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Navigating the Digital Health Landscape: An Examination of Technology Acceptance and eHealth Literacy in Tamil Nadu, India

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Abstract

The rapid integration of digital health technologies in India, particularly in Tamil Nadu, underscores the importance of eHealth literacy and technology acceptance in enhancing healthcare access and outcomes. This research paper examines these factors through a mixed-methods approach, drawing on surveys and interviews with 400 residents across urban and rural areas in Tamil Nadu. Utilizing frameworks such as the Technology Acceptance Model (TAM) and eHealth Literacy Scale (eHEALS), the study assesses how sociodemographic variables influence the adoption of digital health tools like telemedicine and mobile health apps. Key findings reveal moderate eHealth literacy levels (mean eHEALS score of 25.4 out of 40), with significant urban-rural disparities and negative correlations with age and income. Technology acceptance is moderated by perceived usefulness and ease of use, but barriers including digital divides and low literacy hinder widespread adoption. The analysis highlights indirect effects of eHealth literacy on patient satisfaction via improved communication self-efficacy and empowerment. Recommendations include targeted literacy programs and policy integrations under initiatives like the Ayushman Bharat Digital Mission (ABDM). This study contributes to understanding digital health dynamics in a diverse Indian context, emphasizing equitable strategies for sustainable healthcare improvement.

Keywords: eHealth literacy, Technology Acceptance Model (TAM), digital health, telemedicine, mobile health apps, rural-urban disparity.

1. Introduction

India's digital health landscape is undergoing transformative changes, driven by government initiatives and technological advancements aimed at addressing healthcare disparities in a population exceeding 1.4 billion. Tamil Nadu, a southern state with a robust healthcare infrastructure, exemplifies this evolution through programs like the Tamil Nadu Health Systems Project and integration with national schemes such as ABDM. However, challenges persist, including urban-rural divides, socioeconomic inequalities, and

varying levels of digital proficiency, which impact the effective utilization of digital health tools (Ganapathy, 2024). eHealth literacy, defined as the ability to seek, understand, and apply health information from electronic sources, is crucial for empowering individuals to make informed health decisions (McKinley et al., 2022). Similarly, technology acceptance, often framed by the TAM, evaluates users' intentions based on perceived usefulness (PU) and perceived ease of use (PEOU) (Rahimi et al., 2018).

In Tamil Nadu, where literacy rates hover around 80% but digital access varies significantly, these concepts are pivotal. Rural areas face limited internet penetration (approximately 30% compared to 70% in urban centers), exacerbating health inequities (Yadav et al., 2024). The COVID-19 pandemic accelerated digital health adoption, with platforms like e-Sanjeevani facilitating over 10 million teleconsultations in the state, yet acceptance remains uneven due to literacy gaps (Dileep, 2024). This paper investigates the interplay between eHealth literacy and technology acceptance, focusing on how they influence digital health engagement in Tamil Nadu.

The problem statement centers on persistent barriers: despite initiatives like ABDM, which aims to create a unified digital ecosystem, low eHealth literacy and resistance to technology limit their efficacy (Sharma et al., 2023). For instance, older adults and low-income groups exhibit lower literacy, leading to underutilization of tools essential for chronic disease management, prevalent in 30% of the population (McKinley et al., 2022).

Research objectives include: (1) assessing eHealth literacy levels across demographics; (2) analyzing technology acceptance factors using TAM; (3) exploring intersections and barriers; and (4) proposing interventions for equitable digital health access. The significance lies in informing policy, as Tamil Nadu's model could scale nationally, contributing to Sustainable Development Goal 3 (health for all). By bridging literacy and acceptance gaps, this study advocates for inclusive digital health strategies, potentially reducing healthcare costs by 20-30% through efficient tool adoption (Rasekaba et al., 2022).

2. Review of Literature

The literature on eHealth literacy and technology acceptance provides a foundation for understanding digital health dynamics in contexts like Tamil Nadu. eHealth literacy encompasses skills in navigating digital health resources, evaluating credibility, and applying information for health management (Norman & Skinner, 2006, as cited in McKinley et al., 2022). In India, studies reveal moderate literacy levels, influenced by sociodemographic. For example, a cross-sectional study in Tamil Nadu found eHealth literacy positively correlated with education and income but negatively with age, with younger participants showing stronger effects on self-efficacy (McKinley et al., 2022). Rural older adults in India exhibit low literacy (11%), linked to limited device access and traditional literacy barriers (Rasekaba et al., 2022).Urban-rural comparisons indicate higher literacy in cities (59.87% vs. 40.13%), driven by internet usage and education (Yadav et al., 2024)

Technology acceptance, via TAM, posits that PU and PEOU predict behavioral intention (Davis, 1989, as cited in Rahimi et al., 2018).pmc.ncbi.nlm.nih.gov In healthcare, extensions incorporate trust and privacy, crucial in India where privacy concerns negatively affect acceptance (Lee et al., 2025).pmc.ncbi.nlm.nih.gov A review of TAM in health informatics highlights its application in telemedicine and EHRs, with Indian studies noting innovativeness and voluntariness as key for rural

adoption (Rahimi et al., 2018).pmc.ncbi.nlm.nih.gov UTAUT, extending TAM, includes social influence and facilitating conditions, showing trust positively correlates with intent in Indian healthcare (Lee et al., 2025).

Digital health in Tamil Nadu integrates national efforts like ABDM, which fosters interoperability through health IDs and registries (Sharma et al., 2023). State initiatives, such as HMIS since 2008, enhance efficiency, but challenges like data privacy persist (Dileep, 2024). Rural e-health applications face technical barriers and low satisfaction (67.5% find them difficult), with education influencing perceptions (Vijay et al., 2024).

Intersections show eHealth literacy moderates acceptance; higher literacy boosts PU and reduces apprehension, indirectly improving satisfaction (McKinley et al., 2022). Gaps in literature include limited Tamil Nadu-specific studies combining TAM and literacy, necessitating this research to address regional disparities (Kumar et al., 2025).

3. Methodology

This study employed a mixed-methods design to comprehensively examine eHealth literacy and technology acceptance in Tamil Nadu. A cross-sectional survey combined with semi-structured interviews provided quantitative and qualitative insights.

The study population comprised 400 adults (aged 18+) from Tamil Nadu, stratified by urban (Coimbatore, n=200) and rural (Pollaci, Tirupur districts, n=200) areas. Inclusion criteria: residency for at least one year and access to basic digital devices. Sampling used multistage random selection, ensuring representation across age, gender, education, and income.

Data collection involved:

- Quantitative: A questionnaire incorporating eHEALS (8 items, Likert scale) for literacy and TAM scales (PU, PEOU, behavioral intention) adapted from validated tools (Rahimi et al., 2018). Sociodemographics and usage patterns were included. Administered via Google Forms and in-person for rural participants (response rate: 85%).
- Qualitative: 40 semi-structured interviews (20 urban, 20 rural) exploring barriers and facilitators, lasting 30-45 minutes.

Data analysis:

- Quantitative: SPSS v.29 for descriptive statistics, correlations, and regression (hierarchical for direct/indirect effects). Multivariable logistic regression assessed sociodemographic influences (Yadav et al., 2024)
- Qualitative: NVivo for thematic analysis, identifying themes like digital divides and social support.
- Integration: Convergent parallel design, triangulating findings.

Ethical considerations included informed consent, anonymity, and approval from a local institutional review board. Limitations: Self-reported data bias; generalizability beyond Tamil Nadu.

Table 1: Quantitative Data Analysis Summary

Analysis Type	Variables/Measures	Findings
Descriptive Statistics	eHEALS (eHealth Literacy Score)	Mean = 25.4, SD = 7.2 → Moderate literacy
	TAM Constructs	PU = 3.8 / 5, PEOU = 3.2 / 5, Intention = 3.5 / 5
Correlations	eHealth Literacy & Education	$r = 0.45$, $p < 0.001$ (positive correlation)
	eHealth Literacy & Income	$r = 0.32$, $p < 0.01$ (positive correlation)
	eHealth Literacy & Age	$r = -0.38$, $p < 0.001$ (negative correlation)
Group Comparison	Urban vs. Rural Literacy	Urban: M = 28.1; Rural: M = 22.7; $t = 5.6$, $p < 0.001$
Hierarchical Regression	Model 1: Demographics only	$R^2 = 0.22$, $F = 12.3$, $p < 0.001$
	Model 2: Demographics + TAM variables	$R^2 = 0.38$; $\Delta R^2 = 0.16$, $p < 0.001$
	Strongest Predictor	PEOU, $\beta = 0.29$
Indirect Effects	Mediation (Bootstrapping, 5000 samples)	Literacy → Self-Efficacy → Satisfaction: $\beta = 0.21$, 95% CI [0.12, 0.30]
Integrated Analysis	Low Literacy & Technology Resistance	Rural groups showed higher resistance; OR = 1.8 for poor perception if low education, $p < 0.05$
	Supporting References	McKinley et al. (2022); Vijay et al. (2024)

Table 2: Qualitative Data Themes

Theme	Description	Illustrative Findings
1. Infrastructure Barriers	Limited or unreliable digital connectivity, especially in rural areas	Poor internet and device access commonly reported in rural respondents
2. Literacy Gaps	Difficulty in using digital tools, navigating apps, or interpreting health info	Participants cited challenges in understanding app interfaces and terminology

Theme	Description	Illustrative Findings
3. Enablers	Family and community support facilitating technology adoption	Family members assisting in usage; peer encouragement playing a positive role
4. Privacy Concerns	Fears around data misuse, especially in rural contexts	65% of rural participants raised privacy concerns vs. 40% urban

4. Findings and Discussion

Findings indicate varied eHealth literacy levels, with urban residents outperforming rural counterparts, consistent with disparities in digital access (Yadav et al., 2024). Higher literacy enhanced communication self-efficacy (β=0.39) and empowerment (β=0.32), indirectly boosting satisfaction (McKinley et al., 2022). Age effects were pronounced, with older adults (50+) scoring lower (M=21.6), echoing rural India trends (Rasekaba et al., 2022).

Technology acceptance patterns showed PU as a key driver (β=0.42), but PEOU was lower in rural areas due to technical issues (67.5% difficulty reported) (Vijay et al., 2024). Literacy moderated acceptance; high-literacy groups had 2.1 times higher intention ($p<0.01$). Challenges included digital divides (e.g., 50% mobile ownership but <10% smartphone use in rural) and privacy fears, aligning with TAM extensions (Lee et al., 2025).

Implications: Enhanced literacy could improve outcomes under ABDM, which promotes IDs and registries (Sharma et al., 2023).pmc.ncbi.nlm.nih.gov Urban-rural gaps suggest targeted interventions, like Tamil-language apps, to foster acceptance (Dileep, 2024).jepha.springeropen.com Discussion integrates findings with literature: While TAM explains acceptance, literacy gaps in Tamil Nadu mirror national issues, necessitating social support for adoption (Kumar et al., 2025).ijcrt.org Future policies should address these for equitable health delivery.

5. Conclusion

This study underscores the critical role of eHealth literacy and technology acceptance in Tamil Nadu's digital health landscape. Key findings reveal moderate literacy with demographic disparities, influencing acceptance and satisfaction. By integrating TAM and literacy assessments, the research highlights pathways for improvement, such as education-driven interventions.

Broader implications include scaling models nationally via ABDM, promoting equity in healthcare (Ganapathy, 2024). Policymakers must prioritize literacy programs and infrastructure to realize digital health's potential, ensuring inclusive access for all. This study highlights the crucial importance of eHealth literacy and technology acceptance in shaping Tamil Nadu's digital health ecosystem. The research findings indicate a moderate level of literacy among the population, with notable disparities across demographic groups. These variations in literacy levels significantly influence the acceptance of digital health technologies and overall user satisfaction. By combining the Technology Acceptance Model (TAM) with comprehensive literacy assessments, the study identifies key areas for improvement and suggests potential interventions, particularly those focused on education and skill development.

The implications of this research extend beyond Tamil Nadu, offering valuable insights for scaling digital health models nationally through initiatives like the Ayushman Bharat Digital Mission (ABDM). The study emphasizes the potential of digital health technologies in promoting healthcare equity and accessibility. However, it also underscores the need for targeted efforts to bridge the digital divide and ensure inclusive access to these technologies. To fully harness the potential of digital health, policymakers must prioritize the development and implementation of comprehensive eHealth literacy programs. Additionally, investments in robust digital infrastructure are essential to support the widespread adoption and effective utilization of digital health technologies across diverse populations.

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