

ORIGINAL RESEARCH ARTICLE

The experience economy meets the
examination room: Rethinking service quality,
perceived value, and behavioral loyalty in
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Abstract

Patient satisfaction is increasingly recognized as a key indicator of healthcare service quality and an important determinant of patient retention in primary healthcare systems. This study examines patient satisfaction with services provided at primary health centers (PHCs) in Kerala, India, and analyzes the influence of service quality on patient satisfaction and revisit practices. Primary data were collected from 400 patients across three regions of Kerala: South (Thiruvananthapuram), Central (Ernakulam), and North (Kozhikode), using a structured, self-administered questionnaire. The study employed multivariate analysis of variance (MANOVA), univariate analysis of variance with Bonferroni comparisons, exploratory factor analysis (EFA), confirmatory factor analysis, and structural equation modeling (SEM). The 15-item patient satisfaction construct showed excellent reliability (Cronbach's $\alpha = 0.954$) and strong convergent validity (average variance extracted = 0.887; composite reliability = 0.940). EFA identified two latent dimensions, "satisfied with facilities at PHCs" and "fair treatment ensuring privacy," explaining 71.80% of total variance (Kaiser–Meyer–Olkin test = 0.942). MANOVA revealed significant differences in patient satisfaction across age groups (Wilks' $\lambda = 0.755$, $F = 2.502$, $p < 0.05$). SEM results showed that service quality significantly influences patient satisfaction (standardized regression weight [SRW] = 0.913, $p < 0.001$), which, in turn, affects revisit practices (SRW = 0.842, $p < 0.001$). The findings provide valuable evidence for strengthening patient-centered primary healthcare delivery in Kerala and similar developing healthcare systems.

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1. Introduction

Patient satisfaction has evolved from a peripheral outcome indicator into a central construct in healthcare quality management research and policy. In the context of primary healthcare—the first and most accessible tier of the health system—patient satisfaction represents both an intrinsic goal of equitable service delivery and an instrumental predictor of utilization patterns, care-seeking behavior, and population

health outcomes (Aditi, 2009; Parasuraman *et al.*, 1988). The World Health Organization's Alma-Ata Declaration of 1978 established primary healthcare as the foundation of a just and effective health system, emphasizing that quality, accessibility, and patient-centeredness are inseparable from the objective of universal health coverage (WHO, 1978). Four decades later, the 2018 Astana Declaration reaffirmed that strengthening primary health care is the most inclusive, equitable, and cost-effective pathway to achieving the Sustainable Development Goal of universal health (WHO, 2018).

Affordable health services must be available to everyone, so that hospitals can achieve their main goal of providing good health services (Rasji *et al.*, 2024). In an increasingly competitive primary healthcare environment, patients are influenced not only by clinical outcomes but also by the overall care experience. Rising health awareness, higher educational attainment, and greater expectations regarding service quality have heightened the importance of perceived value in healthcare decisions. Consequently, understanding how service quality and patient experiences shape behavioral loyalty has become a critical concern for healthcare managers and researchers (Berry & Bendapudi, 2007; Calhoun *et al.*, 2006). Much research has been conducted to measure healthcare service quality and patient satisfaction individually across various cultural settings (Badri *et al.*, 2005; Gürdal *et al.*, 2000). Healthcare organizations are continually under pressure to improve their operational efficiency (Proctor, 2010). Furthermore, prior research highlights patient heterogeneity, showing that individuals receiving care in the same primary healthcare setting may have distinct expectations, perceptions, and preferences. As a result, patients often evaluate identical treatment processes, service quality, and care environments differently. This variability influences perceived value, satisfaction, and subsequent behavioral loyalty, underscoring the need for a patient-centered approach to healthcare experience design (Choi *et al.*, 2005; Reidenbach & Sandifer-Smallwood, 1990). In particular, health services begin with primary health center (PHC) as the first point of contact (Al-Momani, 2016; Papanikolaou & Zygiaris, 2014). Healthcare services are focused on patients, who link their expectations with their perceptions (Bustamante *et al.*, 2020; Valencia-Arias *et al.*, 2018). Traditionally, assessments of healthcare service quality have relied heavily on patient satisfaction measures (Fatima *et al.*, 2018; Ferrand *et al.*, 2016). Historically, healthcare research has predominantly focused on patient satisfaction (Ferrand *et al.*, 2016), service quality (Mosadeghrad, 2014), patient loyalty (Kalhor *et al.*, 2021), and trust (Bentum-Micah *et al.*, 2020). Patient experience is the sum of all interactions shaped by the healthcare institution

that influence patient perceptions across the continuum of care (Wolf *et al.*, 2021). Enhancing and innovating the service experience for customers represents a key priority for companies to survive and compete more effectively (Lemon & Verhoef, 2016; Verleye, 2015; Voorhees *et al.*, 2017). Consumers are more judgmental about the worth of healthcare services being delivered (Lim & Tang, 2000; Ndubisi, 2014). Hospital service quality can be improved by fostering patient contentment, which can be achieved by ensuring service providers' empathy within a reformed organizational setup (Helkkula *et al.*, 2023; Karlton *et al.*, 2020; Sandvin Olsson *et al.*, 2020).

In India, PHCs represent the cornerstone of the public health infrastructure, serving as the first point of contact between rural and semi-urban communities and the formal health system. Established under the Bhore Committee recommendations and subsequently strengthened through National Health Mission frameworks, PHCs are mandated to deliver a comprehensive basket of curative, preventive, and promotive services to designated population catchments (Bhore Committee, 1946; Ministry of Health and Family Welfare, 2005). Kerala, consistently rated among India's highest-performing states on health outcome indicators—including infant mortality rate, life expectancy, and maternal mortality ratio—presents a particularly important case for understanding how service quality shapes patient experience at the primary care level (NITI Aayog, 2021). Kerala's 886 PHCs serve a population with high literacy levels, strong health awareness, and relatively greater expectations regarding healthcare quality, making the assessment of patient satisfaction particularly relevant in this setting.

Despite Kerala's health system achievements, systematic empirical research on patient satisfaction with PHC service quality—employing validated psychometric instruments, rigorous multivariate analyses, and structural equation modeling (SEM)—remains sparse in the published literature. The dominant body of patient satisfaction research in India focuses on tertiary and secondary care institutions (Ramanujam, 2011; Sharma & Narang, 2011), leaving primary care—which handles the majority of healthcare interactions—relatively underexplored. Furthermore, existing studies rarely integrate demographic comparative analysis with factor-analytic dimension reduction and structural equation model-based causal pathway modeling, limiting the depth of insight available for policy and practice.

This study addresses these gaps by analyzing patient satisfaction with PHC services in Kerala using a theoretically grounded and methodologically comprehensive framework. Specifically, the study

investigates: (i) how patient satisfaction levels and perceptions differ across demographic categories (age, gender, domicile, income); (ii) which latent dimensions best summarize the 15-item patient satisfaction construct; and (iii) how service quality dimensions causally impact patient satisfaction and its downstream effect on revisit practices. The findings contribute to the growing literature on healthcare service quality in primary care settings in developing countries, offer empirical benchmarks for Kerala's health administrators, and demonstrate a methodological template applicable to analogous health system research contexts.

2. Review of literature

2.1. Service quality and patient satisfaction: Conceptual foundations

The conceptualization of service quality as a multi-dimensional construct finds its most influential articulation in the service quality (SERVQUAL) model developed by Parasuraman *et al.* 1988, which operationalizes service quality as the gap between patient expectations and perceptions across five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. Subsequent healthcare-specific adaptations—including HEALTHQUAL (Dave *et al.*, 2025) and PubHCServQual (Khambhat, 2018)—have expanded this framework to incorporate dimensions particularly relevant to public health settings, such as accessibility, communication, and security and safety, reflecting the distinctive institutional and patient-population characteristics of primary care.

Patient satisfaction, closely related to but conceptually distinct from perceived service quality, refers to the evaluative judgment patients make about their healthcare experience relative to their expectations (Andaleeb, 1998; Hall & Dornan, 1988). The relationship between service quality and patient satisfaction has been extensively explored in the literature, with the predominant finding that perceived service quality is a significant positive predictor of patient satisfaction across diverse healthcare contexts—from public hospitals in Africa and Asia (Alemu *et al.*, 2021; Shi *et al.*, 2020) to primary care clinics in South Asia and the Middle East (Al-Borie & Sheikh Damanhur, 2013). Aditi (2009) explicitly positions service quality as a predictor of patient satisfaction, arguing that the two constructs together constitute the fundamental building blocks for improving health service performance.

2.2. Dimensions of patient satisfaction in primary care

Research on primary care patient satisfaction identifies a consistent set of determinants: physician quality, nursing

care, diagnostic services, medication availability, waiting time, cleanliness, physical facilities, privacy, and complaint handling. Abbas and Talib (2024) found that patients of Kerala's PHCs were generally satisfied with medical services and staff demeanor but dissatisfied with infrastructure and sanitary conditions—a finding that contextualizes the present study's Kerala-specific analysis. Bhattacharya *et al.* (2018) similarly found that dissatisfaction at primary care facilities clusters around waiting time, seating arrangements, cleanliness, toilet facilities, and medication availability—precisely the dimensions captured in the present study's satisfaction instrument.

Studies from comparable developing country primary care settings reinforce the centrality of clinical care quality alongside non-clinical facility dimensions. Shi *et al.* (2020) found that time spent commuting to the hospital, waiting time, doctors' communication quality, patients' participation in decision-making, and hospital facility quality collectively determined satisfaction levels among patients in primary health facilities in western China. Kazemi *et al.* (2013) found that patients were particularly dissatisfied with responsiveness—the capacity of staff to assist patients and attend to their needs—in Iranian hospital care, a dimension also identified as prominent in the present study's SEM results. These cross-country convergences suggest that while healthcare system structures differ, the fundamental determinants of primary care patient satisfaction are highly universal.

2.3. Demographic influences on patient satisfaction

A substantial body of literature examines whether patient satisfaction varies systematically across demographic categories. Age has been identified as a consistent moderator of satisfaction perception, with older patients generally reporting either higher satisfaction—attributed to lower expectations—or lower satisfaction—attributed to greater health needs and higher vulnerability to service failures (DeVoe *et al.*, 2003; Jaipaul & Rosenthal, 2003). Grøndahl *et al.* (2018) found that patients' perceptions of care quality improved with environmental upgrades but did not vary significantly with demographics in Norwegian hospital settings, while Bhattacharya *et al.* (2018) reported gender-differentiated satisfaction patterns, with men most satisfied with technical excellence and women with interpersonal quality.

Income-related satisfaction differences reflect differences in expectations, access barriers, and reliance on public healthcare. Patients from lower-income groups—who are more dependent on PHCs due to limited ability to access private facilities may evaluate PHC services through a lens of relative gratitude or reduced expectations, while higher-income patients bring comparative reference

points from private-sector experiences (Sharma & Narang, 2011). The domicile dimension urban versus rural patient satisfaction reflects both infrastructural disparities between PHC locations and differential access to alternative healthcare options that shape relative satisfaction benchmarks Abbas and Talib (2024).

2.4. The architecture of evidence: Causal modeling in service quality literature

Structural equation modeling has become the preferred methodology for investigating causal relationships between service quality, patient satisfaction, and behavioral intentions in healthcare research, enabling simultaneous estimation of measurement and structural components while accounting for measurement error (Karsana & Murhadi, 2021; Murti *et al.*, 2013). Murti *et al.* (2013) used SEM with eight service quality dimensions in Indian private hospitals to demonstrate that service quality has both direct effects on behavioral intention and indirect effects mediated through patient satisfaction. Amin and Nasharuddin (2013) employed SEM to show that all five hospital service quality factors—admission, medical care, overall service, discharge, and social responsibility—significantly influenced patient satisfaction, which in turn predicted revisit intention and recommendation behavior.

In the primary care context, SEM studies are rarer, particularly in the Indian public health setting. The composite SEM approach adopted in the present study—integrating exploratory factor analysis (EFA)-derived dimensions into confirmatory factor analysis (CFA) measurement models and combining them into a structural composite model—follows established methodological precedents in healthcare quality research (Dagger *et al.*, 2007; Darvishmotevali & Altinay, 2022) and extends them into the PHC context, contributing methodological novelty alongside substantive findings.

2.5. Research gap

The literature review reveals that while patient satisfaction with healthcare service quality has been extensively studied in tertiary and private care settings globally and in India, PHC-specific research employing integrated EFA–CFA–SEM frameworks in the Indian public health context is limited. Kerala, despite its exceptional health system performance, lacks published peer-reviewed research that systematically analyzes the determinants of multi-dimensional patient satisfaction across demographic groups and models their causal impact on revisit practices using SEM. The present study addresses this gap, generating evidence that is both theoretically grounded and directly actionable for PHC quality improvement in Kerala and

comparable Indian states.

3. Research objectives

This study is guided by the following specific research objectives:

- (i) Objective 1: To examine the satisfaction of patients in relation to the services provided at PHCs in Kerala across demographic categories of age, gender, domicile, and income.
- (ii) Objective 2: To identify and validate the latent dimensions underlying the patient satisfaction construct through EFA and CFA.
- (iii) Objective 3: To confirm the impact of service quality dimensions on patient satisfaction and the consequent effect of patient satisfaction on revisit practices through SEM.

The following hypotheses guide the analysis connected to patient satisfaction:

- (i) H1: There is no significant difference in patient satisfaction across categories of age, gender, domicile, and income groups.
- (ii) H2: There is no significant impact on patient satisfaction based on service quality dimensions.
- (iii) H3: There is no significant impact on revisit practices based on patient satisfaction.

4. Research methodology

4.1. Research design

The study adopts a descriptive and analytical research design. It is descriptive in characterizing the profiles and perceptions of PHC patients across demographic groups, and analytical in testing hypothesized relationships among service quality, patient satisfaction, and revisit practices using multivariate statistical modeling. The study is quantitatively oriented, employing a cross-sectional survey design. Primary data collection was undertaken between January 2024 and June 2024, with a reference period spanning 2010 to 2025.

4.2. Population and sampling

The study population comprises patients who visited or availed services at PHCs in Kerala. The sampling frame was the universe of 886 PHCs distributed across Kerala's 14 districts. A multi-stage stratified sampling design was employed. In the first stage, Kerala was stratified into three geographic regions—South, Central, and North—to ensure representation across agro-climatic and demographic diversity. Districts with the highest PHC concentration within each region were selected: Thiruvananthapuram

(South, 72 PHCs), Ernakulam (Central, 81 PHCs), and Kozhikode (North, 64 PHCs). In the second stage, a stratified proportionate simple random sampling method was used to select PHCs from each district, maintaining proportional representation (28% South, 39% Central, 33% North). In the third stage, patients were selected using purposive sampling based on willingness to participate and having availed PHC services during the data collection period.

A total of 400 valid questionnaire responses were obtained and used for analysis. This sample size comfortably exceeds the minimum recommended for SEM-based studies (Hair *et al.*, 2010) and provides adequate statistical power for the multivariate analyses employed.

4.3. Instrument Development

Prior to the main survey, a pilot study was conducted to assess the clarity, reliability, and suitability of the questionnaire items. The pilot survey was administered to 30 patients from selected PHCs in Kerala who were not included in the final sample. Feedback obtained during the pilot phase helped refine the wording, sequencing, and comprehensibility of certain items, improving response accuracy and reducing ambiguity. Reliability analysis of the pilot data indicated satisfactory internal consistency, with Cronbach's alpha (α) values exceeding the acceptable threshold of 0.70 for all major constructs. Based on the pilot study findings, minor modifications were incorporated before administering the final questionnaire for the main data collection.

Since the study was conducted among patients attending PHCs in Kerala, the questionnaire was prepared in English and translated into Malayalam to ensure better comprehension among respondents. The translated version was reviewed for linguistic accuracy and contextual appropriateness before administration. During data collection, respondents were provided with the questionnaire in their preferred language to facilitate accurate and reliable responses.

The structured self-administered questionnaire comprised two sections. Part 1 captured respondent demographic data, including age, gender, education, occupation, family income, domicile (rural/urban), type of service availed, frequency of visits, distance to the health center, and waiting time. Part 2 measured the study constructs using 5-point Likert scales ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The patient satisfaction construct was operationalized through 15 measurement items adapted from validated scales in the healthcare quality and patient satisfaction

literature (Abbasi-Moghaddam *et al.*, 2019; Ahmed *et al.*, 2014; Andaleeb, 2001; Chahal & Kumari, 2012; Chang *et al.*, 2013; Dagger *et al.*, 2007; Hall & Dornan, 1988; Sillero-Sillero & Zabalegui, 2019; Soleimanpour *et al.*, 2011; Vinagre & Neves, 2008; Zaim *et al.*, 2013). The 15 items covered: satisfaction with time spent in PHC; procedures followed for patients; quality of care by physician; quality of care by nurses and supportive staff; diagnostic care; medicine facilities; facilities provided; time taken at PHC for getting treatment; cleanliness and hygiene; confidence and support given; ensuring privacy; parking facility; waiting area; redressal of complaints; and fairness in treatment.

The service quality construct was measured using 50 variables across eight dimensions—tangibility (8 items), reliability (6 items), responsiveness (7 items), assurance (4 items), empathy (3 items), accessibility (6 items), communication (7 items), and security and safety (5 items)—adapted from established healthcare service quality scales (Brahmbhatt *et al.*, 2011; Lim & Tang, 2000; Singh, 2014; Suki *et al.*, 2011; Taner & Antony, 2006). Revisit practices were measured using 5 items adapted from Pighin *et al.* (2022) and Wandebori (2017).

4.4. Analytical approach

Data were analyzed using SPSS version 24.0 and AMOS version 20.0 (IBM, United States of America). The analytical sequence proceeded as follows:

- Descriptive statistics: Frequency distributions and mean scores for demographic variables and satisfaction items.
- Multivariate analysis of variance (MANOVA) and univariate analysis of variance (ANOVA): To test H2—whether patient satisfaction differs significantly across age, gender, domicile, and income groups. Wilks' lambda (λ) was used for multivariate tests; Bonferroni pairwise comparisons were applied where significant group differences were found.
- Exploratory factor analysis: Principal component analysis with varimax rotation was applied to the 15-item patient satisfaction construct to identify underlying latent dimensions. Kaiser–Meyer–Olkin (KMO) sampling adequacy and Bartlett's test of sphericity were computed as preconditions. Two factors were extracted.
- Confirmatory factor analysis: The EFA-derived factor structure was validated using CFA within the AMOS SEM framework. Composite reliability (CR), average variance extracted (AVE), discriminant validity (heterotrait–monotrait ratio of correlations [HTMT] criterion), and model fit indices were evaluated.

- Structural equation modeling: A composite SEM incorporating measurement models for service quality, patient satisfaction, and revisit practices was estimated to test H4 (there is no significant impact of service quality dimensions on patient satisfaction) and H5 (there is no significant impact of patient satisfaction on revisit practices). Model fit was evaluated using absolute fit (root mean square error of approximation [RMSEA], goodness-of-fit index, chi-square minimum discrepancy), incremental fit (comparative fit index [CFI], normed fit index), and parsimonious fit indices. The significance threshold was set at $p < 0.05$.

A Cronbach's α coefficient of 0.70 or above was adopted as the threshold for acceptable internal reliability across all constructs (Nunnally, 1978).

5. Data analysis and discussion

5.1. Demographic profile of respondents

The sample of 400 respondents exhibited the following demographic distribution. Female respondents constituted 56.8% ($n = 227$) and male respondents 43.3% ($n = 173$), reflecting the higher frequency with which women access primary healthcare facilities in Kerala, consistent with state-level health utilization patterns (NITI Aayog, 2021). The majority of respondents (46.8%) were aged 30 years or younger, with 29% aged 31–40, 15.5% aged 41–50, and 8.8% aged 50 years or older. Graduates constituted 45% and postgraduates 41% of respondents, reflecting Kerala's high educational attainment. In terms of occupation, salaried employees constituted 42%, followed by students (24.5%), businessmen (15.3%), and retired persons (12.3%). The predominant income group was below ₹25,000 per month (57%), with 20.3% in the ₹25,001–50,000 range, 11% in the ₹50,001–75,000 range, and 11.8% above ₹75,000 per month. Equal representation of rural and urban PHC patients was ensured by design.

Regarding service utilization patterns, 44.5% of respondents used curative services, 27.5% preventive services, and 13% child health facilities. The majority (79.3%) visited PHCs only when required. Most respondents (64%) lived within 3 km of their PHC, while 37.3% waited 11–20 min—a figure that has implications for satisfaction with responsiveness and time-related dimensions.

5.2. Descriptive statistics: Patient satisfaction measures

Table 1 presents the descriptive statistics for the 15 measures of patient satisfaction across the total sample

($n = 400$). Mean scores ranged from 3.55 (redressal of complaints) to 3.93 (satisfaction with diagnostic care provided), with all scores exceeding the scale midpoint of 3.00, indicating a generally positive satisfaction orientation among respondents.

The most prominent satisfaction measure was “satisfaction toward diagnostic care provided” ($\bar{X} = 3.93 \pm 0.834$), followed by “satisfaction with medicine facilities” ($\bar{X} = 3.84 \pm 0.915$). These top-ranked dimensions reflect patients' appreciation of the clinical service core—diagnosis and pharmacy provision—suggesting that PHC medical staff competence and medicine availability are positively perceived. In contrast, the least prominent satisfaction measure was “redressal of complaints” ($\bar{X} = 3.55 \pm 1.093$), indicating that patients perceive the grievance redressal mechanism as the weakest dimension of PHC service quality, a finding consistent with studies from comparable public primary care settings in India (Bhattacharya *et al.*, 2018; Abbas and Talib (2024).

Among age groups, the highest satisfaction scores across most dimensions were recorded among the 41–50 years group, while patients above 50 years reported consistently lower satisfaction, particularly on “confidence and support given” ($\bar{X} = 2.54 \pm 1.379$) — the lowest mean score observed in any age-dimension combination in the entire dataset. This finding is clinically significant: Older patients, who typically present with more complex multi-morbidity profiles and require more nuanced communication and support, report the lowest confidence in staff support—signaling a service quality gap specifically at the patient-provider interaction level for the elderly.

5.3. Hypothesis: There is no significant difference in patient satisfaction across categories of age, gender, domicile, and income groups

5.3.1. Age-wise analysis

The MANOVA test with age group as the independent variable yielded a significant multivariate effect (Wilks' $\lambda = 0.755$, $F = 2.502$, hypothesis $df = 45$, error $df = 1135.605$, $p < 0.001$), rejecting the null hypothesis that there is no significant difference in combined patient satisfaction measures across age groups. This finding indicates that patient age is a significant moderator of multi-dimensional satisfaction with PHC services.

Follow-up univariate ANOVA tests (Table 2) confirmed significant differences across age groups for all 15 individual satisfaction measures (all $p < 0.05$). The F -values were highest for “confidence and support given” ($F [3, 396] = 22.334$, $p < 0.001$) and “satisfaction toward facilities provided” ($F [3, 396] = 18.456$, $p < 0.001$), and

Table 1. Descriptive statistics: patient satisfaction measures (total sample, $n = 400$)

Patient satisfaction measure	Mean	Standard deviation
Satisfaction with diagnostic care provided	3.93	0.834
Satisfaction on medicine facilities	3.84	0.915
Satisfaction with procedures followed for patients	3.83	0.929
Satisfaction with the time taken at the primary health center (PHC) for getting treatment	3.81	0.899
Quality of care provided by nurses and supportive staff	3.78	0.833
Satisfaction toward facilities provided	3.78	0.889
Satisfaction toward quality of care provided by the physician	3.77	0.863
Parking facility	3.77	0.899
Insuring privacy	3.79	0.955
Cleanliness and hygiene	3.68	1.028
Satisfaction with time spent in PHC	3.66	1.061
Waiting area	3.64	0.923
Confidence and support given	3.63	1.02
Fairness in treatment	3.58	1.087
Redressal of complaints	3.55	1.093

Note: Source: Primary data

lowest for “waiting area” ($F [3, 396] = 3.398, p = 0.018$) and “satisfaction with time spent in PHC” ($F [3, 396] = 3.930, p = 0.009$).

Bonferroni pairwise comparisons revealed that statistically significant differences were concentrated between the “above 50 years” age group and all younger cohorts, with older patients consistently reporting lower satisfaction on clinical care dimensions. For example, in “quality of care by nurses and supportive staff,” the above 50 years group scored 1.088 points below the 41–50 age group (mean difference = $-1.088, p < 0.001$) and 0.809 points below the up to 30 years group ($p < 0.001$). This pattern suggests that standard PHC service delivery protocols are

Table 2. Analysis of variance results: patient satisfaction by age group

Satisfaction measure	$F (3, 396)$	Significance
Confidence and support given	22.334	0.000***
Satisfaction toward facilities provided	18.456	0.000***
Quality of care by nurses and supportive staff	15.765	0.000***
Satisfaction toward quality of care by the physician	14.295	0.000***
Satisfaction on medicine facilities	13.386	0.000***
Fairness in treatment	12.473	0.000***
Parking facility	12.865	0.000***
Cleanliness and hygiene	12.74	0.000***
Insuring privacy	11.156	0.000***
Satisfaction with diagnostic care provided	11.154	0.000***
Satisfaction with procedures followed for patients	10.435	0.000***
Satisfaction with the time taken at the PHC for getting treatment	10.332	0.000***
Redressal of complaints	7.369	0.000***
Satisfaction with time spent in PHC	3.93	0.009**
Waiting area	3.398	0.018*

Notes: Source: Primary data. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

insufficiently adapted to the communication, empathy, and support needs of elderly patients. The 41–50-year age group was consistently the most satisfied cohort, possibly reflecting that this working-age group benefits most from PHC preventive and curative services that match their epidemiological profile.

5.3.2. Domicile-wise analysis

Independent samples t -tests revealed that rural and urban PHC patients differed significantly on selected satisfaction measures. Significant differences were observed primarily in measures related to medicine availability, facility quality, and procedure-related satisfaction, with urban patients generally reporting higher satisfaction

on these dimensions—reflecting the typically superior infrastructure and supply chain management of urban PHCs relative to their rural counterparts Abbas and Talib (2024). No significant domicile-based differences were found on clinical interaction dimensions such as physician quality and nurse care, suggesting that clinical staff performance is relatively consistent across PHC types in Kerala.

5.3.3. Gender-wise analysis

Gender-stratified *t*-tests confirmed significant differences on five specific satisfaction measures: “satisfaction with procedures followed for patients,” “satisfaction with time taken at PHC for getting treatment,” “confidence and support given,” “waiting area,” and “fairness in treatment.” In all cases, female patients reported significantly higher satisfaction than male patients. This finding may reflect that female patients in Kerala have a higher frequency of interaction with PHCs, particularly for maternal, child health, and reproductive health services, leading to greater familiarity with PHC procedures and a relatively more positive evaluation of staff interactions. Female patients’ greater satisfaction with “fairness in treatment” also aligns with Kerala’s relatively progressive record of gender equity in public service delivery.

5.3.4. Income-wise analysis

Analysis of variance across four income groups revealed significant differences on multiple satisfaction measures. The highest satisfaction with physician care quality was recorded among the ₹50,001–75,000 income group, who likely bring higher quality expectations alongside greater ability to evaluate clinical service quality. The most prominent satisfaction gap involved “redressal of complaints”—the consistently lowest-rated satisfaction measure—with the below ₹25,000 income group reporting the least satisfaction, inferring that the grievance redressal mechanism is perceived as least accessible and effective by the most economically vulnerable patient group. This finding carries significant policy implications: PHC complaint mechanisms disproportionately fail patients most dependent on and least able to exit the public healthcare system.

5.4. Exploratory factor analysis of patient satisfaction

The 15-item patient satisfaction construct was subjected to principal component analysis with varimax rotation to identify its latent dimensional structure.

Precondition tests confirmed the suitability of the data for factor analysis. The KMO measure of sampling adequacy

was 0.942—well above the recommended minimum of 0.70—indicating that the correlation patterns among variables were compact and appropriate for factor analysis. Bartlett’s test of sphericity was significant ($\chi^2 = 2,845.61$, $df = 105$, $p < 0.001$), confirming that the correlation matrix was not an identity matrix and that the shared variance justified factor analysis. The determinant of the correlation matrix was 0.00004 (>0.00001), confirming the absence of problematic multicollinearity.

Two factors were extracted, collectively explaining 71.80% of the total variance: Factor 1 accounted for 38.44% and Factor 2 for 33.36% after varimax rotation. Table 3 presents the factor loading matrix after varimax rotation.

Factor 1—named “satisfied with facilities at PHCs”—comprises nine items with loadings ≥ 0.459 , anchored by satisfaction with physical and medical service dimensions: facilities provided, nursing care, diagnostic care, medicine, treatment time, physician quality, cleanliness, confidence and support, and time spent in PHC. This factor captures the core clinical and environmental quality experience of PHC patients and accounts for the larger share of variance (38.44%), confirming the primacy of clinical service quality in determining overall patient satisfaction (Parasuraman *et al.*, 1988).

Factor 2—named “fair treatment ensuring privacy”—comprises six items with loadings ≥ 0.654 : redressal of complaints, waiting area, ensuring privacy, fairness in treatment, procedures followed for patients, and parking facility. This factor captures the procedural fairness, dignity, and administrative quality dimensions of satisfaction—an aspect of patient experience that is increasingly recognized as independently important in patient-centered care frameworks (Dagger *et al.*, 2007). The relatively high loading of “redressal of complaints” (0.827) on this factor confirms that patients perceive complaint handling as fundamentally linked to procedural fairness and dignified treatment, rather than to clinical quality. This is a novel and practically important insight for PHC quality management.

5.5. Confirmatory factor analysis: Measurement model validation

The EFA-derived two-factor structure was validated using CFA in AMOS. The patient satisfaction measurement model demonstrated strong psychometric properties across all evaluated criteria, as reported in Table 4.

Both factors demonstrated highly significant standardized regression weights (SRWs): Satis_PCA1 (SRW = 0.967, $p < 0.001$) and Satis_PCA2 (SRW = 0.916, $p < 0.001$), confirming that both dimensions are highly significant and reliable reflections of the latent “patient

Table 3. Factor loading matrix: patient satisfaction (varimax rotation)

Satisfaction item	Factor 1	Factor 2
Satisfaction toward facilities provided	0.815	0.368
Quality of care by nurses and supportive staff	0.800	0.342
Satisfaction with diagnostic care provided	0.785	0.310
Satisfaction on medicine facilities	0.785	0.348
Satisfaction with the time taken at the PHC for getting treatment	0.745	0.364
Satisfaction toward quality of care by the physician	0.697	0.504
Cleanliness and hygiene	0.670	0.574
Confidence and support given	0.654	0.543
Satisfaction with time spent in PHC	0.459	0.386
Redressal of complaints	–	0.827
Waiting area	0.312	0.807
Ensuring privacy	0.489	0.773
Fairness in treatment	0.452	0.736
Satisfaction with procedures followed for patients	0.470	0.687
Parking facility	0.525	0.654

Note: Source: Primary data.

Table 4. Reliability and validity statistics: patient satisfaction measurement model

Statistic	Value	Threshold	Assessment
Cronbach's alpha	0.954	≥0.70	Excellent
Composite reliability	0.94	≥0.70	Excellent
Average variance extracted	0.887	≥0.50	Excellent
SRW: Satis_PCA1 (factor 1)	0.967***	Significant	Confirmed
SRW: Satis_PCA2 (factor 2)	0.916***	Significant	Confirmed
HTMT correlation (PCA1–PCA2)	0.886	<0.85 preferred	Negligible excess

Note: *** $p < 0.001$.

Source: Primary data.

Abbreviations: HTMT: Heterotrait–monotrait ratio of correlations; PCA: Principal component analysis; SRW: Standardized regression weight.

satisfaction” construct. The Cronbach's α of 0.954 and CR of 0.940 are substantially above the acceptable threshold of 0.70, indicating excellent internal consistency. The AVE of 0.887—well above the 0.50 threshold—demonstrates strong convergent validity, meaning that the items in the model share high common variance with their hypothesized latent construct.

The HTMT correlation between the two patient satisfaction factors was 0.886, marginally exceeding the conservative 0.85 threshold for discriminant validity. However, as noted by Hair *et al.* (2010), a slight excess over this criterion is not problematic when CR and AVE are strong, and when the theoretical rationale for the distinction between dimensions is well-supported. The two factors are theoretically distinguishable—clinical facility satisfaction versus procedural fairness and privacy—justifying their retention as distinct constructs. Both CFA hypotheses (H17: Satisfied with facilities at PHCs is a significant reflection of patient satisfaction; H18: Fair treatment ensuring privacy is a significant reflection of patient satisfaction) were rejected at $p < 0.001$, confirming the measurement model's validity.

5.6. Structural equation modeling: Service quality, patient satisfaction, and revisit practices

A composite SEM integrating measurement models for all service quality dimensions, patient satisfaction, and revisit practices was estimated in AMOS to test hypotheses

Table 5. Composite model fit indices: service quality, patient satisfaction, and revisit practices

Fit index	Value	Threshold	Assessment
χ^2/df (discrepancy ratio)	3.426	<5.0	Good fit
RMSEA	0.072	<0.08	Good fit
GFI	0.91	>0.90	Good fit
CFI	0.94	>0.90	Good fit
NFI	0.929	>0.90	Good fit
Standardized RMR	0.0544	<0.08	Good fit
CMIN χ^2	548.239 (df = 160)	$p > 0.05$	Acceptable

Source: Primary data.

Abbreviations: χ^2 : Chi-square; CFI: Comparative fit index; CMIN χ^2 : Chi-square minimum discrepancy; GFI: Goodness-of-fit index; NFI: Normed fit index; RMR: Root mean square residual; RMSEA: Root mean square error of approximation.

H4 and H5—the causal impact of service quality on patient satisfaction and the downstream effect of patient satisfaction on revisit practices.

5.6.1. Composite model fit

The composite model demonstrated satisfactory fit across all evaluated indices, as reported in Table 5.

All fit indices meet their respective thresholds, confirming that the composite model is a good fit to the data. The RMSEA of 0.072—below the <0.08 threshold for acceptable fit—and the CFI of 0.940 together indicate that the model adequately represents the covariance structure of the observed data, supporting the validity of the estimated structural relationships.

5.6.2. Structural paths: Service quality → patient satisfaction → revisit practices

Table 6 presents the SRWs for the key structural paths in the composite model, with a focus on the patient satisfaction pathway.

The null hypothesis H4—that service quality dimensions have no significant impact on patient satisfaction—is rejected at the 0.001 significance level (SRW = 0.913, $p < 0.001$). This means that a unit change in service quality dimensions produces a 0.913-unit change in patient satisfaction, a near-perfect positive impact demonstrating the primacy of multi-dimensional service quality as the determinant of PHC patient satisfaction. Among the eight service quality dimensions, responsiveness (SRW = 1.000) and assurance (SRW = 1.000) have the maximum standardized effect on service quality—the capacity of staff to promptly attend to patients and provide assurance of competent care are the most influential quality dimensions

in determining the overall service quality score, which drives satisfaction.

The null hypothesis H5—that patient satisfaction has no significant impact on revisit practices—is also rejected at the 0.001 significance level (SRW = 0.842, $p < 0.001$). A 1-unit change in patient satisfaction produces a 0.842-unit change in revisit practices—a large and highly significant effect confirming that satisfied patients are substantially more likely to return for future care and recommend the PHC to family members. This finding aligns with the theoretical framework proposed by Andaleeb (1998) and empirically confirmed by Murti *et al.* (2013) and Karsana and Murhadi (2021) in analogous healthcare settings, and extends this evidence into Kerala's primary health system.

The full causal chain—service quality → patient satisfaction → revisit practices—is thus empirically validated in the Kerala PHC context. The mediating role of patient satisfaction is particularly important from a policy standpoint: It confirms that improvements in measurable service quality dimensions (waiting time, staff attentiveness, medicine availability, facility cleanliness) will cascade through patient satisfaction into improved utilization behaviors, including greater willingness to use PHC for all health issues and recommend the facility to family members. This provides a quantitative justification for sustained investment in improving the quality of PHC services.

6. Key findings

6.1. Finding 1: Patient satisfaction is moderate-to-high but uneven across dimensions

Overall patient satisfaction with PHC services in Kerala is moderate to high, with all 15 measures scoring above the

Table 6. Standardized regression weights: key structural paths (patient satisfaction)

Structural path	SRW	<i>p</i> -value	Hypothesis	Decision
Service quality → patient satisfaction	0.913	***	H2	Rejected
Patient satisfaction → revisit practices	0.842	***	H3	Rejected
Service quality → tangibility	0.913	***	–	Confirmed
Service quality → reliability	0.899	***	–	Confirmed
Service quality → responsiveness	1	***	–	Confirmed
Service quality → assurance	1	***	–	Confirmed
Service quality → empathy	0.987	***	–	Confirmed
Service quality → security and safety	0.922	***	–	Confirmed

Note: *** $p < 0.001$.

Source: Primary data.

Abbreviation: SRW: Standardized regression weight.

scale midpoint. Clinical service dimensions—diagnostic care ($\bar{X} = 3.93$), medicine facilities ($\bar{X} = 3.84$), and physician quality ($\bar{X} = 3.77$)—are the highest-rated, while administrative and procedural dimensions—particularly redressal of complaints ($\bar{X} = 3.55$) and waiting area adequacy ($\bar{X} = 3.64$)—are the lowest-rated. This pattern suggests that the clinical competence of PHC staff is relatively well-received by patients, but the structural and administrative dimensions of the service experience require significant improvement.

6.2. Finding 2: Age is a significant moderator of patient satisfaction

Multivariate and univariate analyses confirm significant age-group differences in patient satisfaction across all 15 dimensions (Wilks' $\lambda = 0.755$, $p < 0.001$). Patients aged 41–50 years report the highest satisfaction across most dimensions, while patients above 50 years consistently report the lowest—particularly on “confidence and support given” ($\bar{X} = 2.54$)—indicating that elderly patients' communication, emotional support, and care continuity needs are not adequately met by current PHC service protocols. PHC staff training specifically targeting geriatric-sensitive communication is strongly indicated.

6.3. Finding 3: Two latent dimensions underpin patient satisfaction

Exploratory factor analysis identifies a robust two-factor structure (KMO = 0.942, total variance explained = 71.80%): “satisfied with facilities at PHCs” (factor 1: 38.44%), capturing clinical quality and environmental experience, and “fair treatment ensuring privacy” (factor 2: 33.36%), capturing procedural fairness, dignity, and administrative responsiveness. Both factors are confirmed as significant reflections of the patient satisfaction construct by CFA (SRW₁ = 0.967, SRW₂ = 0.916, $p < 0.001$). The distinction between these two satisfaction dimensions is practically important: interventions targeting factor 1 (facility and clinical upgrades) and factor 2 (complaint mechanisms, privacy, fairness) require different administrative responses.

6.4. Finding 4: Service quality has a near-perfect impact on patient satisfaction

Structural equation modeling analysis confirms that service quality dimensions have a highly significant, near-perfect positive impact on patient satisfaction (SRW = 0.913, $p < 0.001$), rejecting H4. Responsiveness and assurance emerge as the most influential service quality dimensions (SRW = 1.000 each), followed by empathy (0.987), security and safety (0.922), tangibility (0.913), reliability (0.899), communication (0.869), and accessibility

(0.856). This ranking provides healthcare administrators with a prioritization framework for quality improvement investments.

6.5. Finding 5: Patient satisfaction significantly drives revisit practices

Patient satisfaction exerts a strong positive effect on revisit practices (SRW = 0.842, $p < 0.001$), rejecting H5. Satisfied patients are substantially more likely to return to the PHC for future health needs and recommend the facility to family members, validating the theoretical framework that positions patient satisfaction as the critical mediating link between service quality delivery and patient retention in public primary healthcare. This finding has direct implications for resource allocation: investment in service quality improvement yields measurable returns in patient utilization and facility effectiveness.

7. Suggestions and policy recommendations

7.1. Strengthening clinical and facility dimensions of satisfaction

To enhance patient satisfaction in primary healthcare settings, targeted improvements should focus on strengthening both clinical services and facility-related dimensions.

- Primary health center administration should prioritize modernization of diagnostic equipment and medicine supply chain management, as “satisfaction towards diagnostic care” and “satisfaction with medicine facilities” are the highest-valued satisfaction dimensions—maintaining and improving these will sustain the patient satisfaction baseline (Bhattacharya *et al.*, 2018).
- Infrastructure master plans for PHC buildings should incorporate adequate patient space, clean and well-maintained facilities, proper sanitary arrangements, and dedicated waiting areas—directly addressing the lowest-performing physical environment satisfaction measures.
- Periodic maintenance audits for cleanliness and hygiene should be institutionalized, with measurable cleanliness standards incorporated into PHC performance scorecards reviewed by district medical officers.

7.2. Improving grievance redressal and procedural fairness

To further enhance patient satisfaction in primary healthcare settings, it is essential to strengthen grievance redressal systems and ensure procedural fairness in service delivery.

- A structured, transparent, and patient-accessible grievance redressal mechanism should be established at every PHC, with complaint boxes checked weekly, digital complaint submission options, and mandated acknowledgement and resolution timelines. Public awareness campaigns on grievance entitlements should be conducted periodically.
- Primary health center staff should receive training in procedural fairness principles—treating all patients equally regardless of income, caste, or gender—with community-level feedback mechanisms to monitor compliance. The significantly lower satisfaction of patients with incomes below ₹ 25,000 with complaint redressal demands requires specific attention.
- Waiting area quality, privacy provisions (including private consultation spaces), and parking facilities should be incorporated into PHC infrastructure standards, as these constitute the “fair treatment ensuring privacy” factor that independently explains 33% of patient satisfaction variance.

7.3. Addressing age-differentiated satisfaction gaps

To improve equity in patient experience across age groups, it is important to address age-differentiated satisfaction gaps within primary healthcare services.

- Targeted geriatric communication training should be provided to PHC clinical and support staff, equipping them with skills to deliver empathetic, unhurried, and comprehensible interactions with elderly patients—directly addressing the “confidence and support given” dimension where patients above 50 years report the lowest satisfaction across the entire dataset.
- Primary health center service protocols should be reviewed to ensure that elderly patients receive priority queuing, extended consultation time, and enhanced follow-up support—acknowledging their greater health burden and lower satisfaction with standard service delivery.

7.4. Leveraging responsiveness and assurance as priority dimensions

To enhance overall service quality in primary healthcare settings, particular emphasis should be placed on strengthening responsiveness and assurance as the most influential dimensions of patient satisfaction.

- Given that responsiveness (SRW = 1.000) and assurance (SRW = 1.000) have the strongest impact on service quality—and thereby on patient satisfaction—PHC management should implement specific responsiveness improvement initiatives: streamlined registration procedures, reduced pre-consultation waiting times, dedicated staff helpdesk functions, and

prompt pharmacist interaction.

- Healthcare quality training programs should emphasize the dimensions of assurance—politeness, courteousness, providing encouragement and a sense of trust to patients—as foundational interpersonal quality standards for all PHC staff, from frontline nurses and doctors to administrative personnel.

7.5. Systemic and policy-level recommendations

To strengthen the performance of the primary healthcare system and ensure evidence-based policy formulation, systemic and policy-level interventions are required.

- Kerala’s health administration should institutionalize regular patient satisfaction surveys as a mandatory component of PHC quality monitoring, using the validated 15-item instrument developed in this study as a standardized measurement tool. Annual satisfaction reports should be publicly available at the district and state levels.
- The evidence that patient satisfaction (SRW = 0.842) strongly drives revisit practices should inform budget justifications for PHC quality improvement investments—presenting quality expenditure not merely as a welfare cost but as a measurable driver of facility utilization rates and primary healthcare absorption, reducing the burden on secondary and tertiary facilities.

The findings regarding older patients indicate the need for further qualitative exploration to better understand the barriers that influence their perceptions, healthcare experiences, and utilization patterns within PHCs. In-depth qualitative approaches, such as interviews or focus group discussions, may provide richer insights that support more effective, context-specific policy implementation. Additionally, strengthening health promotion and awareness programs at the community level may improve patient engagement, service utilization, and understanding of available healthcare facilities. Future studies may also examine the influence of cultural and social factors on patient expectations, healthcare experiences, and satisfaction levels, as these contextual dimensions can significantly shape perceptions of service quality in primary healthcare settings.

8. Conclusion

This study provides a comprehensive, methodologically rigorous empirical analysis of patient satisfaction with services at PHCs in Kerala, India—a domain that, despite Kerala’s exceptional health system performance, has lacked systematic quantitative investigation in the published literature. Using a validated 15-item instrument administered to 400 patients across three geographic

regions, and employing an integrated analytical framework of MANOVA, EFA, CFA, and SEM, the study delivers evidence on three interconnected questions: how patient satisfaction varies across demographic groups, what latent dimension structures the patient satisfaction construct, and how service quality causally shapes satisfaction and its downstream effect on revisit practices.

The principal findings are clear and actionable. Patient satisfaction with PHC services in Kerala is moderate to high overall, but exhibits significant heterogeneity across demographic categories—particularly age—with elderly patients systematically less satisfied across nearly all dimensions, most critically on “confidence and support given.” The two-factor structure of patient satisfaction—“satisfied with facilities at PHCs” and “fair treatment ensuring privacy”—confirmed by both EFA and CFA with excellent reliability ($\alpha = 0.954$) and convergent validity ($AVE = 0.887$), reveals that patient satisfaction is not monolithic but encompasses both clinical service quality and procedural dignity and fairness. These two dimensions demand distinct and targeted quality improvement responses.

Most significantly, the SEM-based causal analysis demonstrates that service quality is a near-perfect predictor of patient satisfaction ($SRW = 0.913$, $p < 0.001$), and patient satisfaction is a strong driver of revisit practices ($SRW = 0.842$, $p < 0.001$). The responsiveness and assurance dimensions of service quality exert the greatest influence, followed closely by empathy, security and safety, and tangibility. This ranking should inform resource allocation decisions and staff training priorities for PHC administrators across Kerala and comparable Indian public health contexts.

The study’s contributions are threefold. Theoretically, it extends the service quality–patient satisfaction–behavioral intention framework to the primary public healthcare context of a high-performing Indian state, generating context-specific evidence that complements and nuances the predominantly tertiary and private-care-focused literature. Methodologically, it demonstrates the value of integrating multi-stage factor-analytic and SEM approaches in healthcare quality research, providing a replicable template for primary care satisfaction research in developing country settings. Practically, it delivers specific, evidence-based recommendations for PHC administrators, district medical officers, and Kerala’s state health policy apparatus.

Limitations of the study include its cross-sectional design, which precludes causal inference beyond the SEM framework, and the use of purposive patient sampling at the PHC level, which may introduce selection bias toward more health-engaged patients. Future research

should employ longitudinal designs to track changes in satisfaction with PHC quality improvement interventions, extend the geographic scope to all 14 districts of Kerala, and incorporate the service provider perspective—a dimension explicitly outside the present study’s scope—to provide a complete quality management view. A comparative analysis of patient satisfaction between public PHCs and private primary care facilities would also yield practically valuable benchmark data for quality improvement policy.

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Conflict of interest

The authors declare they have no competing interests.

Author contributions

Conceptualization: Sofia Ahmed Sait

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Ethics approval and consent to participate

The study was conducted in accordance with established ethical principles for social science and health-related research. Participation in the survey was entirely voluntary, and informed consent was obtained from all respondents prior to data collection. Participants were assured of the confidentiality and anonymity of their responses, and the collected data were used solely for academic and research purposes. Ethical clearance for the study was granted by the Institutional Ethics Committee of the University of Kerala at the meeting held on November 22, 2023. No approval/reference number was issued.

Consent for publication

All participants provided informed consent for the use of their anonymized responses for research and publication purposes. No personally identifiable information is reported in this study.

Availability of data

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request. Access may be subject to ethical and confidentiality considerations to protect participant privacy.

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