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Determinants of Access to Vestibular Healthcare Services in Tamil Nadu

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ABSTRACT

Vestibular disorders are increasingly recognized as important public health concerns due to their impact on balance, mobility, functional independence, and quality of life. Despite advances in vestibular assessment and rehabilitation, access to specialized vestibular healthcare services remains inadequate in many regions of India, particularly in rural communities. The present study investigated determinants influencing access to vestibular healthcare services among adults residing in Tamil Nadu.

A descriptive cross-sectional survey design was adopted involving 300 adults from the districts of Vizhupuram, Ulundhurpet, Tiruchirappalli. Data were collected using the Vestibular Healthcare Access Barrier Scale (VHABS) developed for the study. Statistical analyses included descriptive statistics, Chi-square analysis, Independent Samples t-test, and regression analysis using IBM SPSS Statistics Version 26.0.

The findings revealed limited awareness regarding vestibular disorders, vestibular rehabilitation, and the role of audiologists in balance assessment and management. Geographic accessibility emerged as a major determinant influencing healthcare utilization, particularly among rural participants residing farther from tertiary healthcare facilities. Female participants experienced significantly greater socio-cultural and logistical barriers compared to males. Limited awareness regarding vestibular symptoms, rehabilitation options, and available healthcare facilities was consistently observed across demographic groups.

The study highlights the influence of socio-cultural, geographic, educational, and healthcare-system determinants on access to vestibular healthcare services in Tamil Nadu. Strengthening public awareness initiatives, decentralizing vestibular rehabilitation services, improving referral pathways, and integrating vestibular care within primary healthcare systems may facilitate early diagnosis and improve healthcare utilization among underserved populations.

Keywords: Vestibular Disorders, Vestibular Rehabilitation, Healthcare Accessibility, Rural Health, Balance Disorders, Tamil Nadu

1. INTRODUCTION

Vestibular disorders are major causes of dizziness, vertigo, imbalance, falls, and functional disability, significantly affecting mobility, independence, and quality of life. Despite advancements in vestibular assessment and rehabilitation, access to specialized vestibular healthcare services remains limited, particularly in developing countries and rural communities. In India, vestibular disorders are often underdiagnosed due to limited awareness, inadequate referral systems, transportation difficulties, financial burden, and poor accessibility to specialized healthcare services. Many individuals rely on self-medication or traditional remedies before seeking professional care, leading to delayed diagnosis and rehabilitation. Rural populations, women, and elderly individuals are particularly vulnerable because specialized vestibular services are mainly concentrated in urban tertiary centers. Limited awareness regarding vestibular symptoms, rehabilitation approaches, and healthcare professionals further contributes to delayed healthcare-seeking behaviour and underutilization of services. Therefore, the present study aimed to investigate awareness, accessibility patterns, and determinants influencing vestibular healthcare utilization among adults residing in Tamil Nadu.

2. RATIONALE OF THE STUDY

Vestibular disorders significantly affect mobility, functional independence, and quality of life. Despite advances in vestibular assessment and rehabilitation, many individuals experience delayed diagnosis and treatment due to inadequate awareness, socio-cultural misconceptions, financial burden, and limited healthcare accessibility. In Tamil Nadu, unequal distribution of specialized healthcare facilities, transportation difficulties, and limited awareness regarding vestibular rehabilitation contribute to delayed healthcare-seeking behaviour and underutilization of services. Therefore, the present study aimed to investigate socio-cultural, geographic, educational, financial, and awareness-related determinants influencing vestibular healthcare accessibility in Tamil Nadu.

2.1 Aim

To investigate determinants influencing access to vestibular healthcare services among adults residing in Tamil Nadu.

2.2 Objectives

1. To evaluate public awareness regarding vestibular disorders and rehabilitation services.
2. To examine accessibility of vestibular healthcare facilities.
3. To identify socio-cultural, financial, geographic, and systemic determinants affecting vestibular healthcare utilization.
4. To compare perceived barriers across demographic variables such as gender and residential background.
5. To determine factors contributing to delayed vestibular healthcare-seeking behaviour among adults in Tamil Nadu.

3. METHODOLOGY

3.1 Research Design

A descriptive cross-sectional survey design was adopted to investigate determinants influencing access to vestibular healthcare services.

3.2 Study Area

The study was conducted in selected districts of Tamil Nadu including Tiruchirappalli, Vizhupuram, Ul-

undhurpet, Madurai, Thoothukudi, etc. Participants represented rural, semi-urban, and urban populations.

3.3 Participants

A total of 300 adults participated in the study through convenience sampling. The sample included both male and female participants aged above 18 years.

Inclusion Criteria

- Adults aged 18 years and above
- Residents of Tamil Nadu for at least five years
- Individuals able to understand Tamil or English

Exclusion Criteria

- Individuals with cognitive limitations affecting response reliability
- Professionals from vestibular and hearing healthcare fields

3.4 Instrumentation

Data were collected using the **Vestibular Healthcare Access Barrier Scale (VHABS)** developed for the study.

The questionnaire included:

- Socio-demographic information
- Awareness-related questions regarding vestibular disorders
- Assessment of determinants influencing vestibular healthcare access:
  - Socio-cultural determinants
  - Financial and systemic determinants
  - Geographic and logistical determinants
  - Awareness and knowledge-related determinants

Responses were recorded using a five-point Likert scale.

No.	Statements	1	2	3	4	5
1	I believe dizziness and balance problems are a normal part of aging.	☐	☐	☐	☐	☐
2	People in my community usually try home remedies before seeking vestibular healthcare.	☐	☐	☐	☐	☐
3	My family may not consider dizziness serious enough for hospital consultation.	☐	☐	☐	☐	☐
4	I feel uncomfortable discussing balance-related problems with others.	☐	☐	☐	☐	☐
5	Social stigma discourages individuals from seeking vestibular rehabilitation services.	☐	☐	☐	☐	☐
6	Vestibular assessment procedures are expensive.	☐	☐	☐	☐	☐
7	I am unaware of insurance or government support for vestibular treatment.	☐	☐	☐	☐	☐
8	Referral services for dizziness and balance disorders are difficult to obtain.	☐	☐	☐	☐	☐
9	Specialized vestibular healthcare services are unavailable in nearby hospitals.	☐	☐	☐	☐	☐
10	Long waiting periods discourage me from seeking vestibular consultation.	☐	☐	☐	☐	☐
11	Vestibular healthcare facilities are located far from my residence.	☐	☐	☐	☐	☐

12	Transportation to vestibular healthcare centers is difficult or costly.	☐	☐	☐	☐	☐
13	Traveling during episodes of dizziness or imbalance is challenging.	☐	☐	☐	☐	☐
14	I depend on others for transportation to healthcare facilities.	☐	☐	☐	☐	☐
15	Poor road and transport facilities affect my healthcare access.	☐	☐	☐	☐	☐
16	Before this survey, I was unaware of vestibular rehabilitation therapy.	☐	☐	☐	☐	☐
17	I do not know which healthcare professional treats vestibular disorders.	☐	☐	☐	☐	☐
18	I am unaware that dizziness and imbalance can be medically treated.	☐	☐	☐	☐	☐
19	Reliable information regarding vestibular disorders is not easily available in my language.	☐	☐	☐	☐	☐
20	I worry that vestibular testing procedures may worsen dizziness temporarily.	☐	☐	☐	☐	☐

3.4.1 Scoring Procedure and Interpretation

Responses obtained from the VHABS were systematically scored using a standardized evaluation framework to quantify perceived barriers and determinants associated with vestibular healthcare accessibility.

Domain	Item Numbers	Score Range
Socio-Cultural Determinants	1–5	5–25
Financial and Systemic Determinants	6–10	5–25
Geographic and Accessibility Determinants	11–15	5–25
Awareness and Knowledge Determinants	16–20	5–25

Composite Scoring

- Minimum Total Score = 20
- Maximum Total Score = 100

Higher scores indicate greater perceived barriers affecting access to vestibular healthcare services.

Interpretation of Scores

Score Range	Interpretation
20–46	Low Barrier Level
47–73	Moderate Barrier Level
74–100	High Barrier Level

3.4.2 Domain-wise Scoring

Mean scores were computed separately for the following domains:

- Socio-Cultural Determinants
- Systemic and Financial Determinants
- Geographic and Accessibility Determinants
- Awareness and Knowledge Determinants

These domain-specific scores were utilized to determine the severity and distribution of factors influencing vestibular healthcare accessibility.

3.4.3 Validity and Reliability

Content validity of the VHABS was established through expert evaluation by experienced professionals in audiology and speech-language pathology. The questionnaire was reviewed for clarity, relevance, linguistic appropriateness, and representation of vestibular healthcare accessibility determinants.

The questionnaire demonstrated acceptable internal consistency reliability with satisfactory Cronbach's alpha values across domains.

3.4.5 Translation and Linguistic Adaptation

The questionnaire was initially prepared in English and subsequently translated into Tamil using standardized forward–backward translation procedures. Independent bilingual experts performed translation and re-translation to maintain semantic equivalence and cultural appropriateness.

3.5 Procedure for Data Collection

Data collection was conducted over a three-month period from January 2026 to March 2026 using both online and direct community-based approaches. Participants were informed regarding study objectives, confidentiality, voluntary participation, and withdrawal rights prior to data collection. Informed consent was obtained from all participants.

The questionnaire was distributed digitally through Google Forms, WhatsApp groups, and social media platforms. Face-to-face data collection was additionally undertaken in community settings to include participants with limited digital accessibility.

3.6 Statistical Analysis

Data were analyzed using IBM SPSS Statistics Version 26.0.

Descriptive Analysis

Frequencies, percentages, means, and standard deviations were computed to summarize socio-demographic characteristics and awareness levels regarding vestibular healthcare.

Inferential Analysis

- Chi-square test was used to examine associations between demographic variables and vestibular healthcare accessibility patterns.
- Independent Samples t-test was used to compare barrier scores across gender groups.
- Multiple regression analysis was performed to identify significant determinants contributing to delayed vestibular healthcare utilization.

A p-value less than 0.05 was considered statistically significant.

4. RESULTS AND DISCUSSION

The findings of the present study demonstrated that access to vestibular healthcare services in Tamil Nadu is influenced by multiple socio-demographic, geographic, awareness-related, and healthcare-system determinants.

Table 4.1 Public Awareness Regarding Vestibular Disorders and Rehabilitation Services

Awareness Parameter	Aware n (%)	Unaware n (%)	(χ^2)	p-value
Familiarity with vestibular disorders	32.0	68.0	5.82	0.016
Awareness that vertigo is treatable	39.3	60.7	4.91	0.027
Awareness of vestibular rehabilitation therapy	24.0	76.0	8.44	0.004
Awareness regarding role of audiologists in balance	13.7	86.3	11.25	0.001

assessment				
Awareness regarding association between hearing loss and balance disorders	21.3	78.7	6.17	0.013
Awareness regarding nearby vestibular healthcare services	19.3	80.7	7.52	0.006

Multiple regression analysis demonstrated that several socio-demographic and healthcare-related variables significantly influenced delayed vestibular healthcare-seeking behaviour among adults in Tamil Nadu. The regression model was statistically significant ($F = 35.62$, $p < 0.001$) and explained 55.1% of the variance in delayed healthcare utilization ($R^2 = 0.551$). Rural residential background, low awareness score, greater distance from healthcare facilities, financial constraints, and female gender significantly contributed to delayed access to vestibular healthcare services, whereas higher educational qualification showed a protective influence against delayed healthcare utilization. The findings indicate that geographic accessibility and awareness-related factors were major determinants affecting vestibular healthcare utilization. Participants residing in rural regions and those located farther from tertiary healthcare centers experienced greater delays due to transportation difficulties, inadequate referral pathways, and limited specialist availability. Similar findings were reported by Kumar et al. (2022) and Reddy and Prasad (2021), who identified rural residence and travel burden as significant barriers affecting rehabilitation healthcare accessibility. Poor awareness regarding vestibular disorders and rehabilitation services also contributed to delayed healthcare utilization, consistent with findings reported by Singh et al. (2023). Female participants experienced greater barriers related to healthcare accessibility and delayed healthcare-seeking behaviour, possibly due to socio-cultural dependency, transportation difficulties, and financial burden. Comparable findings were reported by Joseph and Mathew (2022). Financial constraints additionally emerged as an important determinant, supporting findings by Patil et al. (2021). Higher educational qualification demonstrated a protective effect against delayed healthcare utilization, similar to observations reported by Sharma et al. (2023).

Table 4.2 Accessibility of Vestibular Healthcare Facilities

Accessibility Variable	**Subcategory**	**N**	**%)**
Distance from vestibular healthcare facility	< 20 km	101	33.7
	21–50 km	117	39.0
	> 50 km	82	27.3
Availability of transportation facilities	Adequate	108	36.0
	Inadequate	192	64.0
Waiting period for specialist consultation	< 1 hour	69	23.0
	1–3 hours	143	47.7
	> 3 hours	88	29.3
Ease of obtaining referral services	Easy	84	28.0
	Difficult	216	72.0
Accessibility to vestibular rehabilitation services	Accessible	74	24.7
	Not Accessible	226	75.3

The findings demonstrated substantial geographic and infrastructural barriers affecting accessibility to vestibular healthcare services in Tamil Nadu. Only 33.7% of participants resided within 20 km of a vestibular healthcare facility, while most participants reported inadequate transportation facilities, long waiting periods, and difficulty obtaining referral services. Accessibility to vestibular rehabilitation services was also limited, with only 24.7% reporting easy access to specialized services. The results indicate that geographic distance, transportation limitations, and inadequate healthcare infrastructure significantly influence vestibular healthcare utilization. Participants residing farther from specialized healthcare facilities experienced greater difficulties in accessing timely diagnosis and rehabilitation services. Similar findings were reported by Reddy and Prasad (2021) and Kumar et al. (2022), who identified travel burden and limited availability of rehabilitation centers as major barriers affecting healthcare accessibility in rural populations. Long waiting periods and difficulty obtaining referral services additionally suggest systemic limitations within healthcare delivery pathways. Comparable observations were reported by Patil et al. (2021) and Singh et al. (2023), who emphasized that inadequate referral systems, poor rehabilitation infrastructure, and low public awareness negatively affect utilization of vestibular healthcare services.

Table 4.3 Socio-Cultural, Financial, Geographic, and Systemic Determinants Affecting Vestibular Healthcare Utilization

Determinant Domain	Mean Score ± SD	Interpretation
Socio-Cultural Determinants	3.48 ± 0.82	Moderate Barrier
Financial and Systemic Determinants	4.12 ± 0.67	High Barrier
Geographic and Accessibility Determinants	3.89 ± 0.91	Moderate Barrier
Awareness and Knowledge Determinants	4.01 ± 0.74	High Barrier
Overall Barrier Score	63.27 ± 8.45	High Barrier

The analysis of determinant domains revealed that participants experienced multiple barriers affecting access to vestibular healthcare services in Tamil Nadu. Financial and systemic determinants demonstrated the highest barrier level (4.12 ± 0.67), followed by awareness and knowledge determinants (4.01 ± 0.74). Geographic and accessibility determinants (3.89 ± 0.91) and socio-cultural determinants (3.48 ± 0.82) showed moderate barrier levels. The overall barrier score (63.27 ± 8.45) indicated a high overall burden affecting vestibular healthcare accessibility. The findings suggest that financial burden, inadequate healthcare infrastructure, referral difficulties, and limited awareness significantly restrict vestibular healthcare utilization. Difficulties related to affordability of diagnostic procedures, transportation expenses, and specialist accessibility may delay healthcare-seeking behaviour. Similar findings were reported by Patil et al. (2021) and Reddy and Prasad (2021), who identified economic burden and healthcare-system limitations as major barriers affecting rehabilitation accessibility. Awareness and knowledge-related barriers additionally contributed to delayed healthcare utilization due to poor understanding regarding vestibular disorders and rehabilitation services. Comparable observations were reported by Singh et al. (2023). Moderate socio-cultural and geographic barriers further indicate the influence of transportation difficulties, social stigma, and rural healthcare disparities, consistent with findings reported by Kumar et al. (2022).

Table 4.4 Gender-wise Comparison of Vestibular Healthcare Barrier Scores

Barrier Domain	Male Mean ± SD (n = 138)	Female Mean ± SD (n = 162)	t-value	p-value
Socio-Cultural Determinants	3.24 ± 0.71	3.68 ± 0.88	-4.18	<0.001*
Financial and Systemic Determinants	4.05 ± 0.59	4.19 ± 0.72	-1.92	0.056
Geographic and Accessibility Determinants	3.57 ± 0.83	4.16 ± 0.97	-4.27	<0.001*
Awareness and Knowledge Determinants	3.88 ± 0.63	4.12 ± 0.79	-2.11	0.036*
Overall Barrier Score	60.42 ± 7.91	65.71 ± 8.16	-5.08	<0.001*

Gender-wise comparison revealed that female participants experienced significantly greater barriers in accessing vestibular healthcare services compared to males, particularly in socio-cultural determinants, geographic and accessibility determinants, awareness and knowledge determinants, and overall barrier scores. Although females also reported higher financial and systemic barrier scores, the difference was not statistically significant. The findings suggest that socio-cultural dependency, caregiving responsibilities, transportation difficulties, and limited mobility may negatively influence healthcare accessibility among women. Similar findings were reported by Joseph and Mathew (2022) and Kumar et al. (2022), who identified socio-cultural norms and transportation barriers as major challenges affecting rehabilitation healthcare utilization among women in rural communities. Awareness and knowledge-related barriers were also significantly greater among female participants, indicating limited awareness regarding vestibular disorders and rehabilitation services. Comparable observations were reported by Singh et al. (2023). Higher financial barrier scores among females further suggest that economic burden and healthcare-system limitations may reduce accessibility to specialized vestibular healthcare services, consistent with findings reported by Patil et al. (2021).

Table 4.5 Residential Background-wise Comparison of Vestibular Healthcare Barrier Scores

Barrier Domain	Rural Mean ± SD (n = 185)	Urban Mean ± SD (n = 115)	t-value	p-value
Socio-Cultural Determinants	3.61 ± 0.86	3.22 ± 0.71	3.74	<0.001*
Financial and Systemic Determinants	4.21 ± 0.68	3.96 ± 0.59	3.12	0.002*
Geographic and Accessibility Determinants	4.22 ± 0.88	3.35 ± 0.79	7.94	<0.001*
Awareness and Knowledge Determinants	4.17 ± 0.73	3.75 ± 0.66	4.85	<0.001*
Overall Barrier Score	66.14 ± 8.23	58.65 ± 7.12	8.21	<0.001*

Residential background-wise comparison revealed that rural participants experienced significantly greater barriers in accessing vestibular healthcare services compared to urban participants across all determinant domains. Rural participants demonstrated higher socio-cultural, financial and systemic, geographic and accessibility, and awareness-related barrier scores, with significantly higher overall

barrier scores than urban participants. The findings indicate that rural populations face greater challenges related to transportation difficulties, limited healthcare infrastructure, poor accessibility to specialized vestibular healthcare centers, and reduced awareness regarding vestibular disorders and rehabilitation services. Geographic and accessibility determinants demonstrated the greatest difference between rural and urban participants, suggesting that long travel distances and inadequate transportation facilities substantially affect healthcare utilization. Similar findings were reported by Kumar et al. (2022) and Reddy and Prasad (2021), who identified rural residence and poor healthcare accessibility as major barriers affecting rehabilitation service utilization. Financial, awareness-related, and socio-cultural barriers were also significantly greater among rural participants, indicating reduced health literacy, referral difficulties, reliance on traditional remedies, and delayed healthcare-seeking behaviour. Comparable findings were reported by Singh et al. (2023) and Patil et al. (2021). Overall, the findings demonstrate that rural residence is an important determinant influencing vestibular healthcare accessibility in Tamil Nadu.

Table 4.6 Multiple Regression Analysis for Determinants Contributing to Delayed Vestibular Healthcare-Seeking Behaviour

Predictor Variable	(β)	Standard Error	t-value	p-value
Rural Residential Background	0.341	0.062	5.48	<0.001*
Distance from Healthcare Facility	0.298	0.055	4.92	<0.001*
Low Awareness Score	0.316	0.059	5.21	<0.001*
Female Gender	0.184	0.048	3.36	0.001*
Financial Constraints	0.271	0.057	4.47	<0.001*
Educational Qualification	-0.193	0.051	-3.28	0.002*

Residential background-wise comparison revealed that rural participants experienced significantly greater barriers in accessing vestibular healthcare services compared to urban participants across all determinant domains. Rural participants reported higher socio-cultural, financial, geographic, and awareness-related barrier scores, along with significantly higher overall barrier scores. The findings suggest that transportation difficulties, limited healthcare infrastructure, poor accessibility to specialized vestibular healthcare centers, and reduced awareness significantly affect rural populations. Similar findings were reported by Kumar et al. (2022) and Reddy and Prasad (2021). Greater financial, awareness-related, and socio-cultural barriers among rural participants further indicate reduced health literacy and delayed healthcare-seeking behaviour, consistent with findings reported by Singh et al. (2023) and Patil et al. (2021).

5. LIMITATIONS

The study was restricted to selected districts of Tamil Nadu, thereby limiting generalizability of findings to other regions. The cross-sectional design does not permit causal interpretation of determinants affecting vestibular healthcare accessibility. The study relied primarily on self-reported responses, which may be influenced by recall bias and subjective interpretation. Objective vestibular assessment was not included. Convenience sampling may additionally limit representativeness of the population.

6. CONCLUSION

The present study identified multiple determinants affecting access to vestibular healthcare services in Tamil Nadu, including limited public awareness, geographic limitations, transportation difficulties, socio-cultural factors, and inadequate healthcare infrastructure. Rural populations and female participants experienced greater barriers in accessing specialized vestibular healthcare services. Limited awareness regarding vestibular rehabilitation and balance disorder management contributed to delayed healthcare-seeking behaviour. The findings highlight the need for community awareness programs, decentralized vestibular rehabilitation services, improved referral systems, and integration of vestibular care within primary healthcare settings to improve healthcare accessibility and early intervention.

7. RECOMMENDATIONS FOR FUTURE RESEARCH

Future studies should include larger multi-regional populations to improve generalizability of findings. Longitudinal research integrating objective vestibular assessment alongside self-reported measures is recommended to better understand determinants influencing vestibular healthcare accessibility over time. Further investigations focusing on tele-rehabilitation services, community awareness programs, and decentralized vestibular rehabilitation models may help improve accessibility of vestibular healthcare services in underserved populations.

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