



**DIGITAL HEALTH LITERACY IN TAMIL NADU: CHALLENGES
AND INSIGHTS FROM A CROSS-SECTIONAL STUDY**

¹Arvind Kumar Subramaniam and ²Meena Rajeswari Iyer

¹Department of Communication, PSG College of Arts and Science, Coimbatore, Tamilnadu, India

²Department of Visual Communication and Electronic Media, PSG College of Arts and Science, Coimbatore, Tamilnadu, India

DOI: <https://doi.org/10.5281/zenodo.17078976>

Abstract: The contemporary healthcare sector deeply depends on digital health literacy for its operations. One must possess the ability to search and understand as well as utilize digital health information for digital health literacy. The main target of this investigation includes determining digital health literacy levels among Tamil Nadu residents while examining their relationships with socioeconomic characteristics and general skills and their impact on health outcomes. A detailed cross sectional evaluated survey with 249 participants showed that age together with education level and income status and employment status influence digital health literacy. The skill sets related to seeking and utilizing health information together with most other skills showed less expected strength in their correlations indicating a need for added assistance. This research study exposes how disadvantaged groups have trouble understanding and reaching accessible health resources during evaluations of healthcare service enhancement efforts. Research findings generate serious public health policy effects that need modifications in health literacy societies by implementing targeted campaigns and educational measures.

Keywords: Digital Health Literacy, eHealth Literacy, Tamil Nadu, Digital Divide, Public Health Policy, Health Outcomes, Socio-Demographic Disparities, Operational Skills, Information Searching, Digital Inclusion.

I. INTRODUCTION

The rapid progress of digital transformation leads to health-related information distribution through electronic systems which has created the requirement for eHealth literacy. The definition of eHealth literacy established by Sutton et al. stands for the skillset that enables people to find health information online along with comprehension and evaluation to use this information as solutions for health issues. Modern healthcare systems build their foundation upon eHealth literacy. Digital platforms adopted worldwide for health information and services delivery have developed healthcare systems that present more accessible patient-centered systems which operate

efficiently. The existence of digital health disparities between geographical areas and different demographic groups across socioeconomic statuses results in inequity of healthcare benefits distribution.

EHealth literacy across the world helps people become empowered by allowing them to handle their health independently while getting access to reputable information and handling health issues and making informed decisions. Millions of people employed online platforms to obtain guidance about preventing and treating COVID-19 alongside receiving the vaccination during the pandemic because of their limited eHealth literacy. The strong eHealth literacy of countries leads to superior public health performance and individual fitness results thus proving its essential role in handling worldwide health emergencies.

Despite the advantages the system provides it faces several remaining difficulties to tackle. The present distribution manner of digital health literacy shows inconsistency although affected by age groups and education levels as well as personal income and technological availability. The implementation of advanced eHealth literacy in nations mostly depends on their digital capacity and inclusion rates while countries with economic limitations such as LMICs face infrastructure restrictions and digital competence challenges which lead to tool-provider practice differences. The necessity exists to connect digital health education with technology improvements along with the development of eHealth solutions that adapt to cultural dynamics and functionality needs.

A study focused on eHealth literacy would benefit greatly from analyzing the situation in Tamil Nadu State of India. Health initiatives and literacy rates in Tamil Nadu surpass most of its neighbouring States in the region. The area has typical population disparities across urban territories versus rural areas together with contradictions between different socioeconomic groups and gender categories. The research will evaluate digital health literacy skills among Tamil Nadu population by examining their capabilities to interact with digital health information resources. This research that aims to identify eHealth literacy patterns and challenges as well as influencing factors will deepen comprehension of eHealth literacy effects on public health and policy and digital inclusion across regional and worldwide contexts.

Penetration of digital health care requires understandings about eHealth literacy to advance individual health outcomes while enabling public health policies that guarantee healthcare accessibility fair to everyone.

Problem Statement: Digital medical platforms have increased access but they have not solved the digital inequities which prevent fair healthcare service opportunities and knowledge-based medical choices. Throughout Tamil Nadu the digital divide results in worsened inequalities because economic disadvantages along with age factors continue to affect both rural residents and older people of all ages. People with insufficient digital health information interpretation and application skills distribute misinformation while taking poor health actions and question their belief in digital healthcare platforms. The present study investigates the essential nature of studying eHealth literacy patterns combined with obstacles and factors that influence them in Tamil Nadu to develop strategic models for establishing digital equality in healthcare.

II. REVIEW OF LITERATURE

"Digital literacy as a new determinant of health: A scoping review" (2023), this scoping review examines the impact of low digital literacy on health in terms of definitions, assessment tools, and interventions to address the gap in digital health disparities. The study emphasizes that digital health literacy is the most important tool to access and apply health information. It states the eHealth Literacy Scale (eHEALS) as a very widely used instrument of assessing, which needs better measurement instruments and effective interventions in order to bridge the gap of the digital health divide.

"Digital Health Literacy and Its Association with Sociodemographic Characteristics, Health Resource Use, and Health Outcomes: Rapid Review" (2024), this rapid review investigates associations between digital health literacy and factors such as sociodemographic characteristics, health resource utilization, and health outcomes.

The results show that high education levels and younger ages are generally associated with better digital health literacy. Moreover, higher levels of digital health literacy are also associated with improved health outcomes, such as better mental health as well as management of chronic diseases. However, there was variability in these associations reported in the literature, thus requiring further research.

"Determinants and outcomes of eHealth literacy in healthy adults: A systematic review" (2023), this systematic review evaluates the determinants and outcomes of eHealth literacy in healthy adults. Age, education, and socioeconomic status are identified as significant determinants of eHealth literacy. Outcomes related to greater eHealth literacy include improved health behaviors, better health status, and more likely uptake of preventive health. The study points out the need for focused interventions aimed at enhancing eHealth literacy among heterogeneous populations.

"Adolescents' self-efficacy and digital health literacy: a cross-sectional study" (2022), this cross-sectional study examines adolescents' digital health literacy and its association with self-efficacy. The research underlines how, although adolescents often report that their ability to find online health information is good or high, their skills may not be as good as their perception of that ability. In this context, a study on digital health literacy emphasizes the importance of educational programs designed to develop skills in critical evaluation by adolescents to effectively navigate and evaluate online health information.

"Digital Health Literacy and Patient Safety" (2024), this paper explores the emerging field of digital health literacy and its impact on patient safety. The article emphatically states that being able to seek information, contact providers, manage appointments, and access a patient's own record requires the ability to access digital health resources. The study therefore calls upon further research into the digital health literacy-patient outcomes relationship to inform the development of strategies that enhance patient safety in this backdrop of digital health.

Research Gap: Despite the growing reliance on digital platforms for health information and services, disparities in digital health literacy persist, creating significant barriers to equitable healthcare access and informed decision-making. In Tamil Nadu, a state known for its progressive healthcare initiatives, the digital divide exacerbates inequalities, particularly among socio-economically disadvantaged groups, rural populations, and older demographics. Limited skills in evaluating, interpreting, and applying digital health information often lead to misinformation, suboptimal health behaviours and reduced trust in digital health tools. This study addresses the urgent need to assess and understand the patterns, challenges, and determinants of eHealth literacy in Tamil Nadu to inform strategies for bridging these gaps and fostering an inclusive digital health ecosystem.

Significance of the Study: The importance of this study is its ability to add relevant insight into the pertinent challenge of digital health literacy and its effects on healthcare accessibility and decision-making in Tamil Nadu. While digital platforms present enormous opportunities to access health-related information and services, disparities in digital skills create obstacles that are disproportionately affecting vulnerable groups. Socio-economically vulnerable populations, rural dwellers, and elderly people tend to have difficulty with comprehending, assessing, and effectively using online health information, resulting in misinformation, unhealthy decisions, and decreased use of digital health tools. Through a systematic review of the trends, issues, and important determinants of eHealth literacy, this study offers evidence-based policy recommendations for policymakers, healthcare professionals, and digital health developers to create more accessible and user-centered digital health interventions. In addition, the research is consistent with Tamil Nadu's continued healthcare innovations by determining digital health literacy gaps that, when filled, will improve equitable provision of healthcare, enable people to make informed decisions about their health, and improve public health outcomes in the end. The results can inform the creation of focused educational programs, online health training, and policy interventions to close the digital divide, making it possible for everyone—regardless of their socio-economic or geographical context—to navigate the digital health space with confidence.

Conceptual Model of the Study:

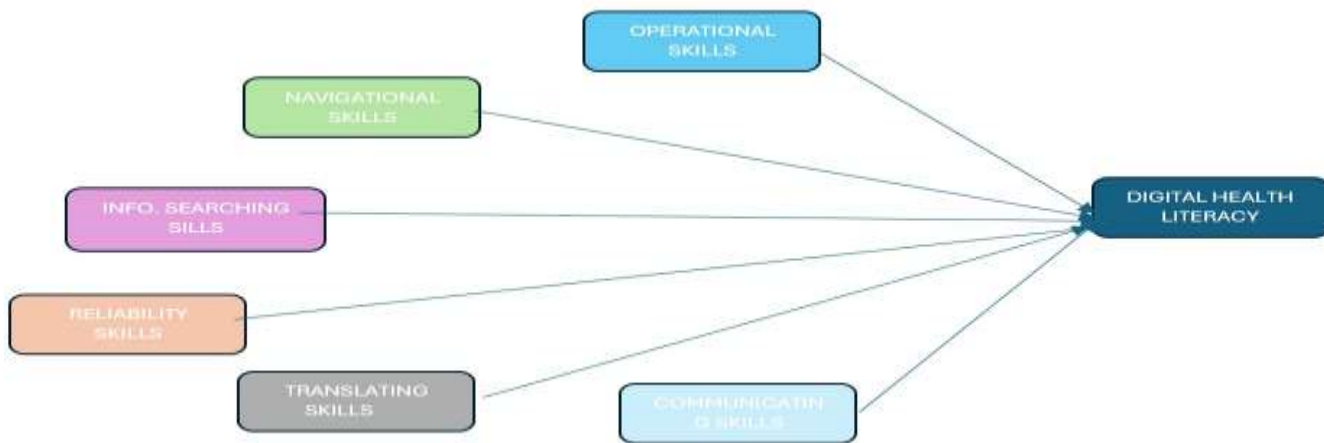


Fig 1: Factors Influencing Digital Health Literacy

Objectives:

1. To examine the socio-demographic factors (e.g., age, gender, education, income) influencing digital health literacy in Tamil Nadu.
2. To analyze the relationship between digital health literacy dimensions and their impact on the effective use of health information for decision-making and health outcomes.
3. To assess the level of digital health literacy among individuals in Tamil Nadu across key dimensions such as operational, navigation, and information-searching skills.

Research hypotheses:

1. There is a significant difference in digital health literacy levels based on socio-demographic factors such as age, gender, education, and income.
2. Higher levels of operational and navigation skills positively correlate with the ability to evaluate and apply health information from digital platforms.
3. Individuals with higher digital health literacy levels are more likely to demonstrate effective health behaviors and decision-making compared to those with lower literacy levels.

III. RESEARCH METHODOLOGY

S. No	Dimensions	Research Source
1.	Research Design	Exploratory and Descriptive
2.	Data Source	Primary data & Secondary sources of data were gathered
3.	Data Instrument	Structured Questionnaire
4.	Sample respondents	249
5.	Sampling Way	Non-Probability Sampling – Convenience Sampling
6.	Sampling Methodology	Google Forms Link via Whatsapp, Instagram, Facebook
7.	Research Period	Sep 2024 to Nov 2024
8.	Statistical Tools Used	Correlation and Multiple Regression Analysis

The research design for this research adopts a blend of exploratory and descriptive research designs to examine the subject matter in depth. The exploratory design assists in the identification of major patterns, trends, and insights, whereas the descriptive design enables a systematic analysis of the variables in question. Through the combination of the two designs, the research seeks to present a balanced understanding of the subject matter.

Data collection was based on both primary and secondary sources to provide a strong foundation for the study. Primary data were collected directly from respondents using a structured questionnaire, which was used to collect specific and relevant information. The questionnaire was developed using previous research, theoretical concepts, and particular study goals. Secondary data were collected from reliable sources, such as academic journals, research papers, government reports, and industry magazines, to support primary findings and add contextual richness.

There were 249 participants in the study. The sampling method used was non-probability sampling, and more specifically, convenience sampling. This implies that the respondents were chosen based on their willingness and availability to take part. The reason for selecting this method is that it is practical, economical, and efficient in reaching many respondents within a short time period. To ensure maximum reach and accessibility, the questionnaire was shared through Google Forms on a number of social media platforms such as WhatsApp, Instagram, and Facebook. The choice of platforms was made based on their widespread usage and ease of access, thereby providing a diverse range of participants from all walks of life.

The study was carried out over a period of three months, from September 2024 to November 2024, to provide ample time for data collection, analysis, and interpretation. In order to provide a guarantee for the validity and reliability of the findings of the study, statistical methods like correlation analysis and multiple regression analysis were utilized. Correlation analysis helped to analyze the correlations among various variables, and their strength and direction were identified. Multiple regression analysis was utilized to establish the influence of the independent variables over the dependent variable to find predictive relationships as well as the influential factors. These statistical methods yielded quantitative information, adding credibility and rigor to the research.

IV. RESULTS

Table 1: DEMOGRAPHIC FACTORS

Factor	Sub-Factor	Frequency	Percentage
Gender	Female	125	50.2
	Male	124	49.8
Age Group	25 years & below	169	67.87
	36 years & above	39	15.66
	31 to 35 years	21	8.43
	26 to 30 years	20	8.03
Education Level	Under Graduate	141	56.63
	Post Graduate & above	74	29.72
	Higher Secondary	34	13.65
Employment Status	Unemployed	165	66.27
	Employed	59	23.69
	Self Employed	25	10.04
Monthly Income	45,001 & above	107	42.97
	25,000 & below	66	26.51
	25,001 to 35,000	40	16.06
	35,001 to 45,000	36	14.46

Table 1 explains that the sample is almost evenly distributed by gender, with females (50.2%) slightly outnumbering males (49.8%). The majority of respondents (67.87%) are 25 years and below, reflecting a predominantly younger demographic, while smaller proportions are aged 31 to 35 years (8.43%), 26 to 30 years (8.03%), and 36 years and above (15.66%). In terms of education, over half (56.63%) have an undergraduate degree, followed by 29.72% with postgraduate qualifications or higher, and 13.65% with higher secondary education. Employment status reveals that most respondents are unemployed (66.27%), with smaller groups being

employed (23.69%) or self-employed (10.04%). Regarding monthly income, 42.97% earn 45,001 & above, while 26.51% earn 25,000 & below, and the remainder fall into the 25,001 to 35,000 (16.06%) and 35,001 to 45,000 (14.46%) brackets, highlighting a diverse economic profile.

Table 2: MEAN ANALYSIS

Descriptive Statistics			
	N	Mean	Std. Deviation
Operational Skills	249	3.53	.933
Navigation Skills	249	3.11	1.082
Information Searching Skills	249	3.09	1.191
Reliability Skills	249	3.37	1.004
Translating Skills	249	3.46	1.070
Communicating Skills	249	3.30	1.140
Valid N (listwise)	249		

The descriptive statistics provide insights into the average levels (mean) and variability (standard deviation) of six e-health literacy dimensions. Among these, Operational Skills has the highest mean (3.53), indicating that respondents generally feel more confident in their ability to perform basic tasks with ICT tools. Conversely, Information Searching Skills has the lowest mean (3.09), suggesting that locating reliable health information may be a more challenging aspect for participants. The standard deviations are relatively consistent, with Information Searching Skills showing the greatest variability (1.191), indicating differing skill levels among respondents.

Table 3: CORRELATION ANALYSIS

Correlations							
		Operational_Skills	Navigation_Skills	Information_Searching_Skills	Reliability_Skills	Translating_Skills	Communicating_Skills
Operational Skills	r	1	.390**	.447**	.447**	.398**	.295**
	p value		.000	.000	.000	.000	.000
	N	249	249	249	249	249	249
Navigation Skills	r	.390**	1	.462**	.453**	.410**	.271**
	p value	.000		.000	.000	.000	.000
	N	249	249	249	249	249	249
Information Searching Skills	r	.447**	.462**	1	.370**	.373**	.286**
	p value	.000	.000		.000	.000	.000
	N	249	249	249	249	249	249
Reliability Skills	r	.447**	.453**	.370**	1	.419**	.381**
	p value	.000	.000	.000		.000	.000
	N	249	249	249	249	249	249
Translating Skills	r	.398**	.410**	.373**	.419**	1	.325**
	p value	.000	.000	.000	.000		.000

	N	249	249	249	249	249	249
	r	.295**	.271**	.286**	.381**	.325**	1
Communicating skills	p value	.000	.000	.000	.000	.000	
	N	249	249	249	249	249	249

** . Correlation is significant at the 0.01 level (2-tailed).

The correlation table highlights the relationships between different e-health literacy dimensions. All correlations are significant at the 0.01 level, indicating meaningful associations between the dimensions. The strongest relationships are between Operational Skills and both Information Searching Skills ($r = 0.447$) and Reliability Skills ($r = 0.447$), showing that operational proficiency is crucial for searching and validating health information. Communicating Skills exhibits weaker correlations with other dimensions, such as Navigation Skills ($r = 0.271$) and Information Searching Skills ($r = 0.286$), implying that communication might depend on other factors beyond core literacy skills. These results underscore the interconnected nature of e-health literacy dimensions while highlighting variability in the strength of relationships.

Findings and Discussion: The study highlights significant findings regarding digital health literacy in Tamil Nadu. Demographically, the sample is evenly distributed by gender, with females (50.2%) and males (49.8%) almost equally represented. A predominantly younger demographic emerges, with 67.87% aged 25 years and below. Education levels indicate over half (56.63%) of respondents are undergraduates, while the majority (66.27%) are unemployed, reflecting potential challenges in accessing digital health resources among non-working individuals. Income disparities are evident, with 42.97% in the highest income bracket (45,001 & above) and 26.51% in the lowest (25,000 & below). Among e-health literacy dimensions, Operational Skills scored the highest mean (3.53), suggesting confidence in basic ICT tasks, whereas Information Searching Skills had the lowest mean (3.09), and indicating difficulties in locating reliable health information.

Correlation analysis shows strong relationships between Operational Skills and both Information Searching Skills and Reliability Skills ($r = 0.447$), emphasizing the foundational role of operational proficiency. Communicating Skills exhibited weaker correlations, such as with Navigation Skills ($r = 0.271$), implying that effective communication may depend on additional factors like interpersonal or contextual influences. These findings align with earlier studies, such as those by Sutton et al., emphasizing the importance of digital literacy in navigating and applying health information, and the systematic review (2023) that identified education and age as key determinants of eHealth literacy. Similar to global findings, this study reaffirms that higher education levels correlate with better eHealth literacy, while disparities persist among socio-economically disadvantaged groups, as highlighted by the rapid review (2024). However, compared to prior studies that emphasized high eHealth literacy in advanced economies, this study underscores unique regional challenges, particularly in balancing literacy between rural and urban populations in Tamil Nadu. Addressing these disparities through targeted interventions and education programs is essential for fostering equitable digital health inclusion.

V. LIMITATIONS AND CONCLUSION

This study highlights the current state of digital health literacy in Tamil Nadu, revealing critical insights and acknowledging several limitations. The findings demonstrate that operational and reliability skills are key to effectively navigating and applying health information, while disparities persist among age groups, socio-economic statuses, and rural versus urban populations. However, the study's reliance on convenience sampling and self-reported data may have introduced selection and social desirability biases, limiting the generalizability of the results. Additionally, the cross-sectional design restricts causal inferences, and cultural or language barriers

were not addressed. Despite these limitations, the study aligns with global trends, emphasizing the importance of digital health education, accessibility, and cultural inclusivity to bridge the digital divide. Ensuring equitable eHealth literacy, individuals can make informed health decisions, improving public health outcomes and advancing a more inclusive digital health ecosystem. Future research should adopt longitudinal designs, explore culturally sensitive tools, and investigate broader determinants of digital health literacy for a comprehensive understanding.

REFERENCES

- Chesser, A., Drassen Ham, A., & Keene Woods, N. (2020). Assessment of COVID-19 knowledge among university students: Implications for future risk communication strategies. *Health Education & Behavior*, 47(4), 507-511. <https://doi.org/10.1177/1090198120931420>
- Van der Vaart, R., & Drossaert, C. H. (2017). Development of the digital health literacy instrument: Measuring a broad spectrum of health 1.0 and health 2.0 skills. *Journal of Medical Internet Research*, 19(1), e27. <https://doi.org/10.2196/jmir.6709>
- Manafo, E., & Wong, S. (2012). Health literacy programs for older adults: A systematic literature review. *Health Education Research*, 27(6), 947-960. <https://doi.org/10.1093/her/cys067>
- Kim, H., & Xie, B. (2017). Health literacy in the eHealth era: A systematic review of the literature. *Patient Education and Counseling*, 100(6), 1073-1081. <https://doi.org/10.1016/j.pec.2017.01.015>
- Paige, S. R., Krieger, J. L., Stellefson, M., & Alber, J. M. (2017). eHealth literacy in chronic disease management: A systematic review. *Patient Education and Counseling*, 100(6), 1073-1081. <https://doi.org/10.1016/j.pec.2017.01.015>
- Yang, S. C., Luo, Y. F., & Chiang, C. H. (2017). The association between eHealth literacy and preventive behaviors in Taiwan: A cross-sectional study. *BMC Public Health*, 17, 174. <https://doi.org/10.1186/s12889-017-4117-8>
- Rowlands, G., Protheroe, J., Winkley, J., Richardson, M., Seed, P. T., & Rudd, R. (2015). Health literacy and the social determinants of health: A qualitative model from adult learners. *Health Promotion International*, 30(3), 493-505. <https://doi.org/10.1093/heapro/dat074>
- Diviani, N., & Schulz, P. J. (2014). What should laypersons know about health literacy? *Health Communication*, 29(9), 912-921. <https://doi.org/10.1080/10410236.2013.829160>
- Stellefson, M., Hanik, B., Chaney, B., Tennant, B., & Chavarria, E. A. (2011). eHealth literacy among college students: A systematic review with implications for eHealth education. *Journal of Medical Internet Research*, 13(4), e102. <https://doi.org/10.2196/jmir.1703>
- Norman, C. D., & Skinner, H. A. (2006). eHEALS: The eHealth literacy scale. *Journal of Medical Internet Research*, 8(4), e27. <https://doi.org/10.2196/jmir.8.4.e27>

- Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12, 80. <https://doi.org/10.1186/1471-2458-12-80>
- Parker, R. M., Ratzan, S. C., & Lurie, N. (2003). Health literacy: A policy challenge for advancing high-quality health care. *Health Affairs*, 22(4), 147-153. <https://doi.org/10.1377/hlthaff.22.4.147>
- Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science & Medicine*, 67(12), 2072-2078. <https://doi.org/10.1016/j.socscimed.2008.09.050>
- McInnes, N., & Haglund, B. J. (2011). Readability of online health information: Implications for health literacy. *Informatics for Health and Social Care*, 36(4), 173-189. <https://doi.org/10.3109/17538157.2010.542529>
- Bautista, J. R., Rosario, R. C. C., Uy, M. M., & Banogon, E. C. M. (2020). Digital health literacy and its correlates among university students: A cross-sectional study in the Philippines. *Journal of Public Health*, 28(5), 561-568. <https://doi.org/10.1007/s10389-020-01224-z>