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Strategies of quality improvement in healthcare organizations on sustainable healthcare system

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Abstract

Introduction Sustainable healthcare systems are essential for improving public health outcomes while ensuring resource efficiency and long-term care delivery. Despite growing interest in the sustainability of healthcare, research on how healthcare provider initiatives influence system sustainability remains limited. While previous studies have explored factors contributing to healthcare quality and provider engagement, few have specifically investigated the role of healthcare providers in fostering sustainable practices within healthcare organizations.

Information & methods This study utilized an exploratory research design, collecting data through surveys and semi-structured interviews with healthcare providers, patients, and administrators in tertiary care hospitals. Quantitative data were analyzed using statistical methods, while qualitative data underwent thematic analysis. A sample of 150 healthcare providers was surveyed to assess the impact of their initiatives on service quality and patient satisfaction. Pre- and post-initiative comparisons were made to evaluate improvements in healthcare delivery.

Results The Chi-square analysis revealed a statistically significant relationship between provider participation and improved service quality ($\chi^2 = 12.5$, $p < 0.01$), with increased provider engagement linked to higher patient satisfaction and operational efficiency. Qualitative findings highlighted the critical role of administrative efficiency and technology, such as EHR systems and telemedicine, in enhancing healthcare delivery. Providers emphasized that streamlined processes and patient data access improved clinical outcomes. Satisfaction among providers also correlated strongly with patient satisfaction, indicating that a satisfied workforce contributes to better patient experiences.

Conclusion This study highlights the pivotal role of healthcare providers in driving sustainability within healthcare systems. Providers significantly contribute to improved service quality, patient outcomes, and operational efficiency through active participation and collaboration. The findings emphasize the importance of continuous quality improvement and technology integration to enhance healthcare delivery.

Keywords Sustainable healthcare · Healthcare organization · Patient satisfaction · Healthcare professionals · Quality improve

1 Introduction

A sustainable healthcare system is increasingly recognized as essential for improving health outcomes, preserving the environment, and ensuring the availability of resources for future generations. It represents an integrated approach that aims to enhance patient care, reduce environmental impact, and promote social equity, economic

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viability, and community resilience. Key components of a sustainable healthcare system include equitable access, resource efficiency, holistic health, community engagement, innovation and technology, workforce sustainability, and adaptability. This definition emphasizes the integration of environmental stewardship with healthcare delivery—a concept that has become central to modern healthcare strategies. In hospitals, sustainability involves optimizing the use of resources such as personnel, medical equipment, and energy while ensuring the delivery of high-quality care. Healthcare providers play a pivotal role in achieving these goals. As van Vooren et al. (2020) note, health management initiatives are increasingly focused on building systems that support sustainable health and well-being. However, there remains a lack of clarity regarding which specific strategies are most effective in advancing these goals [1, 2]. The rising frequency of natural disasters, pandemics, and other large-scale health crises highlights the urgent need for sustainable healthcare systems. Buffoli et al. (2013) stress that providers must prioritize both structural sustainability and management efficiency to meet these growing demands without compromising care quality [3]. Healthcare providers are uniquely positioned to support these efforts. They interact directly with patients and manage essential healthcare resources, giving them insight into patient needs and system inefficiencies. Their responsibilities include leading staff, improving care quality through training and skill development, and implementing incentive-based systems to boost motivation. These actions are critical for enhancing hospital performance and patient satisfaction. As populations age and chronic diseases become more prevalent, the demand for healthcare services continues to rise. Providers face growing challenges in maintaining effective care delivery. At the same time, global events such as pandemics and environmental disasters emphasize the need for resilient and adaptable healthcare systems [4, 5]. This study focuses on the role of healthcare providers in shaping sustainable healthcare systems. Professionals such as doctors, nurses, paramedics, and administrative staff are directly involved in both care delivery and operational management. Their actions have a direct impact on healthcare quality and sustainability outcomes [6]. Providers contribute by improving workflows, embracing new technologies, and developing their clinical and management skills. They also foster a culture of continuous quality improvement. As Glickman et al. (2007) explain, leadership from senior executives and healthcare providers is vital for building a quality-driven culture that aligns with sustainability goals [7, 8]. Jha (2011) and Mir et al. (2012) further note that patient satisfaction is closely tied to care quality and the ability of providers to meet patient expectations. Healthcare managers must therefore develop a vision centered on patient satisfaction, which involves regularly seeking feedback from patients and families to guide quality improvements. As Chakravarty (2011) and Bahuguna (2014) point out, non-clinical aspects of care—such as hospital cleanliness and staff communication skills—are increasingly shaping patient perceptions [3, 4, 8]. The evolution of healthcare organizations has shifted responsibility from individual providers to collaborative teams that include management and staff at all levels. This change highlights the growing importance of provider participation in driving sustainable improvements. A sustainable healthcare system depends on synergy between provider efforts and administrative strategies.

This study aims to explore the role of healthcare providers in promoting sustainability and improving quality within hospital settings. Specifically, it examines how provider-led initiatives influence hospital performance, patient satisfaction, and operational efficiency. The findings offer insights that can inform future healthcare practices and policy development [9, 10]. While previous research has emphasized the importance of provider engagement in healthcare improvement, there is limited empirical evidence linking provider participation to sustainable outcomes—particularly in non-Western healthcare systems. In addition, although administrative systems and technology are known to improve efficiency, few studies have examined how these factors, combined with provider engagement, contribute to long-term sustainability.

To address these gaps, this study investigates the following research questions:

- How does healthcare provider engagement in clinical and administrative functions influence the sustainability of healthcare systems?
- What is the relationship between administrative efficiency, technology use, and healthcare provider satisfaction in promoting sustainable practices?
- To what extent does provider satisfaction correlate with patient outcomes and overall system sustainability?

By exploring these questions, this study aims to deepen the understanding of how healthcare providers advance sustainable practices. It also identifies the operational and organizational factors that support—or hinder—their involvement. The findings will contribute to the ongoing conversation about healthcare sustainability and offer evidence-based

recommendations for administrators and policymakers seeking to develop more resilient, efficient, and patient-centered systems.

2 Methodology

2.1 Research design

This was a cross-sectional, observational study conducted from January 2024 to October 2024 in the tertiary care hospital Pune India. This study employed a mixed-methods approach to explore the role of healthcare providers in driving quality improvement and sustainability within healthcare organizations. By combining quantitative and qualitative methods, the research captured both measurable data and deeper insights into healthcare providers' experiences and perceptions. This comprehensive approach allowed for a more nuanced understanding of how provider engagement affects healthcare quality, patient satisfaction, and organizational sustainability.

Quantitative data were collected using a semi-structured questionnaire to assess various aspects of provider involvement in quality improvement initiatives. In parallel, qualitative data were gathered through semi-structured interviews, which explored the lived experiences and professional perspectives of healthcare providers in greater depth.

2.2 Sample

To ensure the inclusion of various professional subgroups within the hospital, the study utilized stratified random sampling. This method divided the healthcare providers into distinct strata based on specific characteristics such as professional role, years of experience, and department. Participants were then randomly selected from each group in proportion to their overall representation within the healthcare facility.

This sampling method ensured that all key subgroups were adequately represented, thereby enhancing the credibility and generalizability of the study's findings.

2.3 Stratification criteria

- **Professional role**: Doctors, nurses, paramedics, and administrative staff
- **Years of experience**: Less than 5 years, 5–10 years, more than 10 years
- **Department**: Emergency, surgery, pediatrics, and administration

2.4 Sample size

The study aimed to collect data from 150 healthcare providers, with each stratum proportionally represented based on the hospital's staffing distribution.

2.5 Data collection

2.5.1 Survey

The semi-structured questionnaire explored multiple aspects of provider roles, including:

- Participation in quality improvement activities
- Perceptions of organizational sustainability
- Contributions to patient satisfaction

The questionnaire included:

- **Closed-ended questions** (e. g., Likert scales) to measure variables such as provider engagement, staffing adequacy, and perceptions of care quality

- **Open-ended questions** to elicit qualitative insights into practices that have positively influenced healthcare delivery

2.5.2 Examples of constructs measured

- **Provider Engagement**: "How often do you participate in quality improvement activities (e. g., training, meetings, process improvements)?"
- **Staffing and Resources**: "Do you feel that staffing levels meet the needs of patient care in your unit?" (Yes/No)
- **Patient Satisfaction**: "How has provider engagement in quality improvement initiatives affected patient satisfaction?"

2.5.3 Interviews

Semi-structured interviews were conducted with a subset of participants. These interviews allowed researchers to:

- Clarify and expand on survey responses
- Explore complex issues such as the role of technology, provider satisfaction, and barriers to quality improvement

2.5.4 Document review

To complement the primary data, secondary data were reviewed, including:

- Patient satisfaction surveys
- Internal administrative reports
- Records of past quality improvement initiatives
- This triangulation process strengthened the validity of the study's findings.

2.6 Data analysis

Quantitative Analysis: Closed-ended survey responses were analyzed using SPSS (Statistical Package for the Social Sciences). The analysis involved:

- **Descriptive statistics** such as frequencies, means, and percentages
- **Chi-square tests** to examine associations between variables, including provider engagement and perceived care quality

Qualitative Analysis: Responses to open-ended questions and interview transcripts were analyzed using thematic analysis. This method helped identify key themes and patterns related to:

- Provider involvement in quality improvement
- Perceptions of organizational sustainability
- Factors influencing patient satisfaction

2.7 Ethical considerations

Informed Consent: All participants were provided with detailed information about the study, including its purpose, voluntary nature, and their rights. Informed consent was obtained, and participants were assured they could withdraw at any time without any negative consequences. *Confidentiality*: To maintain participant confidentiality, all responses were anonymized. Personal identifiers were removed from the data, and results were reported in aggregate form to prevent individual identification. *Ethical Approval*: As the study did not involve patients or sensitive clinical data and posed minimal risk, formal ethical approval was exempted. Nonetheless, the study adhered to ethical research standards. It followed the guidelines of the Independent Ethics Committee of Symbiosis International University, Pune, India, ensuring the protection and respectful treatment of all participants.

Table 1 Participation of healthcare providers and administrators in sustainable healthcare

Sr	Participation variable	Observed value	Expected value	Chi-square statistic	Degrees of freedom	P-value
1	Provider participation	150	33	161.1232	4	0.00
2	Administrative staff services	22	22	43.560	2	0.00
3	Access to registration	119	61	139.920	2	0.00
4	Access to hospital services	126	78.5	180.773	2	0.00
5	Availability of previous patient records	88	30.5	16.140	3	0.00

Table 2 Providers' initiatives for quality improvement

Sr	Initiatives for quality improvement	Observed value	Expected value	Chi-square statistic	Degrees of freedom	P-value
1	Staffing for technical work	106	38.5	163.733	2	0.00
2	Management satisfaction	103	34	151.093	2	0.00
3	Facilities satisfaction	107	19.5	118.800	2	0.00
4	Quality of care	101	41	89.720	3	0.00

2.8 Pilot testing

Before the main study, the questionnaire was pilot tested with a small group of healthcare providers. Feedback from the pilot participants was used to refine the survey instrument. This step helped ensure the questions were clear, relevant, and appropriately structured for the target population.

3 Results

His study provide valuable insights into the role of healthcare providers' initiatives in improving healthcare quality, patient satisfaction, and the sustainability of healthcare systems. Data collected from 150 healthcare providers were analyzed using quantitative and qualitative methods. The findings underscore the importance of provider engagement in quality improvement initiatives and highlight the key factors influencing healthcare delivery in a tertiary care setting.

3.1 Quantitative findings

The Chi-square tests revealed several significant associations between healthcare providers' participation in quality improvement initiatives and service quality and operational efficiency improvements. These results are detailed in Tables 1 and 2 below.

The Chi-square analysis revealed significant relationships between provider participation and various operational factors, such as access to registration, hospital services, and the availability of patient records. These findings highlight that active provider involvement in both clinical and administrative functions is crucial for improving service efficiency and patient care outcomes.

Practical implications:

The positive correlation between provider participation and improvements in service quality suggests that hospital systems can benefit significantly from encouraging healthcare providers to take on more active roles in quality improvement initiatives. This can lead to streamlined hospital processes, such as reducing patient wait times and improving diagnostic accuracy by ensuring more effective access to patient records (Table 1).

Administrative staff involvement also plays a key role in ensuring smooth hospital operations, underlining the need for comprehensive collaboration across various departments. Hospitals should invest in integrated systems that allow for more seamless cooperation between clinical and administrative staff to improve overall efficiency (Table 1).

The results from Table 2 further emphasize that staffing levels, management satisfaction, and facility satisfaction are significantly associated with improvements in the quality of care. Adequate staffing and positive interactions with management were found to improve provider satisfaction, which in turn contributed to enhanced patient outcomes and hospital performance.

Practical implications:

- These findings underscore the importance of adequate staffing and management support in ensuring high-quality care delivery. Hospitals that provide sufficient resources and foster positive relationships between management and staff can significantly improve employee morale and improve patient care (Table 2).
- In addition, facility satisfaction—including well-maintained medical equipment and comfortable environments—emerged as a critical factor for ensuring optimal care delivery. Hospitals should prioritize facility upgrades to improve operational efficiency and patient satisfaction (Table 2).

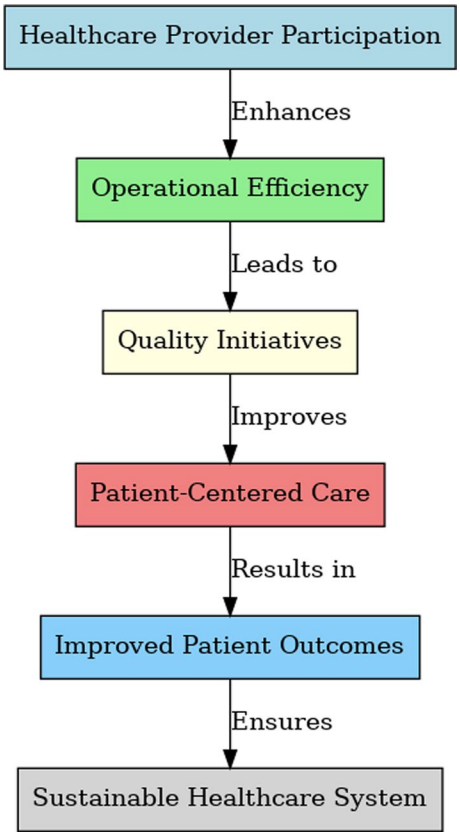
3.2 Qualitative findings

The qualitative analysis of open-ended responses and interview transcripts revealed several key themes related to healthcare providers' initiatives and perceptions of healthcare sustainability:

Engagement in Continuous Training and Development: Many providers emphasized the importance of ongoing professional development and continuous education. Providers reported that training programs were crucial for improving care quality, enhancing communication skills, and ensuring adherence to best practices.
Efficient Communication and Collaboration: Healthcare providers highlighted the need for effective communication and collaboration between hospital departments to improve patient care. A coordinated approach between clinical and administrative staff led to faster decision-making and smoother workflows, benefiting patients.
Use of Technology for Better Care Delivery: Providers noted the increasing role of technology—such as electronic health records (EHR) and telemedicine—in improving diagnostic accuracy, treatment planning, and patient management. These technologies were seen as key enablers of efficient healthcare delivery.
Patient-Centered Care: Providers expressed a growing focus on patient-centered care, noting that patients are now evaluating healthcare quality based on their experience with the healthcare system, including staff interactions and the overall hospital environment.
Staff Morale and Satisfaction: The findings revealed that providers who felt supported by management, had adequate resources, and worked in a positive environment were more motivated to deliver high-quality care. This highlights the significant interconnection between staff and patient satisfaction (Table 2).

Practical implications:

- Hospitals should prioritize staff development programs to improve provider skills and enhance overall care quality.
- Inter-departmental communication systems should be enhanced to foster collaboration between clinical and non-clinical staff, improving workflows and operational efficiency.
- Technological advancements should be integrated into daily operations to improve diagnostic and treatment processes. Hospitals must invest in digital solutions that enhance patient care and streamline services.



Flowchart: Impact of provider engagement on healthcare sustainability

This flowchart visually represents how provider participation and the quality of healthcare resources collectively contribute to a sustainable healthcare system with enhanced patient outcomes. By focusing on these interrelated factors, hospitals can optimize their operational performance and service quality [11, 12].

3.3 Results key findings

- Provider engagement and participation in quality improvement initiatives positively impact service quality and patient satisfaction.
- Adequate staffing levels, management support, and well-maintained facilities are crucial for high-quality care delivery.
- Technological integration and efficient communication systems are essential in improving healthcare delivery efficiency.

These findings emphasize the importance of a holistic approach to healthcare sustainability, where provider involvement, resource allocation, and technological advancements are critical in fostering an efficient and high-performing healthcare system.

4 Discussion

The findings of this study underscore the critical role of healthcare providers in shaping sustainable healthcare systems. This section explores the broader implications of these findings, drawing comparisons with existing literature, and provides recommendations for future research to address the study's limitations.

Significance of Provider Participation in Healthcare Sustainability: This study highlights the essential role of healthcare providers—ranging from clinical staff to administrative personnel—in fostering sustainable healthcare systems. The chi-square analysis revealed a significant correlation between provider involvement and improved patient outcomes. This finding supports the importance of provider engagement in both clinical and operational activities. These results are consistent with previous studies by Glickman et al. (2007) and Jha (2011), which emphasized that provider leadership fosters a culture of quality within healthcare organizations. However, several confounding factors—such as organizational culture, leadership styles, and resource availability—may also influence provider engagement. This study did not account for these variables, which could vary significantly across settings. Future research should control for these factors or investigate their independent effects to more accurately isolate the impact of provider participation on healthcare sustainability [13–15]. *Role of Administrative Efficiency in Quality Improvement*: Efficient administrative systems are critical in supporting healthcare providers and enhancing operational effectiveness. This study found that timely access to registration systems, patient records, and healthcare services significantly contributes to improved care quality. These findings align with Madhiwalla and Roy (2006), who observed that administrative efficiency leads to reduced wait times and greater patient satisfaction. However, the relationship between administrative efficiency and care quality may be influenced by other organizational factors. These include staffing levels, training of administrative staff, and the use of standardized procedures. Providers in better-resourced environments with stronger administrative support may report more favorable outcomes. Future research should control for these variables or study more diverse healthcare settings to ensure findings are generalizable [16, 17]. *Impact of Technology on Healthcare Sustainability*: Technology plays a vital role in enhancing healthcare delivery and sustainability. Participants in this study reported that tools such as electronic health records (EHR), telemedicine, and automated scheduling systems reduced human error and improved diagnostic accuracy. These results support findings by Buffoli et al. (2013), who demonstrated that innovative technologies improve operational efficiency and patient care. However, the study did not explore barriers to technology adoption. These may include high implementation costs, training requirements, and resistance from providers unfamiliar with digital tools. Additionally, technological failures can disrupt care delivery and impact provider satisfaction. Future research should assess these barriers and examine their influence on the effectiveness and sustainability of technological interventions [18, 19]. *Provider and Patient Satisfaction*: A significant correlation was found between provider and patient satisfaction. Satisfied healthcare providers were more likely to deliver high-quality care. This aligns with the work of Warren et al. (1998), who noted that staff morale directly influences patient outcomes. Despite these findings, the study relied on self-reported data from providers, which introduces the potential for bias. For example, respondents may have exaggerated their satisfaction levels due to social desirability or institutional pressures. Future studies should incorporate objective performance indicators—such as patient outcomes or quality metrics—to validate self-reported data and improve reliability [20, 21]. *Patient-Centered Care and Its Growing Importance*: This study also reveals the increasing importance of patient-centered care. Providers acknowledged that patient satisfaction is influenced not only by clinical outcomes but also by factors such as communication, environment, and overall experience. These insights are consistent with research by Mead (2000) and Bahuguna (2014), who highlighted the value of holistic and compassionate care. However, patient satisfaction can also be shaped by external factors beyond provider control. These include socioeconomic status, access to healthcare, and community health resources. Since this study did not consider such variables, future research should explore their influence on patient satisfaction to develop a more comprehensive understanding of care quality [22]. *Sustainability and Continuous Quality Improvement*: The study emphasizes the importance of continuous quality improvement in achieving healthcare sustainability. Findings support those of Fineberg (2012) and Cousin et al. (2012), who stressed the need for collaborative, system-wide approaches to CQI. Although this study shows that active provider participation supports CQI efforts, it does not explore the challenges of implementing and sustaining these initiatives across varied healthcare environments. Future studies should evaluate obstacles to long-term CQI success and develop adaptable frameworks for continuous improvement in different healthcare contexts [23].

Limitations of the Study and Future Directions: While this study offers valuable insights, several limitations should be addressed in future research. *Sampling Bias*: The use of convenience sampling limits the generalization of the findings. Future research should employ stratified or random sampling techniques and include a broader range of healthcare settings—especially rural and underserved areas—to enhance representativeness. *Self-Reported Data*: The reliance on self-reported responses introduces bias. Future studies should supplement these with objective measures of provider engagement and performance, such as patient outcome data or quality indicators. *Geographic Limitation*: The study focused solely on healthcare providers in Pune, India. As healthcare systems vary greatly across regions and countries, further research should include international comparisons to assess how provider engagement influences sustainability in different healthcare contexts.

4.1 Actionable recommendations

Promote Provider Engagement at All Levels: Encourage healthcare providers to participate in decision-making, quality improvement, and policy development. Recognize and reward their contributions to boost morale and increase engagement [20]. *Invest in Administrative Efficiency*: Streamline administrative processes through tools such as EHRs and automated scheduling. Regular training should be provided to ensure effective use of these systems, allowing providers to focus more on patient care [21]. *Leverage Technology to Enhance Care and Sustainability*: Invest in digital health tools, including telemedicine and data analytics, to support both clinical and administrative functions. Policymakers should ensure these technologies are affordable and accessible, especially in resource-constrained settings [23]. *Prioritize Continuous Quality Improvement*: Make CQI a core part of healthcare strategy by establishing clear performance metrics, fostering provider feedback, and encouraging a culture of ongoing improvement. Develop adaptable models for sustained CQI in different healthcare environments [24, 25]. *Enhance Provider Satisfaction to Improve Outcomes*: Create work environments that support provider well-being. This includes fair compensation, adequate staffing, professional development opportunities, and a culture of respect and collaboration. Satisfied providers are more likely to deliver high-quality care [26, 27]. *Integrate Patient-Centered Care Principles*: Train staff to improve communication and empathy in provider-patient interactions. Design systems and environments that address both the clinical and emotional needs of patients [28, 29]. *Address Study Limitations Through Expanded Research*: Future research should overcome the limitations of this study by using more diverse samples, incorporating international perspectives, and combining subjective and objective data to gain deeper insights into the link between provider engagement and healthcare outcomes [30, 31].

5 Conclusion

Study reaffirms that the active involvement of healthcare providers is essential for fostering a sustainable healthcare system. Healthcare systems can achieve higher-quality care, improved patient outcomes, and long-term sustainability by focusing on provider engagement, administrative efficiency, and continuous improvement. For healthcare administrators and policymakers, the challenge lies in creating an environment where providers are empowered and supported in their roles, thereby enhancing individual job satisfaction and collective system performance. By implementing the above recommendations, healthcare systems can move closer to achieving sustainable, high-quality care for all.

Future research: should continue to explore the dynamic interactions between provider participation, administrative efficiency, and patient outcomes to further enhance the sustainability and quality of healthcare services.

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Data availability Data availability on demand.

Declarations

Ethics approval and consent to participate As the study did not involve patients or sensitive clinical data and posed minimal risk, formal ethical approval was exempted. Nonetheless, the study adhered to ethical research standards. It followed the guidelines of the Independent Ethics Committee of Symbiosis International University, Pune, India, ensuring the protection and respectful treatment of all participants.

Consent for publication Not applicable.

Competing interests The authors declare that there are no competing interests.

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