

# BMJ Open Impact of quality routine health data utilisation on health service delivery outcomes in low-income and middle-income countries: a systematic review protocol

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## ABSTRACT

**Background** Evidence-based decision-making in healthcare relies heavily on routine health information. However, in many low-income and middle-income countries (LMICs), concerns persist regarding the use of quality routine health data for health service delivery. Moreover, no systematic synthesis currently exists on how the use of quality data influences health service delivery in these settings. This systematic review aims to address this gap by consolidating existing evidence on the utilisation of quality routine health data and its impact on health service delivery in LMICs.

**Methods and analysis** This review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses framework for identification, screening and reporting of studies. We will develop our keywords and search strategy using a public involvement approach, generative artificial intelligence (AI) and a combination of keywords and Boolean operators in relevant databases. Studies will be retrieved from CENTRAL, PubMed, Science Citation Index and Scopus. The review will include studies that were published from 2000 to 2025 and that determined the impact of quality routine health data utilisation on health service delivery. It will include both experimental and observational study designs. Two independent authors will screen all titles, abstracts and full-text data. A third reviewer will resolve any disagreements that may arise between the two reviewers. The primary outcome of interest is the impact of the use of quality routine health data on health service delivery. Assessment of risk of bias of all relevant studies will be evaluated using the Joanna Briggs Institute Critical Appraisal Checklist for Systematic Reviews and Research Syntheses tool. The narrative synthesis approach and thematic analysis will be employed for the review.

**Ethics and dissemination** No institutional ethics approval will be obtained for this study. However, during the review process, only articles published in peer-reviewed journals/databases will be included in this review. Further, all studies to be included in the review should have obtained ethical approval from relevant institutional review boards. The findings from the systematic review will be disseminated through technical reports, conferences,

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The use of the Performance of Routine Information System Management framework allows for systematic interpretation of organisational, technical and behavioural determinants influencing health data quality in service delivery.
- ⇒ Searches across multiple major databases (CENTRAL, PubMed, Science Citation Index, Scopus) will ensure broad inclusion of relevant global evidence.
- ⇒ Engagement of experts and stakeholders at the design stage will enhance relevance, credibility and potential policy impact of the review findings.
- ⇒ Restriction of the review to English-language publications only is a significant limitation that may introduce language bias and exclude relevant evidence from non-English speaking low-income and middle-income countries, particularly those in francophone and lusophone Africa, Latin America and Asia.
- ⇒ The time frame of 2000–2025 is appropriate given the rationale provided, but it also means that included studies will span a period of rapid technological change in health information systems.

academic publications, LinkedIn and all relevant platforms available to the researchers.

**PROSPERO registration number** CRD420251131622.

## INTRODUCTION

A health information system (HIS) is a core component of the World Health Organisation's (WHO) six building blocks of a health system.<sup>1</sup> It plays a critical role in supporting evidence-based decision-making and guides interventions that enhance health service delivery and overall system performance.<sup>2</sup> Routine health information (RHI), generated daily by healthcare providers, forms the backbone of these systems, enabling the monitoring of health status, planning and



allocation of resources, supervision of health workers and improvement of service quality.<sup>2,3</sup> A well-functioning HIS ensures systematic collection, analysis, dissemination and utilisation of reliable and relevant data on health determinants, system performance and outcomes.<sup>1</sup>

The quality of routine health data is therefore central to advancing health system goals, including responsiveness, equity, efficiency and improved health outcomes.<sup>1,2</sup> Effective utilisation of complete, consistent, accurate and timely data allows policymakers and practitioners to identify gaps, design targeted interventions and monitor progress towards national and global goals such as Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs). However, in many low-income and middle-income countries (LMICs), the use of quality routine health data is minimal.<sup>4,5</sup> Despite its vitality to the health systems and, in particular, service delivery, the data recorded in most LMICs' HIS are also fraught with several challenges, including but not limited to data quality.<sup>6</sup>

For many years, studies conducted in LMICs have consistently reported low quality of RHI and underutilisation.<sup>7</sup> For instance, in Ethiopia, utilisation of quality routine health data was reported to be 45.8%.<sup>8</sup> Data are often incomplete, inaccurate, untimely or inconsistently reported, reducing their utility for evidence-based planning.<sup>9</sup> Even when high-quality data are available, utilisation is constrained by organisational, behavioural barriers, technical skills,<sup>10,11</sup> poor attitudes towards data use, inadequate feedback mechanisms and competing political or donor priorities.<sup>12,13</sup> Furthermore, while governments in these settings have shown increasing interest in strengthening health information systems,<sup>12</sup> persistent challenges such as fragmented systems, weak digitalisation, limited technical capacity and inadequate culture of data use continue to undermine these efforts.<sup>8,14</sup>

To date, no systematic review has synthesised the available evidence on how the utilisation of quality routine health data influences health service delivery in LMICs. The only recent review in this area focused on interventions to improve routine health data quality at the district level,<sup>9</sup> leaving out the regional and national levels. A substantial number of studies have examined routine health data, including primarily assessing the quality,<sup>6</sup> developing strategies and interventions to improve the quality,<sup>15</sup> and utilisation.<sup>16</sup> Limited attention has been given to how utilisation of quality routine health data influences health service delivery. Where such evidence exists, it remains fragmented and has not been systematically synthesised, leaving a critical gap in the literature. This lack of evidence synthesis makes it challenging for policymakers, practitioners and researchers to draw comprehensive conclusions about the larger implications of quality routine health data utilisation for health service delivery in LMICs. In effect, there is a need to conduct a systematic review to consolidate available evidences that exist and provide robust insights to inform health planning, policy decisions and service delivery.

## Research questions

### Main research question

- What is the impact of quality routine health data utilisation on health service delivery in LMICs?

### Specific research questions

1. To what extent does utilisation of quality routine health data contribute to improvement in health service delivery in LMICs?
2. What are the main barriers and facilitators to effective utilisation of quality routine health data for service delivery in LMICs?

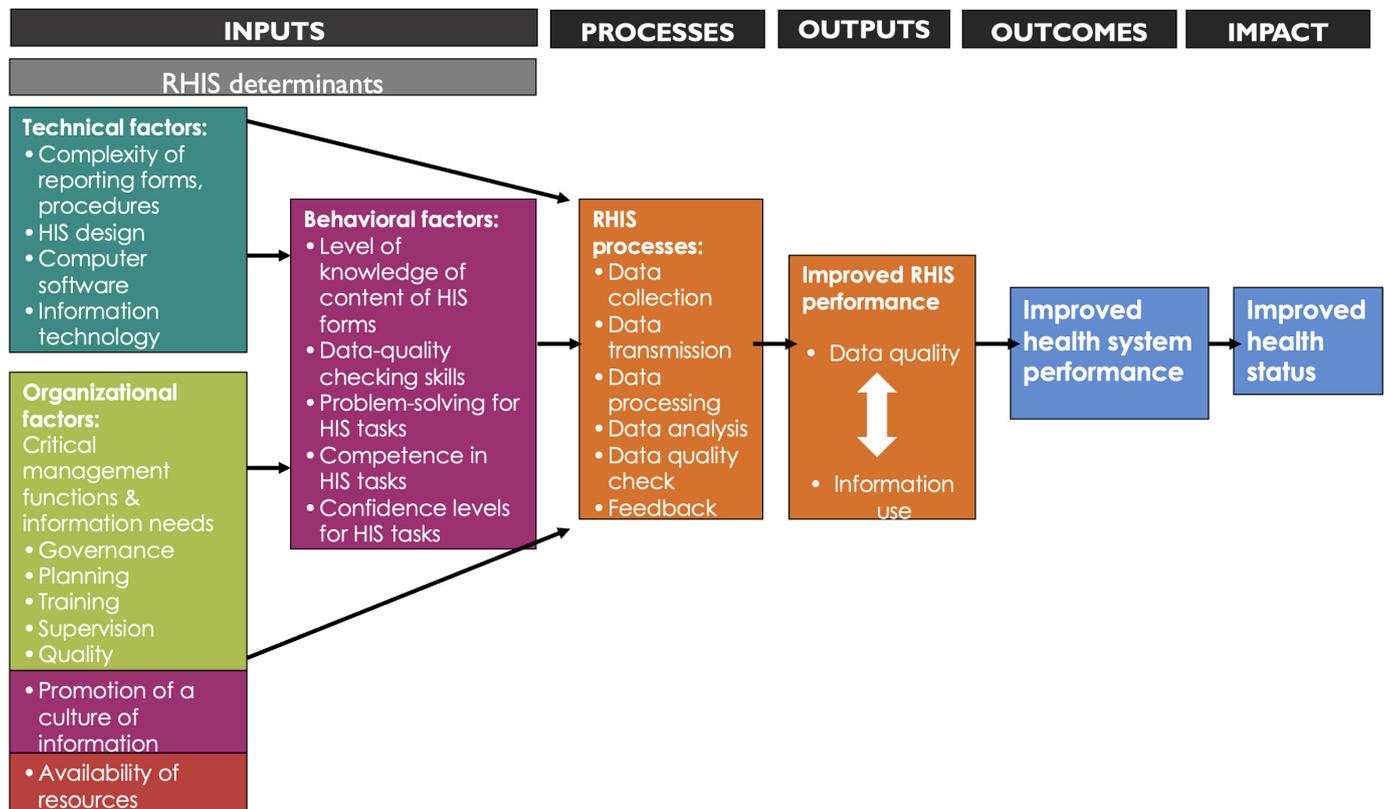
## Performance of Routine Information System Management framework

The Performance of Routine Information System Management (PRISM) Framework (figure 1) is a global tool for evaluating a RHI system's (RHIS) timeliness and dependability, using evidence to support judgements, and identifying any weaknesses that need to be addressed. This framework is highly relevant to our review. It incorporates organisational, technical and behavioural determinants of performance to strengthen and evaluate RHISs.<sup>10</sup> The approach of this framework aligns with our focus on quality routine health data utilisation in health service delivery. The RHIS processes of data collection, transmission, processing and analysis all feed into a systematic assessment of how quality routine health data influences service delivery.

The PRISM framework provides a clear definition of RHIS performance, operationalised as improved data quality and continuous use of information. This is in line with the outcomes of the review, where the use of quality routine health data to improve service delivery is the main indicator. Second, it also outlines the causal pathways linking technical capacity (eg, tools and reporting systems), organisational support (eg, supervision, governance, resources), and behavioural factors (eg, motivation, competence and data use culture) to RHIS performance. This provides us with a relevant guide for interpreting the diverse evidence across LMICs. We will also be able to identify the mechanisms through which data impacts service delivery. Finally, the framework's emphasis on linking RHIS performance to broader health system performance and service delivery provides a conceptual foundation for situating the findings of this review.

## METHODS

This review will adopt the systematic review approach, guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement.<sup>17</sup> We will follow the PRISMA tool to guide our search, screening, selecting, extracting and reporting data from the included studies. This review protocol has been registered in PROSPERO (ID: CRD420251131622), an international database for systematic review protocols.



**Figure 1** PRISM (Performance of Routine Information System Management) framework. HIS, health information system; RHI, Routine Health Information System.

### Patient and public involvement

We adopted the patient and public involvement approach to plan and develop aspects of the study. The review included the public to ensure that the findings and approach are relevant and meaningful, and important to the public. We actively engaged the public, including health systems strengthening experts and researchers. Specifically, for this review, we sought the audience and insights of experts in the field to assist with the refinement of our key questions and development of search terms and keywords.

The Advisory Committee (experts in systematic reviews and health systems research) for this review advised on setting clear research questions and developing clear eligibility criteria, as well as the keywords and terms that informed the development of the protocol. Their inputs on the review questions and the keywords will help with comprehensive search and selection of relevant studies. Lastly, to ensure a wide dissemination of the findings from this review, the findings will be presented at workshops and conferences. These platforms will serve as a means to share the research outcomes with a broader audience (the public). The use of this approach in this review is scarce in LMIC settings and the area of quality routine health data and health service delivery,<sup>18</sup> making this review unique.

### Eligibility criteria

The eligibility criteria will be developed using the Population, Intervention, Comparator, Outcomes and Study design (PICOS) framework, as detailed below.

### Population (P)

This review will include primary studies conducted in LMICs focusing on health service delivery at the primary care level, secondary and tertiary levels, including preventive and curative care. Studies that were not conducted in LMICs will not be considered.

### Intervention (I)

Studies that look at the use of quality routine health data on health service delivery will be included. Studies may have examined either one, all or some of the aspects of data quality dimensions (completeness, accuracy, timeliness and consistency). Potential studies that do not report on data quality using the WHO definition of data quality or assess data quality subjectively will be excluded.<sup>19</sup>

### Comparison/comparator (C)

Included comparators for this review will be studies with low-quality routine health data (incomplete, delayed, inconsistent, inaccurate).

### Outcomes (O)

The primary outcome of this review is health service delivery at all levels of healthcare provision.

### Study design (S)

The review will focus on reviewing primary studies/evidence on quality routine health data utilisation and its impact on health service delivery, with a focus on all



healthcare services in LMICs. Specifically, this study will review findings from all primary studies, including but not limited to: Randomised-controlled trials, Quasi-experimental studies, Cohort studies, Cross-sectional studies, Case-control studies, Case series, Case studies. Studies that have not been peer-reviewed but are published online will be excluded. Commentaries and study protocols will be excluded from this study.

### Language and time frame

Only studies published in the English language from 2000 to 2025 will be included in this review. Additionally, studies that are not published in the English language or published within the specified time frame will not be included in the review. Lastly, studies that are not available for download or have to be purchased will be excluded from the review. The Millennium Development Goals were launched in 2000, and it was around that period that most LMICs' health systems started to reform and build routine health database platforms, such as the district health information management system, through global investments and health system reforms. Evidence before 2000 will dominantly be on non-standardised paper-based systems, which are different from the current HIS, and hence will be difficult to compare. These restrictions ensure that evidence included in this review is policy relevant and methodologically comparable.

### Data sources and search terms

The data for this review will be collected from primary studies using the following databases: CENTRAL - Cochrane Central Register of Controlled Trials; PubMed; SCI-Science Citation Index; and Scopus. Additionally, backwards and forwards citation searches will be performed using Citation Chaser.<sup>20</sup> These sources will provide comprehensive coverage of all relevant articles to be included in this review. The key search and MESH terms for this review will include Data Quality (completeness, timeliness, consistency and accuracy) (table 1), Health Data, Routine Health Data, Health Service Delivery, Quality Routine Health Data and LMICs.

### Keywords and search strategy

The detailed search strategy for this review will be developed by generating search strings using the keywords and the Boolean operators (“OR”, “AND”, “NOT”). We will use the same keywords across all agreed databases, which will help identify and retrieve relevant articles for our review. The search strings will be developed and tested in the various databases. Our initial search strings/strategies were developed from the MeSH Advanced Search Builder in PubMed, the Advanced Search interface in Scopus and Artificial Intelligence (AI) for other databases.

### PubMed search strategy

((“data quality”[tiab] OR completeness[tiab] OR timeliness[tiab] OR consistency[tiab] OR accuracy[tiab]) AND (“health data”[tiab] OR “routine health data”[tiab] OR “routine health information”[tiab] OR “health

**Table 1** Operational definitions

| Terms  | Operational definitions  |
|--|--|
| Quality routine health data                    | Quality data are widely defined as data that is accurate, complete, timely and consistent. <sup>19</sup><br>Data completeness: This refers to health facilities measuring and capturing all values and entities which are supposed to be recorded and reported.<br>Data timeliness: refers to the timely submission of health data on or before the prespecified deadline.<br>Data accuracy: Routine health data generated from health facilities should reflect the actual level of service delivery that was conducted in the health facility.<br>Data consistency: The degree to which data is uniform, reliable and coherent across different sources, systems or periods. In health information systems, it means that data values should not conflict with each other and should remain stable when reported at different times or across different platforms. |
| Health service delivery                        | Good health services are those which deliver effective, safe, quality personal and non-personal health interventions to those who need them, when and where needed, with minimum waste of resources. This review will consider health service delivery at all levels of healthcare systems.  |
| Data utilisation                               | Refers to the application of routine health data to inform and guide service delivery, planning and policymaking, programme planning and management, advocacy and resource allocation.   |
| LMICs  | Defined as countries with lower-middle-income economies are those with a GNI per capita between US\$1136. <sup>31</sup>  |
| LMICs, low-income and middle-income countries. |  |

information system\*[(tiab] OR RHIS[tiab]) AND (utilization[tiab] OR use[tiab] OR “data use”[tiab] OR “information use”[tiab] OR “evidence use”[tiab] OR “data-driven decision\*”[tiab] OR “decision making”[-tiab]) AND (“health service delivery”[tiab] OR UHC[-tiab] OR “primary health care”[tiab] OR PHC[tiab] OR “service delivery”[tiab] OR “health service\*”[tiab]) AND (“low income”[tiab] OR “middle income”[tiab] OR LMIC\*[tiab] OR “developing countr\*”[tiab]))

### Scopus search strategy

(TITLE-ABS-KEY(“data quality” OR “health data quality” OR “data completeness” OR “data timeliness” OR “data consistency” OR “data accuracy” OR “information quality” OR qualit\*) AND TITLE-ABS-KEY(“health data” OR “routine health data” OR “routine data” OR “routine health information” OR “health information system\*” OR HIS OR RHIS OR “health information” OR “health record\*” OR “medical data” OR “clinical

data” OR “administrative data” OR “surveillance data”) AND TITLE-ABS-KEY(uti?ation OR use OR “data use” OR “information use” OR “evidence use” OR “use of data” OR “data-driven decision\*” OR “decision making” OR “decision-making”) AND TITLE-ABS-KEY(“health service delivery” OR “universal healthcare” OR UHC OR “primary health care” OR “primary healthcare” OR PHC OR “health service\*” OR “service delivery” OR “health-care delivery” OR “health system\*“) AND TITLE-ABS-KEY(“low income countr\*” OR “middle income countr\*” OR “low and middle income” OR LMIC\* OR “developing countr\*” OR “resource limited” OR “resource constrained” OR “global south”).

### Study selection and screening

References and citation files of the selected primary studies from our initial search will be imported into the Rayyan software for data preparation and screening. Following this, duplicate studies will be removed. Further, the initial title-abstract screening will be done in the Rayyan software. This will be done by skimming and scanning through the titles and abstracts of each of the imported references to check if the title or the abstract presents methods or findings on the impact of quality routine health data utilisation on service delivery in LMICs. This process will be handled independently by two groups of three investigators each (summing up to six investigators), leaving the last investigator to resolve discrepancies where necessary. A consensus meeting will be convened to deliberate and resolve the disagreement, if any. Included studies from the initial title-abstract screening stage will be imported for full-text screening using the Rayyan software. At this stage, the included references will be sought after for their full text in PDF versions. This will enable the team to have a critical look at all aspects of each included review. Here again, three investigators will review the included studies independently, with the last investigator available to resolve discrepancies and check for quality throughout the screening process. The full-text screening will focus on whether or not the review fits our inclusion criteria. At this stage, the study, the population, exposures, outcomes, location and publication date of the included reviews will be assessed. Studies that are eligible based on our criteria will be included and forwarded for data extraction and charting.

### Data extraction and charting

The relevant information of the papers identified will be extracted and charted using a pre-populated Microsoft Excel spreadsheet. Key information to be extracted from the included studies will include study identification (eg, names of authors, year of publication, study location), study methods (eg, purpose/aim of the study, study design), study intervention (eg, use of poor/high data quality measures and scales/tools and framework), and outcomes (eg, health service delivery, levels of primary healthcare, type of health system) other findings (eg, barriers and facilitators to use of quality routine

health data, interventions and strategies implemented to improve quality data utilisation). The extraction of the necessary information will be piloted by two independent investigators using five of the included studies. This is to ensure that relevant information is captured and that resources are not wasted on extracting data not required. Additionally, it is essential to ensure consistency between the researchers’ charting of the information. To ensure that the data extraction is devoid of bias, unreliability and human errors, two independent researchers will perform this exercise, namely: PA and CSF. Consolidation of extracted data will be done by two other investigators. The extracted data will be reviewed by the advisory committee, and concerns and issues raised will be addressed by all investigators.

### Assessment of risk of bias

Risk of bias for included studies will be assessed using a critical appraisal tool: the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Systematic Reviews and Research Syntheses. This tool will be employed because it allows for the methodological assessment of the different categories of studies with diverse approaches and designs, which is the case for this review. The tool allows assessment of rigour and the degree to which studies have mitigated potential bias and quality from the study’s conception, execution and analysis.<sup>21</sup> For each study, three of the reviewers will independently assess the study according to the 11 questions in the JBI checklist, and any disagreements will be resolved by discussion or a fourth reviewer. The appraisal will consider assessing the quality of the study design, the methods, approaches and the quality of findings from the included studies. Using the appraisal checklists, each item in the checklist will be marked yes if it meets the criteria and no if it does not meet the criteria. Unclear assessments will be marked as insufficient information or not applicable. Based on these assessments, each study will be given an overall quality score of low, medium or high, with any disagreements resolved through discussion.

The risk of assessment resulting from missing results will be assessed using the JBI Critical Appraisal Checklists appropriate to the study design. Three reviewers will independently assess each study for risks of selective outcome reporting, unpublished findings or reporting bias. Any disagreements will be resolved by a fourth reviewer or discussion. The certainty of the evidence will be assessed using the JBI approach. For quantitative evidence, the JBI methodology evaluates the overall certainty of findings across studies by considering domains such as risk of bias, consistency, directness, precision and publication bias. Each outcome will be graded as high, moderate, low or very low certainty. For qualitative evidence, the JBI ConQual approach will be applied, assessing dependability and credibility to determine the confidence in synthesised findings. Three reviewers will conduct the assessments independently, with disagreements resolved through discussion or by a fourth reviewer. The results



will be presented in summary tables to provide a transparent account of the certainty or confidence in the body of evidence.

### Data synthesis and analysis

Extracted data will be examined and synthesised using a narrative review approach to identify recurring themes/findings and relationships, and quality. The use of the narrative synthesis approach will help use textual descriptions and written summaries to consolidate and present findings across multiple studies.<sup>22</sup> This approach is suitable because differences are anticipated in study designs, settings, measures, quality data use and health service delivery outcomes. Each study will first be described in text, including its setting, design, population, how the use of quality routine health data was measured, the various service delivery outcomes and the reported relationship between use of quality routine health data and service delivery outcomes (main findings). Patterns across studies will be explored to identify common findings and relationships between the use of quality routine health data and service delivery outcomes. Attention will be paid to whether the use of high-quality routine health data is consistently linked to improved service delivery. Findings from studies with stronger methodological quality will be considered separately from those with poorer quality to assess the robustness of the evidence. Finally, gaps in the evidence will be identified, and an overall summary of the strength and consistency of findings will be provided. This process of review will be led by CSF, assisted by PA and reviewed by HA. These team members have undergone intensive workshops on evidence review and have experience with narrative reviews in evidence synthesis.

### ETHICS AND DISSEMINATION

This review will not require ethical clearance because it does not involve human participants or primary data collection. Nevertheless, all studies to be included in the review should obtain ethical approval from relevant institutional review boards and have been conducted in accordance with approved ethical protocol. Findings from this review will be disseminated through conference presentations, reports to relevant health stakeholders, journals and relevant social media platforms.

### DISCUSSION

We have chosen to use the PRISM framework as it examines health information systems from diverse perspectives, including the organisational, technical and behavioural factors, rather than just one aspect. Prior studies using the PRISM framework have shown that these factors influence data quality and data use.<sup>23</sup> By using PRISM, we are treating utilisation of quality routine health data as a complex system rather than just a technical issue. Further, we involved the public and relevant stakeholders from the start to shape our questions, keyword development and

search strategy. This approach is recognised and used in previous studies.<sup>24</sup> The PPI approach positions findings of studies to influence policy and practice.<sup>25 26</sup> To ensure that we find and use quality and relevant evidence in our review and reduce selection bias, we will search multiple bibliographic databases. This approach has been used in other similar studies.<sup>27</sup>

Nonetheless, our review is limited by restricting inclusion to only articles written and published in English and those that have free access. This may limit our review from including other relevant evidence due to language and accessibility. This is particularly important for LMIC-focused reviews since significant health systems research is published in French, Portuguese, Spanish and Chinese, especially in francophone Africa, lusophone Africa and Latin America.<sup>28</sup> Other future work could consider addressing this limitation by forming a multi-lingual team to address this question. Our timeframe (2000–2025) aligns with major transitions in RHI systems and matches boundaries used in previous RHIS reviews.<sup>29 30</sup> The early 2000s saw increased investment in standardised RHIS and digital platforms like District Health Information Management Systems 2 (DHIS2). However, this long timeframe means we will be looking at very different systems. Early studies often examined paper-based systems, while recent ones focus on digital platforms and data dashboards.

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