








BMJ Open How can the healthcare system deliver sustainable performance? A scoping review

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ABSTRACT

Background Increasing health costs, demand and patient multimorbidity challenge the sustainability of healthcare systems. These challenges persist and have been amplified by the global pandemic.

Objectives We aimed to develop an understanding of how the sustainable performance of healthcare systems (SPHS) has been conceptualised, defined and measured.

Design Scoping review of peer-reviewed articles and editorials published from database inception to February 2021.

Data sources PubMed and Ovid Medline, and snowballing techniques.

Eligibility criteria We included articles that discussed key focus concepts of SPHS: (1) definitions, (2) measurement, (3) identified challenges, (4) identified solutions for improvement and (5) scaling successful solutions to maintain SPHS.

Data extraction and synthesis After title/abstract screening, full-text articles were reviewed, and relevant information extracted and synthesised under the five focus concepts.

Results Of 142 included articles, 38 (27%) provided a definition of SPHS. Definitions were based mainly on financial sustainability, however, SPHS was also more broadly conceptualised and included acceptability to patients and workforce, resilience through adaptation, and rapid absorption of evidence and innovations. Measures of SPHS were also predominantly financial, but recent articles proposed composite measures that accounted for financial, social and health outcomes. Challenges to achieving SPHS included the increasingly complex patient populations, limited integration because of entrenched fragmented systems and siloed professional groups, and the ongoing translational gaps in evidence-to-practice and policy-to-practice. Improvement strategies for SPHS included developing appropriate workplace cultures, direct community and consumer involvement, and adoption of evidence-based practice and technologies. There was also a strong identified need for long-term monitoring and evaluations to support adaptation of healthcare systems and to anticipate changing needs where possible.

Conclusions To implement lasting change and to respond to new challenges, we need context-relevant definitions and frameworks, and robust, flexible, and feasible measures to support the long-term sustainability and performance of healthcare systems.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This scoping review addresses a knowledge gap by providing a comprehensive synthesis of the literature including definitions, measurement, challenges, solutions for improvement and scaling up successful solutions to maintain sustainable performance of healthcare systems (SPHS).
- ⇒ The review methodology was guided by the Preferred Reporting Items for Systematic review and Meta-Analysis extension for Scoping Reviews statement, and we searched multiple databases and used complementary snowballing techniques to increase comprehensiveness.
- ⇒ The use of the Hawker and Authority Accuracy Coverage Objectivity Date Significance quality appraisal tools provided an assessment of the quality of literature on the SPHS.
- ⇒ Our review is limited in scope to countries with health systems of relevance to Australia, and this limits the generalisability of our results to low-income or middle-income countries.

BACKGROUND

Globally, healthcare spending is tracking above and beyond economic growth.¹ Challenges facing healthcare systems include an ageing population and subsequent rise of chronic diseases and multimorbidity^{2,3} and increasingly expensive new medical technologies.^{3,4} It is estimated that approximately 30% of care delivered by healthcare systems is low-value, attributable mainly to administrative overheads, bureaucracy, overdiagnosis, over-treatment or other factors.⁵ Systems lacking coordination and integration across clinical disciplines and healthcare sectors also result in wasteful spending through both care duplication and omission of needed care.⁶ If healthcare spending follows current trajectories, governments suggest that healthcare systems will begin to become unaffordable.³ This leads us to the question: ‘what is the current thinking about interventions and



initiatives to make healthcare systems more sustainable?'. Understanding how healthcare system sustainability is conceptualised underpins the implementation and evaluation of system-wide interventions that aim to improve performance. Although literature about the sustainability of individual innovations and improvement programmes is growing,⁷ the broad question of whole-of-system sustainability is rarely studied.

Sustainability itself has remained an ambiguous topic in the literature. Sustainability suggests that healthcare systems should be built to last, and able to adapt and endure, ensuring that resources are expended efficiently and responsibly to maintain or improve individual and population health and well-being.⁸ To be sustainable, a healthcare system must adequately deliver across financial, social and environmental concerns.⁴ This triple bottom-line is difficult to achieve consistently over time. For example, sustainable health services may need additional short-term investments to be financially beneficial in the long term.¹

The healthcare system is defined as one that delivers care to those who need it across many different settings. It includes key components: capacity—including physical, capital and human assets; organisational structure, both formal and informal; finances—including mechanisms for funding allocations, ownership and solvency; patients or clients and their characteristics and needs; and care processes and infrastructure.⁹

Healthcare system sustainability is difficult to measure in practice and requires ongoing long-term monitoring and evaluation of appropriate indicators. One potential way to conceptualise and operationalise sustainability is an assessment of the sustainable performance of healthcare systems (SPHS). Although past reviews have

addressed the sustainability of improvement programmes and policies in the healthcare system,^{7 10 11} they did not specifically address how SPHS is conceptualised in the medical literature. As a response, this study was designed using a systems science lens to fill this gap in knowledge by reviewing publications that report on or discuss the SPHS.

OBJECTIVES

This scoping review of health and medical literature aims to develop an understanding of how SPHS has been conceptualised, defined, and measured, and to scope the identified challenges and potential solutions to achieving and maintaining SPHS.

METHODS

Study design

In keeping with scoping review methodology,¹² our inclusion criteria were broad, and our search was comprehensive to capture the state of knowledge about SPHS. We included literature reviews, primary empirical articles (including qualitative, quantitative and mixed-methods studies), case studies, opinion pieces and editorials published in English from database inception to February 2021. To be included, studies had to report on, or discuss in detail, aspects of healthcare systems sustainability, resilience or performance improvement, and could cover improvements in cost-effectiveness, affordability, safety, quality, equity or access, while creating or realising value (table 1). Only articles that addressed the research objectives and provided insights into current knowledge of sustainability in healthcare delivery systems were

Table 1 Inclusion and exclusion criteria

Inclusion criteria*	Exclusion criteria
<ol style="list-style-type: none"> 1. Definition(s) of healthcare systems performance sustainability. 2. Measurement of SPHS. 3. Discussion and identification of the challenges involved in SPHS. 4. Discussion or identification of ways in which to improve SPHS. 5. Discussion of sustaining and scaling change in SPHS. 	<ol style="list-style-type: none"> 1. Pertaining to sustainability relating to: <ol style="list-style-type: none"> a. Disaster management, pandemic or other emergency preparedness. b. Foreign aid or foreign investment. c. Workplace health and safety. d. Environmental sustainability. 2. Of no relevance to the Australian context: <ol style="list-style-type: none"> a. Low-income countries. b. Healthcare systems in conflict zones. c. Specific to a country's political situation. 3. Does not otherwise deal with sustainability of 'healthcare systems' (eg, concerned with diagnosis or management of a single disease or programme or improvements in a single healthcare setting). 4. Focuses on broad population healthcare initiatives rather than healthcare delivery systems (eg, vaccination programmes). 5. Does not otherwise address the objectives of this review. 6. High risk of bias or low quality.

*To be eligible for inclusion, articles needed to demonstrate one or more of the inclusion criteria. SPHS, sustainable performance of healthcare systems.

included. Articles on environmental sustainability; those investigating discrete improvement programmes implemented in specific healthcare settings including studies on specific diseases or programmes (eg, studies on vaccination programmes for a specific disease); and studies with a specific focus on COVID-19 were out of scope, as we applied a system-wide lens rather than a disease-specific focus (table 1).

Information sources

In consultation with an experienced university medical librarian, we developed a search strategy using key words and MeSH terms and conducted an advanced search of PubMed and Ovid Medline (online supplemental file 1). Additional relevant articles were identified by hand searching reference lists of included articles (snowballing).

Study selection

Guided by the Preferred Reporting Items for Systematic review and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) statement,^{13 14} and the methodological framework for scoping reviews,¹² screening of the article titles and abstracts was conducted by four reviewers (JHolt, JHerkes, GD and EM) using the predetermined inclusion and exclusion criteria (table 1). Reviewers screened a 5% sample of the titles and abstracts while applying the inclusion and exclusion criteria and the team then met to discuss any discrepancies, before screening continued. The full-text review was then conducted by a second reviewer team (JHerkes, YZ, GD, IM and GL) in consultation with JHolt and EM. Discrepancies were resolved in team meetings in consultation with JB as arbitrator.

Quality assessment of individual studies

To understand the scope of the quality of included articles, Hawker *et al*'s Quality Assessment Tool was applied as it enables quality assessment among many different article types including quantitative, qualitative or mixed-methods empirical research studies or literature reviews.¹⁵ The Quality Assessment Tool contains nine categories (abstract and title; introduction and aims; method and data; sampling; data analysis; ethics and bias; results; transferability or generalisability; and implications and usefulness) and a total quality score can be calculated (maximum score=36), where higher scores denote higher quality.¹⁵⁻¹⁷ For quality assessment of opinion or commentary pieces, the Authority Accuracy Coverage Objectivity Date Significance (AACODS) checklist was used.^{12 17}

Data extraction

Characteristics of included articles, year of publication, country of origin and article type were tabulated. A purpose-designed Excel spreadsheet was used to extract relevant details from each article. The Excel spreadsheet was piloted by three reviewers on five articles and adjusted as needed.

Patient and public involvement

No patients or public were involved.

RESULTS

Study selection

Of 5675 articles identified in the database searches, 2404 were duplicates, leaving 3271 articles. Undertaking independent title and abstract screening of 5% of articles, two reviewers achieved an acceptable level of agreement ($\kappa=0.6$).¹⁸ A further 2750 articles were excluded, leaving 521 articles for full-text review. A substantial level of agreement was achieved on review of 5% of full-text articles undertaken independently by four reviewers JHerkes, YZ, GD and IM; ($\kappa=0.7$).¹⁸ After full-text review, 136 articles were included. Eighty-three additional articles were identified from snowballing, and six met the inclusion criteria, for a total of 142 articles included for data extraction (figure 1). See online supplemental file 2 for further details.

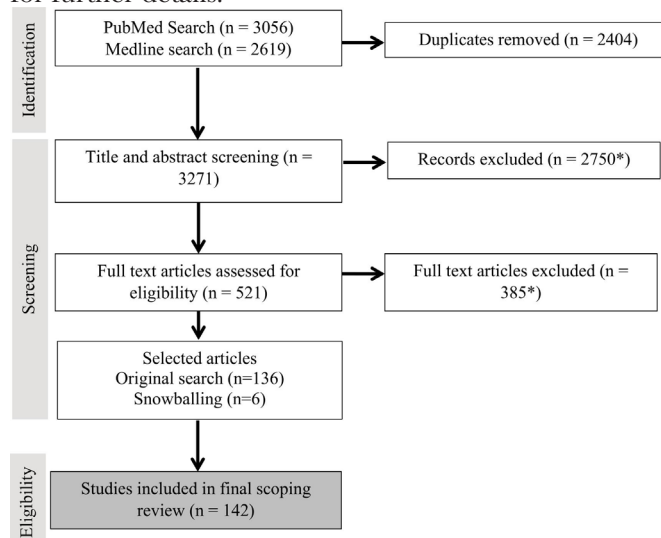


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram summarising the review and reasons for article exclusion. *Full text articles and snowballed articles excluded for the following reasons. Note that some articles were excluded for multiple reasons. Reasons for article exclusion are below.

Reason	Excluded at title/abstract screening (N)	Excluded at full text review (N)
Disaster or emergency	199	3
Foreign aid, equity or community healthcare	598	20
Occupational health and safety	69	2
Environmental sustainability	89	5
Not relevant to Australia, for example, low-resource setting	730	82
Not about systems, for example, single disease or programme	1291	109



Reason	Excluded at title/abstract screening (N)	Excluded at full text review (N)
Preventative, for example, regarding vaccination or nutrition	277	18
Not relating to healthcare delivery, for example, regarding animal care or food safety	46	0
Regarding physiology/ pharmacology	44	0
Does not in another way define, measure, identify challenges, opportunities for improvement or scale up of sustainability in the healthcare system	398	166
Other, for example, article not written in English, full text not available	4	95

Study characteristics

Of the included articles, 18 were review articles (either systematic or narrative), 82 were editorial or opinion pieces, 37 were primary empirical studies and 5 were a brief narrative review combined with an empirical study (classified as empirical for simplicity). Empirical studies used a wide variety of data collection techniques and included qualitative analysis of interviews,¹⁹ survey results,^{20 21} analysis of hospital data records^{22 23} and economic analysis.^{24–28} The included articles described studies that covered various geographic locations, most commonly Canada (n=22), the USA (n=22), Australia (n=23, including two which involved Australia and New Zealand), the UK (n=6), the Netherlands (n=2) and one each from the following countries: Austria, Italy, Northern

Ireland, Malaysia, Malta, New Zealand, Oman, the Philippines, Portugal, Scotland and Spain. The remainder of studies referred to geographical regions such as the European Union, or to multiple nations, for example one included the USA, the UK and Australia²⁹ and another included Australia, Ireland, Austria and Denmark.³⁰

The data extraction sheet included the citation, study aims, study design, themes addressed and additional relevant information about SPHS. Details of the 142 included articles are summarised in online supplemental file 2. Of the 142, most identified challenges (n=94, 66%) and proposed ways to improve SPHS (n=89, 62%) while fewer discussed measuring SPHS (n=48, 34%), or sustaining and scaling change (n=47, 33%) and fewer still provided any definition of SPHS (n=38, 27%).

Quality of included studies

Forty-three empirical studies scored 25–34 points on the Hawker's Quality Assessment Tool,¹⁵ and 29 were of high quality, 13 moderate quality and 1 borderline low quality.¹⁶ None were excluded due to low quality (online supplemental file 3). The quality of editorial and opinion pieces (n=99) was analysed according to the AACODS criteria, and 72 articles ranked 'yes' for all criteria indicating high quality (online supplemental file 3).

Defining SPHS

Definitions of SPHS were provided by 38 publications including 25 opinion pieces, 7 review articles and 6 empirical studies (table 2). The definitions fell into three broad groupings: (1) fiscal sustainability, (2) human resource sustainability and acceptance of change by stakeholders and (3) system adaptability and improvement (table 2). Definitions focused on continual improvement,²⁹ and

Table 2 Definitions of sustainable performance of healthcare systems

Definition	Exemplar quotes	Relevant references		
		Empirical articles	Editorials or opinion pieces	Reviews
Fiscal sustainability	'The WHO considers fiscal sustainability as a requirement, rather than an objective, of health financing policy. Sustainability of healthcare financing therefore cannot be interpreted as a reduction of healthcare costs, but rather as a predictable growth or control of health expenditures'. ²⁴	35 36 64 127	24 32–34 37 39 56	40 41 104 127 128
Human resource sustainability and acceptability to stakeholders	'It has been increasingly recognised that getting HR policy and management "right" has to be at the core of any sustainable solution to health system performance'. ^{32 129} 'A sustainable health system also has acceptability to key constituents, including patients and health professionals'. ³³	64	32–34 38 56 67 83 90 129–132	31 104
Adaptability and improvement over time to create a future-focused intervention	'A sustainable health system ... [has] adaptability, because health and health care needs are not static (i.e., a health system must respond adaptively to new diseases, changing demographics, scientific discoveries, and dynamic technologies in order to remain viable).' ³³ 'Ensuring that sufficient resources are available over the long term to provide timely access to quality services that address Canadians' evolving health needs'. ¹³³	36 43	4 33 39 42 56 67 78 83 89 98 108 131–135	31 49 88 104 128

Table 3 Summary of established and novel frameworks suggested for measuring SPHS

Established framework name	Rationale for use
Organisational Change Model (OCM)	To measure the success of sustained organisational change, according to faculty member survey respondents ⁵¹
Analysis of hospital records (eg, payroll records)	Measuring staff turnover, workforce supply and financial sustainability ^{22 26}
Evaluation of health networks	To evaluate the effectiveness and sustainability of health networks ¹³⁶
Novel framework name	Rationale for development
Q* Scale	To measure performance at the hospital level ⁵⁰
Dynamic Sustainability Framework (DSF)	To investigate the fit between the intervention, the practice setting, and the ecological system ³⁹ To improve measurement of SPHS beyond patient outcomes only ⁴⁰
Resilience Indicator	To highlight the systemic relevance of primary care network systems to quantify healthcare resilience ⁵⁴
eMergy (embodied energy) Sustainability Index	To address the lack of qualitative indicators for sustainability ⁴⁹
Future Health Index (FHI)	To identify preparedness of countries to build sustainable health systems ⁵⁵
Health Care Sustainability Framework (HCSF)	To measure the relationships between political and fiscal sustainability of an intervention ⁵²
Responsible Innovations for Health (RIH) Framework	To identify interventions that suitably address five domains (population health, healthcare system, economic, organisational, environmental) ⁵³
Research Lifecycle Framework	To enhance the impact of the Learning Health System by operationalising research innovations into clinical practice ⁴⁵
Value Of Diagnostic Information (VODI) Framework	To outline the multidimensional benefits and potential of healthcare diagnostics ¹¹⁴

*SPHS, sustainable performance of healthcare systems.

embeddedness of changes into the healthcare system in the long term.^{31–33}

Several articles defined SPHS in terms of fiscal sustainability.^{24 32–37} Examples included discussions of sustainability of rural primary care services in the face of ongoing policy change to reimbursement and practice incentives,³⁶ adoption of new funding models to ensure availability of medicines²⁴ and hospital capital investments to improve patient access to care.³⁵ Articles also discussed the importance of balancing financial interests with social and ecological interests.³⁸ Several papers conceptualised SPHS as the continuation of programmes after the cessation of external program-specific funding.^{39–41}

Four articles^{42–45} discussed SPHS through the lens of a learning healthcare system, a system in which ‘science, informatics, incentives, and culture are aligned for continuous improvement and innovation’.⁴⁶ These articles focused predominantly on using data and evidence to support system adaptability and improvement over time.

Measuring SPHS

The measurement of SPHS was addressed through theoretical discussions across the 24 editorials and 7 review articles, and by proposing, developing or applying frameworks or indicators in 17 empirical studies (table 3). These frameworks and indicators were heterogeneous and included financial, social and healthcare outcomes⁴⁷ with some articles highlighting the limitations of widely used financial metrics.^{34 48} Although heterogeneous,⁴⁰ measures were undertaken at three broad outcome levels: (1) individual (eg, continued health benefits for patients

or healthcare providers); (2) organisational (eg, continuation of innovations, hospital-level fiscal improvements) or (3) community (eg, continued use of programmes, services or healthcare interventions).

A variety of new SPHS measures were proposed, developed, modified or tested in research environments^{20 22 45 49–51} to address current deficits in available measures (table 3). For example, the Q*Scale was designed to combine data on caseload, patient satisfaction and physician aptitude, such that changes in hospital performance could be more effectively monitored.⁵⁰ In contrast, the Dynamic Sustainability Framework seeks to investigate the fit between the intervention, practice settings, contexts and cultures, healthcare policies, and the broader ecology within which healthcare systems operate, including sociopolitical systems.³⁹ Similarly, the Healthcare Sustainability Framework (HCSF) and the Responsible Innovations for Health framework, recognise the importance of accounting for the needs and trends of the population, workforce and financial constraints.^{52 53} Alternative models utilising a scoring system (eg, using the Resilience Indicator) were based on data-driven simulation modelling,⁵⁴ or theoretical composite indicators of the value of healthcare systems.^{54 55}

Identified challenges to SPHS

Ninety-four articles, including 60 editorials, 22 empirical studies and 12 reviews, identified challenges to SPHS across three main themes: (1) increasingly complex patient populations; (2) ongoing gaps between evidence, policy and practice and (3) concerns of system fragmentation



and need for integration for a more streamlined adoption and sustainment of interventions.

Increasingly complex patient populations,^{3 23 54 56–63} including patients with multi-morbidity^{21 54 58 59 61 64–66} and greater demand for effective aged care, under already strained healthcare budgets^{3 27 56 67–73} were frequently discussed. The increasing demands and expectations of patients for healthcare of the highest quality challenges healthcare systems to meet this demand.^{4 21 58 59 61 74 75}

The gaps between evidence, policy and practice^{40 76 77} continue to threaten SPHS as does limited investment in building workforce capacity and stakeholder involvement.^{30 43} The challenge of increasing public scrutiny and the need to balance financial, environmental and social sustainability were also recognised.^{28 38 78–80}

The fragmented nature of healthcare systems including power imbalances among the health professions, and resistance to changes in the scope of practice was reported to limit team approaches to care.^{81 82} Siloed care delivery models can become misaligned with the complexity of the healthcare system and the complexity of patient needs.^{52 83–85} Other publications reported lack of collaboration between public and private hospitals^{72 86} and widening gaps in care quality in rural/remote regions due to limited resources.^{23 36 72 87} Poor integration of primary care with the broader healthcare system was also seen as challenging SPHS.^{60 88}

Opportunities for improvement of SPHS

To address the challenges posed requires more than a one-time simple ‘fix’. Continued adaptation in response to local contexts, and ongoing monitoring and evaluation are required to support the sustainment of effective solutions and to anticipate future needs and solutions.⁵¹ Twelve review articles, 19 empirical articles and 56 editorials discussed opportunities to improve SPHS.

Greater strategic investment in the system,^{34 48 69 70 89} including funding novel interventions,^{26 40 80 90 91} and capacity building programmes for staff^{30 92} were advocated. Workplace culture in healthcare was identified as an important factor for SPHS. The importance of physician well-being was highlighted,^{44 76 93 94} and was strongly linked with organisational culture.¹⁷ The importance of mentorship, teaching and leadership were also highlighted as enablers of organisational improvements.^{19 43 75 76} Building healthcare system cultures that support medical graduates was viewed as crucial.^{38 94–96} Promoting incentives for generalist doctors to practice rurally was thought to address the current geographical gap in access to healthcare.^{44 87 95–97}

The promotion of desired attitudes, values and ideals of healthcare organisations was also recognised for achieving SPHS. Specifically, the value of patient-centred care and evidence-based medicine,^{30 44 58 63 65 97–99} and collaboration between and within healthcare facilities and disciplines was highlighted as important for SPHS.^{42 64 86 99–102} Support by management that values the workforce, uses robust data-driven hospital management systems, and

accessible, shared electronic medical record systems was also acknowledged as vital.^{74 103}

The importance of political stability and bridging the jurisdictional-federal divide in federated healthcare systems (such as in the USA, Canada and Australia) was important for effective unified healthcare system functioning.^{24 69 70 104–106} It is not only organisational culture in healthcare,¹⁰⁷ but the broader organisation, governance and regulation of the healthcare system that are important for SPHS.^{108–110}

Community involvement is an important factor that bolsters capacity to implement and sustain change.¹⁰³ Empowering patients to care for their own health, and building confidence among caregivers to deliver some aspects of care, reduces burden on the healthcare system.⁵⁸ Community involvement via Community Based Participatory Research bolstered equity and improved outcomes of care¹¹¹ and responding to recommendations from citizen panels also improved SPHS.^{73 102 112}

As technology advances, so does the ability to harness it to promote the sustainability of healthcare systems.³³ For example, point-of-care electronic prompts were used in one study of hospital surgical wards to decrease rates of hospital-acquired infections.¹¹³ Embedding artificial intelligence and big data analytics hold promise to support efficient and effective service delivery to improve SPHS.⁸³ Other studies have suggested greater adoption of telemedicine to reduce travel time and costs⁴ as complementary support to patients,⁹¹ to improve diagnostics,¹¹⁴ and as a platform to promote prevention of illness,²³ as contributing to SPHS.

Sustaining and scaling change in SPHS

Forty-seven articles addressed this theme, including 9 reviews, 11 empirical articles and 27 editorials. As interventions are often implemented with limited and/or short-term (2–3 years) evaluation plans, demonstrating SPHS is often elusive.⁴⁰ Robust evaluations using relevant SPHS indicators embedded alongside implementation, from the outset, to support adaptations and decisions about ongoing investments were advocated.^{104 115} One article proposed that federal funding agencies should perceive funding implementations of health innovations as ongoing strategic investments rather than time-limited projects.⁴²

The importance of accepting changes or adaptations to proposed interventions were also highlighted.^{116 117} For example, Greenhalgh *et al*¹¹⁷ reported on a 3-year case study follow-up of a healthcare system transformation and found that adaptations of the intervention to local contexts was important for sustainment of the intervention.

A recurring sentiment in the articles reviewed was the importance of support for the continuation of interventions from leaders and stakeholders.^{57 98 103 107 118 119} Leaders and managers have a clear role in supporting staff throughout the processes of reforms and changes, by providing opportunities for codesign, education

including e-learning, and building peer networks^{89 120} while creating open communication to involve front-line staff in planning and implementation.^{103 121} For example, one article suggested that pharmacists should be involved in developing hospital discharge procedures to improve medication safety and adherence.¹²² In more recent articles, policy-makers and political leaders are highlighted as important change agents, as long as they work in concert with front-line health staff.^{104 119 123}

Transparent healthcare policies and algorithms for equitable distribution of healthcare funds were advocated, and particularly prioritised by rural areas.^{36 48} Beyond the government, communities and multi-sectorial partners,⁵⁶ collaborations among hospitals, medical schools and physicians were also highlighted as vital for SPHS.⁴⁷

Although publications in our review predominantly urged for the sustainability of innovations, recent literature also highlights the need for discontinuation or redesign of programmes that have become ineffective or irrelevant over time.^{4 39 117} This is important to achieve sustainability as it ensures that value is maintained in the healthcare system.¹²⁴

DISCUSSION

Definitions of SPHS were rarely offered, with only 27% of included articles providing any definition of SPHS while referring to the concept of SPHS. When definitions were provided, they mainly centred on financial and workforce sustainability, and a variety of concepts related to adaptability, improvement and innovation for the future. The lack of definitions and variability in definitions creates significant limitations for the interpretation of the current body of literature on SPHS. As a first step to address this limitation, we would urge authors discussing SPHS to provide a definition that is relevant to their context. Furthermore, there were interesting contrasts in the boundaries adopted to describe the 'healthcare system' in the included papers which has also been identified by others.¹²⁵ For example, some studies measured SPHS at a single hospital level,⁵⁰ whereas others addressed it at a national system level,¹²⁶ making comparisons across studies difficult. In the future, as evidence about SPHS develops it may be possible to create nuanced measures, definitions, and approaches to SPHS as applied to different healthcare system levels and contexts.

The long-standing approach to measure SPHS in terms of financial outcomes is increasingly becoming more sophisticated through the development of newer more nuanced frameworks and indicators that account for health and societal benefits while factoring in the complex and dynamic nature of healthcare systems. Although new frameworks and measures, for example, the Future Health Index,⁵⁵ the Q*Scale⁵⁰ and the Resilience Indicator⁵⁴ have been proposed, the evidence for the practical application of such frameworks and measures in the real world was limited.

The most common opportunities for improving SPHS related to building supportive and functional workplace and organisational cultures that promote collaboration, transparency, patient-centredness and community participation. The adoption of technological advances including greater use of linked up information technology platforms to provide intelligence about aspects of SPHS were also discussed in the literature.^{4 23 33 91 113} Importantly, policy and political stability over time was also recognised as a supportive factor for SPHS, especially when implementing innovations and interventions that require longer-term horizons to demonstrate their impacts on SPHS.^{24 40 69 70 77 104–106} This aligns with findings from a recent systematic review that specifically focused on the sustainability of health improvement programmes.⁴⁴

The increasing adoption of pragmatic implementation trials in healthcare research is an important advance to support effectiveness testing in real-life situations rather than in contrived randomised controlled trials that are difficult to implement at scale in real-world settings to meet the needs of changing populations.^{46 121}

Table 4 provides a summary of the current evidence about SPHS under five headings: defining sustainability; measuring it; associated challenges of realising sustainable performance; identifying opportunities for improvement and creating, sustaining and scaling SPHS. This provides an important starting point for future research in the field.

Strengths and limitations

Methodological strengths of the current review include the use of the PRISMA-ScR statement to guide the review, including searching multiple databases and using snowballing techniques to increase comprehensiveness. Although formal quality appraisal is not recommended for scoping reviews, we felt it was important to also understand the scope of the quality of articles being published in addition to understanding their content and findings about SPHS.

As described earlier, the heterogenous nature of the current literature and limited use of definitions and frameworks made synthesis challenging. Our choice to limit the current review to studies reporting on SPHS in high-income countries further limits generalisability to other settings including in low-income and middle-income countries (LMICs).

Future research directions

This article summarises the current scope of the literature on SPHS and provides an important starting point for future research. Although new SPHS measures and frameworks that include factors other than financial inputs and outputs have been proposed, their usefulness needs to be evaluated in the real-world healthcare ecosystem in the future. Taking a broad system-wide lens, our focus was on the SPHS in healthcare delivery settings and did not specifically consider individual programmes for specific diseases, conditions or settings. In addition, the role of

**Table 4** Summary of key findings under the five SPHS focus areas analysed in this review

Criteria	Explanation	Key points from included articles
Defining sustainability	What do we mean by SPHS?	<ul style="list-style-type: none"> ▶ SPHS is difficult to define^{29 31–33} ▶ Sustainability is most often framed in terms of fiscal/financial or economic sustainability^{4 24 32–37 49} ▶ Sustaining a system intervention post implementation and initial funding period^{39–41}
Measuring	How do we measure SPHS?	<ul style="list-style-type: none"> ▶ Issue of system boundaries—at which level should we measure sustainability? (eg, at the individual hospital or healthcare system level)^{50 126} ▶ Heterogeneous outcome data collection techniques (eg, individual, organisation and community level)^{34 40 47 48} ▶ Wide variety of new methods and indicators suggested (see table 3)^{20 22 49–51 53}
Associated challenges	What challenges are associated with SPHS?	<ul style="list-style-type: none"> ▶ Complex patient population (eg, ageing, comorbidities and chronic illnesses)^{3 4 21 27 56–59 65 66 68–72 74} ▶ The chasm between evidence and practice and policy and practice^{26 28 34 40 48 69 70 76–80 89–92} ▶ Fragmentation and gaps (eg, power imbalances between healthcare personnel, rural vs urban services, fragmentation between public and private hospitals)^{36 51 52 72 81 82 84 86}
Opportunities for improvement	What helps improve SPHS?	<ul style="list-style-type: none"> ▶ Workplace culture (eg, mentorship, leadership, support for health professionals)^{17 19 76 87 93 95 96} ▶ Organisational culture (eg, promoting collaborative attitudes, transparency, patient-centred care and political stability)^{24 58 65 69 70 74 86 100 103 105 106} ▶ Consumer and community involvement to align the system with needs (eg, patient reported measures, in research, focus groups and consumer panels)^{58 103 111 112} ▶ Implementing technological advances (eg, e-health)^{4 23 33 91 113}
Sustaining and scaling	What initiatives for have been used to improve and maintain to SPHS (or value)?	<ul style="list-style-type: none"> ▶ Setting up interventions for sustainability (eg, extended initial funding periods, ongoing evaluation feedback loops, using pragmatic trial designs)^{40 80 113 137} ▶ Support from all stakeholders^{56 57 89 103 118 120–122} ▶ Developing cross-sectoral, interdisciplinary relationships and collaborations^{36 47 48 58} ▶ Ability of intervention to adapt and flex depending on the context of implementation¹¹⁷

SPHS, sustainable performance of healthcare systems.

preventative care and broader public health prevention measures such as vaccination programmes, should be a focus for future research. Research on the specific effect of the COVID-19 pandemic on SPHS is warranted to inform future responses to similar broad-ranging global threats to SPHS.^{113 115} Understanding the scope of SPHS in LMICs is important for the future development of SPHS and future research is needed to summarise current knowledge, interventions, programmes and measures of SPHS in these settings.

CONCLUSION

There is broad agreement that the sustainability of healthcare systems and their performance levels are increasingly being challenged. Our review confirms that the concept of SPHS is important and is frequently discussed in the health and medical literature. The field of SPHS is expanding with recent publications defining SPHS in terms other than the traditional financial measures. This places more emphasis on acceptability of the system to patients, healthcare providers and other stakeholders,

adaptation and resilience, and sufficient nimbleness to absorb new evidence and innovations to support continuous improvements.

It is unlikely that we will, nor should we, settle on a single definition of SPHS. We would favour definitions that are robust but flexible to ensure their utility in the many and varied healthcare system contexts, however, authors and editors should strive to ensure that a definition is provided in any discussions of SPHS. We need sophisticated yet practical indicators of SPHS that capture sustainability beyond the traditional financial measures. Such measures have been proposed in the research literature, but their utility needs to be tested in real-world settings. The current literature suggests that SPHS is improved by strengthening workplace cultures, continuous workforce development, direct health consumer and community involvement, and swift adoption and embedding of new evidence and technologies that are proven to have an advantage over current practice.

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