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Performance Evaluation of Integrated Health System from the Viewpoint of Health Center Staff

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ABSTRACT

Aims The integrated health system or SIB is an electronic platform designed to record, manage, and integrate health information across healthcare centers. By connecting different service levels, it aims to improve data monitoring, coordination, and service delivery. Given its wide application in primary healthcare, this study aimed to evaluate the performance of the integrated health system from the perspective of staff working in health centers affiliated with Maragheh University of Medical Sciences.

Participants & Methods This qualitative study was conducted in 2024 in health centers under the supervision of Maragheh University of Medical Sciences. Data were collected through semi-structured interviews with 26 key informants, including health workers, healthcare providers, and experienced personnel, selected through purposive sampling. Data analysis was performed using conventional content analysis with MAXQDA 10 software.

Findings We identified five main themes and nine sub-themes, including system access challenges (internet disruptions and geographical limitations), infrastructural and technical issues (system errors, design weaknesses, limited system development, and support problems), human and occupational impacts (workload and ergonomic challenges), information management issues (data entry, maintenance, processing, and retrieval difficulties), and potential benefits, such as increased data accuracy and reduced errors.

Conclusion The integrated health system plays a significant role in improving the quality of healthcare services through enhanced information management and integration of health-related data.

Keywords Integrated Health System; Electronic Health Record; Qualitative Study; Information Systems

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Introduction

In the current era, advancements in management knowledge have made evaluation systems essential in organizations. Every organization requires assessment to understand the quality of its activities, particularly in complex and dynamic environments. Without such systems, implementing the necessary improvements for organizational growth and development would be impossible, which could result in inefficiency and potential organizational failure [1].

Performance is a central topic in all organizational analyses, and attention to organizational performance contributes to the development of organizational theory. Evaluating and measuring performance enhances system intelligence and motivates individuals toward desirable behaviors, playing a key role in formulating and implementing organizational policies [2]. Performance measurement is one of the main management processes, conducted to analyze performance and examine its alignment with organizational goals, thereby facilitating informed decision-making. In recent years, the health and medical situation in many countries, particularly regarding infectious diseases, has improved. This improvement is reflected in indicators, such as life expectancy at birth, disability-adjusted life expectancy, and reduced mortality due to healthcare interventions [3, 4].

However, these improvements have been accompanied by persistent concerns, including the rising prevalence of chronic diseases, inequalities in access to healthcare services, health disparities within and between countries, changes in care quality and safety, mismatches between human resources and healthcare needs, and discrepancies between rising healthcare costs and changes in public expectations [3]. Recent financial and economic crises have heightened concerns about the performance of the healthcare system and the sustainability of its financing, underscoring the government's crucial role in maintaining social cohesion and improving public health [5].

Health information systems are computer-based systems designed to facilitate the management of health and medical information, thereby improving care quality and reducing costs. These systems serve as infrastructure for decision-making and play a crucial role in cost management, quality improvement, and research expansion [6]. Healthcare information systems are designed and implemented to process data, generate information, and create knowledge in primary healthcare. They form the backbone of paperless health service systems and play a key role in integrating service delivery across all providers and consumers [7].

The common objective of health information systems is to meet user needs, conduct epidemiological research, manage health information, and improve care quality. The integrated health system (SIB), as per notification No. 100/298 dated June 26, 2016, by the Ministry of Health, has been deployed in most medical universities and was launched in early October 2016 across the majority of medical sciences universities [8, 9]. This system was established to create a national electronic health record for nearly the entire population, to be used in health centers under all medical universities, supporting primary healthcare, maternal and child health, non-communicable disease risk factors, screening, and patient follow-up. It aims to improve problem-solving, decision-making, and the horizontal and vertical integration of services, enabling the monitoring of primary healthcare system performance and the implementation of health reforms [10-12].

The SIB system collects and records household information and required healthcare services at centers and health bases. These services are provided by over 125,000 users across more than 32,000 service delivery centers. Information systems play a crucial role in optimizing and integrating individual health data, as exemplified by electronic health records [13]. Electronic health systems can play a crucial role in addressing health challenges, enhancing individual health, and reducing mortality by recording health data and histories [14]. Studies in the United Kingdom, the United States, and Canada have demonstrated that investing in electronic health systems, combined with meticulous attention to their processes, can enhance patient outcomes and significantly contribute to managing chronic diseases [15].

A study conducted by the Department of Surgery at the Icahn School of Medicine in New York showed that electronic health systems can significantly reduce hospital mortality rates from hospital-acquired infections, such as bloodstream infections in surgical intensive care units, by enhancing coordination for patient-centered care [16]. The World Health Organization (WHO) defined e-health in 2019 as the cost-effective and secure use of information and communication technologies to support health and related fields, including healthcare services, health monitoring, health literature, education, knowledge, and health-related research [3]. Multiple studies have indicated that electronic health records are among the factors that strengthen and improve the quality of healthcare services, increasing accuracy, reducing costs, and promoting efficiency. One such system in Iran is the SIB electronic health record. Several studies have examined the SIB system, offering strategies for enhancing its performance [17].

The success of health information systems depends on accurate evaluation, as the quality, efficiency, and effectiveness of healthcare provision rely entirely on it [18]. For these systems to succeed, human factors, costs, and time must be taken into consideration.

Success means actual system use and creation of added value for users and managers. It is achieved when the system operates effectively according to planned objectives, and both the project team and users are satisfied with the outcomes [18-20]. Given the complexity of information systems, both success and failure can be observed in various contexts [21]. Approximately 4.6% of healthcare company budgets are allocated to health information systems, and their failure can hurt patients and staff [4]. This study evaluates the performance of the integrated health system (SIB) from the perspective of community health workers and healthcare providers.

Participants and Methods

This qualitative study was conducted on 26 participants, including health workers, healthcare providers, and key informants selected using purposive sampling during 2024 in selected health centers affiliated with Maragheh University of Medical Sciences. Eligibility criteria required participants to have at least two years of work experience and be willing to participate.

Data were gathered through semi-structured interviews guided by an interview protocol developed and validated by supervisors and advisors. Three pilot interviews were conducted to confirm the guide's validity. The interview guide focused on the primary objective of the study: evaluating the performance of the integrated health system (SIB) from the perspective of community health workers and healthcare providers. Its content included demographic information (age, gender, educational degree, work experience, occupation) and questions regarding the advantages and disadvantages of the SIB system, its impact on monitoring, the challenges of the system, and the factors contributing to these challenges.

Interviews were conducted individually and face-to-face after obtaining ethical approval (IR.MARAGHEHPHC.REC.1403.024) and informed consent. Participants were informed about the study objectives and gave verbal consent for audio recording and note-taking. Interviews were scheduled at convenient times and locations for participants. Participation was voluntary, with the right to withdraw at any time. Interviews lasted an average of 45 minutes (range: 30-60 minutes) and continued until data saturation was reached, resulting in a total of 26 interviews.

To ensure rigor, Lincoln and Guba's criteria of credibility, dependability, confirmability, and transferability were applied [19]. Measures to enhance trustworthiness included pilot interviews, appropriate interview duration, continuous comparison of data during analysis, member checking, and peer debriefing. Summaries of findings were shared with participants for validation, and an external expert reviewed the credibility of the data. Interviews were conducted in calm, comfortable environments to facilitate open and honest communication.

Interview recordings were transcribed verbatim and analyzed using conventional qualitative content analysis with the assistance of MAXQDA 10 software. Two researchers independently transcribed and coded the data. Transcripts were repeatedly reviewed to ensure thorough understanding. Codes were extracted line-by-line and grouped into main themes and subthemes. Discrepancies were resolved through consensus during team discussions.

Findings

A total of 26 participants contributed to the study (Table 1). A total of 74 initial codes were extracted from the interview transcripts. After merging conceptually similar codes, 19 secondary codes were developed.

Table 1. Demographic information of the participants (n=26)

Parameters		Frequency (%)
Gender	Female	18 (69)
	Male	8 (31)
Age (year)	30-40	9 (34.6)
	40-50	11 (42.3)
	>50	6 (23.1)
Work experience (year)	1-10	7 (26.9)
	10-20	12 (46.2)
	>20	7 (26.9)
Education	Diploma	3 (11.6)
	Bachelor's degree	20 (76.8)
	Master's degree	3 (11.6)
Job	Health caregiver	16 (61.6)
	Health worker	3 (11.6)
	Observer	7 (26.9)

Results from qualitative analysis were categorized into five main themes and nine subthemes, including system access challenges (Internet disruptions, geographic limitations), infrastructural and system design issues (systemic errors, weaknesses in technical design, challenges of system development, support issues), human and occupational impacts (job and ergonomic challenges; Information management (data recovery, maintenance and processing challenges), and benefits and positive outcomes (increased accuracy and reduced errors; Table 2).

1. System access challenges

One of the primary obstacles in the effective use of the integrated health system (SIB) identified by participants was Internet connectivity disruptions. The system's complete dependence on a stable internet connection created significant difficulties, particularly when the network was slow or intermittently unavailable. For instance, a participant explained:

"When the internet is unstable, we are forced to revert to manual paper-based recording and later duplicate the data entry into the system, which is time-consuming and raises the risk of errors." (P.5)

Table 2. Challenges of working with the integrated health system from the perspective of health workers

Primary codes (final codes)	Secondary codes/concepts	Subthemes	Main themes
Internet shutdowns **Lack of access to information during outages** **Absence of offline version** **Need for permanent internet connection**	Internet-related access problems	Internet disruptions	System access challenges
Difficulties in registration in villages **Lack of system access in remote areas**	Geographic access limitations	Geographic limitations	
Lack of communication between county centers **Restricted observer access** **Difficulty accessing certain areas**	Inter-organizational access barriers		
System slowness **Delayed activation of sections** **Information loss during internet outages** **Lack of national system integrity** **Inability to prevent human errors** **Lack of connection with treatment system**	System instability	Systemic errors	Infrastructural and system design issues
Missing disease indicators (e.g., tuberculosis) **Difficulty registering specific group services** **Problems in data classification** **Lack of coordination with user needs** **Repetitive questioning** **Restricted editing capabilities** **Absence of patient referral follow-up display** **Inconsistent drug naming** **Restricted nutrition counseling**	Technical design weaknesses	Weakness in technical design	
Removal of important items during updates **Difficulty adapting to new updates** **Delayed updates** **Removal of key indicators (e.g., child indicators)**	Update-related design challenges	Challenges of system development	
Insufficient user guides **Poor communication between centers** **Lack of consultation with experienced users**	Support and communication deficiencies	Support issues	
Burnout **Dry eyes** **Ergonomic disorders** **Psychological effects from prolonged system use**	Occupational health problems	Job and ergonomic challenges	Human and occupational impacts
Deletion of deceased/born information **Lack of comprehensive statistics display** **Difficulty separating information** **Lack of indicator tracking tools** **Time-consuming registration** **Repetitive care tasks** **Difficult and slow indicator extraction** **Interrupted seasonal indicator reporting**	Data management and retrieval problems	Data recovery, maintenance and processing challenges	Information management
Reduced computational errors **Ease of indicator extraction** **Improved accuracy in service registration** **Reduced paperwork** **Minimized manual data entry** **Improved access to patient records** **Ability to review patient's previous records**	Improved performance and efficiency	Increased accuracy and reduced error	Benefits and positive outcomes

Geographic challenges were also highlighted. Participants based in remote rural areas noted limited or altogether absent internet access, severely restricting their ability to utilize the system efficiently:

"In some remote villages, we have virtually no internet access, rendering the system unusable and making our job extremely difficult." (P.1)

Another participant remarked:

"Communication between different city centers is weak, hindering timely updates and coordination of patient information." (P.2)

2. Infrastructure and system design issues

Several system-related barriers surfaced throughout interviews. System performance issues, such as slow operation and lagging response times, were commonly cited:

"The system frequently slows down to a point where data entry becomes impractical during busy hours, causing long queues and patient dissatisfaction." (P.4)

Furthermore, participants reported technical glitches and errors, especially following software updates that sometimes removed or altered key system components:

"Important health indicators, such as those related to tuberculosis tracking, were inexplicably removed after recent updates, complicating our reporting tasks." (P.7)

Concerns about insufficient technical support were widespread, with participants complaining about the

lack of comprehensive manuals and slow response times from support teams:

"There is no detailed guide covering all system functionalities, and whenever we face problems, getting help can take too long." (P.14)

3. Human and occupational impacts

The extended use of the system had noticeable effects on staff well-being. Many reported increased workload pressures leading to stress and burnout:

"The demand for exhaustive data entry has increased our workload significantly, resulting in job dissatisfaction and fatigue." (P.20)

Ergonomic issues also emerged as a significant concern, with users suffering from physical strain due to prolonged computer use:

"Prolonged hours of working with the system have caused eye strain and musculoskeletal discomfort among us." (P.18)

4. Data and information management

Managing data efficiently posed various challenges. Participants described experiences of accidental deletion of important data with little to no recourse for recovery:

"Sometimes, critical patient data is lost due to accidental deletion, and the system does not allow us easy options to restore or edit this information." (P.23)

Additionally, extracting health indicators and generating reports was criticized as a cumbersome and slow process:

"Preparing quarterly reports often takes excessive time because the tools for data extraction are not user-friendly or efficient." (P.19)

5. Benefits and positive outcomes

Despite the problems, the SIB system offered several key advantages that were recognized by participants. There was a general consensus about improved accuracy in health data recording:

"The system helps reduce human errors in calculations and ensures more reliable data entry." (P.9)

Moreover, participants appreciated that the system contributed to reducing paperwork and improving access to patient records, streamlining many administrative processes:

"Thanks to the system, we spend less time on paperwork and can effortlessly access patients' medical histories, aiding better continuity of care." (P.11)

Discussion

The present study aimed to evaluate the performance of the SIB system from the perspective of healthcare workers in health centers. The integrated health system (SIB) is a nationally implemented electronic health record system in Iran, developed to optimize health information management and improve the delivery of healthcare services. The findings were organized into five main themes, including system access challenges, infrastructural and design-related challenges, human and occupational impacts, information management issues, and the potential benefits of the system.

One of the significant challenges associated with the SIB system was the inadequate national Internet infrastructure and difficulties in accessing the system, which represent substantial barriers to the electronic delivery of health services [10, 22]. Similar findings are reported by Jafari *et al.*, who report low Internet speed, frequent disconnections, and delays in sending tracking codes via SMS as key challenges [22]. In their study on factors affecting the establishment of electronic health systems in Iran, deficiencies in communication infrastructure—such as insufficient telecommunication coverage in certain regions, particularly rural areas, and low internet speed—are identified as significant obstacles to e-health development [23]. Mirani *et al.* also report slow data transmission and the time-consuming nature of information systems as critical problems affecting system performance [24].

Infrastructural challenges related to the design of the SIB system were identified as another primary concern. The system should be designed to encourage user engagement and facilitate routine use. Naseri *et al.* reported that the main usability challenges of the SIB system included dependence on specialized and experienced personnel for system setup and troubleshooting, system complexity, extensive initial learning requirements, and cumbersome usability. These findings are consistent with our results [25]. In general, a more usable system is characterized by transparent, simple, familiar, and intuitive design features, enabling professional users to operate it accurately and efficiently without requiring extensive training [26].

Another frequently reported issue was the time-consuming nature of system use due to the high volume of activities and repetitive questions. In the study by Torabian *et al.* [27], more than three-quarters of participants state that completing electronic health records required a substantial amount of time. Similarly, Sadoughi *et al.* [28] refer to the collection of unnecessary data, and Kabir *et al.* [29] report that the lowest levels of satisfaction among both physicians and health workers are related to the appropriateness of data volume and redundancy within the SIB system. Our findings further confirm these concerns.

Another critical challenge related to system support and development was insufficient attention to user feedback during the system design process. When end users are excluded from system development, the resulting system may not align with their real operational needs, leading to ineffective interaction and reduced system success [28]. Tavakoli *et al.* emphasize that despite the vital role of the referral system in healthcare delivery and the necessity of its implementation at all levels, the family physician program has not yet been fully implemented nationwide, resulting in weak integration between

different levels of healthcare services. Consequently, many individuals bypass primary care and seek higher-level services directly. This issue is consistent with our findings, as incomplete referral processes and failure to adhere to initial care pathways undermine the effectiveness of the SIB system [30].

The use of the SIB system may require users to spend prolonged periods working with computer systems, which can lead to ergonomic problems, occupational burnout, and adverse psychological effects. In their qualitative study, Imani *et al.* identify physical issues associated with electronic health systems, including wrist, eye, and back injuries, as significant challenges. These findings align with those of the present study [31].

Despite the challenges identified, the SIB system offers several potential benefits, including increased accuracy, reduced human error, easier extraction of health indicators, reduced paperwork, and improved accessibility to health records. Jafari *et al.* categorize these benefits into three main domains: managerial (human resources management, reporting, organizational communication, and planning), technical (visibility, accessibility, and editability), and content-related (data durability, confidentiality, and transferability) [22].

Additionally, reported advantages included improved communication between departments, enhanced managerial supervision of staff, the elimination of traditional paper-based systems, support for disease diagnosis and treatment, and reductions in resource waste and costs. The speed and accuracy of such systems play a crucial role in enhancing the quality of healthcare services [32].

Integrated health information systems can improve healthcare delivery by organizing, collecting, processing, and sharing electronic information within organizations. By reducing the time required to collect essential information and making it readily available to healthcare professionals, these systems can reduce clinical errors, support healthcare providers, improve information management, and enhance patient access to healthcare services. These findings are consistent with the results of previous studies evaluating the integrated health system [33-36].

The findings of qualitative studies are primarily dependent on the researchers' interpretations and perspectives, which may influence the results. Common challenges associated with this type of research include researcher bias, difficulties in data collection and analysis, limited generalizability of findings, greater time and resource requirements compared with quantitative studies, and ethical considerations related to participant privacy and informed consent.

One specific limitation of the present study was the limited availability of participants' time for interviews. However, by emphasizing the importance of the study topic and ensuring appropriate coordination, this challenge was managed and mitigated.

The evaluation of the performance of the integrated health system (SIB) from the perspective of community health workers and healthcare providers indicated that the system has played a significant role in improving the quality of healthcare services through enhanced information management and integration of health-related data. Nevertheless, challenges, such as technical complexity, infrastructural limitations, and the need for further training remain major barriers to achieving optimal system efficiency. While users acknowledged the benefits of the system, they emphasized the necessity of addressing these challenges to improve overall performance.

To enhance the effectiveness of the SIB system, strengthening technical infrastructure, providing continuous training, obtaining regular user feedback, and revising system design are essential. Improvements such as reducing redundant and repetitive steps, simplifying processes, and harmonizing different system components can facilitate system use. In addition, system design should improve color and light contrast, provide appropriate system messages, and enhance the validation and display of input and output data. The availability of a comprehensive and efficient user guide for different system components is also of considerable importance.

Ultimately, aligning the system with national programs and strategic objectives, incorporating intelligent features to reduce errors and increase processing speed, and utilizing feedback from frontline users are key strategies that can contribute to improving the performance and productivity of the SIB system.

Conclusion

The integrated health system (SIB) plays a significant role in improving the quality of healthcare services through enhanced information management and integration of health-related data.

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