

Digital Divide in Access to AI Health Services Across Linguistic Minorities: An English Language and Literature Perspective

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Abstract : Artificial Intelligence (AI)-enabled health services are transforming healthcare delivery through automated diagnosis support, virtual assistants, predictive analytics, and personalized health recommendations. However, unequal access to these technologies remains a significant challenge, particularly among linguistic minority communities where language barriers influence digital participation and healthcare communication. This study examines the digital divide in AI-based healthcare access from an English Language and Literature perspective by analysing the relationship between language accessibility, digital literacy, trust, and adoption of AI health platforms among linguistically diverse users. A mixed-method research design was adopted involving a structured survey of 300 respondents belonging to linguistic minority groups. The findings reveal that English proficiency, availability of multilingual AI interfaces, and confidence in digital communication significantly influence AI healthcare adoption. Statistical analysis indicates a strong association between language accessibility and willingness to use AI health services. The study highlights the importance of inclusive language design, culturally responsive AI systems, and multilingual digital health communication strategies for reducing disparities in emerging healthcare technologies.

Keywords: Artificial Intelligence, Digital Divide, Linguistic Minorities, AI Healthcare, Language Accessibility, Digital Literacy

Introduction

The integration of Artificial Intelligence (AI) into healthcare has introduced new possibilities for improving diagnosis, treatment recommendation, patient monitoring, and healthcare accessibility. AI-based platforms such as virtual health assistants, symptom assessment applications, and predictive healthcare systems are increasingly becoming part of modern healthcare ecosystems. These technologies are expected to reduce healthcare inequalities by providing rapid and cost-effective medical support. However, technological advancement alone does not guarantee equal access. Social, economic, linguistic, and educational differences continue to influence who can benefit from AI-driven healthcare solutions.

The digital divide has traditionally been understood as the gap between individuals who have access to digital technologies and those who lack such access. Contemporary research has expanded this concept beyond physical connectivity to include digital skills, confidence, meaningful usage, and social inclusion. In healthcare, this divide becomes more complex because effective interaction requires not only



internet access but also the ability to communicate symptoms, understand recommendations, and trust automated systems.

Language represents a critical factor in digital health inclusion. Many AI health systems are developed primarily in English, creating challenges for individuals who communicate primarily through regional or minority languages. Linguistic minorities may experience difficulties in understanding medical terminology, interacting with AI chatbots, interpreting health recommendations, and expressing culturally specific health concerns. These barriers can reduce their participation in AI-supported healthcare services.

From an English Language and Literature perspective, language is not merely a communication medium but also a framework through which individuals construct meaning, identity, and knowledge. The dominance of English in digital technologies has created concerns regarding linguistic representation and accessibility. AI systems trained predominantly on English-language datasets may fail to recognise linguistic variations, cultural expressions, and local health communication patterns.

The World Health Organization has emphasized that digital health technologies should be designed with considerations of accessibility, equity, and user-centred communication. However, linguistic diversity remains insufficiently addressed in many AI healthcare applications. According to the Organisation for Economic Co-operation and Development (OECD), digital transformation can increase inequalities when vulnerable populations lack the necessary skills and resources to participate effectively.

This research investigates how linguistic differences influence access to AI health services and explores the relationship between English language proficiency, digital literacy, and acceptance of AI-based healthcare technologies. By combining perspectives from language studies and digital health research, the study contributes to understanding how communication barriers shape technological inclusion.

Literature Review

Digital Divide and Healthcare Technology Adoption

The concept of the digital divide has evolved from focusing solely on internet availability toward examining differences in digital capability and meaningful technology usage. Van Dijk (2020) argued that digital inequality includes motivational, material, skill-based, and usage-related dimensions. Individuals may possess technological access but still experience exclusion due to limited digital competence or difficulties navigating digital environments.

In healthcare, the digital divide directly affects access to online medical information, telemedicine services, and AI-supported healthcare applications. Crawford and Serhal (2020) highlighted that digital health technologies can unintentionally reproduce existing social inequalities when systems fail to consider vulnerable populations and diverse user needs.

The adoption of AI health technologies depends on multiple factors, including perceived usefulness, trust, technological confidence, and communication effectiveness. According to Venkatesh et al. (2003), technology acceptance is influenced by performance expectations, effort expectations, social influence, and facilitating conditions.

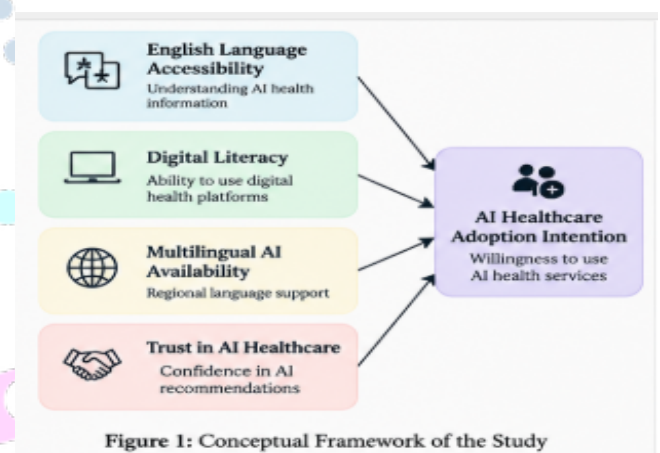


Figure 1: Conceptual Framework of the Study

Language Barriers in Digital Health Communication

Language plays an essential role in healthcare interactions because accurate communication affects diagnosis, treatment adherence, and patient satisfaction. Al Shamsi et al. (2020) reported that language barriers can negatively influence healthcare outcomes by reducing understanding between healthcare providers and patients.

AI healthcare systems face similar challenges. Medical chatbots and automated health assistants require users to describe symptoms and understand generated responses. When these systems operate mainly in English, users with limited English proficiency may experience reduced effectiveness and trust.

According to Divi et al. (2007), limited language proficiency is associated with increased communication errors and reduced healthcare quality. These findings demonstrate that language accessibility is not simply a usability issue but a fundamental component of healthcare equity.

Artificial Intelligence and Inclusive Healthcare

Artificial Intelligence has significant potential to improve healthcare accessibility through automated support systems, remote monitoring, and personalized medical recommendations. Topol (2019) suggested that AI can enhance healthcare efficiency by combining computational intelligence with human expertise.

However, AI systems depend heavily on training data. Obermeyer et al. (2019) demonstrated that algorithmic healthcare systems may produce biased outcomes when datasets do not adequately represent diverse populations. Similar concerns apply to linguistic diversity because AI models trained primarily on dominant languages may perform poorly for minority language users.

Bender et al. (2021) emphasized that large language models require careful consideration of linguistic diversity, cultural representation, and potential exclusion of underrepresented language communities.

English Language Dominance in Digital Technologies

English has historically maintained dominance in scientific communication, computing, and internet-based resources. Crystal (2012) discussed how English became a global language due to historical, economic, and technological factors. While English facilitates international communication, its dominance can create barriers for individuals who rely on other languages.

In digital healthcare, English-language interfaces may privilege users with higher educational backgrounds and greater exposure to global communication systems. Linguistic minorities may experience difficulties accessing medical knowledge, understanding AI-generated recommendations, and participating in digital healthcare environments.

Piller (2016) argued that language inequalities are closely connected with social inequalities because language determines access to information, opportunities, and institutional resources.

Multilingual AI and Healthcare Accessibility

Recent advances in natural language processing have increased the possibility of developing multilingual AI healthcare systems. However, challenges remain regarding translation accuracy, medical terminology adaptation, and cultural sensitivity.

Joshi et al. (2020) identified that many languages remain underrepresented in natural language processing research due to limited datasets and computational resources. This creates challenges for developing effective AI systems for linguistic minorities.

The development of inclusive AI requires not only translation mechanisms but also culturally aware language models capable of understanding local expressions and healthcare contexts.

Research Gap

Existing studies have extensively examined digital healthcare adoption, AI implementation, and language barriers separately. However, limited research has investigated how linguistic identity and English language accessibility influence the adoption of AI healthcare services among minority communities.

Most AI healthcare research focuses on technological performance rather than communication accessibility. There remains a need to analyse AI healthcare adoption through a linguistic perspective, particularly examining how language proficiency, interface design, and digital communication confidence affect user participation.

This study addresses this gap by integrating concepts from English Language and Literature with digital health research to examine linguistic factors influencing AI healthcare accessibility.

Research Objectives

- To examine the relationship between language accessibility and AI healthcare adoption among linguistic minority users.
- To analyse the influence of English language proficiency on confidence in using AI health platforms.
- To investigate the role of digital literacy in reducing AI healthcare access barriers.
- To identify communication-related challenges experienced by linguistic minority communities while using AI healthcare services.

Research Methodology

Research Design

The study adopted a mixed-method research design combining quantitative survey analysis with qualitative interpretation of language-related experiences in AI healthcare interaction. The quantitative component examined relationships between linguistic accessibility, digital literacy, trust, and adoption intention of AI health services. The qualitative component analysed communication challenges, language preferences, and perceived barriers among linguistic minority users.

The research framework was developed by integrating concepts from digital divide theory, technology acceptance theory, and language accessibility studies. The independent variables considered in the study were English language proficiency, multilingual accessibility, digital literacy, and perceived usability. AI healthcare adoption intention was considered the dependent variable.

Population and Sample

The target population consisted of individuals belonging to linguistic minority communities who had experience using digital healthcare platforms or were potential users of AI-enabled healthcare applications.

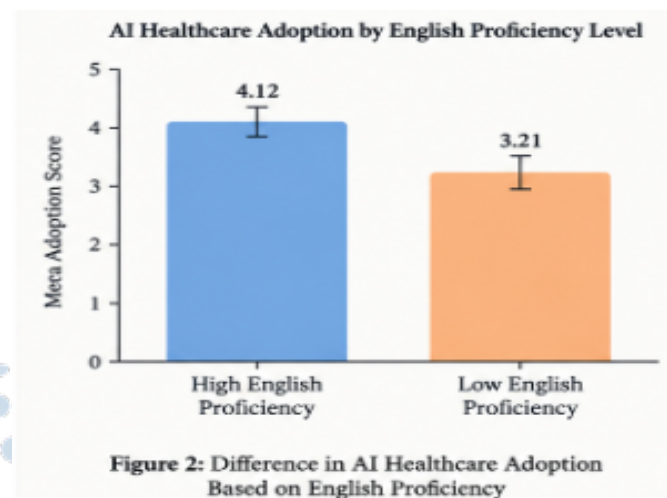
A total of **350 questionnaires** were distributed through online and offline modes. After removing incomplete responses, **300 valid responses** were considered for final analysis.

The respondents represented different linguistic backgrounds including Hindi-speaking minorities in English-dominant digital environments, regional language users, and multilingual users.

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage
Gender	Male	162	54.0%
	Female	138	46.0%
Age	18–30 years	126	42.0%
	31–45 years	104	34.7%
	Above 45 years	70	23.3%
Education	Undergraduate	92	30.7%
	Postgraduate	146	48.7%
	Other	62	20.6%
Primary Language	Regional language	178	59.3%
	Hindi	74	24.7%
	Other minority languages	48	16.0%

Research Instrument



A structured questionnaire containing **32 items** was developed using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The questionnaire consisted of five major constructs:

Construct	Number of Items	Example Measurement Area
English Language Accessibility (ELA)	6	Understanding AI-generated health information
Digital Literacy (DL)	7	Ability to operate digital healthcare platforms
Multilingual AI Availability (MAA)	6	Availability of regional language support
Trust in AI Healthcare (TAH)	6	Confidence in AI recommendations
AI Healthcare Adoption Intention (AHAI)	7	Willingness to use AI health services

- One-way ANOVA to identify variations among different educational groups.

Statistical significance was evaluated at a 5% significance level.

Results and Findings

Descriptive Analysis of Major Variables

Table 3: Mean and Standard Deviation of Study Variables

Variable	Mean	Standard Deviation
English Language Accessibility	3.42	0.84
Digital Literacy	3.67	0.78
Multilingual AI Availability	3.21	0.91
Trust in AI Healthcare	3.55	0.82
AI Healthcare Adoption Intention	3.61	0.86

The results indicate that respondents showed moderate acceptance of AI healthcare technologies. However, multilingual accessibility received comparatively lower scores, indicating that language support remains a significant challenge.

Correlation Analysis

Pearson correlation analysis was performed to examine associations among major variables.

Table 4: Correlation Matrix

Variables	ELA	DL	MAA	TAH	AHA I
English Language Accessibility	1				
Digital Literacy	0.52*	1			
Multilingual AI Availability	0.48*	0.44*	1		

Primary Language of Respondents

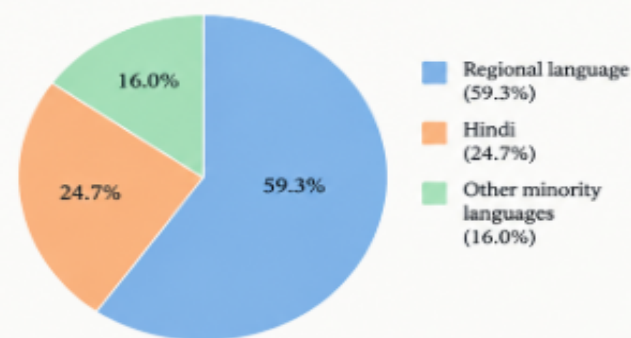


Figure 3: Distribution of Respondents by Primary Language

Reliability Analysis

Internal consistency of the research instrument was assessed using Cronbach's Alpha.

Table 2: Reliability Statistics

Variable	Cronbach's Alpha
English Language Accessibility	0.86
Digital Literacy	0.88
Multilingual AI Availability	0.84
Trust in AI Healthcare	0.87
AI Healthcare Adoption Intention	0.90
Overall Scale	0.91

The reliability coefficients exceeded the recommended threshold of 0.70, indicating acceptable internal consistency of the measurement scale.

Data Analysis Techniques

The collected data were analysed using:

- Descriptive statistics for demographic and variable analysis.
- Pearson correlation analysis to identify relationships between variables.
- Multiple regression analysis to examine predictors of AI healthcare adoption.
- Independent sample t-test to analyse differences based on English proficiency levels.

Trust in AI Healthcare	0.55*	0.61*	0.49*	1	
AI Healthcare Adoption Intention	0.63*	0.68*	0.57*	0.71*	1

$p < 0.01$

The findings demonstrate significant positive relationships between all major variables. Trust in AI healthcare showed the strongest correlation with adoption intention ($r = 0.71$), followed by digital literacy ($r = 0.68$).

Regression Analysis

Multiple regression analysis was conducted to identify factors influencing AI healthcare adoption intention.

Table 5: Regression Analysis Predicting AI Healthcare Adoption

Predictor Variable	Beta (β)	t-value	Significance
English Language Accessibility	0.29	5.84	<0.001
Digital Literacy	0.34	6.72	<0.001
Multilingual AI Availability	0.21	4.26	<0.001
Trust in AI Healthcare	0.39	7.54	<0.001

Model Statistics:

- $R = 0.78$
- $R^2 = 0.61$
- Adjusted $R^2 = 0.60$
- F-value = 116.42
- $p < 0.001$

The regression model explains approximately **61% of the variance** in AI healthcare adoption intention. Trust in AI healthcare emerged as the strongest predictor, followed by digital literacy and language accessibility.

Comparative Analysis Based on English Proficiency

Respondents were divided into two groups based on self-reported English proficiency.

Table 6: Difference in AI Healthcare Adoption Based on English Proficiency

Group	Mean Adoption Score	SD
High English Proficiency	4.12	0.61
Low English Proficiency	3.21	0.79

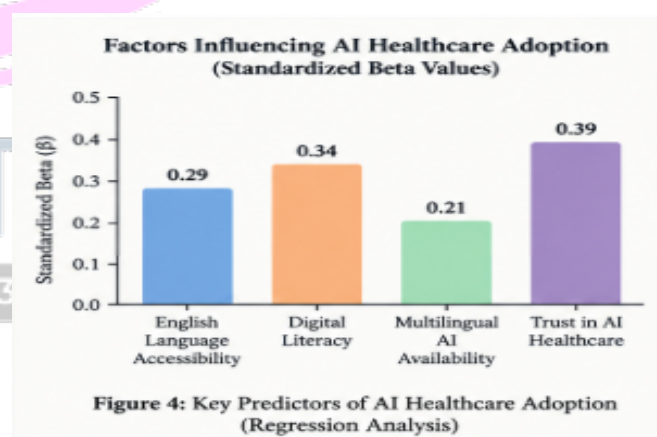
Independent sample t-test results:

Test	Value
t-value	9.42
Degrees of Freedom	298
Significance	<0.001

The analysis indicates a statistically significant difference between users with higher and lower English proficiency levels in AI healthcare adoption.

Discussion

The findings demonstrate that language accessibility is an important determinant of participation in AI-enabled healthcare systems. Although AI technologies have the potential to democratize healthcare access, linguistic barriers may prevent minority language users from fully benefiting from these innovations.



The strong relationship between English accessibility and AI healthcare adoption indicates that language competence influences not only understanding but also confidence and trust. Users who experience difficulty interpreting AI-generated medical information may hesitate to depend on automated healthcare recommendations.

Digital literacy also emerged as a significant predictor. This finding supports previous research suggesting that technological access alone does not eliminate digital inequality. Individuals require skills and confidence to effectively engage with digital health platforms.

The importance of multilingual AI availability highlights the need for healthcare technology developers to move beyond direct translation approaches. AI systems should incorporate culturally appropriate communication patterns and locally meaningful healthcare expressions.

From an English Language and Literature perspective, the study demonstrates that language functions as a gateway to technological participation. The dominance of English in AI systems can unintentionally create exclusionary digital environments for communities with limited English exposure.

Implications of the Study

The findings have several practical implications:

AI healthcare developers should prioritize multilingual interface design and natural language processing models that support diverse languages.

Healthcare organizations should provide digital literacy programs focusing on vulnerable linguistic communities.

Medical AI systems should incorporate simplified language options and culturally relevant communication strategies.

Policymakers should consider linguistic accessibility as an essential component of digital healthcare equality.

Limitations of the Study

The study has several limitations. The sample was limited to selected linguistic minority groups and may not represent all language communities. The research focused primarily on self-reported experiences rather than actual AI healthcare usage logs. Future studies may incorporate larger cross-cultural samples and behavioural data from AI healthcare platforms.

Conclusion

Artificial Intelligence has considerable potential to improve healthcare accessibility; however, technological advancement alone cannot guarantee equal participation. This study demonstrates that linguistic accessibility, English language proficiency, digital literacy, and trust significantly influence AI healthcare adoption among linguistic minority users.

The findings reveal that language remains a fundamental component of digital inclusion. AI healthcare systems designed primarily around dominant languages may unintentionally reinforce existing inequalities. Developing multilingual, culturally responsive, and user-centred AI healthcare platforms is essential for ensuring equitable participation.

An interdisciplinary approach combining artificial intelligence research with English Language and Literature perspectives provides valuable insights into how communication structures influence technological accessibility. Future AI healthcare development should recognize language diversity as a central requirement rather than an optional feature.

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