CONTRACTOR PROJECT REPORT

Building the Evidence Base for Social Determinants of Health Interventions

Prepared for
**the Office of the Assistant Secretary for Planning and Evaluation (ASPE)
at the U.S. Department of Health & Human Services**

by
RAND Health Care

May 2021

Office of the Assistant Secretary for Planning and Evaluation

The Assistant Secretary for Planning and Evaluation (ASPE) advises the Secretary of the U.S. Department of Health and Human Services (HHS) on policy development in health, disability, human services, data, and science; and provides advice and analysis on economic policy. ASPE leads special initiatives; coordinates the Department's evaluation, research, and demonstration activities; and manages cross-Department planning activities such as strategic planning, legislative planning, and review of regulations. Integral to this role, ASPE conducts research and evaluation studies; develops policy analyses; and estimates the cost and benefits of policy alternatives under consideration by the Department or Congress.

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ASPE Project Team

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Please visit https://aspe.hhs.gov/social-risk-factors-and-medicares-value-based-purchasing-programs for more information about ASPE research on social risk factors and Medicare's value-based purchasing programs.

ASPE Executive Summary

In 2014, under the Improving Medicare Post-Acute Care (IMPACT) Act, Congress asked that ASPE study the relationship between social risk factors[1] and Medicare's value-based purchasing (VBP) programs. ASPE wrote two Reports to Congress, making recommendations based on the studies' findings. One of the main findings of these reports was that although many organizations are working to improve equity in health outcomes by addressing social risk, which interventions are effective, replicable, and scalable remains unclear due to limited evaluation. Correspondingly, the Reports included the recommendation that additional research is needed in two domains: (1) best practices for providing care to beneficiaries with social risk factors, and (2) how to scale best practices once they have been identified.[2]

To begin to address this recommendation, ASPE asked the RAND Corporation to evaluate the existing evidence for effective interventions to address social determinants of health (SDOH) and social needs and identify potential next steps for further developing the evidence base for effective interventions. In particular, this project focused on what is already known; where there are gaps or insufficient evidence in terms of research, implementation, and dissemination; what data are currently available; what additional data are needed; and options to obtain needed data.

This exercise consisted of three tasks:

1. Conducting an environmental scan to understand what is already known and what data are available to inform ASPE's research agenda on SDOH.
2. Conducting key informant interviews with subject-matter experts to review the environmental scan analysis and interpret findings.
3. Convening staff from U.S. Department of Health and Human Services (HHS) agencies and operating divisions to review findings from the environmental scan and identify priority areas that align with those of the subject-matter experts.

Each of these tasks focused on the same set of research questions:

A. Which policies or programs addressing SDOH have been shown to be effective in improving health or health behaviors?
B. Which policies or programs have been shown to have a savings in terms of net program savings, social costs, or health benefits?
C. What are the funding sources for the identified policies and programs (i.e., federal programs, foundations, nonprofit hospital or health plan community benefits, etc.)?
D. What available medical or non-medical data sources on individual or community social needs can be used to guide implementation of SDOH interventions and/or target populations?

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[1] The term "social risk factors" was suggested by the National Academies of Sciences, Engineering, and Medicine as discussed below. Although the IMPACT Act used the term socioeconomic status or SES, the National Academies of Sciences, Engineering, and Medicine suggested a broader framing of "social risk" factors as an alternative.

[2] See all of ASPE's work on this topic at https://aspe.hhs.gov/social-risk-factors-and-medicares-value-based-purchasing-programs

While this project identified a range of health benefits related to SDOH interventions, gaps remain. There is substantial evidence of effective interventions in health care, but less in other domains including economic stability, education, neighborhood and built environment, and social and community context. Moreover, there is less information on interventions targeting multiple domains (intersectional impacts of interventions across disaggregated subgroups), evidence to help distinguish between intervention effects, and intergenerational and long-term impacts. Additional research is needed to assess the effect of social services on health outcomes and to identify interventions that might achieve sustained and lasting improvements in population health. Finally, there was little evidence on cost-benefit profile or sustainability of specific interventions.

Going forward, this project identifies a need for standardizing terminology and measurement focusing on outcomes outside of health. Further, to continue to grow the evidence base, investments are needed from a broad range of funders including philanthropy and organizations within the health care industry. An HHS-driven SDOH research agenda could help support approaches to close these gaps.

The Biden-Harris Administration has emphasized the importance of equity across the government, and health equity in particular. This report directly responds to Executive Order 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*.[3] Identifying and implementing effective interventions to address SDOH and social needs is foundational to improving health equity.

A Note on Social Risk Factors, Race, and Ethnicity

Although the IMPACT Act required that ASPE study "the effect of individuals' socioeconomic status on quality measures," ASPE commissioned a series of reports from the National Academies of Science, Engineering, and Medicine who suggested that the term "social risk factors" was more appropriate and provided a conceptual model that listed the specific domains and risk factors.[4] ASPE's Reports to Congress have used the term social risk factors and the specific factors identified.[4]

In recent years, there has been further discussion on appropriate terminology, including understanding the distinctions between social determinants of health, social risk factors, and social needs.[5,6] This continuing discussion shows the interconnectedness of these concepts, while also recognizing that not all characteristics and needs can or should be addressed in the same way. This report primarily refers to social determinants of health and social needs, as those are the most appropriate terms for the types of interventions being assessed.

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[3] See https://www.federalregister.gov/documents/2021/01/25/2021-01753/advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government

[4] National Academies of Sciences, Engineering, and Medicine. 2016. *Accounting for social risk factors in Medicare payment: Identifying social risk factors.* Washington, DC: The National Academies Press.

[5] Alderwick, H. and Gottlieb, L.M., 2019. Meanings and misunderstandings: a social determinants of health lexicon for health care systems. *The Milbank Quarterly*, 97(2), p.407.

[6] Green, K. and Zook M., 2019. When Talking About Social Determinants, Precision Matters. *Health Affairs Blog*, October 29. Available at https://www.healthaffairs.org/do/10.1377/hblog20191025.776011/full/.

The social risk factors identified by the National Academies of Science, Engineering, and Medicine include the domains of socioeconomic position; race, ethnicity, and cultural context; gender; social relationships; and residential and community context. These domains and the individual factors within them were identified based on existing evidence of the association between the factor and worse health outcomes. We note that the factors identified include both modifiable social determinants of health and also non-modifiable factors such as race and ethnicity, which are themselves not causal factors for disparities but are subject to structural inequities that produce adverse health outcomes.

The Biden-Harris Administration's emphasis on health equity brings an additional perspective to this issue. In addressing health equity, we in the federal government include many of the same factors that the National Academies of Science, Engineering, and Medicine identified as social risk factors. We take a slightly different perspective than presented by National Academies of Science, Engineering, and Medicine and consider non-modifiable factors such as race, ethnicity, and rural location as associated with health disparities, but not risk factors themselves or drivers of those disparities. We are interested in identifying non-modifiable factors, such as race and ethnicity, to assess differential health outcomes.

In the types of interventions discussed in the report, we primarily focus on modifiable factors, such as structural racism, that are the drivers of the outcome differences. In the end, the goal of these interventions is to address health equity and improve health outcomes.

About This Project Report

In an effort to help build the evidence base around the social determinants of health (SDOH), the Assistant Secretary for Planning and Evaluation (ASPE) engaged RAND in a project to evaluate the current evidence from programs and policies targeting SDOH and identify the SDOH research questions, data sources, and data gaps that might be used to develop an SDOH research agenda. RAND used a multimethods approach that included an environmental scan of the published and gray literature of SDOH interventions; key informant interviews with subject-matter experts; and a convening of U.S. Department of Health and Human Services (HHS) agencies and operating divisions to review the results of the environmental scan and offer insights on the findings. While this project identified a range of health benefits related to SDOH interventions, gaps remain in our understanding of what works to address certain types of social determinants, the specific intervention components that improve health, and which interventions might achieve sustained and lasting improvements in population health. To grow the evidence base, investments are needed from a broad range of funders including philanthropy and organizations within the health care industry. Further, an HHS-driven SDOH research agenda can help support approaches to close these gaps.

This work, sponsored by the ASPE, was conducted within the Payment, Cost, and Coverage Program within RAND Health Care, a division of the RAND Corporation. The authors of this report are Malcolm V. Williams, Lilian Perez, Sameer Siddiqi, Nabeel Qureshi, Jessica Sousa and Alexandra Huttinger.

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Summary

One of the most often cited concerns in addressing the social determinants of health (SDOH) is the lack of evidence regarding which programs and policies are effective, replicable, and scalable. To address this concern, ASPE engaged RAND in a project to evaluate the current evidence from programs and policies targeting SDOH; and to identify SDOH research questions, data sources and data gaps that might be used to develop an SDOH research agenda. To accomplish these goals, RAND applied a multi-methods approach that included an environmental scan of the published and gray literature of SDOH interventions; key informant interviews with subject-matter experts; and a convening of U.S. Department of Health and Human Services (HHS) agencies and operating divisions to review the results of the environmental scan and offer insights on the findings. These tasks focus on the following research questions:

1. What patterns of evidence on SDOH policy and program interventions illustrate gaps in our understanding of SDOH interventions focusing on both health outcomes and cost-effectiveness?
2. How do these gaps inform the development of a research agenda on SDOH policy and program interventions?

Key Findings

Below we present findings from this multimethods approach and focus on (1) findings from the environmental scan, (2) summary of evidence gaps, (3) issues that have to be addressed to pursue a SDOH research agenda, and (4) resources needed to execute an SDOH research agenda.

Summary of Findings from the Environmental Scan

RAND used the Healthy People 2020 (HP2020) framework to define the five domains and 21 subdomains of the SDOH (Table S.1). Our review identified 116 articles that aligned with these domains. However, as Table S.1 shows, the bulk of the findings were in the health care domain, and there was a great deal of imbalance in the number of reviews per subdomain. For example, within the education domain, there were no reviews for the subdomains of enrollment in higher education, high school graduation, language and literacy. A high-level summary of the findings from this review is presented below by domain.

Table S.1. Healthy People 2020 Framework SDOH Domains and Subdomains

SDOH Domain	Subdomains (Number of Reviews)
Economic stability	• Housing instability (6) • Poverty (8) • Food insecurity 3) • Employment (1)
Education	• Early childhood development and education (3) • Enrollment in higher education (0) • High school graduation (0) • Language and literacy (0)
Neighborhood and built environment	• Quality of housing (6) • Access to foods that support healthy eating patterns (3) • Environmental conditions (3) • Crime and violence (3) • Transportation access (2)
Social and community context	• Civic participation (0) • Discrimination (1) • Incarceration (0) • Social cohesion (1) • Social support (16)
Health care	• Health literacy and education (60) • Access to health care services (41) • Culturally and linguistically competent care (22)

The *economic stability* domain focuses on how individual- and household-level financial resources and economic factors affect health and well-being. The bulk of the evidence identified in the environmental scan addressed the subdomains of housing instability and poverty. This evidence showed that housing interventions (e.g., rental housing assistance, supportive housing, and housing vouchers) were associated with a range of positive health outcomes. Evidence on interventions targeting poverty was much more mixed. For example, the Earned Income Tax Credit (EITC) was associated with improvements in several maternal and child health outcomes but had no effect on health behavior outcomes.

The *education* domain focuses on the educational opportunities from early life to adulthood that support learning, healthy development, economic mobility, and access to resources that promote health. Evidence from the environmental scan showed that home visit interventions delivered by professionals reduced child behavioral and mental health problems and increased mental health treatment for children. The scan identified only reviews addressing the early childhood development and education subdomain.

The *neighborhood and built environment* domain focuses on the attributes of the places where people live that can shape opportunities to engage in healthy behaviors (e.g., physical activity), exposure to environmental hazards, and levels of stress. Evidence from the scan was limited for all of the subdomains but showed that interventions targeting respiratory and infectious disease outcomes (e.g., home remediation programs, home visits for environmental control, retrofitting air units, germicidal ultra violet); lead hazard control interventions (e.g., building component replacement and paint stabilization); interventions intended to improve access to foods that support healthy eating patterns (e.g., culturally tailored programs, summer nutrition programs, and food pricing policies); built environment interventions intended to promote physical activity (e.g., walking, cycling); and violence prevention interventions, like intimate partner violence prevention programs (e.g., home visitation programs), were all associated with improvements in a range of health outcomes.

The *social and community context* domain focuses on the social characteristics of the contexts in which people live, as well as the social, religious, cultural, and other institutions with which they interact. Example intervention targets include civic participation, discrimination, incarceration, social cohesion, and social support. Most of the articles reviewed in this domain addressed social support. Evidence from this scan showed that chronic disease self-management interventions involving social support, supportive community-based behavioral interventions, family-based interventions, and broader community-wide health interventions were all associated with a range of positive health and well-being outcomes. However, there were more mixed results for faith-based, and family and caregiver support interventions.

The *health care* domain focuses on factors affecting access to and understanding of health care services. Example intervention targets include access to affordable, high-quality, and culturally and linguistically appropriate health care, particularly primary, specialty, and preventive care; health insurance and prescription drug coverage; and health literacy. Factors that can influence access to care include health insurance, inconvenient or unreliable transportation, physician shortages, and geographic barriers, among others. Overall, the bulk of the evidence from this environmental scan fell under the health care domain, and this evidence showed that several interventions (e.g., integrated medical, behavioral, and social services; patient navigation and care coordination; and Medicaid expansion) had a positive impact across health outcomes. However, there was mixed results for technology-based health literacy interventions; interventions that facilitated access to health care services through community paramedicine, telehealth services, and coordinated care; and cultural competency training.

Summary of Evidence Gaps Identified in the Environmental Scan

We identified several critical gaps in the literature on SDOH. Overall, there was little evidence deriving from cost-benefit analyses of these interventions and less evidence for the SDOH domains other than health care. Further, there were gaps in evidence to help distinguish between different interventions particularly for domains in which there were mixed results,

interventions targeting multiple domains (intersectional impacts of interventions across disaggregated subgroups), intergenerational and long-term impacts, and intervention sustainability. We also found that additional research is needed to assess the effect of social services on health outcomes, particularly on how to integrate medical and social services, and more information is needed to distinguish between individual- and community-level factors, as well as interventions that have the potential to make a difference on population health more broadly. More information is also needed on whether and how outcomes varied by intervention intensity or dose. More information is needed to identify meaningful differences between interventions to ameliorate the detrimental consequences of SDOH deficiencies and interventions to achieve sustained and lasting improvements in population health.

Finally, there are gaps in information for several SDOH domains that do not appear in the Healthy People Framework:

- structural and systemic racism and discrimination
- communication, as a distinct construct from health literacy
- mobility related to disability (i.e., using an assistive device) and legal issues (e.g., policies that prevent one's ability to get a driver's license), rather than just access to transportation
- social isolation, as a distinct construct from social support
- adverse childhood experiences (ACEs) and other traumatic experiences/events.

Issues That Will Support the Impact of an SDOH Research Agenda

In addition to evidence gaps, this project identified three activities that will support the impact of a SDOH research agenda. First, there is a lack of clarity on key concepts underlying SDOH across frameworks. This suggests a need for **standardizing terminology and measurement**, including aligning approaches to data collection to help make comparisons across interventions that target similar social determinants. One way to achieve this goal might be to align definitions of SDOH that may be different in federal guidance such as Healthy People 2030 and the Intergovernmental Task Force.

Second, this project highlighted the need to **focus on outcomes outside of health**. Many of the programs or policies included in the environmental scan are beneficial for well-being more generally (e.g., interventions related to economic stability), but these broader benefits were not highlighted by the evidence identified in the scan.

Third, developing successful approaches to address SDOH requires expertise and insights from multiple organizations inside and outside the health care system However, there are gaps in evidence on the **impact of partnerships to develop and sustain successful SDOH interventions**.

Resources Needed to Execute an SDOH Research Agenda

Identifying the research gaps and activities needed to support the SDOH research agenda is important, but this project also highlighted the need for additional *resources* to execute that

research agenda. We identified two major resource needs. The first are data resources: new national databases, broader access to existing databases, and capitalizing on opportunities to build evaluations into federal demonstrations. The second is the need to broaden the funding sources for SDOH research beyond the federal government. Philanthropy, hospitals with community benefit requirements, and other corporations with an interest in health care all have a role to play. In addition, the goals, approaches, and evidence have to be aligned across sectors (e.g., education, transportation, and social services).

Conclusion and Next Steps

While there have been several successful approaches to improving health outcomes by addressing social determinants in both health care and community settings, gaps in evidence remain. To build this evidence, an HHS-driven SDOH research agenda is needed. To accomplish this, agencies in HHS can take several steps, including

- developing and using new data resources
- embedding evaluations in all programs in which social services are offered to address health care and social needs
- expanding sources of funding
- aligning evidence across sectors
- considering the role of HHS in moving beyond individual interventions to community-wide interventions (i.e., social needs versus SDOH) and access to care
- sharing communication across the department.

Further, our conversations with experts highlighted the need for research on how to integrate social services with health care and on the impact of social services on health. However, there was agreement among the HHS experts that the department could look for ways to prioritize approaches, identify gaps in investments or collaborations, and generate a regular report for updating efforts across agencies.

Acknowledgments

Abbreviations

ASPE	Office of the Assistant Secretary for Planning and Evaluation
CHW	community health worker
CMS	Centers for Medicare and Medicaid Services
ED	emergency department
EITC	Earned Income Tax Credit
FQHC	Federally Qualified Health Centers
HHS	U.S. Department of Health and Human Services
HIT	health information technology
HIV	human immunodeficiency virus
NIA	National Institute on Aging
NIDILRR	National Institute on Disability and Rehabilitation Research
NHLBI	National Heart, Lung, and Blood Institute
NICHD	National Institute on Child Health and Human Development
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
NIDILRR	National Institute on Disability, Independent Living, and Rehabilitation Research
NIH	National Institutes of Health
PCMH	patient-centered medical home
PCORI	Patient-Centered Outcomes Research Institute
TANF	Temporary Assistance for Needy Families

1. Overview

The United States ranks higher in per capita spending for health care than other high-income countries yet ranks in the bottom third for health outcomes such as infant mortality and life expectancy at birth. Inequities in health and health care also persist in the United States, contributing to economic burden in both direct and indirect costs (e.g., lost productivity) and lower quality of life. One potential explanation for why high health care spending has not translated to better national health outcomes is that medical care accounts for only 10–20 percent of modifiable contributors to improved health outcomes and, as such, is insufficient to improve the nation's population health.

The remaining 80–90 percent of modifiable contributors that effect health is driven by nonmedical factors. These factors, known as social determinants of health (SDOH), include access to medical care, socioeconomic factors, early life adverse events, and the built environment and other environmental factors (Braveman and Barclay 2009; CDC 2014; Chuang et al. 2005; Kindig, Asada, and Booske 2008; McGinnis, Williams-Russo, and Knickman 2002; ODPHP 2019; Sampson 1992). Policies, community infrastructure (e.g., quality of schools and public transportation), and access to health-enhancing amenities such as parks can also foster (or in some cases hinder) opportunities for health and have been shown to improve individuals' health. Moreover, social determinants may explain the existence and persistence of health inequalities associated with race and ethnicity and socioeconomic status. Given the impact of social factors on health, it is important for the public health and health care systems to understand the drivers of poor health outcomes and how to address issues that may be due to social, not medical factors.

SDOH refers to the contexts in which people live that are "shaped by the distribution of money, power and resources at global, national and local levels (WHO 2021)." Further, the inequitable distribution of these resources leads to health inequity. For example, high childhood obesity rates among low-income children can be explained in part by lower access to outdoor spaces for physical activity (Gordon-Larsen et al. 2006). Living in a lower-resourced community leads to lower physical activity, which increases obesity rates. Collectively, these concerns have resulted in an increased interest in interventions targeting SDOH in both the clinic and community setting (National Academies of Sciences 2019).

Research assessing how SDOH can have negative impacts on health (Kaplan, Shema, and Leite 2008; Raphael 2006) has been used to support care delivery to meet patient needs and address disparities in health outcomes (Chen, Tan, and Padman 2020). Interventions to address SDOH, for example, have been developed in both the clinical and community settings and through federal, state, and local policies. Within the clinical setting, interventions have been implemented in primary care or family practice settings, urgent care, hospitals, mental health

clinics, Federally Qualified Health Centers (FQHC) and Community Health Centers, and some specialty clinics (e.g., asthma, mental health, cancer) (Gottlieb, Wing, and Adler 2017), with the majority of SDOH interventions occurring in the primary and urgent care setting (Gottlieb, Wing, and Adler 2017; Tsega et al. 2019).

SDOH interventions in community settings (e.g., interventions that take place outside of medical settings) take multiple forms, including those developed by researchers and organizations that work outside of these communities and those developed by organizations within the community.

Interventions to address SDOH often require investments from sectors other than health (e.g., housing, transportation, and economic development) in order to be effective. As result, SDOH program developers increasingly rely on cross-sector collaboration because these approaches have the potential to improve population health through improved coordination and alignment between health systems and community partners (Chandra et al. 2016; Towe et al. 2016). Investments from other community-based institutions that affect health can help expand the efforts of the public health and health care sectors by accelerating behavior change, improving organizational efficiency, enhancing social change, and improving dissemination and diffusion of innovations (Valente 2012). Cross-sector collaborations also enhance or extend the reach of existing population health activities while not taxing an already stressed formal public health workforce (Wholey, Gregg, and Moscovice 2009). These collaborations also make it easier to engage community members in public health interventions. In response to this realization, hospitals, health systems, and community organizations have begun to collaboratively address SDOH through increasingly diverse and innovative approaches.

Funders and national organizations have also elevated the importance of—and at times catalyzed—these efforts through innovation challenges, cooperatives, and grant dollars. For example, the American Hospital Association created the Hospital Community Cooperative which sought to bring hospitals and community organizations together to collectively promote health equity by building a national network of hospital-community partnerships and to catalyze place-based collaborative projects to address SDOH. Similarly, the Aetna Foundation, American Public Health Association, and National Association of County Officials founded the Healthiest Cities and Counties Challenge, which supported small to mid-sized U.S. cities, counties, and federally recognized tribes to build multisectoral collaborations or coalitions to address SDOH and improve the health of their community.

Early work on the impacts on health was followed by work examining the mechanisms by which these SDOH affect health directly (Garces, Thomas, and Currie; 2002). While this evolution is promising, the effectiveness of most SDOH interventions is not well understood (Fichtenberg, Alley, and Mistry 2019). Most evaluations of SDOH interventions, for example, focus on implementation or on outcomes that are themselves the social determinant of health (e.g., educational outcomes) rather than on health outcomes or costs (Fichtenberg, Alley, and

Mistry 2019). As a result, there is also a lack of evidence regarding which SDOH programs and policies are effective at improving health and which are replicable and scalable.

To address this lack of information, ASPE engaged RAND in a project to evaluate the current evidence from programs and policies targeting SDOH and identify questions to address gaps in our understanding of SDOH, data sources, and information needs that can be used to help ASPE develop a research agenda to generate needed evidence to advance efforts to address SDOH. RAND's scope of work was not to define the research agenda but rather to inform it. To accomplish these goals, RAND engaged in three activities:

- conducted an environmental scan to understand what is already known and what data are available to inform ASPE's research agenda on SDOH
- interviewed technical experts to obtain input on the environmental scan analysis and interpret findings
- convened staff from U.S. Department of Health and Human Services (HHS) agencies and operating divisions to review findings from the environmental scan and identify priority areas that align with those of the technical experts.

These tasks focus on the following research questions:

1. What patterns of evidence on SDOH policy and program interventions illustrate gaps in our understanding of SDOH interventions focusing on both health outcomes and cost-effectiveness?
2. How do these gaps inform the development of a research agenda on SDOH policy and program interventions?

Summary of Methods

In September 2020, RAND evaluated the scientific literature on the impact of program and policy interventions addressing SDOH on health or health behavior outcomes in the United States. Given the sheer volume of research evaluating individual programs and policies targeting SDOH, ASPE limited the project scope to a review of reviews and other summary documents. RAND used the Healthy People 2020 (HP2020) place-based framework to categorize the interventions included in the reviews by SDOH domain and subdomain. RAND and ASPE decided to align this review with the HP2020 framework since it is a key organizing framework for HHS's efforts to identify and address SDOH, and it has informed the development of key objectives to address these SDOH. The five main domains are: economic stability, education, neighborhood and built environment, social and community context, and health care (see Table 1.1). Although these domains have been updated for Healthy People 2030, the 2030 framework was not available when we conducted this review.

We limited the search to reviews of interventions implemented in the United States and to those that included measures of effects on health or health behavior outcomes. For more details about the approach to identifying and reviewing these articles, please see Appendix A.

Table 1.1. Healthy People 2020 Framework SDOH Domains and Subdomains

SDOH Domain	Subdomains
Economic stability	• Housing instability • Poverty • Employment • Food insecurity
Education	• Early childhood development and education • Enrollment in higher education • High school graduation • Language and literacy
Neighborhood and built environment	• Quality of housing • Access to foods that support healthy eating patterns • Environmental conditions • Crime and violence • Transportation access
Social and community context	• Civic participation • Discrimination • Incarceration • Social cohesion • Social support
Health care	• Health literacy and education • Access to health care services • Culturally and linguistically competent care

To augment the literature scan and identify gaps in evidence, RAND convened a series of virtual technical expert discussions. In addition to talking to these experts, RAND held a meeting with staff drawn from several federal agencies across HHS. The technical expert discussions were held with a total of nine experts—each representing a state or local government organization, a funding organization, an organization of health plans and payers, a community-based organization, an academic or research institution, or a health care organization—who had expertise in health care policy, research, and social service and health care delivery, as well as expertise in the SDOH domains and subdomains assessed in the scan (see Appendix C for the list of technical experts). The HHS meeting drew 19 staff from agencies across HHS as well as various staff from ASPE (see Appendix D for the list of participating agencies). For the purposes of this project, we consider both the technical experts and HHS staff as experts in SDOH, HHS approaches to addressing SDOH, or both, and therefore refer to all participants in this project as experts. In all discussions, we focused on understanding from the experts' perspectives the implications of our review of the SDOH evidence. Appendix A describes the approach used to

summarize these conversations. This report highlights findings from the environmental scan and expert discussions. Specifically, we report on three major sets of findings:

1. how evidence gaps on SDOH interventions can contribute to shaping a SDOH research agenda
2. research needs to inform an SDOH research agenda
3. resource needs to support an SDOH research agenda.

2. Summary of Findings from the Environmental Scan of SDOH Interventions

Summary of Findings from the Environmental Scan

Table 2.1 highlights the number of reviews abstracted by type of intervention (policy or program). Overall, we identified 116 review articles on SDOH program and policy interventions. The median number of articles assessed by each of the review articles was 21 with a range of 5–152. The vast majority of these articles focused entirely on programs to address SDOH.

Table 2.1. Summary of Reviews Abstracted for the Environmental Scan

Article Type	Number
Review articles focusing entirely on programs to address SDOH	87
Review articles focusing entirely on policies	26
Review articles that include both programs and policies	3
Total	116
Median number of articles assessed per review article (Range)	21 (5–152)

In the following section, we summarize evidence and known gaps with respect to effectiveness in improving health or health behaviors, and positive return on investment or cost-benefit profile, which both address research question 1.

Table 2.2 shows the counts of reviews that focused on interventions targeting each outcome within each SDOH domain and subdomain. Major topline findings for each domain follow the table. Detailed findings that summarize associations between interventions and specific health outcomes are presented in Appendix 5.

Table 2.2. Number of Reviews by Domain, Subdomain, and Health Outcome

Domain	Subdomain	Health Outcome	N of Reviews[a]
Economic stability			**18**
	Housing instability		*6*
		Behavioral health[b]	3
		Child and adolescent health and development	2
		Infectious disease	1
	Poverty		*8*
		Behavioral health	2
		Child and adolescent health and development	1
		General health	1

Domain	Subdomain	Health Outcome	N of Reviews[a]
		Health behaviors	1
		Health care utilization	1
		Maternal health	1
		Obesity	1
	Employment		*1*
		Behavioral Health	1
	Food Insecurity		*3*
		Health Behaviors	3
Education			**3**
	Early childhood development and education		*3*
		Behavioral health	1
		Child and adolescent health and development	2
Neighborhood and built environment			**17**
	Quality of housing		*6*
		Asthma and respiratory disease	3
		Child and adolescent health and development	1
		Health behaviors	1
		Infectious disease	1
	Access to foods/substances that support healthy eating patterns		*3*
		Diabetes	1
		Health behaviors	2
	Environmental conditions		*3*
		Asthma and respiratory disease	1
		Health behaviors	1
		Injury prevention	1
	Crime and violence		*3*
		Violence prevention	2
		Substance abuse	1
	Transportation access		*2*
		Health behaviors	2
Social and Community Context			**18**
	Discrimination		*1*
		Behavioral health	1
		Health behaviors	1
	Social cohesion		*1*
		Health behaviors	1
	Social support		*16*
		Behavioral health	5

Domain	Subdomain	Health Outcome	N of Reviews[a]
		Cancer	1
		Cardiovascular disease	1
		Child and adolescent health and development	1
		Diabetes	2
		Health behaviors	6
Health Care			**120**
	Health literacy and education		*60*
		Asthma and respiratory disease	4
		Behavioral health	4
		Cancer	5
		Cardiovascular disease	5
		Diabetes	12
		Health behaviors	10
		Health care utilization	6
		Infectious disease	4
		Maternal health	2
		Obesity	7
		Pain	1
	Access to health care services		*41*
		Asthma and respiratory disease	2
		Behavioral health	16
		Cancer	5
		Cardiovascular disease	4
		Child and adolescent health and development	2
		Diabetes	3
		Health behaviors	2
		Health care utilization	5
		Infectious disease	1
		Pain	1
	Culturally and linguistically competent care		*22*
		Asthma and respiratory disease	1
		Behavioral health	2
		Cancer	2
		Cardiovascular disease	3
		Child and adolescent health and development	1
		Diabetes	4
		General health	1
		Health behaviors	2
		Infectious disease	1
		Injury prevention	1
		Obesity	4

[a] Reviews may address more than one SDOH subdomain or outcome, thus the total number of reviews reported in this table is greater than the 116 reviews articles assessed in this environmental scan.
[b] Behavioral health includes mental health and substance abuse.

The *economic stability* domain focuses on how individual- and household-level financial resources and economic factors affect health and well-being. Example intervention targets include housing instability, poverty, food insecurity, and employment. These factors can undermine health through lower health care access, higher exposure to environmental hazards, reduced ability to engage in healthy behaviors, and chronic stress, among other pathways. Overall, evidence from this environmental scan showed that economic assistance interventions yielded a range of positive outcomes:

- Housing interventions (e.g., rental housing assistance, supportive housing, and housing vouchers) were associated with positive outcomes for HIV-related clinical outcomes, hospital utilization, and birth weight.
- Evidence on antipoverty interventions (e.g., minimum wage increases and the EITC) was mixed. These policies were associated with improved birth outcomes, maternal mental health outcomes, and perceptions of health and reduced problem behaviors among children. But the EITC had no effect on obesity, and health behavior outcomes.
- Food security–related interventions (e.g., Supplemental Nutrition Assistance Program, summer feeding programs, and meal delivery programs for seniors) were associated with increased intake of nutritious foods and willingness to try new fruits and vegetables.

The *education* domain focuses on the educational opportunities from early life to adulthood that support learning, healthy development, economic mobility, and access to resources that promote health. Example intervention targets include early childhood development and education, enrollment in higher education, high school graduation, and language and literacy (listening and speaking skills, writing and reading, etc.). Overall, our environmental scan found reviews of research on the *early childhood development* subdomain, but not the *enrollment in higher education*, *high school graduation*, or *language and literacy* subdomains. Within the *early childhood development* subdomain, all reviews focused on child health outcomes and found that home visit interventions delivered by professionals reduced child behavioral and mental health problems and increased mental health treatment for children.

The *neighborhood and built environment* domain focuses on the attributes of the places where people live that can shape opportunities to engage in healthy behaviors (e.g., physical activity), exposure to environmental hazards, and levels of stress. Intervention targets include quality of housing, access to foods that support healthy eating patterns, environmental conditions, crime and violence, and transportation access. Overall, evidence from the scan was limited for all of the subdomains but positive impacts were associated with three types of interventions: housing quality, food and physical activity, and violence prevention, as shown here:

- Housing quality:
  - Interventions targeting respiratory and infectious disease outcomes (e.g., home remediation programs, home visits for environmental control, retrofitting air units, germicidal ultra violet) reduced asthma symptoms, infectious disease outcomes,

school absenteeism, and asthma acute care visits, and they had overall favorable cost-benefit ratios.

- o Lead hazard control interventions (e.g., building component replacement and paint stabilization) reduced blood lead levels of children.
- Food and physical activity:
  - o Interventions intended to improve access to foods that support healthy eating patterns (e.g., culturally tailored programs, summer nutrition programs, and food pricing policies) yielded improved diabetes and dietary outcomes and increased purchasing and consumption of healthy foods or beverages.
  - o An evaluation of built environment interventions intended to promote safety for pedestrians and bikers showed beneficial impacts on reducing traffic injuries.
- Violence prevention:
  - o Interventions like intimate partner violence prevention programs (e.g., home visitation programs) reduced intimate partner violence.

The *social and community context* domain focuses on the social characteristics of the contexts in which people live as well as the social, religious, cultural, and other institutions with which they interact. Example intervention targets include civic participation, discrimination, incarceration, social cohesion, and social support. These factors can influence health via behavioral (e.g., support for healthy behaviors) and psychological (e.g., reducing stress) pathways. Overall, this environmental scan showed that interventions targeting social- and community-motivated changes in health behaviors yielded some positive outcomes. However, most reviews addressed social support rather than other subdomains, and evidence for faith-based and family and caregiver support interventions was mixed:

- Supportive community-based behavioral interventions and family-based interventions were associated with reductions in emergency department utilization and hospital readmission for stroke survivors, reductions in behavioral risks related to sexually transmitted diseases and teen pregnancy among youth, and reductions in depressive symptoms and improved preterm birth and low-birth-weight outcomes for pre- and postpartum women.
- Broader community-wide health interventions reduced alcohol-related injury and improved child health outcomes, immunization uptake, HIV screening, and breastfeeding outcomes among members of racial/ethnic minority groups.

The *health care* domain focuses on factors affecting access to and understanding of health care services. Example intervention targets include access to affordable, high-quality, and culturally and linguistically appropriate health care, particularly primary, specialty, and preventive care; health insurance and prescription drug coverage; and health literacy. Factors that can influence access to care include health insurance, inconvenient or unreliable transportation, physician shortages, and geographic barriers, among others. Overall, the bulk of the evidence

from this environmental scan fell under the health care domain and this evidence showed that several interventions (e.g., integrated medical, behavioral, and social services; patient navigation and care coordination; and Medicaid expansion) had a positive impact across health outcomes.

Many reviews focused on culturally or linguistically tailored technology-enabled educational or communication interventions (e.g., web counseling, telemedicine, reminders, social media groups), patient navigation, and self-management interventions, including those involving community health workers, home visits, and health care professionals. These largely showed beneficial results for

- a variety of chronic disease management outcomes (e.g., blood pressure, pain management, HbA1c, and asthma symptom monitoring outcomes)
- treatment and medication adherence, hospitalization and health care utilization, and mental health outcomes (e.g., crisis stabilization)
- psychosocial outcomes (e.g., health beliefs, self-efficacy)
- self-reported behavioral outcomes and preventive health behaviors (e.g., cancer screening, physical activity, dietary, and vaccination behaviors).

However, culturally competency training for health care providers serving racial and ethnic minority populations did not lead to improvements in diabetes outcomes. In addition, these interventions were frequently assessed and found to be beneficial among diverse subgroups, including African American, Asian, and Latino adults and youth.

Access to care interventions were also successful at improving multiple health outcomes:

- Interventions that entailed culturally and linguistically competent care and tailored educational sessions were also associated with improvements in diabetes outcomes, psychosocial outcomes (e.g., health beliefs, self-efficacy), reducing cardiovascular disease risk factors, self-reported behavioral outcomes, and patient and provider behaviors.
- Interventions that improved access to health care through integrated medical, behavioral, and social services programs showed largely positive evidence on improving behavioral health outcomes for adults, children, and adolescents (e.g., problem behaviors, parental stress, and depression outcomes). Similarly, tailored collaborative care and support programs (e.g., programs that include team-based care, patient self-management support, and linkages to community resources) had largely positive evidence for depression and anxiety symptoms. Interventions within the criminal justice system (e.g., discharge planning with benefit application assistance, intensive case management) increased use of mental health services over usual care upon release from incarceration.
- Interventions that improved financial access to care yielded positive effects. Patient assistance programs (e.g., providing prescription drugs at low or no cost to patients who lack prescription drug coverage) and community paramedicine improved

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diabetes outcomes and were cost-effective. Programs to reduce out of pocket costs for medications (e.g., Value-based Insurance Design plans) related to CVD and other conditions found such programs were associated with improvements in medication adherence, including among individuals with low-income, elderly individuals, and individuals with CVD. Expanding access to Medicaid and Accountable Care Organization implementation improved access for previously uninsured people with diabetes as well as quality of care.

- Interventions that improved physical access to care were also associated with improvements in health care utilization. For example, interventions to minimize transportation barriers among people with chronic diseases found that transportation services embedded in multicomponent interventions involving patient navigation and chronic disease education reduced unnecessary emergency department (ED) visits. Increased access to health care in schools was also related to improved child outcomes. For example, directly observed therapy in school for individuals with chronic conditions (e.g., observing a student use an inhaler appropriately) reduced ED visits, and school-based case-management interventions for children with complex care needs were associated with improvements in asthma symptoms and decreased utilization of urgent care and ED visits. Access to tuberculosis testing among homeless individuals increased patient follow-up and care utilization, and pregnancy-related interventions among women involved in the U.S. criminal justice system increased use of contraception.

3. Summary of Evidence Gaps

Summary of Evidence Gaps Identified in the Environmental Scan

The review highlighted several critical gaps in the literature. One major evidence gap concerned the cost-benefit analyses of engaging in these interventions. There were cost-benefit studies in only two domains, health care and neighborhood and built environment. In the health care domain SDOH, several reviews of patient navigation and interventions led by community health workers (CHW) found that these interventions are cost-effective for hypertension management (Foster et al. 2019), improving access to care (Foster et al. 2019), and cancer prevention (Kim et al. 2016). Another review found that access to CHW interventions reduced depression symptoms and were more cost-effective than nurse home visits or usual care. (Viswanathan et al. 2010). In addition, one review concluded that patient assistance programs that provide certain prescription drugs at low or no cost to patients who lack prescription drug coverage significantly improve HbA1c. For persons with hyperlipidemia, there were significant improvements in LDL. The findings were cost-effective at 4:1 to 11:1 ratios (Felder et al. 2011).

In the SDOH of neighborhood and built environment, one review found that home-based multicomponent programs that involved home visits (by nurses, CHWs, environmental counselors, or others) to improve indoor asthma triggers among low-income persons were cost-effective with cost savings due to asthma symptom-free days (Nurmagambetov et al. 2011). Another review found that policies to increase the price of alcohol (e.g., taxes) reduced alcohol-associated harm and were cost-effective (Elder et al. 2010). A third review found that transportation assistance to attend cancer screening appointments (for breast, cervical, or colorectal cancer), in combination with other strategies such as mailing home screening kits, were cost-effective (Mohan and Chattopadhyay 2020). There were no review articles related to cost benefit analyses in any other domains.

There was less evidence for all of the SDOH domains compared to the health care domain, including education, social and community context, economic stability, and neighborhood and built environment. In particular, there was limited evidence on interventions targeting several subdomains such as food insecurity, employment, transportation, discrimination, and social cohesion; and there was a general lack of evidence in the education domain.

More details on the associations between specific interventions and health outcomes by SDOH domain and subdomain, along with number of studies associated with each outcome, can be found in Appendix E.

Because a major focus of this assessment is on understanding what information is lacking about SDOH interventions, we focused the discussions with experts on the gaps we identified from the environmental scan. In the sections that follow we summarize expert findings on

additional SDOH domains and the need to address evidence gaps in intervention cost and outcomes effectiveness, intersectionality and intergenerational risk, and scalability and sustainability. We expand on each of these points below.

Additional Potential SDOH Domains

Several experts observed that because the environmental scan focused solely on the HP2020 framework, information about interventions targeting SDOH domains that are more prominent in other frameworks may be missing. For example, the experts thought that evidence on the following subdomains was missing and should comprise some of the unanswered questions for an SDOH research agenda:

- Structural and systemic racism and discrimination is a cross-cutting theme that underlies inequities across the SDOH domains. This theme includes concerns about inequities driven by individual characteristics such as race or ethnicity, gender, immigrant and refugee status, and wealth. It also includes broader contextual concerns such as racial/income segregation and acculturation.
- Communication is a distinct construct from health literacy and was described as the ability to communicate in any format (verbal, phone, computer, etc.). This can be influenced by learning disabilities and technology/broadband access, among other factors.
- Mobility should be included as a concept that is broader than access to transportation, to include disability (i.e., using an assistive device) and legal issues (e.g., policies that prevent one's ability to get a driver's license), among other factors.
- Social isolation as a distinct construct from social support.
- The experience of adverse childhood experiences (ACE's) and other traumatic experiences/events that may affect well-being throughout life.

Several experts were particularly concerned about the absence of racism, discrimination, and shifting power in the current research on SDOH interventions. Several suggested a need for additional research on how addressing discrimination and systemic racism can affect health outcomes. This includes a suggestion that researchers should consider defining race as a multidimensional construct and avoiding skin color as a health determinant in research related to the delivery of care. Rather than focusing on skin color as a risk factor, in other words, researchers should instead be focusing on the most important experiences that lead to vulnerability for various groups. This means that to understand the link between race and health we need to be measuring underlying structural and historical determinants such as racism, trust, personal experiences with providers, and policies and systemic practices that serve as barriers to achieving health for some people.

Evidence Gaps

The experts also identified evidence gaps related to intervention effectiveness for the included SDOH domains, intervention cost-effectiveness, interventions targeting multiple domains (intersectional impacts of interventions across disaggregated subgroups), intergenerational and long-term impacts, and intervention sustainability. In this section, we report on broad evidence gaps and directions for an SDOH research agenda. Specific research questions that experts noted should be included in an SDOH research agenda to address these evidence gaps are listed in Appendix B.

Intervention Effectiveness and Cost-Effectiveness

The experts highlighted a gap in evidence—among the SDOH domains for which there was any—to help distinguish between intervention effects, particularly for domains in which there were mixed results. That is, within a given domain or subdomain, what additional evidence is needed to identify specific interventions or intervention components (e.g., including peer leaders versus CHWs) that have particularly noteworthy effects on health outcomes? As one participant suggested, "If we had better evidence to show which optional benefits demonstrated improved outcomes there would be more incentive for state Medicaid agencies and MA plans to offer these optional services that address SDOH."

In their review of the data, the experts also felt that there was a need for additional research on the effect of social services on health outcomes, particularly on how to integrate medical and social services. One expert suggested assessing both provider and patient perspectives on the need to integrate social needs assessments in medicine. Further, another expert suggested that research on SDOH should not exclusively focus on whether social services reduce medical costs. Rather, cost-benefit analyses should consider savings in any sector.

Relatedly, several experts thought there was a need for more information on whether and how outcomes varied by intervention intensity or dose. One expert pointed to the mixed findings for the economic stability subdomain and asked: "What should we do with areas in which there are positive interventions, and what kind of support is available to implement, scale, and further evaluate such interventions?" Another expert remarked that economic stability interventions appeared to show modest effects for niche outcomes, though intuitively it seems clear that economic stability has a significant impact across health outcomes. This expert expressed reluctance in developing an SDOH research agenda based on the results of this literature scan, given the "mixed" results, and suggested that the more we can prioritize new research within SDOH domains, the better it will be for identifying ways to translate findings into meaningful action. Another expert noted a gap in knowledge around interventions that health plans are interested in paying for, such as supplemental benefits. Several experts also pointed to the need to distinguish between individual- and community-level factors and prioritize upstream interventions that have the potential to make a difference on population health more broadly. The

experts also pointed to the need to move beyond effectiveness and include economic evaluations examining an intervention's return on investment, cost-effectiveness, or cost-benefit profile.

Intersectionality and Intergenerational Risk

The experts also discussed the lack of evidence on intersectionality (the concept that an individual's health may be affected by their social statuses and multiple SDOH simultaneously). This is important because the experts also thought that intersectionality should be a lens for future work on researching and intervening on SDOH. Several suggested that intersectionality is important both in the way it is assessed across studies and in the way the effects of interventions are measured. As one expert suggested: "How do we look at disability, for example, for individuals who are also minorities or living in underprivileged areas?" Another expert suggested that current research sometimes focuses too much on making changes at the margin rather than addressing the fundamental problems that lead to inequity. Because many interventions address only one dimension, they fail to get at the root of the problem, which is multifaceted. Finally, another expert noted that research focused on a single policy or program often fails to account for effects related to intersectionality (in terms of identity, geography, and other factors) and the effects of adjacent policies/programs, including those in nonhealth domains. This includes the need for research on programs or policies that consist of multiple components or target multiple determinants. At the same time, evaluations of policies targeting a single social determinant often fail to consider broader effects outside of health.

The complexity of the SDOH also includes the concept of intergenerational risk and impacts across the life course. However, the experts noted the lack of evidence on this topic. As one expert suggested, the trauma and adversity of racism, discrimination, and poverty are known to accumulate and affect people across multiple generations. But the interventions reviewed are often too narrowly focused on only one determinant or population rather than the long-term impacts on multiple determinants within the same family, community, or population assessed across multiple generations. As another expert suggested, a longer-term view of intervention impacts is needed: "What we do now affects future generations. You get three to five years of funding, but these things take decades to play out. Looking at long-term trajectories over the lifetime. Research needs to start earlier, in utero exposure, or previous generations. A few years of intervention is not enough." Another expert stated, "I would hope we could look at more longer-term interventions. Relying on managed care to implement interventions means that we limit ourselves to enrollees in plans, and short-term outcomes."

Scalability and Sustainability

Experts also noted there are meaningful differences between interventions to ameliorate the detrimental consequences of SDOH deficiencies and interventions to achieve sustained and lasting improvements in population health. They identified a gap in evidence with regard to the latter. As one expert asked,

> If we identify an element or activity that will improve a SDOH and improve the health outcomes, how do we ensure the intervention has endurance? What is the care and feeding [of maintaining programs] that needs to be done? Is there something that would allow us to understand how the [federal] investments would be maintained either in perpetuity [from the federal government] or how the Federal government would implement a successful transition plan to other entities?

Another noted that it is important to identify through implementation science which evidence-based interventions are scalable. The expert noted, "We know we don't know how to properly scale interventions." The gap in evidence on the scalability of interventions resonated with other experts who were interested in identifying interventions that demonstrated both effectiveness and the ability to be scaled across population settings or jurisdictions.

However, as one expert pointed out, this raises questions about sustainability and identifying how to maintain programs without investing funds in perpetuity. This requires research that assesses the long-term and sustainable effects of SDOH and related interventions.

4. Issues That Have to Be Addressed to Pursue a SDOH Research Agenda

The experts identified a number of issues that will support the impact of SDOH research agenda. Specifically, across the technical experts and HHS staff, there was broad agreement on three areas:

1. standardizing terminology and measurement
2. focusing on outcomes outside of health
3. building partnerships to develop SDOH interventions.

These are discussed in more detail below.

Standardizing Terminology and Measurement

Both the technical experts and HHS staff suggested that there are several frameworks for identifying the domains of SDOH, but there is also a lack of clarity on key concepts underlying SDOH across frameworks. They suggested that this highlights the need for standardizing terminology. For example, some experts noted that concepts related to SDOH were better articulated in social service domains than in public health and health care. Others noted that there is often confusion about the definitions of a particular SDOH and that often the concept of SDOH is conflated with health equity or other similar constructs like social needs and social risk factors.

Several experts also suggested that in addition to more precise language around key SDOH concepts and domains, standardization of measurement, use of existing health IT value sets/codes and standards, and approaches to data collection are important for comparing distinct interventions that target similar social determinants. For example, one expert suggested that pushing for the standardization of key terms and agreeing on a shared, systematic method of assessment is critical to ensure that researchers and systems are measuring constructs in the same way. One stated that "Standardization is necessary to synthesize data across [HHS] agencies, and we also need to think about the value or utility of specific factors such as education versus income, [and] geography versus access." Others highlighted that it is difficult to assess the quality and impact of an intervention without common definitions and measures. As one expert stated, "Mortality is a common measure, but measures of education and economic stability vary across different institutions." Further, several experts suggested a need for research that compares similar interventions implemented in distinct communities, populations, and health systems. Another expert suggested that there are also differences and variability based on the

level of the intervention and whether the intervention addresses one element of SDOH or multiple dimensions.

Experts suggested that one key strategy for aligning concepts might be to look at specific definitions of SDOH that may be different in federal guidance such as Healthy People 2030 and the Intergovernmental Task Force to identify differences (Office of Minority Health 2021a, 2021b). In addition, experts suggested that there are opportunities to address measurement concerns by linking researchers with agencies that deliver services. As one expert suggested,

> The federal government leads interventions across sectors, and it seems there should be a way to link agencies that deliver services to those who focus on research, in order to ensure more rigorous interventions. There is general agreement on the importance of these social needs, and many European and other countries have Health in All Policies.

In addition, some experts suggested the need for several additional specific measures:

- measures that can be used to identify what determinants a specific policy or program is targeting

- measures related to individual economic stability or program cost savings that account for diffuse savings scattered throughout multiple systems and potential gains (e.g., an increase in income) that might result from education, employment, or housing stability

- measures that describe health equity activities and outcomes in health care settings and that define and emphasize equity in health care.

However, several experts highlighted that there is a tension between this desire to align SDOH concepts, definitions, and metrics and the importance of identifying and replicating effective interventions. As one expert suggested, racial and ethnic disparities in COVID-19 outcomes highlight the serious need to address SDOH immediately. This expert stated,

> We need to take into account in near real-time what we are learning from COVID—who we are seeing becoming seriously ill and dying and what policies and conditions in the places where people live, learn, work, etc. may or may not have been in place to protect particular groups of people before and during the pandemic's onset.

Another suggested that this might be solved by working on parallel tracks of aligning definitions and metrics while also identifying high-priority interventions to replicate using prior efforts as references (e.g., Centers for Medicare and Medicaid Services 2021; Office of the National Coordinator for Health Information Technology 2020). Building on current federal efforts such as the ONC Federal Health IT Strategic Plan to integrate health and human services information is an efficient way to accomplish this.

Focusing on Outcomes Outside of Health

Some experts expressed frustration with the narrow health lens being used to assess programs and policies that may yield benefits beyond health. That is, many of the programs or policies included in the environmental scan are beneficial for health and well-being more generally (e.g., interventions related to economic stability), but these benefits were not highlighted in the scan. In addition, one expert suggested that in order to avoid medicalizing poverty, research on the social determinants of health should be conducted beyond clinical settings or health systems. As one expert suggested, "Research in this area needs to move beyond consideration of what the health care system is doing and look to criminal justice, housing, policies around structural racism, and other factors that contribute to population health." Finally, one other expert asserted that there is a need to parse health research from social services and to make distinctions by field of practice, adding that federal agencies focused on health research have significantly more funding than those dedicated to social service delivery. The implication here is that more funding is needed to identify the outcomes provided by social service programs and their alignment with improvement in health.

Building Partnerships to Develop SDOH Interventions

Given that no organization has infinite resources to ensure that interventions are sustained, the technical and HHS experts both highlighted the gap in evidence of the impact of partnerships on the success of interventions to address the multisectoral and complex nature of SDOH; and evidence of how best to leverage partnerships among organizations to improve and sustain outcomes related to the social determinants of health. As one expert stated, "We need to ask, 'What are the partnerships we need to build on the grantee recipients in the communities we participate in?' And then at the end of grant cycles, 'Who is an upstream partner that will augment our programs?' I am interested in exploring a disciplined way to get those partnerships." Another expert suggested that there is a need for multisectoral local consortiums that include government and cross-sector organizations to set the agenda for identifying and addressing locally focused SDOH concerns in that community. For example, given the number of jurisdictions that have prioritized policies to address racism, there may be opportunities to systematically explore what they are doing and their impacts. Finally, an expert noted that their agency works deliberately to concentrate on partnerships to help programs achieve their goals. In these circumstances, they try to ask what partnerships are needed to build at the level of grantee award recipients in communities where programs are being offered. In the literature scan, it was unclear how the construction of partnerships impacts whether and how these interventions achieve their goals. However, community partners are valuable because they may be adept at identifying and recruiting populations of interest; they are often ideal settings for conducting SDOH interventions both because the institutions may be particularly trusted within the community and because their staff are adept at communicating complicated health information in

the right language and at the right level of understanding to the communities they serve. Thus, more work can be done to assess how best to build partnered approaches to SDOH interventions.

5. Resources Needed to Execute an SDOH Research Agenda

Identifying the research gaps and issues that have to be addressed in order to advance the SDOH research agenda is important, but discussions with the experts also focused on the *resources* that are needed to execute that research agenda. The experts highlighted needs for

- data resources that include new data sources, broader access to existing data sources, and capitalizing on opportunities to build evaluations into federal demonstrations
- changes to approaches to funding SDOH research.

Data Resources

The experts identified data as one of the most important resource needs. They focused on both developing new data sources and gaining access to existing data sources to identify and track SDOH. The technical experts suggested that there is demand for improved data access to a wide variety of federal data, particularly those of Medicaid and Medicare, in order to assess questions related to SDOH. Both the technical experts and HHS staff suggested that there is a need for improved research collaboration and data sharing between agencies/departments in HHS with other areas of the federal government (e.g., Department of Justice). In addition, the experts suggested that there are opportunities to build evaluations into novel federal demonstrations related to the social determinants of health. For example, there are ongoing initiatives in Medicare and Medicaid that will lead to more information about promising approaches to addressing SDOH. Efforts to capitalize on this information can be replicated across programs and agencies. In addition, one expert suggested that there is also a need for a legal framework that addresses privacy and supports pulling data out of siloes (e.g., health care, plans, providers, social services are bound by separate laws) for the purpose of research and improved care.

HHS experts further identified data they need but do not yet have to address SDOH research questions:

- more robust sociodemographic data (e.g., standardized collection of race/ethnicity/ language/SES data, and greater disaggregation of data by race/ethnicity)
- better clarity about what "community-level" data versus individual-level data/health outcomes data are available
- better direct data on social/community-level issues, rather than proxies
- national data on the service population with high social needs to which individual HHS agencies can compare their own data (e.g., to determine if various subpopulations are disproportionately served)

- data on telehealth access, especially as it relates to usage of health IT connectivity among individuals who do not have the technology or access to broadband
- barriers to leveraging administrative data and linked data to improve evidence-building activities for SDOH interventions
- access to claims data to demonstrate impact of HHS-funded SDOH programs on health care utilization.

Changes to Existing Approaches to Funding SDOH research

Funding of SDOH intervention research was also identified as a resource need. As one expert suggested, at the federal level, some agencies do not get a research budget; rather, their budgets focus on implementing programs and policies, which makes it difficult to track impacts and lessons. Further, over time, as the global research budget has shrunk, there is less ability to look at exploratory questions. In addition, one expert suggested that there is a bias toward who gets large research grants (e.g., NIH R01) grants, which limits the types of researchers who contribute to this field and the types of research that is done. Both the technical experts and HHS staff suggested that, in addition to the federal government, other critical funding partners include philanthropy, hospitals with community benefit requirements, and other corporations with an interest in health are. As one expert stated, philanthropic support is particularly important: "it is often bolder than government funding because [foundations] focus more research on root causes rather than on interventions." But to have the greatest impact, the experts suggested that these other potential funders should be incentivized to invest community benefit funds and other outreach efforts in programs or activities related to SDOH. In addition, several experts suggested that funders should support research that is both based in underrepresented communities (i.e., in terms of sampling) and conducted by researchers and research teams that reflect those communities and are aligned with the priority needs of such communities. This reflects the concern that research should be more inclusive of the lived experiences of people and organizations that are most impacted by policies related to the social determinants of health. In addition, several experts suggested that SDOH convenings, planning, and funding activities should target a broader set of stakeholder perspectives, particularly those outside physician organizations or health systems.

Several experts also suggested that despite a growth in collaborative approaches to building private funding programs in health, funders driving programs limits the research to the questions funders think are important. In addition, federal funding for SDOH research is siloed within sectors and within agencies, which makes it challenging to develop lessons learned from SDOH interventions that are multisectoral. To address this challenge, the goals, approaches, and evidence have to be aligned across sectors.

Limitations

There are several limitations to these findings. First, within each domain and subdomain of the SDOH, we present results of the review organized by health or health behavior outcome (Table 2.1). The outcomes summarized are based entirely on what is presented in the literature. Because we did not focus our search strategy on a predetermined set of health or health behavior outcomes, there is uneven representation of outcomes across the SDOH domains.

Second, we were unable to systematically assess the quality of evidence across studies. The articles we reviewed did not always include an assessment of article quality and, when they did, their assessments were not uniform across studies. Thus, the only way to capture information on quality consistently at the review level was to highlight the number of articles each review article included. But this is a very weak indicator of quality.

Third, while intersectionality was an important gap in the evidence highlighted by the experts, we did identify several studies that focused on interventions that tried to address multiple SDOH; however, it was difficult to assess the impact of different intervention components on a specific SDOH and, as such, these studies were excluded from our review.

Fourth, by limiting our search to reviews, we were unable to capture all the detailed information necessary for drawing conclusions about each SDOH, and our approach may have missed some studies that did not meet the inclusion criteria of the reviews assessed (e.g., poor quality or a narrow focus on a specific population). We also miss evidence from more recent interventions that were not included in the reviews assessed.

Nevertheless, this work provides a potential roadmap for pursuing an SDOH research agenda to inform practice and policy.

6. Conclusion and Next Steps

The findings from this project are important because addressing SDOH is part of the overall solution to improving health more equitably and reducing health care costs. The environmental scan identified that there have been several successful approaches to improving health outcomes by addressing social determinants in both health care and community settings. But gaps in evidence remain. Notably, there was a dearth of evidence in all of the domains other than health care.

Our conversations with experts highlighted the need for research on how to integrate social services with health care and the impact of social services on health. In addition, research is needed on how to leverage data in the health and social service sectors to target resources and facilitate community-wide interventions targeting social determinants to improve health.

Further, this project highlighted several common areas of interest to continue to build the evidence base around SDOH interventions that could inform a research agenda. Through this project, RAND identified the following gaps in understanding SDOH interventions:

- There has been limited research on the effectiveness and cost-effectiveness of SDOH interventions beyond health care (i.e., interventions targeting the built environment, education, etc.).
- Understanding has been poor with regard to intersectionality of multiple SDOH (e.g., education and health care) and individual characteristics (e.g., disability and race), and how they impact health.
- Research is lacking on the intergenerational (e.g., parent-child) and long-term health effects of SDOH interventions.
- There is limited evidence from interventions targeting less studied subdomains such as racism, social isolation, and trauma.

This project also highlighted several challenges, such as defining common SDOH definitions and metrics. Some potential opportunities to address these challenges were raised, including

- defining terms and definitions, standardizing variables/measurements, using the same nomenclature
- acknowledging that investments in social services are important and have great potential for generational impacts, thus more work is needed to bring social service perspective into health care approaches
- identifying ways that ASPE and other agencies can recognize collaborations to facilitate data linkages across agencies to help answer some of the more complicated SDOH-related research questions.

To overcome these challenges and come together around a research agenda, the HHS experts generally agreed on areas for further work on SDOH. First, several experts suggested addressing

critical information needs, including establishing data standards, adopting and harmonizing existing SDOH standards, embracing available or relevant health IT standards, embedding evaluations in all programs in which social services are offered to address health care and social needs, and considering the role of HHS in moving beyond individual interventions to community-wide interventions (i.e., social needs versus SDOH) and access to care. Second, experts suggested maintaining communication across the department. As one expert stated, "This information sharing is useful for creating new networks and ensuring that we don't duplicate efforts." Another expert stated the importance of "identify[ing] which agencies have existing or are planning investments in SDOH interventions/research/payment models and identifying current cross-agency collaborations on SDOH." Overall, there was broad agreement that the department could look for ways to prioritize approaches, identify gaps in investments or collaborations, and generate a regular report for updating efforts across agencies.

Appendix A. Detailed Methods

Environmental Scan

The goal of the environmental scan is to understand the evidence base and research gaps for SDOH interventions (programs and policies) in the United States. To address this goal, we conducted an environmental scan in September 2020 to identify published reviews of interventions, assess what is known, and determine where there are gaps or insufficient evidence.

The scan involved three steps:

1. a search of the literature using electronic databases
2. a preliminary scan of the abstracts and titles of the identified publications to screen out those meeting our exclusion criteria
3. a full review of the of the remaining manuscripts for the data extraction.

Below we provide more details on our specific approach.

Literature Search Strategy

In Step 1, we used PubMed, the Web of Science: Arts and Humanities Citation Index and Social Sciences Citation Index to electronically search for English-language literature on SDOH published since 2010. In consultation with ASPE, we used the Healthy People 2020 place-based framework to identify interventions focused on the following domains:

- Economic stability comprises the individual- and household-level financial resources and economic factors that affect health and well-being. Examples include housing instability, poverty, food insecurity, and employment.

- Education consists of the educational opportunities from early life to adulthood that support learning, healthy development, economic mobility, and access to resources that promote health. Examples include early childhood education and development, enrollment in higher education, high school graduation, and language and literacy (i.e., listening and speaking skills, writing and reading, the ability to understand and work with numbers, and cultural and conceptual knowledge).

- Neighborhood and built environment comprises the attributes of the places where people live that can shape health and well-being. Examples include quality of housing, access to foods that support healthy eating patterns, environmental conditions, crime and violence, and transportation access.

- Social and community context incorporates the social characteristics of the contexts in which people live that can shape health and well-being. Examples include civic participation, discrimination, incarceration, social cohesion, and social support.

- Health care involves factors related to access to and understanding of health care services. Examples include access to affordable, high-quality, and culturally or

linguistically appropriate health care, particularly primary, specialty, and preventive care, health insurance and prescription drug coverage, and health literacy.

We limited the search to the United States. Given the breadth of research on individual programs and policies targeting social determinants of health, we narrowed our search to reviews and other summary documents, and excluded original articles evaluating single interventions, to obtain a more manageable set of publications covering programs and policies. The following types of publications were included: systematic review, review, meta-analysis, and editorials. We included editorials at this step as such articles often focus on research gaps; however, after carefully reviewing those articles, we decided to exclude them at Step 2 since it was difficult to differentiate when they systematically reviewed evidence versus offering subjective opinions about evidence. The search resulted in 1,845 publications.

Inclusion and Exclusion Criteria

In Step 2 (preliminary scan), we screened the abstracts of the 1,845 publications for the following exclusion criteria: not related to a SDOH; did not mention evaluating interventions (e.g., article focused on associations and provided only recommendations for interventions); did not review U.S.-based interventions (e.g., article mentioned U.S. interventions in the introduction or discussion but did not review them); evaluated a single program or policy; did not assess impacts on a health outcome or health behavior, or did not include a cost analysis (e.g., article focused only on changes in knowledge); or other reason (e.g., introduction to a special issue of a scientific journal). Although reviews of interventions targeting SDOH that focus on nonhealth outcomes (e.g., educational outcomes or poverty alleviation) are available, we focused our search on interventions specifically targeting health outcomes or health behaviors to address our research questions; other nonhealth interventions were deemed beyond the scope of this review. A total of 1,181 publications did not meet these criteria or were duplicates and were excluded. Of the 664 publications that remained, we excluded the 74 editorials and other expert opinion pieces (e.g., commentaries) as they may be susceptible to author bias, thereby leaving 590 reviews for data extraction.

Data Extraction

In Step 3 (full review), we searched for the full manuscripts for each of the 590 reviews and excluded those for which a full manuscript was not available (e.g., required special access that was not obtainable within the project period). We reviewed the full manuscripts to assess whether the review should be excluded based on the above exclusion criteria. A total of 43 were excluded from the analysis because a full manuscript was not available without a cost, and 414 reviews were excluded based on one or more of the exclusion criteria.

For each of the remaining 133 reviews, we extracted the following information: the number of articles included in the review; the SDOH domain and subdomain addressed; whether the

review addressed programs or policies or both; outcomes targeted by the interventions; intervention description; characteristics of the populations targeted by the interventions (age, gender, race/ethnicity, income, population with a specific health condition, or other sociodemographic attribute such as rural residence); intervention impacts on outcomes of interest; intervention economic impacts; whether the intervention was supported by a specific funder; and whether the review used data sources other than the data collected by the interventions. For each review, we extracted information about each outcome targeted by the interventions, allowing us to make a clear link between specific SDOH interventions and specific outcomes. We did not assess the strength of the evidence across each review given the variations in how the reviews synthesized the results (e.g., meta-analyses reported overall effects while other reviews reported the proportion of articles reporting significant improvements in a specific outcome). Some reviews also noted that several of the evaluated interventions were underpowered as they were not designed to detect significant associations between changes in the SDOH of interest (e.g., housing) and health outcome, or they had notable limitations (e.g., no "good" comparison group) and thus nonsignificant effects should be interpreted with caution. As such, we assessed the intervention impacts on outcomes based on the direction and consistency of the effects reported across the included studies for each review. We report the number of studies included in each review for each outcome, including whether the evidence is based on a single study. We identified 15 reviews of interventions that focused on multiple SDOH. During the abstraction of the review articles, it became clear that it was not possible to assign outcomes to a specific intervention or SDOH, which made interpretation of the results difficult; thus, we dropped these 15 reviews, for a total of 118 review articles included in this scan.

Discussions with the Technical Experts and HHS Staff

To augment the literature scan, RAND convened nine SDOH technical experts for a series of virtual discussions to inform and interpret the environmental scan, identify gaps within the literature, and develop recommendations for the final report. Experts were drawn from state or local government organizations, funding organizations, health plans and payers, community-based organizations, academic and research organizations, and health care organizations, and had expertise in health care policy, research, and social service and health care delivery, as well as in the SDOH domains and subdomains assessed in the scan. In lieu of an in-person panel discussion, we held individual interviews with each expert on the following topics:

1. Framework and evidence gaps:
   - gaps in the identified SDOH subdomains
   - gaps in the identified health and behavioral health outcomes
   - missing evidence of the impact of policy and program interventions designed to address specific SDOH domains and subdomains
   - gaps in the relevant information on cost-effectiveness of interventions

2. Developing a SDOH research agenda concerning
   - critical unanswered questions around the impact of SDOH interventions
   - strategies for building the evidence base on SDOH interventions
   - resources needed to execute this research agenda
   - critical stakeholders for advancing the research agenda
   - roles for federal and other public/private institutions for developing this evidence base
   - data sources to help guide intervention implementation.

Ahead of each interview we sent the experts an overview of the methods and high-level findings from the scan and an excerpted subsection (grouped by SDOH) of the scan to review (see Appendix E). Interviews were conducted by one lead facilitator and a notetaker. Each interview was guided by a semistructured discussion guide tailored to each person's technical expertise and was recorded to facilitate accurate note taking. Each interview lasted approximately one hour. Because not all experts reviewed all of the SDOH domains in the literature scan, the SDOH domains and subdomains discussed differed by experts. We divided the scan results such that more than one expert reviewed the information in each SDOH domain, with each domain and subdomain of the SDOH being reviewed by at least two experts.

In addition, on December 10, 2020, RAND and ASPE convened a group of federal stakeholders spanning multiple agencies within HHS for a virtual meeting. The purpose of this convening was to review and interpret findings from the environmental scan; review feedback, gaps, and priorities identified by the technical experts; identify the gaps or insufficient evidence in terms of research, implementation, and dissemination; and identify actions that HHS can pursue to fill gaps or insufficient evidence.

Prior to the meeting with HHS staff, RAND and ASPE shared with them the draft environmental scan and summary of the expert panel discussions and asked them to reflect on several questions including the key research questions that should be included in an SDOH research agenda, next steps for their agency in contributing to this work, and ideas for collaboration to achieve the goals of developing this research agenda. At the meeting, ASPE provided background on the project including ASPE's recognition of the need for more evidence on SDOH interventions, and the growing importance of SDOH in public policy debate. ASPE further highlighted that the experience of the COVID-19 pandemic has brought racial and economic disparities in health to the forefront. RAND summarized findings from the environmental scan of SDOH and technical expert discussions. RAND and ASPE jointly developed a discussion guide.

To identify themes on the discussion questions, two RAND researchers reviewed each set of interview notes and the transcript of the HHS meeting to identify areas of commonality. All themes were summarized into four key areas: (1) evidence gaps, (2) development of a research agenda to address these gaps, (3) insights on resources needed to support this research agenda, and (4) considerations to implementing identified solutions. These themes indicate areas of

consensus where more research is needed, and where there is sufficient evidence of impact on outcomes, but also suggest additional outcomes, evaluation considerations such as intersectionality of different SDOH and need for partnerships, including engaging with philanthropic foundations.

Appendix B. Research Questions to Inform the SDOH Research Agenda

In addition to the research gaps identified in Chapter 3, discussions with both the technical experts and HHS staff identified several example research questions that can be pursued to improve knowledge about SDOH interventions, including: effectiveness of various policy and program approaches, cost-effectiveness, intersectionality, and domain-specific questions. The specific research questions identified by these experts are presented below.

Effectiveness of SDOH Interventions

The dearth of evidence on the effects of policies targeting SDOH on health or health behavior outcomes warrants further research. SDOH policy and program evaluations should also go beyond effectiveness and assess impacts on equity (e.g., the extent to which interventions reach and impact vulnerable populations). A better understanding is needed of how researchers and practitioners can leverage existing social services to develop SDOH interventions. Research is also warranted on how SDOH are being integrated into federal initiatives. Further, systems-level thinking is needed to understand how interventions or even systemic shocks (e.g., COVID-19, reckoning about structural racism) impact SDOH at both the individual and systems levels (e.g., health care and social services). Specific questions to address these evidence gaps include the following:

- Which policies addressing SDOH are effective in improving health and for which populations?
- Are there differential effects of social services interventions by racial or ethnic group? Are they consistent across type of social service (e.g., housing, food security) and health outcome?
- What percent of the population with persistently high costs and SDOH needs is being reached by existing federal investments?
- How has COVID-19 impacted SDOH needs, community infrastructure and services, and health care and community partnerships to address SDOH and how can pandemic-related SDOH data and lessons learned inform future efforts?

Cost-Effectiveness

Additional research is warranted on the cost-effectiveness of SDOH interventions to inform policy and decision making. Given that unmet social needs can contribute to the increased use of medical services, economic evaluations can provide support for investing in SDOH interventions as a strategy for addressing these high costs. However, there has not been sufficient argument for why health care organizations need to invest in SDOH activities. In contrast, startups are using

evidence on SDOH to gain contracts with health plans to do this work, and they may run return on investment (ROI) studies to build their business case, but their findings won't be in peer-reviewed articles. The following research questions can provide a starting point for researchers to help build the economic case for investing in SDOH interventions:

- Which interventions (and for which target populations) have the best cost-effectiveness findings and should therefore be considered for immediate inclusion in the Medicare and Medicaid programs?
- Which interventions (and for which target populations) have promising cost-effectiveness findings and should therefore be prioritized for additional research (either through ASPE/foundation partnerships, Center for Medicare and Medicaid Innovation models, or other means)?

Intersectionality

Individuals have complex social needs, yet interventions often target a single social determinant at a time, and this process has largely had limited or mixed impacts on health. Further, there is little research on how an intervention targeting one SDOH impacts another SDOH. Research using an intersectionality lens is warranted to better understand how SDOH are interrelated and how interventions directly or indirectly impact multiple SDOH. In particular, population characteristics (sociodemographics, health status, etc.) can play an important role in facilitating or impeding the impacts of an SDOH intervention, yet there has been limited research examining such mechanisms. Thus, the following questions can help shape future research:

- What evidence is there on intersectionality? For example, what is the impact of behavioral health treatment on criminal justice, the Supplemental Nutrition Assistance Program (SNAP) on health, air pollution on Medicaid/Medicare spending, etc.?
- What role do behavioral health comorbidities (e.g., substance use disorder [SUD]) play in mediating or moderating the effect of SDOH on other health outcomes, and in intervention effectiveness? For instance, does a parent's SUD prevent a housing intervention from improving child health?
- What is the evidence on the relationship of factors such as race and comorbidities on SDOH?
- How can we account for effects related to intersectionality (in terms of identity, discrimination, geography, and other factors) and the effects of adjacent policies or programs, including those in nonhealth domains?

Domain-Specific Questions

The experts identified several further research areas where evidence is needed related to specific subdomains of the health care, economic stability, neighborhood and built environment,

and social and community context domains. One question was also provided for the education domain broadly, given the dearth of research on the health impacts of interventions beyond early childhood development and education (ECE). Specifically, the experts identified the following example research questions:

Access to Care

- What are the adverse impacts of policies on access, such as immigration policies on health insurance enrollment?
- How do upstream factors impact access to care, such as network provider coverage in rural areas, barriers to telehealth (e.g., broadband and internet access), health care workforce diversity (racial concordance between patient and provider), and policies (e.g., work requirements in Medicaid)?

Health Literacy

- To what extent are health communication materials appropriate for the population context, in terms of health literacy, linguistic competence, and cultural preferences or needs?

Culturally and Linguistically Competent Care

- How is the health care workforce pipeline changing to reflect target populations?
- To what extent are religious practices included in cultural competency training?
- What are the independent effects of cultural and linguistic competence on outcomes?

Housing Instability

- What are the health, economic, and societal outcomes of housing interventions, especially at the population level?
- What are the structural barriers to housing interventions, including who (what agencies) funds these programs and what is allowed to get funded?

Employment

- What are the links between systemic employment discrimination and mental health and work-related stress?
- What are the impacts of job development and wraparound programs?

Education

- What are the health impacts of education interventions beyond ECE, including K–12 through higher education?

Crime and Violence

- What are the health impacts of violence interventions targeting refugee populations, among whom suicide and domestic violence may be tied to cultural issues?
- How do individual factors (e.g., poverty and race), neighborhoods, and nonenvironmental systems (criminal justice, law enforcement, child welfare, emergency medical response) interact to shape crime and violence?

Quality of Housing

- What are the best practices for disseminating evidence-based home remediation programs to improve asthma outcomes?
- What are the impacts of home modification programs to improve home safety (e.g., for persons with mobility issues), particularly in managed long-term care?

Discrimination

- How can we improve measurement of the experience of discrimination?

Appendix C. Technical Expert Panel Members and Affiliations

Name	Affiliation	Stakeholder Category
Noha Aboelata, MD	Roots Community Health Center	Health care organizations
Fatima Angeles, MPH	California Wellness Foundation	Funding organizations
Lawrence M. Drake II, PhD, MBA, MS	LEAD Program	Community-based organizations
Chris Esguerra, MD, MBA	DME Consulting Group, Formerly of Blue Shield of California	Health plans/ payers
Sandra Ford, MD, MBA	DeKalb County Board of Health, National Association of County Health Officials	Local/state government organizations
Laura Gottlieb, MD, MPH	University of California San Francisco, Social Interventions Research and Evaluation Network	Academic/ research organizations
Cara James, PhD	Grantmakers In Health	Funding organizations
David Lakey, MD	University of Texas	Local and state government organizations
Thomas LaVeist, PhD	Tulane University	Academic and research organizations

Appendix D. HHS Agency Participants

Administration for Children and Families
Administration for Community Living
Agency for Healthcare Research and Quality
Assistant Secretary for Financial Resources
Centers for Disease Control and Prevention
Centers for Medicare and Medicaid Services
Resources and Services Administration
Indian Health Service
National Institutes of Health
Office of the Assistant Secretary for Health
Assistant Secretary for Administration
Office of the National Coordinator for Health Information Technology

Appendix E. Environmental Scan Detailed Results

The goal of this review is to understand the evidence base and research gaps for interventions (programs and policies) targeting social determinants of health (SDOH) in the United States. To address this goal, we conducted an environmental scan to identify published reviews of interventions, assess what is known, and determine where there are gaps or insufficient evidence.

The review yielded 193 articles. We used the Healthy People 2020 place-based framework to organize the intervention findings first by SDOH domain and then specific subdomain (Table S.1). Within each subdomain we present results of the review organized by health or health behavior outcome.

SDOH: Economic Stability

The economic stability domain focuses on how individual- and household-level financial resources and economic resilience affect health and well-being. Key issues in this domain include housing instability, poverty, food insecurity, employment, and household income.

Housing Instability

Housing instability entails difficulties related to housing, including not having a permanent home, trouble paying rent, overcrowding, moving frequently, or spending the bulk of one's income on housing. Housing instability is associated with poor mental health, stress, disrupted social and community ties, poor sleep, and risk of infectious disease. Interventions targeting housing instability include housing subsidies/assistance and permanent supportive housing.

Behavioral Health

Three reviews reported generally positive evidence on the impact of policies on improving mental health and substance use outcomes. No reviews examined diagnosis of behavioral health conditions or access to behavioral health care:

- A review of 152 studies found that permanent rental housing assistance or supportive housing among adults with HIV experiencing homelessness or unstable housing improved mental health functioning (Aidala et al. 2016).
- A review of 14 studies found that permanent supportive housing with case management support showed inconclusive effects on mental health or substance use outcomes for persons with mental illness experiencing homelessness (Benston 2015).
- One review found that providing housing vouchers reduced psychological distress, depression, and generalized anxiety disorder among low-income girls in food-insecure households. The number of articles included in this review is not clear (Lindberg et al. 2010).

Child and Adolescent Health and Development

Two reviews reported mixed evidence as to whether relevant policies improve child health outcomes. No reviews examined child developmental outcomes:

- One review found that providing housing vouchers to families reduced the likelihood of the children being very low weight relative to children in families who did not receive housing vouchers. The number of articles included in this review is not clear (Lindberg et al. 2010).
- A review of 14 studies found that children in public housing had more violent behaviors than children who were not in public housing (Slopen et al. 2018).
- The same review of 14 studies found that receiving any housing assistance (e.g., public housing, multifamily housing, housing choice vouchers) was associated with small increases in internalizing behaviors (e.g., anxiety, withdrawal) and no change in externalizing behaviors (e.g., aggression) (Slopen et al. 2018).

Infectious Disease

One review of 152 studies reported positive evidence on the effect of housing policies on improving HIV viral load and reducing unnecessary ED visits. No reviews examined HIV diagnosis or other HIV symptoms and management; and no reviews examined the effect on necessary health care utilization:

- Providing permanent rental housing assistance or supportive housing to homeless or unstably housed adults with HIV reduced viral load (Aidala et al. 2016).
- Providing permanent rental housing assistance or supportive housing to homeless or unstably housed adults with HIV resulted in reduced ED utilization (Aidala et al. 2016).

Poverty

Poverty entails the inability to attain the minimum amount of income and other resources needed to cover an individual, family, or household's basic needs. Poverty is closely associated with a variety of poor health outcomes, including reduced access to health care, increased risk of mental illness and chronic disease, higher mortality, and lower life expectancy. Interventions targeting poverty include direct economic assistance (e.g., Earned Income Tax Credit, Temporary Assistance for Needy Families, Social Security Insurance), programs designed to improve economic mobility (e.g., Head Start, wage increases), and programs designed to cover expenses like food (e.g., the National School Lunch Program), housing (e.g., housing vouchers), and health care (e.g., Medicaid).

Behavioral Health

Two reviews found mixed or no evidence for the effect of antipoverty policies on improving mental health outcomes, including reducing days in poor mental health or decreasing substance use. No reviews examined the relationship between poverty and diagnosis of behavioral health conditions or access to behavioral health care.

One review of in-work policies found no evidence of improvement in behavioral health:

- One review of five studies found that receiving the Earned Income Tax Credit (EITC) had no effect on the number of bad mental health days in the past 30 days among qualifying families (Pega et al. 2013).

One review of 18 studies on financial support through Social Security Insurance (SSI) benefits for low-income individuals found mixed evidence for improving behavioral health outcomes:
- There was some evidence that representative payee services (benefit payment management for beneficiaries who are incapable of managing their SSI payments) for persons with disabilities reduced substance use (alcohol and drug use), though most studies found no effect. This policy did not improve depression (Kinsky, Creasy, and Hawk 2019).

Child and Adolescent Health and Development
One review examined the impact of household income supports through various federal policies on child health and development outcomes and found that the evidence was mixed.

Interventions from one review that focused on supporting household income reported a positive impact on infant health:
- One review of 19 studies found that minimum wage raises improved birth outcomes (e.g., reduced low birth weight and postneonatal mortality (Spencer and Komro 2017).
- The same review found that receiving EITC improved birth outcomes, such as reduced low birth weight and postneonatal mortality (Spencer and Komro 2017).

Evidence of the impact on child development of interventions summarized in one review that focused on supporting household income was mixed:
- This review of 19 studies found that receiving EITC reduced problem behaviors (Spencer and Komro 2017).
- The same review found that receiving Temporary Assistance for Needy Families (TANF) had mixed impacts (some improvements, some no effects) on problem behaviors in children (Spencer and Komro 2017).

General Health
One review of 19 studies found that the EITC improved perceptions of general health:
- Receiving the EITC was associated with improved physical health and lower likelihood of self-reported poor health (Spencer and Komro 2017).

Health Behaviors
One review of five studies that evaluated in-work policies (e.g., tax credits for families through EITC) showed no effect on tobacco use. No review examined other health behaviors or uptake of health behaviors such as diet, exercise, or other substance use.

- Receiving EITC had no effect on tobacco use overall but did show lower current smoking for whites and lower rates of smoking during pregnancy (Pega et al. 2013).

Health Care Utilization

One review of 18 studies indicated that representative payee services policies reduced ED visits and increased outpatient visits. These reviews did not distinguish between needed visits in each case:

- Representative payee services for persons with disabilities reduced inpatient utilization and increased outpatient utilization (Kinsky et al. 2019).

Maternal Health

One review of 19 studies indicated that evidence of the impact of household income supports provided through various federal policies on maternal health outcomes is mixed.

- Receiving EITC reduced depression in mothers (Spencer and Komro 2017).
- The same review found that reforms that narrowed the scope of welfare benefits, like TANF, was associated with poor health behaviors in single mothers as compared to married mothers, single nonmothers, and married nonmothers who accessed TANF before and after reforms in the program, including higher rates of binge drinking and a lower likelihood of completing cancer screenings (Spencer and Komro 2017).

Obesity

One review found that in-work policies (e.g., tax credits for families through the EITC) had no effect on obesity outcomes. No review examined antecedents of obesity (i.e., diet, exercise):

- One review of five studies found that receiving the EITC had no effect on weight for obese and overweight individuals (Pega et al. 2013).

Employment

Employment, which describes the condition of working for pay or profit, influences health and well-being through several aspects, including job security, job benefits (e.g., parental or sick leave), underemployment (e.g., loss of social status or income), the work environment (e.g., exposure to environmental hazards), financial compensation, and job demands (e.g., severe physical or mental stress). Job-related stress or environmental hazards can directly influence health outcomes; similarly, underemployment, unemployment, or poor benefits can affect access to health insurance coverage, the ability to take time off for health care services, and mental health status. Interventions targeting employment include workplace improvement interventions, unemployment assistance, and workplace safety and well-being protections. This section focuses on studies that describe the effects of these aspects of employment on health and well-being.

Behavioral Health

One review of ten studies evaluated a workplace intervention that improved maintenance of abstinence from substance use. No reviews examined diagnosis or treatment for substance use disorders:

- An intervention called therapeutic workplace (a workplace program that promotes drug abstinence or medication adherence by tying regular urine samples or scheduled doses of medication to maximum pay) increased the maintenance of abstinence from opiates and cocaine in unemployed pregnant women, increased the maintenance of abstinence from cocaine in unemployed welfare recipients enrolled in methadone treatment, increased the maintenance of abstinence from alcohol in unemployed homeless alcohol-dependent adults, and increased the maintenance of naltrexone in unemployed opioid-dependent adults (Silverman, Holtyn, and Subramaniam 2018).

Food Insecurity

Food insecurity entails the disruption of food intake or eating patterns because of the lack of money and other resources. Food insecurity is often attributable to loss of income or employment, competing costs related to housing or medical care, and limited geographic access to affordable food. It is associated with a variety of negative health outcomes, including poor diet, obesity, developmental challenges, and poor mental health. Interventions targeting food insecurity entail neighborhood or school-based food access programs, meal or grocery delivery programs, nutrition education, and access to the nutrition assistance programs, such as Supplemental Nutrition Assistance Program; the Women, Infants, and Children Program; and National School Lunch Program.

Health Behaviors

Two reviews found mixed or no evidence for the effect of food insecurity interventions on nutritional outcomes, including increasing dietary quality, intake of nutritional foods, intake of vital nutrients, and reducing malnutrition. No reviews examined other health behaviors, such as tobacco use or physical activity.

In two reviews that examined the effect of nutrition interventions and policies on improving nutritional outcomes, the evidence was mixed:

- One review of 14 studies found that families who took part in the Supplemental Nutrition Assistance Program–Education (SNAP-Ed) increased reported intake of nutritious foods (i.e., increased consumption of fruits and vegetables) but did not show similar improvements in dietary quality based on guidelines for a healthy diet (Rivera, Maulding, and Eicher-Miller 2019).
- One review of 18 studies found that summer nutrition programs providing free meals to children and youth in low-income communities during summer months decreased sugar-

sweetened beverage consumption, increased willingness to try new fruits and vegetables, and improved dietary quality (Turner and Calvert 2019).

One review found that interventions providing home-delivered meals improved nutritional outcomes:
- One review found that home-delivered meals for the elderly improved intake of vital nutrients (i.e., protein, thiamin, riboflavin, calcium, iron, and phosphorus) and decreased malnourishment (Sahyoun and Vaudin 2014). The number of articles assessed in this review is not clear.

SDOH: Education

The education domain focuses on the educational opportunities from early life to adulthood that support learning, healthy development, economic mobility, and access to resources that promote health. Key issues in this domain include early childhood education and development, enrollment in higher education, high school graduation, and language and literacy.

Early Childhood Development and Education

Early childhood education and development, particularly in the first five years of life, are key determinants of health and well-being throughout life. Development encompasses physical, social/emotional, behavioral, and language/cognitive growth. Early childhood education and development opportunities are impacted by the social and environmental conditions in early life including stressors and adverse events, the socioeconomic status of children's families and communities, relationships with parents and caregivers, and access to early education programs.

Behavioral Health
One review of 22 studies that evaluated the effect of relevant interventions on improving behavioral outcomes found that the evidence was mixed. There were positive results for child behavioral and mental health problems but mixed or no effects on child health broadly. This review also found positive results for access to mental health treatment. No reviews examined specific behavioral health diagnoses common in children:
- Multicomponent high-intensity home visit interventions delivered by health care professionals reduced child behavioral and mental health problems associated with exposure to adverse childhood events (Marie-Mitchell and Kostolansky 2019).
- Multicomponent medium-intensity home visit interventions delivered by health care professionals increased mental health treatment for all children (Marie-Mitchell and Kostolansky 2019).
- Multicomponent home visit interventions delivered by paraprofessionals had no effect on child health broadly but did reduce infant bruising (Marie-Mitchell and Kostolansky 2019).

Child and Adolescent Health and Development

Two reviews evaluated the impact of relevant interventions and policies on child health and development outcomes and found that the evidence was mixed. There were mixed or no effects on emotional development, teen birth outcomes, psychomotor skills, or cognitive development. No reviews examined infant outcomes, diagnosis of health conditions, or other development outcomes for infants or children.

A review of early care and education (ECE) programs (e.g., state and district preschool, Head Start, and model programs) found no improvement in child development:

- A review of 27 studies found that ECE in general had small and statistically nonsignificant effects on emotional development (Hahn et al. 2016).
- The same review found that Head Start participation had no effect on teen birth outcomes (Hahn et al. 2016).

A review of the impact of home visit interventions on child development found mixed effects:

- A review of 21 studies found that home visits for children and adolescents in at-risk families had positive or no effects on psychomotor and cognitive development (Peacock et al. 2013).
- The same review found that home visits also had mixed impacts on physical growth for low-birth-weight infants and malnourished children. Some studies reported improvements; others found no effect (Peacock et al. 2013).

SDOH: Neighborhood and Built Environment

The neighborhood and built environment domain focuses on the attributes of the places where people live that can shape health and well-being. Key issues in this domain include quality of housing, access to foods that support healthy eating patterns, environmental conditions, crime and violence, and transportation access. Reviews were identified that evaluated interventions targeting each of these five key issues.

Quality of Housing

Quality of housing refers to the physical conditions of one's home and includes aspects such as air quality, home safety, space per individual, and presence of mold, asbestos, or lead. Poor-quality housing is associated with poor health outcomes. Factors that impact housing quality include a home's age, design, structure, maintenance, and infrastructure (e.g., plumbing and air conditioning).

A total of five reviews evaluated interventions targeting housing quality. Interventions included home remediation/improvement programs, changes to homeless shelter conditions, and

smoke-free home policies. Overall, interventions showed beneficial effects on health (asthma, infectious diseases, smoking, and child health) and economic outcomes. However, evidence for interventions targeting homeless shelter conditions was limited.

Asthma and Respiratory Disease

Three reviews evaluated the impacts of programs targeting the home environment on asthma outcomes, such as asthma symptoms and asthma acute care visits, as well as economic outcomes (related to asthma symptom-free days). Overall, these programs were effective at improving asthma symptoms and health care utilization among low-income persons and showed favorable economic outcomes:

- A review of 30 articles evaluating home remediation programs found that individualized home assessments and remediation strategies (e.g., mattress and pillow encasements; HEPA vacuums and air filters; decreased tobacco smoke exposure; pest and cockroach management; and safe household cleaning products) were associated with reduced asthma symptoms, reduced school absenteeism, and reduced asthma acute care visits among low-income school-aged children. Programs without remediation, that is, home-based asthma education only, did not significantly improve outcomes (e.g., ED visits, asthma symptoms, quality of life, school absenteeism). The review included three economic evaluations and found an overall positive return on investment (ROI) for home remediation programs (Giese 2019).
- A review of 50 articles evaluating asthma interventions showed that programs involving home visits for environmental control (e.g., bedding, pest reduction, self-management) and patient education were effective at reducing asthma symptoms. Home visits were made by nurses, teams of providers, or lay persons (Clark et al. 2010).
- A review of 13 articles evaluating home-based multicomponent programs focused on low-income persons with asthma showed overall favorable cost-benefit and cost-effectiveness ratios (with cost savings from asthma symptom-free days). All programs involved home visits (by nurses, CHWs, environmental counselors, or others) to improve indoor asthma triggers, including home air quality (Nurmagambetov et al. 2011).

Child and Adolescent Health and Development

Only one review of 14 articles evaluated the health impacts of residential lead hazard control programs. Overall, such programs were effective at reducing blood lead levels in children. There were no evaluations examining the long-term health or developmental impacts of residential lead hazard control programs, including neurological development:

- Home interventions involving residential lead hazard control programs (e.g., building component replacement and paint stabilization) reduced the blood lead levels of children. Programs involving only education or modest dust control showed modest or no significant declines in the blood lead levels of children (Sandel et al. 2010).

Health Behaviors

Only one review of 14 articles evaluated the impacts of policies to reduce exposure to tobacco smoke in the home. Overall, smoke-free home policies were effective at reducing smoking behaviors across age groups. There were no evaluations examining the long-term health impacts of such policies, such as smoking-related lung cancer:

- Home interventions showed that smoke-free home policies reduced smoking among adults and youth (Sandel et al. 2010).

Infectious Disease

Only one review of 28 articles evaluated the impacts of programs to improve the conditions of homeless shelters. The limited evidence points to favorable program impacts on reducing infectious disease outcomes (respiratory problems and tuberculosis) among persons experiencing homelessness:

- Few studies evaluated programs targeting the conditions of homeless shelters (e.g., retrofitting air units, germicidal ultraviolet [UV]). One evaluation of a program involving cleaning and retrofitting air handling units reduced respiratory complaints among clients and another evaluation of the impacts of a UV system at a homeless shelter found fewer secondary cases of tuberculosis (Moffa et al. 2019).

Access to Foods that Support Healthy Eating Patterns

Access to foods that support healthy eating patterns determines the types and quality of foods available for consumption, which can affect health outcomes, including obesity and chronic diseases. Access to healthy foods is influenced by geographic barriers (distance), limited access to transportation, residing in a "food desert" (an area with fewer food stores that sell a wider variety of healthy options, such as supermarkets), and affordability, among other barriers.

A total of three reviews evaluated interventions to improve access to foods that support healthy eating patterns. Interventions included culturally tailored programs, summer nutrition programs, and food pricing policies. Overall, the interventions showed improved diabetes and diet. No other outcomes were addressed.

Diabetes

One review evaluated the impacts of culturally tailored programs targeting the availability and affordability of healthy foods to improve diabetes outcomes. Overall, such programs were beneficial for improving diabetes prevention and control. However, the evidence was limited to one population (Native Hawaiian and Pacific Islanders):

- Multicomponent culturally tailored interventions for diabetes control and prevention in Native Hawaiian and Pacific Islander adults that addressed barriers to accessing, affording, and preparing healthy meals were beneficial in diabetes prevention and management (e.g., improving HbA1c). Interventions varied in strategies, for example, holding classes in or near participant homes (to reduce transportation barriers) and connecting participants with low-cost or free food programs (to address affordability). The number of articles assessed in this review is not clear (McElfish et al. 2019).

Health Behaviors

Two reviews evaluated the impacts of interventions to improve access to healthy foods on dietary behaviors. Interventions included federal summer nutrition programs targeting low-income youth and food pricing policies. Overall, both intervention types improved dietary behaviors, but evidence on health impacts (e.g., weight or chronic diseases) was limited:

- A review of 18 articles evaluating summer nutrition programs to provide free meals to children and youth in low-income communities showed beneficial effects on dietary quality, increased willingness to try new fruit and vegetables, and reduced consumption of sugar-sweetened beverages (Turner and Calvert 2019).
- A review of 30 articles evaluating pricing policies designed to improve availability, purchase, and consumption of healthy foods (including fruit and vegetables) showed that, overall, most policies increased purchasing and consumption of healthy foods or beverages and decreased purchasing and consumption of unhealthy foods or beverages. Among those evaluating effects on related health outcomes, most showed no significant effects on weight or serum vitamin measures (Gittelsohn, Trude, and Kim 2017).

Environmental Conditions

Environmental conditions include built (e.g., urban design), natural (e.g., extreme heat), and toxic exposures (e.g., polluted air or contaminated water). Chronic exposure to unfavorable environmental conditions is associated with poor health outcomes and premature death. Exposure to environmental conditions is influenced by geographic location (e.g., urban/rural), race/ethnicity, and neighborhood disadvantage.

A total of two reviews evaluated interventions targeting environmental conditions. Interventions included smoking policies and traffic safety countermeasures. Overall, interventions showed beneficial effects on health (respiratory and injury) and behavioral (smoking) outcomes.

Asthma and Respiratory Disease

One review of more than 75 articles evaluated the impacts of policies that prohibit indoor smoking in public spaces. Overall, such policies had beneficial impacts on reducing smoke-associated respiratory outcomes. No evaluations reported on long-term health impacts (e.g., lung cancer):

- Smoke-free laws in workplaces, restaurants, and bars produced significant reductions in smoke-associated biomarkers and respiratory symptoms (Hahn 2010).

Health Behaviors

One review of more than 75 articles evaluated the impacts of policies that prohibit indoor smoking in public spaces. Such policies have beneficial impacts on reducing smoking behaviors, but there is limited evidence of the long-term health impacts:

- Smoke-free policies in workplaces, restaurants, and bars significantly reduced population-level smoking prevalence and improved cessation outcomes, although outcomes varied by gender, race/ethnicity, socioeconomic status, and age (Hahn 2010).

Injury Prevention

One review evaluated the impacts of built environment strategies to promote safety. Evidence for a Safe Routes to School Program, an initiative to promote walking and bicycling to school, showed beneficial impacts on reducing traffic injuries. There were no reviews evaluating the program's impacts on health outcomes (e.g., obesity, chronic diseases) in children:

- A state-based Safe Routes to School Program, which provides funds for traffic safety countermeasures, was associated with reduced collisions for active travelers of all ages (Frank et al. 2019). The number of studies reviewed is not clear.

Crime and Violence

Crime and violence can be experienced at various levels (victimization, property damages, witnessing or hearing about a crime or act of violence, etc.) and can contribute to physical pain and injury, mental distress, reduced quality of life, and other negative health outcomes.

A total of two reviews evaluated interventions targeting crime and violence. Interventions included home visiting programs and intimate partner violence screening. Overall, interventions reduced intimate partner violence.

Violence Prevention

Two reviews evaluated the impacts of intimate partner violence (IPV) prevention programs. Overall, these interventions were beneficial for reducing violence-related outcomes (IPV):

- A review of eight articles evaluating interventions targeting women with current, past, or increased risk for intimate partner violence (IPV) found that a home visitation program led by paraprofessionals was associated with a reduction in IPV victimization and perpetration (Nelson, Bougatsos, and Blazina 2012).
- A review of 30 studies found that interventions to support pre- and postpartum women through screening and counseling for intimate partner violence had mixed effects on intimate partner violence reduction (Feltner et al. 2018).

Substance Abuse

A review of tax policy interventions intended to reduce excessive alcohol consumption found such policies reduced alcohol-associated harm.

- A review of 72 articles evaluating policies to increase taxes on and the price of alcohol sales showed that, overall, policies reduced alcohol-associated harm, and tax policies were cost-effective (Elder et al. 2010).

Transportation Access

Transportation access can affect health and behaviors by impacting one's ability to travel between home and key destinations (work, school, daycare, groceries, health care, etc.). Transportation access includes various dimensions such as affordability and reliability.

A total of two reviews evaluated interventions targeting transportation access. Interventions included light rail transit and multicomponent programs to reduce transportation barriers to health care. Overall, interventions produced favorable health behavior and economic outcomes.

Health Behaviors

Two reviews evaluated the impacts of interventions to improve transportation access on active travel (walking/bicycling) and cancer screening behaviors:

- A review of built environment interventions found four natural experiment evaluations of light rail systems, with all showing associations with increased active travel behaviors following implementation (Frank et al. 2019).
- A review of 30 articles found that transportation assistance to attend cancer screening appointments (for breast, cervical, or colorectal cancer), in combination with other strategies (mailing home screening kits, reduced costs for screening with vouchers or free services, cash incentives, patient navigation, etc.) had favorable cost-effective and cost-benefit evidence (Mohan and Chattopadhyay 2020).

SDOH: Social and Community Context

The social and community context domain focuses on the social characteristics of the contexts in which people live that can shape health and well-being. Key issues in this domain include civic participation, discrimination, incarceration, social cohesion, and social support.

Discrimination

Discrimination is an act that occurs at the structural (e.g., policy) and individual (e.g., unfair treatment based on individual characteristics such as race or gender) levels that adversely affect the health of individuals and groups. Discrimination can have negative physiological effects that can be compounded over time and lead to long-term negative health outcomes.

In this subdomain there was one article reviewing 44 studies on programs and policies to reduce discrimination against nonheteronormative people. This review included interventions in a variety of education, health care, and workplace settings, reporting behavioral and mental health outcomes:

Behavioral Health
- Policy-level antidiscrimination and antibullying interventions delivered in educational, health care, and workplace settings reduced stress, depressive symptoms, and suicidality among sexual minorities (Chaudoir, Wang, and Pachankis 2017).

Health Behaviors
- Policy-level antidiscrimination and antibullying interventions delivered in educational, health care, and workplace settings reduced alcohol use problems among sexual minorities (Chaudoir, Wang, and Pachankis 2017).

Social Cohesion

Social cohesion refers to the strength of relationships and sense of community among members. Social cohesion includes various elements including social capital (access to shared resources) and collective efficacy (a community's ability to create change and exercise social control). Social institutions (e.g., churches) are common sources of social capital and social control.

Health Behaviors
In this subdomain, one review of eight studies evaluated collective efficacy interventions—a vehicle for social cohesion—targeting health behaviors among youth. There was positive evidence that collective efficacy interventions improved health behaviors:
- Collective efficacy interventions that entailed empowerment and social bonding, leveraging, and engagement at the youth, family, or community level decreased youth

substance use, behavioral risks related to sexually transmitted diseases and teen pregnancy, and child abuse outcomes (Butel and Braun 2019).

Social Support

Social support includes emotional (e.g., encouragement after a setback) and instrumental (e.g., ride to a doctor's appointment) support, which affect health via behavioral and psychological pathways (e.g., reducing stress). Social support can be created through social networks or the webs of social relationships. Social institutions (e.g., churches) are common sources of social networks and social support. Social support includes interpersonal and familial emotional and instrumental support.

In this subdomain, 12 reviews assessed social support interventions for improvements in health and behavioral outcomes. Interventions were community- and faith-based, engaged individuals in a specific social role (e.g., caregivers, postpartum mothers), or intervened with a focus on the family as opposed to the individual. Collectively, the 12 reviews included more than 588 articles.

Behavioral Health

Five reviews evaluated the impacts of interventions targeting social and community support for psychological health including stress, depression, and suicidality. Interventions were delivered to specific risk groups including caregivers and sexual minorities:

- A review of 146 studies found that caregiver interventions among parents of medically ill children yielded mixed results in terms of perceived social isolation and emotional stress (Gomez-Bernal et al. 2019).
- A review of 27 articles found that interventions to support pre- and postpartum women through group care and peer support reduced depressive symptoms. The same review also found that interventions to support pre- and postpartum women through screening and counseling for intimate partner violence had mixed effects for depression and anxiety (Garcia and Yim 2017).
- A review of 44 articles found that individual, interpersonal interventions reduced stress, depressive symptoms, and suicidality among sexual minorities. Interpersonal programs included empowerment interventions and family therapy. Behavioral health and individual-level interventions included mental health programs and therapy (Chaudoir, Wang, and Pachankis 2017).
- A review of 31 articles found that evidence for the effect on depression of caregiver training and support interventions for persons with dementia or Alzheimer's disease was mixed (Griffin et al. 2015).
- One review of nine articles found that access to a psychological support and puberty suppression intervention tailored for sexual/gender minority youth, and related interventions, improved self-reported anxiety, depression, and stress (Coulter et al. 2019).

- A review of 27 articles found that family- and caregiver-based supportive interventions for chronic disease self-management had mixed benefits for depression symptom control (Griffin et al. 2014).

Cancer

One review of 27 studies evaluated the impacts of improving social support for family and caregivers on outcomes for cancer patients:

- Family- and caregiver-based supportive interventions for chronic disease self-management had mixed benefits for cancer symptom control (Griffin et al. 2014).

Cardiovascular Disease

One review of five studies evaluated the impacts of improving social support for family and caregivers on outcomes for stroke patients:

- Family and informal caregiver interventions for stroke survivors were associated with decreased ED utilization and hospital readmission (Aldehaim et al. 2016).

Child and Adolescent Health and Development

One review of 27 studies evaluated the impacts of interventions targeting social and community support for mothers on their infants' birth outcomes and found:

- Interventions to support pre- and postpartum women through group care and peer support improved preterm birth and low birth weight in some high-quality studies (Garcia and Yim 2017).
- Interventions to support pre- and postpartum women through screening and counseling for intimate partner violence reduced low-birth-weight outcomes (Garcia and Yim 2017).

Diabetes

Two reviews evaluated the health impacts of social support for diabetes self-management; these were community-based, workplace-based, and faith-based interventions:

- A review of culturally tailored workplace and community-based interventions that entailed health care provision and education related to nutrition, physical activity, and self-care were associated with reductions in HbA1c among Pacific Islanders. The number of articles reviewed is not clear (McElfish et al. 2019).
- A review of 19 articles found that faith-based interventions for chronic disease self-management were associated with improved glycemic and lipid levels, and reduced weight (Newlin et al. 2012).

Health Behaviors

Six reviews evaluated the impacts of interventions targeting social- and community-motivated changes in health behaviors relating to substance use, sexual behavior, physical

activity, and dietary choices. Interventions offered faith-based, community-based, and group/interpersonal support for behavior change:

- A review of 18 articles found that faith-based physical activity interventions increased physical activity among participants. The same review found that faith-based physical activity interventions increased physical activity among participants but had mixed effects for body weight decrease (Tristão Parra et al. 2018).

- A review of 23 articles found that faith-based interventions for tobacco cessation were associated with promising yet nonsignificant improvements in tobacco use (Mitchell, Kneipp, and Giscombe 2015).

- A review of 19 articles found that faith-based interventions for chronic disease self-management increased physical activity and increased fruit and vegetable intake (Newlin et al. 2012).

- A review of 44 articles found that individual, interpersonal interventions reduced problems of alcohol use among sexual minorities. Interpersonal programs included empowerment interventions and family therapy. Behavioral health and individual-level interventions included mental health programs and therapy (Chaudoir, Wang, and Pachankis 2017).

- A review of 15 articles found that supportive community-based behavioral interventions and family-based interventions reduced behavioral risks related to sexually transmitted diseases and teen pregnancy among youth, but the former was not associated with increased rates of sexual abstinence or delayed sexual activity (Cardoza et al. 2012).

- A review of 15 articles found that integrated substance use disorder programs for parents reduced substance use (Moreland and McRae-Clark 2018).

SDOH: Health Care

The health care domain focuses on access to and understanding of health care services that affect health and well-being. Key issues in this domain include health literacy, access to health care services, and culturally and linguistically competent care.

Health Literacy and Health Education

Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions. Low health literacy can affect adherence to medication regimens, utilization of emergency services, and provider communication, and is particularly common among older adults and members of racial/ethnic minority groups. Interventions targeting health literacy include educational programs and multimedia tools (e.g., plain language instructions), self-management programs and health care navigation aids, health worker–based assistance programs (e.g., community health workers [CHWs]) who may interact with people in clinical settings or through home visits, and programs or services to assist in health care decision making. Many of these health education interventions support understanding of various health conditions, the importance of screening, and navigation of health systems in an effort to improve patients' capacity to interact with the health care system.

Asthma and Respiratory Disease

There were four reviews that addressed health literacy or health education interventions focusing on improving asthma outcomes. One review focused on improving asthma symptom monitoring, and two focused on reducing health care utilization. One review each focused on health literacy programs generally, self-management interventions, and home visits by nurses or paraprofessionals/CHWs. Across these studies, results showed positive improvements in asthma outcomes.

There was positive evidence that health literacy programs improved asthma outcomes:
- A review of 24 health literacy programs overall showed improvement in asthma symptom monitoring and asthma knowledge (Press et al. 2012).

Health education interventions generally had positive evidence of improved asthma outcomes:
- A review of 50 articles found that self-management and home-based interventions, which involved physician and multidisciplinary team-led interventions among Latino individuals, were associated with reductions in hospitalizations and health care utilization (Clark et al. 2010).
- A review of 39 articles found home visits by nurses or paraprofessionals/CHWs targeting education, self-management, identifying asthma triggers in the home, and providing

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cleaning supplies to children and adults over the age of five showed no effect on urgent asthma visits for adults or children (Abbott and Elliott 2017).
- A review of seven articles related to CHWs in pediatric educational asthma programs found that four of seven studies reported significant increases in symptom-free days and/or decrease in symptom frequency of asthma symptoms (Uchima et al. 2019).

Behavioral Health

Four reviews focused on health education interventions to improve behavioral health. They reviewed a broad array of outcomes including crisis stabilization, utilization, broad psychological measures, quality of life, depression, and sleep. There was no information on diagnosed mental health conditions other than depression, and the review of interventions was limited to self-management.

There is largely positive evidence that health education interventions focused on self-management approaches improve behavioral health:
- A review of peer-led interventions aimed at improving chronic disease self-management showed that these programs were associated with crisis stabilization. The same review also found that a peer-led self-management intervention conducted by recovery mentors who have a self-identified history of mental illness were associated with reduced number of hospitalizations and hospital days for mental illness. The number of articles assessed in this review is not clear (Fisher et al. 2014).
- A review of ten articles found that self-management interventions for cardiovascular disease (CVD) including culturally tailored educational components and social support showed improvements in psychological measures (Huang and Garcia 2020).
- A review of 31 articles found mixed evidence for the impact of self-management interventions (e.g., action planning or goal setting, behavioral coaching, peer and social support, problem solving, and mental health counseling) for persons with chronic conditions on quality of life and depression (Miller et al. 2020).
- A review of 39 articles found that home visiting programs by paraprofessionals/ CHWs, nurses, or case workers reduced psychiatric diagnoses and sleep problems in children (Abbott and Elliott 2017).

Cancer

Five reviews evaluated the impacts of interventions targeting health literacy on cancer prevention. There were no reviews that addressed the impact of health literacy on other outcomes across the cancer care continuum, including detection, diagnosis, treatment, or survivorship.

Home visiting is not clearly related to improving cancer screening:
- A review of 39 articles on home visiting programs that incorporate paraprofessionals/CHWs providing education on cancer screening, training in self-exams, and assistance scheduling screening appointments showed mixed results on the impact of

home visiting on improving screening rates for breast and cervical cancer, and no evidence of its effect on prostate cancer (Abbott and Elliott 2017).

There is positive evidence that technology-related communication tools increase cancer screening among African American and Spanish-speaking populations:

- A review of 41 articles found that multimedia interventions were most effective at increasing cancer screening behaviors among African Americans (Adedoyin et al. 2016).
- A review of 42 articles found that disease self-management interventions enabled by health information technology (HIT) addressing topics such as appointment reminders among Spanish-speaking individuals improved cancer screening. Most were culturally tailored interventions delivered in clinic, community center (e.g., public space), or multiple locations. Common platforms for delivering the interventions included computer, radio, and television (Chaet et al. 2016).
- A review of 16 articles found that a mobile text messaging intervention tailored to participants' needs that provided information on cervical health and screening to adult female Asian Americans increased cervical cancer screening (Anderson-Lewis et al. 2018).
- A review of eight articles found that in-clinic health education videos that provide information on cancer treatment and survival had no effect on quality-of-life measures for cancer patients. Interventions were targeted at underrepresented minorities (Hirschey et al. 2020).

Cardiovascular Disease

Five reviews evaluated the impacts of interventions targeting health literacy on CVD-related outcomes. These outcomes included blood pressure, cholesterol, and health care utilization. There were no reviews that addressed the impact of health literacy on other outcomes such as heart attacks and strokes or mortality.

There is positive evidence that health educational programs broadly, and those that specifically focus on promoting self-management, improve CVD outcomes and are cost neutral:

- A review of 100 articles found that educational interventions designed to support disease self-management led by CHWs, peers, and other health care staff were associated with reduced blood pressure (Mills et al. 2018).
- A review of 14 articles found that chronic disease self-management programs for adults with serious mental illness improved blood pressure and cholesterol (Kelly et al. 2014).
- A review of CHW-led interventions for hypertension management involving health education found that these programs were associated with reduced ED hospitalizations, and a cost-benefit analysis found they can achieve cost neutrality if 3 percent of ED visits are averted each year. The review did not mention the number of articles it assessed (Foster et al. 2019).
- A review of 58 studies evaluating CHW interventions did not demonstrate reduced blood pressure in hypertensive patients (Viswanathan et al. 2010).

- A review of ten articles found that culturally tailored education and social support interventions targeting adult Asian Americans with CVD led to improvements in blood pressure (Huang and Garcia 2020).

Diabetes

Twelve reviews evaluated the impact of interventions targeting health literacy on glycemic control as measured by HbA1c. There were no reviews that addressed the impact of health literacy on other outcomes such as comorbidity or mortality.

There is largely positive evidence that technology-based approaches that provide educational information to support patients improve diabetes outcomes:

- One review of 58 articles found that multicomponent education programs led by *promotoras* (lay Latino/Hispanic community health educators) improved HbA1c in the intervention group relative to the control group at six months (Terens et al. 2018).
- A review of 15 articles on interventions designed to improve patient self-management using mHealth and provider communication tools among adults with both type 1 and type 2 diabetes improved glycemic control compared to non-mHealth approaches (Kitsiou, Paré, and Jaana 2013).
- One review of 13 studies found that EPIC (a diabetes self-care education intervention) was effective at lowering HbA1c levels at three-month and one-year follow-up relative to the control patients (DePuccio and Hoff 2013).
- A review of 16 articles found mixed evidence of the effect of interventions providing educational information on glucose monitoring, health behaviors, foot care, medications via SMS text messaging, remote nurse support, or phone calls to African American and Latino adults. Mobile interventions improved glucose monitoring and health behaviors in an African American sample but no improvements in diabetes control (HbA1c) in the Latino sample (Anderson-Lewis et al. 2018).
- A review of 11 articles found that secure messaging via Electronic Health Records (EHR) for diabetes care resulted in significant improvement in patients' HbA1c. However, improvements in patients' secondary outcomes, including blood pressure and cholesterol, were inconsistent (Kuo and Dang 2016).

There is largely positive evidence that health education programs improve diabetes outcomes:

- A review found that educational interventions to support disease self-management led by CHWs, peers, and other health care staff were associated with improved HbA1c levels. The number of articles reviewed in this assessment is not clear (Foster et al. 2019).
- A review of 10 articles found that culturally tailored education and social support interventions among adult Asian Americans with CVD improved HbA1c (Huang and Garcia 2020).
- A review of 14 articles found that chronic disease self-management programs for adults with serious mental illness improved HbA1c (Kelly et al. 2014).
- One review found that multicomponent culturally tailored interventions for diabetes prevention at the workplace resulted in significant reductions in HbA1c at three months

for Pacific Islanders. The number of articles assessed in this review is not clear (McElfish et al. 2019).

- A review of 27 articles found that interventions based on community health centers (e.g., educational interventions) led to decreases in HbA1c among older adults with diabetes (Han et al. 2019).
- One review of 58 programs found that an experimental computer multimedia program that included audio/video sequences decreased HbA1c among persons with low health literacy; however, there was no significant change among high health literacy subjects (Terens et al. 2018).
- One review of 13 articles found that interventions to improve self-management including HIT and telemedicine for low-income, medically underserved adults with diabetes (diabetes care, nutrition, physical activity, self-care behaviors) improved HbA1c at six months and 12 months (Heitkemper et al. 2017).

Health Behaviors

There were ten reviews that addressed health literacy/health education interventions focusing on improving health behaviors. The reviews covered multiple health behaviors including physical activity, healthy eating, behavioral risks related to sexually transmitted diseases and teen pregnancy, and health behaviors associated with CVD. Interventions were predominantly health education programs delivered by peers, coaches, or professionals, or technology-based interventions. Across these studies, results were generally mixed, but improvements in healthy eating were noted.

There is largely positive evidence that interventions that focus on self-management conducted through peers or coaches, or by innovative approaches such as dance improve healthy eating, and mixed evidence that they improve physical activity and reduce smoking:

- A review of 18 articles indicated that peer-based interventions focused on self-management, peer navigation, and healthy lifestyle delivered in various settings with persons with serious mental health illness improved dietary outcomes, such as healthy eating or healthy dietary changes. The interventions were not associated with increased physical activity or reduced smoking (Cabassa et al. 2017).
- A review of 23 articles found that a HipHop-based health communication intervention to improve healthy behaviors did not lead to statistically significant changes in physical activity or smoking (Robinson et al. 2018).
- A review of 15 articles found that health coaching to provide information on healthy behaviors improved diets (reduced cholesterol, reduced saturated fat intake) (Olsen and Nesbitt 2010).
- A review of 58 articles revealed that patient education programs delivered by a nurse case manager combined with support groups tailored to minority populations decreased high-fat diets (Terens et al. 2018).
- A review of ten articles on educational self-management interventions that were culturally tailored and included social support among Asian Americans with CVD improved health behaviors (Huang and Garcia 2020).

There is mixed evidence as to whether technology-based health literacy interventions or those that were led by teachers, parents, or CHWs improve behavioral risks related to sexually transmitted diseases and teen pregnancy and largely positive evidence that they improve healthy eating behaviors:

- One review of 16 articles found that individuals who participated in a Facebook and a text messaging group had greater increases in physical activity behaviors than those who received only print material. This same review found that mobile interventions that involve streaming soap operas with information on HIV risk prevention reduced sexually transmitted infections (STIs) and improved safe sex behavior among youth and adult African American females. But phone counseling interventions to prevent HIV and STIs had no effect with the same population. The review also found mixed evidence for the effect on health behaviors of mobile interventions focused on providing tailored messages on prenatal and postpartum services and behaviors or phone counseling to prevent teen pregnancy targeted to female youth. The phone counseling intervention showed no effects on preventing teen pregnancy; the text messaging intervention improved health behaviors during pregnancy (Anderson-Lewis et al. 2018).
- A review of 45 articles found that interventions to improve safe sexual behavior led by schoolteachers, based in family medicine clinics, or that involved parents led to reduced behavioral risks related to sexually transmitted diseases and teen pregnancy among youth. However, interventions that were mother-led or CHW interventions showed no significant effects on sex behaviors (Burrus et al. 2018).
- A review of 33 articles found that educational or behavioral change interventions that utilize e-health tools for pediatric behavior change (e.g., goal setting) among African American youth improved self-reported diet (Cushing and Steele 2010).
- A review of 18 articles found that lifestyle interventions in rural settings targeting both diet and physical activity, delivered through community-based participatory research (CBPR), distance-learning (web-based, telephone, or mail), or case management improved physical activity, fruit and vegetable intake, and weight loss. (Smith, Georgiopoulos, and Quittner 2016)
- A review of 15 articles found that Web 2.0 interventions (e.g., social networking, telemedicine, mHealth applications) promoting chronic disease self-management strategies through collaboration between patients, caregivers, and practitioners had mixed impacts on lifestyle behaviors (diet, physical activity); some interventions targeted both behaviors, making it impossible to separate effectiveness for each outcome. Asynchronous communication tools (e.g., email, discussion boards) and progress tracking features (e.g., graphical displays of personal data) were cited as most useful for self-management support (Stellefson et al. 2013).

Health Care Utilization

Three reviews included studies that examined the effect of health education interventions on health care utilization generally without focusing on specific disease conditions. Across the three studies there was positive evidence that self-management interventions and written materials

improved utilization outcomes as measured by medication adherence but there were mixed results on the impact of patient support programs on a series of unspecified clinical outcomes.

Health education efforts have positive evidence of improving various measures of utilization, including medication adherence:

- A review of ten articles found that self-management interventions led by CHWs, peers, and health care staff were associated with improved medication adherence and reduced all-cause hospitalization (Allegrante, Wells, and Peterson 2019).
- A review of 49 articles focused on a variety of interventions to improve information and/or education materials for prescription medications, including materials regulated by health authorities and produced by drug and device manufacturers. Improvements implemented as part of these interventions included the use of plain language principles, typographic cues, quantitative descriptors, and standardized formats. The review found that the use of plain, behavior-oriented language written for readability at a fifth-grade reading level or lower increased medication adherence (Mullen et al. 2018).
- One review of 64 articles related to patient support programs, which include medication management, education, and counseling, offered mixed evidence of effectiveness: 27 percent of studies reported significant positive clinical outcomes, 38 percent of studies reported mixed clinical outcomes, 3 percent reported negative outcomes, and 33 percent were unclear (Ganguli, Clewell, and Shillington 2016).

Infectious Disease

There were four reviews that addressed infectious disease. These reviews focused on vaccination, HIV, and Hepatitis B.

There were two reviews that addressed the impact of health literacy or health education interventions on vaccination; they found that providing vaccination information through text messaging and tailored to language preference increased vaccinations among low-income youth and minorities:

- One review of 16 articles found that a text messaging intervention promoting influenza vaccination by providing personalized information by language preference improved influenza vaccination among youth ages five to 17 and persons with low income (Anderson-Lewis et al. 2018).
- One review of nine articles related to HPV vaccination interventions among minorities found that education about vaccine importance and appointment follow up/ reminders among Asian Americans, African Americans, and Latino persons increased HPV vaccination (Lott et al. 2020).

There were two reviews that addressed the impact of health literacy or health education interventions on HIV. These focused on home visiting and discharge planning combined with disease management sessions. There was no information on other health literacy interventions or populations. These reviews found that home visiting focused on providing education on

medication improved antiretroviral adherence and that discharge planning combined with disease management sessions and other postrelease intervention decreased viral load among ex-prisoners:

- A review of 39 articles found that home visiting programs by nurses and CHWs that focused on antiretroviral adherence among adults older than 60 years, including African American and Latino/Hispanic adults, improved antiretroviral adherence (Abbott and Elliott 2017).
- One review that addressed interventions focused on individuals involved in the criminal justice system found discharge planning and disease management sessions, together with postrelease interventions, were associated with decreased viral load. The number of articles assessed in this review is not clear (Freudenberg and Heller 2016).

A review of 39 articles focused on health education provided via home visits showed evidence of improving screening among some populations:

- Home visits by paraprofessionals/CHWs providing translated educational information improved rates of Hepatitis B testing among Asian American adults (Abbott and Elliott 2017).

Maternal Health

Two reviews addressed educational maternal health interventions and found mixed evidence. Health education programs conducted through home visits did not improve how women accessed care, but preconception education improved maternal health outcomes. There were no reviews addressing other aspects of maternal health:

- A review of 39 articles found that home visits by community health nurses to provide education had no effect on addressing barriers to reproductive health care (Abbott and Elliott 2017).
- One review of 12 articles found that preconception education provided beyond primary care settings (e.g., print, web-based, social media, email, media campaigns, community-based presentations) targeting youth and adults ages 15–45 years improved maternal health knowledge and behaviors, such as folic acid supplementation, physical activity, reduced smoking and alcohol consumption, and updating child vaccinations (Brown et al. 2017).

Obesity

There were seven reviews that focused on education interventions to improve obesity. They examined a broad array of interventions, including education through technology, mindfulness, dance, and self-management facilitated by peers and CHWs.

There was mixed evidence on whether health education interventions decrease obesity:

- A review of 16 articles found that interactive voice response technology interventions promoting weight self-monitoring, weight change goals, skills training, and calls with a clinician improved weight loss. The interventions were targeted at multiple populations

including women, African American adults, and low-income populations (Anderson-Lewis et al. 2018).

- A review of 15 articles found that health coaching to provide information on healthy behaviors reduced body mass index (BMI) (Olsen and Nesbitt 2010).
- A review of 20 articles found that mindfulness-based programs (MBPs) involving a care-based referral to weight-loss patient education that targeted Latino patients significantly reduced BMI as compared to usual care and a nutrition and exercise information group (Cotter and Jones 2020).
- A review of five articles found that culturally tailored mindfulness and behavioral interventions for chronic disease management showed mixed evidence for improving obesity; several studies reported improvements in weight, while another study found no benefit (Johnson, Sheffield, and Brown 2018).
- A review of 23 articles found that a HipHop-based health communication intervention designed to improve health behaviors did not lead to statistically significant changes in BMI (Robinson et al. 2018).
- A review of 18 articles found that peer-led interventions to improve chronic disease self-management had mixed results. Seven articles reported limited positive impact on weight-related outcomes; only two of seven articles in this review reported statistically significant improvement in weight-related outcomes (Cabassa et al. 2017).
- One review of 11 articles found that CHW interventions, most of which entailed health behavior education and counseling, and referrals to services, did not reduce BMI (Schroeder et al. 2018).

Pain

A review of 39 articles indicated that home visits improved pain management:

- Home visits by a nurse or other health professional focused on culturally relevant education regarding self-care or pain management among Asian American, African American, Latino, and white patients with heart failure, cancer, or diabetes improved pain management (Abbott and Elliott 2017).

Access to Health Care Services

Access to health care services entails the ability to obtain timely health care services, including primary, emergency, and specialty care. Access to primary care entails the ability to obtain timely health care services from clinicians who are able to address a majority of personal health care needs, including routine care, early detection and treatment of disease, chronic disease management, and preventive care. Access to emergency and specialty care entails access to specialists who are able to respond to urgent care needs or those who are able to manage and treat chronic disease, long-term conditions, or other complex conditions. Barriers to access are typically attributable to lack of health insurance, out-of-pocket costs, linguistic barriers, disability, inability to travel or take time off work, and provider shortages. Interventions

targeting access to health care services include integrated behavioral and medical services, access to a medical home, clinical referral programs, health insurance and prescription drug coverage, reductions in out-of-pocket costs for medical services or medication, care coordination/integration, assistance via patient navigators or CHWs, telemedicine and related HIT interventions, and other programs targeting barriers (e.g., transportation).

Asthma and Respiratory Disease

Two reviews addressed asthma and other respiratory diseases. One review examined interventions that facilitate access to health care services through care coordination for asthma outcomes including utilization and asthma symptoms. The other review focused on community paramedicine and emergency medical services (EMS), which encompasses mobile integrated health care with paramedics and emergency medical technicians providing care outside the emergency department, and its impact on ED admissions for chronic obstructive pulmonary disease. No other aspects of respiratory conditions were addressed.

There was positive evidence that care coordination improved asthma outcomes:
- One review of 25 articles related to school-based health care services for children with complex care needs found that care coordination between providers and case management programs among persons with asthma, including children, were associated with improvements in asthma symptoms and with decreased utilization of urgent care and emergency department visits (McClanahan and Weismuller 2015).

There was positive evidence that community paramedicine reduced ED admissions for chronic obstructive pulmonary disease:
- One review of eight articles found that access to community paramedicine and emergency medical services that encompasses mobile integrated health care outside the emergency department resulted in reduced ED admissions for shortness of breath among patients with chronic obstructive pulmonary disease (Gregg et al. 2019).

Behavioral Health

Seven reviews addressed access to behavioral health care through integrated medical, behavioral, and social services. The interventions reviewed were focused on multiple outcomes including behavioral outcomes generally; child problem behaviors, hyperactivity, internalizing behaviors, and depression; parental substance use, stress, depression, and psychosocial adjustment; cost-effectiveness; and utilization.

There is largely positive evidence that integrated medical, behavioral, and social services programs improve behavioral health outcomes:

- Two reviews (examining 31 and 22 articles, respectively) addressed the impact of access to integrated medical-behavioral care on behavioral health outcomes for children and adolescents. These programs improved child behavioral health, including problem behaviors, hyperactivity, internalizing behaviors, and depression. The interventions included in these reviews entailed collaborative care models (i.e., models of care that systematically integrate the delivery of physical and mental health care services through coordinated teams that include primary care providers, care managers, psychiatric consultants and patient-centered care activities); enhancing primary care resources through provider training; consultation; computer-assisted support tools; colocated care with minimal integration; bibliotherapy; telephone coaching; and motivational interviewing (Asarnow et al. 2015; Njoroge et al. 2016).
- One review of 15 articles focused on access to integrated substance use disorder treatment interventions. Access to substance use disorder treatment programs that were integrated with medical and behavioral care for parents decreased parental substance use significantly, reduced parent stress, and decreased depression, but parental psychosocial adjustment showed mixed results (Moreland and McRae-Clark 2018).
- One review of 32 studies examined integrated primary care, social work, and community programs. It found that interprofessional teams that included at least one social worker and provided a combination of face-to-face and phone communication with patients reduced depressive symptoms. It also found that a combination of interventions from interprofessional teams that included social workers, behavioral health care, care management, and community engagement significantly improved behavioral health outcomes. However, seven studies (26.9 percent) reported no significant differences between integrated and routine care. Integrated care appeared to be at least revenue neutral when compared with usual care (Fraser et al. 2018).
- One review of 27 articles that focused on alternative payment and delivery models found that less than half of reviewed alternative payment and delivery models improved mental health or substance use services utilization (Carlo et al. 2020).
- A review of 12 studies related to proactive mental health screening found that integrated mental health care among hospitalized patients reduced hospital length of stay (Oldham, Chahal, and Lee 2019).

Six reviews focused on access to health care services through tailored collaborative care and support programs, including CHW programs, substance use disorder programs, community paramedicine interventions, and care coordination programs on behavioral health outcomes.

There is largely positive evidence that tailored collaborative care and support programs improve behavioral health outcomes:
- One review of 43 articles found that programs focused on access to mental health care that involved CHWs in an auxiliary role (e.g., cotherapy) improved behavioral health outcomes and reduced symptoms compared to usual care (Barnett et al. 2018).

- A review of 59 articles found that access to CHW interventions reduced depression symptoms and was more cost-effective than nurse home visits or usual care (Viswanathan et al. 2010).
- One review of eight articles found that access to community paramedicine services and EMS mobile integrated health care was beneficial for reducing patient depression and anxiety (Gregg et al. 2019).
- One review of 53 articles found that access to collaborative care models, which can include patient self-management support, clinical information systems, system redesign, provider decision support, health care organization support by local leadership, and linkages to community resources, was effective in improving outcomes for depression, particularly severe depression (Miller et al. 2013).
- One review of access to interventions addressing loneliness among caregivers, which encompass case management, occupational therapy, nursing assistance, and support group approaches, lowered perceived stress, improved depression, and increased self-efficacy (Gomez-Bernal et al. 2019).
- A review of 20 articles related to mindfulness-based programs targeting Latinos showed mixed evidence on effectiveness for improvements in self-reported stress, anxiety/depression, and impulsivity/emotional regulation (Cotter and Jones 2020).
- One review focused on interventions within the criminal justice system, specifically discharge planning with benefit-application assistance, increased participants' use of mental health services upon release from incarceration. Overall, inmates receiving some intensive case management or other correctional reentry interventions fared better than those receiving treatment as usual on release. The number of articles assessed in this review is not clear (Freudenberg and Heller 2016).

A review of 37 randomized controlled trials found that there is mixed evidence as to whether access to integrated care interventions providing culturally focused consultation and care for depressive symptoms among Latino, African American, and Chinese immigrant populations reduces depressive symptoms (Sprague Martinez et al. 2019). Two reviews that focused on access to health care services through technology-based interventions reported mixed evidence on improving behavioral health outcomes:

- One review of 14 articles addressing the effectiveness of technology-based interventions for co-occurring trauma symptoms and substance use for veterans, disaster-affected individuals, and recent rape victims found that the evidence was mixed. Three of four studies found significant decreases in trauma symptoms. The fourth did not find significant reductions in substance use or trauma symptoms (Gilmore et al. 2017).
- A review of 146 articles discussing interventions targeting rural Latinos found that access to telemedicine produced greater reductions in depressive symptoms than in-person care (Stone, Fernandez, and DeSantiago 2019).

One review of 120 studies found that access to opioid overdose reversal medication interventions improved fatal and nonfatal overdose outcomes:

- Policy and system-level interventions targeting prescription drug overdoses found that access to Naloxone resulted in a substantial reduction in fatal and nonfatal overdose (Haegerich et al. 2014).

Cancer

Five reviews focused on access to care facilitated by patient navigation and CHW interventions. The outcomes assessed included cost-effectiveness and screening, but no other cancer outcomes were assessed.

There is positive evidence that access to care facilitated by patient navigation and CHW interventions improves cost-effectiveness and increases screening:
- One review of 31 studies found that patient navigation interventions with telephone support/education and lay health workers consistently improved cervical cancer screening, including among Asian American, African American, and Latino adults. Interventions with telephone counseling improved follow-up of an abnormal pap smear among African American and Latino females (Glick et al. 2012).
- One review of nine economic evaluations found that patient navigation is a cost-effective way to improve access to care. Cost-effectiveness evidence is most robust for patient navigation programs designed to increase colonoscopy screening (Gervès-Pinquié et al. 2018).
- One review of 67 articles found that CHW interventions for preventive cancer care, which entailed education, counseling, patient navigation, case management, and other components, were associated with a trend toward improvements in cancer prevention, and cost analyses found these interventions were cost-effective and sustainable (Kim et al. 2016).
- In one review of 24 articles, CHWs and patient navigators working in an FQHC increased cancer screenings and referral to imaging for diagnosis (Roland et al. 2017).
- One review of 26 articles found that one intervention, which entailed organizational redesign, a provider update, and a patient navigation intervention, improved colonoscopy screening (Gorin et al. 2012).

Cardiovascular Disease

Four reviews focused on interventions that facilitated access to health care services through community paramedicine, telehealth services, and coordinated care. Outcomes addressed included blood pressure, mortality, and utilization. While one review focused on stroke mortality, none focused on heart attacks.

The evidence on whether these interventions improve CVD outcomes is mixed:
- One review of eight articles found that access to community paramedicine and emergency medical services that encompasses mobile integrated health care outside the

emergency department resulted in reduced blood pressure among persons with hypertension (Gregg et al. 2019).

- One review of 18 articles related to interventions to improve cardiovascular care in rural areas found that access to telehealth services for stroke patients in rural areas reduced mortality only in some studies (Ruiz-Pérez et al. 2019).
- One review of 100 articles related to strategies for blood pressure control in hypertensive patients found that team-based care models involving nonphysicians in the management of medication and other aspects of care were associated with reduced blood pressure (Mills et al. 2018).
- One review of 18 articles related to programs to reduce out-of-pocket costs for medications (e.g., Value-based Insurance Design plans) related to CVD and other conditions found that such programs improved medication adherence, including among low-income individuals, elderly individuals (in the case of Medicare Part D), and individuals with CVD (Njie et al. 2015).

Child and Adolescent Health and Development

Two reviews focused on access to a medical home for children through a medical home and home visiting programs. Outcomes included developmental screening, health-related quality of life, cognitive development, and birth outcomes. No other outcomes or interventions were assessed. The evidence on whether these interventions improve developmental health outcomes is mixed:

- One review of nine articles found that children with a medical home were more likely to receive developmental screening and to have higher health-related quality of life (Hadland and Long 2014).
- A review of 51 studies found that home visiting programs that included access to preventive care and early interventions had significant positive effects on child cognitive development but not birth outcomes, child health, or child maltreatment (Filene et al. 2013).

Diabetes

Three reviews focused on access to Medicaid, drug coverage, and community paramedicine services addressing outcomes such as HbA1c, cost-effectiveness, fasting glucose, use of services, and care quality.

There is positive evidence that patient assistance programs and community paramedicine improve diabetes outcomes and are cost-effective:

- One review of 33 articles concluded that patient assistance programs that provide certain prescription drugs at low or no cost to patients who lack prescription drug coverage significantly improve HbA1c. For persons with hyperlipidemia, there were significant improvements in LDL. The findings were cost-effective at ratios of 4:1 to 11:1 (Felder et al. 2011).

- One review of eight articles found that access to community paramedicine and emergency medical services that encompass mobile integrated health care outside the emergency department resulted in reduced fasting blood glucose among people with diabetes (Gregg et al. 2019).

There is positive evidence that expanding access to Medicaid and accountable care organization implementation improves access as well as quality of care:

- One review found that expanding access to Medicaid (via the Affordable Care Act) on diabetes care improved health care access for previously uninsured people with diabetes. The review also found that Accountable Care Organization implementation was associated with higher-quality diabetes care. The number of articles assessed in this review is unclear (Myerson and Laiteerapong 2016).

Health Behaviors

Two reviews examined reproductive health care interventions. There is positive evidence that such interventions increase access to productive health care and reproductive health outcomes:

- One review of 19 articles on youth-friendly family planning services found that they improved reproductive health outcomes, such as reduced teen pregnancy and increased contraceptive use (Brittain et al. 2015).
- One review of 28 articles regarding pregnancy-related interventions among women involved in the U.S. criminal justice system found that interventions that improve access to sexual and reproductive health care to women in prisons increased use of contraception (Hoff et al. 2021).

Health Care Utilization

Six reviews focused on interventions that facilitate access to care through transportation services, prescription drug coverage, community paramedicine, patient navigation, and care coordination.

There is largely positive evidence that three interventions improve health care utilization.

- Two reviews addressed interventions targeting transportation barriers to health care access. One review of ten articles related to interventions to minimize transportation barriers among people with chronic diseases found that transportation services embedded in multicomponent interventions involving patient navigation and chronic disease education improved health care utilization outcomes (e.g., ED visits), especially among older adults (Starbird et al. 2019).
- A review of eight articles related to transportation interventions in health care found that subsidized nonemergency medical transportation services for patients (e.g., taxi vouchers, ridesharing services, van services, bus tickets, and parking vouchers) resulted in little or no change in health care utilization (Solomon et al. 2020).
- A review of 39 articles related to school health care services for individuals with chronic conditions found that directly observed therapy in school (e.g., observing a student using

an inhaler appropriately) reduced ED visits. Care coordination and case management in school showed mixed results in reducing ED visits (Leroy, Wallin, and Lee 2017).

Three reviews examined access to high-quality coordinated health care and case management. There is largely positive evidence that these interventions improve health care utilization:

- One review of 23 articles related to access to tuberculosis testing among homeless individuals found that testing followed by connection to care increased patient follow-up and care utilization (Parriott et al. 2018).
- One review of nine articles found that children with a medical home were more likely to receive preventive medical care and were less likely to seek care in the emergency department than children without a medical home. There was mixed evidence on vaccinations and no effect for preventable hospitalization (Hadland and Long 2014).
- A review of 62 articles related to interventions to improve adherence to self-administered medications for chronic diseases found that case management resulted in only limited increases in medication adherence relative to usual care for medications for diabetes, hypertension, and hyperlipidemia. There was moderate evidence that case management improves medication adherence for self-administered drugs for those with depression (Viswanathan et al. 2012).

Infectious Disease

One review of 21 articles found that care coordination programs for persons with HIV improve access to HIV services:

- Care coordination programs among persons with HIV that integrated HIV care and family planning led to increased access to HIV services (Lindegren et al. 2012).

Pain

One review of 59 articles examining CHW interventions found that these interventions improved pain outcomes:

- CHW interventions that increased access to health care services led to improvements in back-pain symptoms (Viswanathan et al. 2010).

Culturally and Linguistically Competent Care

Culturally and linguistically competent care entails access to health care services and programs that are responsive to the cultural beliefs and language of the population being served. Interventions targeting cultural and linguistic competence include community-based interventions that have been adapted to reflect specific cultural values or perspectives (e.g., an

intervention tailored toward African American women), assistance via culturally competent patient navigators or CHWs, or materials made available in other languages.

Asthma and Respiratory Disease

One review of 146 interventions reported mixed evidence on improving asthma-related outcomes. No reviews examined asthma diagnosis or access to services for asthma:

- Community-based interventions or lay health workers for members of racial/ethnic minority groups had mixed effects on asthma-related outcomes (Anderson et al. 2015).

Behavioral Health

Two reviews evaluated interventions targeting improved behavioral health outcomes. Both reviews reported positive results for psychological outcomes, self-reported outcomes for mental illness, and overall quality of mental health. No reviews examined diagnosis or access to services around behavioral health conditions:

- A review of 21 studies found that educational and patient navigation interventions tailored to Korean Americans were associated with improvements in psychosocial outcomes (e.g., health beliefs, self-efficacy, depression) and self-reported behavioral outcomes and knowledge related to chronic mental illness (Heo and Braun 2014).
- A review of 146 studies found that community-based interventions improved mental health quality among members of racial/ethnic minority groups (Anderson et al. 2015).

Cancer

Two reviews addressed culturally tailored environments and information on cancer symptom management and screening. No other interventions or cancer outcomes such as mortality were assessed. The effect of these interventions on the outcomes is mixed:

- A review of 17 articles found that interventions targeting African American women diagnosed with breast cancer that appeared to have the greatest success in symptom management were those that created a cultural environment in which African American women feel welcome, have established trust, and use resources valued in the community such as spirituality, kin networks, and oral storytelling (Whitehead and Hearn 2015).
- A review of 146 studies found that lay health workers and peer- and professional-led group education tailored to members of racial/ethnic minority groups had mixed effects on breast, cervical, and colorectal cancer screening (Anderson et al. 2015).

Cardiovascular Disease

Two reviews evaluated relevant interventions that sought to improve CVD risk factor and symptom management. Both reviews found positive results for blood pressure control. No reviews examined diagnosis or access to services around hypertension and other aspects of CVD:

- A review of 21 studies found education sessions tailored to African American women by organizations with a large number of African American members were crucial for addressing the many CVD risk factors that African American women disproportionately experience. Of the 14 interventions, three improved blood pressure and two improved cholesterol control (White, Rochell, and Warren 2020).
- A review of five studies found mixed evidence on the effect of culturally tailored mindfulness and behavioral interventions on chronic disease management. Several studies showed improvements in blood pressure (Huang and Garcia 2020), while another study found no benefit (Johnson, Sheffield, and Brown 2018).

Child and Adolescent Health and Development

One review of 146 relevant interventions found that they improved child health outcomes. No reviews examined child development:

- Community-based interventions improved child health outcomes among members of racial/ethnic minority groups (Anderson et al. 2015).

Diabetes

Four reviews of culturally or linguistically tailored interventions found that evidence of their effect on improving diabetes risk factor and symptom management was mixed. Three reviews found positive impacts on diabetes outcomes, including control of cholesterol, LDL, and HbA1c. One review found no evidence for improvement of HbA1c and hypertension. No reviews examined diagnosis or access to services around diabetes.

Three reviews evaluated culturally tailored interventions and found that these interventions improved diabetes outcomes:

- A review of six studies found that culturally tailored telehealth interventions that included components such as incentives and peer-led, health professional–led, group-based, web-based, telephone, SMS, or video interaction among Native Americans with hyperlipidemia and hypertension reduced cholesterol and improved LDL as compared to usual care (Dawson et al. 2020).
- One review found that culturally tailored self-management interventions for diabetes care for Latino populations produced a modest but significant improvement in HbA1c at three months and six months. The number of articles assessed in this review is not clear (Marquez, Calman, and Crump 2019).
- A review of six studies found that culturally tailored intervention for diabetes prevention conducted in workplace- and community-based settings and that involved health care provision, inclusion of family members, nutrition, physical activity, and self-care education and support among Pacific Islanders resulted in significant reductions in HbA1c at three months, six months, and 12 months (McElfish et al. 2019).

However, not all reviews showed positive outcomes:

- A review of seven studies found that cultural competency training for health care providers serving racial/ethnic minority populations with diabetes did not lead to improvements in diabetes outcomes (HbA1c) and hypertension (Lie et al. 2011).

General Health

One review of 38 studies evaluated interventions aimed at improving patient and provider behavior and found that they lead to better general health:

- Interventions focusing on providing language concordance in health care delivery were generally associated with improved patient and provider behaviors (Hsueh et al. 2019).

Health Behaviors

Two reviews reported mixed evidence on whether culturally tailored health education interventions improve health behaviors, including sexual activity, substance use, physical activity, pesticide safety, dietary fat intake, and teenage pregnancy rates.

- A review of 29 studies found that culturally tailored comprehensive sex and reproductive health education (e.g., partner sexual communication skills, condom use skills) for African American youth delivered in schools, clinics, or community centers was strongly associated with increased condom use. Sex and reproductive health education were moderately associated with improvements in abstinence among African American adolescents. Interventions did not affect number of sexual partners (Evans et al. 2020).
- A review of 146 studies found that evidence for whether community-based interventions, professionally led groups, and programs that were tailored toward the cultural context of the participants improved a range of health behaviors was mixed.
  - Community-based interventions or professional-led group education tailored to members of racial/ethnic minority groups had mixed effects on alcohol or substance use (Anderson et al. 2015).
  - Professionally led group education improved tobacco use outcomes among members of racial/ethnic minority groups, but interventions that entailed community-wide or peer-led group education had mixed effects (Anderson et al. 2015).
  - Community-wide interventions improved breastfeeding outcomes among members of racial/ethnic minority groups but had no effect on physical activity (Anderson et al. 2015).
  - Programs led by lay health workers had no effect on pesticide safety behaviors among migrant farm workers (Anderson et al. 2015).
  - Neither community-wide interventions nor peer-led group health education improved dietary fat intake among members of racial/ethnic minority groups (Anderson et al. 2015).
  - Community-wide interventions or professional-led health education did not affect teen pregnancy or safe sex behaviors among members of racial/ethnic minority groups (Anderson et al. 2015).

Infectious Disease

One review addressed infectious disease. They focused on HIV and vaccinations. No other outcomes were reviewed.

One review of 146 relevant interventions found that they improve HIV screening. No reviews examined HIV diagnosis or symptom management:

- Community-based interventions, lay health workers, and peer-led group education improved HIV screening among members of racial/ethnic minority groups (Anderson et al. 2015).

One review of 146 interventions concluded that they improve immunization uptake:

- Community-based interventions improved immunization uptake among members of racial/ethnic minority groups (Anderson et al. 2015).

Injury Prevention

One review of 146 relevant interventions found that they reduce alcohol-related injury. No reviews examined other types of injuries:

- Community-wide interventions reduced alcohol-related injury among members of racial/ethnic minority groups (Anderson et al. 2015).

Obesity

Four reviews evaluated relevant interventions and found mixed or no evidence that they improve BMI categorization. No reviews examined other obesity outcomes such as early mortality:

- A review of seven studies found that cultural competency training for health care providers serving racial/ethnic minority populations with diabetes had no impact on weight loss (Lie et al. 2011).
- A review of nine studies found that giving CHWs work in areas where they share the ethnicity and culture of the population in that community led to a decrease in BMI and BMI category (Schroeder et al. 2018).
- A review of 18 studies found that evidence of the effect of faith-based physical activity interventions on body weight decrease was mixed (Tristão Parra et al. 2018).
- A review of 146 studies found that the effect of community-wide interventions and peer and lay-led group health education tailored to members of racial/ethnic minority groups on weight/obesity was mixed (Anderson et al. 2015).

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