Changing Tendencies of Healthcare Utilization and Expenditure Patterns in Rural Tamil Nadu: Evidence from a Cross-Sectional Study

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Abstract: The pressing demand for healthcare in rural areas of Tamil Nadu, India, necessitates a closer examination of existing healthcare utilization patterns and preferences. Despite the expansion of healthcare services, significant disparities persist, highlighting the need for targeted policy interventions. Research was conducted in 38 non-panchayat villages in Tamil Nadu, a southern Indian state, with 1225 respondents. Logistic regression and chi-square tests were used to examine factors influencing treatment preferences, satisfaction levels, and expenditure patterns in rural areas. Results reveal a marked preference for Private healthcare facilities, despite higher expenditure compared to government hospitals. Interestingly, distance to healthcare facilities did not significantly affect satisfaction levels; however, shorter travel times correlated with higher satisfaction. The quality of treatment proved to be a significant factor influencing patient satisfaction in remote villages. Notably, concrete differences in expenditure were observed across different types of healthcare facilities. The findings of this study underscore the importance of perceived quality of care and convenience in shaping healthcare utilisation patterns. In rural areas, policy interventions should focus on improving the accessibility and quality of healthcare services in remote villages to promote health equity.

Keywords: Patient Satisfaction; Health Expenditure; Quality of Care; Rural Health; Healthcare Preference; Healthcare Accessibility; Health Equity; Government Hospitals.

1. Introduction

Rural development has garnered increasing attention in recent years due to several critical factors. Two major issues underscore the importance of addressing healthcare in the rural context. First, approximately two-thirds of the population still reside in villages, where persistent underdevelopment remains a significant concern. Second, the underdevelopment of the rural sector poses a substantial obstacle to the overall economic progress. An analysis of the rural landscape in Tamil Nadu reveals notable trends between the 2001 and 2011 census periods. The data shows that rural areas account for a significant share of Tamil Nadu's population, with approximately 51.60 per cent residing in villages. In absolute numbers, this translates to a total rural population of 18,679,065, comprising 18,550,525 males and 37,229,590 females. The striking population growth recorded over the decade (2001-2011) reflects the rapid expansion and demographic shift within rural Tamil Nadu. This trend suggests the

interplay of multiple factors, including improvements in healthcare and infrastructure, contributing to enhanced living conditions and opportunities in these areas. Moreover, it highlights the need for targeted policies and investments to support the growing rural population and ensure sustainable development [8]. Over the years, there has been a significant expansion in healthcare service delivery in rural areas. However, a prevalent perception remains that high-quality health services are disproportionately concentrated in urban areas.

In a state like Tamil Nadu, renowned for its health tourism, it is crucial to examine the roles of both public and private healthcare entities in providing essential services. In Tamil Nadu, the proportion of ailing persons per thousand is higher in both rural (146) and urban (184) areas compared to the national average (89 in rural areas and 118 in urban areas). This suggests a higher reported morbidity in Tamil Nadu. A greater percentage of non-hospitalised individuals in Tamil Nadu —both rural (40%) and urban (27%) —use public facilities compared to the national averages (25% rural and 20% urban) (Healthcare Utilisation & Expenditure in India: State Fact Sheets). This indicates a relatively higher reliance on public healthcare services in Tamil Nadu for non-hospitalised care [15].

Private healthcare is more frequently used for non-hospitalised cases across both rural and urban areas. In Tamil Nadu, 55% of rural and 67% of urban non-hospitalised cases use private facilities, compared to 64% (rural) and 73% (urban) at the national level. The use of informal care is lower in Tamil Nadu (5% rural, 6% urban) compared to the national average (11% rural, 7% urban). The proportion of people getting hospitalised per thousand is slightly higher in Tamil Nadu (57 rural, 59 urban) than the national average (44 rural, 49 urban). This might indicate better access to healthcare facilities in Tamil Nadu, allowing more people to seek hospitalisation when needed. For hospitalisation, Tamil Nadu's rural population uses public facilities (40%) at a rate similar to the national average (42%).

Private hospitals are used more frequently for hospitalisations in Tamil Nadu, with 60% of rural and 71% of urban hospitalised cases utilising private facilities, which aligns with national trends. Tamil Nadu's OOPE per hospitalised case is lower than the national average in rural areas (Rs. 11,438 vs. Rs. 14,473) but similar in urban areas (Rs. 21,637 vs. Rs. 21,985). Public healthcare results in significantly lower OOPE compared to private care. For example, in rural Tamil Nadu, the OOPE for public hospitalisations is Rs. 459, compared to Rs. 18,876 for private hospitals. This trend is consistent with the national scenario. The cost disparity between public and private hospitalisations suggests that those utilising private facilities face a much higher financial burden, particularly in urban areas [11]. Tamil Nadu sees a higher incidence of reported morbidity and a greater reliance on both public and private healthcare facilities compared to the national average. Private healthcare use, especially for hospitalisation, is usually dominant, leading to higher OOPE. Despite increased use of private care, the public healthcare system remains a crucial resource for minimising healthcare costs in the state.

Tamil Nadu has 12,620 Village Panchayats, distributed across its 30 districts and 385 administrative blocks. On average, each district has around 421 Village Panchayats, while each block contains approximately 32. Some districts, such as The Kanniyakumari, Karur, Nilgiris, and Theni, have relatively fewer Village Panchayats. In contrast, districts like Cuddalore, Kancheepuram, Tiruvannamalai, Vellore, and Villupuram have a considerably higher number of Village Panchayats. The disparities in resource allocation among Village Panchayats in Tamil Nadu have notable implications for healthcare access and utilisation, particularly in smaller Panchayats. Village Panchayats in the state vary significantly in population, ranging from less than 500 to over 25,000 residents.

The devolution of State Finance Commission (SFC) grants is primarily linked to population size, resulting in smaller Panchayats receiving less funding despite having fixed operational costs, such as administrative expenses and utility payments. While larger Panchayats may have more substantial needs due to their larger populations, smaller Panchayats often struggle to meet even their basic operational costs, which can adversely affect the delivery of essential public services, including healthcare. Limited financial resources constrain the ability of smaller Panchayats to maintain primary healthcare infrastructure, organise regular medical camps, or provide other critical health-related services. For instance, several smaller Panchayats have reported difficulties in covering the expenses of primary healthcare centres (PHCs).

They are often unable to provide adequate support for staffing and maintenance, resulting in lower service availability. Furthermore, these financial constraints hinder the capacity of smaller Panchayats to adapt to emerging healthcare challenges, such as seasonal disease outbreaks or the need for emergency medical supplies. Such limitations are particularly concerning in rural Tamil Nadu, where populations often rely heavily on local public healthcare facilities for accessible, affordable care. Financial under-resourcing often leads to delayed care, limited availability of health services, and increased out-of-pocket expenditure for residents of smaller Panchayats. By examining these patterns, research can inform policy recommendations to more equitably distribute SFC grants and ensure that smaller Panchayats are better equipped to meet the healthcare needs of their communities. This is a crucial step for fostering a more inclusive approach to healthcare provision, ensuring that the rural health system in Tamil Nadu is responsive to the diverse needs of its populations, irrespective of the size of their Panchayats.

2. Review of Literature

The way people seek healthcare is influenced by their perceptions of the quality of services provided in health centres. A study by Yadav et al. [12] found that most individuals seek formal healthcare, with a preference for private facilities due to their perceived higher quality. However, it is crucial to examine the healthcare landscape in rural areas, particularly in the most remote villages, to understand preferences for healthcare facilities and the pivotal role of quality in determining them. Observing the preference for healthcare facilities in rural areas is crucial for improving access to essential healthcare services, thereby guiding effective resource allocation and addressing disparities between rural and urban healthcare [16]. By understanding the specific needs and barriers faced by rural populations, policymakers and healthcare providers can enhance the quality of care, make informed decisions about service offerings, and ensure that facilities are well-equipped and strategically located. A study by Hannawa et al. [1] found that private healthcare facilities typically offer better-quality care, shorter waiting times, and more personalised attention than public healthcare facilities. Private facilities often have more resources, advanced medical equipment, and higher staff-to-patient ratios, contributing to improved patient experiences. Additionally, the competitive nature of private healthcare may drive these facilities to maintain higher service standards to attract and retain patients [2]. Consequently, these factors are believed to contribute to higher patient satisfaction among those who choose private healthcare.

In evaluating patient satisfaction across various healthcare settings, understanding the nuances between patient experiences and facility type is crucial for enhancing service delivery [10]; [4]. Satisfaction levels often reflect the perceived quality of care, access to medical resources, and the responsiveness of healthcare providers. The type of facility—ranging from government and private hospitals to ESI hospitals, native healthcare centres, and other specified locations—can significantly influence patient satisfaction due to variations in service delivery standards, resource availability, and patient-provider interactions. Government hospitals often serve as a primary care point for economically marginalised populations, but concerns regarding overcrowding, resource constraints, and extended waiting times can negatively impact patient satisfaction [8]; [14]. In contrast, private hospitals tend to offer more personalised care with reduced waiting times; however, the higher cost of services may limit access for lower-income groups. ESI hospitals serving formally employed populations aim to balance affordability and quality; however, patient satisfaction in these facilities can vary depending on the adequacy of infrastructure and specialised services [7]. Native healthcare centres, often providing traditional or alternative treatment methods, cater to patients seeking culturally aligned care or those who may prefer non-allopathic approaches. Satisfaction in these settings can be influenced by patients' beliefs and the alignment of services with cultural expectations. Understanding patient satisfaction across different types of healthcare facilities can inform resource allocation decisions and healthcare policy development aimed at optimising the delivery of healthcare services to diverse populations.

When it comes to travelling for availing treatment in rural areas, longer travel distances increase inconvenience, delay timely care, impose physical and emotional strain, elevate transportation costs, disrupt continuity of care, and foster perceptions of inadequate local services, all of which contribute to lower patient satisfaction. Hence, patients with reduced travel times to healthcare facilities will exhibit higher levels of patient satisfaction, grounded in several key factors. Shorter travel times enhance convenience, reducing the logistical burden and stress associated with longer journeys [5]. They also reduce transportation costs, alleviating financial toxicity and improving overall satisfaction. Additionally, quicker access to care enables timelier treatment, which can lead to improved health outcomes and a more positive patient experience [13]. Reducing travel time through telemedicine can also decrease physical and emotional strain, particularly for those with chronic conditions or disabilities, and encourage more frequent visits, thereby improving the continuity of care. Collectively, these factors suggest that minimising travel time can significantly enhance patient satisfaction with healthcare services.

Factors influencing a patient's choice, such as quality of care, convenience, cost, and specific services, shape their treatment experience [9]. Patients select facilities based on what they value most, and if these preferences align with their actual experiences, they are likely to report higher satisfaction. For instance, if a facility is chosen for its advanced medical technology or convenience, and it meets these expectations, the patient's satisfaction is likely to be higher. Similarly, cost-related preferences can impact satisfaction if the facility meets financial expectations. Despite extensive research on healthcare utilisation and patient satisfaction in rural India, significant gaps remain, particularly in rural Tamil Nadu. Prior studies have primarily focused on the general preference for private healthcare due to perceived superior quality, even with higher out-of-pocket expenditures (OOPE). However, there is a lack of detailed analysis that considers how factors such as travel time, satisfaction levels, and expenditure patterns interact specifically in non-panchayat rural regions. Additionally, most studies have highlighted urban-rural disparities without thoroughly investigating differences within rural areas themselves (intra-rural disparities), such as variations between remote and more accessible villages.

The role of proximity to healthcare facilities and its influence on patient satisfaction, especially among rural populations, remains underexplored. Furthermore, while digital health solutions such as telemedicine have been proposed to mitigate travel burdens, their impact on satisfaction and healthcare-seeking behaviour in these rural settings remains poorly understood. Therefore, this study aims to gain insights into current trends in healthcare access and delivery in rural areas, focusing on the

determinants that shape individuals' healthcare treatment preferences, their satisfaction with the chosen treatment, and the subsequent economic implications [3]. The primary objective is to explore the relationship between key factors, including the preferred healthcare location, the underlying rationales guiding these preferences, proximity to chosen facilities, time-related aspects, the influence of private healthcare services, healthcare providers, and their collective impact on patient satisfaction and expenditure.

3. Materials and Methods

The study focuses on recapitulating the tendency to utilise healthcare provision in the smaller villages of Tamil Nadu. The areas chosen are the "remote villages", which are defined as those with fewer than 1,000 households, situated away from the periphery of towns or urban areas. To identify these smaller/remote villages, a comprehensive list of 15,049 villages was referenced from the Census 2011 data. Villages located more than 30 kilometres from cities or towns were selected, resulting in 354 such villages in Tamil Nadu. Among these, 197 villages were identified as non-panchayat villages, distributed across 34 Blocks in 17 Districts.

From these, 38 villages were selected for the study, representing approximately 10% of the villages in each block. A primary survey was conducted to assess accessibility and satisfaction among respondents from the identified villages. The study cohort comprised 1,224 respondents from various households, representing diverse demographic groups, including the elderly, youth, women, marginalised groups, and individuals with disabilities. Additional data sources consulted for the study include the NSSO, Economic Surveys spanning various years, Human Development Reports specific to Tamil Nadu, and reports from the rural development programmes. This approach facilitates a comprehensive evaluation of the factors influencing healthcare treatment preferences, satisfaction levels, and their economic implications (Table 1).

Table 1: Frequency of age, sex and social group of the respondents

		Frequency	**Valid Percent**	**Cumulative Percent**
Sex	Male	768	62.7	62.7
	Female	457	37.3	100.0
	Total	1225	100.0	
Age	10-30	196	16.0	16.0
	31-50	587	47.9	63.9
	51-70	392	32.0	95.9
	71-90	50	4.1	100.0
	Total	1225	100.0	
Social group	OC	20	1.6	1.6
	BC	358	29.2	30.9
	MBC	174	14.2	45.1
	SC	324	26.4	71.5
	SCA	4	0.3	71.8
	ST	345	28.2	100.0
	Total	1225	100.0	

Statistical analysis involves conducting a Chi-square test to assess the association between the choice of private healthcare and reported satisfaction levels. Logistic regression was used to examine the relationship between the distance to facilities and satisfaction, and another regression analysis was conducted to assess the correlation between travel time and reported satisfaction. Furthermore, the Kruskal-Wallis test is used to detect differences in monthly healthcare expenditures across facility types. This comprehensive analysis offers insights into the factors that influence healthcare preferences, satisfaction levels, and expenditure patterns in the region.

4. Findings and discussion

4.1. Healthcare preferences

In pursuit of the objective of determinants of choice of healthcare, this study examines the correlation between variables, specifically investigating whether patients opting for private healthcare facilities report higher satisfaction levels with their treatment compared to those choosing public facilities, and it is hypothesised as:

- **H1:** Individuals who choose private healthcare facilities exhibit higher levels of satisfaction than individuals who select public healthcare facilities.

This hypothesis is tested to determine if this assumption holds in the most remote rural areas (Table 2).

Table 2: Cross-tabulation of patient satisfaction across different healthcare facilities

Patient Satisfaction Across Different Healthcare Facilities			Treatment Satisfaction		Total
			Yes	No	
Place of Treatment	Govt. Hospital	Count	906	86	992
		Expected Count	915.0	77.0	992.0
		% within Place of Treatment	91.3%	8.7%	100.0%
	Pvt. Hospital	Count	151	6	157
		Expected Count	144.8	12.2	157.0
		% within Place of Treatment	96.2%	3.8%	100.0%
	ESI Hospital	Count	67	1	68
		Expected Count	62.7	5.3	68.0
		% within Place of Treatment	98.5%	1.5%	100.0%
	Native Health Care	Count	4	0	4
		Expected Count	3.7	0.3	4.0
		% within Place of Treatment	100.0%	0.0%	100.0%
	Others specify	Count	1	2	3
		Expected Count	2.8	0.2	3.0
		% within Place of Treatment	33.3%	66.7%	100.0%
Total		Count	1129	95	1224
		Expected Count	1129.0	95.0	1224.0
		% within Place of Treatment	92.2%	7.8%	100.0%

A comparative analysis of patient satisfaction across these healthcare settings provides insights into how each facility type meets patient expectations and contributes to the population's overall health outcomes. Such findings can inform strategic decisions on resource allocation, infrastructure development, and targeted interventions to improve patient satisfaction, thereby ensuring equitable access to quality healthcare services. This approach aligns with the goals of achieving Universal Health Coverage (UHC) by addressing the varying needs of populations served by different healthcare providers, thus contributing to a more efficient and patient-centred healthcare system (Table 3).

Table 3: Patient satisfaction across healthcare facilities- chi-square test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.182[a]	4	.000
Likelihood Ratio	17.960	4	.001
Linear-by-Linear Association	2.398	1	.122
N of Valid Cases	1224		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 23.			

The Pearson Chi-Square test strongly suggests a significant relationship between the type of healthcare facility chosen and the level of reported satisfaction with treatment. With a p-value extremely close to zero (.000), confirming an association between the preferred healthcare facility and satisfaction level. These results robustly suggest that individuals who favour private healthcare facilities exhibit notably higher reported satisfaction levels than those who opt for public facilities. This reinforces the initial hypothesis by establishing a clear link between a preference for private facilities and higher satisfaction levels.

4.2. Distance of Facility and Time as Determinants

The findings by Nemet and Bailey [6] support the notion that greater distance from healthcare providers correlates with reduced utilisation, indicating that proximity not only serves as a proxy for access but also reflects the broader social connections between residents and their local communities.

- **H2:** The distance to the preferred healthcare facility negatively influences treatment satisfaction, with greater distance being associated with lower satisfaction ratings.

To test this hypothesis, a logistic regression analysis was conducted, treating satisfaction level as the binary dependent variable (outcome) and travel time as the independent variable (scale variable-predictor).

$$Y = \beta_0 + \beta_1 + \ldots\ldots + \beta_n$$

Y denotes the probability of the binary outcome (in this case, patient satisfaction). β_0 is the intercept of the model, indicating the log-odds of the outcome when all predictor variables (X_1, X_2, ..., X_n) are zero. It provides the baseline log-odds of patient satisfaction when travel time is zero. β_1, β_2, ..., β_n are the coefficients for the predictor variables. Each coefficient represents the change in the log odds of the outcome for a one-unit change in the respective predictor variable. For example, β_1 represents the change in the log odds of patient satisfaction resulting from a one-unit increase in travel time. X_1, X_2, ..., X_n are the predictor variables. In this study, X_1 corresponds to the travel time to healthcare facilities. The logistic regression model is used to evaluate the impact of independent variables, such as travel time, on the probability of the dependent variable, namely patient satisfaction. By examining the coefficients (β), the model determines whether longer or shorter travel times correlate with higher or lower satisfaction levels. This research specifically aims to understand how variations in travel time (X_1) affect the probability of patient satisfaction (Y). Here, patient satisfaction is the binary outcome variable, and travel distance is the continuous predictor variable. The model is estimated using the `glm` function in R, employing the binomial family, which is suitable for binary outcome data (Figure 1). This analysis helps us understand how changes in travel distance influence the likelihood of patient satisfaction (Table 4).

Coefficients

Table 4: Regression results for the effect of distance on the outcome variable

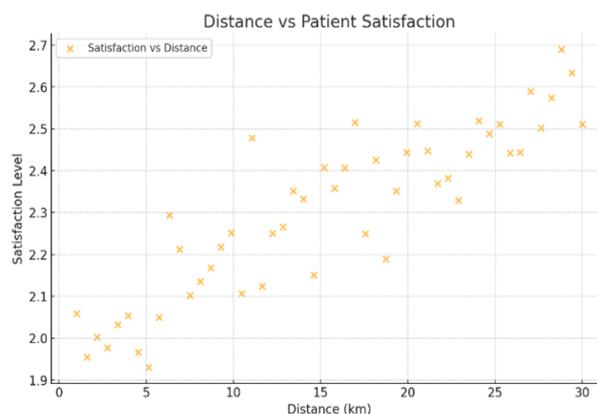|	**Estimate**	**Std. Error**	**z value**	**Pr (>|z|)**
(Intercept)	2.30457	0.18010	12.796	<2e-16
Distance	0.02063	0.01827	1.129	0.259

(Dispersion parameter for the binomial family is assumed to be 1)
Null deviance: 668.07 with 1223 degrees of freedom
Residual deviance: 666.66 with 1222 degrees of freedom
AIC: 670.6
Number of Fisher Scoring iterations: 5

Source: Author's analysis from the data

Figure 1: Scatter plot of distance travelled to satisfaction levels

The estimated coefficient for Distance, at 0.02063, implies that with every additional kilometre in distance from the healthcare facility, there's an approximate increase of 0.02063 units in the log-odds of reporting Satisfaction. However, with a p-value of 0.259, which exceeds the standard significance threshold of 0.05, the result is not statistically significant. Therefore, the data do not provide substantial evidence to support the hypothesis that greater distances adversely affect the choice of healthcare facility.

Moreover, the logistic regression model incorporating the Distance variable doesn't offer improved explanatory power compared to the model with only the intercept, as evidenced by the AIC value. Ultimately, these findings suggest that there is no noteworthy association between distance to healthcare facilities and treatment satisfaction in this dataset. The respondents' inclination towards longer distances likely stems from the superior quality of healthcare services provided by the distant health facility.

- **H3:** Patients with reduced travel time to healthcare facilities will exhibit higher satisfaction with their healthcare experience.

Logistic regression analysis was conducted to examine the relationship between travel time and patient satisfaction. In this analysis, patient satisfaction, a binary outcome variable, was modelled as a function of travel time, a continuous predictor variable. The model was estimated using the `glm` function in R with a binomial family, which is appropriate for binary outcomes. Specifically, the model was specified as `as.factor (data$Satisfaction) ~ Time`, where `as.factor(data$Satisfaction)` ensures that the satisfaction variable is treated as a categorical outcome with two levels, and `Time` represents the predictor variable (Figure 2). This enables us to assess how changes in travel time affect patient satisfaction (Table 5).

Coefficients

Table 5: Regression results of the model predicting outcome using distance

	Estimate	Std. Error	z value	Pr (>|z|)
(Intercept)	2.00707	0.22286	9.006	<2e-16
Distance	0.17441	0.07727	2.257	0.024

Significant Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Dispersion parameter for the binomial family assumed to be 1)
Null deviance: 668.07 with 1223 degrees of freedom
Residual deviance: 662.58 with 1222 degrees of freedom
AIC: 666.58
Number of Fisher Scoring iterations: 5
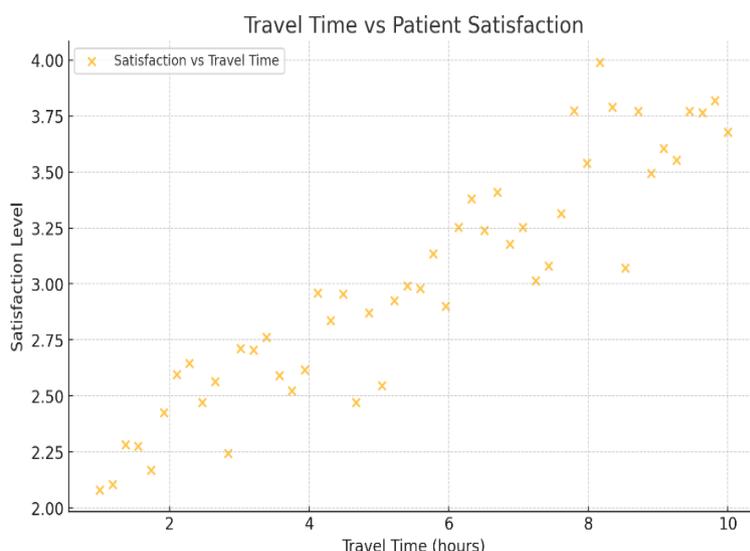
Source: Author's analysis from the data

Figure 2: Scatter plot of travel time to satisfaction levels

4.3. Healthcare Facility Selection and Motivations

- **H4:** The reasons for preferring a particular healthcare facility will be associated with differences in treatment satisfaction (Table 6).

Table 6: Association between treatment satisfaction and preferred reasons for healthcare facilities

Treatment Satisfaction and Preferred Reasons for Healthcare Facilities			Affordability	Accessibility	Treatment quality	Specialised Care & Hospital availability	Total
			Preferred reasons				**Total**
Treatment Satisfaction	No	**Count**	5	35	28	19	87
		Expected Count	12.4	23.7	33.3	17.6	87
		% within Treatment Satisfaction	5.7%	40.2%	32.2%	21.8%	100.0%
		% within Reasons to prefer	2.9%	10.7%	6.1%	7.8%	7.2%
		% Total	0.4%	2.9%	2.3%	1.6%	7.2%
	Yes	Count	167	293	433	225	1118
		Expected Count	159.6	304.3	427.7	226.4	1118.0
		% within Treatment Satisfaction	14.9%	26.2%	38.7%	20.1%	100.0%
		% within Reasons to prefer	97.1%	89.3%	93.9%	92.2%	92.8%
		% Total	13.9%	24.3%	35.9%	18.7%	92.8%
Total		Count	172	328	461	244	1205
		Expected Count	172.0	328.0	461.0	244.0	1205.0
		% within Treatment Satisfaction	14.3%	27.2%	38.3%	20.2%	100.0%
		% within Reasons to prefer	100.0%	100.0%	100.0%	100.0%	100.0%
		% Total	14.3%	27.2%	38.3%	20.2%	100.0%

These reasons include affordability, accessibility, treatment quality, and the availability of specialised care and hospitals. We consider affordability in terms of the cost-effectiveness of healthcare services, ensuring they are within patients' financial means. The accessibility component of this study includes factors such as proximity to healthcare facilities, ease of transportation, and opening hours, ensuring that patients can readily access the care they need. Treatment quality refers to the standard of medical care provided, encompassing the competence of healthcare professionals, the effectiveness of treatments, and patient outcomes. Specialised care and hospital availability denote the availability of specialised medical services and the presence of well-stocked hospitals with necessary medications and supplies.

Understanding these preferred reasons can help healthcare providers tailor their services to better meet patient needs and improve overall treatment satisfaction. The quality of treatment has a significant impact on patient satisfaction in rural Tamil Nadu. Patients in remote villages who perceive high treatment quality are more likely to be satisfied with their healthcare experience. This highlights the importance of maintaining high standards of medical care to improve patient satisfaction and healthcare outcomes. Among those satisfied, 97.1% cited affordability, 89.3% valued accessibility, 93.9% emphasised treatment quality, and 92.2% preferred specialised care and hospital availability. These data indicate that treatment quality, accessibility, and affordability are key determinants of patient satisfaction, with treatment quality being the most frequently cited reason (Table 7).

Table 7: chi-square test results for healthcare facility and treatment satisfaction

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	11.628[a]	3	.009
Likelihood Ratio	12.281	3	.006
Linear-by-Linear Association	.323	1	.570
N of Valid Cases	1205		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.42.			

The test statistic of 11.628 and the p-value of 0.009 indicate a significant association between the reasons for selecting a healthcare facility and treatment satisfaction, leading us to reject the null hypothesis. A subsequent test statistic of 12.281 with a p-value of 0.006 further supports this association. Conversely, a test statistic of 0.323 with a p-value of 0.570 indicates no significant linear relationship, suggesting the connection is categorical. Overall, the results reveal that factors like treatment quality, accessibility, affordability, and specialised care significantly affect patient satisfaction, with treatment quality being the most influential. These findings underscore the importance of prioritising care quality and other key factors to boost patient satisfaction and improve healthcare services.

4.4. Rural Household Expenditure Patterns on Healthcare

Monthly healthcare expenditure is expected to vary significantly depending on the type of healthcare facility chosen (Table 8).

Table 8: The ranks of health facilities

Ranks			
	Preferred place	**N**	**Mean Rank**
	Government Hospital	383	252.95
	Private Hospital	116	323.30
Amount Spent	ESI Hospital	54	354.89
	Others	2	371.00
	Total	555	

The Kruskal-Wallis test, a non-parametric method, is employed to assess whether there are significant differences in a continuous variable across three or more independent groups (Table 9).

Table 9: Test Statistics

Test Statistics [a,b]	
	Amount Spent
Chi-Square	32.108
Df	3
Asymp. Sig.	.000

- Kruskal-wallis test
- Grouping variable: preferred place

The p-value associated with the Chi-Square statistic is .000, which is below the usual significance level of 0.05. This indicates significant differences in the "Amount Spent" variable among different "preferred place" categories. The Kruskal-Wallis test, which analysed the amount spent per month on healthcare across various facility types, produced a Chi-Square statistic of 32.108 with three degrees of freedom and a significance value of .000. The mean ranks for amount spent were 252.95 for Government Hospitals, 323.30 for Private Hospitals, and 354.89 for ESI Hospitals, based on 555 observations. These results suggest that the choice of healthcare facility has a significant impact on monthly healthcare spending, underscoring the importance of accounting for facility type when evaluating expenditure patterns (Figure 3). Based on the provided data, individuals seem to prefer the amount spent (323), as indicated by the highest mean rank. Conversely, the least preferred healthcare facility appears to be others, although it's noteworthy that this category had only two observations. The expenditure

patterns suggest that individuals are willing to spend more when opting for Private Hospitals than for Government Hospitals or ESI Hospitals. This may imply that individuals perceive Private Hospitals to offer better-quality healthcare services or more personalised care, prompting them to allocate a larger share of their healthcare budget to these facilities, even in smaller villages.
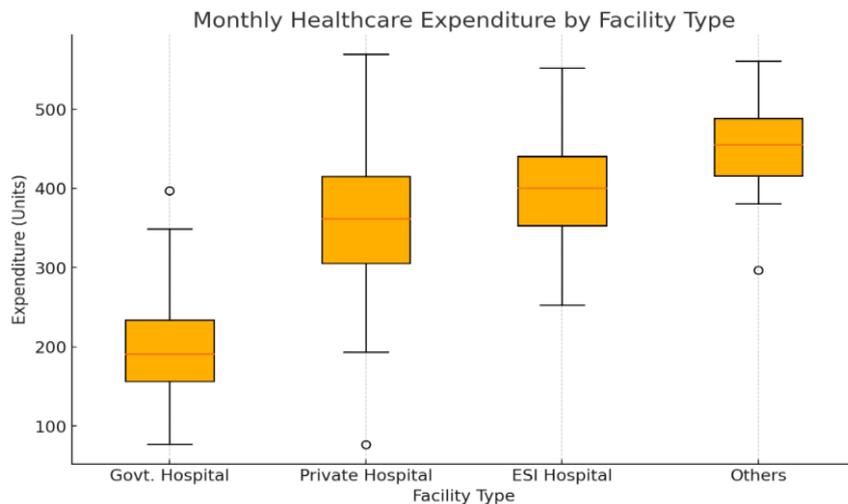
Source: Author's analysis from the data

Figure 3: Box plot- monthly healthcare expenditure by facility type

On the other hand, the lower expenditure observed in Government Hospitals and ESI Hospitals may indicate that individuals are financially constrained or perceive these facilities as offering lower-quality or less desirable healthcare services. Additionally, the disparity in expenditure across different types of healthcare facilities highlights potential inequalities in access to and utilisation of healthcare services based on socioeconomic status or perceived quality of care (Table 10).

Table 10: pairwise comparison- preferred places of treatment

Sample 1- Sample 2	Test statistic	Standard error	Standard test statistic	Significance	Adjusted significance
Government- Private hospital	-70.343	16.883	-4.167	.000	.000
Government -ESI hospital	-101.935	23.156	-4.402	.000	.000
Government hospital-	-118.046	112.937	-1.045	.296	1.000
Private - ESI hospital	-31.591	26.243	-1.204	.229	1.000
Private hospital- Others	-47.703	113.610	-.420	.675	1.000
ESI hospital- Others	-16.111	114.711	-.140	.888	1.000

The Kruskal-Wallis test revealed statistically significant differences (Chi-Square = 32.108, df = 3, p < .001) in the healthcare expenditure across preferred places of treatment. Pairwise comparisons indicated significant differences between Government Hospitals and Private Hospitals (Test statistic = -70.343, p < .001), Government Hospitals and ESI Hospitals (Test statistic = -101.935, p < .001), and Private Hospitals and ESI Hospitals (Test statistic = -31.591, p = .229). This suggests that patients have distinct preferences between these types of healthcare facilities, with factors such as quality of care, accessibility, cost, or reputation influencing their choices. However, no significant differences were observed between Government Hospitals and Other facilities, Private Hospitals and Other facilities, or ESI Hospitals and Others. For these options, factors such as convenience, proximity, or specific services offered may play a more influential role in their decision-making. Overall, the results offer valuable insights into patients' comparative preferences for different types of healthcare facilities, providing information that is beneficial for healthcare providers and policymakers seeking to understand the factors influencing patient satisfaction and choice in healthcare settings.

These findings suggest that individuals allocate differing amounts of healthcare expenditure based on their choice of healthcare facility, with Private Hospitals generally associated with higher spending compared to Government Hospitals and ESI Hospitals. The study examining healthcare utilisation in remote villages of Tamil Nadu reveals that, despite the expansion of rural healthcare services, high-quality care is still predominantly perceived as being available primarily in urban centres. The

preference for private healthcare, reflected in expenditure patterns, suggests a perception of better care and higher patient satisfaction. However, disparities in healthcare spending across different facility types highlight potential inequalities in access, influenced by socioeconomic factors or perceived care quality. While the distance to healthcare facilities did not significantly impact treatment satisfaction, shorter travel times were associated with higher satisfaction. These findings imply that in rural Tamil Nadu, perceived care quality and convenience, rather than physical distance alone, greatly influence healthcare utilisation and patient satisfaction.

5. Conclusion

To address disparities in healthcare access and utilisation in rural Tamil Nadu, policymakers should focus on improving the quality and accessibility of healthcare services in remote villages. This could involve improving infrastructure and facilities in government hospitals and ESI hospitals to provide higher-quality care and attract patients who may otherwise opt for private healthcare. Additionally, investments in transportation infrastructure could reduce travel times to healthcare facilities, thereby improving access and satisfaction levels among the rural population. Furthermore, targeted policies and initiatives should be implemented to address socioeconomic barriers to healthcare access and ensure equitable distribution of resources across rural communities. A comprehensive strategy that addresses both supply and demand in healthcare delivery is essential for enhancing healthcare outcomes and promoting health equity in rural areas.

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