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# Performance measurement systems in primary health care: a systematic literature review

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## Abstract

**Background** Performance measurement systems (PMS) are increasingly recognized as essential tools in healthcare services. However, there remains a significant gap in the literature regarding their development, implementation, and impact on primary health care (PHC). This study aims to systematically review peer-reviewed literature to identify and analyze existing constructs, methodologies, and challenges associated with PMS in primary care settings worldwide.

**Methods** This systematic review follows the PRISMA guidelines regarded as the gold standard for evidence synthesis in scientific and grey literature. The quality of the selected studies was assessed using the Rosalind Franklin Qualitative Research Appraisal Instrument (RF-QRA), focusing on transferability, reliability, credibility, and confirmability.

**Results** From an initial pool of 167 articles, 14 studies were selected for in-depth analysis. These studies highlighted several challenges, including difficulties in evaluating PMS post-implementation within primary care units, limited evidence on the longitudinal monitoring of performance indicators, and inconsistencies in methodological approaches. The findings also revealed that regional, operational, and cultural contexts influenced the most PMS adaptations.

**Conclusions** This systematic review offers a comprehensive diagnosis of the best PMS models implemented globally over the past five years, emphasizing heterogeneity, diversification, and reliability. The findings underscore the potential for PMS to inform public policies to achieve high-performance primary healthcare systems and enhance decision-making processes at both operational and managerial levels.

**Keywords** Performance measurement systems, Decision support systems, Operational research, Primary health care, Performance Indicators

## Introduction and background

### Definition and importance of primary health care

A healthcare system based on Primary Health Care (PHC) organizes its structures. It functions around the

principles of equity, social solidarity, and the universal right to the highest attainable standard of health. This encompasses every human being, regardless of race, religion, political ideology, or socioeconomic status [1, 2]. PHC operates as the first level of care, delivering both individual and collective health actions. These include health promotion, disease prevention, diagnosis, treatment, rehabilitation, harm reduction, and health maintenance, all aimed at providing comprehensive care that positively impacts community health [3].

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The Alma Ata Declaration, which marked its forty-fifth anniversary in September 2023, remains a foundational document guiding global PHC strategies. Its commitments continue to influence decision-making at all levels of PHC [4–6]. This declaration set the groundwork for global health equity, emphasizing prioritizing primary healthcare in global health agendas. Despite significant advancements in access, infrastructure, and communication in PHC globally [7–9], the progression anticipated by the World Health Organization (WHO) remains hindered. Specifically, the absence of effective measurement of internal processes within care units across service delivery, regional, and central levels limits operational efficiency and the achievement of global health targets [10–12]. Addressing this gap is crucial, as every person, everywhere, has the right to achieve the highest possible level of health [13, 14]. The Astana Declaration reaffirmed and redirected global efforts in primary healthcare [5]. This declaration sought to ensure equitable access to the highest attainable standard of health worldwide [15–17]. With a focus on achieving high performance in PHC, the WHO, during its 75th anniversary, collaborated with member countries to address the post-COVID-19 public health landscape. The urgency highlighted by the pandemic reinforced the need for universal health coverage (UHC) and robust PHC systems [18–20]. The commitment to UHC and the Sustainable Development Goals (SDGs)—specifically SDG 3: Good Health and Well-being—places PHC at the center of strategies for achieving global health equity [21]. This entails addressing current limitations in PHC, particularly in measuring, monitoring, and improving internal processes to ensure the sustainability of health outcomes [22, 23]. PHC can continue to evolve by focusing on these challenges, serving as the foundation for equitable and accessible healthcare worldwide.

#### **Performance measurement: definition and general applications**

Performance measurement refers to systematically evaluating processes, practices, and outcomes within an organization using key performance indicators (KPIs) [24–26]. It is widely applied across public and private sectors to identify efficiency gaps, evaluate quality, and prioritize interventions [27, 28]. In healthcare, performance measurement traditionally focuses on standalone indicators, such as mortality rates or operational efficiency metrics [29, 30].

In contrast, performance measurement systems go beyond individual metrics by analyzing the interconnections between indicators and their mutual influences [31]. These structured systems allow for more comprehensive insights, revealing one KPI's proportional or

non-proportional impact on another [32, 33]. While performance measurement provides snapshot evaluations, performance measurement systems deliver integrated perspectives, making them essential for managing complex services [34, 35].

#### **Performance measurement applied to the healthcare sector and primary care**

In healthcare, performance measurement systems have gained prominence for identifying structural vulnerabilities, improving resource allocation, and assessing the impact of organizational and clinical interventions [36, 37]. However, while the private sector often employs established methodologies such as the Balanced Scorecard (BSC), public sector applications face challenges in adapting these approaches to the unique cultural, operational, and economic contexts of PHC [38, 39].

In PHC, the adoption of performance measurement systems is constrained by a lack of methodological standardization and fragmented literature. Studies such as those by Prates et al. [40] and Gartner and Lemaire [41] explore complementary aspects but do not fully address performance measurement systems in PHC. Prates et al. [40] evaluate PHC attributes using the PCATool, focusing on quality from the perspectives of users and professionals. Gartner and Lemaire map dimensions of performance and KPIs in broader healthcare contexts but do not address the specific methodological needs of PHC. This gap highlights the need for a sharper focus on performance measurement systems tailored to PHC, considering its unique operational and organizational requirements. By bridging this gap, it is possible to enhance service delivery and improve the quality of care in PHC settings.

#### **Research question, relevance and objective**

The increasing complexity and demand for primary healthcare services highlight the need for robust and adaptable performance measurement systems (PMS). However, the literature still reveals significant gaps regarding the development, implementation, and validation systems across different regional and technological contexts. This study aims to explore how PMS can be specifically designed and applied to address the operational and social particularities of diverse global realities.

The central research question is: what are the constructs, methodologies, and indicators used in performance measurement systems in primary healthcare, as documented in peer-reviewed literature, and how can these systems be adapted to address regional specificities by incorporating technological and methodological innovations to enhance management and operational outcomes? The research question is guided by three main

dimensions: Regional adaptability and local contextualization, highlight that healthcare systems face distinct challenges in different regions, ranging from infrastructure limitations in low-income countries to organizational complexity in high-income nations. The effectiveness and equity of primary care services depend on the ability of performance measurement systems (PMS) to adapt indicators and approaches to local specificities. Moreover, cultural, social, and economic factors play essential roles in defining priorities and ensuring the efficient use of healthcare resources [42, 43]. Simultaneously, the incorporation of emerging technologies, such as artificial intelligence, machine learning, and digital platforms is transforming performance measurement by enabling real-time data collection and analysis. While these innovations promote faster and more accurate decision-making, their integration into PMS requires robust methodologies that ensure effectiveness even in contexts with varying levels of technological maturity [44, 45].

This systematic review aims to bridge these gaps by synthesizing peer-reviewed literature to identify constructs and methodologies applied to performance measurement systems in primary care. By exploring diverse methodologies and their practical applications, this study offers unique contributions to the academic and operational understanding of performance measurement in primary healthcare settings.

## Materials and methods

This section outlines the methodology employed as well as the methods and instruments used to conduct the systematic review focused on the operational performance measurement system in primary health care. The aim is to synthesize the information from the researched literature with a qualitative base that is structured, reproducible, and transparent. This section will be divided into two subsections. The first will focus on the adopted strategy for literature search, aiming to gather the primary references on performance measurement systems in primary health care. The second subsection will describe the instruments used, as well as the methodology for constructing the systematic review and the variables considered in the analyses. The research strategy of Kringos et al. [45] was used as a foundational framework to describe the core dimensions of primary health care and guide the conceptualization of this study. The structure of a primary healthcare system consists of three dimensions: 1. governance; 2. economic conditions; and 3. workforce development. The process of primary health care is determined by four dimensions: 4. access; 5. continuity of care; 6. care coordination; and 7. comprehensiveness of care. The outcomes of a primary health care

system encompass three dimensions: 8. quality of care; 9. efficient care; and 10. health equity.

### a First Stage: Systematic Review following PRISMA

This systematic review follows a robust quantitative approach, systematically grounded in literary documents and pre-selected scientific research, as outlined by Levitt (2018). The review adheres to the PRISMA 2020 Statement [46], which provides a 27-item checklist recognized as the gold standard for evidence synthesis and reporting of systematic reviews and meta-analyses. PRISMA has been widely endorsed by EQUATOR (Enhancing the Quality and Transparency Of Health Research), promoting reliability and transparency in health services research [47].

In addition to PRISMA, this review integrates methodological guidance from the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis [48] and the Cochrane Handbook for Systematic Reviews of Interventions, version 6.4 [49]. These complementary frameworks ensured rigor throughout the stages of study selection, data extraction, and synthesis. The PRISMA checklist for this review has been completed and is included as an appendix to ensure transparency and reproducibility. Furthermore, to ensure the relevance and originality of this review, a thorough search was conducted in Cochrane Database, JBI Database of Systematic Reviews and Implementation Reports, and PROSPERO. This search confirmed the absence of prior systematic reviews or protocols that specifically investigate the methodologies for developing performance measurement systems in primary health care. This finding emphasizes the need for a comprehensive study that not only consolidates existing knowledge but also provides actionable insights for improving health services globally and regionally.

### • Eligibility

The research focused on selecting full peer-reviewed articles published between 2016 and 2023 written in English and available in full text online. The search was limited to the years 2016 to 2023 based on significant advancements in global health and performance measurement beginning in 2016. This year marks a turning point with the implementation of the Sustainable Development Goals (SDGs) established in 2015, which included specific targets for universal health coverage and strengthening primary health care [22, 50]. Additionally, the literature on the Primary Health Care Performance Initiative (PHCPI), launched in 2015, began to emerge in 2016, strongly influencing performance measurement approaches in primary health care [51, 52].

The inclusion and exclusion criteria for this systematic review were structured using the Population, Concept, and Context (PCC) framework, as recommended by methodological guidelines [48, 49]. The population included studies involving healthcare systems, facilities, or professionals working within primary healthcare settings globally. The concept focused on articles that explore, develop, or evaluate performance measurement systems, performance indicators, or methodologies applied to primary healthcare, emphasizing operational and organizational dimensions. The context covered studies conducted in primary healthcare settings across diverse geographic and socioeconomic environments, with an emphasis on improving healthcare delivery, resource allocation, and patient outcomes. Articles addressing operational and organizational performance measurement systems in primary healthcare were eligible. As shown in Table 1, studies focusing on the performance of clinical equipment and their calibrations, metrological performance, or those lacking complete conceptual texts on performance measurement systems, not written in English, or dealing with performance in laboratory settings were excluded.

- Research strategy and organization of sources

The search strategy was designed to ensure rigor and adaptability to each database, following the guidelines of the PRISMA framework. The selected databases—PubMed, SCOPUS, Web of Science, SciELO, and Springer—are recognized for their high-impact references and manuscript quality in areas related to performance measurement systems, performance intelligence, and operational performance in primary health care.

Search fields were structured around the introduction of keywords, including “health performance measurement,” “performance measurement,” “performance measurement systems,” and “performance intelligence.”

Boolean operators (AND, OR), wildcards (\*), and parentheses were employed to refine the search logic and maximize relevant results. The strategy was tailored for each database to align with its unique indexing and functionality, ensuring comprehensive retrieval of relevant studies.

The searches were conducted between May 5, 2023, and July 7, 2023. The complete search strategies, including specific adaptations for each database, are provided in the appendix to ensure transparency and reproducibility.

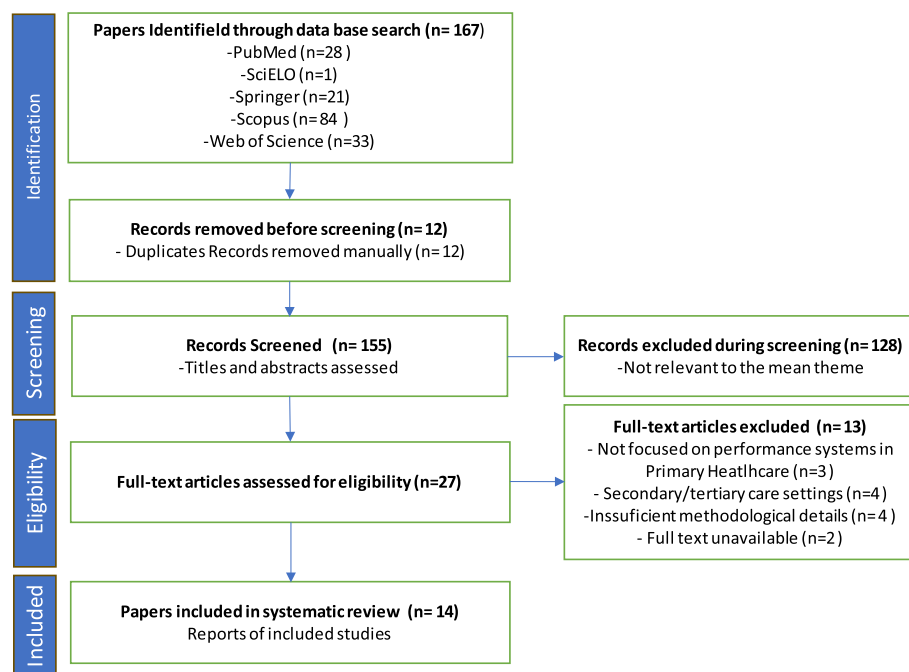
- Selection of manuscripts

The selection of studies followed a rigorous double-blind process to ensure objectivity and minimize potential bias, as recommended by systematic review methodological guidelines [48, 49]. The article selection process adhered to the PRISMA framework, encompassing four stages [53]. Initially, two independent reviewers (Reviewer 1 and Reviewer 2) conducted the screening of titles and abstracts independently, without knowledge of each other’s decisions. Both reviewers applied predefined inclusion and exclusion criteria strictly.

Records from the years 2016 to 2023 were included, and abstracts were assessed to identify articles relevant to the research question, as shown in Fig. 1. This process resulted in the selection of 14 articles that discussed performance measurement systems in primary health care. During the initial screening, 12 duplicate records were removed, followed by the exclusion of 128 manuscripts due to their lack of relevance to the main research theme, and 13 articles were excluded for the following reasons: six articles did not address performance measurement systems in primary healthcare; four articles focused on secondary or tertiary healthcare settings, which were beyond the scope of this review; two articles lacked sufficient methodological details to satisfy the eligibility criteria; and one article was not available in full text. These exclusions are transparently documented in the

**Table 1** Inclusion and exclusion criteria applied to the research

Inclusion criteria	Exclusion Criteria
Articles directly related to performance measurement systems in primary care	Duplicate articles in databases
Articles written in the English language	Articles without full text;
Peer-reviewed;	Informative and conceptual articles on the PMS topic
Articles comprised in the period from 2016 to 2023	Articles that are not in the English language;
	Articles not aligned with the primary health care research topic
	Calibration Performance Articles
	Performance measurements within diagnostic evaluation
	Performance measurement for metrology
	Performance measurement of laboratory procedures (bio-chemical analysis methods)



**Fig. 1** Review protocol based on Page et al. [46]

PRISMA 2020 flowchart (Fig. 1) to ensure alignment with best practices for systematic reviews [46]. In the second stage, the 14 selected articles underwent full-text review. Both reviewers independently assessed the manuscripts, focusing on methodology and alignment with the central research theme. Any disagreements during this process were resolved through discussion, and when necessary, a third reviewer was consulted to achieve consensus. This rigorous approach ensured that all chosen articles fully met the eligibility criteria and aligned with the research objectives.

**b** Second stage: systematization of information collection and summarization

The data synthesis was conducted using an integrative approach to capture both qualitative and quantitative insights into performance measurement systems in primary healthcare. The manuscripts were selected, and the following data were extracted and organized into a database using Microsoft Excel for subsequent analysis: (1) research database used; (2) keywords used to locate the article; (3) type of manuscript (full article or abstract); (4) journal name; (5) manuscript title; (6) publication year; (7) country where the study was conducted or the corresponding author's country (when the research location was not clearly defined); (8) journal's cite score; (9) journal's impact factor; (10) main research question; (11) whether the manuscript provided a methodological

framework for performance measurement systems rather than isolated indicators; (12) main methodology used in the article; (13) auxiliary methodologies supporting the manuscript's framework; (14) key research findings; and (15) important secondary results validating the proposed methods. For qualitative data, the four categories of the Rosalind Franklin Qualitative Research Appraisal Instrument (RF-QRA)—transferability, reliability, credibility, and confirmability—were applied to assess the quality of eligible studies [54]. The risk of bias for all included studies was deemed low, and the peer-reviewed articles were considered to have high reliability. The RF-QRA framework ensured that the synthesis maintained methodological rigor and reliability.

For quantitative data, metrics such as publication details, journal impact scores, and the number of recurring themes across studies were extracted and aggregated to identify patterns, trends, and consistencies in performance measurement practices. To organize these findings, the ranking cohort technique [55] was employed, which classified unique methodological themes into hierarchical categories. These categories were tabulated and analyzed to synthesize common measurement methodologies. Finally, a convergent synthesis design was applied to integrate qualitative and quantitative findings. The categorization into these nine areas was derived through a systematic content analysis of the most recurring performance measures identified across the studies. This approach ensured that the selected

areas comprehensively represented the key dimensions of performance measurement in primary health care. By grouping these measures into overarching categories, the research offers a holistic view of the structures adopted by the manuscripts. Qualitative themes were matched with quantitative patterns to provide a comprehensive understanding about methodologies and outcomes. Divergent results were noted and discussed to identify gaps or inconsistencies in the literature. This dual-layered approach allowed for a robust synthesis of data, capturing the multidimensional aspects of performance measurement systems in primary healthcare.

### iii. bibliometric analysis

To complement the systematic review and deepen the understanding of the research landscape on performance measurement systems (PMS) in primary healthcare, a bibliometric analysis was conducted. This approach enabled the identification of patterns, trends, and thematic clusters within the selected literature, offering valuable insights into key focuses and gaps in the field.

The bibliometric analysis was carried out using the full text of the 14 articles included in the study. The software VOSviewer 2020 was employed to map the co-occurrence of terms, identify thematic clusters, and visualize connections between keywords and relevant concepts. The process began with data extraction, during which titles, abstracts, keywords, and terms from the full text of the articles were organized into a database using Microsoft Excel. Key bibliometric indicators analyzed included the frequency of term occurrences, their connections, and the evolution of thematic clusters over the analyzed period (2016–2023).

Using this database, terms were analyzed with VOSviewer, focusing on identifying clusters that represented thematic areas related to PMS. These clusters were categorized into implementation methodologies, such as the Balanced Scorecard and Delphi method; contextual applications, including social and economic factors; and technological advancements, such as artificial intelligence and digital tools. Furthermore, network maps were generated to illustrate the relationships between terms, highlighting the main research focuses across the selected studies.

## Results

### Selection of studies

Table 2 displays the database extracted from the selected manuscripts that met the eligibility criteria. The inclusion of RF-QRA test analyses was conducted to assess the reliability of data incorporation into the manuscript.

3.1.1. Impact of Performance Measurement Systems in Primary Care Performance measurement systems

have shown diverse impacts on primary care settings. Rashidian et al. [42] evaluated the performance of medical sciences universities in Iran, ranking them using models such as Weighted Factor Analysis (WFA), Stochastic Frontier Analysis (SFA), and Data Envelopment Analysis (DEA). These findings emphasize the importance of integrating multiple models into measurement systems to avoid misleading results. Similarly, Peled, Porath, and Wilf-Miron [56] analyzed clinical indicators in Israel, demonstrating significant improvements over time and the benefits of setting accurate performance goals for resource allocation. Varela et al. [57] assessed the implementation of a patient-centered care model in Chile, identifying critical factors such as population size, healthcare team coordination, and additional training as drivers of successful implementation.

### Challenges of performance measurement systems in primary care

Several challenges hinder the effective application of performance measurement systems in primary care. Bresick et al. [52] identified low utilization of validated measurement instruments across African primary healthcare systems, despite recommendations for their adoption. Munar et al. [58] highlighted significant evidence gaps, including underuse of audits and feedback mechanisms, especially in low- and middle-income countries. In Malawi, Dullie et al. [43] found deficiencies in first-contact access, continuity, and comprehensiveness, with patient experiences influenced by characteristics such as gender, geographic location, and health status. These findings underscore the need for robust methodologies tailored to diverse contexts.

### Tools and methodologies for performance measurement

The development of performance measurement systems in primary care relies on various tools and methodologies. Ratcliffe et al. [59] utilized the PHCPI (Primary Health Care Performance Initiative) framework across five countries, demonstrating its feasibility and reliability. Barbazza et al. [60] introduced the PHC-IMPACT tool in Europe, mapping 139 indicators across six domains, including primary care structures and outcomes. Ruan et al. [39] applied the Delphi method to refine a performance measurement system for clinics in China, ensuring alignment with local needs. Similarly, Agarwal et al. [61] employed the Delphi method to develop performance indicators for Community Health Worker (CHW) programs, enhancing programmatic effectiveness. The development of Performance Measurement Systems (PMS) adapted to local realities relies on mechanisms that integrate social, operational, and economic factors into their design. For example, the Delphi Method

**Table 2** List of records included in the extraction data, eligibility criteria and reliability of records for projects studying Performance Measurement Systems

Title and author	Data extraction			Election criteria				Record reliability		
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care	The study provides a complete structure of an organizational performance measurement system in the service		The study refers to the performance measurement system with replicable methodology in health services in primary care	The study refers to the operational performance measurement system
T—Performance evaluation and ranking of regional primary health care and public health systems in Iran A—Rashidian et al	health performance measurement, Primary Health Care	Efficiency; Health care evaluation mechanisms; Primary health care; Program evaluation; Public health	2021	Iran	University of Medical Sciences of Iran	Yes, Performance measurement systems in primary health care units	Yes, using Weighted Factor Analysis (WFA), Equal Weighting (EW), Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA)	Yes, with a greater focus on comparison with other health units	Yes	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound
T—Primary health care performance: a scoping review of the current state of measurement in Africa A—Bresick, G et al	health performance measurement, Primary Health Care	SYSTEM, INCOME	2019	África do Sul	Primafamed PHC African Network	Yes, Performance measurement systems in primary health care units	Yes, using the Primary Healthcare Performance Initiative	Yes	Yes	RF-QRA—Level 1 Credibility: Strong Transferability: Strong Dependability: Strong Confirmability: Strong
T—Evidence gap map of performance measurement and management in primary healthcare systems in low-income and middle-income countries A—Munar, W et al	health performance measurement	DISTINCTIVE COMPETENCES, DYNAMIC CAPABILITY-TIES, QUALITY IMPROVEMENT, INTERVENTIONS	2019	EUA	Milken Institute of Public Health, George Washington University, USA	Yes, gap map with evidence for performance measurement systems in primary health care units	Yes, using the PMM (Performance Measurement and Management) Cycle and EGMs (Evidence Gap Maps)	Yes	Yes, with variables for strategic and tactical level	RF-QRA—Level 1 Credibility: Strong Transferability: Strong Dependability: Strong Confirmability: Strong

**Table 2** (continued)

Title and author	Data extraction		Election criteria					Record reliability		
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care	The study provides a complete structure of an organizational performance measurement system in the service		The study refers to the performance measurement system with replicable methodology in health services in primary care	The study refers to the operational performance measurement system
T—PHC Progression Model: a novel mixed-methods tool for measuring primary health care system capacity A—Ratcliffe, HL et al	health performance measurement	There are no keywords	2019	EUA	Ariadne Labs, Brigham and Women's Hospital & Harvard TH Chan School of Public Health, Boston, Massachusetts, EUA	Yes, Performance measurement systems in primary health care units	Yes, using a reformulation of the PHCPI	Yes	Yes, for the central management and operational level	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound
T—Quality of primary care from patients' perspective: a cross sectional study of outpatients' experience in public health facilities in rural Malawi A—Dullie, L et al	health performance measurement	Primary care, Primary care performance, Primary care assessment tool, Patient experience measurement, Health services, Malawi	2018	Malawi	Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway Partners In Health, Blantyre, Neno, Malawi University of Malawi College of Medicine, Blantyre, Malawi	Yes, Performance measurement systems in primary health care units	Yes, using the Malawian version of the primary care assessment tool (PCAT-Mw)	Yes	Yes with other clinical approaches	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound

**Table 2** (continued)

Title and author	Data extraction		Election criteria				Record reliability			
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care				
T—Creating performance intelligence for primary health care strengthening in Europe A—Barbazzia, E et al	health performance measurement	Primary health care, Performance assessment, Health systems, Measurement, Primary care, Europe	2020	Holanda	Amsterdam UMC, Department of Public Health, University of Amsterdam, Amsterdam Public Health research institute, Meibergdreef 9, 1105 AZ, Amsterdam, the Netherlands WHO European Centre for Primary Health Care, Health Services Delivery Programme, Division of Health Systems and Public Health, Tole Bi 88, Almaty, Kazakhstan	Yes, Performance measurement systems in primary health care units	Yes, using Focus Groups and Survey	Yes	Yes, with different types of approaches	Classification: Rosalind Franklin Qualitative Research Appraisal Instrument (RF-QRA)
										RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound

**Table 2** (continued)

Title and author	Data extraction			Election criteria				Record reliability		
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care	The study provides a complete structure of an organizational performance measurement system in the service		The study refers to the performance measurement system with replicable methodology in health services in primary care	The study refers to the operational performance measurement system
T—Development of a performance measurement system for general practitioners' office in China's primary healthcare A—Ruan, WJ et al	health performance measurement	General practice, Performance measurement system, Quality of health service, Focus group method, Delphi method	2022	China	General Practice Ward/Internal Medical Center Ward, General Practice Medical Center, West China Hospital, Sichuan University, Chengdu, China	Yes, Performance measurement systems in primary health care unit doctors' offices	Yes, using the Index pool: Delphi method and survey	Yes	Yes, for the central management and operational level in 3-level productivity	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound
T—Improving the quality of primary care by allocating performance-based targets, in a diverse insured population A—Peled, R., Porath, A. & Wilf-Miron, R	health performance measurement	Public health, Quality improvement, Quality measurement, Quality indicators	2017	Israel	Maccabi Healthcare Services (MHS) Department Health Systems Management, Faculty Health Sciences, Ben Gurion University of the Negev, Beer Sheva, 65,321, Israel Peres Academy Center, Rehovot, Israel	Yes, focused on community health	Yes, but the study does not describe the relationship of the indicators, only the domains	Yes	Yes with other clinical approaches	RF-QRA—Level 4 Credibility: sound Transferability: Sound Dependability: Sound Confirmability: Sound

**Table 2** (continued)

Title and author	Data extraction		Election criteria				Record reliability		
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care			
T—A conceptual framework for measuring community health workforce performance primary health care systems A—Agarwal et al	health performance measurement	Community health worker, Primary health care, Health metrics, Health-care quality indicators, Health information systems	2019	EUA	Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA	Yes, focused on the quality of services provided by community health workers	The study provides a complete structure of an organizational performance measurement system in the service	The study refers to the performance measurement system with replicable methodology in health services in primary care	Classification: Rosalind Franklin Qualitative Research Appraisal Instrument (RF-QRA)
	health performance measurement	Balanced scorecard, Performance, Indicators, Health, Hospital, Evaluation, Assessment, COVID-19	2022	Hungria	Doctoral School of Health Sciences, Faculty of Health Sciences, University of Pécs, Pécs, Hungary	Yes, with a systematic review of all KPIs found	Yes	Yes, with many KPIs available for use in primary care	RF-QRA—Level 1 Credibility: Strong Transferability: Strong Dependability: Strong Confirmability: Strong
T—A systematic review: the dimensions to evaluate health care performance and an implication during the pandemic A—Ameret al	health performance measurement	Balanced scorecard, Performance, Indicators, Health, Hospital, Evaluation, Assessment, COVID-19	2022	Hungria	Doctoral School of Health Sciences, Faculty of Health Sciences, University of Pécs, Pécs, Hungary	Yes, with a systematic review of all KPIs found	Yes	Yes, with many KPIs available for use in primary care	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound

**Table 2** (continued)

Title and author	Data extraction		Election criteria					Record reliability		
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care	The study provides a complete structure of an organizational performance measurement system in the service		The study refers to the performance measurement system with replicable methodology in health services in primary care	The study refers to the operational performance measurement system
T—Population segments as a tool for health care performance reporting: an exploratory study in the Canadian province of British Columbia A—Langton et al	health performance measurement	Primary care, Performance measurement, Population segmentation, Risk adjustment, Health care costs, Administrative data	2020	Canada	Centre for Health Services and Policy Research, The University of British Columbia (UBC), 201–2206 East Mall, Vancouver, BC, V6T 1Z3, Canada School of Population and Public Health, UBC, Vancouver, BC, Canada	Yes, in a large district of the country of study	Yes, focused on costs and access to the service	Yes, from the use of longitudinal data with logistic regression to create KPIs	Yes	RF-QRA—Level 1 Credibility: Strong Transferability: Strong Dependability: Strong Confirmability: Strong
T—Evidence-based indicators for the measurement of quality of primary care using health insurance claims data in Switzerland: results of a pragmatic consensus process A—Blazik et al	health performance measurement	Quality indicator, Quality assessment, Quality measurement, Claims data, Health insurance, Evidence-based, Consensus process	2018	Switzerland	Swiss Quality Indicator for Primary Care (SQIPRICA) Working Group	Yes	Yes, focused on the quality of services provided and clinical monitoring	Yes	Yes	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound

Table 2 (continued)

Title and author	Data extraction		Election criteria					Record reliability	
	Subject search terms	Article keywords	Publication Year	Research country or corresponding author	Organization promoting the study	Confirmation that the study refers to health services in primary health care	The study provides a complete structure of an organizational performance measurement system in the service		The study refers to the performance measurement system with replicable methodology in health services in primary care
T—Evaluation of the implementation progress through key performance indicators in a new multimorbidity patient-centered care model in Chile A—Varela et al	health performance measurement	Multimorbidity, Key performance indicators, Implementation, Progress, Patient-centered, Model	2023	Chile	the Centro de Innovación en Salud ANCORA UC (CISAUC), together with the Servicio Metropolitano Sur Oriente (SSMSO) and National Found of Health (FONASA),	Yes	Yes, based on pre-existing methods implemented in the service	Yes	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound
T—Health facility management and primary health care performance in Uganda A—Kim et al., 2022	health performance measurement	Management, Health facilities, Primary health care, Quality, Essential drugs	2022	Uganda	Performance Monitoring for Action (PMA) project ( <a href="http://www.pmadata.org">www.pmadata.org</a> )	Yes	Yes	Yes	RF-QRA—Level 2 Credibility: Strong Transferability: Strong Dependability: Sound Confirmability: Sound

has been employed to achieve consensus among local experts, ensuring the relevance of indicators. Tools like the PHC Progression Model and adaptations such as the Malawian version of the PCATool (PCAT-Mw) demonstrate the feasibility of customizing frameworks to address regional challenges. These approaches highlight the necessity of aligning methodologies with local cultural, organizational, and infrastructural contexts to ensure their effectiveness.

### **Contextual applications of performance measurement systems**

The application of performance measurement systems is highly influenced by the context of primary care services. Bresick et al. [52] highlighted differences in performance measurement practices based on user and staff engagement in South Africa and Malawi. Kim et al. [44] evaluated healthcare facilities in Uganda, linking effective management practices to improved availability of essential medicines and higher service utilization. Langton et al. [36] examined population segmentation in Canada, using socioeconomic status as a proxy for patient vulnerability to enhance cost analysis and optimize services. Blozik et al. [62] developed performance indicators in Switzerland using health insurance claims data, adapting these indicators to align with local public health priorities.

### **Categorization of areas**

Across the 14 manuscripts reviewed with total of 1,291 performance measures were identified, encompassing 165 subdomains and 75 domains. These performance measures were categorized into 9 major areas: Service and Process Quality; Communication, Information, and Empowerment; Finances; Stakeholders—Customers, Clients, and Patients; People and Culture; Governance and Organizational Management; Infrastructure and Inputs; Productivity, Performance, and Effectiveness; and Scope of Services Provided and Available.

Table 3 presents the structures adopted in each article for the performance measurement systems, along with the number of dimensions, domains, subdomains, and the total number of indicators. The study by Rashidian et al. [42] employed a combination of mixed methods to structure the base of performance indicators: Weighted Factor Analysis (WFA), Equal Weighting (EW), Stochastic Frontier Analysis (SFA), and Data Envelopment Analysis (DEA). The study by Bresick et al. [52] utilized a widely used structure by primary care managers, the Primary Healthcare Performance Initiative (PHPI) [51], and Ratcliffe et al. [59] adapted it to create a framework named PHC Progression Model. Munar et al. [58] demonstrated their set of indicators through the mixed use

of Performance Measurement and Management (PMM) and Evidence Gap Maps (EGMs).

Three studies used survey-based approaches in their performance measurement system frameworks: Ruan et al. [39] with the Index Pool (Delphi method and survey), Barbazza et al. [60] with Focus Groups and Survey for monitoring indicators, and Kim et al. [44] with the PRIME-Tool adapted from the World Management Survey. Two authors used classical performance measurement system frameworks: Amer et al. [63] with the Balanced Scorecard (BSC) and Blozik et al. [62] with the IQ (Indicators Quality) framework. The remaining authors either adapted existing methods or created new ones to underpin their research applications: Dullie et al. [43] with the Malawian version of the primary care assessment tool (PCAT-Mw), Peled, R., Porath & Wilf-Miron [56] with the Performance Measurement System (PMS) by HEDIS Measures and Technical Resources, Agarwal et al. [61] with The Community Health Worker Performance Measurement Framework, and Varela et al. [57] with the Multimorbidity Patient-Centered Care Model (MPCM).

The distribution of each area is illustrated in Fig. 2, and Table 3 highlights the detailed structures, including dimensions, subdomains, and indicators.

To illustrate the connections between the main categories of identified indicators, their respective dimensions, and the methodologies applied in the analyzed articles, we developed the framework presented in Fig. 3. This framework organizes the information into three layers: main categories, associated dimensions, and utilized methodologies. It provides an integrated view of the approaches to performance measurement in primary healthcare systems, highlighting the interdependencies between indicators and methodologies. The framework serves as a comprehensive guide for understanding how various methodologies align with specific dimensions and contribute to addressing the operational and contextual challenges in primary healthcare.

### **Research characterization**

As per Fig. 4, three studies were published by Americans or conducted in the United States [58, 59, 61], and nine research studies were conducted in various countries: South Africa [52], Iran [42], Netherlands [60], Uganda [44], Chile [57], Canada [36], Hungary [63], Malawi [43], China [61], Switzerland [62] and Israel [56].

As per Fig. 5, the journal with the highest number of publications is BMC Health Services Research, with a total of 9 publications, followed by 3 publications in BMJ Global Health and one each in BMC Family Practice and Human Resources for Health.

**Table 3** Measure structures of performance measurement systems in primary care for projects studying Performance Measurement Systems

Manuscript and authorship	Structure proposed by the research	Number of Domains/Dimensions	Number of Subdomains	Number of performance measures	Domain Measurement								
					Service and process quality	Communication, information and training	Finance	Stakeholders—Customers, Clients and patients	People and Culture	Governance and Organizational Management	Infrastructure and inputs	Productivity and effectiveness	Scope of services provided and available
T—Performance evaluation and ranking of regional primary health care and public health Systems in Iran A—Rashidian et al	Weighted Factor Analysis (WFA), Equal Weighting (EW), Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA)	2	4	39		1. Death, communicable and non communicable disease		1. Workforces and other resources	1. Risk Factors and Health Behaviors				1. Services Coverage
T—Primary health care performance: a scoping review of the current state of measurement in Africa A—Bresick, G et al	Primary Health-care Performance Initiative (PHPI)	5	15	38	1. Availability of Effective PHC Services; 2. People-Centered Care 3. Effective service coverage 4. Health Status 5. Morbidity; 6. Mortality	1. Information Systems; 2. Provider Knowledge	1. Health Financing 2. Funds	1. Workforce	1. Responsiveness to People	1. Governance & Leadership 2. Organization and Management	1. Drugs & Supplies; 2. Facility Infrastructure; 3. Access 4. Equity	1. Efficiency 2. Resilience of Health Systems 3. Access 4. Equity	1. Adjustment to Population Health Needs; 2. Access 3. Equity
T—Evidence gap map of performance measurement and management in primary health care systems in low-income and middle-income countries A—Munar, W et al	Performance Measurement and Management (PM&M) and Evidence Gap Maps (EGMs)	5	15	22	1. Quality of care process 2. Improvements 3. Adherence to recommended practice or guidelines; 3. Patient satisfaction; 4. Perceived quality of care			1. Patient satisfaction; 2. Health Status Outcomes: (1) Physiological health 3. Health Status Outcomes: (2) Psychological health 4. Community participation	1. work morale; 2. Stress Burnout and Sick leave 3. Staff Turnover; 4. Attitudes 5. Skills and competencies 6. Changes in organizational culture 7. Health Behaviors: (1) Adherence by patients	1. Changes in organizational culture 2. Unintended outcomes	1. Access to primary care services	1. workload 2. Utilization of specific services 3. Coverage of specific services or interventions 4. Access to primary care services 5. Equity effects	1. Health Behaviors: (2) Health seeking behaviors 2. Utilization of specific services 3. Coverage of specific services or interventions 4. Access to primary care services 5. Equity effects
T—PHC Progression Model: a novel mixed-methods tool for measuring primary health care system capacity A—Racilife, HL et al	PHC Progression Model	3	9	32	1. Quality management infrastructure	1. Surveillance; 2. Innovation and Learning 3. Civil registration and vital statistics 4. Health management information systems 5. Personal care records 6. Training 7. Information system use	1. Facility budgets 2. Financial management information system 3. Salary payment	1. Community engagement; 2. Empowerment 3. Team-based care organisation	1. Density and distribution 2. Community health workers 3. Proactive population outreach	1. PHC policies 2. Social accountability 3. Facility management capability and leadership	1. Stock-out of essential medicines and consumable commodities; 2. Basic equipment; 3. Diagnostic supplies 4. Facility Density 5. Facility amenities 6. Standard safety precautions and equipment 7. Local priority setting 8. Availability of laboratory tests in primary care; 9. Availability of diagnostic imaging in primary care; 10. Availability of equipment in primary care 11. General service readiness at facility-level;	1. Performance measurement and management	1. Priority Setting

**Table 3** (continued)

Manuscript and authorship	Structure proposed by the research	Number of Domains/Dimensions	Number of Subdomains	Number of performance measures	Domain Measurement	Service and process quality	Communication, information and training	Finance	Stakeholders—Customers, Clients and patients	People and Culture	Governance and Organizational Management	Infrastructure and inputs	Productivity and effectiveness	Scope of services provided and available
T—Quality of primary care from patients' perspective: a cross-sectional study of our patients' experience in public health facilities in rural Malawi A—Dulle, L et al	Malawian version of the primary care assessment tool (PCAT-Mw)	5	5	29	1. Is there a complaint/suggestion box at this HC? 2. Does this HC seem interested in the quality of care that you get from that specialist or hospital? 3. Does this HC know your complete medical history? 4. Does this HC know about your work or employment?	1. Do you think the staff at this HC understands what you say or ask? 2. Are your questions answered in a way that you understand? 3. Does this HC know your complete medical history? 4. Does this HC know about your work or employment?	1. Does this HC get opinions and ideas from people or organizations with knowledge to help provide better health care? Eg. the local health committee, churches, other organizations?	1. Is the staff friendly and approachable? 2. Does this HC know you very well as a person, rather than as someone with a medical problem? 3. Does this HC know who lives with you?	1. Does this HC know what the results of the visit were? 2. After you went to the specialist or hospital, did this HC talk with you about what happened at that visit?	1. Do you think this HC knows about the important health problems of your area?	1. Does this HC know what the results of the visit were? 2. After you went to the specialist or hospital, did this HC talk with you about what happened at that visit?	1. Do you think this HC knows about the important health problems of your area?	1. Pay-for-performance 2. Accountability for performance 3. Overall utilization of primary care services 4. Composite measure 5. Composite measure	1. When this HC is closed on Saturday and Sunday and you get sick, would someone from here see you the same day? 2. When the HC is closed and you get sick during the night, would someone from here see you that night? 3. Does this HC give you enough time to talk about your problems or worries? 4. Checking hearing 5. Dental check-up – checking and cleaning your teeth; 6. Treatment by dental therapist eg extraction of bad teeth; 7. Counseling for mental health problems; 8. Plastering of fractures; 9. Treatment of ingrown toe nails or removing part of a nail 10. Advice on wearing reflectors when walking on the road at night; 11. How to prevent hot burns; 12. Advice about appropriate exercise for you; 13. Advice on how to prevent accidental falls; 14. Ways to handle family conflict; arguments; disagreements (that may arise from time to time); 15. Possible exposure to harmful substances in your home, at work or in your area e.g. paraffin; pesticides?
T—Creating performance intelligence for primary health care strengthening in Europe W—Barbaza, A et al	Focus Groups and Survey for monitoring indicators	6	26	139	1. Quality assurance of health professionals; 2. Quality assurance of facilities; 3. Patient experience measures; 4. Job satisfaction; 5. Quality of care processes; 6. External accountability for quality of care delivered by generalist medical practitioners; 7. Patient satisfaction; 8. Patient reporting enough time with doctor; 9. Correct diagnosis; no incident reporting; 10. Incident review; 11. Medication duplication of medical tests;	1. Retraining programme for specialist medical practitioners/narrow specialties; 2. General practice/family medicine undergraduate/bachelor education; 3. General practice/family medicine postgraduate education; 4. General practice/family medicine postgraduate clinical practice; 5. General practice/family medicine specialization among medical students; 6. Nurses working in primary care undergraduate/bachelor and postgraduate education; 7. Professional journal on general practice/family medicine; 8. Electronic health records system;	1. Total primary health care expenditure as a share of total health expenditure; 2. Domestic primary health care expenditure; 3. Capital expenditure and recurrent expenditure arrangements; 4. Provider payments; 5. Employment status and remuneration of generalist medical practitioners; 6. Relative financial status of generalist medical practitioners;	1. Roles of professional associations, medical practitioners; 2. Roles of professional associations of nurses and midwives in primary care; 3. Roles of patient and/or consumer groups; 4. Support for caregivers/family carers; 5. Individual risk assessments; 6. Stability of patient-generalist medical practitioner relationship; 7. Generalist medical practitioner-social services; 8. Patient reported acceptability of primary care services; 9. Risk factors – smoking;	1. Patient rights and choice 2. Type of primary care health professionals; 3. Workforce registry with information on primary care professionals; 4. Age distribution of generalist medical practitioners; 5. Population based screening; 6. Choice of generalist medical practitioner; 7. Caseload of generalist medical practitioner; 8. Existence of care coordinator; 9. Patient reporting opportunity to ask questions; 10. Patient reporting easy explanations;	1. Primary care strategy; 2. Development of primary care clinical practice guidelines 3. Primary care services mandate; 4. Public health incentives for recruitment and retention in underserved areas; 6. Population stratification; 7. Prescribing authority of generalist medical practitioners; 8. Follow-up services in primary care—Other services; 9. Follow-up services shared care plans; 11. Coordination within primary care; with specialist medical practitioners; 13. Coordination across sectors;	1. Quality assurance of facilities; 2. Primary care resources; 3. Electronic health record system linked to clinical systems; 4. Gatekeeping system; 5. Different access routes; 6. Primary care health professionals density 7. Opening hours in primary care; 8. Out-of-hours in primary care 9. Types of primary care facilities; 10. Same day appointments; 11. Waiting time for appointment;	1. Pay-for-performance 2. Accountability for performance 3. Overall utilization of primary care services 4. Composite measure 5. Composite measure	1. Services included in the health benefit package; 2. Scope of practice for primary care health professionals; 3. Availability of essential medicines for primary care; 4. Consulting services; 5. Individual risk assessments/qualification; 6. Vaccination services; 7. Diagnostic exams 8. Final diagnosis in primary care 9. Shared care pathways; 10. Shared practices in primary care; 11. Influenza vaccination coverage; 12. HPV vaccination coverage; 13. Tuberculosis preventive care and diagnostic services; 14. Hypertension treatment coverage; 15. Tuberculosis treatment coverage; 16. Depression treatment coverage; 17. Hypertension follow-up; 18. Diabetes monitoring; 19. Chronic obstructive pulmonary disease follow-up 20. Post-natal care 21. Depression treatment follow-up 22. Access to medicines 23. Control of blood pressure among people treated for hypertension	

Table 3 (continued)

[illegible]

**Table 3** (continued)

Manuscript and authorship	Structure proposed by the research	Number of Domains/Dimensions	Number of Subdomains	Number of performance measures	Domain Measurement	Service and process quality	Communication, information and training	Finance	Stakeholders—Customers, Clients and patients	People and Culture	Governance and Organizational Management	Infrastructure and inputs	Productivity and effectiveness	Scope of services provided and available
T—A conceptual framework for measuring community health workforce performance within primary health care systems A—Agarwal et al	The Community Health Worker Performance Measurement Framework	7	19	46	1. #/of supervisors trained in management and supervision of CHWs; 2. #/of national/sub-national/facility/community meetings in which data from standardized reporting platforms etc.) are discussed/reviewed; 3. #/of CHWs who have access to the client data follow-up) in the last 6 months; 4. #/of CHWs who have received initial training; 5. #/of CHWs who have received follow-up training in the last 2 years; 6. #/of CHWs who have completed the certification program 7. #/of CHWs who have passed knowledge/competency tests following training); 8. #/of CHWs who express that they feel confidence in their abilities to provide health education 9. #/of CHWs who express confidence in their abilities to deliver basic healthcare services; 10. #/of CHWs who submitted reports in the last month; 11. #/of CHW reports submitted that were complete/did not have missing information; 12. In the last 3 months, #/of CHWs who have reported on their activities; 13. #/of women/clients who report they trust the health information provided by the CHW;	1. #/of supervisors who have received their stipend in the last month 2. # of planning/ review meetings held at the level of the local government to discuss CHW program performance; 3. #/of CHWs who expressed satisfaction with the community support they receive; 4. #/of CHWs who expressed satisfaction with the support they receive from health facility staff; 5. #/of community members that know the name of the community CHWs; 6. #/of community members who can name at least 3 services that the CHW provides; 7. #/of women/ households who express satisfaction with services they received from the CHW in the last 3 months; 8. #/of women who report that in their interaction with the CHW they felt humiliated or disrespected (scale 1–5);	1. #/of health workers (CHWs/ supervisors/health facility staff) who have access to client data AND who report using the data to make decisions about their provision of services; 2. #/of CHWs who have been selected in alignment with selection criteria; 3. # of CHWs who have been selected/recruited; 4. CHW's Motivation—Composite metric; 5. Empowerment—Composite metric;	1. Ratio of CHWs to supervisors; 2. Average # of visits per supervisor to monitor/support CHW activities in the last month; 3. #/of CHWs who received a supervisory visit in the last 1–3 months 4. Average # of reports and data collected; 4. Average # of supervisory contacts (in-person visits, phone calls, text messages, etc.) per CHW; 5. #/of CHWs who have received a specific non-financial incentive; 6. #/of clients that completed the referral at the health facility (referral completion)	1. #/of CHWs with all the key stock commodities in the last reporting period	1. # of planning/ review meetings held at the level of the local government to discuss CHW program performance; 2. Average time from onset of symptom to first contact with CHW; 3. #/of CHWs who reported on their activities in the last month; 4. # of days CHW has performed at least one CHW responsibility in the last month; 5. % of individuals referred by CHW to the health facility per 100 clients seen (and subset by reasons for referral) 6. Average # of referrals made per CHW in the last month;	1. Average # of home visits made by CHWs in the last month (indicator to be disaggregated by type of home visit—i.e. sick child visit, antenatal care) 2. #/of households who received at least one visit by a CHW in the last 3 months; 3. #/of women/clients who report they trust the treatment services provided by the CHW			
T—A systematic review: the dimensions to evaluate health care performance and an implication during the pandemic A—Aner et al	Balanced Scorecard (BSC)	13	45	797	1. Standards and regulations; 2. Communications; 3. HCW feedback; 4. HCW training; 5. Patient information; 6. Records; 7. Reports;	1. Complaints; 2. Errors, accidents and complications; 3. Improvement; 4. Internal assessment 5. Patient satisfaction 6. Revenue vs. Expenditure;	1. Expenditures and costs 2. Expenditures and costs 1; 3. Expenditures and costs 1–2; 4. Expenditures and costs 2; 5. Revenue; 6. Revenue vs. Expenditure;	1. Community role and connections; 2. Market share; 3. Patient loyalty; 4. Response to patients;	1. Female consideration; 2. HCW engagement and motivation; 3. HCW loyalty; 4. HCW satisfaction; 5. Staff knowledge, attitude, and practices; 6. Staffing;	1. HCW turnover; 2. Margins;	1. supplies and equipments; 2. Technology/ information system; 3. Volume, Infrastructure and access; 4. Waste management	1. Efficiency, utilization and productivity; 2. Mortality 3. Number of admissions; 4. Services time measuring; 5. ailing time;	1. Infection control; 2. Length of Stay; 3. Medications; 4. Occupancy; 5. Products and Services; 6. Researches/Scientific productivity;	

Table 3 (continued)

Domain Measurement					Number of performance measures	Number of Subdomains	Number of Domains/ Dimensions	Structure proposed by the research	Domain Measurement				
Manuscript and authorship	Structure proposed by the research	Service and process quality	Communication, information and training	Finance					Stakeholders— Customers, Clients and patients	People and Culture	Governance and Organizational Management	Infrastructure and Inputs	Productivity and effectiveness
T—Population segments as a tool for health care performance reporting; an exploratory study in the Canadian province of British Columbia A—Langton et al	System of cost and access indicators by segment for logistic regressions	5	5	14	1. Mean Costs (S): Total FP (family physician) Care (any location) 2. Cost of Specialist Care 3. Mean Costs (S): Inpatient Hospital Care 4. Mean Costs (S): Day surgeries; 5. ED (emergency department) visit (estimated facility cost); 6. Mean Costs (S): Prescription Medicines (PharmaC—are + Private paid) 7. Total Costs (Total FP Care, inpatient hospital care, prescription medicines, plus medical & surgical specialist care, day surgeries and ED visits);	1. Proportion of insured persons aged 65 year or older with at least one chronic condition who were hospitalised for fracture near the pelvic joint;	1. Continuity of Care: UPC Index (Mean, range 0–1);		1. Total FP (family physician) Care (any location) 2. ED (emergency department) visit (estimated facility cost); 3. Access outside office hours: % patients with FP billing outside office hours;	1. Coordination: % patients seeing < 5 FP physicians 2. ED (emergency department) visit (estimated facility cost); 3. Access outside office hours: % patients with FP billing outside office hours;	1. Prescription Medicines (PharmaC—are + Private paid); 2. FP (family physician) visits (any location); 3. Hospital separations per 100 population; 4. ED (emergency department) Visits per 100 population; 5. Filled Classes of medication		
T—Evidence-based indicators for the measurement of quality of primary care using health insurance claims data in Switzerland; results of a pragmatic consensus process A—Blotik et al	IQ (Indicators Quality)	6	6	24	1. Proportion of insured persons aged 65 years or older with prescription of potential inappropriate medications (PWM);	1. Medication costs per insured person; 2. Costs per daily dose in specific ATC groups relevant in primary care;	1. Proportion of insured persons aged 65 year or older with chronic condition who were hospitalised for fracture near the pelvic joint;			1. Number of emergency hospital admissions per 1000 insured persons; 2. Disease-specific hospitalisation rate of insured persons with the Pharmacy Cost Group "Respiratory disease"; 3. Proportion of insured persons with antidiabetic medication receiving which HbA1c controls (number of controls per year); 4. Hospitalisation rate of insured persons with antidiabetic medication;	1. Costs per daily dose in specific ATC groups relevant in primary care; 2. Proportion of prescriptions of inefficient me-too medications; 3. Number of different primary care physicians consulted by an individual insured person; 4. Number of different specialist physicians consulted by an individual insured person; 5. Number of prescriptions of anxiolytics, sedatives or hypnotics; 6. Number of prescriptions of non-steroidal anti-inflammatory drugs (NSAIDs); 7. Proportion of insured persons aged 65 years or older with poly-medication; 8. Proportion of insured persons aged 65 year or older with reimbursed influenza vaccination; 9. Proportion of insured persons receiving long term therapy of systemic corticosteroids; 10. Proportion of insured persons with antidiabetic medication receiving which an ophthalmologic control within 15 months;		

**Table 3** (continued)

Manuscript and authorship	Structure proposed by the research	Number of Domains/Dimensions	Number of Subdomains	Number of performance measures	Domain Measurement					Scope of services provided and available			
					Service and process quality	Communication, information and training	Finance	Stakeholders—Customers, Clients and patients	People and Culture		Governance and Organizational Management	Infrastructure and inputs	Productivity and effectiveness
T—Evaluation of the implementation progress through key performance indicators in a new patient-centered care model in Chile A—Varela et al	Multimorbidity Patient-Centered Care Model (MPCM)	4	4	17	1. The cleanliness in the health facility? 2. How much do you trust the skills and abilities of the health workers at this facility? 3. The level of respect the provider showed you? 4. Overall, taking everything into account, how would you rate the quality of care you received at this facility?	1. Local training plan of MPCM for new employees; 2. Alert system informing PHC teams of patients consulting at emergency room and hospitalization; 3. Phone counseling;	1. Borrowed money or sold something to afford the costs of care/treatment	1. Clinical Pharmacist; 2. High-complexity primary physician; 3. Case Manager; 4. Transition Nurse;	1. Decision makers support (PHC director and managers); 2. Leader for the implementation of the MPCM at the PHC; 3. Implementation of an induction plan;	1. Rescue after hospital discharge;	1. Adult population stratified by risk, available and with patients ID; 2. Unified drug prescription; 3. Integrated multimorbidity included appointments; 4. Individualised Care Plans; 5. Continuity of care with a professional from the team; 6. Transition care		
T—Health facility management and primary health care performance in Uganda A—Kim et al., 2022	PRIMETool adapted from the World Health Management Survey	5	3	27				1. Age; 2. Sex of household member; 3. Quintile of wealth; 4. Highest level of school attended; 5. Marital Status; 6. Neighborhood; 7. Region; 8. Has any insurance or is a member of a mutual health; 9. How easy or difficult was it for you to follow the provider's advice? 10. How likely are you to return or bring your children to this facility for health care in the future?	1. The provider's ability to explain things in a way that you could understand?	1. Managing Authority;	1. Type of Facility; 2. Essential drug index (EDI); 3. Equipment index (EI)	1. The length of wait time at the facility before you were seen?	1. Services Covered by Insurance;



Fig. 2 Number of indicators per classification area

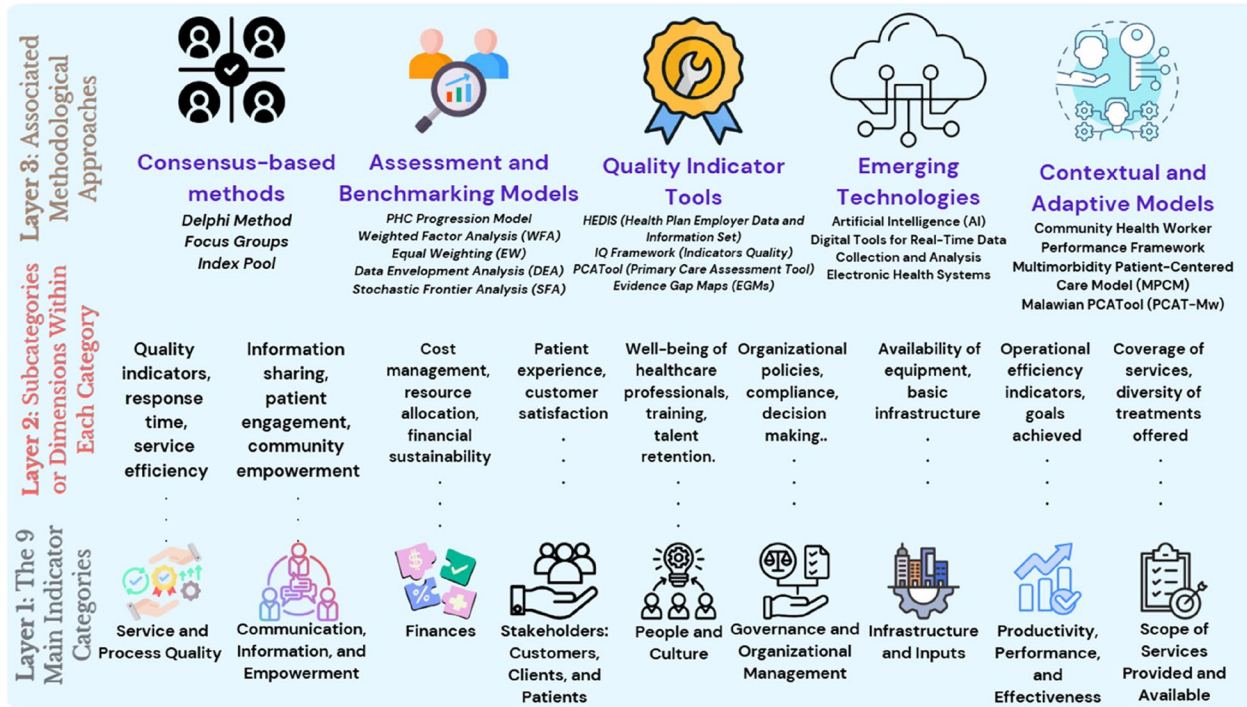
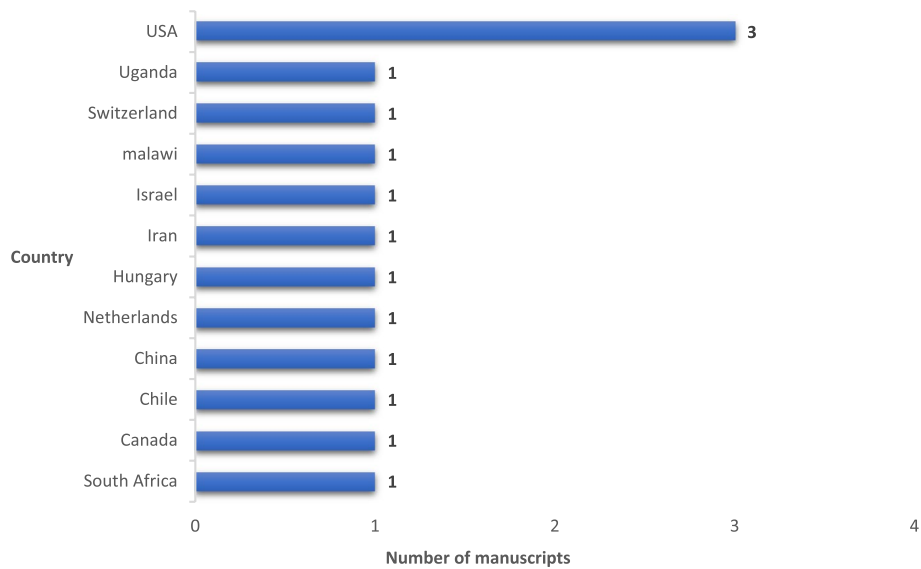


Fig. 3 Framework of Performance Measurement Systems (PMS) in Primary Healthcare, based on studies included in the systematic review. The framework is structured into three layers: (1) The nine main categories of indicators identified in the review (Layer 1), (2) The subcategories or specific dimensions associated with each category (Layer 2), and (3) The methodological approaches employed in the analyzed studies (Layer 3). This hierarchical visualization illustrates the interconnections between categories, dimensions, and methodologies, highlighting their role in addressing operational, contextual, and technological challenges in primary healthcare systems

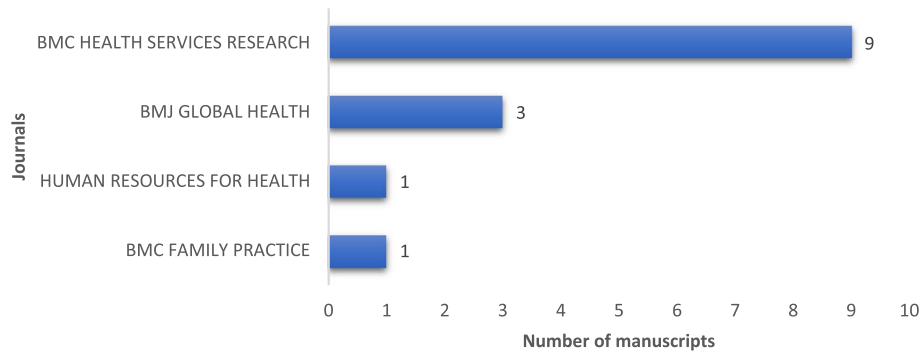
According to this systematic review, the years with the highest number of publications on performance measurement systems in primary healthcare were 2019 and 2022, with 4 and 3 publications, respectively. 2018 and 2020 each had 2 publications, while 2017, 2021, and 2023 (up to the end of June) had 1 publication each (Fig. 6).

Co-occurrence of terms

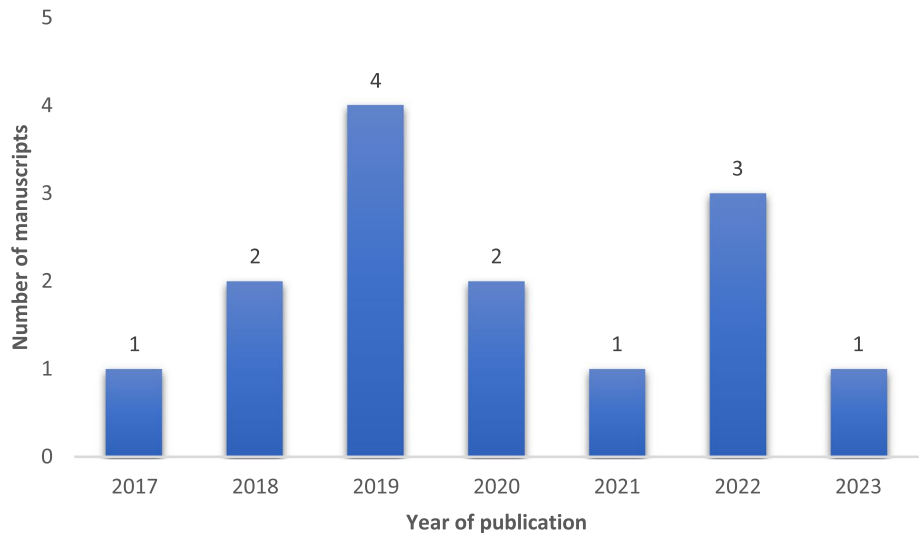
Bibliometric analysis based on the full text of the selected articles allowed the identification of clusters of relevant terms that reflect the main areas of focus in the literature on performance measurement in primary health care (co-occurrence of terms). Using VOSviewer 2020



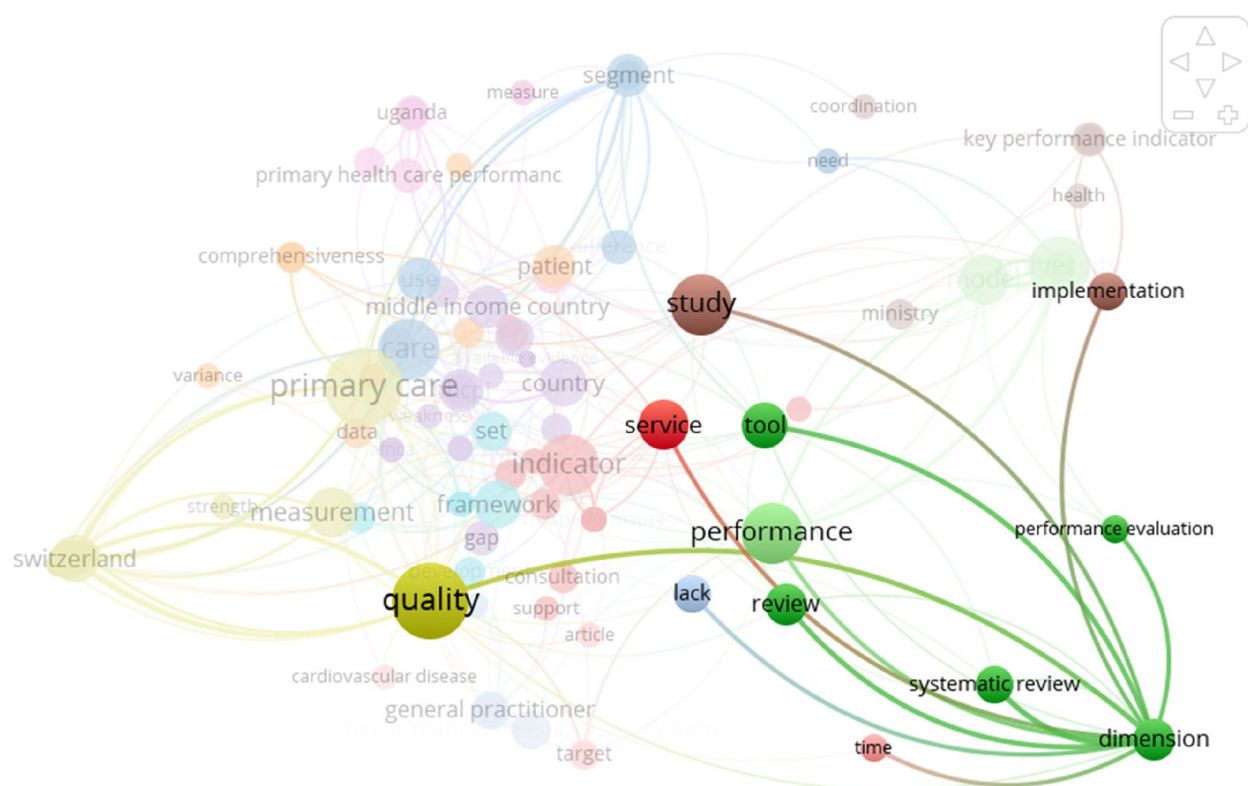
**Fig. 4** Number of manuscripts by country where the research took place or corresponding author’s country



**Fig. 5** Number of manuscripts per publication journal



**Fig. 6** Number of manuscripts by year of publication of the manuscript



**Fig. 7** Network visualization of term co-occurrence in performance measurement systems

[64] (<https://www.vosviewer.com/>), it was possible to visualize the most frequently used terms and their connections, grouped into thematic clusters. Excerpts from full-text articles are available in manuscript appendices. Cluster 1 focuses on terms related to the implementation of performance measurement systems, such as “Balanced Scorecard” and “framework”. They are concentrated in a single term in Fig. 7, Dimensions. This cluster reflects studies that explore the application of standardized methodologies and frameworks to assess organizational performance in primary care.

Cluster 2 (Fig. 8) encompasses themes related to equity and access, highlighting terms such as “access” and “health care costs”. They are concentrated in the Tracking dimension. This cluster suggests a focus on social determinants of health and the assessment of costs associated with access to health services.

Cluster 3 (Fig. 9) highlights terms related to continuity and coordination of care, such as “continuity” and “coordination.” They are concentrated in two poles: comprehensiveness and coordination. This grouping reflects the emphasis on improving integration and continuity of care in fragmented health systems.

The bibliometric analysis reveals strong connections between terms related to “continuity of care” and

“coordination,” reflecting the interdependence of these dimensions in primary healthcare performance. “Balanced Scorecard” emerged as a central term, highlighting its relevance as a widely used tool for implementing and evaluating performance measurement systems. The term co-occurrence analysis also uncovered thematic evolution over time. More recent studies (2021–2023) emphasized advances in the use of digital systems and artificial intelligence to support performance measurement, whereas earlier studies focused more on traditional methods, such as the Delphi approach. These findings underscore the need to align performance measurement systems with local realities, integrating social and operational factors. Moreover, the observed connections between access, cost, and continuity reinforce the importance of adopting a holistic approach to measuring performance in primary healthcare.

## Discussions

This study conducted a systematic literature review with a limited focus on performance measurement systems in primary healthcare (PHC). Among the pre-selected articles, several authors addressed performance measurements closely aligned with formal systems [65–74]. However, only a few studies demonstrated application



for evaluating PHC performance measurement systems. Its emphasis on heterogeneity and adaptability offers valuable insights for tailoring systems to diverse regional and operational contexts, paving the way for more effective and sustainable implementations.

## Gaps and limitations of manuscripts

The 14 analyzed articles highlighted significant challenges in post-implementation evaluation of performance measurement systems at PHC facilities and among professionals, such as general practitioners. This reflects a lack of evidence on the tracking of indicators over time across both infrastructure and professional practice. Moreover, none of the studies compared systems of similar scope and structure across different locations which limits the generalizability and replicability of the findings. The absence of continuous validation, as evidenced in studies by Barbazza et al. [60] and Peled et al. [56], further undermines the consistency of results. Compared to previous reviews, such as those by Prates et al. [40] and Gartner and Lemaire [41], this study goes further by addressing not only the theoretical constructs of performance measurement, but also their practical applications in diverse primary healthcare settings. While previous works focused predominantly on specific regions or

By synthesizing existing knowledge, this systematic review advances the field with a diagnostic framework



Aligned with the research question, this review explored how performance measurement systems address key challenges in primary healthcare, including the integration of emerging technologies, regional adaptability, and methodological robustness. The findings highlight a clear evolution in the methodologies employed, with traditional approaches, such as the Delphi method, remaining prevalent in earlier studies. However, more recent research (2021–2023), such as Ruan et al. [39] and Varela et al. [57], demonstrates an increased reliance on digital technologies and artificial intelligence for performance measurement. These advancements indicate that emerging tools have the potential to address operational and methodological limitations, offering more comprehensive and adaptive solutions for primary healthcare settings.

Studies such as Rashidian et al. [42] highlighted that sites with lower financial inputs performed better than large universities with greater financial resources. This underscores the need for strategies tailored to specific performance conditions [78]. Similarly, Bresick et al. [52] argued that the underuse of validated instruments remains a critical issue decades after the Alma Ata Declaration. The bibliometric analysis revealed that topics such as "Delphi," "Balanced Scorecard," and "artificial intelligence" emerged as central in recent studies. However, areas like "Productivity" and "Effectiveness" remain underrepresented, suggesting challenges in practically implementing these dimensions.

### Practical implications

The findings of this systematic review underscore the critical importance of aligning performance measurement systems with the unique realities and challenges of local contexts in primary healthcare. Effective performance measurement requires a nuanced approach that incorporates social, operational, and technological factors to ensure meaningful outcomes. By tailoring systems to the specific needs of each region or facility, decision-makers can create frameworks that are not only adaptive but also capable of driving tangible improvements in healthcare delivery. The integration of advanced technologies, Driven by the pandemic [79], such as digital health tools and artificial intelligence, presents opportunities to address existing gaps in data collection, analysis, and monitoring. These tools can enhance the accuracy and comprehensiveness of performance evaluations, facilitating more informed decision-making processes. However, the findings also highlight the need for robust training programs for healthcare professionals, ensuring they can effectively utilize these technologies and integrate them into their workflows.

Furthermore, the underrepresentation of dimensions such as "Finances" and "Productivity, Performance, and Effectiveness" suggests a pressing need to develop more comprehensive indicators in these areas. By addressing these gaps, performance measurement systems can provide a more holistic view of healthcare operations, linking patient outcomes with operational efficiency and cost-effectiveness. Finally, continuous validation and periodic updates to these systems are essential. Such practices ensure that performance measurement frameworks remain relevant in the face of evolving healthcare demands, technological advancements, and socio-economic changes. By emphasizing adaptability and regional specificity, performance measurement systems can serve as powerful tools for improving the quality, accessibility, and sustainability of primary healthcare worldwide.

Based on the findings of this review, the dimensions 'Service and Process Quality' and 'Communication, Information, and Empowerment' emerge as priority areas for PMS promotion. These dimensions directly influence patient outcomes and operational efficiency. To adapt these dimensions to local realities, mechanisms such as the use of digital health tools, real-time data collection platforms, and training programs for healthcare professionals are recommended. Additionally, integrating culturally sensitive methodologies, such as community-based participatory approaches, can further enhance their applicability in diverse settings.

### Study limitations

The authors identified certain limitations that should be reported due to their potential impact on the

interpretation of the research findings and data. Despite the large number of articles surveyed, only fourteen studies were classified for inclusion in the systematic review, which may be considered insufficient for a more in-depth analysis. The study conducted by Peled, Porath, & Wilf-Miron [56] did not clearly indicate which indicators were constructed or adapted. Although this article developed a performance measurement system and was applied in primary health care, it met the inclusion criteria; however, it was not possible to quantify or analyze which KPIs were studied and implemented by the authors. Grey literature documents were not searched due to the criteria for inclusion of peer-reviewed articles. This may affect a broader understanding of the extent of performance measurement system applications in the literature. Introducing and discussing some of these documents in more depth was considered to mitigate the lack of this information.

While methodologies such as the Balanced Scorecard and PHC Progression Model have demonstrated strong adaptability and effectiveness across various settings, others have faced limitations. For instance, the Evidence Gap Maps (EGMs), though valuable in identifying research gaps, were underutilized in low-resource settings. Similarly, the application of Equal Weighting (EW) in ranking performance indicators has been criticized for oversimplifying complex healthcare dimensions. These findings underline the need for continuous validation and refinement of PMS frameworks to ensure their applicability across diverse contexts.

### Conclusions

Performance Measurement Systems in primary care, though scarce, have been studied and improved in recent years. The development of the systematic literature review process with a methodology that emphasizes heterogeneity, diversification, reliability, and novelty of the works reflected a diagnosis with a five-year parameter of the best implemented PMS models around the world. The findings, for the most part, differ from each other in study methodology and practice, constructing frameworks according to the needs of each country, including those with medium and low income. The models from each research group showed that this diagnosis needs to be monitored over time and be easily implementable in primary health care. Time series are suggested to track the previously created indicators. The participatory use of primary care workforce has become crucial for the methodological progression of indicator development. Future work is important in the context of the effectiveness of the constructed systems, as this step was limited in most of the works included in the review criteria. The

ease of application and understanding of performance measurement systems in highly vulnerable countries can be another avenue of study through current discussions on primary care.

**Appendix 1**  
**Detailed search strategies**

The following table provides the detailed search strategies applied to each database during the systematic review. These strategies include keywords, Boolean operators, and database-specific adaptations to ensure comprehensive retrieval of relevant studies.

**PubMed**

- "performance measurement systems"[MeSH Terms] OR "performance indicators"[All Fields]
- AND "primary healthcare"[MeSH Terms] OR "primary care"[All Fields]
- AND ("2016"[Date—Publication]: "2023"[Date—Publication])

**Scopus**

- TITLE-ABS-KEY ("performance measurement systems" OR "performance indicators")
- AND ("primary healthcare" OR "primary care")
- AND PUBYEAR > 2015 AND PUBYEAR < 2024

**Web of Science**

- TS=("performance measurement systems" OR "performance indicators")
- AND TS=("primary healthcare" OR "primary care")
- AND PY = (2016-2023)

**SciELO**

- "performance measurement systems" OR "performance indicators"
- AND "primary healthcare" OR "primary care"
- AND ("2016" TO "2023")

**Springer**

- ("performance measurement systems" OR "performance indicators")
- AND ("primary healthcare" OR "primary care")
- AND PUBYEAR BETWEEN 2016 AND 2023

All search strategies were executed between May 5, 2023, and July 7, 2023.

**Appendix 2**  
**Check List PRISMA**

Section/Topic	Item No.	Checklist Item	Reported on Page No.
Title	1	Identify the report as a systematic review.	Page 1
Abstract	2	Provide a structured summary including background, objectives, data sources, eligibility criteria, study appraisal, synthesis methods, results, limitations, conclusions, and implications of key findings.	Page 1
Introduction	3	Describe the rationale for the review.	Page 1 and 2
Introduction	4	Provide an explicit statement of the objectives, including questions and predefined eligibility criteria.	Page 1 and 2
Methods	5	Specify inclusion and exclusion criteria for the study selection.	Page 8
Methods	6	Describe information sources and search strategy.	Page 8 and 9
Methods	7	Specify methods for data collection and extraction.	Page 9 and 10
Methods	8	List and define all variables for which data were sought.	Page 11
Methods	9	Specify methods used for assessing the risk of bias of individual studies.	Page 9 and 10
Methods	10	Specify methods for quantitative synthesis or qualitative analysis.	Page 11 e 12
Results	11	Summarize the characteristics of included studies.	Page 12, 13 and 14
Results	12	Present results for each synthesis, including quantitative or qualitative findings.	Page 14, 15, 16, 17, 18, 19 and 20
Results	13	Describe risk of bias across studies.	Page 11
Discussion	14	Provide a summary of the main findings.	Page 20 and 21
Discussion	15	Discuss the limitations of the evidence and the review process.	Page 21 and 22
Discussion	16	Discuss implications of the findings for practice, policy, and future research.	Page 21, 22 and 23
Other Information	17	State if a protocol exists, including registration details (e.g., PROSPERO).	Page 6
Other Information	18	Include a funding statement or conflicts of interest.	Page 25

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**Authors' contributions**  
CJMS performed the data collection, most of the writing and analysis of the information. ASB collected and edited most of the data, as well as reviewing the writing. AMOS authored the analyzes and revised the English. All authors read and approved the final manuscript.

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**Data availability**  
The datasets generated and/or analysed during the current study are available in the DATA BASE SMD LINK repositor, <https://abrir.link/SMD-PHC>. Access must be through a formal request to the authors.

**Declarations**

**Ethics approval and consent to participate**  
Research project approved by the ethics committee of the Federal University of Bahia under the guidelines of Circular Letter No. 209/2013 CONEP/CNS/GB/MS and internal regulations number 04/2019 and 05/2022.

**Consent for publication**  
Not applicable.

**Competing interests**  
The authors declare no competing interests.

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