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Do Investments in the Social Determinants of Health Reduce Health Care Costs?

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Introduction

Recent decades have seen an increasing awareness of the importance of nonclinical factors in determining health. These nonclinical factors include social circumstances, characteristics of the environment, and economic conditions, which are generally referred to as social determinants of health (SDOH). An early analysis by McGinnis and colleagues [1] suggests that 60 percent of premature deaths in the U.S. can be attributable to deficiencies in these areas and the behavioral patterns that they influence. While other researchers (as summarized by McGovern and colleagues [2]) have suggested different breakouts of the relative impact of each of the determinants of health, it is widely accepted that the SDOH have a major effect on population health.

As a result, there is a growing emphasis on investments that are intended to improve the SDOH experienced by at-risk populations. This proliferation of investments to meet health-related social needs marks a tradeoff. Funding these interventions competes with other programs or policy efforts for dollars in constrained annual budgets when funded by health philanthropies or by public agencies. When funded by health systems, they compete more directly with medical spending.

These tradeoffs in turn suggest a series of questions: How well do these interventions work? What characteristics determine their effectiveness and cost-effectiveness? Into whose "pockets" do their benefits accrue and from whose pockets are they funded? (The benefits of programs are often spread across many stakeholders, but the costs may only come from a limited set of sources.) And what groups of participants yield the greatest net benefit?

These questions are ripe topics for program evaluation research. Numerous studies assessing individual SDOH interventions have produced mixed results regarding their benefits, particularly regarding their impact on health care costs. A small number of reviews of subsets of such studies [e.g., 3-4], have helped to provide a broader picture of the impact of SDOH investments. However, there remains a need for a more comprehensive assessment of these interventions. This paper summarizes a review of studies that evaluated the impacts of SDOH interventions in a select set of domains. While the review addressed the various benefits of these interventions, our emphasis was on evidence of effects that included monetized costs and benefits, especially via impacts on clinical care utilization and expenditures.

Methods

We conducted a preliminary literature review of 237 publications assessing SDOH interventions in each of 11 domains (Table 1). We placed each study about a particular intervention into a matrix in

which we documented the studies' findings. Each row of the matrix represents an analysis of a specific intervention, and the columns describe the following intervention characteristics, where available in the documentation:

- Characteristics of the intervention
- Target population characteristics and sizes
- Funder and implementer
- Investment cost and timing of expenditures
- Contributions to reducing morbidity and mortality
- Contributions to controlling health care costs and the lead times before these contributions are realized
- Other financial impacts and timing of the realization of these impacts
- Research design and strength of evidence for the assessment of the intervention
- Lessons learned from implementing the intervention

Table 1. Publications Included in Intervention Matrix

SDOH Domain	Number of Publications Reviewed
Housing	52
Nutrition/Food Security	44
Transportation	9
Education	4
Income and Jobs	5
Isolation	11
Access to Care	19
Language Literacy	9
Behavioral Health and Other Counseling	28
Perinatal and Early Childhood Needs	3
Case Management	43
Systematic Reviews Addressing Multiple Domains	10
Total	237

We analyzed these publications to assess the overall quality of the underlying methods and reported results. Methodological quality was deemed:

- High if the study was a randomized controlled trial or employed a robust quasi-experimental design (such as a natural experiment)
- Medium if it employed a less robust quasi-experimental design (as with the use of non-equivalent experimental and comparison groups)
- Low if it used a qualitative methodology, was a cross-sectional study, or employed a pre-post design with no control group.

Reported outcomes were rated on their completeness, which were deemed:

- High if all relevant outcomes were reported (including program costs, return on investment information, and utilization counts)
- Medium if some relevant outcomes were reported
- Low if no such relevant outcomes were reported.

We then focused on four of these domains that were indicated by our initial research to have likely impact on health care costs and utilization: housing-based, nutrition-based, and transportation-based interventions, as well as case management. We were especially interested in studies that monetized program costs and benefits.

Each of the four domains was subdivided into multiple types of interventions, as follows:

Housing

- Permanent supportive housing programs (programs that combine affordable housing assistance with social support services)
- Programs that offer assistance in obtaining housing on a short-term basis
- Environmental safety programs that upgrade current living conditions (e.g., to prevent falls or eliminate asthma triggers)

Nutrition

- Home-delivered meals
- Medically tailored meals (home delivered meals designed for the medical needs of the client)
- Food provision (providing non-delivered access to food, such as through the Supplemental Nutrition Assistance Program)

Transportation

- Nonemergency medical transportation
- Mobile clinic programs

Case Management

- Broad social support programs (e.g., connecting patients to housing, transportation, and nutrition services to reduce the likelihood of a readmission or emergency department visit)
- Crisis intervention support programs that take immediate action to remove a client from harm's way (such as safe house programs)
- Care management support programs focused on connecting patients with social support programs to help manage their chronic conditions

We conducted an analysis of the contents of the matrix for these four domains to address such questions as:

- What is the potential for SDOH interventions to reduce the growth in health care spending?
- What is the potential for SDOH interventions to improve the health of the nation?
- To what extent is the cost for such interventions offset by their health care and non-health care financial impacts (such as higher earnings and associated tax revenues resulting from better health)?
- What characteristics of such interventions are associated with their potential impacts (e.g., the degree to which the target population is highly focused, the timing for realizing the financial or health benefits of the intervention, or the cost and ease of obtaining funding for an intervention)?

For this analysis, we used the above quality criteria as well as an assessment of each study's sample size to identify studies with overall low quality and separate them from those with medium and high quality.

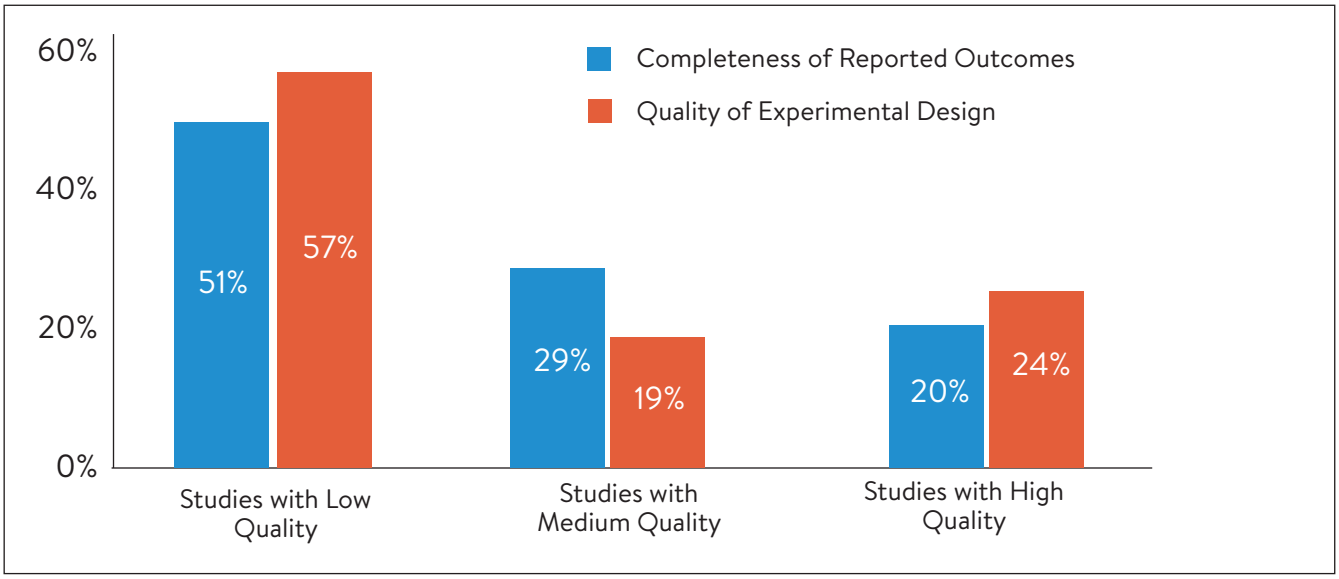
Results

The Quality of Existing Literature on the Value of SDOH Interventions

Empirical evidence about programs targeting social needs abounds, in academic journals as well as governments' and philanthropies' evaluative reports. The generated evidence has often focused on a program's impact on quality of life and social risk factors, including criminality and socioeconomic costs. Much sparser is the set of evaluations that considered program outcomes in terms of mental and physical health and health care spending. While sparse, that health and care-spending literature consists of a diverse set of studies in terms of experimental design, statistical precision, and consistency of reported outcomes.

Overall, a large portion of the literature that we reviewed consisted of studies that were poorly designed, poorly documented, and inconsistently presented. Figure 1 summarizes our assessment of the quality of reported outcomes and the quality of the experimental design across all 11 domains included in the intervention matrix.

Figure 1. Quality of Studies Reviewed



Source: Authors' assessment of studies included in the intervention matrix.

In each of the four domains of SDOH that we studied in detail, we found meta-analyses that focused on health and health care outcomes in financial terms. These meta-analyses agreed with the conclusions we have drawn about study quality from our analysis of our literature matrix, which included many studies omitted by the available meta-analyses in each domain.

Experimental Design

High-quality study designs like randomly controlled trials (RCTs) were relatively rare, and most intervention types lacked even a handful of RCTs evaluating their health-related effects. Indeed, the most common sort of studies were pre-post evaluations without comparison groups. Studies using that design risk the effects of two major biases: their estimate of the intervention's effect includes the effects of external conditions (such as health insurance expansion), and they can capture natural improvements in health among the most unhealthy (a form of regression to the mean).

While pre-post and similarly weak designs were once commonly used in evaluations of social-service programs, they are falling out of favor and are woefully inadequate for health care decision-making and value assessment. Meta-analyses that we reviewed often prioritized RCTs, but some included observational studies, usually applying standards like those proposed by the Good ReseArch for Comparative Effectiveness (GRACE) Initiative [5] to observational studies of social needs interventions. In their review of community health worker programs, Jack and colleagues [6] found that RCTs estimated smaller effects on health utilization and spending than studies with lower-quality designs, suggesting that observational studies introduce biases that overstate benefits. In a systematic review of asthma home-visiting programs that included observational studies, Nurmagambetov and colleagues [7] called for a follow-up systematic review once the relevant literature includes sufficient RCT studies to allow omitting observational studies altogether from meta-analysis. Continued reliance on non-RCT studies risks misestimating interventions' monetized benefits. It is encouraging that, across domains, higher quality studies appear to have been increasingly common in recent years.

Evaluators seeking to measure monetized health benefits of social need interventions should recognize that their studied intervention may be compared against clinical alternatives. Designing studies with comparable resistance to bias will situate these social needs interventions on the same playing field as other preventive activities in which a health system might invest.

We, and most meta-analyses we reviewed, found some well-conducted studies including RCTs and natural experiments that provided evidence of benefits that included averted health care events and saved health spending. We identified 39 RCTs that measured health care outcomes, more than half (23) of which belonged to two intervention types – community health worker programs and medically tailored meals. Still, the great majority were low quality studies by standards of evidence common to value assessment in a health-system context.

Where evidence from RCTs is more prevalent, the studies could provide bias-resistant insight into what characteristics drove the effects of a type of social needs intervention. This was achieved in some of the meta-analyses that we reviewed [6-8].

Documenting Costs

The studies we encountered lacked consistency and granularity of key variables describing the economic impacts of the interventions they addressed. Even fundamental economic information about the interventions was frequently missing, let alone estimates of how costs and economic

benefits are partitioned across the multiple "pockets" among which these programs' costs and benefits flow. Most fundamentally, intervention costs were not commonly reported.

Lack of intervention cost data was also common in the studies considered in the systematic reviews that we found. Among 13 programs surveyed by Nurmagambetov and colleagues [7] that provided cost information for home visits to remove asthma hazards in patients' homes, just four studies disentangled the costs among the components of the program – like labor versus materials. Jack and colleagues [6] reviewed 34 studies estimating care-utilization effects of community health worker programs, finding that 21 studies, or 62 percent, failed to give program cost data at all.

Cost reporting is necessary for assessing a program's value – whether in terms of cost-effectiveness, cost-benefit, or return on investment. Omitting cost detail also limits our insights about how the different arrangements of an intervention type influence intervention cost. Furthermore, data allowing fixed and variable costs to be separated permits identifying economies of scale to encourage replication and scaling-up of programs. In too many studies, we could not infer whether a program's high per-participant costs were inevitable, were unnecessary, or would go down if the program served more participants. This harms value assessment and hinders wise investing in SDOH.

Reporting Outcomes

Insufficient reporting of outcomes also limited our analyses. In each domain, almost all studies reported on only a subset of the associated costs, benefits, and savings; in each domain, though, one or two studies reported almost all financially important outcomes. These often also had higher quality designs, indicating that a small set of studies provide maximal value. Omitting outcomes data or loosely reporting outcomes weakens the usefulness of the evidence.

Benefits should be clearly and separately presented when they accrue to different people. While health spending reductions need not be the only focus of social needs programs, an interested reader should be able to separate the social benefits from health-related benefits or health spending effects. One study estimated a 36:1 benefit–cost ratio for a mobile clinic program, but this fell to 6:1 when considering only health care cost savings. That sort of recalculation should be possible from the reported data in every study: some readers will want to exclude specific outcomes from the value assessment or to partition the outcomes among the stakeholders that they benefit.

Our summary of these issues emphasized their impact on estimates of medical system costs and benefits, but many social needs programs are the inherent domain of public agencies, which seldom consider health spending effects. Because reducing health spending is often—and rightly—seen as a *bonus* rather than a primary aim for public programs, those programs should be reviewed with particular attention to evidence quality related to their health-care outcomes.

Results of Analysis in Four Domains

Most of the studies we reviewed within the domains of housing, transportation, nutrition, and case management provide little credible evidence of positive financial returns from the interventions (Table 2). The vast majority of these studies were either of low quality (22), making the claims of cost savings in some of them suspect, or were of medium quality but did not provide adequate information to allow assessing a return on investment (71). Four studies provided evidence that the interventions did not save money (though they might have provided non-financial benefits), while 33 included credible evidence that the interventions saved money, generally in health care costs. The comparatively smaller number of studies showing no cost savings might be partly an effect of

publication bias. But the existence of a number of well-conducted studies that show positive returns suggests that interventions within some of the categories addressed in our analysis have a potential to save health care dollars.

Table 2. Summary of Results in Four Domains

Domain	Type of Intervention	Low Quality Studies	Medium to High Quality Studies		
			Showing No Positive Return	Showing Positive Return	Providing Inadequate Information
Housing	Permanent Supportive Housing	2	2	5	3
	Assistance in Obtaining Short-Term Housing	5	0	2	5
	Environmental Safety	4	0	4	17
Nutrition	Home-Delivered Meals	0	0	2	7
	Medically Tailored Meals	1	0	3	4
	Food Provision	7	1	0	18
Transportation	Nonemergency Medical Transportation	2	0	0	5
	Mobile Clinic	0	0	2	0
Case Management	Broad Social Support	4	1	9	8
	Care Management Support	0	0	3	2
	Crisis Intervention	2	0	0	2
	Legal Support	7	0	3	0

Source: Authors' assessment of data in source documents.

The Value of Investments in Four Domains

While our findings are consistent with other systematic literature reviews on the need to have more robust experimental designs and reported outcomes, there were some strong examples in each of the four domains that were our principal focus, leading us to believe this type of robust evaluation can be applied to SDOH interventions. These examples provide us with limited evidence of the value of interventions within these domains. Table 3 summarizes examples of higher quality studies within these four domains that demonstrate positive financial returns, primarily in health care cost savings. Among the interventions we reviewed, interventions involving housing, meal delivery (especially medically tailored meals), and case management incorporating multiple types of social support show the most promise in helping to control health care costs.

Within each domain, these successful interventions have some common characteristics. Successful interventions within the housing domain tended to be targeted to populations most in need, used care coordinators, had an education component to augment the basic housing services, and had an immediate impact. Nutrition interventions in which meals were medically tailored to patient needs, included opportunities to socialize, and involved partnerships between community organizations and

Table 3. Studies with Positive Returns in Four SDOH Domains

Domain	Characteristics of Studies with Positive Return	Type of Intervention	Number of Studies with Positive Return	Example Study			
				Cost	Savings	Type of Savings/ Benefit	Reference
Housing	• Targeted population • Use of care coordinators • Education component • Immediate impact	Permanent Supportive Housing	5	$13,440/ person/year	$42,964/ person/year	Health care use and costs; costs of jail bookings; days incarerated; shelter and sobering center use	[9]
		Assistance in Obtaining Short-Term Housing	2	$3,337/ person/year	$9,644/ person/year	Health care costs; substance abuse treatment; nursing home care; legal expenditures	[10]
		Environmental Safety	4	$2,825/ participant	$10,404/ participant/ year	Medicaid expenditures	[11]
Nutrition	• Medically tailored meals • Chance to socialize • Provider/ community partnerships	Home-Delivered Meals	2	$1,752/ person/year	$1,872/ person/year	ED visits and inpatient admisssions	[12]
		Medically Tailored Meals	31	$4,200/ patient/year	$6,840/ person/year	ED visits and inpatient admisssions	[12]
		Food Provision	0				
Transportation	• Targeted population • Provider/ community partnerships	Nonemergency Medical Transportation	0				
		Mobile Clinic	2	$565,700/ year	$3,125/year	ED visits	[13]
Case Management	• Multiple types of social support • Focus on clear outcome • Provider/ community partnerships	Broad Social Support	9	$1,721/ person/year	$4,246/ person/year	Medicaid inpatient and outpatient costs	[14]
		Care Management Support	3	$2,492/ patient/year	$3,314/ patient/year	ED visits and inpatient admisssions	[15]
		Crisis Intervention	0				
		Legal Support	3	$281/patient	$1,041/ patient	Reimbursed Medicaid expenditures	[16]

Source: Authors' assessment of data in source documents.

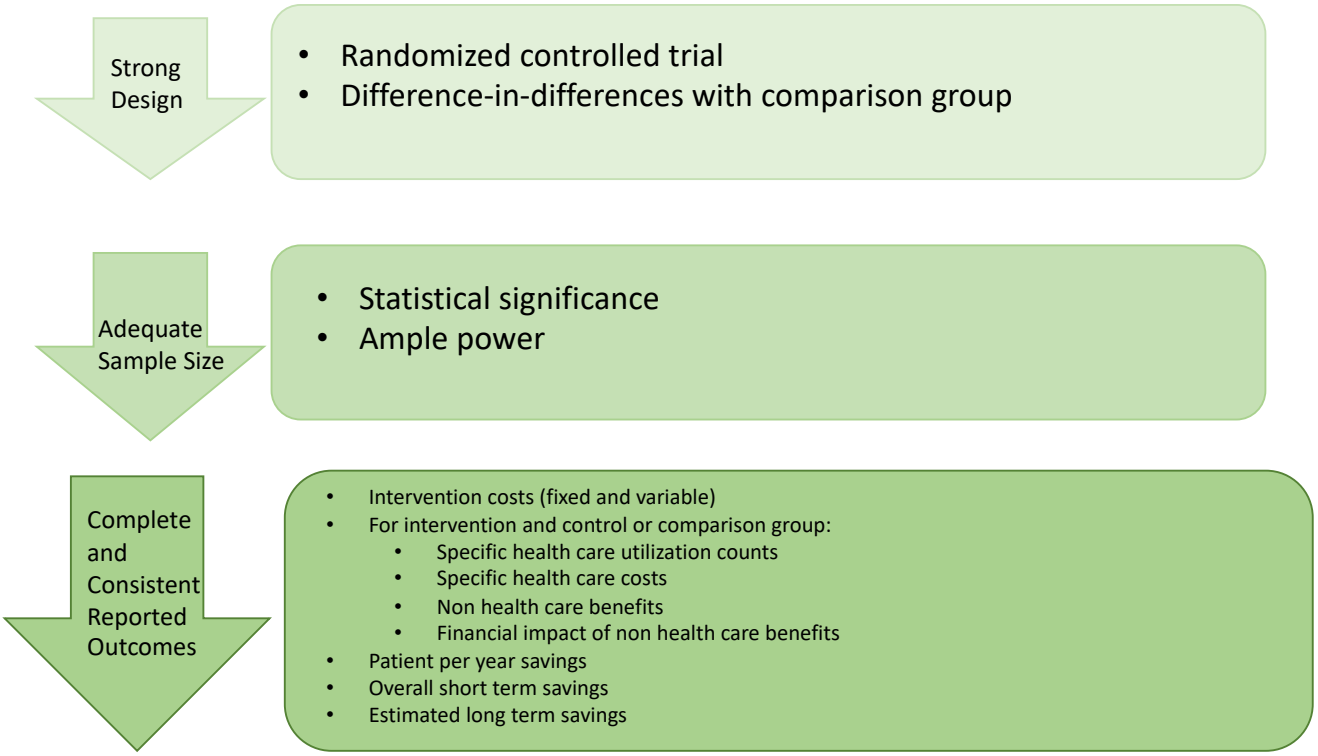
hospitals were among the most successful. Transportation interventions that were successful targeted the populations they served to low-income patients with specific medical conditions, such as diabetes or hypertension, and involved community-hospital partnerships. Successful case management interventions addressed multiple types of social support, focused on a clear outcome, such as 30-day readmissions or utilization of skilled nursing facilities, and involved community-hospital partnerships.

Discussion

While we have found limited evidence of the potential for positive returns on investments in the SDOH domains in our analysis, most of the studies we reviewed did not allow assessing the financial impact of the interventions. These findings are consistent with and support the findings of other researchers that there is a need for more high-quality studies of SDOH interventions. There is little consistency with which SDOH programs are evaluated, and this results in an incohesive set of findings that can be difficult to interpret meaningfully. Furthermore, many studies of SDOH interventions suffer from poor design. The result is that "dissemination has currently outpaced evidence, possibly crowding out interventions that are evidence-based." [17] This suggests the need for formal guidelines for conducting and reporting on these types of studies. A possible model for such guidelines is the work of the two Panels on Cost-Effectiveness in Health and Medicine [18, 19]. These panels developed detailed recommendations for conducting and reporting on cost-effectiveness analyses that have been widely adopted. The panels' work has resulted in improved consistency and quality in the design, implementation, and reporting of cost-effectiveness analyses. Value assessment for SDOH interventions could be improved by establishing and adopting similar guidelines.

Our work has identified several elements that could be included in such guidelines for SDOH evaluations. Focusing on the areas of design, sample size, and outcomes reported, Figure 2 lists examples of important components of high quality SDOH studies.

Figure 2. Improving Study Quality



Conclusion

The increased recognition of the value of improvements in the SDOH has opened the door for investments that have the potential to enhance the health of the U.S. population, with associated economic benefits. This review has identified a limited number of well-studied interventions that suggest properly designed programs that address social needs can be successful and might provide overall savings in health care costs. But the majority of the studies we reviewed did not provide adequate information to allow assessing the value of the interventions studied. As a result, we do not know whether these interventions represent good investments. The limited quality and consistency of the existing body of evidence of the costs and benefits of SDOH interventions constrains our ability to design and implement efficient and effective programs. There is a need to develop and apply guidelines for high-quality evaluation and reporting on the impacts of such investments to help us design future interventions that will ensure this potential will be realized. While some housing, meal delivery, and case management interventions show promise for improving health and helping to control health care costs, further high-quality research is needed to ensure that future investments in these and other SDOH represent dollars well spent.

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ABOUT US

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