BMC Health Services Research

SYSTEMATIC REVIEW Open Access

Impact of hospital and health system initiatives to address Social Determinants of Health (SDOH) in the United States: a scoping review of the peer-reviewed literature

Pavani Rangachari[1*] and Alisha Thapa[1]

Abstract

Background Hospital and health system initiatives addressing Social Determinants of Health (SDOH) are essential for achieving whole-person care and advancing health equity. Building on prior research characterizing these efforts (Part 1), this scoping review (Part 2) evaluates the effectiveness of these initiatives, with a focus on SDOH data integration, EHR utilization, and the broader scope of hospital efforts in addressing individual- and system-level determinants of health. Using an integrated conceptual framework combining the DeVoe & Cottrell framework for operational assessment and the National Academy of Medicine (NAM) 5A framework for systemic evaluation, this study provides a multidimensional assessment of hospital-based SDOH interventions.

Methods Guided by PRISMA-ScR criteria, this review analyzed 41 U.S.-based studies published between 2018 and 2023, identified through three academic databases. Eligible studies examined hospital initiatives addressing SDOH with measurable outcomes. Analyses assessed SDOH data collection, integration into care practices, EHR use, and overall initiative effectiveness.

Results Most studies (66%) were randomized controlled trials in urban settings (68%), targeting patients with chronic or mental health conditions (39%) or high-risk healthcare users (20%). Nearly half of initiatives (49%) addressed multiple SDOH domains, focusing on Social & Community Context, Economic Stability, and Neighborhood & Built Environment. Only 24% of initiatives utilized EHRs for SDOH data collection. EHR-based initiatives demonstrated significantly higher adherence to evidence-based practices, including use of community resource guides for referrals (90% vs. 45%, $p=0.013$). Across all outcome measures, 79% demonstrated improvement, with no instances of worsening outcomes. However, 85% of initiatives lacked community-level SDOH data integration, and few employed upstream, universal strategies. Process, clinical, and social outcomes were unevenly prioritized, with only 10% of studies addressing all three outcome types.

*Correspondence:
Pavani Rangachari
prangachari@newhaven.edu

Full list of author information is available at the end of the article

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Conclusions While these initiatives reflect progress in integrating SDOH into care workflows and improving whole-person care at the individual level, progress toward health equity remains insufficient. Persistent gaps in EHR use, community-level data integration, and upstream strategies hinder systemic impact, potentially perpetuating disparities. Strengthening SDOH-EHR integration, fostering community partnerships, and supporting policy advocacy are critical to bridging individual and community needs. Future research should emphasize long-term, sustainable, and community-level impacts of hospital-led SDOH interventions.

Keywords Social determinants of health, Hospitals and health systems, Health-related social needs, Electronic health records, Whole person care, Population health, Health equity, Quintuple aim

Introduction

In recent years, hospitals and health systems in the United States (U.S.) have placed greater emphasis on addressing Social Determinants of Health (SDOH) [1–3]. In 2000, nearly 900,000 deaths in the U.S. were linked to social determinants such as racial segregation, inadequate social support, low education, income inequality, and poverty [4]. SDOH are widely recognized to play a more significant role than healthcare in shaping population health outcomes [5]. For example, people in low-income neighborhoods often face inadequate housing and limited access to healthy food, contributing to higher rates of preventable illnesses and premature death [4–6].

Healthy People 2030, a U.S. federal initiative aimed at addressing national public health priorities, provides a framework for organizing SDOH into five key domains: (1) economic stability, (2) education access and quality, (3) social and community context, (4) healthcare access and quality, and (5) the neighborhood and built environment [7]. An unequal distribution of SDOH at the community level is the root cause of health-related social needs (HRSNs) at the individual level [8]. HRSNs refer to the specific, immediate social needs of individuals, such as access to healthy food, affordable housing, or reliable transportation. In this sense, HRSNs are the downstream, individual impacts of systemic inequities in SDOH distribution, highlighting how community-level conditions directly shape individual health challenges [8, 9].

The U.S. is home to 6,120 hospitals, with 5,129 (84%) of them being community hospitals. Among these, 2,987 (49%) are nonprofit community hospitals. Additionally, 3,510 (57%) community hospitals are part of a health system, including both multihospital and diversified single-hospital systems [10]. Nonprofit community hospitals, as tax-exempt organizations, are legally required to support the well-being of their communities and possess significant financial resources to address SDOH [11]. They have the potential to implement both "downstream" and "upstream" strategies. Downstream efforts might involve screening patients for HRSNs, like housing insecurity, and connecting them to community services [1, 3, 12]. Upstream approaches could include investing in local housing infrastructure, expanding affordable housing, and advocating for policy changes at the state and federal levels to address housing stability on a broader scale [13, 14]. Before the Affordable Care Act (ACA) of 2010, hospitals and health systems in the U.S. made minimal investments in addressing SDOH [1, 12, 15, 16]. The ACA marked a turning point by shifting provider payments from fee-for-service to value-based care and requiring nonprofit hospitals to conduct Community Health Needs Assessments (CHNAs) and develop implementation strategies every three years. Value-based care has pushed providers to look beyond treating specific diseases, encouraging them to address unmet social needs, improve outcomes, and provide better value to patients and payers. Additionally, CHNAs have strengthened collaboration between hospitals, health departments, and community organizations [13, 15].

Despite progress, concerns remain about the adequacy and distribution of hospital initiatives to address SDOH [12]. During the COVID-19 pandemic, rural, critical access, and safety-net hospitals screened for social needs at similar rates as non-safety-net hospitals but implemented fewer interventions, leaving vulnerable populations underserved [17, 18]. In the post-pandemic era, there has been unprecedented federal focus on reducing health disparities [19, 20]. For the first time, the Department of Health & Human Services (HHS) and other federal agencies have adopted a multi-sector approach to tackle structural barriers to health equity [20]. As the largest healthcare payer, the Centers for Medicare & Medicaid Services (CMS) will play a pivotal role in improving quality, equity, and outcomes in the coming decade [21].

Study purpose and significance

This paper aims to assess the *impact* of hospital and health system initiatives addressing SDOH in the U.S. through a scoping review of peer-reviewed literature. Notably, it serves as a follow-up (Part 2) to a previous article by the authors, which outlined the *characteristics* of these initiatives [22]. The earlier paper (Part 1) detailed key aspects of hospital efforts, including the types of SDOH addressed, conditions targeted, services provided, and the emphasis on downstream HRSNs versus upstream SDOH. It also examined universal versus targeted approaches [23], internal capacity versus

community partnerships, the use of Electronic Health Records (EHRs) to manage SDOH data, and challenges hospitals face in addressing SDOH [24, 25].

The earlier paper (Part 1) focused on "what" hospitals and health systems are doing to address SDOH, offering insight into the scope and distribution of these initiatives in the U.S. It found that academic health centers led more initiatives than safety-net facilities, with most efforts being research-based, including clinical trials. Only one-third used the EHR to collect SDOH data, and most were downstream efforts targeting individual needs rather than upstream community-level solutions like housing investments. Initiatives often relied on internal capacity rather than community partnerships. The study highlighted that the focus on clinical trials targeting high-risk populations, combined with limited EHR use, may hinder the ability to address community needs holistically and limit the scalability of these efforts in safety-net hospitals [22]. These findings underscored the need for policy incentives to more effectively integrate SDOH data into EHR systems and foster stronger community partnerships to ensure broader, sustainable impact. While Part 1 explored "what" hospitals/health systems are doing to address SDOH in the U.S, it did not assess "how effectively" they are doing it. This paper (Part 2) seeks to address the latter question by examining the impact of these initiatives.

Research questions

The objective of this review is to evaluate the impact of existing hospital and health system initiatives addressing SDOH in the United States. The research questions are as follows:

1. How successful have hospitals and health systems been in collecting and organizing patient-reported and community-level SDOH data?
    a. *Have standardized SDOH data collection tools been utilized*?
    b. *Have hospitals effectively leveraged EHR technology for the collection and organization of SDOH data*?
2. How effectively have hospitals and health systems integrated SDOH data into care practices, and to what extent have they used EHR technology for this integration?
    a. *Have SDOH data been incorporated into clinical workflows and referral processes*?
    b. *Have EHR systems been used to automate actions for addressing SDOH*?
3. Have hospital and health system initiatives addressing SDOH shown a positive impact on targeted outcome measures?
    a. *What types of outcomes have been targeted (process, clinical, or social outcomes)*?
    b. *What has been the measurable impact of services on these outcomes*?
4. How do initiatives that used EHR technology to collect and organize SDOH data compare with those that did not?

Although not explicitly stated as a research question, this paper will examine the attributes of studies included in the review, including study design, targeted populations, rural versus urban settings, and sources of funding or sponsorship. By presenting this evidence, the paper will provide critical insights to contextualize the current state of research on hospital and health system initiatives addressing SDOH in the US.

Importantly, while the overall effectiveness of hospital and health system initiatives addressing SDOH is not framed as a distinct research question, this topic will be a focal point in the discussion section. By synthesizing the findings from Parts 1 and 2 of this study, the discussion will explore whether and how hospital and health system efforts to address SDOH have contributed to improving outcomes and advancing health equity.

Rationale for a scoping review

Scoping reviews are well-suited for addressing broad questions, such as exploring the available literature on a specific topic [26]. To date, no comprehensive review has examined the impact of hospital and health system-led initiatives addressing SDOH in the U.S. This review fills that gap, with its questions designed to capture the full scope of knowledge in this area.

Conceptual framework

The earlier article (Part 1) [22] was the first systematic scoping review of hospital and health system initiatives addressing SDOH in the U.S. It made two key contributions: (1) creating a framework to identify the types of SDOH that hospitals and health systems should address and (2) developing a comprehensive model to characterize these efforts. Part 1 integrated the Healthy People SDOH framework [7] with the Institute for Healthcare Improvement (IHI) SDOH listing [27] to identify SDOH types and inform the search for hospital initiatives. Additionally, Part 1 provided an extensive characterization of these initiatives based on the results of the review, drawing upon an existing conceptual framework adapted by Pourat et al. (2022) [28] to assess SDOH

efforts undertaken by Federally Qualified Health Centers (FQHCs). Part 1 used this framework to understand hospitals' use of EHRs for collecting SDOH data.

Building on Part 1, this study (Part 2) advances the focus from describing hospital initiatives, to systematically evaluating their effectiveness in addressing SDOH. The conceptual framework for this review integrates existing frameworks, namely the DeVoe and Cottrell framework [29, 30] adapted by Pourat et al. [28], while introducing the National Academy of Medicine (NAM) 5A framework [31] to enhance the study's ability to address research questions. The integration of these frameworks ensures a robust and multidimensional approach to evaluating the overall effectiveness of hospital and health system initiatives.

Existing conceptual frameworks

As described in Part 1, Pourat et al. (2022) [28] adapted a conceptual framework developed by DeVoe et al. (2018) and expanded by Cottrell et al. (2019) [29, 30] to conduct a systematic review of efforts by FQHCs to address SDOH. This framework outlines four key steps for integrating SDOH data into care delivery: (1) collecting and organizing patient- and community-level SDOH data, (2) integrating this data into care workflows, (3) creating EHR-based automated support for action on SDOH data, and (4) evaluating the impact of integrating SDOH into care.

Although originally designed for primary care, the DeVoe and Cottrell framework provides evidence-based practices for integrating SDOH data across all care settings [29, 30]. Pourat et al. adapted it to evaluate FQHCs, which also deliver acute and chronic care, and recommended its broader application to other providers and health plans [28]. The framework is particularly relevant for hospitals and health systems in the current context, as CMS strengthens Race, Ethnicity, and Language (REL) and SDOH data collection efforts as part of the HHS health equity initiative [20, 21]. This focus on REL and SDOH data underscores the importance of integrating clinical and social care in addressing health disparities, making the DeVoe and Cottrell framework a vital tool for assessing hospital-led efforts [29, 30].

Integrating the NAM 5A framework with the existing DeVoe & Cottrell framework

Building on the previously introduced DeVoe and Cottrell framework, this study incorporates the National Academy of Medicine (NAM) 5A framework to provide a comprehensive evaluation of hospital and health system initiatives addressing Social Determinants of Health (SDOH). As illustrated in Fig. 1, these frameworks offer

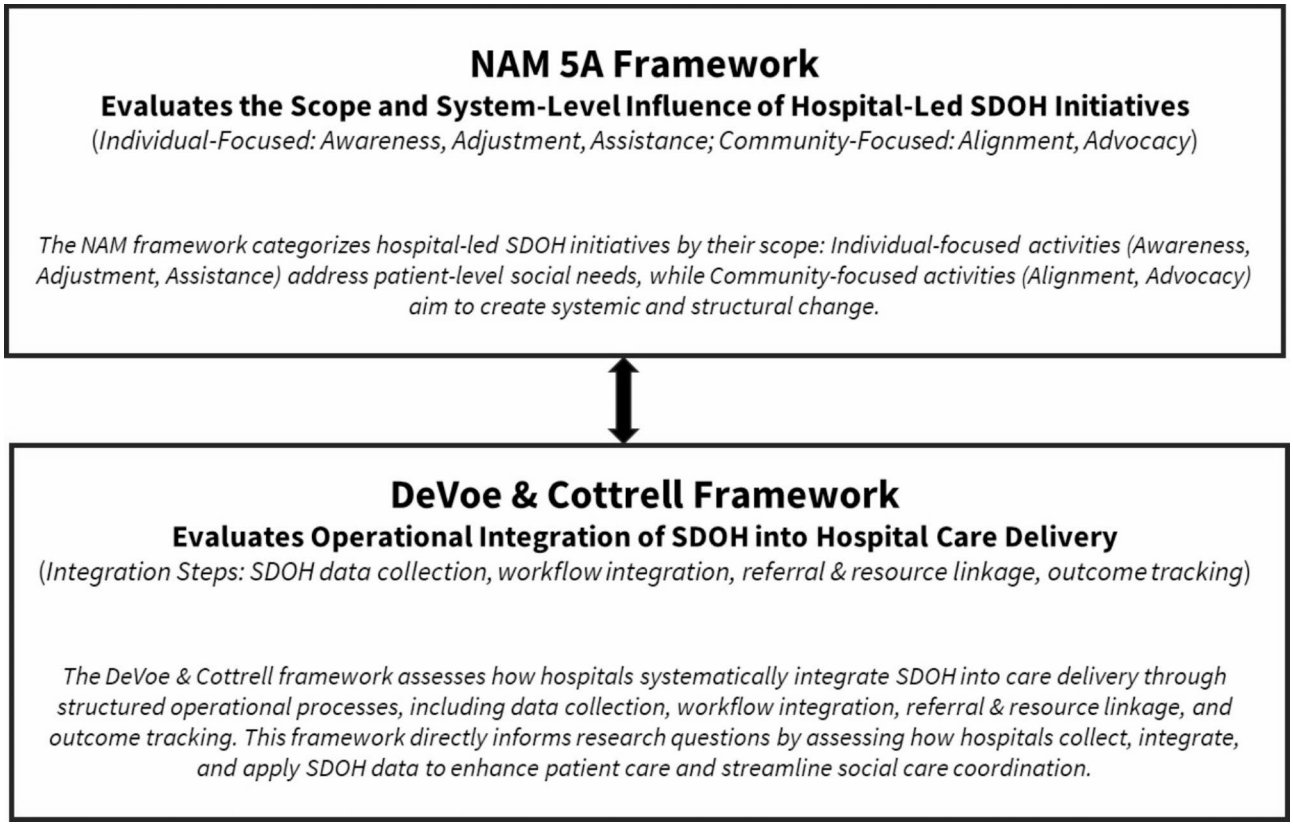

Fig. 1 Integrating the NAM 5A and DeVoe & Cottrell frameworks for evaluating hospital-led SDOH initiatives

distinct but complementary perspectives, strengthening the study's analytic depth by assessing both operational integration and system-level scope and influence.

The DeVoe and Cottrell framework, previously discussed as the foundation for evaluating how hospitals integrate SDOH data into care delivery, focuses on four core operational steps: SDOH data collection, workflow integration, referral and resource linkage, and outcome tracking. This framework provides a structured approach to assessing how hospitals embed SDOH data into clinical workflows and leverage it to support patient care coordination.

In contrast, the NAM 5A framework categorizes the scope and system-level influence of hospital-led SDOH initiatives into two levels. Individual-focused activities, including Awareness, Adjustment, and Assistance, address patient-level social needs, while community-focused activities, such as Alignment and Advocacy, aim to create systemic and structural change. The integration of these frameworks ensures a dual-level assessment that captures both the operational execution of hospital-led SDOH initiatives and their broader systemic influence on health equity.

Figure 1 provides a visual representation of this integrated conceptual approach, highlighting how these frameworks work in tandem to assess the effectiveness, scope, and operational execution of SDOH interventions in hospital settings. The NAM framework is leveraged in this study to serve three key purposes. First, it provides a structured approach to evaluating how hospital initiatives address both immediate patient needs and upstream systemic determinants of health. Second, it complements the DeVoe and Cottrell framework by offering a system-level perspective, examining whether initiatives focus on downstream or upstream efforts and their broader impact on health equity. Third, integrating these frameworks strengthens the analytic approach, ensuring that the study not only assesses the effectiveness of data integration but also evaluates the strategic scope and potential impact of hospital-led initiatives.

By leveraging both frameworks, this study offers a more comprehensive understanding of how hospitals contribute to addressing SDOH, balancing individual patient care with broader community-level strategies. This integration enhances the ability to evaluate not only how hospitals operationally implement SDOH initiatives but also the extent to which they align with systemic goals for advancing health equity.

New contributions

As a follow-up to the first comprehensive review of hospital and health system initiatives addressing SDOH in the U.S., this review directly contributes to the literature by conducting a systematic impact assessment of these efforts. It evaluates whether hospitals have systematically collected SDOH data, integrated it into clinical workflows, assessed the impact of these initiatives, and demonstrated improvements in health outcomes. The review also sheds light on the types of SDOH beyond REL that hospitals have addressed and the extent to which SDOH data collection has been standardized.

Additionally, this review compares the impact of initiatives that utilized EHR systems to collect and organize SDOH data with those that did not, offering deeper insights into the role of EHRs in driving effective outcomes. It also provides a holistic assessment of initiative effectiveness by integrating insights from Part 1 regarding the adequacy and distribution of initiatives with impact assessments from this review. This holistic perspective is enhanced using the NAM framework. These contributions aim to inform policy and future research while promoting best practices for addressing SDOH within hospitals and health systems.

Specific enhancements to the DeVoe & Cottrell framework

In addition to integrating the NAM 5A and DeVoe & Cottrell frameworks, this review introduces specific enhancements to the DeVoe & Cottrell framework to strengthen its applicability in evaluating hospital-led SDOH initiatives. One key enhancement is the expansion of outcome measures to include social outcomes, such as housing stability and access to nutritious food, alongside clinical and process measures, allowing for a more comprehensive assessment. Another refinement is the incorporation of impact direction, evaluating whether initiatives result in improved, unchanged, or worsened outcomes to provide a more nuanced understanding of effectiveness. Additionally, this review captures funding sources and sponsorship for each initiative, an element not previously included, to offer insights into how these efforts are resourced and sustained. These enhancements, which are reflected in Appendix 1, ensure a more robust framework for assessing the operational integration of SDOH data into healthcare delivery while informing strategies for scaling and sustaining effective interventions.

Leveraging existing evidence-based practices for evaluating initiatives

The DeVoe and Cottrell framework (Appendix 1) identifies evidence-based practices for integrating SDOH data into care delivery, both within and outside the EHR [29, 30]. These practices, developed through research evidence, have been validated as effective strategies for integrating SDOH into clinical workflows from an operational perspective and provide a structured foundation for evaluation [28–30]. This study leverages these evidence-based practices to assess hospital and health

system efforts in three key areas: the collection and organization of SDOH data, the integration of SDOH data into care, and the use of EHR technology to facilitate this integration, and the impact of services on outcomes. These areas align directly with the study's research questions, ensuring that the framework is used systematically to evaluate hospitals' adherence to best practices in addressing SDOH.

While no nationally standardized set of evidence-based practices for integrating SDOH into care and EHRs currently exists, the DeVoe and Cottrell framework serves as a robust guide for this study's clinical and operational assessments [29, 30]. Complementing this framework, the broader NAM framework provides a systemic lens to evaluate individual-focused activities and community-level strategies [31]. This dual perspective ensures that the study evaluates both clinical/operational practices and broader systemic contributions, fostering actionable insights to improve outcomes and advance health equity.

Comparison between EHR-utilizing initiatives and non-EHR initiatives

The earlier article noted that only a small proportion of initiatives used EHR systems to collect and organize SDOH data. This review compares the impact of initiatives that used EHR technology with those that did not, offering deeper insights for practice, policy, and research.

Holistic assessment of initiative effectiveness

Finally, and importantly, this review integrates findings from Part 1 regarding the characteristics of hospital-led SDOH initiatives with impact assessments from this review. This integration enables a more comprehensive understanding of the overall effectiveness of hospital and health system efforts to address SDOH in the U.S. By leveraging the NAM framework's dual categorization of individual- and community-focused activities, this study provides a nuanced analysis of hospital initiatives and their alignment with systemic health equity goals. The NAM framework directly supports the research questions, particularly those examining the integration of SDOH data into workflows (RQ#2) and the discussion on overall effectiveness of initiatives. By integrating the NAM 5A framework alongside the DeVoe and Cottrell frameworks, this study offers a comprehensive and multidimensional perspective, advancing the understanding of how healthcare systems can effectively address SDOH and promote health equity.

Methodology

Both Parts 1 and 2 of this review were planned from the start, with distinct objectives. Part 1 focused on identifying "what" hospitals and health systems in the U.S. are doing to address SDOH, while this review evaluates "how effectively" these initiatives are being implemented. There is no overlap in research questions between the two reviews. As outlined in Part 1, the scoping review followed PRISMA-ScR criteria [32] and searched three academic databases for eligible articles from 01.01.2018 to 06.30.2023. The review protocol, based on Joanna Briggs Institute (JBI) guidelines [33], was not registered but is included in Appendix 2, with the PRISMA-ScR checklist in Appendix 3.

Information sources

The information sources for both Parts 1 and 2 included three academic databases: PubMed, ABI/Inform, and Academic Search Premier. These databases were selected to ensure comprehensive coverage across medical, public health, and social sciences domains, aligning with the interdisciplinary nature of SDOH research and our focus on peer-reviewed literature. These databases were searched for relevant articles published between 01.01.2018 and 06.30.2023. The search was conducted in September 2023.

Search strategy

As outlined in Part 1, three sets of search terms were used to identify articles on hospital and health system initiatives addressing SDOH in the U.S [22]. The first set targeted individual SDOH factors. Part 1 integrated the five Healthy People SDOH domains [7] with the IHI's list of ten SDOH areas for hospitals [27], including (i) health coverage, (ii) food insecurity, (iii) housing instability, (iv) unmet immigrant needs, (v) unmet correctional health needs, (vi) climate and decarbonization related challenges, (vii) voting right violations, (viii) lack of educational support, (ix) lack of early childhood support, and (x) lack of social support among the elderly.

Part 1 includes a figure summarizing this framework, which guided the search for SDOH-related articles. The second set of search terms focused on the care setting, using keywords such as "hospital," "health system," "health center," and "medical center" to reflect the wide variety of healthcare providers, including 5,000 + community hospitals and 220 + academic health/medical centers [10] in the U.S. The third set of terms incorporated National Library of Medicine (NLM) Medical Subject Headings (MeSH) to capture the context of social determinants of health. These three sets of terms were combined with Boolean operators to form the final search algorithm. The complete search strategy used in PubMed is detailed in Appendix 4.

Eligibility criteria

Part 1 of the review employed broader eligibility criteria, and included research articles (e.g., randomized controlled trials, observational studies, and analytical

cross-sectional studies), as well as case reports and review articles, some of which lacked outcome measures. It also included studies focused on predicting social risk and understanding disparities, such as predictive models for food insecurity [22]. However, since Part 2 aims to assess the impact of hospital and health system interventions on SDOH, it is restricted to research articles that describe hospital-led initiatives designed to address SDOH and improve outcomes. Studies predicting social risks without implementing interventions were excluded.

To be included in Part 2, articles had to meet the following criteria: published between 01.01.2018 and 06.30.2023, in English, in peer-reviewed journals, and based in the U.S. At least one author had to be affiliated with a U.S.-based institution, and the article had to describe a hospital or health system-led initiative focused on addressing SDOH within the U.S. The articles also needed to be available in full text from open-access or publishing sources. Eligible articles were required to be research studies using outcome measures (e.g., process, clinical, or social outcomes) to evaluate the impact of SDOH initiatives. Excluded articles included study protocols, editorials, opinion papers, discussion papers, review articles, and case reports. Finally, articles had to meet the critical appraisal criteria set by the JBI [33] and/or the Mixed-Method Assessment Tool (MMAT) [34] as applicable, after satisfying all other eligibility requirements.

Process for selecting sources of evidence

As outlined in Part 1, the eligibility criteria were applied across three stages of article selection: (1) during the academic database search, (2) during article screening, and (3) during full-text review. In the final stage, (4) articles meeting the critical appraisal criteria were included in the review. After the database search, all identified articles were uploaded into Zotero 5.0 to remove duplicates. Titles and abstracts were then screened for potential inclusion based on the eligibility criteria. Full texts of the remaining articles were reviewed, and those meeting the criteria underwent a critical appraisal using JBI checklists for clinical trials, cohort studies, and cross-sectional studies, and the MMAT for mixed-method studies. Articles passing critical appraisal were included in the final scoping review. At each stage, two independent reviewers resolved conflicts through discussion, consulting a third reviewer if consensus could not be reached.

Process for charting data items for individual sources of evidence

All included articles were thoroughly reviewed to extract data across corresponding to the first three research questions (RQ#1– RQ#3). The fourth research question (RQ#4) was addressed through a quantitative comparison between initiatives that used EHRs and those that did not. All data collected on individual sources of evidence is available in Appendix 5 (Charts 1–4), and the raw dataset is provided in Appendix 6.

Process for synthesizing results

Data collected from the articles were summarized using counts, aggregates, and proportions to analyze and interpret findings in relation to the review questions. Bivariate analyses (chi-square tests) were conducted to compare proportions between EHR-utilizing and non-EHR initiatives, providing insights into potential associations between EHR use and the effectiveness of these interventions. Additionally, results from Parts 1 and 2 were integrated to offer a qualitative assessment of the overall effectiveness of hospital and health system efforts in addressing SDOH. This process enabled a comprehensive synthesis of evidence on the impact and effectiveness of these initiatives in the United States.

Results

Selection of sources of evidence

As outlined in Part 1 [22], a total of $n = 3{,}027$ studies were initially identified through database searches, ready for duplicate removal and screening. The initial search, which applied only a date restriction, retrieved $n = 21{,}246$ records across the three databases: PubMed ($n = 8{,}772$), ABI/Inform ($n = 10{,}436$), and Academic Search Premier ($n = 2{,}038$). After applying additional exclusion criteria, $n = 18{,}219$ records were removed. From the remaining $n = 3{,}027$ articles, $n = 268$ duplicates were excluded. Following title and abstract screening, $n = 2{,}381$ articles were excluded due to not being in English ($n = 2$), being an ineligible article type ($n = 84$), not being based in the U.S. ($n = 1{,}605$), or being outside the study's scope ($n = 690$). The full text of the remaining $n = 378$ articles was reviewed, and further exclusions were made for ineligible article type ($n = 76$), not being U.S.-based ($n = 20$), and falling outside the scope ($n = 234$). After critical appraisal, $n = 7$ more articles were excluded, leaving $n = 41$ for final inclusion in this review [35–75]. The search results are visually detailed in the PRISMA chart in Fig. 2.

Characteristics of sources of evidence

The attributes of all 41 included studies (individual sources of evidence) are detailed in Appendix 5, Chart 1.

Results of individual sources of evidence

Appendix 5, Charts 2, 3, and 4 present the results related to RQ#1, RQ#2, and RQ#3, respectively, for all 41 studies.

Synthesis of results

Attributes of studies included in the review

Table 1 presents the characteristics of the study sample ($n = 41$). The majority were randomized controlled trials

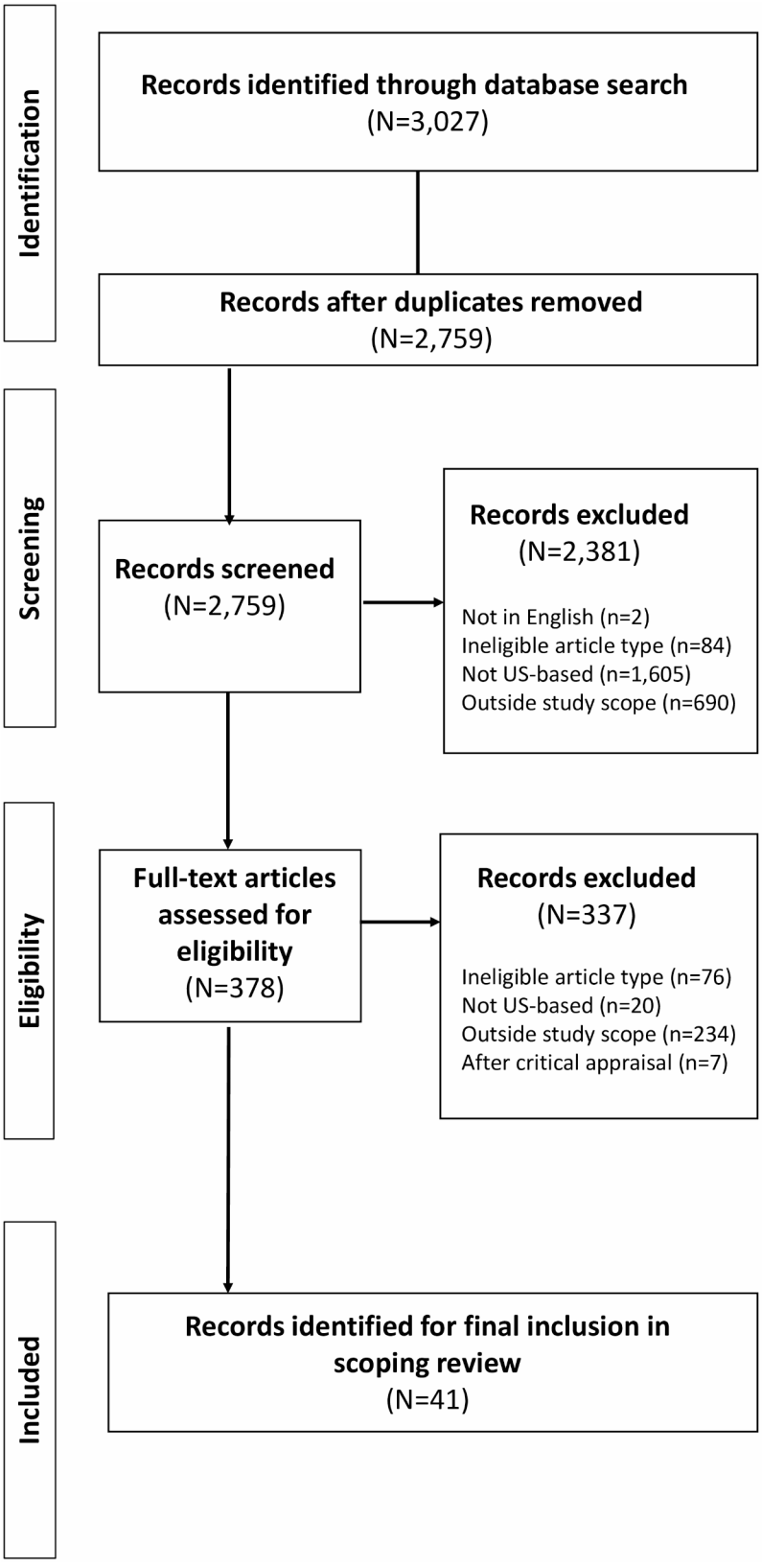

Fig. 2 PRISMA flow chart for article selection

Table 1 Study characteristics

#	Data Element	Frequency	Percentage
1	**Study design (*n* = 41)**		
	Randomized Controlled Trial	27	65.85%
	Quasi-experimental Study	2	4.88%
	Analytical Cross-sectional Study	4	9.76%
	Observational Quantitative Study	7	17.07%
	Observational Mixed-Method Study	1	2.44%
	Total	**41**	**100%**
2	**Targeted population (*n* = 41)**		
	General Adult Patients	9	21.95%
	Pediatric Patients	6	14.63%
	Pregnant Women	2	4.88%
	Patients with Chronic Disease or Mental Health Conditions	16	39.02%
	High-risk for Healthcare Utilization	8	19.51%
	Total	**41**	**100%**
3	**Setting (*n* = 41)**		
	Rural	4	9.76%
	Urban	28	68.30%
	Regional or State-level or Multiple Regions	9	21.95%
	Total	**41**	**100%**
4	**Funding source of study (*n* = 41)**		
	National Institutes for Health (NIH)	9	21.95%
	Centers for Medicare & Medicaid Services (CMS)	2	4.88%
	Other Federal or Non-federal Funding Source	13	31.71%
	Multiple Funding Sources	10	24.30%
	Private Funding Source	1	2.44%
	No External Funding	3	7.32%
	Not Described	3	7.32%
	Total	**41**	**100%**

(RCTs) ($n = 27$, 66%), followed by observational studies ($n = 8$, 19%), which included observational-quantitative (17%) and observational-mixed-method (2%) designs. The sample also included analytical cross-sectional studies ($n = 4$, 10%) and quasi-experimental studies ($n = 2$, 5%). Target populations varied, with most studies focusing on patients with chronic or mental health conditions ($n = 16$, 39%) and high-risk healthcare users ($n = 8$, 20%). Other specialized groups included pediatric patients ($n = 6$, 15%) and pregnant women ($n = 2$, 5%). Most studies were conducted in urban settings ($n = 28$, 68%) or across multiple regions ($n = 9$, 22%), with only 4 studies (10%) based in rural areas. Regarding funding, more than half of the studies ($n = 24$, 58%) were supported by federal agencies or non-federal research foundations. Federal agencies included the NIH (22%), CMS (5%), HRSA (2%), and the Veterans Health Administration (7%), while non-federal sources (22%) included the RWJF and PCORI. Multiple funding sources supported 10 studies (24%).

Table 2 Assessment of collection and organization of patient-reported and community-level SDOH data

#	Data Element	Frequency	Percentage
1	**Gathered data based on needs of care teams (*n* = 41)**		
	Yes	5	12.20%
	Not Described	36	87.80%
	Total	**41**	**100%**
2	**Gathered data on providers perspectives on integration of SDOH into workflows (*n* = 41)**		
	Yes	3	7.32%
	Not Described	38	92.68%
	Total	**41**	**100%**
3	**Gathered data on patient feelings on collecting SDOH data and including them in EHR (*n* = 41)**		
	Yes	2	4.88%
	Not described	39	95.12%
	Total	**41**	**100%**
4	**Used standardized data collection methods (*n* = 41)**		
	Yes (Used standardized tool)	28	68.30%
	Yes (Used Self-developed tool)	8	19.51%
	Not Described	5	12.19%
	Total	**41**	**100%**
5	**Type of specific SDOH indicators collected (*n* = 41)**		
	Economic Stability	4	9.76%
	Education Access and Quality	1	2.44%
	Neighborhood and Built Environment	3	7.32%
	Healthcare Access and Quality	3	7.32%
	Social and Community Context	7	17.07%
	Multiple	20	48.78%
	Not Specified	3	7.32%
	Total	**41**	**100%**
6	**Leveraged EHR technology for collecting patient reported SDOH (*n* = 41)**		
	Yes	10	24.39%
	Not Described	31	75.61%
	Total	**41**	**100%**
7	**Frequency of SDOH data collection (*n* = 41)**		
	One-time collection	17	41.46%
	At initial and follow-up visits (multiple timepoints)	13	31.71%
	Not Described	11	26.83%
	Total	**41**	**100%**
8	**Types of community-level SDOH data (*n* = 41)**		
	Census Data	1	2.44%
	Other	5	12.20%
	Not Described	35	85.36%
	Total	**41**	**100%**

RQ#1: collection and organization of patient-reported and community-level SDOH data

Table 2 summarizes efforts to collect and organize SDOH data. Only 12% of initiatives ($n = 5$) assessed care team needs through focus groups ($n = 2$), expert panels ($n = 1$), or partnerships ($n = 1$), while 88% ($n = 36$) did not provide

this information. Feedback on patient perspectives was gathered by 5% ($n=2$), and 7% ($n=3$) assessed provider perspectives, with full support shown, while 93% ($n=38$) did not report this information. Most initiatives ($n=28$, 68%) used standardized tools to collect SDOH data, with $n=3$ (7%) using standardized tools that have been promoted by federal agencies like PRAPARE, WE CARE, or the AHC Screening Tool. Other standardized tools included the Well Rx questionnaire [76], US Department of Agriculture (USDA) food security survey [77], Hunger Vital Sign [78], PROMIS [79], PHQ-9 [80], and others related to food insecurity, housing stability, and social support. A few initiatives ($n=8$, 20%) used self-developed tools.

Only 24% ($n=10$) of initiatives used EHR technology to collect SDOH data [36, 37, 41, 42, 61, 63, 64, 66, 70, 72], while the majority ($n=31$, 76%) did not describe using the EHR, instead, many of these non-EHR initiatives reported using independent technology like the REDCap (Research Electronic Data Capture) to collect SDOH data. Only 15% ($n=6$) of all initiatives collected community-level SDOH data, although none stored it in EHRs. Nearly half ($n=20$, 49%) collected multiple types of SDOH, focusing on Social and Community Context, Economic Stability, and Neighborhood and Built Environment, with less focus on Education Access and Quality. Most studies collected SDOH data once at baseline (41%), with 32% collecting at multiple points, and 27% not reporting frequency.

RQ#2: integration of SDOH data into care practices and use of EHR technology

Table 3 details efforts to integrate SDOH data into care workflows and utilize EHR technology. Consistent with findings reported under RQ#1, only 24% of studies ($n=10$) used EHRs for storing and reporting patient-reported SDOH data. Overall, reports or summaries of patient-level SDOH data were generated by 46% of studies, shared with the care team in 34% of studies and discussed with patients in 27% of studies. Many studies (56%) used community resource lists or guides to aid referrals, with 22% providing these guides to patients and another 24% facilitating referrals through other means, including appointments with community health workers. Only one study (2%) integrated a community resource database directly into the EHR [66].

Many studies (49%) incorporated patient referral practices. Specific initiatives offered patients a referral ($n=12$, 29%), helped schedule social service appointments ($n=3$, 7%), or provided warm hand-offs to service providers ($n=2$, 5%). About one-third ($n=13$, 32%) tracked referrals to confirm service receipt, using methods like follow-up calls ($n=5$) or other means such as patient self-reports or follow-ups with community health workers ($n=8$). Only one study (2%) detailed staffing models and training resources within the EHR, including streamlined workflows and decision-making tools to overcome complexity and time barriers [36]. One other study (2%) incorporated EHR-based tools like automated alerts to notify team members about hospitalizations of children from high-risk neighborhoods [66]. Additionally, three studies (7%) integrated referral tracking tools into the EHR [36, 41, 63].

Applying the NAM framework reveals a limited implementation of both individual- and community-level activities [31]. For individual-level efforts, such as "Awareness" (identifying social risks) and "Adjustment" (modifying care to accommodate barriers), the studies demonstrated some progress, with 68% using standardized tools to collect SDOH data and 32% conducting follow-up to track referrals. However, "Assistance" activities, such as systematically connecting patients to resources, remain underdeveloped, with only 5% of studies facilitating warm hand-offs and just 2% integrating resource databases directly into EHRs. Community-level efforts, represented by "Alignment" (organizing community assets) and "Advocacy" (supporting systemic changes), were notably underrepresented. Only 15% of initiatives collected community-level SDOH data, and none integrated it into EHRs. Moreover, while 56% of studies used community resource lists, the lack of integration into the EHR and clinical workflows highlights missed opportunities to leverage these tools for broader systemic alignment.

RQ#3: demonstration of impact of services on targeted outcome measures

Figure 3 provides a three-part comprehensive summary of the impact of hospital and health system initiatives on targeted outcome measures. The top tier highlights the distribution of studies assessing process, clinical, and social outcomes, using an innovative Venn diagram to show overlaps where studies assessed multiple types of outcomes. For instance, 10% of studies ($n=4$) evaluated all three types of outcome measures, while 41% ($n=17$) assessed a combination of two, and nearly half (49%, $n=20$) targeted a single outcome type. Additionally, the stratified bar graph in the second tier illustrates the direction of effects for process, clinical, and social outcomes, categorizing them as improved, showing no change, or mixed results. Examples of interventions are also provided to illustrate these findings, offering context and evidence on the impact of specific interventions in practice.

Across the 41 studies included in this review, a total of 66 instances of measures (process, clinical, or social) were assessed. Of these, improvement was recorded in 52 instances (79%) of all measures. In 9 instances (14%), no change was recorded, and mixed results were reported in

Table 3 Assessment of integration of SDOH data into care practices and use of EHR technology

	Data Element	Frequency	Percentage
Integration of SDOH data into care practices			
1	**Created reports or summarized patient-level SDOH data (*n* = 41)**		
	Yes	19	46.34%
	Not Described	22	53.66%
	Total	**41**	**100%**
2	**Patient SDOH data was shared with the care team (*n* = 41)**		
	Yes	14	34.15%
	Not Described	27	65.85%
	Total	**41**	**100%**
3	**Care team discussed SDOH results with patients (*n* = 41)**		
	Yes	11	26.83%
	Not Described	30	73.17%
	Total	**41**	**100%**
4	**Used list or guide of community resources to facilitate referrals (*n* = 41)**		
	Yes (Database embedded in EHR)	1	2.44%
	Yes (Resources provided by provider or staff)	1	2.44%
	Yes (Generalized resource guide provided to patients)	3	7.32%
	Yes (Personalized resource guide provided to patients)	6	14.63%
	Yes (Support network)	2	4.87%
	Yes (Other)	10	24.40%
	Not Described	18	43.90%
	Total	**41**	**100%**
5	**Had referral protocols (*n* = 41)**		
	Yes	20	48.78%
	Not Described	21	51.22%
	Total	**41**	**100%**
6	**Patient referral practices used (n = *41)***		
	Yes (Gave patients a referral)	12	29.27%
	Yes (Helped patients make an appointment)	3	7.32%
	Yes (Warm Handoff)	2	4.88%
	Yes (Other)	3	7.32%
	Not clear	2	4.88%
	Not Described	19	46.34%
	Total	**41**	**100%**
7	**Tracked referrals (*n* = 41)**		
	Yes (Through follow-up calls)	5	12.20%
	Yes (Other)	8	19.51%
	No (Didn't track referrals)	2	4.88%
	Not Described	26	63.41%
	Total	**41**	**100%**
8	**Had protocols on use of community-level SDOH data in referrals and patient management (*n* = 41)**		
	Yes	0	0%
	Not described	41	100%
	Total	**41**	**100%**
Use of EHR technology in the integration			
9	**Stored and presented patient-level SDOH data in the EHR (*n* = 41)**		
	Yes	10	24.40%
	Not Described	31	75.60%
	Total	**41**	**100%**
10	**Stored and presented community-level SDOH data in the EHR (*n* = 41)**		
	Yes	0	0%
	Not Described	41	100%
	Total	**41**	**100%**

Table 3 (continued)

	Data Element	Frequency	Percentage
11	**Described staffing models and training resources in EHR (*n* = 41)**		
	Yes	1	2.44%
	Not Described	40	97.56%
	Total	**41**	**100%**
12	**EHR-based tool included automated triggers or alerts (*n* = 41)**		
	Yes	1	2.44%
	Not Described	40	97.56%
	Total	**41**	**100%**
13	**Had referral tracking tools in EHR (*n* = 41)**		
	Yes	3	7.32%
	No (Didn't track referrals)	1	2.44%
	Not Described	37	90.24%
	Total	**41**	**100%**
14	**Community resources lists were integrated into the EHR (*n* = *41*)**		
	Yes	2	4.88%
	Not Described	39	95.12%
	Total	**41**	**100%**

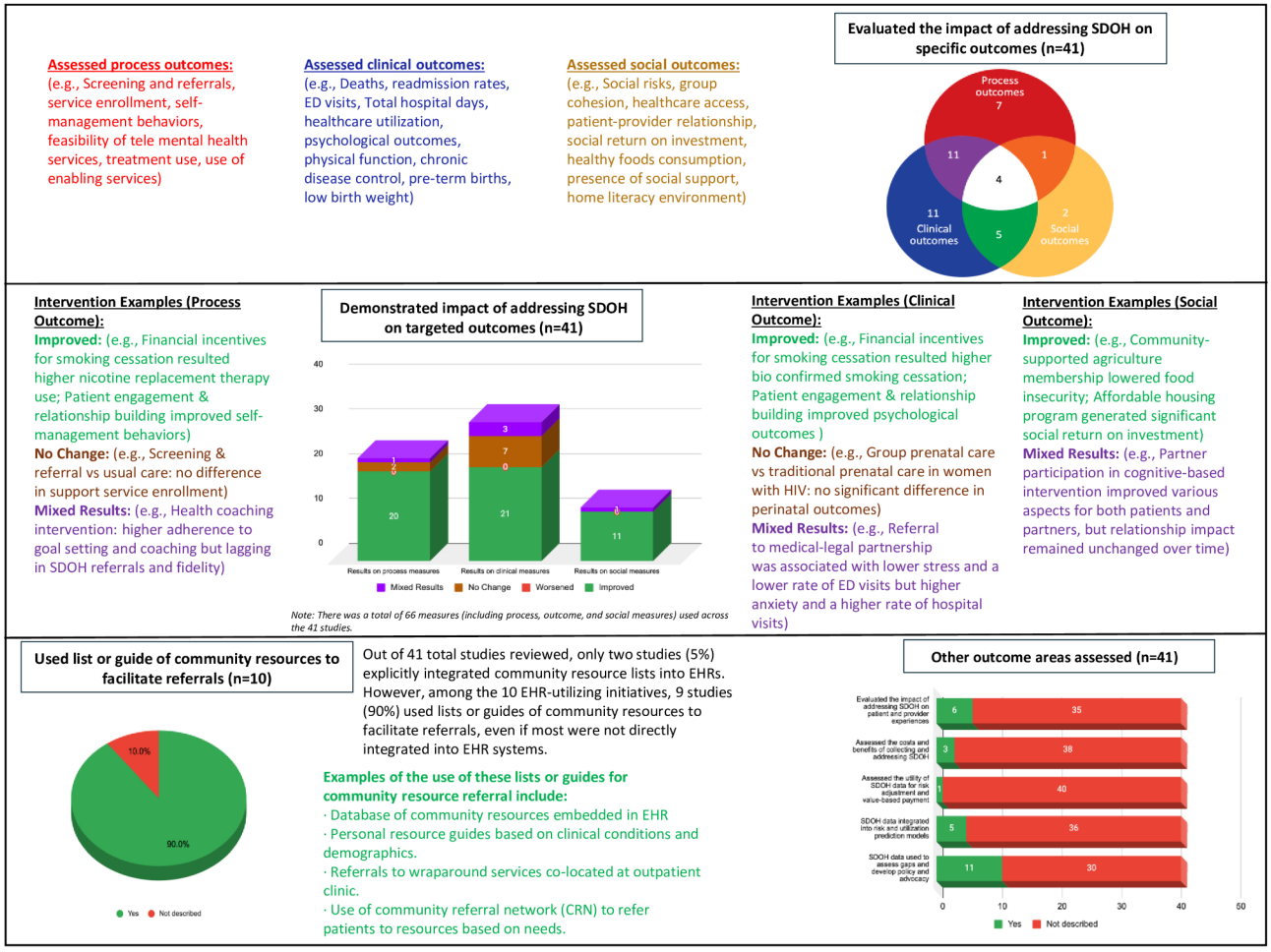

Fig. 3 Impact of hospital and health system SDOH initiatives on outcomes

5 instances (7%). These aggregated findings underscore the overall positive direction of most interventions while also indicating some no change or mixed results in outcomes, reflecting the potential need for further refinement to achieve consistent and sustainable outcomes.

The evaluation of process outcomes revealed improvements in 87% of cases ($n = 20$ of 23 instances), with no instances of worsening outcomes. For example, in a nurse-led hospital-to-community care intervention for people living with HIV, viral suppression rates significantly increased in the intervention group [44]. Other examples of process outcomes included increased referrals and improved medication adherence. Notably, 10% of process outcomes ($n = 2$) showed no change, while one instance (5%) showed mixed results, such as goal-setting adherence improving but lagging in SDOH referrals [49].

Clinical outcomes were assessed either alone or in combination with other types of outcomes in 31 instances, with 68% showing improvement ($n = 21$). For example, a randomized controlled trial (RCT) involving community health workers demonstrated a significant reduction in 30-day hospital readmissions for patients discharged to short-term rehabilitation facilities [37]. However, in 23% of instances ($n = 7$), clinical outcomes showed no change, and in 10% ($n = 3$), mixed results were reported. Examples of clinical outcomes included bio-confirmed smoking cessation, reductions in HbA1c levels, and psychological health improvements.

Social outcomes were assessed in 12 instances, with 83% ($n = 10$) showing improvement. For example, a collaborative initiative between local health departments and nonprofit hospitals fostered healthy behaviors and strengthened social capital within communities, enhancing relationships between key stakeholders [58]. In one instance, no change was observed (8%), and another (8%) reported mixed results, such as varying impacts on patient-provider relationships over time. Social outcomes measured included food security, access to utilities, and reductions in child maltreatment.

Among the four studies that evaluated all three types of outcome measures—process, clinical, and social—three studies (75%) demonstrated significant improvements across all domains. For example, one RCT examined the effects of self-management support for diabetes in community health centers, showing improvements in self-management behaviors (process outcomes), mental health (clinical outcomes), and food security and access to utilities (social outcomes) [38]. Another study on enabling services in health centers found that care coordination, health education, and free medications (process outcomes) were linked to increased routine checkups (clinical outcomes) and improved primary care access (social outcomes) [59].

Beyond these measures, fewer studies assessed additional impacts, such as patient and provider experiences ($n = 6$, 15%), the costs and benefits of collecting SDOH data ($n = 3$, 7%), or the use of SDOH data for policy advocacy and risk adjustment ($n = 11$, 27%). For instance, one study conducted a social-return-on-investment analysis of a health system's affordable housing program, using SDOH data to identify policy gaps and inform advocacy efforts [60].

RQ#4: impact differences between initiatives that used EHR technology vs. those that did not

As mentioned earlier, less than a quarter of the initiatives ($n = 10$, 24%) used EHRs to collect and organize SDOH data. Table 4 compares EHR-utilizing initiatives with non-EHR initiatives on adherence to key best practices. The results reveal that initiatives utilizing EHR technology demonstrated significantly higher adherence to evidence-based practices for effectively integrating SDOH data into care delivery, outperforming non-EHR initiatives in this critical area.

To begin with, a significantly higher proportion of EHR-utilizing initiatives (40%) reported gathering data based on the needs of care teams prior to implementation, compared to non-EHR initiatives (3%) ($p = 0.002$). EHR-utilizing initiatives were also more likely to use standardized tools for collecting SDOH data (80%) compared to non-EHR initiatives (65%). Conversely, none of the EHR initiatives used self-developed tools, while 26% of non-EHR initiatives relied on such tools.

Additionally, there were significant differences in referral practices. 90% of EHR initiatives used community resource lists to facilitate referrals, compared to 45% of non-EHR initiatives ($p = 0.012$). Similarly, 70% of EHR initiatives had referral protocols, compared to 26% of non-EHR initiatives ($p = 0.013$), and 80% of EHR initiatives used patient referral practices, compared to 39% among non-EHR initiatives ($p = 0.023$). Referral tracking was also more common in EHR initiatives (60%) compared to non-EHR initiatives (23%) ($p = 0.027$). No significant differences were noted between EHR initiatives and non-EHR initiatives on the types of outcomes assessed, and the results related to outcome measures.

It is noteworthy that among the 41 total studies reviewed, only two studies (5%) explicitly integrated community resource lists into EHRs. This highlights a significant gap in leveraging EHR systems for community resource alignment and referral facilitation. However, as reported above, among the 10 EHR-utilizing initiatives, 9 studies (90%) used lists or guides of community resources to facilitate referrals, even if most were not directly integrated into EHR systems. Figure 3 includes examples of the use of these lists or guides for community resource referral, such as personal resource guides tailored to

Table 4 Bivariate analysis comparing EHR-utilizing initiatives with non-EHR initiatives

	Leveraged EHR technologies for collecting self-reported SDOH		*p*-value
	Yes *n* (%)	Not described *n* (%)	
ADHERENCE TO EVIDENCE-BASED IMPLEMENTATION PRACTICES			
Gathered data based on needs of care teams			
Yes	4 (40.00%)	1 (3.23%)	0.002*
Not described	6 (60.00%)	30 (96.77%)	
Used standardized data collection methods			
Yes (Used standardized tool)	8 (80.00%)	20 (64.52%)	0.173
Yes (Used self-developed tool)	0 (0%)	8 (25.81%)	
Not described	2 (20.00%)	3 (9.68%)	
Used list or guide of community resources to facilitate referrals			
Yes	9 (90.00%)	14 (45.16%)	0.013*
Not described	1 (10.00%)	17 (54.84%)	
Had referral protocols			
Yes	7 (70.00%)	8 (25.81%)	0.012*
Not described	3 (30.00%)	23 (74.19%)	
Patient referral practices used			
Yes	8 (80.00%)	12 (38.71%)	0.023*
Not described/ Not clear	2 (20.00%)	19 (61.29%)	
Tracked referrals			
Yes	6 (60.00%)	7 (22.58%)	0.027*
No/Not described	4 (40.00%)	24 (77.42%)	
PERFORMANCE ON OUTCOME MEASURES			
Assessed process outcomes			
Yes	5 (50.00%)	18 (58.06%)	0.655
Not described	5 (50.00%)	13 (41.94%)	
Results on process outcomes (*n* = 23)			
Improved	5 (100%)	15 (83.33%)	0.328
Not improved**	0 (0%)	3 (16.67%)	
Assessed clinical/health outcomes			
Yes	8 (80.00%)	23 (74.19%)	0.710
Not described	2 (20.00%)	8 (25.81%)	
Results on clinical/health outcomes (*n* = 31)			
Improved	7 (87.50%)	14 (60.87%)	0.165
Not improved**	1 (12.50%)	9 (39.13%)	
Assessed social outcomes			
Yes	1 (10.00%)	11 (35.48%)	0.124
No	9 (90.00%)	20 (64.52%)	
Impact on social outcomes (*n* = 12)			
Improved	1 (100%)	9 (81.82%)	0.640
Not improved**	0 (0%)	2 (18.18%)	

* Indicates statistical significance at the 0.05 level ($p < 0.05$)

**The "not improved" category under impact on outcome measures represents an aggregate of "no change", "mixed results" and "worsened" results summarized in Table 4

demographics, referrals to wraparound services co-located at outpatient clinics, and use of community referral networks (CFN) for patients screening positive for HRSNs.

Discussion

Summary of results

The study sample ($n = 41$) predominantly consisted of randomized controlled trials (66%) and observational studies (19%), focusing mainly on chronic or mental health conditions (39%) and high-risk healthcare users (20%). Most studies were urban based (68%), with limited representation from rural areas (10%). Funding came primarily from federal agencies (58%) and non-federal sources like RWJF and PCORI (22%).

Efforts to collect and organize SDOH data showed that only 12% of studies assessed care team needs, 7% gathered provider perspectives, and only 24% used EHRs for

data collection. However, 68% of initiatives used standardized tools. Nearly half the initiatives (49%) collected multiple types of patient-reported SDOH data, focusing on Social and Community Context, Economic Stability, and Neighborhood and Built Environment, with less focus on Education Access and Quality. Only 15% collected community-level SDOH data. When integrating SDOH data into care workflows, nearly half (49%) had referral protocols, and 56% used community resource lists for referrals.

EHR-based initiatives demonstrated better adherence to evidence-based practices, with 40% gathering care team input (compared to 3% in non-EHR initiatives), 80% using patient referral practices (vs. 39% in non-EHR), and 60% using referral tracking (vs. 23% in non-EHR). This suggests that EHR integration has potential to strengthen the continuum of care and support both patient-level and community-level interventions.

Outcomes were assessed across process, clinical, and social measures. Of the 66 outcome measures used across all studies, 79% showed improvement, with no worsening outcomes reported. Among studies targeting a single outcome measure ($n = 20$), clinical outcomes were targeted by 55% of studies, process outcomes by 35%, and social outcomes by 10%. Studies evaluating all three outcome types (10%) demonstrated improvements in 75% of cases, including better food security, health education, and social support.

Overall effectiveness of hospital and health system initiatives to address SDOH

While most initiatives in this study (79%) demonstrated improvements across process, clinical, and social outcomes, these results do not tell the whole story. In the absence of SDOH-EHR integration, many of these initiatives may be one-off efforts with limited potential for replicability or sustainability. Moreover, the improvements observed are often driven by downstream, targeted interventions that address immediate needs but fail to tackle broader systemic inequities. Without a balanced intervention design that integrates upstream and universal approaches [23, 24], such initiatives risk perpetuating disparities rather than reducing them. This underscores the need to move beyond simply evaluating outcomes and focus on the structural and operational gaps that hinder the long-term effectiveness of hospital and health system initiatives addressing SDOH.

Outcomes mask persistent gaps

The integration of findings from Part 1 and Part 2 reveals three critical gaps that persist despite observed outcome improvements: (1) a predominant focus on downstream interventions over upstream approaches, (2) an overreliance on targeted efforts at the expense of universal strategies, and (3) a lack of systematic integration of SDOH data into EHRs [22, 25]. Downstream interventions, while addressing immediate HRSNs, fail to tackle upstream determinants such as housing, education, and economic stability that drive long-term health outcomes. Similarly, the predominance of targeted approaches often leaves broader community needs unaddressed, further reinforcing disparities. For example, only 15% of initiatives in this study collected community-level SDOH data, and none stored it in EHRs, limiting their ability to align clinical efforts with broader community resources. This narrow focus undermines the potential for sustainable and equitable health outcomes, highlighting the importance of addressing these gaps through a more integrated and comprehensive approach.

Leveraging the NAM framework to illuminate gaps

The NAM framework provides a valuable lens to further illuminate gaps in hospital-led SDOH initiatives. The framework emphasizes the importance of balancing individual-focused activities (Awareness, Adjustment, Assistance) with community-level efforts (Alignment, Advocacy). Findings from this study indicate that most hospital initiatives align with individual-focused activities but neglect community-level strategies, such as advocacy for systemic changes. For instance, while 90% of EHR-utilizing initiatives used community resource lists for referrals, few integrated these lists into broader advocacy efforts or aligned their practices with community resources. This imbalance limits the potential of these initiatives to address upstream determinants and achieve sustainable health equity.

A key missing dimension in many initiatives is the application of "cold spotting," a strategy focused on identifying underserved areas or populations lacking adequate resources to address SDOH [81]. By integrating cold spotting into EHR-supported analytics, hospitals can proactively identify resource gaps and prioritize interventions for marginalized communities. This strategy aligns with the NAM framework's emphasis on alignment and advocacy, ensuring that interventions extend beyond individual needs to address structural inequities. For example, cold spotting could guide hospitals in targeting areas with high food insecurity or inadequate housing, ensuring resources are directed where they are most needed.

Although cold spotting has been proposed as a strategy to link healthcare with public health efforts, its implementation faces challenges. Effective use of cold spotting requires robust data systems, integration of diverse datasets, and strong collaboration between healthcare institutions and community organizations. Additionally, operational and financial constraints may hinder hospitals' ability to reallocate resources based on identified

cold spots. Overcoming these barriers requires investment in data infrastructure, strategic partnerships, and policy initiatives that support targeted interventions in underserved communities [81].

While this review did not identify any hospital initiatives explicitly using cold spotting, its integration into SDOH interventions represents an important opportunity to enhance health equity. By leveraging EHR analytics and geospatial data, hospitals can refine their approach to addressing community-level disparities, complementing existing patient-centered strategies with broader systemic reforms.

The critical role of SDOH-EHR integration

Integrating SDOH data into EHR systems is foundational for enhancing the design, implementation, and evaluation of hospital-led SDOH initiatives. EHRs enable hospitals to link individual-level data with broader population health analytics, supporting a balanced intervention design that addresses both immediate needs and systemic inequities [22, 25, 82]. However, this study found significant gaps in SDOH-EHR integration, with only 24% of initiatives using EHRs to collect and organize SDOH data. Key deficiencies in integration were observed across several areas, limiting the full potential of SDOH-informed care delivery.

One major gap was community resource integration, with only 5% of initiatives embedding community resource lists within EHR systems to facilitate referrals. The absence of this functionality restricts hospitals' ability to align patient care with broader community-level resources, thereby reducing the effectiveness of interventions designed to address systemic SDOH inequities. Additionally, standardized data collection tools were inconsistently utilized; while 68% of initiatives employed standardized tools, 36% of non-EHR initiatives either relied on self-developed tools or did not specify their methodology. This lack of standardization undermines data interoperability and scalability, making it more difficult to share and integrate SDOH data across healthcare and social service sectors. Furthermore, referral tracking was inconsistent across initiatives. Although 60% of EHR-utilizing initiatives implemented referral tracking mechanisms, 40% did not, creating gaps in ensuring continuity of care and evaluating intervention impact. Without robust tracking mechanisms, it becomes challenging to determine whether referred patients successfully accessed necessary social services or whether interventions had the intended effect.

Despite these gaps, EHR-utilizing initiatives demonstrated significantly higher adherence to evidence-based practices compared to non-EHR initiatives. For example, 90% of EHR initiatives used community resource lists for referrals, compared to 45% of non-EHR initiatives, and 70% of EHR initiatives had formal referral protocols, compared to 26% of non-EHR initiatives. These capabilities provide EHR-utilizing initiatives with an advantage in delivering whole-person care by streamlining service coordination and strengthening social care linkages. However, the persistent deficiencies in community resource integration, standardization, and referral tracking highlight the need for more systematic SDOH-EHR integration. Strengthening these areas is essential for hospitals to not only improve care coordination but also advance health equity by ensuring that interventions extend beyond individual patient needs to address broader systemic determinants.

Whole-person care vs. health equity

Whole-person care focuses on the individual level, addressing the full spectrum of factors influencing health, including clinical, social, and environmental determinants [22, 23]. EHR-utilizing initiatives are particularly well-suited for whole-person care, as they integrate SDOH data into workflows, enabling providers to address patients' immediate social needs more effectively [25]. For example, referral tracking was significantly more common among EHR-utilizing initiatives (60%) compared to non-EHR initiatives (23%), reflecting the meaningful integration of SDOH data into patient-centered care processes. Examples from this study include initiatives that demonstrated significant improvements in process, clinical, and social outcomes, such as increased use of enabling services, improved chronic disease management, and enhanced food security. Overall, these efforts reflect meaningful progress in addressing whole-person care at an individual level.

However, from a health equity perspective, the findings reveal critical shortcomings. Health equity requires addressing systemic and structural factors contributing to disparities in health outcomes. The lack of community-level data integration, underutilization of policy advocacy, and insufficient use of standardized tools limit the ability of EHR-utilizing initiatives to advance equity. Additionally, the reliance on targeted approaches risks reinforcing disparities, particularly if underserved populations remain overlooked [22]. Incorporating cold spotting strategies focused on identifying and addressing gaps in service delivery could help hospitals proactively address inequities and ensure resource allocation aligns with community needs [81].

Why hospitals and health systems must address SDOH

Some have argued that addressing SDOH represents a "bridge too far" for hospitals and health systems, given their primary focus on clinical care and resource constraints [83]. This perspective suggests that tackling social determinants may overextend the role of healthcare

institutions, diverting attention from their core mission. However, such a viewpoint overlooks the intrinsic link between SDOH and health outcomes, as well as the critical role of hospitals in achieving systemic goals like the Quintuple Aim [84]., which includes improving population health, enhancing patient experience, reducing costs, improving provider well-being, and advancing health equity. By addressing SDOH, hospitals not only fulfill a moral imperative but also position themselves to improve population health, reduce costs, and advance health equity. The NAM framework [31] and CMS health equity initiative [21] emphasize the need for integrating SDOH into healthcare delivery as part of a Learning Health System (LHS) approach [85]. This perspective aligns with the growing recognition that addressing SDOH is essential for sustainable healthcare transformation.

Nonprofit community hospitals, in particular, have a unique obligation to address SDOH due to their community benefit requirements and substantial financial resources. While direct investment in social services is one approach, hospitals can also leverage strategic starting points to set the stage for upstream transitions without perpetuating disparities [22]. These include:

- *Policy Advocacy*: Using aggregated SDOH data to advocate for systemic changes, such as housing policy reforms or broadband expansion, ensures interventions address root causes [60].
- *Community Partnerships*: Collaborating with local organizations enhances the reach and impact of hospital initiatives, aligning efforts with existing community resources [22, 51].
- *Enabling Services*: Providing services such as transportation assistance, health education, or care coordination addresses immediate barriers to care while laying the groundwork for systemic reforms [59].
- *Direct Investment*: While resource-intensive, direct investments in areas like affordable housing or food security can yield transformative impacts on community health [13].

Hospitals must recognize that targeted interventions, if not carefully designed, can move further away from health equity by disproportionately benefiting certain groups while leaving others behind. Adopting a broader health equity perspective enables hospitals to preempt this risk and ensure their efforts contribute to sustainable and equitable health outcomes. By leveraging strategic starting points, hospitals can address immediate needs while laying the foundation for transitioning from downstream to upstream approaches.

The findings of this study highlight both the progress and limitations of hospital and health system initiatives addressing SDOH. While significant strides have been made in improving individual outcomes through whole-person care, persistent gaps in SDOH-EHR integration, universal approaches, and upstream reforms limit their overall effectiveness in advancing health equity. By prioritizing systematic EHR integration, leveraging strategic starting points, and adopting a balanced intervention design, hospitals can enhance the sustainability and equity of their SDOH initiatives. These insights set the stage for the next section, which will explore implications for policy, practice, and future research.

Implications for policy

In 2022, CMS launched a health equity initiative requiring hospitals and health systems to expand data collection beyond REL to include five SDOH domains: food insecurity, housing instability, transportation insecurity, interpersonal safety, and utilities [86]. To facilitate SDOH data integration into electronic health records (EHRs), CMS has promoted the use of ICD-10-CM Z codes [87] and tools like PRAPARE to standardize data collection [88, 89].

This review emphasizes evidence-based practices for collecting and integrating SDOH data, such as gathering team-specific data, using standardized tools, sharing patient SDOH data with care teams, and tracking the outcomes of referrals. Less than a quarter of the initiatives reviewed used EHRs for SDOH data, but those that did showed significantly higher adherence to these best practices. Given the critical role of SDOH-EHR integration in addressing social determinants both downstream (e.g., screening patients for housing insecurity) and upstream (e.g., advocating for affordable housing policies), it is essential for policymakers to incentivize and support the integration of SDOH data into EHRs. This could involve financial incentives for EHR upgrades, promoting standardized tools like PRAPARE, and fostering cross-sector partnerships to streamline care coordination and referrals.

Hospitals have faced challenges such as organizational and implementation barriers in addressing SDOH. Some have responded by launching initiatives like unconscious bias training for staff, engaging patients in data collection, and educating internal stakeholders on the importance of SDOH data to alleviate concerns about potential impacts on reimbursement [90, 91]. Policymakers, particularly CMS, could play a key role in supporting such initiatives by offering research grants to explore best practices for overcoming these barriers and practice grants to assist hospitals in upgrading EHR systems. CMS could also develop tax breaks or other financial incentives for hospitals that successfully integrate SDOH data into care workflows. In addition, policymakers could consider reforming the community benefit program to

better incentivize hospitals to address SDOH effectively. Updating requirements to emphasize measurable social outcomes, such as improved housing stability or reduced food insecurity, would ensure that tax-exempt resources are used for impactful SDOH-related programs targeted to addressing systemic inequities.

In addition to supporting hospitals directly, policymakers could incentivize health plans to facilitate SDOH-based care coordination by offering bonuses or funding for digital platforms that integrate SDOH data. Health plans and hospitals could engage with community partners to create referral networks for addressing needs like food and housing insecurity. Community Resource Referral Platforms (CRRPs) like NowPow or Aunt Bertha [92, 93] allow hospitals to link patients to local resources while tracking referral outcomes, ensuring continuity of care across health and social service sectors.

Policymakers could also support hospitals in addressing upstream SDOH through policy advocacy and community partnerships. For example, they could collaborate with hospitals to expand access to Supplemental Nutrition Assistance Program (SNAP) benefits [94] or advocate for zoning reforms to promote affordable housing [13, 60]. By focusing on policy advocacy, partnerships, financial incentives, and technology, this multifaceted approach would drive more effective and equitable integration of SDOH into healthcare delivery, with potential to address both immediate health-related social needs and broader structural determinants of health.

Implications for practice

Integrating the findings from Parts 1 and 2 of the review provides a comprehensive framework for learning healthcare systems to effectively address both downstream and upstream social determinants of health (SDOH) and promote health equity. The learning healthcare systems (LHS) approach is particularly well-suited for this role due to its dynamic, data-driven approach. It continuously learns and adapts through data collection, evidence generation, and real-time feedback [85, 95, 96]. Such adaptability would allow LHS to identify disparities and social risks across populations and inform targeted interventions at both the individual (downstream) and community (upstream) levels. Moreover, LHS can foster collaboration across sectors—such as healthcare, social services, and policy advocacy—making it a powerful tool to tackle SDOH challenges and create a more equitable healthcare system [95]. Based on the findings of this study, outlined below are five key principles LHS could use to address SDOH.

Invest in understanding community-level determinants of health

Learning healthcare systems must not only focus on social risks among high-risk patient groups but also consider the broader determinants of health at the community level [66]. Relying solely on data from targeted high-risk groups can create gaps; for example, a focus on housing insecurity in one demographic could overlook other populations affected by housing instability. Hospitals can partner with local public health departments, conduct community surveys, or use geospatial mapping to gather data on community-level risks. Investing in predictive models and data systems that track community-wide needs enables hospitals to design comprehensive, proactive interventions that address emerging social risks before they become entrenched health disparities.

Clarify the scope: downstream HRSNs vs. upstream SDOH

LHS must define whether its focus will be on downstream efforts (addressing individual health-related social needs) or upstream initiatives (tackling structural issues like housing policies). While downstream interventions may be resource-dependent, it is crucial to ensure that even these efforts are equity-driven. For example, offering food assistance should consider the unique challenges of those living in food deserts, ensuring interventions do not inadvertently increase inequities [64, 69, 94]. Equity should be the guiding principle in all interventions, whether downstream or upstream, to avoid reinforcing existing disparities.

Leverage EHR technology to collect and organize SDOH data

Integrating SDOH data into EHRs is essential for creating seamless workflows that address social needs in real-time. LHS should invest in implementing evidence-based practices for SDOH-EHR integration [22, 25, 82]. This includes engaging providers in the process, accurately collecting patient-reported data, and facilitating care coordination through referral systems [28–30]. Challenges such as unconscious bias or staff unfamiliarity with SDOH data collection can hinder this process, so hospitals should provide training to reduce bias and enhance patient engagement. By effectively integrating SDOH data into clinical workflows, hospitals can efficiently connect patients with the necessary resources for holistic, patient-centered care.

Implement both universal and targeted SDOH initiatives

Once EHR integration is established, hospitals can focus on universal initiatives such as community-wide screenings and referrals to better understand and address social needs [23, 24, 36, 64]. These screenings should be combined with targeted initiatives that use community health

data to address the needs of specific populations. For example, universal SDOH screening can identify social risks across the community, while targeted initiatives might focus on housing support for vulnerable populations. In other words, initiatives could address both immediate individual needs (downstream) and broader structural challenges (upstream), such as housing policy reforms [13, 60, 94].

Transform downstream into upstream initiatives

To transition downstream interventions into sustainable upstream solutions, hospitals can leverage strategic starting points that facilitate long-term systemic change while addressing immediate social needs. One critical avenue is policy advocacy, where hospitals can play an influential role in pushing for legislative and regulatory changes that address structural determinants of health, such as affordable housing policies or expanded transportation access [60]. By engaging in advocacy efforts, hospitals can help shape policies that have a lasting impact on social conditions affecting health outcomes.

Additionally, community partnerships serve as a powerful mechanism for expanding the reach and sustainability of hospital-led SDOH initiatives. Collaborating with local organizations, such as food banks or housing coalitions, enables hospitals to scale their interventions beyond individual patient care and embed them within broader, community-driven efforts [22, 51]. These partnerships can enhance resource alignment and improve care coordination, ensuring that hospitals are not working in isolation but rather integrating their efforts within established community infrastructures.

Another effective strategy involves enabling services, such as providing transportation assistance or digital literacy training, which help bridge gaps in care access. These services address immediate barriers that patients face while also highlighting the need for broader infrastructure improvements, ultimately contributing to long-term public health advancements [59]. In some cases, hospitals may choose to engage in direct investment in social programs to create sustainable, long-term impact. Investments in initiatives like affordable housing projects can shift hospitals from providing temporary solutions—such as housing vouchers—to fostering stable housing options that contribute to long-term community health improvements [13, 60]. By directing resources toward structural interventions, hospitals can help address root causes of health inequities rather than merely mitigating their effects.

By incorporating these strategic approaches, learning healthcare systems can continuously refine and expand their capacity to address both downstream and upstream SDOH. A multifaceted strategy that blends policy advocacy, community collaboration, enabling services, and targeted investments will enhance the role of healthcare institutions in advancing health equity. This holistic transformation fosters collaboration, innovation, and data-driven decision-making, positioning hospitals as key drivers of systemic change in the pursuit of improved health outcomes.

Implications for future research

Based on the discussion on overall effectiveness and the analysis of sponsors, several recommendations emerge for future research:1) *Expand beyond targeted "hot spotting"*: Federal sponsors like NIH, CMS, and private foundations such as RWJF and PCORI should fund research that moves beyond targeting small, high-risk populations. Future initiatives should prioritize universal SDOH screening and address broader, community-wide needs, with a focus on upstream interventions that impact entire communities. 2) *Incentivize SDOH-EHR integration*: Sponsors should emphasize SDOH-EHR integration in future grants. This includes incentivizing hospitals to adopt or upgrade EHR systems to capture patient-reported and community-level SDOH data [22, 82]. Research should also explore predictive models leveraging SDOH data for clinical and population health strategies. 3) *Support community-level social needs*: Funders should encourage hospital initiatives that address structural SDOH through CHNAs and collaborations with local organizations [51, 58], prioritizing underserved communities. 4) *Address implementation challenges*: Research should focus on overcoming barriers to SDOH-EHR integration, staff engagement, and referral processes. Funders could incentivize training programs and infrastructure development for referral tracking and care coordination across sectors. 5) *Promote strategic starting points for upstream efforts*: Sponsors should emphasize policy advocacy, community partnerships, enabling services, and direct investments in social programs. These efforts would shift hospital initiatives from short-term interventions to long-term solutions addressing root causes of health disparities.

Strengths and limitations

The scoping review adhered to evidence-based JBI criteria and PRISMA guidelines, with a clear rationale for choosing a scoping review to align with the broader research objectives. The review employed an integrated framework incorporating Healthy People SDOH domains and industry-recommended types to guide a thorough search of peer-reviewed literature.

Among limitations, one was the exclusion of gray literature, such as industry reports and unpublished studies, potentially omitting valuable insights from non-peer-reviewed initiatives. The review's timeline was also limited, excluding earlier initiatives from the ACA era, and it

was restricted to English-language studies, which reduces the applicability of findings to non-English-speaking populations and international settings. Additionally, hospitals may have used strategies outside the conceptual framework, limiting the ability to capture diverse approaches. Lastly, new studies may have emerged post-review that could offer updated insights.

Despite these limitations, the review provides key strengths, filling a gap in the literature by offering critical insights into the effectiveness of U.S. hospital initiatives addressing SDOH, an area underexplored in previous research. The study employed a rigorous methodology using an integrated SDOH framework, ensuring a comprehensive analysis of hospital efforts [22, 32, 33]. By focusing on impact and outcomes, it delivers practical insights for healthcare practitioners and policymakers. Finally, this review makes significant contributions to the field of health equity by assessing how hospitals address both individual health-related social needs and broader community-level social determinants of health, offering a more holistic picture of the effectiveness of U.S. hospitals in addressing SDOH.

Conclusion

The findings of this study highlight progress in hospital and health system initiatives to address SDOH but also reveal significant gaps. While many hospitals focus on health-related social needs (HRSNs) for high-risk populations, most efforts remain centered on downstream, patient-level interventions, with limited attention to upstream, community-wide solutions. The inconsistent use of electronic health records (EHRs) for integrating SDOH data and coordinating care underscores the need for improvement. To achieve whole-person care and health equity, hospitals must adopt universal strategies that address social risks across entire communities. Integrating SDOH data into EHRs is crucial for scaling these efforts, allowing for better care coordination and data-driven decisions. Hospitals should also focus on building community partnerships, enabling services, and engaging in policy advocacy to tackle structural determinants of health. Policymakers, particularly CMS, can support these efforts by expanding funding for universal screening and EHR upgrades, as well as encouraging cross-sector collaboration and policy advocacy efforts. Future research and funding should prioritize SDOH-EHR integration, community-level interventions, and the development of long-term solutions that address the root causes of health disparities. By working collaboratively, hospitals, policymakers, and sponsors can move beyond fragmented, short-term interventions and create lasting, equitable improvements in population and community health.

Abbreviations

ACA	Affordable Care Act
AHC	Accountable Health Communities
CHNA	Community Health Needs Assessment
CMS	Centers for Medicare & Medicaid Services
COVID-19	Coronavirus Disease 2019
EHR	Electronic Health Records
FQHC	Federally Qualified Health Center
HHS	Health and Human Services
HIV	Human Immunodeficiency Virus
HRSA	Health Resources and Services Administration
HRSN	Health Related Social Needs
ICD-10-CM	International Classification of Diseases, Tenth Revision, Clinical Modification
IHI	Institute for Healthcare Improvement
JBI	Joanna Briggs Institute
LHS	Learning Healthcare Systems
MeSH	Medical Subject Headings
MMAT	Mixed-Method Assessment Tool
NIH	National Institutes of Health
NLM	National Library of Medicine
PCORI	Patient-Centered Outcomes Research Institute
PHQ-9	Patient Health Questionnaire-9
PRAPARE	Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews
PROMIS	Patient Reported Outcomes Measurement Information System
RCT	Randomized Control Trial
REDCap	Research Electronic Data Capture
REL	Race, Ethnicity, and Language
RQ	Research Question
RWJF	Robert Wood Johnson Foundation
SDOH	Social Determinants of Health
SNAP	Supplemental Nutrition Assistance Program
USDA	United States Department of Agriculture
WE CARE	Well Child Care Evaluation, Community Resources, Advocacy, Referral, Education

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-025-12494-2.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

Supplementary Material 6

Acknowledgements

We would like to thank the University of New Haven for awarding a Summer Research Grant to support this project. We also thank all team members from Part 1 of the study, including Dawa Lhomu Sherpa, Keerthi Katukuri, Hiba Jaidi, Kashyap Ramadyani, and Lewis Goodrum. A big thank you also to Lauren Slingluff, Director of Peterson Library at the University of New Haven, and her team, for their invaluable assistance in fulfilling all our library requests.

Authors' contributions

PR conceptualized the review effort. PR, AT conducted the review, data collection, and data analysis. PR prepared the original draft of the manuscript. PR, AT contributed to revising and finalizing the manuscript by providing critical feedback to drafts. All authors have reviewed and approved the final manuscript.

Authors' information
The authors bring multidisciplinary expertise, spanning healthcare administration, quality improvement, and public health, providing a comprehensive perspective on addressing social determinants of health (SDOH) within hospital systems.

Funding
This project was supported by a summer research grant from the University of New Haven.

Data availability
Data is provided within the manuscript or supplementary information file (Appendix 6).

Declarations

Ethics approval and consent to participate
Are not applicable to this scoping review of the literature. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Department of Population Health and Leadership, School of Health Sciences, University of New Haven, 300 Boston Post Road, West Haven, CT 06516, USA

Received: 30 September 2024 / Accepted: 27 February 2025
Published online: 05 March 2025

References

1. Solomon LS, Kanter MH. Health Care Steps Up to Social Determinants of Health: Current Context. Perm J. 2018;22:18–139. https://doi.org/10.7812/TPP/18-139. PMCID: PMC6207436.
2. Hilts KE, Yeager VA, Gibson PJ, Halverson PK, Blackburn J, Menachemi N. Hospital partnerships for population health: A systematic review of the literature. J Healthc Manag. 2021;66(3):170–98. https://doi.org/10.1097/JHM-D-20-00172. PMID: 33960964; PMCID: PMC8323487.
3. Bickerdike L, Booth A, Wilson PM, Farley K, Wright K. Social prescribing: less rhetoric and more reality. A systematic review of the evidence. BMJ Open. 2017;7(4):e013384. https://doi.org/10.1136/bmjopen-2016-013384. PMID: 28389486; PMCID: PMC5558801.
4. Galea S, Tracy M, Hoggatt KJ, Dimaggio C, Karpati A. Estimated deaths attributable to social factors in the united States. Am J Public Health. 2011;101(8):1456–65. https://doi.org/10.2105/AJPH.2010.300086. Epub 2011 Jun 16. PMID: 21680937; PMCID: PMC3134519.
5. Hood CM, Gennuso KP, Swain GR, et al. County health rankings: relationships between determinant factors and health outcomes. Am J Prev Med. 2016;50(2):129–35. https://doi.org/10.1016/j.amepre.2015.08.024.
6. World Health Organization. Social determinants of health: what are social determinants of health? Geneva: WHO. Retrieved, March 2024. Available from: https://www.who.int/social_determinants/en/
7. Healthy People 2030 Framework. Healthy People. 2030. https://health.gov/healthypeople/about/healthy-people-2030-framework.
8. Whitman, A., De Lew, N., Chappel, A., Aysola, V., Zuckerman, R., Sommers, B. Addressing Social Determinants of Health: Examples of Successful Evidence-Based Strategies and Current Federal Efforts. U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. 2022. https://aspe.hhs.gov/sites/default/files/documents/e2b650cd64cf84aae8ff0fae7474af82/SDOH-Evidence-Review.pdf, Retrieved, June 2023.
9. Tsega M, Lewis C, McCarthy D, Shah T, Coutts K. Review of Evidence for Health-Related Social Needs Interventions. 2019. The Commonwealth Fund. https://www.commonwealthfund.org/sites/default/files/2019-07/ROI-EVIDENCE-REVIEW-FINALVERSION.pdf. Retrieved, June 2023.
10. American Hospital Association Fast Facts on US Hospitals. https://www.aha.org/statistics/fast-facts-us-hospitals; Retrieved, June 2023.
11. Nonprofit Hospitals Can Improve Community Health Through Housing Investments. 2023. Center for American Progress, Retrieved May 2023.
12. Bleser WK, Miranda PY, Jean-Jacques M, Korwek KM, Crook HL. Pandemic-driven health policies to address social needs and health equity. Health Affairs Health Policy Brief. 2022. https://doi.org/10.1377/hpb20220210.360906.
13. Horwitz LI, Chang C, Arcilla HN, Knickman JR. Quantifying health systems' investment in social determinants of health, by sector, 2017-19. Health Aff. 2020;39(2):192–8. https://doi.org/10.1377/hlthaff.2019.01246.
14. Magnan S. Social determinants of health 101 for health care: Five plus five. *NAM Perspectives*. Discussion Paper, National Academy of Medicine. 2017. https://doi.org/10.31478/201710c.
15. Lee J, Korba C. Social determinants of health: how are hospitals and health systems investing in and addressing social needs? Deloitte Development. 2019. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/life-sciences-health-care/us-lshc-addressing-social-determinants-of-health.pdf; Retrieved May 2023.
16. Castrucci BC, Auerbach J. Meeting individual social needs falls short of addressing social determinants of health. Health Affairs Forefront. 2019. https://www.healthaffairs.org/content/forefront/meeting-individual-social-needs-falls-short-addressing-social-determinants-health.
17. Figueroa JF, Duggan C, Toledo-Cornell C, Zheng J, Orav EJ, Tsai TC. Assessment of strategies used in US hospitals to address social needs during the COVID-19 pandemic. JAMA Health Forum. 2022;3(10):e223764. https://doi.org/10.1001/jamahealthforum.2022.3764. PMID: 36269339; PMCID: PMC9587473.
18. Henning-Smith C, Tuttle M, Kozhimannil KB. Unequal distribution of COVID-19 risk among rural residents by race and ethnicity. J Rural Health. 2020;36(4):602–8. https://doi.org/10.1111/jrh.12463.
19. Centers for Disease Control and Prevention. COVID-19 racial and ethnic health disparities. 2020. https://stacks.cdc.gov/view/cdc/98548.
20. The White House. Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government. Federal Register. 2021. https://www.federalregister.gov/documents/2021/01/25/2021-01753/advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government.
21. Centers for Medicare and Medicaid Services. CMS Framework for Health Equity. 2022–2032; https://www.cms.gov/files/document/cms-framework-health-equity-2022.pdf; Retrieved February 10, 2024.
22. Rangachari P, Thapa A, Sherpa DL, Katukuri K, Ramadyani K, Jaidi HM, Goodrum L. Characteristics of hospital and health system initiatives to address social determinants of health in the united States: a scoping review of the peer-reviewed literature. Front Public Health. 2024;12:1413205. https://doi.org/10.3389/fpubh.2024.1413205.
23. Fisher M, Harris P, Freeman T, Mackean T, George E, Friel S, Baum F. Implementing universal and targeted policies for health equity: lessons from Australia. Int J Health Policy Manage. 2021;10(2):70–8. https://doi.org/10.34172/ijhpm.2021.157.
24. Carey G, Crammond B, De Leeuw E. Towards health equity: A framework for the application of proportionate universalism. Int J Equity Health. 2015;14(1):81. https://doi.org/10.1186/s12939-015-0207-6.
25. Veinot TC, Ancker JS, Bakken S. Health informatics and health equity: improving our reach and impact. J Am Med Inform Assoc. 2019;26(8–9):689–95. https://doi.org/10.1093/jamia/ocz132.
26. Sucharew H, Macaluso M. Methods for research evidence synthesis: the scoping review approach. J Hosp Med. 2019;14(7):416–8. https://doi.org/10.12788/jhm.3248.
27. Berwick DM. Getting serious about producing health: the ten teams challenge. JAMA. 2022;327(19):1865–6. https://doi.org/10.1001/jama.2022.6921.
28. Pourat N, Lu C, Huerta DM, Hair BY, Hoang H, Sripipatana A. A systematic literature review of health center efforts to address social determinants of health. Med Care Res Rev. 2023;80(3):255–65. Epub 2022 Apr 25.
29. DeVoe JE, Bazemore AW, Cottrell EK, Likumahuwa-Ackman S, Grandmont J, Spach N, Gold R. Perspectives in primary care: A conceptual framework and path for integrating social determinants of health into primary care practice. Ann Fam Med. 2016;14(2):104–8. https://doi.org/10.1370/afm.1903.
30. Cottrell EK, Gold R, Likumahuwa S, Angier H, Huguet N, Cohen DJ, Clark KD, Gottlieb LM, DeVoe JE. Using health information technology to bring social determinants of health into primary care: A conceptual framework to guide research. J Health Care Poor Underserved. 2018;29(3):949–63. https://doi.org/10.1353/hpu.2018.0071.

31. National Academies of Sciences, Engineering, and Medicine. Integrating social care into the delivery of health care: moving upstream to improve the Nation's health. National Academies; 2019. https://doi.org/10.17226/25467.
32. PRISMA. PRISMA for Scoping Reviews. https://prisma-statement.org/Extensions/ScopingReviews. Accessed 5 Jan 2021.
33. Joanna Briggs Institute. Critical Appraisal Tools. https://jbi.global/critical-appraisal-tools. Accessed 5 Jan 2021.
34. Hong QN, Fàbregues S, Bartlett G, et al. The mixed methods appraisal tool (MMAT) version 2018 for information professionals and researchers. Educ Inform. 2018;34(4):285–91.
35. Ladapo JA, Tseng CH, Sherman SE. Financial incentives for smoking cessation in hospitalized patients: A randomized clinical trial. Am J Med. 2020;133(6):741–9. https://doi.org/10.1016/j.amjmed.2019.12.025.
36. de la Buitron P, Losi S, Sprague Martinez L, et al. Implementing an EHR-based screening and referral system to address social determinants of health in primary care. Med Care. 2019;57(6 Suppl 2):S133–9. https://doi.org/10.1097/MLR.0000000000001029.
37. Carter J, Hassan S, Walton A, Yu L, Donelan K, Thorndike AN. Effect of community health workers on 30-Day hospital readmissions in an accountable care organization population: A randomized clinical trial. JAMA Netw Open. 2021;4(5):e2110936. https://doi.org/10.1001/jamanetworkopen.2021.10936.
38. Hessler D, Fisher L, Dickinson M, Dickinson P, Parra J, Potter MB. The impact of enhancing self-management support for diabetes in community health centers through patient engagement and relationship building: a primary care pragmatic cluster-randomized trial. Transl Behav Med. 2022;12(9):909–18. https://doi.org/10.1093/tbm/ibac046.
39. Fortier CB, Currao A, Kenna A, et al. Online telehealth delivery of group mental health treatment is safe, feasible, and increases enrollment and attendance in Post-9/11 U.S. Veterans. Behav Ther. 2022;53(3):469–80. https://doi.org/10.1016/j.beth.2021.11.004.
40. Creech SK, Pulverman CS, Kahler CW, et al. Computerized intervention in primary care for women veterans with sexual assault histories and psychosocial health risks: a randomized clinical trial. J Gen Intern Med. 2022;37(5):1097–107. https://doi.org/10.1007/s11606-021-06851-0.
41. Fitzpatrick SL, Papajorgji-Taylor D, Schneider JL, et al. Bridge to health/puente a La Salud: a pilot randomized trial to address diabetes self-management and social needs among high-risk patients. Transl Behav Med. 2022;12(7):783–92. https://doi.org/10.1093/tbm/ibac016.
42. Tung EL, Abramsohn EM, Boyd K, et al. Impact of a Low-Intensity resource referral intervention on patients' knowledge, beliefs, and use of community resources: results from the communityRx trial. J Gen Intern Med. 2020;35(3):815–23. https://doi.org/10.1007/s11606-019-05530-5.
43. Battaglia TA, Gunn CM, Bak SM, et al. Patient navigation to address sociolegal barriers for patients with cancer: A comparative-effectiveness study. Cancer. 2022;128(Suppl 13):2623–35. https://doi.org/10.1002/cncr.33965.
44. Moen M, Doede M, Johantgen M, et al. Nurse-led hospital-to-community care, clinical outcomes for people living with HIV and health-related social needs. J Adv Nurs. 2023;79(5):1949–58. https://doi.org/10.1111/jan.15485.
45. Wang GX, Gauthier R, Gunter KE, et al. Improving diabetes care through population health innovations and payments: lessons from Western Maryland. J Gen Intern Med. 2023;38(Suppl 1):48–55. https://doi.org/10.1007/s11606-022-07918-2.
46. Nijhawan AE, Metsch LR, Zhang S, et al. Clinical and sociobehavioral prediction model of 30-Day hospital readmissions among people with HIV and substance use disorder: beyond electronic health record data. J Acquir Immune Defic Syndr. 2019;80(3):330–41. https://doi.org/10.1097/QAI.0000000000001925.
47. Vasan A, Morgan JW, Mitra N, et al. Effects of a standardized community health worker intervention on hospitalization among disadvantaged patients with multiple chronic conditions: A pooled analysis of three clinical trials. Health Serv Res. 2020;55(Suppl 2):894–901. https://doi.org/10.1111/1475-6773.13321.
48. Murray E, Roosevelt GE, Vogel JA. Screening for health-related social needs in the emergency department: adaptability and fidelity during the COVID-19 pandemic. Am J Emerg Med. 2022;54:323.e1-323.e4.
49. Gupta A, Hu J, Huang S, et al. Implementation fidelity to a behavioral diabetes prevention intervention in two New York City safety net primary care practices. BMC Public Health. 2023;23(1):575. https://doi.org/10.1186/s12889-023-15477-2. Published 2023 Mar 28.
50. Potter JE, Duthely LM, Diaz-Mendez N, et al. Implementing centeringpregnancy group prenatal care for minority women living with HIV at an urban university hospital. J Midwifery Womens Health. 2019;64(4):451–61. https://doi.org/10.1111/jmwh.12987.
51. Berkowitz SA, O'Neill J, Sayer E, et al. Health Center-Based Community-Supported agriculture: an RCT. Am J Prev Med. 2019;57(6 Suppl 1):S55–64. https://doi.org/10.1016/j.amepre.2019.07.015.
52. Gottlieb LM, Adler NE, Wing H, et al. Effects of In-Person assistance vs personalized written resources about social services on household social risks and child and caregiver health: A randomized clinical trial. JAMA Netw Open. 2020;3(3):e200701. https://doi.org/10.1001/jamanetworkopen.2020.0701. Published 2020 Mar 2.
53. Hinton L, La Frano E, Harvey D, et al. Feasibility of a family-centered intervention for depressed older men in primary care. Int J Geriatr Psychiatry. 2019;34(12):1808–14. https://doi.org/10.1002/gps.5196.
54. Swankoski KE, Reddy A, Grembowski D, Chang ET, Wong ES. Intensive care management for high-risk veterans in a patient-centered medical home - do some veterans benefit more than others? Healthc (Amst). 2023;11(2):100677. https://doi.org/10.1016/j.hjdsi.2023.100677.
55. LaBedz SL, Prieto-Centurion V, Mutso A, et al. Pragmatic clinical trial to improve patient experience among adults during transitions from hospital to home: the partner study. J Gen Intern Med. 2022;37(16):4103–11. https://doi.org/10.1007/s11606-022-07461-0.
56. Liaw W, Northrup TF, Stotts AL, et al. Medical-Legal partnership effects on mental health, health care use, and quality of life in primary care: A randomized clinical trial. J Am Board Fam Med. 2023;36(3):414–24. https://doi.org/10.3122/jabfm.2022.220349R1.
57. Post B, Lapedis J, Singh K, et al. Predictive Model-Driven hotspotting to decrease emergency department visits: a randomized controlled trial. J Gen Intern Med. 2021;36(9):2563–70. https://doi.org/10.1007/s11606-021-06664-1.
58. Cramer GR, Young GJ, Singh S, McGuire J, Kim D. Evidence that collaborative action between local health departments and nonprofit hospitals helps foster healthy behaviors in communities: a multilevel study. BMC Health Serv Res. 2021;21(1):1. https://doi.org/10.1186/s12913-020-05996-8. Published 2021 Jan 2.
59. Yue D, Pourat N, Chen X, et al. Enabling services improve access to care, preventive services, and satisfaction among health center patients. Health Aff (Millwood). 2019;38(9):1468–74. https://doi.org/10.1377/hlthaff.2018.05228.
60. Drabo EF, Eckel G, Ross SL, et al. A Social-Return-On-Investment analysis of Bon secours hospital's housing for health affordable housing program. Health Aff. 2021;40(3):513–9. https://doi.org/10.1377/hlthaff.2020.00998.
61. Cornell PY, Halladay CW, Ader J, et al. Embedding social workers in veterans health administration primary care teams reduces emergency department visits. Health Aff (Millwood). 2020;39(4):603–12. https://doi.org/10.1377/hlthaff.2019.01589.
62. John McConnell K, Kaufman MR, Grunditz JI, et al. Project nurture integrates care and services to improve outcomes for Opioid-Dependent mothers and their children. Health Aff (Millwood). 2020;39(4):595–602. https://doi.org/10.1377/hlthaff.2019.01574.
63. Vest JR, Harris LE, Haut DP, Halverson PK, Menachemi N. Indianapolis provider's use of wraparound services associated with reduced hospitalizations and emergency department visits. Health Aff (Millwood). 2018;37(10):1555–61. https://doi.org/10.1377/hlthaff.2018.0075.
64. Ofili MN, Lawson RM. The impact of food insecurity screenings and community food resource referrals for patients with type 2 diabetes. J Health Disparities Res Pract. 2020;13(4):32–45.
65. Pugh J, Penney LS, Noël PH, et al. Evidence based processes to prevent readmissions: more is better, a ten-site observational study. BMC Health Serv Res. 2021;21(1):189. https://doi.org/10.1186/s12913-021-06193-x. Published 2021 Mar 1.
66. Beck AF, Anderson KL, Rich K, et al. Cooling the hot spots where child hospitalization rates are high: A neighborhood approach to population health. Health Aff (Millwood). 2019;38(9):1433–41. https://doi.org/10.1377/hlthaff.2018.05496.
67. Wu AW, Weston CM, Ibe CA, et al. The Baltimore Community-Based organizations neighborhood network: enhancing capacity together (CONNECT) cluster RCT. Am J Prev Med. 2019;57(2):e31–41. https://doi.org/10.1016/j.amepre.2019.03.013.
68. Kangovi S, Mitra N, Norton L, et al. Effect of community health worker support on clinical outcomes of Low-Income patients across primary care facilities: A randomized clinical trial. JAMA Intern Med. 2018;178(12):1635–43. https://doi.org/10.1001/jamainternmed.2018.4630.

69. Cullen D, Woodford A, Fein J. Food for thought: A randomized trial of food insecurity screening in the emergency department. Acad Pediatr. 2019;19(6):646–51. https://doi.org/10.1016/j.acap.2018.11.014.
70. Beaudoin FL, Jacka BP, Li Y, et al. Effect of a Peer-Led behavioral intervention for emergency department patients at high risk of fatal opioid overdose: A randomized clinical trial. JAMA Netw Open. 2022;5(8):e2225582. https://doi.org/10.1001/jamanetworkopen.2022.25582. Published 2022 Aug 1.
71. Dougherty CM, Thompson EA, Kudenchuk PJ. Patient plus partner trial: A randomized controlled trial of 2 interventions to improve outcomes after an initial implantable cardioverter-defibrillator. Heart Rhythm. 2019;16(3):453–9. https://doi.org/10.1016/j.hrthm.2018.10.011.
72. Sable P, Ross A, Clock A, et al. Illustrating the value of social work: results of an open pilot trial of the psychosocial acuity scale in a large urban pediatric hospital. Soc Work Health Care. 2021;60(5):448–66. https://doi.org/10.1080/00981389.2021.1926398.
73. Summers NA, Colasanti JA, Feaster DJ, et al. Predictors for poor linkage to care among hospitalized persons living with HIV and Co-Occurring substance use disorder. AIDS Res Hum Retroviruses. 2020;36(5):406–14. https://doi.org/10.1089/AID.2019.0153.
74. Jimenez ME, Crabtree BF, Hudson SV, et al. Enhancing reach out and read with a video and text messages: A randomized trial in a Low-Income predominantly Latino sample. Acad Pediatr. 2021;21(6):968–76. https://doi.org/10.1016/j.acap.2021.02.011.
75. Lopez MA, Yu X, Hetrick R, et al. Social needs screening in hospitalized pediatric patients: A randomized controlled trial. Hosp Pediatr. 2023;13(2):95–114. https://doi.org/10.1542/hpeds.2022-006815.
76. Page-Reeves J, Kaufman W, Bleecker M, Norris J, McCalmont K, Ianakieva V, Kaufman A. Addressing social determinants of health in a clinic setting: the WellRx pilot in Albuquerque, new Mexico. J Am Board Family Med. 2016;29(3):414–8. https://doi.org/10.3122/jabfm.2016.03.150272.
77. United States Department of Agriculture, Economic Research Service. Food security in the United States: Survey tools. 2023. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/.
78. Hager ER, Quigg AM, Black MM, Coleman SM, Heeren T, Rose-Jacobs R, Cook JT, de Cuba SE, Casey PH, Chilton M, Cutts DB, Meyers AF, Frank DA. Development and validity of a 2-item screen to identify families at risk for food insecurity. Pediatrics. 2010;126(1):e26–32. https://doi.org/10.1542/peds.2009-3146.
79. Cella D, Yount S, Rothrock N, Gershon R, Cook K, Reeve B, Ader D, Fries JF, Bruce B, Rose M. The Patient-Reported outcomes measurement information system (PROMIS): progress of an NIH roadmap cooperative group during its first two years. Med Care. 2007;45(5 Suppl 1):S3–11. https://doi.org/10.1097/01.mlr.0000258615.42478.55.
80. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16(9):606–13. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.
81. Westfall JM. Cold-spotting: linking primary care and public health to create communities of solution. J Am Board Family Med. 2013;26(3):239–40. https://doi.org/10.3122/jabfm.2013.03.130094.
82. Chen M, Tan X, Padman R. Social determinants of health in electronic health records and their impact on analysis and risk prediction: A systematic review. J Am Med Inf Assoc. 2020;27(11):1764–73. https://doi.org/10.1093/jamia/ocaa143.
83. Glied S, D'Aunno T. Health systems and social services—A Bridge too far? JAMA Health Forum. 2023;4(8):e233445. https://doi.org/10.1001/jamahealthforum.2023.3445.
84. Nundy S, Cooper LA, Mate KS. The quintuple aim for health care improvement: A new imperative to advance health equity. JAMA. 2022;327(6):521–2.
85. Brooks D, Douglas M, Aggarwal N, Prabhakaran S, Holden K, Mack D. Developing a framework for integrating health equity into the learning health system. Learn Health Syst. 2017;1(3):e10029. https://doi.org/10.1002/lrh2.10029.
86. AHIMA Journal. New SDOH Reporting Requirements Expected to Impact HI Workflow, Staffing. 2024. https://journal.ahima.org/health-data/details/new-sdoh-reporting-requirements-expected-to-impact-hi-workflow-staffing; Retrieved, July 2024.
87. Lee JS, MacLeod KE, Kuklina EV, Tong X, Jackson SL. Social determinants of health-Related Z codes and health care among patients with hypertension. AJPM Focus. 2023;2(2):100089. https://doi.org/10.1016/j.focus.2023.100089.
88. Protocol for Responding. To & assessing patients' assets, risks & experiences (PRAPARE). Retrieved; May 2024. https://prapare.org/.
89. The Centers for Medicare and Medicaid Services. The Path Forward: Improving Data to Advance Health Equity Solutions. 2022. https://www.cms.gov/files/document/path-forwardhe-data-paper.pdf; Retrieved, July 2024.
90. Vega Perez RD, Hayden L, Mesa J, Bickell N, Abner P, Richardson LD, Ngai KM. Improving patient race and ethnicity data capture to address health disparities: A case study from a large urban health system. Cureus. 2022;14(1):e20973. https://doi.org/10.7759/cureus.20973.
91. Fricke J, Siddique SM, Aysola J, et al. Healthcare Worker Implicit Bias Training and Education: Rapid Review. 2024 Jan. In: Making Healthcare Safer IV: A Continuous Updating of Patient Safety Harms and Practices. Rockville: Agency for Healthcare Research and Quality (US); 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK600156/.
92. Center for Healthcare Strategies. NowPow. https://www.chcs.org/digital-health-products/nowpow/; Retrieved, August 2024.
93. DeVetter N, Westfall JM, Carrozza M, Westfall E. Calling your Aunt Bertha for social assets: family medicine and social determinants of health. J Prim Care Community. 2022;13:21501319221131405. https://doi.org/10.1177/21501319221131405.
94. Steiner JF, Stenmark SH, Sterrett AT, Paolino AR, Stiefel M, Gozansky WS, Zeng C. Food insecurity in older adults in an integrated health care system. J Am Geriatr Soc. 2018;66(5):1017–24. https://doi.org/10.1111/jgs.15285.
95. Brown SA, Hudson C, Hamid A, Berman G, Echefu G, Lee K, Lamberg M, Olson J. The pursuit of health equity in digital transformation, health informatics, and the cardiovascular learning healthcare system. Am Heart J Plus. 2022;17:100160. https://doi.org/10.1016/j.ahjo.2022.100160.
96. Coley RY, Duan KI, Hoopes AJ, Lapham GT, Liljenquist K, Marcotte LM, Ramirez M, Schuttner L. A call to integrate health equity into learning health system research training. Learn Health Syst. 2022;6(4):e10330. https://doi.org/10.1002/lrh2.10330.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.