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Redefining wellness: assessing grassroots healthcare transformation in India

Abstract

This study provides a comprehensive analysis of service quality and empathy dimensions within Primary Health Centres (PHCs) in Kerala, India, to evaluate their impact on patient satisfaction. Using a descriptive and analytical research approach, primary data were collected from 400 patients across three districts – Malappuram, Ernakulam, and Thiruvananthapuram – using a stratified multi-stage sampling method. The study assesses critical service quality dimensions, including tangibility, reliability, responsiveness, assurance, empathy, accessibility, communication, safety and security. Statistical analysis reveals that empathy, a key driver of patient satisfaction, significantly shapes healthcare experiences alongside other dimensions like accessibility and safety. Demographic factors such as age, gender, and socio-economic status were found to influence patient perceptions, highlighting the need for tailored healthcare

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approaches. The findings underscore systemic challenges like infrastructure limitations, inconsistent grievance mechanisms, and inadequate provider-patient communication. Positive outcomes, including well-maintained facilities and competent staff, are offset by operational inefficiencies in service delivery. To address these gaps, the study recommends targeted interventions, including enhanced training in interpersonal skills, technological modernisation, and strategies to improve responsiveness, assurance, and empathy. This research contributes valuable insights into the strengths and weaknesses of Kerala's PHCs, offering actionable recommendations for policy-makers and healthcare administrators to enhance patient-centred care. By bridging critical gaps, PHCs can better align with India's broader equitable and high-quality healthcare goals. Future studies could expand the scope to explore the qualitative perspectives of healthcare providers and assess the impact of proposed interventions on patient satisfaction.

Keywords: health care delivery, service quality, Primary Healthcare Centres (PHC's), healthcare sector, empathy in healthcare

Health is universally regarded as a fundamental right. As a core determinant of individual satisfaction, happiness, and well-being, health remains a global priority, aptly captured by the adage "Health is Wealth". Beyond personal welfare, it is a critical driver of economic progress and societal advancement, forming the bedrock of modern development (Ghebreyesus et al., 2017). India's aspiration to become a healthy and developed nation by 2047, marking 100 years of independence underscores the urgency of strengthening its healthcare systems (Arakeri & Rao, 2024). A nation's health infrastructure is shaped by socio-political and economic forces, reflecting the evolving ideologies of its time (Sodhi & Singh, 2016). Healthcare remains a cornerstone of socioeconomic development, contributing significantly to GDP and employment (Attaran, 2022). In a country with over 1.3 billion people, ensuring equitable access to affordable and empathetic care, particularly at the primary level, poses an enduring challenge (Vishwakarma et al., 2022). Despite being conceived as the foundation of the healthcare system, India's public health services are often hampered by long wait times, infrastructure deficits, and eroding public trust, leading many to opt for private care (Sharma et al., 2021).

Access to quality healthcare is a human need and a prerequisite for balanced socioeconomic growth. Globally, the push toward equitable healthcare underscores the dynamic relationship between public health and national development (Ramani & Mavalankar, 2006). India's healthcare sector is rapidly expanding and knowledge-driven (Tiwari, 2021), achieving key milestones such as eradicating poliomyelitis, yaws, and maternal and neonatal tetanus. However, persistent burdens like communicable and non-communicable diseases, alongside a shortage of healthcare professionals, call for renewed attention to service quality and empathetic care (Akhtar & Ramkumar, 2023). India's ongoing urbanisation – projected to reach 590 million urban dwellers by

2030, introduces opportunities and systemic challenges. Addressing the health needs of marginalised populations, especially those in urban slums, is essential for achieving the Sustainable Development Goals (Shrivastava et al., 2023). The country's vast ethnic, socioeconomic, and geographical diversity amplifies disparities in healthcare access and outcomes (Behera et al., 2018). Despite advancements, inequities persist, making the focus on healthcare quality and human-centred care imperative (Kumar et al., 2020). While recent decades have witnessed notable improvements in population health and narrowing urban-rural divides, gaps remain (Mohan & Kumar, 2019). Evidence from various global contexts affirms that robust primary healthcare systems yield better health outcomes (Dutta et al., 2020). Community participation, long emphasised in global public health narratives, remains central to the success of PHC initiatives (Pandey et al., 1997). The 2005 National Rural Health Mission (NRHM) launched India's PHC infrastructure with renewed impetus (Rahman et al., 2020). As of March 31, 2022, India had 31,053 PHCs – 24,935 in rural and 6,118 in urban areas – underscoring these institutions' vast reach and strategic significance (Rural Health Statistics, 2021-22). Reliable data on the cost-effectiveness of care provided by community health workers (CHWs) is also vital for planning and evaluation (Prinja et al., 2014). The global discourse increasingly recognises PHC as central to health system resilience and accessibility (Ramani et al., 2019). Many low- and middle-income countries (LMICs), including India, have invested significantly in PHC systems to ensure affordable, essential care (Rao & Sheffel, 2018). Rising life expectancy in India can be attributed to health literacy, policy reforms, and community-centred services, with PHCs serving a pivotal role in promoting preventive and curative care (Bangalore Sathyananda et al., 2021). In rural India, PHCs are often the primary interface between the state and the people (Rajpurohit et al., 2013), with primary care physicians acting as gatekeepers and ensuring continuity of care (Starfield et al., 2005; WHO, 2008). Service quality, co-created by multiple stakeholders, remains essential to patient outcomes but often falls short of expectations. Enhancing patient empowerment – a crucial yet underexplored dimension – can significantly elevate care standards (Alemu et al., 2021). With rising health awareness and an ageing population, there is an urgent need for patient-centric, empathetic service models that meet evolving expectations (Fatima et al., 2018). Effective healthcare delivery must encompass preparedness, accessibility, and continuous support while fostering a friendly and compassionate care environment (Goula et al., 2021). Hospitals and health centres, including PHCs, are not merely clinical spaces but essential public institutions that reflect societal commitments to health, dignity, and human well-being (Murhadi & Karsana, 2021). PHCs thus serve as a vital bridge between formal health systems and the daily lives of individuals and communities (Tarun Dhyani et al., 2021). The Millennium Development Goals (MDGs), particularly those related to health, reaffirm the role of healthcare in combating poverty and enhancing quality of life, especially for vulnerable populations (Dodd & Cassels, 2006). A well-designed PHC system can meet most health needs regardless of socioeconomic or geographic barriers (Ghebreyesus et al., 2017). Ensuring equitable access, person-centred care, and community involvement are central to creating resilient healthcare ecosystems (Dhanya & Maneesh, 2016). Recent global scholarship emphasises that PHC must

prioritise disease prevention, health promotion, and efficient resource use to improve overall population health (Croke et al., 2024). Against this backdrop, this study investigates the quality and empathy dimensions of PHC services in Kerala India's frontrunner in public health outcomes. Through a descriptive-analytical framework, data were collected from 400 patients across Malappuram, Ernakulam, and Thiruvananthapuram using a stratified multi-stage sampling approach. This study is distinctive in its focus on care's interpersonal and emotional aspects particularly empathy as determinants of patient satisfaction. The analysis reveals that while infrastructure and service access are important, empathy, communication, and provider behaviour emerge as critical influencers of how patients perceive and engage with PHC services.

The findings offer valuable insights for healthcare providers, administrators, and policymakers seeking to enhance primary care's responsiveness, trust, and effectiveness. By foregrounding empathy as an operational priority, this study contributes to the discourse on transforming grassroots healthcare from a purely functional system into a deeply humane, inclusive, and aligned with India's larger developmental goals.

Review of literature

Organisational culture (OC) in government healthcare institutions remains an under-researched area in India. Purohit et al. (2014) emphasised the importance of core organisational values such as openness, trust, and autonomy in shaping service delivery at Primary Health Centres (PHCs). Their findings reveal a significant variance in value perceptions across staff categories, underscoring the need for autonomy and collaborative environments. This aligns with emerging perspectives that patient satisfaction is influenced by structural factors and the empathy and value systems embedded in healthcare delivery. Emerging literature explores how competing policy instruments influence public health outcomes, particularly in mixed healthcare systems. Dayashankar and Hense (2022) highlighted how Kerala's emergency care policies, overshadowed by insurance-driven programmes, have led to a shift from public service provision to private facilitation. This divergence reflects the broader tensions in New Public Management reforms. However, few studies have examined service quality and empathy within PHCs as determinants of patient satisfaction, a gap this study addresses through empirical insights from Kerala. Recent studies emphasise the urgent need to integrate mental health into primary healthcare, particularly in early childhood. Jacob et al. (2021) conducted a community-based assessment in Kerala revealing that over 30% of toddlers exhibited behavioural, emotional, or rhythm-related disturbances, underscoring service gaps in maternal mental health support. This aligns with the broader discourse on empathy and patient satisfaction in PHCs, where culturally relevant tools and collaborative models are advocated to improve holistic care outcomes in low-resource settings. Primary healthcare systems in low- and middle-income countries face persistent challenges, including limited consultation time and inadequate availability of trained professionals. These constraints often result in brief, illness-focused patient interactions, overlooking emotional and

psychological needs (Irving et al., 2017; Mukherjee et al., 2014). Empirical research highlights how organisational, technical, and individual factors shape evidence-based decision-making (EBDM) at the grassroots level (Sahota et al., 2024). Their study in Haryana found data-driven decision-making among Medical Officers influenced by data quality, management support, training, and technological competence. While data use remains suboptimal, fostering a data-conducive culture enhances programme outcomes. However, limited studies explore how service quality and empathy dimensions affect patient satisfaction in PHCs, especially in Kerala, indicating a gap this study seeks to address. Recent studies highlight the need for equitable access and quality in India's Primary Health Centres (PHCs), especially for marginalised groups. Mehta et al. (2024) found that public PHC utilisation in Bihar was evenly distributed across socioeconomic groups, yet adjusting for care quality slightly favoured wealthier users. Their benefit incidence analysis emphasises that high-quality, accessible services are vital for ensuring equity in public health delivery. Ugargol et al. (2023) highlight persistent challenges within India's public health system, exacerbated by underfunding, staffing shortages, and fragmented delivery mechanisms. They advocate for establishing a dedicated public health cadre and integrating family physicians to restore community trust in primary care. Sreelal et al. (2022) conducted a prescription-based study in Kerala revealing poor control rates of hypertension and diabetes, especially among patients with comorbidities. Their findings point to irrational prescribing patterns and significant disparities between public and private healthcare institutions. These results highlight systemic gaps in treatment quality, despite Kerala's advanced health indicators. Their study reinforces the urgency to examine institutional and provider-level factors – such as empathy, drug rationality, and adherence to clinical guidelines – to enhance patient-centred care in Kerala's primary healthcare system. Joseph et al. (2025) examined sex-based disparities in health service utilisation and satisfaction in Kerala's reformed PHC system. Their large-scale survey revealed that males exhibited greater awareness of reforms, while females were more likely to use public PHC services. The study also highlighted stark cost differences between public and private providers. These findings underscore the influence of gender in shaping health-seeking behaviour and satisfaction, reinforcing the need for equitable, gender-sensitive service delivery models in Kerala's grassroots healthcare system. India's primary health care (PHC) system has historically lacked a coherent framework to address its rapidly transitioning health needs (Biswas et al., 2009). Fragmented services, limited family medicine integration, and an underprepared workforce pose challenges to equitable care. However, emerging technologies and community-based approaches offer avenues to enhance PHC delivery. India's healthcare landscape has undergone structural reforms to address disparities in access, particularly through the Ayushman Bharat initiative. Pillai and Obasanjo (2022) compared Kerala and Tamil Nadu in implementing the AB-PMJAY scheme and highlighted systemic challenges such as low reimbursement rates and eligibility misclassification. Based on frontline health worker interviews, their qualitative assessment revealed how political alignments and administrative differences influenced the scheme's effectiveness. These findings underline the need for decentralised, empathetic service delivery models – providing a relevant foundation for examining patient satisfaction and service quality at the

grassroots level in Kerala's PHCs. The evolution of Universal Health Coverage (UHC) is closely tied to the Alma-Ata Declaration of 1978, yet local implementations often predate and transcend this global milestone. Beaudevin et al. (2023) emphasise the foundational role of Primary Health Care (PHC) systems in Tanzania, Oman, and Kerala, highlighting shared priorities such as rural outreach, accessibility, non-medical workforce training, and integrated health delivery. These localised efforts reflect diverse trajectories but collectively underscore the enduring significance of PHC in constructing equitable and sustainable healthcare frameworks across varied geopolitical landscapes. Golechha et al. (2021) underscore how rural primary care providers (PCPs) in India demonstrated remarkable resilience despite systemic deficiencies during the COVID-19 crisis. Their qualitative study revealed gaps in epidemic preparedness, inadequate mental health support, and training limitations, all impacting service quality. Yet, social and institutional encouragement fostered perseverance. These insights highlight the urgent need to enhance PCPs' emotional well-being and professional development, particularly in grassroots health systems, to ensure sustainable, patient-centric primary healthcare delivery. Recent studies on Kerala's community-based healthcare, particularly in palliative care, emphasise the critical role of support groups and community nurses in enhancing psychosocial outcomes. George and Ganesh (2024) highlighted how outpatient meetings facilitated by trained nurses addressed cancer stigma, promoted informed care decisions, and improved quality of life. These insights underscore the Kerala model's holistic and inclusive approach, reaffirming the value of empathetic service delivery and frontline healthcare providers in grassroots wellness transformation. Community health workers (CHWs) play a pivotal role in primary care delivery across low-resource settings, acting as essential liaisons in promoting wellness and disease prevention (Yasobant et al., 2021). Studies increasingly recognise the evolving scope of CHWs from traditional health promotion roles to potential One Health activism especially in community-centric models. The motivation, systemic support, and service quality dimensions like empathy are now critical in assessing CHWs' impact and the transformative potential of grassroots healthcare delivery systems in India. Through this comprehensive review, it becomes evident that while India's Primary Health Centres (PHCs), particularly in Kerala, have made notable progress in enhancing physical access and service coverage, critical qualitative dimensions such as empathy, patient-centred communication, and institutional responsiveness remain underexplored and inconsistently addressed. Existing literature underscores organisational culture, health system design, and provider-patient dynamics profoundly influence service quality and patient satisfaction. However, studies like those by Purohit et al. (2014) and Sahota et al. (2024) suggest that top-down reforms and performance metrics often overshadow these structural elements that neglect the humanistic core of care. Moreover, the review highlights that while Kerala is frequently cited as a model for public health innovation, recent research (e.g., Sreelal et al., 2022; Joseph et al., 2025) reveals systemic disparities in care delivery, gender-based service utilisation patterns, and rational prescribing practices. Similarly, although national schemes such as Ayushman Bharat aim to universalise access, their impact remains mediated by localised administrative efficiency, provider motivation, and community trust areas where empathetic engagement becomes

critical. The literature also signals an emerging consensus that empathy, interpersonal competence, and responsiveness should not be ancillary but central to evaluating PHC performance. However, empirical studies integrating these soft dimensions into measurable service quality frameworks remain sparse, particularly within the Indian context. While global and regional studies (e.g., Beaudevin et al., 2023; Golechha et al., 2021) validate the relevance of community-based and culturally responsive healthcare models, few have empirically tested how these translate into patient satisfaction outcomes at the grassroots level. Thus, this study addresses a significant knowledge gap by empirically examining the relationship between service quality, particularly the empathy dimension and patient satisfaction within Kerala's PHCs. By grounding the analysis in patient-reported experiences across diverse districts, the study not only contributes to the academic discourse on healthcare quality but also offers actionable insights for policymakers, health administrators, and frontline providers striving to strengthen India's primary healthcare system through more humanised, inclusive, and accountable service delivery mechanisms.

Study objectives

- To evaluate the influence of tangibility, reliability, responsiveness, assurance, empathy, accessibility, communication, and safety and security on patient satisfaction at Primary Health Centres (PHCs) in Kerala.
- To analyse the relationship between healthcare providers' empathy and patient satisfaction at PHCs in Kerala.
- To examine the impact of demographic factors (age, gender, socio-economic status) on patient perceptions of service quality dimensions – accessibility, communication, and safety and security – at PHCs in Kerala.
- To identify barriers to delivering high-quality healthcare services, focusing on tangibility, communication, safety, and security at PHCs in Kerala.
- To recommend strategies for improving service quality dimensions, focusing on responsiveness, assurance, empathy, and communication while addressing challenges related to accessibility, tangibility, safety, and security at PHCs in Kerala.

Research questions

- How do service quality dimensions – tangibility, reliability, responsiveness, Assurance, empathy, accessibility, communication, safety, and security – affect patient satisfaction at Primary Health Centres in Kerala?
- What is the relationship between healthcare providers' empathy and patient satisfaction at PHCs in Kerala?
- How do demographic factors (age, gender, and socio-economic status) influence patient perceptions of accessibility, communication, safety, and security at PHCs in Kerala?
- What challenges do Primary Health face in delivering high-quality healthcare, particularly in tangibility, communication, safety, and security?

- What strategies can be implemented to enhance responsiveness, assurance, empathy, and communication, and address barriers in accessibility, tangibility, safety, and security at PHCs in Kerala?

Methods

This study adopts a descriptive and analytical research approach to evaluate service quality and empathy dimensions in India's primary health sector, with a focused regional study in Kerala. The methodological choice stems from the need to understand patient-centred experiences in a socio-politically and epidemiologically unique state. Kerala has long been regarded as a model for inclusive and equitable healthcare in India due to its high literacy rates, especially among women, strong public health infrastructure, effective land reforms, and widespread access to public distribution systems. These factors collectively contribute to Kerala's distinct health outcomes, such as high life expectancy and low infant and maternal mortality rates comparable to those in developed economies. However, in recent decades, the state has also faced a dual burden of emerging communicable diseases and a surge in non-communicable diseases (NCDs), such as diabetes and hypertension. Additionally, the health challenges of marginalised groups, growing privatisation, and rising treatment costs necessitate a closer examination of public healthcare delivery especially at the grassroots level. Given these unique dynamics, Kerala provides a robust case for understanding how primary health systems function under stress and transformation. Primary Health Centres (PHCs), the first contact point for millions of residents, are particularly relevant in this context. The study's focus on PHCs allows for an in-depth evaluation of the grassroots healthcare experience. The research adopted a multi-stage sampling design to capture these realities and ensure representativeness and depth. Kerala was stratified into three regions North, Central, and South each representing geographical, cultural, and administrative diversity. The districts selected Malappuram (North), Ernakulam (Central), and Thiruvananthapuram (South) were chosen based on healthcare density and regional importance through judgmental sampling. Subsequently, stratified proportionate simple random sampling was used to select 149 PHCs (45 in Thiruvananthapuram, 50 in Ernakulam, and 54 in Malappuram), using a random number generator in Microsoft Excel to ensure impartiality. In the final stage, purposive sampling was used to recruit 400 patients who met specific inclusion criteria: individuals aged 18 and above, with at least two outpatient visits to the selected PHCs. Equal representation from rural and urban areas was ensured to capture diverse service perceptions. Ethical procedures included informed consent and a detailed explanation of the study's purpose to all participants. The structured questionnaire used for primary data collection consisted of multiple-choice and Likert-scale items to assess patient perceptions of eight service quality indicators: tangibility, reliability, responsiveness, assurance, empathy, accessibility, communication, safety, and security. These indicators are grounded in the SERVQUAL model and adapted for the Indian primary healthcare context, where patient-provider interactions, communication, and safety directly affect trust, adherence, and revisit intention.

Kerala's people-centric and equity-based healthcare ethos informs the focus on empathy as a central indicator. Empathy in provider behaviour is particularly significant given the increasing mental health burdens, ageing population, and historically marginalised communities in the state. Including accessibility and communication, dimensions reflect systemic gaps observed in earlier health evaluations, especially in reaching vulnerable groups like fisherfolk, Adivasis, and women in remote areas. Data were analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0 for advanced statistical tests, while Microsoft Excel supported graphical and preliminary analysis. Normality tests confirmed a near-normal distribution, validating the use of parametric methods. Descriptive statistics, correlation analysis, and regression models were employed to assess the relationship between service quality indicators and patient satisfaction, supplemented by subgroup analysis based on age, gender, and socioeconomic status.

Results

Table 1. Dimensions of Service quality – tangibility

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Professional and well-groomed staff and doctors	4.11	0.719	200
Clean, tidy, and hygienic conditions	3.89	0.886	200
Availability of safety measures (e.g., handrails, ramps)	3.89	0.884	200
Sufficiency of space in the health centre	3.62	1.119	200
Basic physical facilities are visually appealing and comfortable	3.58	1.029	200
Availability of Complaint Box/Complaint Book	3.49	1.116	200
Modernised equipment	3.48	1.051	200
Availability of information boards	3.79	0.966	200

Table 1 illustrates the analysis of tangibility as a dimension of service quality, highlighting significant variations across its measures. The highest-rated factor was "Professional and well-groomed staff and doctors" ($\bar{X}$= 4.11, SD = 0.719), indicating the critical role of personnel professionalism in shaping service quality perceptions. This was closely followed by "Clean, tidy, and hygienic conditions" ($\bar{X}$= 3.89, SD = 0.886) and "Availability of safety measures" ($\bar{X}$= 3.89, SD = 0.884), emphasising the importance of cleanliness and safety in healthcare environments. However, the lowest-rated measure, "Modernised equipment" ($\bar{X}$= 3.48, SD = 1.051), points to a potential gap in technological infrastructure that may require immediate attention to meet patient expectations. Similarly, "Availability of Complaint Box/Complaint Book" ($\bar{X}$= 3.49, SD = 1.116) suggests room for improvement in grievance mechanisms. The findings underscore the need for healthcare facilities to prioritise the professional presentation of staff and infrastructural advancements, as these are pivotal in enhancing patient satisfaction and overall service quality.

Table 2. Reliability as a Dimension of Service Quality

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Experienced and knowledgeable staff	4.18	0.726	200
Consistency in service	4.12	0.724	200
Timely service	3.84	0.794	200
Availability of promised service	3.71	0.980	200
Complaints of the patients are handled well	4.00	0.726	200
Accuracy in maintaining records	3.70	0.947	200

The descriptive analysis of Reliability, as shown in Table 2, highlights the performance of six measures constituting this critical dimension of service quality. Among these, the most prominent measure was "Experienced and knowledgeable staff" ($\bar{X}$= 4.18, SD = 0.726). This indicates that patients perceive the expertise and competence of healthcare personnel as the most reliable attribute, fostering trust, and confidence in primary health services. The low standard deviation reflects a high level of agreement among respondents, further underscoring its critical role in shaping service quality perceptions. The second-highest mean score was recorded for "Consistency in service" ($\bar{X}$ = 4.12, SD = 0.724), emphasising the importance of uniformity and dependability in healthcare delivery. Patients valued consistent service experiences, reinforcing their expectations of reliable care during each visit.

"Timely service" ($\bar{X}$= 3.84, SD = 0.794) received moderate ratings, suggesting that while timeliness is acknowledged as a key component of reliability, its current performance leaves room for improvement. Addressing delays and ensuring prompt service delivery could significantly enhance patient satisfaction. "Availability of promised service" ($\bar{X}$ = 3.71, SD = 0.980) and "Accuracy in maintaining records" ($\bar{X}$ = 3.70, SD = 0.947) scored the lowest among the reliability indicators. These measures' relatively high standard deviations indicate considerable variability in patient experiences, pointing to potential inconsistencies in fulfilling service commitments and administrative precision. These findings signal the need for targeted interventions to strengthen service reliability's availability and documentation aspects. Complaints handling achieved a favourable mean score of 4.00 (SD = 0.726), reflecting the effectiveness of grievance redressal mechanisms in the healthcare sector. While this measure demonstrates satisfactory performance, continually enhancing patient feedback systems could further bolster reliability perceptions.

Overall, the analysis underscores that the reliability dimension is primarily driven by the quality of staff and service consistency. However, addressing gaps in record accuracy and service timeliness can further enhance the perception of reliability in primary healthcare services. These findings provide actionable insights for healthcare administrators to improve service quality and empathy, aligning with patient expectations.

Table 3. Dimensions of service quality – responsiveness

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Promptness of service	3.83	0.916	200
Willingness to help	3.90	0.743	200
Attentiveness towards the patient	3.88	0.891	200
Supportive advice and instructions given	3.84	0.853	200
Timely official intervention in resolving patients' issues	3.86	0.897	200
Quickness in attending calls	3.70	0.887	200
Waiting time for service is minimum	3.70	0.992	200

The dimension of responsiveness was evaluated using seven measures, providing insight into the performance of primary healthcare services in India. Among these measures, the highest-rated attribute was "Willingness to help" ($\bar{X}$= 3.90, SD = 0.743), indicating that healthcare providers are perceived as willing to assist patients effectively. This is closely followed by "Attentiveness towards the patient" ($\bar{X}$= 3.88, SD = 0.891), suggesting that empathetic and focused interactions significantly contribute to perceived service quality.

Conversely, the least prominent measures were "Quickness in attending calls" ($\bar{X}$= 3.70, SD = 0.887) and "Waiting time for service is minimum" ($\bar{X}$= 3.70, SD = 0.992). These findings highlight potential areas for improvement, particularly in minimising wait times and enhancing the responsiveness of communication systems. Interestingly, the standard deviations reveal variations in patient perceptions. For instance, "Waiting time for service" exhibited the highest standard deviation (SD = 0.992), suggesting inconsistency in service delivery. In contrast, the relatively lower standard deviation for "Willingness to help" (SD = 0.743) indicates more uniformity in patient experiences. These results underscore the need for targeted interventions in healthcare management to balance promptness and empathetic care. Efforts to reduce delays in attending calls and wait times could further enhance the overall responsiveness of the healthcare system. Furthermore, leveraging the strengths of existing positive attributes such as attentiveness and willingness to help could serve as a foundation for broader service improvements.

Table 4. Assurance dimension in service quality

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Politeness and courtesy towards patients	3.72	0.973	200
Providing encouragement, assurance, and trust to patients	3.73	0.940	200
Sufficiency of time allotted for patient diagnosis	3.98	0.789	200
Maintenance of patient privacy	3.96	0.791	200

Table 4 illustrates the descriptive statistics of the assurance dimension of service quality reveal nuanced insights into patients' perceptions in India's primary healthcare sector. Of the four measures evaluated, the highest mean score was observed for the item "Sufficiency of time allotted for patient diagnosis" ($\bar{X}$ = 3.98, SD = 0.789), indicating that patients generally perceive the time allocated for their diagnosis as adequate. This finding suggests that time management is crucial to patients' overall satisfaction and trust in healthcare services. The standard deviation is relatively low, reflecting moderate consistency in the responses, although some variability in patient perceptions remains. The second-highest mean score was recorded for "Privacy of patient is maintained" ($\bar{X}$ = 3.96, SD = 0.791). This strong rating underscores the importance of privacy in primary healthcare settings, which contributes significantly to building trust between healthcare providers and patients. The low standard deviation indicates a high degree of agreement among respondents, highlighting that privacy is widely valued across the sample. In comparison, the measures "Providing encouragement, assurance, and trust to patients" ($\bar{X}$= 3.73, SD = 0.940) and "Politeness and courtesy towards patients" ($\bar{X}$= 3.72, SD = 0.973) received slightly lower ratings. The relatively higher standard deviations for these items suggest more significant variability in patient experiences, indicating that while some patients felt adequately supported and treated with respect, others reported more inconsistent or less satisfactory interactions with healthcare providers. This variability may reflect differences in the interpersonal skills of healthcare professionals or differences in patient expectations, both of which warrant attention to improve overall service quality. These findings point to key areas where primary healthcare services in India may benefit from targeted improvements. The higher ratings for time sufficiency and privacy suggest that these aspects are already well-managed. A greater focus on enhancing politeness, courtesy, and consistent encouragement from healthcare providers could improve patient experiences. These improvements are vital in ensuring a more holistic and empathetic healthcare environment, ultimately leading to increased patient satisfaction and trust in the primary healthcare sector.

Table 5. Empathy as a dimension of service quality

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Remembers patients' previous problems and preferences	3.66	1.068	200
Ability to console the patients	3.69	0.893	200
Empathetic attitude towards the patients	3.84	0.829	200

Table 5 analysing the descriptive statistics of empathy as a dimension of service quality in India's primary healthcare sector provides insightful findings regarding patient perceptions of empathy-based interactions. As shown in Table 5, the measure of "Empathetic attitude towards the patients" (Mean = 3.84, SD = 0.829) emerged as the most prominent indicator of empathy. The relatively low standard deviation

suggests that respondents consistently perceive healthcare providers as demonstrating a high level of empathy through positive emotional engagement and an overall caring attitude. This indicates that healthcare workers successfully convey compassion, which is a critical element of patient satisfaction in healthcare settings.

On the other hand, the measure of "Ability to console the patients" ($\bar{X}$= 3.69, SD = 0.893) is closely followed in importance, with a slightly higher variability in responses. While healthcare providers are generally viewed as capable of offering emotional support, the variation in patient feedback suggests that there may be occasional gaps in the consistency and effectiveness of such consolatory behaviours. This finding suggests a potential area for improvement, as ensuring a uniform level of emotional support could further enhance patient experience and care satisfaction. The measure "Remembers patients' previous problems and preferences" ($\bar{X}$= 3.66, SD = 1.068) was found to be the least prominent empathy-related factor. The higher standard deviation associated with this measure indicates significant variability in how patients perceive their healthcare providers' attentiveness to their past medical history and preferences. This inconsistency may suggest that healthcare professionals could improve their ability to recall and act on prior patient information, essential for delivering personalised, patient-centred care. Addressing this gap could lead to a more cohesive and responsive healthcare experience, fostering stronger patient-provider relationships and improving overall service quality. In a nutshell, while the overall display of empathy within India's primary healthcare sector is commendable, the findings suggest opportunities for enhancing specific empathetic behaviours, particularly in remembering patient histories and preferences. Such improvements could contribute significantly to the overall quality of care, ensuring that patients feel emotionally supported and personally valued.

Table 6. Dimensions of accessibility

Accessibility Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	Sample Size (N)
Easy access to service location	3.57	0.970	200
Access to different service facilities	4.08	0.802	200
Pharmacy and laboratories are easily accessible	3.82	0.962	200
Access to toilets	3.87	0.955	200
Access to parking area	3.84	0.912	200
Accessibility of boards with information	3.80	0.968	200

Table 6 highlights the variations in perceptions of accessibility within India's primary healthcare services. Among the six accessibility measures, "Access to different service facilities" emerged as the most prominently rated aspect, with a mean score of 4.08 (SD = 0.802). This suggests that respondents considered the availability of diverse healthcare services to be a key strength of primary health facilities. In contrast, "Easy access to service location" received the lowest mean score of 3.57 (SD = 0.970),

indicating potential challenges related to the location or transportation infrastructure, which could act as barriers to healthcare access. Other important factors such as "Access to toilets" ($\bar{X}$= 3.87, SD = 0.955), "Pharmacy and laboratories are easily accessible" ($\bar{X}$= 3.82, SD = 0.962), and "Access to parking area" ($\bar{X}$= 3.84, SD = 0.912) also received relatively favourable ratings. These scores suggest that, while patients generally had positive experiences regarding basic amenities and healthcare resources, there remains room for improvement. Similarly, "Boards with information are accessible" ($\bar{X}$= 3.80, SD = 0.968) reflects the importance of effective signage and communication within healthcare settings, which could be enhanced to better guide patients and visitors. These findings underscore the importance of improving accessibility across various dimensions to enhance overall service quality in primary healthcare settings. Specifically, addressing the challenges related to service location accessibility could be a key focus for future healthcare infrastructure development, ensuring that geographical or transportation barriers do not deter patients. Additionally, while the other accessibility measures scored positively, continuous efforts to improve facilities such as parking, signage, and sanitation will further elevate the patient experience and improve healthcare outcomes.

Table 7. Dimension of service quality – communication

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	N
Information provided at the registration counter is easy to understand	3.44	1.159	200
Communication about the diagnosis to the patient well communicated	3.98	0.823	200
Local language is used for communicating the information to the patients	3.91	0.914	200
Lab report by lab technician is communicated clearly	4.27	0.691	200
Medical prescription is explained well by pharmacist	3.73	1.032	200
Information about Grievance Redressal is displayed	3.80	0.997	200
Information about the type of service available is (Sources-Authors) being displayed	3.71	1.050	200

Table 7 reveals a variation in the effectiveness of communication measures, with significant differences in mean scores, suggesting varying levels of perceived service quality. The highest-rated measure was "Lab report by lab technician is communicated clearly", which achieved a mean score of 4.27 (SD = 0.691). This suggests that patients perceive lab technicians as highly effective in conveying lab results, critical for accurate diagnosis and treatment planning. This substantial communication measure likely improves patient trust and satisfaction with healthcare delivery. Following this, "Communication about the diagnosis to the patient well communicated" garnered a mean score of 3.98 (SD = 0.823), indicating that communication regarding diagnosis is generally effective. However, there may be room for improvement in making this

information accessible and comprehensible to all patients. On the lower end of the spectrum, the measure "Information provided at the registration counter is easy to understand" had the lowest mean score of 3.44 (SD = 1.159), suggesting that patients find the information provided during registration less clear. The relatively high standard deviation for this measure implies a significant variability in patient perceptions, which could reflect issues in the consistency of communication at the point of entry into the healthcare system. Other measures, such as the use of local language in communication ($\bar{X}$ = 3.91, SD = 0.914) and the clarity of medical prescriptions ($\bar{X}$ = 3.73, SD = 1.032) were rated moderately, highlighting areas of communication that could benefit from standardisation or additional training to ensure clarity and understanding across diverse patient populations. The findings underscore the importance of effective communication in enhancing service quality within India's primary healthcare sector. The results suggest that while certain aspects of communication, such as the clarity of lab reports, are well-received, there remain gaps in areas like registration information and prescription explanations that could impact the overall patient experience. Improving these aspects of communication can contribute to a more patient-centric approach, ultimately leading to enhanced healthcare quality and patient satisfaction. Future interventions should focus on standardising communication practices, especially at the registration counter, and ensuring that medical and diagnostic information is conveyed comprehensively and in accessible language. Addressing these communication gaps could strengthen the quality of patient care, fostering a more empathetic and efficient healthcare system.

Table 8. Safety and security dimension of service quality

Measure	Mean ($\bar{X}$)	Standard Deviation (SD)	N
Safety of the premises is maintained	3.58	1.162	200
Visiting policy is maintained	3.85	0.857	200
Sanitary practices and level of care followed by hospital staff	3.62	1.000	200
Burning of waste is not carried out in PHC	3.86	0.964	200
No stray animal in PHC	3.60	0.935	200

The descriptive statistics analysis for the Safety and Security dimension underscores key insights into the service quality measures in India's primary health sector. The highest mean score was recorded for the measure "Burning of waste is not carried out in PHC" ($\bar{X}$= 3.86, SD = 0.964), suggesting strong adherence to waste management protocols in most primary health centres (PHCs). This aligns with increasing awareness and enforcement of the sector's environmental and health safety standards. Similarly, "Visiting policy is maintained" also showed a high mean score ($\bar{X}$= 3.85, SD = 0.857), reflecting the consistent application of structured policies to regulate patient and visitor access, contributing to overall safety and control within these facilities. Conversely, while measures such as "Safety of the premises is maintained" ($\bar{X}$= 3.58,

SD = 1.162) and "No stray animal in PHC" ($\bar{X}$ = 3.60, SD = 0.935) exhibited relatively lower mean scores, their higher standard deviations point to variability in implementation across facilities. This suggests room for improvement in physical infrastructure and operational consistency. The moderate score for "Sanitary practices and level of care followed by hospital staff" ($\bar{X}$= 3.62, SD = 1.000) reflects ongoing challenges in maintaining uniformity in hygiene practices despite awareness campaigns and training initiatives. These findings emphasise the critical need for targeted interventions to address the variability observed in safety and security measures. While policy frameworks appear robust in some areas, consistent implementation and monitoring are essential to elevate overall service quality in the primary health sector. Addressing gaps in sanitary practices and physical safety measures will require a combination of policy enforcement, resource allocation, and community engagement to foster an environment conducive to quality and empathetic care.

Discussions

The study's exploration of service quality dimensions within Kerala's Primary Health Centres (PHCs) uncovers key factors influencing patient satisfaction at the grassroots level. Evaluating service quality in Kerala's Primary Health Centres (PHCs) offers critical insights into patient experiences and the operational realities of grassroots healthcare delivery. The multidimensional analysis highlights entrenched strengths and systemic gaps, reinforcing the need for a comprehensive, patient-centred approach to primary healthcare reform in the state. **Tangibility**, as a dimension, extends beyond aesthetics to encompass the physical cues that patients associate with professionalism, safety, and competence. The consistently high ratings for staff grooming and facility cleanliness reflect an ingrained culture of hygiene and visual assurance in PHCs, which aligns with Kerala's long-standing emphasis on public health. Patients, especially those from rural or less literate backgrounds, often assess care quality through such observable cues, making these findings highly significant. However, the low scores for modernised equipment and ineffective grievance mechanisms highlight an imbalance. While the environment appears reassuring, the underlying medical infrastructure and administrative processes require urgent modernisation. Addressing this disparity would necessitate capital investment in diagnostic technologies and developing structured, transparent complaint redressal systems beyond informal interactions. The **reliability** dimension focuses on the operational consistency and trustworthiness of PHCs. High ratings for staff competence and consistent service delivery reaffirm that Kerala's human resources for health remain its most valuable asset. However, the moderate scores for timely service and availability of promised care point toward capacity strain – perhaps stemming from high patient volumes, staff shortages, or supply chain inefficiencies. Moreover, record accuracy and documentation weaknesses suggest that PHCs may struggle with continuity of care, especially for chronic patients or those with complex histories. The dichotomy between interpersonal responsiveness and weak institutional processes reveals a deeper issue: the absence of integrated systems for quality monitoring and

data management. Investments in electronic health records (EHRs), staff training on documentation, and workflow optimisation could address these reliability concerns.

The findings Empathyate an important paradox in assessing empathy: while frontline providers are largely perceived as compassionate, this Empathy does not consistently extend into continuity and depth of care. High variability in responses regarding staff's ability to remember patient histories or offer emotional support underscores the influence of individual personalities and workloads rather than structured institutional practices. This inconsistency is especially problematic in primary care settings, where patient engagement, trust, and continuity are vital. Embedding emotional intelligence training into continuing medical education, encouraging reflective practice, and integrating empathy metrics into performance evaluations may standardise empathetic care delivery. Additionally, PHCs could benefit from tools that support relational continuity, such as patient-held records or digital prompts for providers to recall personal patient information.

Accessibility, a foundational goal of primary healthcare, reveals both achievement and exclusion. The availability of services within the PHC premises received strong endorsements, validating Kerala's co-locating diagnostics, pharmacy, and clinical care model. However, physical access to these centres remains uneven, particularly in remote or geographically challenging areas. This underscores the need to rethink accessibility in terms of service presence and actual reach. Transport challenges, inadequate parking, and underwhelming signage all impede equitable access, especially for the elderly, persons with disabilities, and the illiterate. Addressing these issues requires more than infrastructure it involves inclusive design thinking. Localised innovations such as community transport networks, health worker-led navigation support, and multilingual, pictorial signage can bridge the accessibility gap meaningfully. Further, digital interventions like telemedicine must be matched with efforts to overcome digital literacy barriers and ensure culturally sensitive interfaces.

Communication, a dimension that cuts across the patient care journey, was marked by significant variation in quality. Patients appreciated the clarity in lab result communication and diagnostic explanations, suggesting that specific clinical processes follow standard protocols. However, the communication breakdowns at the registration counters and in explaining prescriptions reflect a lack of attention to the patient's informational needs during critical moments. The relatively low rating for local language use further exposes linguistic mismatches that can exacerbate patient confusion or anxiety. These shortcomings could be addressed through structured communication training, standardised scripts, and the deployment of community health volunteers fluent in local dialects. Moreover, visual aids, digital kiosks, and simplified forms can enhance patient understanding while reducing reliance on medical jargon.

In examining safety and security, the study points to partial adherence to regulatory and infrastructural norms. Favourable ratings for biomedical waste disposal and visiting policy adherence reflect institutional alignment with national health mandates and infection control principles. Nevertheless, lower scores for indicators such as stray animals, safety of premises, and staff hygiene highlight operational inconsistencies that can undermine patient confidence. The variability in these indicators suggests

uneven implementation rather than systemic neglect. Addressing these issues will require consistent supervision, periodic facility audits, and community oversight mechanisms. Strengthening health and safety training, ensuring the availability of basic resources, and introducing feedback loops can institutionalise safe care environments.

A broader synthesis of findings reveals a system between historical strength and emerging complexity. Kerala's PHCs demonstrate commendable performance in professional conduct, clinical availability, and foundational hygiene – outcomes that reflect decades of investment in public health literacy and decentralised governance. However, the study exposes structural challenges related to documentation, infrastructure, empathetic engagement, and systemic responsiveness. The results suggest that further gains in healthcare quality will require a shift from input-based models to function-based evaluations prioritising how services are delivered, perceived, and experienced by patients.

From a policy perspective, several strategic interventions emerge. First, digital transformation encompassing EHRs, appointment systems, and mobile health – can significantly enhance service coordination, timeliness, and record accuracy. Second, embedding patient-centred communication and empathy training within workforce development programmes can improve relational and informational quality. Third, ensuring inclusive physical and informational accessibility must be treated not as auxiliary improvements but as core health equity commitments. Fourth, formalising grievance redressal mechanisms and using patient feedback for service redesign can close the accountability loop.

Finally, the study highlights the importance of contextualised health service evaluation. While many national metrics focus on coverage and utilisation, this analysis emphasises the subtler but equally important dimensions of how care is delivered and experienced. Future research should build on these findings by incorporating qualitative perspectives from healthcare providers and patients, thereby capturing the socio-cultural dynamics influencing care quality. Longitudinal studies evaluating the impact of specific interventions particularly those targeting empathy digital systems and accessibility will be instrumental in shaping scalable models of high-quality, equitable primary healthcare delivery across India.

Limitations and future research

While this study provides valuable insights into the service quality and patient satisfaction within Kerala's Primary Health Centres (PHCs), several limitations should be acknowledged. First, the data collected was based on patient perceptions, which are inherently subjective and may not fully capture the broader operational challenges faced by PHCs. Additionally, the study focused on a limited sample of PHCs, which may not represent the diversity of healthcare delivery across all rural and urban settings in Kerala. Future research could expand the scope to include a more extensive and diverse sample, allowing for a more comprehensive analysis of the regional and demographic variations in patient satisfaction. Moreover, the study did not explore the underlying reasons for the identified operational inefficiencies, such as service delivery

delays and technological infrastructure issues. Further investigations using qualitative methods, such as interviews or focus groups with healthcare providers and administrators, could offer deeper insights into the root causes of these challenges. Future studies could also examine the impact of specific interventions on patient satisfaction and service quality, such as the introduction of modern equipment or improvements in grievance mechanisms. Lastly, exploring the role of community engagement in enhancing the empathy and responsiveness of healthcare providers could provide valuable direction for improving patient care in PHCs.

Conclusion

This study offers a critical reappraisal of grassroots healthcare delivery in Kerala by assessing patient satisfaction through eight service quality dimensions within Primary Health Centres (PHCs). The study goes beyond generic evaluations of public health infrastructure by employing a cross-sectional analytical framework across diverse districts. It brings to light, nuanced patterns of care quality as experienced by patients. The findings reveal that while Kerala's PHCs demonstrate consistent strengths in human resource competencies and facility upkeep, there remain significant disparities in systemic areas such as grievance redressal, communication equity, and continuity of empathetic care. The multidimensional role of **empathy** emerges prominently from the analysis not merely as an emotional quality but as an operational determinant of patient-centred service. Empathy, when institutionalised rather than individualised, strengthens the relational aspect of care, builds trust, and improves compliance. The study's emphasis on this dimension calls for a paradigm shift in how training, performance, and health outcomes are aligned in primary healthcare delivery. Equally important are accessibility and safety, which together form the threshold criteria for engaging underserved populations. Physical and informational accessibility, coupled with basic assurances of environmental safety, significantly affect healthcare-seeking behaviour, particularly among vulnerable groups such as the elderly, persons with disabilities, and those with low literacy.

The discussion underscores that patient satisfaction is influenced not only by visible aspects such as cleanliness or staff behaviour but also by less visible systemic practices – record-keeping, timely communication, infrastructure reliability, and workflow coordination. These qualitative perceptions vary significantly across demographic groups, emphasising the need for culturally competent and demographically sensitive care strategies. This insight has far-reaching implications for how Kerala's healthcare policy must evolve to address the diverse expectations of its population. By mapping patient experience across tangibility, reliability, responsiveness, assurance, empathy, accessibility, communication, and safety, the study reveals that service quality is not a linear construct but an interplay of structural and interpersonal dynamics. While Kerala's model remains an exemplar in many respects, the evidence points toward an urgent need to bridge the operational gaps that compromise the holistic care experience. Policy responses must move beyond infrastructure development and target the micro-level processes that shape patient trust and engagement. The study also

highlights the fragmentation between policy design and last-mile delivery. Despite the presence of national health programs and institutional norms, the variation in PHC performance suggests inconsistent implementation. This highlights the need for robust monitoring systems, real-time feedback loops, and stronger accountability mechanisms embedded within primary care governance structures.

Regarding strategic implications, the findings advocate for a layered reform agenda integrating technology (e.g., electronic health records, telemedicine), enhancing human touchpoints (e.g., empathy training, patient navigators), and embedding equity-focused design into infrastructure and service flows. Furthermore, incorporating patient feedback into continuous quality improvement frameworks would ensure that the services evolve dynamically with community needs.

Ultimately, the study provides diagnostic clarity and prescriptive direction for transforming grassroots healthcare. It invites policymakers, administrators, and health professionals to view service quality not as an ancillary concern but as a central determinant of health outcomes and system trust. Future research should build on these insights using longitudinal and qualitative approaches to examine how specific interventions reshape patient experience over time. In doing so, Kerala's PHCs can serve as scalable models for equitable, empathetic, and resilient primary healthcare systems across India**.**

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