Estimated Costs of Intervening in Health-Related Social Needs Detected in Primary Care

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➕ Multimedia

➕ Supplemental content

IMPORTANCE Health-related social needs are increasingly being screened for in primary care practices, but it remains unclear how much additional financing is required to address those needs to improve health outcomes.

OBJECTIVE To estimate the cost of implementing evidence-based interventions to address social needs identified in primary care practices.

DESIGN, SETTING, AND PARTICIPANTS A decision analytical microsimulation of patients seen in primary care practices, using data on social needs from the National Center for Health Statistics from 2015 through 2018 (N = 19 225) was conducted. Primary care practices were categorized as federally qualified health centers (FQHCs), non-FQHC urban practices in high-poverty areas, non-FQHC rural practices in high-poverty areas, and practices in lower-poverty areas. Data analysis was performed from March 3 to December 16, 2022.

INTERVENTION Simulated evidence-based interventions of primary care–based screening and referral protocols, food assistance, housing programs, nonemergency medical transportation, and community-based care coordination.

MAIN OUTCOMES AND MEASURES The primary outcome was per-person per-month cost of interventions. Intervention costs that have existing federally funded financing mechanisms (eg, the Supplemental Nutrition Assistance Program) and costs without such an existing mechanism were tabulated.

RESULTS Of the population included in the analysis, the mean (SD) age was 34.4 (25.9) years, and 54.3% were female. Among people with food and housing needs, most were program eligible for federally funded programs, but had low enrollment (eg, due to inadequate program capacity), with 78.0% of people with housing needs being program eligible vs 24.0% enrolled, and 95.6% of people with food needs being program eligible vs 70.2% enrolled. Among those with transportation insecurity and care coordination needs, eligibility criteria limited enrollment (26.3% of those in need being program eligible for transportation programs, and 5.7% of those in need being program eligible for care coordination programs). The cost of providing evidence-based interventions for these 4 domains averaged $60 (95% CI, $55-$65) per member per month (including approximately $5 for screening and referral management in clinics), of which $27 (95% CI, $24-$31) (45.8%) was federally funded. While disproportionate funding was available to populations seen at FQHCs, populations seen at non-FQHC practices in high-poverty areas had larger funding gaps (intervention costs not borne by existing federal funding mechanisms).

CONCLUSIONS AND RELEVANCE In this decision analytical microsimulation study, food and housing interventions were limited by low enrollment among eligible people, whereas transportation and care coordination interventions were more limited by narrow eligibility criteria. Screening and referral management in primary care was a small expenditure relative to the cost of interventions to address social needs, and just under half of the costs of interventions were covered by existing federal funding mechanisms. These findings suggest that many resources are necessary to address social needs that fall largely outside of existing federal financing mechanisms.

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ndividuals' unmet health-related social needs, such as housing instability, food insecurity, or transportation barriers, are associated with health disparities, poor clinical outcomes, and increased health costs across a number of conditions.[1] There are increasing calls for health care systems to address such needs. Programs to do this typically involve screening for health-related social needs, which are self-reported patient assessments of their needs,[2] and referring those who screen positive to a community-based social care intervention, such as providing medically tailored meals, procuring and maintaining housing, providing education and counseling about social service programs, or arranging nonemergency medical transportation to appointments.[3-6] Some studies of such interventions have found that they can successfully mitigate social needs and produce beneficial health outcomes.[7,8]

When considering implementing such programs at scale, there may be inadequate capacity to address the needs once identified—a problem known as the bridge to nowhere.[2] Moreover, how best to finance such interventions remains a major, unaddressed question.[9,10] This question is relevant to payers such as state Medicaid agencies, Medicare, and Medicare Advantage plans and to health systems that deliver care—particularly those financed through capitated or value-based contracts that incentivize cost containment and quality improvement. As the Centers for Medicare & Medicaid Services (CMS) and the Assistant Secretary for Planning and Evaluation increasingly consider adjusting health care payments for social risk, it will be important to know how to gauge payments to meet health-related social needs.[11-13] Understanding the resource landscape (ie, what interventions are available to address needs), existing financing mechanisms to pay for such interventions, and gaps in financing that would need to be filled is crucial for planning major changes to health care delivery.[9,10,14] At the present time, the amount of funding required to supplement existing social care interventions vs funding new interventions remains unclear.[15] States and countries with large investments in social needs interventions have better health outcomes,[16-18] indicating that health-related social needs intervention financing is both a health and social policy choice.

We sought to estimate the cost of implementing interventions to mitigate social needs detected in primary care practices. Furthermore, we sought to understand where gaps between needs and existing interventions are highest and estimate the costs of implementing a comprehensive approach to addressing social needs.

Methods

We developed and validated a microsimulation model[19] of patients seen in primary care practices, using nationally representative data to estimate the populations with food, transportation, housing, and community-based care coordination needs—the 4 domains of focus for the CMS in mitigating social needs and the domains with robust literature detailing interventions to address identified needs.[7-9,14] Data analysis was

Key Points

Question What are the estimated costs of implementing evidence-based interventions to address social needs identified in primary care practices?

Findings In this decision analytical model with a simulated sample based on data of 19 225 noninstitutionalized children and adults of all ages seen in primary care practices, the cost of providing evidence-based interventions for social needs averaged $60 per member per month.

Meaning The findings of this study suggest that substantial resources would be needed to implement a comprehensive approach to addressing social needs that falls largely outside of existing federal financing mechanisms.

performed from March 3 to December 16, 2022. We tabulated how many people would be expected to enroll in programs currently funded through federal or state mechanisms vs how many people in need would be excluded due to limited eligibility or barriers to participation in federally funded programs, and therefore rely on programs primarily funded by charities, foundations, and/or state or local funding mechanisms. We used only publicly available deidentified data sources, and the study was therefore deemed exempt from institutional review board approval by the Western Institution Review Board–Copernicus Group. Our study methods follow the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline (eMethods in Supplement 1).[20]

Study Design

We designed a nationally representative microsimulation model that samples directly from survey data tables to capture the covariation among key demographic, socioeconomic, and health factors. Our model simulates individual patients of any age who visit a primary care practice for health care; their self-reported social needs in the domains of food, housing, transportation, and community-based care coordination needs; their enrollment in existing programs to address those social needs; their eligibility and enrollment rates after screening and referral from their primary care practice to additional social needs interventions; and the associated costs of the interventions (**Figure 1**). We subset the results by practice type of the patient's primary care practice (subtypes of federally qualified health centers [FQHCs] and look-alikes, non-FQHC urban practices in high-poverty areas [defined as ≥20% of the population in the practice's county under the federal poverty threshold], non-FQHC rural practices in high-poverty areas, and practices in lower-poverty areas)[21,22] and by quartiles of Area Deprivation Index (ADI) level assigned based on the patient's census tract of residence, which is a composite area level metric of social risk.[23] A microsimulation method was chosen because the microsimulation approach can prospectively estimate the national-level expenditures and variations in those expenditures that would be expected across practice types and geographies nationwide.[19,21,22] A microsimulation captures correlations among practice characteristics and

Figure 1. Model Diagram
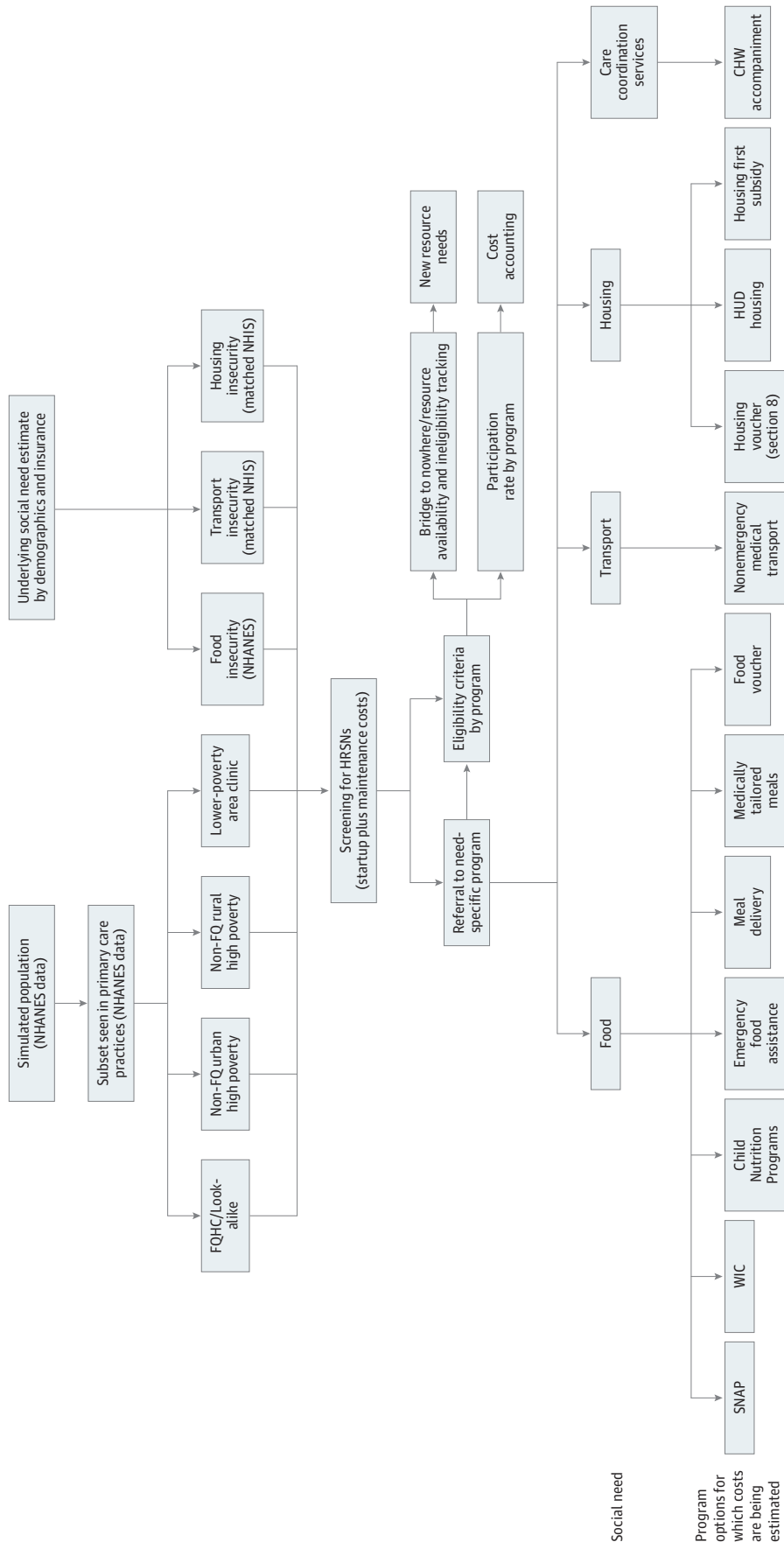
The model first simulates individual patients of any age who visit a primary care practice for health care and estimates their self-reported social needs in the domains of food, housing, transportation, and community-based care coordination; simulates their enrollment in existing programs to address those social needs; and simulates their eligibility and enrollment rates after screening and referral from their primary care practice to additional social needs interventions. The model computes the associated costs of the interventions by annual screening and referral within their primary care practice for social needs, with associated costs to the practice of training and deployment of a standardized, validated screening instrument, education and counseling to patients concerning their rights and social service options, and closed-loop electronically facilitated referrals. Enrollment in each program was simulated using data on program enrollment rates among those eligible and referred (**Table 1**) to account for both limited program capacity and the proportion of people who may not enroll for other reasons (eg, application difficulty). For patients ineligible for existing federally funded programs or not enrolling in them, the costs of providing additional, non-federally funded, evidence-based interventions were computed (**Table 1**; eMethods in Supplement 1). CHW indicates community health worker.; FQHC, federally qualified health center; HRSN, health-related social needs; HUD, US Department of Housing and Urban Development; NHANES, National Health and Nutrition Examination Survey (2015-2018); NHIS, National Health Interview Survey (2015-2018); SNAP, Supplemental Nutrition Assistance Program; and WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

patients' social needs, reflecting that some primary care practices care for populations of patients who have a high concentration of social needs and therefore would be expected to manage multiple comorbid needs, and similarly some geographies would have disproportionate concentration of needs, which would be expected to affect funding allocations across practice types and geographies.

Data Sources

We constructed the simulated sample of individuals by matching participants across the National Health and Nutrition Examination Survey (NHANES), 2015-2018 (n = 19 225),[24] which provided sociodemographic, chronic disease, and food insecurity data, with data from the National Health Interview Survey (NHIS), 2015-2018 (n = 351 921),[25] which provided housing and transportation insecurity data (matching methods and results described in the eMethods, eTable 1 in Supplement 1). Race and ethnicity were included as it is known that racism and ethnic discrimination relate to differential exposure to social risks to health and therefore should be captured in an evaluation of social needs. We estimated the prevalence of social needs from the surveys using the following definitions: moderate to severe food insecurity defined using the Department of Agriculture 6-item measure[26]; severe housing insecurity defined as having no housing, transient or other nonpermanent housing, or self-report of inability to afford current housing[27]; transportation insecurity defined by delay in getting necessary medical care in the past year due to inadequate transportation[6]; and community-based care coordination needs defined by having 2 or more chronic medical conditions or a history of hospitalization in the past calendar year (concordant with the inclusion criteria in the reviewed community-based care coordination trials).[28-30]

Intervention Definitions and Costs

For those reporting each type of social need included in this evaluation, we simulated referral to food, transportation, housing, and community-based care coordination interventions showing benefits to health outcomes in randomized clinical trials or observational studies with a comparison group included in the 2022 update to a systematic review of peer-reviewed and gray literature of social needs interventions deployed within the US (**Table 1**[5-7,28-30,32-51]; eAppendix in Supplement 1).[7] The underlying eligibility criteria and costs of these interventions per member per month (PMPM) were updated to January 2022 US dollars based on the Consumer Price Index to adjust for inflation (Table 1). We accounted for state and health plan variations in coverage, including current Medicaid waiver-based coverage in some states for medically tailored meals, nonemergency medical transportation, and community health worker programs, and Medicare Advantage plan coverage related to transportation coverage, by estimating which persons were eligible in the microsimulation for these services.[52,53] In addition, we separately tabulated the proportion already enrolled in the Supplemental Nutrition Assistance Program (SNAP) or Special Supplemental Nutrition Program for Women, Infants,

and Children (WIC) for food insecurity (self-report in NHANES), or those receiving housing or rental assistance through the US Department of Housing and Urban Development (HUD) (self-report in NHIS).

For all patients, we simulated annual screening and referral within their primary care practice for social needs with associated costs to the practice of training and deployment of a standardized, validated screening instrument, education and counseling to patients concerning their rights and social service options, and closed-loop electronically facilitated referrals.[31] We then simulated that among the population of people reporting a particular social risk, referral would occur based on the eligibility criteria for each program. We simulated enrollment in each program using data on program enrollment rates among those eligible and referred (Table 1) to account for both limited program capacity and the proportion of people who may not enroll for other reasons (eg, application difficulty). The eligibility and enrollment rate estimates capture variations that occur due to geographic variability (eg, state) and variations in population characteristics, including unmeasured or unobserved characteristics, such as documentation status. Given that states also bear a portion of Medicaid costs,[54] we additionally estimated the portion of interventions funded through Medicaid dollars by state.

For patients ineligible for existing federally funded programs or not enrolling in them, we computed the costs of providing additional nonfederally funded, evidence-based interventions (Table 1; eMethods in Supplement 1). We did not assume that participation in any given program was mutually exclusive with participation in another program (eg, a person could be enrolled in multiple food insecurity interventions and/or enrolled in both food and housing interventions).

Simulation Methods

We simulated the total PMPM cost among the population attributed to each practice type and in each ADI quartile to account for the different prevalence of food, transportation, housing, and care coordination needs in different contexts. We used provided survey weights to create a nationally representative simulation of the noninstitutionalized civilian population; missing data were present for less than 10% of any given covariate, and multiple imputation with chained equations was performed to impute missing data.[55] Probabilistic uncertainty analysis was performed by repeated sampling with replacement from normal probability distributions constructed from the mean (SD) of cost and enrollment rates (Table 1) to estimate the mean (95% CI) around the study outcome measures.[19]

Sensitivity Analyses

We varied both the social needs prevalence rates and program enrollment rates by 10% above and below our baseline estimates to examine the association of variations in need and enrollment (eg, due to changes in capacity) with study outcomes. Simulations were performed in R, version 4.1.2 (R Foundation for Statistical Computing).

Table 1. Social Risk Interventions Incorporated Into the Simulation[a]

Activity/intervention	Simulated eligibility criteria	Simulated enrollment rate, % of those eligible who enroll (95% CI)	Simulated costs, PMPM, $ (95% CI)[b]	Payer[c]
Screening and referral coordination[31]	All patients, annually	NA	5 (4-6)	PCP practice
SNAP[32-34]	<130% FPL	83 (64-100)	Benefit 212 (183-234) plus overhead 441 (217-945) once at enrollment	USDA
WIC program[35-37]	<185% FPL + pregnant or child younger than 5 y	57 (56-59)	Benefit 39 (36-41), plus overhead 25 (23-27)	USDA
Child Nutrition Programs (eg, school breakfast/lunch)[38,39]	<185% FPL	95 (83-100)	Benefit and overhead 51 (50-53)	USDA
Emergency Food Assistance (food banks, food pantries, farmers market programs)[40,41]	<400% FPL	27 (17-37)	Benefit and overhead 1.3 (1.2-1.4)	USDA
Meal delivery service (non-medically tailored, eg, the Senior Nutrition Program)[42,43]	Age ≥60 y; unable to prepare meals or shop for self	68 (41-94)	Benefit and overhead 208 (149-276)	Charitable
Medically tailored meal delivery[42,44]	Multiple chronic conditions or a hospitalization in the past year	68 (41-94)	Benefit and overhead 300 (208-350)	Charitable or CMS
Food vouchers[45]	Moderate to severe food insecurity	31 (21-41)	Benefit and overhead 21 (20-22)	Charitable
Housing vouchers (section 8 Housing Choice Vouchers, Rental Assistance)[46-48]	<50% Median income for county	25 (10-40)	Benefit and overhead 1163 (667-1659)	HUD
HUD housing (public housing operating fund, public housing capital fund)[46-48]	<50% median income for MSA; age >65 y, or having a disability	24 (23-25)	Benefit and overhead 430 (407-457)	HUD
Housing First rental subsidy (with embedded case management services)[5,49]	Severe housing insecurity	90 (86-93)	Benefit and overhead 673 (661-685)	Charitable
Nonemergency medical transport (private ride-share, taxi, public transportation voucher, or [if having a disability affecting ambulation] wheelchair van transportation to appointments, dialysis, physical therapy, and/or wound care visits)[6,7,50]	Missed medical appointments due to lack of transport	7 (1-30)	Benefit and overhead 104 (7-599)	Charitable or CMS
Care coordination program (standardized community health care worker program to assist patients with enrollment and management of patient-stated life goals, appointments, and applications related to social, financial, legal, and/or health care services)[28-30,51]	Chronic conditions or a hospitalization in the past year	38 (36-40)	Benefit and overhead 194 (64-686)	Charitable or CMS

Abbreviations: CMS, Centers for Medicare & Medicaid Services; FPL, federal poverty line; HUD, US Department of Housing and Urban Development; MSA, metropolitan statistical area; NA, not applicable; PCP, primary care practitioner; PMPM, per person per month; SNAP, Supplemental Nutrition Assistance Program; USDA, US Department of Agriculture; WIC, Special Supplemental Nutrition Program for Women, Infants and Children.

[a] Cost estimates were derived by repeatedly sampling from the distributions specified within the table, reflecting variations in eligibility, enrollment, and cost across populations and practice types. The screening and referral

coordination cost estimates were derived from a study of practices varying from 10 to 83 full-time clinician equivalents.

[b] Cost estimates calculated per 2022 US dollars.

[c] For items in which the payer is identified as charitable or CMS, the subset of people (Table 2) was identified who were eligible for Medicaid waiver or Medicare Advantage plan coverage for the given intervention (paid by CMS) vs those who would need to rely on charitable funding sources to receive the intervention.

Results

We studied participants in NHANES who reported visiting primary care practices (77% of respondents) representing 251 406 318 individuals. Of these, 45.7% were male, 54.3% were female, 11.2% were non-Hispanic Black, 16.2% were Hispanic, 32.4% had less than a college education, and 16.2% had primarily Medicaid health insurance (Table 2). Mean (SD) age was 34.4 (25.9) years. Those who reported visiting primary care practices were less commonly on Medicaid than were persons in the general population. In the simulated population, 10.8% of individuals were attributed to FQHCs, 43.8% to non-FQHC practices in urban high-poverty areas, 9.3% to non-FQHC practices in rural high-poverty areas, and 36.1% to non-FQHC practices in lower-poverty areas. Additionally, 39.2% of the population were living in the lowest (least deprived) ADI quartile of counties, 26.6% in the second quartile, 18.8% in the third

quartile, and 15.5% in the highest (most deprived) ADI quartile. The demographic characteristics of the population by ADI and practice type were consistent with independent data used for validation, as shown in the eFigure in Supplement 1.

Prevalence of Social Needs

Social needs prevalence (Table 2) was 17.5% for moderate to severe food insecurity (consistent with US Department of Agriculture [USDA] estimates[56]), 0.9% for severe housing insecurity (consistent with HUD and National Alliance to End Homelessness data[46,57]), 2.8% for transportation insecurity (consistent with an American Hospital Association analysis[58]), and 12.7% for being eligible for community-based care coordination.

The prevalence of social needs in our analysis was similar among FQHC practices and non-FQHC practices in high-poverty areas and far lower among practice types in lower-poverty areas (Table 2). Among patients attributed to FQHCs,

Table 2. Descriptive Characteristics of the Study Sample[a]

No. (%)

Category and covariate	Overall (N = 251 406 318)	Primary care practice type				ADI quartile			
		FQHCs (n = 35 768 025)	Non-FQHC in urban high-poverty area (n = 101 534 099)	Non-FQHC in rural high-poverty area (n = 21 539 446)	Non-FQHC in lower-poverty area (n = 92 564 748)	Lowest quartile (least deprived) (n = 98 471 751)	Quartile 2 (n = 66 755 635)	Quartile 3 (n = 47 265 718)	Highest quartile (most deprived) (n = 38 913 213)
Sex									
Female	136 474 060 (54.3)	19 601 688 (54.8)	56 296 240 (55.4)	12 476 452 (57.9)	48 099 680 (52.0)	51 599 149 (52.4)	35 101 537 (52.6)	27 028 495 (57.2)	22 744 879 (58.5)
Male	114 932 258 (45.7)	16 166 337 (45.2)	45 237 859 (44.6)	9 062 994 (42.1)	44 465 068 (48.0)	46 872 602 (47.6)	31 654 098 (47.4)	20 237 223 (42.8)	16 168 334 (41.5)
Race and ethnicity[b]									
Hispanic	40 670 240 (16.2)	9 607 352 (26.9)	18 756 823 (18.5)	4 223 592 (19.6)	8 082 473 (8.7)	7 383 698 (7.5)	9 752 898 (14.6)	11 373 176 (24.1)	12 160 468 (31.3)
Non-Hispanic Black	28 161 407 (11.2)	5 998 788 (16.8)	12 835 448 (12.6)	2 942 331 (13.7)	6 384 839 (6.9)	6 177 427 (6.3)	7 320 804 (11.0)	6 795 506 (14.4)	7 867 669 (20.2)
Non-Hispanic White	157 230 510 (62.5)	16 677 433 (46.6)	59 125 540 (58.2)	12 406 356 (57.6)	69 021 181 (74.6)	74 810 311 (76)	43 237 159 (64.8)	24 484 933 (51.8)	14 698 107 (37.8)
Other	25 344 161 (10.1)	3 484 452 (9.7)	10 816 288 (10.7)	1 967 167 (9.1)	9 076 255 (9.8)	10 100 315 (10.3)	6 444 774 (9.7)	4 612 103 (9.8)	4 186 969 (10.8)
Educational level									
College graduate	79 913 766 (31.8)	4 749 779 (13.3)	22 140 431 (21.8)	4 434 344 (20.6)	48 589 213 (52.5)	52 838 366 (53.7)	18 023 062 (27.0)	6 306 289 (13.3)	2 746 049 (7.1)
Some college	89 839 575 (35.7)	14 016 965 (39.2)	40 231 776 (39.6)	8 760 530 (40.7)	26 830 304 (29.0)	29 148 482 (29.6)	27 529 993 (41.2)	19 055 588 (40.3)	14 105 512 (36.2)
High school graduate	54 889 455 (21.8)	10 279 050 (28.7)	25 210 806 (24.8)	5 289 581 (24.6)	14 110 017 (15.2)	14 282 018 (14.5)	15 828 404 (23.7)	13 164 611 (27.9)	11 614 422 (29.8)
<High school	26 763 521 (10.6)	6 722 231 (18.8)	13 951 086 (13.7)	3 054 990 (14.2)	3 035 214 (3.3)	2 202 885 (2.2)	5 374 176 (8.1)	8 739 231 (18.5)	10 447 230 (26.8)
Principal health insurance payer[c]									
Medicaid	40 735 941 (16.2)	16 737 043 (46.8)	16 261 725 (16.0)	3 249 072 (15.1)	4 488 102 (4.8)	1 515 696 (1.5)	5 894 143 (8.8)	13 493 391 (28.5)	19 832 711 (51.0)
Medicare	24 262 472 (9.7)	3 403 310 (9.5)	12 435 694 (12.2)	2 295 074 (10.7)	6 128 394 (6.6)	6 327 821 (6.4)	6 326 851 (9.5)	6 125 353 (13)	5 482 447 (14.1)
Private	165 965 149 (66.0)	7 570 172 (21.2)	65 637 346 (64.6)	14 321 101 (66.5)	78 436 529 (84.7)	88 607 263 (90.0)	48 839 154 (73.2)	21 220 249 (44.9)	7 298 484 (18.8)
Uninsured	20 442 755 (8.1)	8 057 500 (22.5)	7 199 334 (7.1)	1 674 198 (7.8)	3 511 724 (3.8)	2 020 971 (2.1)	5 695 487 (8.5)	6 426 726 (13.6)	6 299 572 (16.2)
Attributed primary care practice, type									
FQHC	27 070 236 (10.8)	35 768 025 (100.0)	0	0	0	1 326 410 (1.3)	10 356 278 (15.5)	11 978 649 (25.3)	12 106 688 (31.1)
Non-FQHC in urban high-poverty area	110 231 888 (43.8)	0	101 534 099 (100.0)	0	0	9 573 932 (9.7)	44 698 430 (67)	27 290 942 (57.7)	19 970 795 (51.3)
Non-FQHC in rural high-poverty area	23 307 988 (9.3)	0	0	21 539 446 (100.0)	0	2 324 334 (2.4)	9 554 296 (14.3)	5 697 983 (12.1)	3 962 832 (10.2)
Non-FQHC in lower-poverty area	90 796 206 (36.1)	0	0	0	92 564 748 (100.0)	85 247 074 (86.6)	2 146 632 (3.2)	2 298 145 (4.9)	2 872 897 (7.4)

(continued)

Table 2. Descriptive Characteristics of the Study Sample[a] (continued)

| | No. (%) | | | | | | | | |
| Category and covariate | Overall (N = 251 406 318) | Primary care practice type | | | | ADI quartile | | | |
		FQHCs (n = 35 768 025)	Non-FQHC in urban high-poverty area (n = 101 534 099)	Non-FQHC in rural high-poverty area (n = 21 539 446)	Non-FQHC in lower-poverty area (n = 92 564 748)	Lowest quartile (least deprived) (n = 98 471 751)	Quartile 2 (n = 66 755 635)	Quartile 3 (n = 47 265 718)	Highest quartile (most deprived) (n = 38 913 213)
ADI quartile									
Lowest quartile (least deprived)	98 471 751 (39.2)	1 326 410 (3.7)	9 573 932 (9.4)	2 324 334 (10.8)	85 247 074 (92.1)	98 471 751 (100.0)	0	0	0
Quartile 2	66 755 635 (26.6)	10 356 278 (29.0)	44 698 430 (44.0)	9 554 296 (44.4)	2 146 632 (2.3)	0	66 755 635 (100.0)	0	0
Quartile 3	47 265 718 (18.8)	11 978 649 (33.5)	27 290 942 (26.9)	5 697 983 (26.5)	2 298 145 (2.5)	0	0	47 265 718 (100.0)	0
Highest quartile (most deprived)	38 913 213 (15.5)	12 106 688 (33.8)	19 970 795 (19.7)	3 962 832 (18.4)	2 872 897 (3.1)	0	0	0	38 913 213 (100.0)
Prevalence of social needs									
Food insecurity[d]	44 110 849 (17.5)	11 422 012 (31.9)	23 496 875 (23.1)	5 226 595 (24.3)	3 965 366 (4.3)	2 606 972 (2.6)	9 015 423 (13.5)	14 197 632 (30.0)	18 290 822 (47.0)
Housing insecurity[e]	2 163 025 (0.9)	384 162 (1.1)	1 291 318 (1.3)	266 371 (1.2)	221 174 (0.2)	327 391 (0.3)	502 851 (0.8)	587 024 (1.2)	745 760 (1.9)
Transportation insecurity[f]	6 919 679 (2.8)	1 218 480 (3.4)	2 931 843 (2.9)	733 076 (3.4)	2 036 280 (2.2)	1 987 057 (2.0)	1 861 028 (2.8)	1 413 573 (3.0)	1 658 021 (4.3)
Care coordination needs[g]	31 874 348 (12.7)	4 500 999 (12.6)	15 105 203 (14.9)	3 570 962 (16.6)	8 697 185 (9.4)	9 581 679 (9.7)	8 323 419 (12.5)	7 713 087 (16.3)	6 256 164 (16.1)

Abbreviations: ADI, Area Deprivation Index; FQHC, federally qualified health center.

[a] Population included civilian, noninstitutionalized people in the US who reported visiting a primary care practitioner (weighted N = 251 406 318), based on the National Health and Nutrition Examination Survey (NHANES), years 2015-2018, matched to the National Health Interview Survey (NHIS), years 2015-2018.

[b] Categories used in the database. No further expansion available for classification given as other.

[c] The primary payer is listed such that dually eligible persons on both Medicare and Medicaid are listed as Medicare.

[d] Defined as moderate to severe food insecurity by the Department of Agriculture 6-item measure.[26]

[e] Defined as having no housing, transient or other nonpermanent housing, or self-report of inability to afford current housing.[27]

[f] Defined by reporting a delay in getting necessary medical care in the past year due to inadequate transportation.[6]

[g] Having 2 or more chronic medical conditions or a history of hospitalization in the past year corresponding to the most common inclusion criteria in the reviewed community-based care coordination studies.[28-30]

31.9% were estimated to have food insecurity, 1.1% housing insecurity, 3.4% transportation insecurity, and 12.6% community-based care coordination needs. Among non-FQHC practices in lower-poverty areas, 4.3% of patients were estimated to have food insecurity, 0.2% housing insecurity, 2.2% transportation insecurity, and 9.4% community-based care coordination needs.

The prevalence of social needs was highest in the most deprived ADI quartile and decreased incrementally across less deprived quartiles (Table 2). In the most deprived ADI quartile, 47.0% of patients were estimated to have food insecurity, 1.9% housing insecurity, 4.3% transportation insecurity, and 16.1% community-based care coordination needs. In the least deprived ADI quartile, 2.6% of patients were estimated to have food insecurity, 0.3% housing insecurity, 2.0% transportation insecurity, and 9.7% community-based care coordination needs.

Program Eligibility and Enrollment Estimates

We estimated that 95.6% of those who reported food insecurity were eligible for 1 or more existing federally funded food support interventions, 78.0% of those who reported housing insecurity were eligible for 1 or more existing federally funded housing interventions, 26.3% of those who reported transportation insecurity were eligible for 1 or more existing federally funded transportation support interventions, and 5.7% of those with community-based care coordination needs were eligible for 1 or more existing federally funded community-based care coordination programs (**Figure 2**; eTable 2 in Supplement 1). Of those with food insecurity, 40.1% were already participating in SNAP and 25.9% were already participating in WIC. Of those with housing insecurity, 5.2% were already receiving HUD assistance.

Among people with food and housing needs, low enrollment (eg, due to inadequate program capacity) limited participation in a federally funded intervention, with 95.6% of people with food needs being eligible vs 70.2% enrolled, and 78.0% of people with housing needs being eligible vs 24.0% enrolled (Figure 2; eTable 3 in Supplement 1). Among those with transportation insecurity and care coordination needs, eligibility criteria were a larger barrier than enrollment rates (26.3% of those in need being program eligible for transportation programs and 1.4% enrolled, and 5.7% of those in need being program eligible for care coordination programs and 2.2% enrolled).

When simulating interventions designed to enroll people not enrolled in existing federally funded interventions, the total population enrolled increased most substantially for housing and care coordination programs (Figure 2; eTable 3 and eTable 4 in Supplement 1). In subgroup analyses (eTables 2-4 in Supplement 1), the practices having the most eligible patients and those with the highest projected enrollment were non-FQHC practices in urban high-poverty areas, followed by FQHCs.

Intervention Cost Estimates

We estimated the mean total cost of social need interventions to be $60 (95% CI, $55-$65) PMPM at a population level (in 2022 dollars) (**Figure 3**; eTable 5 in Supplement 1), which includes screening, navigation and enrollment, and ongoing intervention delivery. Of the total costs, $27 (95% CI, $24-$31) (45.8%) could be financed by existing mechanisms for federally funded interventions, while $33 (95% CI, $30-$35) (54.2%) would be required to expand interventions to address those not eligible or eligible but not enrolled (eg, due to inadequate program capacity). Of the total population-level costs, $5 (8.3%) of the total costs were for screening and referral expenses borne by the practice, $38 (63.8%) for food insecurity interventions, $7 (12.0%) for housing security interventions, $0.2 (0.3%) for transportation insecurity, and $9 (15.5%) for community-based care coordination.

The proportion of social needs costs borne by existing federal payers was 61.6% for food insecurity costs ($23 PMPM by the USDA, $1 PMPM by CMS), 45.6% for housing insecurity costs ($3 PMPM by HUD), 27.8% for transportation insecurity costs ($0.1 PMPM by CMS), and 6.4% for community-based care coordination costs ($0.6 PMPM by CMS) (Figure 3). States varied in their Medicaid contributions from $0.18 (Mississippi) to $0.47 PMPM (Wyoming) (eTable 6 in Supplement 1). In subgroup analyses (Figure 3; eTable 5 in Supplement 1), populations attributed to FQHCs required interventions costing a mean of $93 PMPM (95% CI, $87-$99 PMPM) vs $77 PMPM (95% CI, $70-$84 PMPM) for non-FQHC practices in high-poverty urban areas, $77 PMPM (95% CI, $67-$87 PMPM) for non-FQHC rural practices in high-poverty rural areas, and $24 PMPM (95% CI, $21-$27 PMPM) for non-FQHC practices in lower-poverty areas. The intervention costs not borne by existing federal payers (Figure 3; eTable 5 in Supplement 1) were highest among non-FQHCs in low-income rural areas ($45; 95% CI, $37-$53 PMPM), followed by non-FQHCs in low-income urban areas ($40; 95% CI, $36-$45 PMPM) vs $36 PMPM among FQHCs (95% CI, $30-$42 PMPM). In sensitivity analyses (eTable 7 in Supplement 1), the cost calculations varied by less than $5 PMPM from our baseline estimates when simulating as much as 10% fluctuations in either the prevalence of need or in enrollment rates.

Discussion

As primary care practices are being asked to screen for social needs, we estimated that the cost of providing evidence-based interventions for these needs averaged $60 PMPM, of which $5 supported clinics doing screening and referrals, and less than half ($27) had existing federal financing mechanisms. We observed both low enrollment in existing programs, especially for food and housing interventions for which inadequate program capacity may limit participation of eligible people, and narrow eligibility criteria for existing transportation and care coordination interventions that excluded many in need. This suggests that major changes to the way social services are delivered in the US may be needed if we are to respond appropriately to needs identified through health care–based screening.

Our findings are consistent with national data on inadequate funding for housing or rental assistance. For example, among eligible households for the Section 8 Housing Choice

Figure 2. Projected Program Eligibility and Enrollment Rates for Social Needs Interventions
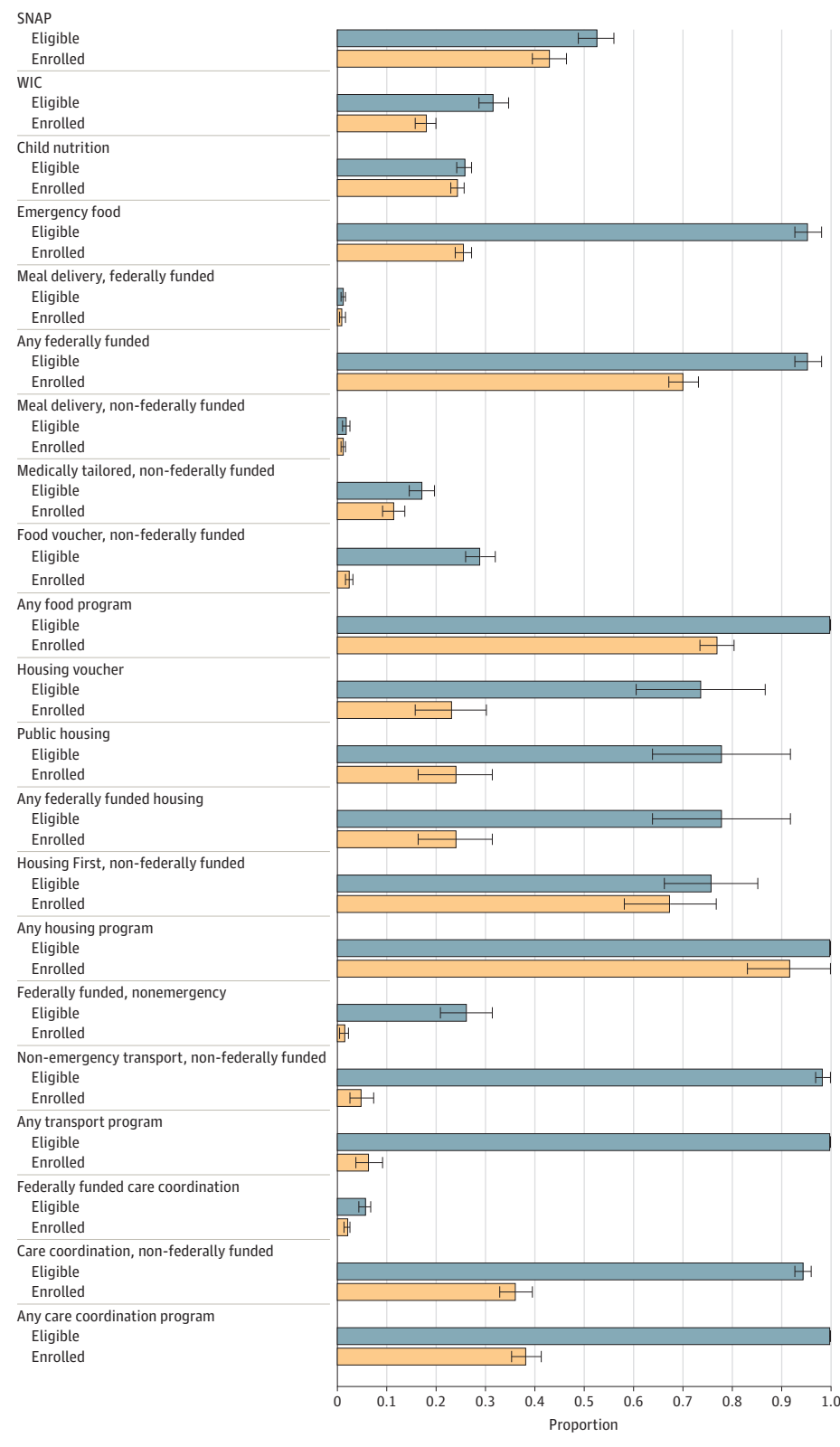
Rates determined for those identifying a need in the study sample of civilian, noninstitutionalized people in the US who reported visiting a primary care practitioner (weighted N = 251 406 318), based on the National Health and Nutrition Examination Survey (2015-2018), matched to the National Health Interview Survey (2015-2018). Household food insecurity was defined as moderate to severe food insecurity by the Department of Agriculture 6-item measure[26]; housing insecurity as severe housing insecurity defined by having no housing, transient or other nonpermanent housing, or self-report of inability to afford current housing[27]; transportation insecurity as reporting delay in getting necessary medical care in the past year due to inadequate transportation[6]; and care coordination needs as having 2 or more chronic medical conditions or a history of hospitalization in the past year, corresponding to the most common inclusion criteria in the reviewed community-based care coordination studies.[28-30] Both the Supplemental Nutrition Assistance Program (SNAP) and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) were simulated, as well as programs to address persons not eligible or not enrolling in such programs; as a result, by definition, the any program eligibility spans all persons in need in a given category. Error bars indicate 95% CI. Programs are further described in **Table 1**.

Figure 3. Projected Costs of Social Needs Interventions
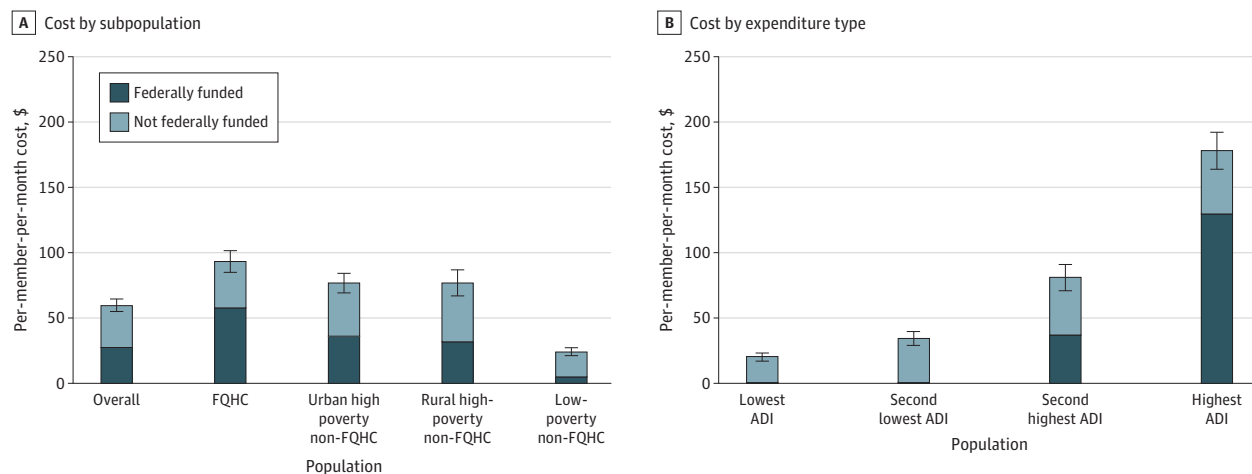
Rates determined by subpopulation (A) and expenditure type (B) for civilian, noninstitutionalized people in the US who reported visiting a primary care practitioner (weighted N = 251 406 318), based on the National Health and Nutrition Examination Survey (2015-2018), matched to the National Health Interview Survey (2015-2018). The overall cost statistic represents a weighted mean of the subgroups, calculated using 2022 US dollars. Hence, while the highest Area Deprivation Index (ADI) tracts have a higher spending and the lowest ADI tracts a lower spending than the average, the overall statistic reflects the national mean. Error bars indicate 95% CI. FQHC indicates federally qualified health center.

Voucher Program, the nation's largest source of rental assistance, only 25% receive any rental assistance after an average wait time of approximately 2.5 years.[46] Additionally, our findings suggest the total costs of social needs interventions are far beyond what is typically allocated to programs for addressing health-related social needs, and this is particularly true for practices serving the neediest patients. Early payment models for addressing social needs have been adjusted to account for additional health care costs attributable to populations in need, rather than the intervention costs for resolving their social needs.[13] Of the simulated costs without a federal funding mechanism, screening and referral management in primary care was a small expenditure relative to the cost of interventions to address social needs. This finding suggests that health care organizations may have a lower financial barrier to screening and referring patients to social services, while community-based or public-sector agencies may have greater barriers to financing necessary interventions on referral—exacerbating the "bridge to nowhere" problem of inadequate community-based capacity to address social needs identified by health care systems.[2] Nevertheless, the cost of screening and referral management may be high relative to capitated primary care payments to a practice. The highest needs and highest costs for overall social interventions were among populations attributed to both FQHC and non-FQHC practices in high-poverty areas. While disproportionate funding was available to populations seen at FQHCs, the populations seen at non-FQHC practices in high-poverty areas were found to have larger funding gaps in terms of the intervention costs not borne by existing federal funding mechanisms.

Because we evaluated a limited domain of health-related social needs with robust evidence for intervention as of 2022, future work should update these simulations data as new interventions become available. Additionally, future research should tease apart capacity limitations from inability to participate due to application barriers, stigma, and patient preference. Future studies could also examine the workforce implications for local social service agencies of the expanded efforts to address social needs based on screening in primary care practices.[59] Future work can also consider how the costs for investment in social needs interventions contrast with potential savings in terms of return on investment from improved health and potentially lower health care costs.[7]

Limitations

This study has limitations. The findings are based on a simulation model; hence, our study is subject to several modeling-related assumptions and limitations. First, we used data before the COVID-19 pandemic to estimate the prevalence of social needs and distribution of primary care among practice types. The pandemic increased needs, while the associated public health emergency declaration increased eligibility for several programs temporarily.[60] With the public health emergency status winding down, we believe the pre-COVID-19 data likely better reflect the upcoming policy environment, but there is, of course, substantial uncertainty. Similarly, we included coverage from existing Medicaid waivers, which may not be sustained. Need and eligibility will fluctuate with the economy, with new programs becoming available and changes in eligibility or funding of existing programs. Yet, our open-source model and method offers a standardized approach to assist policy makers to estimate needs and costs from nationally representative surveys. We also included interventions that may only mitigate and not fully resolve social needs; hence, our budget estimates may underestimate actual requirements for need resolution. In addition, our estimates of need were based on those most severely affected, such as persons with moderate to severe food insecurity or severe housing insecurity; a larger

proportion of people have more modest needs and may require assistance, rendering our cost estimates conservative.

Conclusions

Findings of this decision analytical microsimulation study help to establish an approach and current estimate for the cost of implementing interventions for social needs detected in primary care practices. We identified large gaps between needs and the estimated number of people who would be expected to enroll in interventions. These findings suggest that substantial resources would be needed to implement a comprehensive approach to addressing social needs that fall largely outside of existing federal financing mechanisms.

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Invited Commentary

Addressing Health-Related Social Needs— Costs and Optimism

Jenifer Clapp, MPA; Alessandra Calvo-Friedman, MD; Nichola Davis, MD, MS

It is well documented that health care contributes about 20% to a person's health, while social and economic factors contribute twice as much.[1] The substantial effect of social needs on health has led to increased interest in screening for and addressing social needs within health care settings.

In this issue of *JAMA Internal Medicine*, Basu et al[2] create a nationally representative simulation to estimate the cost of screening and addressing the need for services in 4 key domains (food, transportation, housing, and care coordination) among patients seen in primary care practice. They found that the cost of screening within health care was $5 per member per month. Using eligibility and enrollment rates in public benefits programs, the authors estimated that it would cost $60 per member per month to provide evidence-based interventions to address these social needs with higher costs among patients who get their health care in high-poverty neighborhoods. The authors found that less than half the cost of these programs was covered by existing federal funding.

There are a few limitations of this study.[2] First, the model assumes that self-reported rates of social needs from the National Health and Nutrition Examination Survey are consistent with what patients would report to primary care practitioners. In practice, we know from experience that some patients fear the stigma of disclosing a social need, staff may rush a patient through a screener, and screening fatigue may set in if patients are asked personal questions repeatedly and meaningful action is not taken in response. Implementing optimal screening for social needs is a subject of ongoing investigation and debate.[3] Second, estimates of the costs for primary care patients should not be generalized to other clinical care settings, such as emergency departments and inpatient care settings. Patients with higher social risk and greater needs, such as patients experiencing homelessness, are more likely to present in emergency department settings than primary care.[4] The cost of programs to address social needs for patients identified through emergency department visits and inpatient screening may be higher, and more research is needed into effective practices to address the needs identified in this setting. Third, it is unclear whether existing public benefits programs sufficiently meet patients' social needs; the cost of truly meeting the need, rather than enrolling them in a program, may be much higher.

Multimedia

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However, beyond the calculation of costs, this article[2] raises fundamental questions about addressing social needs. Is the health care sector, which is expensive and specialized, the right setting to address patients' social needs? Certainly, health care professionals must ask about social issues in the pursuit of diagnosis and treatment (eg, What is the housing environment for the patient with environmentally triggered asthma? Is there someone at home to help the older person with dementia?). But how involved should health care professionals be in identifying needs unrelated to illness and solving those needs? How is this affordable when we have been trying to tamp down health care costs that already account for greater than 18% of the gross domestic product?

The reality is that the health care sector in the US must take this on because, unlike many western European countries, there is an insufficient social service sector to address the basic human needs of children and working-age adults.[5] Without proper housing, food, and transportation, many patients can neither be healthy nor prioritize access to needed health services. Most health care professionals are familiar with taking care of someone with diabetes who has little to no ability to afford healthy foods or the patient who misses multiple appointments because they do not have transportation. Perhaps the patient who has been labeled as nonadherent is, in fact, stressed about being evicted or paying for childcare. As health care professionals, we have reason to be as concerned about the impact of social needs on health as the impact of disease and as the authors note,[2] in many cases the intervention does not mean having to pay for the social services, but rather helping to enroll patients in services they are already eligible for.

For both housing and food needs, the authors noted an eligibility gap: people who are eligible for services but not enrolled.[2] They cited barriers to participation as a potential reason for this gap. We posit that within these barriers to participation, there are gaps in patient understanding of what they may be eligible for or knowledge of how to apply. Health care may be an entry point into accessing social services. Helping patients to understand their benefit eligibility, screening for benefits, and providing support to navigate the complex social service system could be a key role for health care.

Health care is now at a national inflection point when it comes to social determinants of health, making this study timely. The Centers for Medicare and Medicaid Services will mandate social needs screening and reporting for all hospitalized adults starting in 2024.[6] The Joint Commission will require health care