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Digital Health Access Inequality and Its Epidemiological Impact on Preventive Healthcare Utilization: A Community-Based Survey from India

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Abstract

Background:
Rapid expansion of digital health technologies has transformed healthcare delivery worldwide; however, unequal access to digital resources remains a major public health concern in low- and middle-income countries. In India, disparities in digital access may influence the utilization of preventive healthcare services, thereby contributing to avoidable epidemiological inequalities. This study aimed to assess the prevalence of digital health access inequality and to examine its association with preventive healthcare utilization in a community-based population.

Materials and Methods:
A community-based cross-sectional survey was conducted among adults aged ≥18 years residing in urban and semi-urban communities in India. Data were collected using a structured questionnaire assessing socio-demographic characteristics, digital health access indicators (smartphone ownership, internet availability, digital literacy, and use of digital health services), and utilization of preventive healthcare services, including routine health check-ups and screening for common non-communicable diseases. Descriptive statistics were used to estimate prevalence rates, and multivariable logistic regression analysis was performed to identify associations between digital health access and preventive healthcare utilization.

Results:
Among the surveyed participants, substantial inequalities were observed in access to digital health resources. Individuals with adequate digital access demonstrated significantly higher utilization of preventive healthcare services compared to those with limited or no digital access. After adjusting for age, gender, education, and socioeconomic status, digital health access remained a significant predictor of preventive healthcare utilization, with digitally connected participants showing higher odds of undergoing regular health check-ups and disease screening.

Conclusion:
Findings from this study indicate that digital health access inequality constitutes an important

epidemiological determinant of preventive healthcare utilization in community settings. Addressing digital disparities through inclusive public health strategies may enhance preventive care uptake and contribute to improved population health outcomes in India.

Keywords: Community, Healthcare, Urban, Sem-Urban, Digital

Introduction

The increasing integration of digital technologies into healthcare systems has emerged as one of the most significant transformations in public health practice in the twenty-first century. Digital health—an umbrella term encompassing telemedicine, mobile health (mHealth) applications, electronic health records, wearable technologies, and online health information platforms—has been widely promoted as a solution to long-standing challenges related to healthcare access, efficiency, and equity. From an epidemiological perspective, digital health technologies have the potential to influence population health outcomes by facilitating early disease detection, improving continuity of care, and enhancing the uptake of preventive healthcare services. However, the benefits of digital health are not uniformly distributed across populations, giving rise to new forms of health inequality rooted in disparities in digital access and literacy[1].

Preventive healthcare utilization represents a cornerstone of public health strategy aimed at reducing morbidity, mortality, and healthcare expenditure associated with both communicable and non-communicable diseases. Preventive services such as routine health check-ups, blood pressure monitoring, diabetes screening, cancer screening, and lifestyle counseling play a critical role in identifying health risks at an early stage and preventing disease progression. Epidemiological evidence consistently demonstrates that populations with higher uptake of preventive healthcare services experience lower disease burden and improved health outcomes. Despite this, preventive healthcare utilization remains suboptimal in many low- and middle-income countries, including India, where structural, socioeconomic, and behavioral barriers continue to limit access to preventive care[2].

India is currently undergoing a complex epidemiological transition characterized by a declining burden of communicable diseases alongside a rapidly rising prevalence of non-communicable diseases such as cardiovascular disease, diabetes, chronic respiratory diseases, and cancer. This transition places considerable strain on the healthcare system and underscores the importance of strengthening preventive healthcare services at the community level. Early detection and prevention are particularly important in the Indian context, where delayed diagnosis and fragmented healthcare utilization often result in advanced disease presentation and poorer outcomes. In this setting, digital health technologies have been positioned as a key enabler of preventive care, with the potential to bridge gaps in healthcare access and improve health system responsiveness[3].

Over the past decade, India has witnessed rapid growth in digital infrastructure, including widespread mobile phone penetration, expanding internet connectivity, and the proliferation of digital health platforms supported by both public and private sectors. Government-led initiatives aimed at digital transformation of healthcare, including the promotion of teleconsultation services, electronic health records, and digital health identification systems, reflect a growing recognition of the role of digital health in achieving universal health coverage. At the same time, the private sector has played a significant role in developing mobile health applications, online consultation platforms, and digital diagnostic services aimed at improving healthcare access and convenience[4].

Despite these advancements, access to digital health resources remains highly uneven across different segments of the population. The concept of digital health access inequality extends beyond mere ownership of digital devices to include reliable internet connectivity, digital literacy, affordability of data services, and the capacity to effectively engage with digital health tools. In India, these dimensions of inequality are often shaped by age, education, income, gender, and place of residence. Rural and semi-urban populations, older adults, individuals with lower educational attainment, and socioeconomically disadvantaged groups are more likely to experience limited digital access, potentially excluding them from the benefits of digital health innovations[5].

From a public health perspective, digital health access inequality represents an emerging social determinant of health with important epidemiological implications. Limited access to digital health resources may restrict individuals' ability to obtain health information, schedule appointments, access teleconsultations, and receive reminders for preventive screenings. Conversely, individuals with greater digital access may be better positioned to engage in preventive health behaviors, monitor their health status, and seek timely medical care. These disparities have the potential to reinforce existing health inequalities and contribute to differential patterns of preventive healthcare utilization at the population level.

The relationship between digital health access and preventive healthcare utilization is particularly relevant in community settings, where healthcare-seeking behavior is influenced by a complex interplay of individual, social, and systemic factors. Community-based epidemiological studies provide valuable insights into real-world patterns of healthcare utilization and help identify barriers and facilitators of preventive care uptake. While hospital-based studies offer important clinical data, they often fail to capture the experiences of individuals who do not routinely engage with formal healthcare systems. Community-based surveys are therefore essential for understanding how digital health access influences preventive healthcare behavior across diverse population groups[6].

Existing literature on digital health has largely focused on technological adoption, user satisfaction, and clinical outcomes in specific disease contexts. Although some studies have examined the role of digital interventions in improving preventive care uptake, many have been conducted in high-income countries with relatively uniform digital infrastructure. Evidence from low- and middle-income countries remains limited, and findings from high-income settings may not be directly transferable due to differences in health system organization, socioeconomic conditions, and digital literacy levels. In the Indian context, research examining the epidemiological impact of digital health access inequality on preventive healthcare utilization is particularly sparse.

Moreover, much of the available research treats digital health access as a binary variable—present or absent—without adequately capturing the multidimensional nature of digital inequality. Factors such as smartphone ownership, internet reliability, digital literacy, and actual use of digital health services may independently and collectively influence healthcare utilization patterns. An epidemiological approach that integrates these dimensions can provide a more nuanced understanding of how digital health access shapes preventive care behavior in community populations[7].

Preventive healthcare utilization is influenced not only by access to services but also by awareness, perceived need, cultural beliefs, and trust in the healthcare system. Digital

platforms can play an important role in shaping these factors by disseminating health information, promoting awareness of screening programs, and facilitating communication between individuals and healthcare providers. However, individuals who lack access to digital resources may remain disconnected from these information channels, limiting their exposure to preventive health messaging and opportunities for early intervention.

In addition, the COVID-19 pandemic has accelerated the adoption of digital health services worldwide, highlighting both the potential and limitations of digital healthcare delivery. During periods of restricted mobility, digital platforms became a primary means of accessing healthcare services, including preventive consultations and follow-up care. While this shift demonstrated the feasibility of digital health solutions, it also exposed deep-seated inequalities in digital access. Populations with limited digital resources were disproportionately affected, underscoring the importance of addressing digital health access inequality as a public health priority[8].

Understanding the epidemiological relationship between digital health access inequality and preventive healthcare utilization has important implications for health policy and planning. If digital access is found to be a significant determinant of preventive care uptake, interventions aimed at improving digital literacy and infrastructure may play a crucial role in enhancing population health outcomes. Such interventions could complement traditional public health strategies by expanding the reach of preventive services and reducing barriers to care.

In the Indian healthcare landscape, where resource constraints and population diversity present ongoing challenges, evidence-based strategies are needed to ensure that digital health innovations contribute to health equity rather than exacerbating existing disparities. Community-based epidemiological research can inform the design of inclusive digital health policies that prioritize vulnerable populations and support equitable access to preventive healthcare services[9].

In light of these considerations, the present study was designed to assess digital health access inequality and examine its association with preventive healthcare utilization in a community-based population in India. By adopting a cross-sectional epidemiological approach, this study seeks to quantify disparities in digital health access, evaluate patterns of preventive healthcare utilization, and identify key associations between digital access indicators and preventive care behaviors. The findings are expected to contribute to the growing body of public health literature on digital health and provide evidence to support the development of targeted interventions aimed at improving preventive healthcare utilization through inclusive digital health strategies.

Methodology

Study Design

A community-based cross-sectional survey was conducted to assess digital health access inequality and its epidemiological association with preventive healthcare utilization among adults in India. A cross-sectional design was selected as it is appropriate for estimating prevalence and examining associations between exposure variables (digital health access indicators) and outcome variables (preventive healthcare utilization) at a single point in time. This design is widely used in epidemiological and public health research to explore population-level patterns and determinants of health-related behaviors[10].

Study Setting

The study was carried out in selected urban and semi-urban communities in India. These settings were chosen to capture variations in digital infrastructure, socioeconomic conditions, and healthcare access that commonly exist within rapidly urbanizing regions. Urban and semi-urban areas provide an appropriate context for examining digital health inequality, as they include populations with both high and limited access to digital resources, thereby allowing meaningful comparison across different levels of digital access[11].

Study Population

The study population consisted of adult community residents aged 18 years and above who had been residing in the selected communities for a minimum period of six months. This residency criterion was applied to ensure that participants had adequate exposure to local healthcare services and digital infrastructure. Individuals who were severely ill at the time of data collection or unable to provide informed consent were excluded from the study[12].

Sample Size and Sampling Technique

A minimum sample size of 400 participants was considered adequate to estimate prevalence and examine associations with sufficient statistical power, assuming a 50% prevalence of preventive healthcare utilization, a 95% confidence level, and a 5% margin of error. To account for potential non-response or incomplete questionnaires, the target sample size was increased.

A non-probability convenience sampling technique was employed, with efforts made to ensure representation across age groups, gender, educational status, and socioeconomic strata. Data were collected from households and community gathering points to minimize selection bias and enhance community-level representation[13].

Study Procedure

Data collection was conducted using a structured, interviewer-administered questionnaire. Prior to data collection, the questionnaire was pilot tested on a small subset of participants to assess clarity, relevance, and feasibility. Necessary modifications were made based on feedback obtained during the pilot phase[14].

Trained field investigators approached eligible participants, explained the purpose of the study, and obtained informed consent prior to administering the questionnaire. Interviews were conducted in a language understood by the participants to ensure accurate responses. Privacy and confidentiality were maintained throughout the data collection process[16].

Measures

Independent Variables[17]

Sociodemographic Characteristics

Sociodemographic variables included age, gender, educational attainment, employment status, household income, and place of residence (urban or semi-urban). These variables were included based on their established role as determinants of healthcare utilization and digital access in public health literature.

Digital Health Access Indicators

Digital health access was assessed using multiple indicators to capture its multidimensional nature:

- **Smartphone ownership** (yes/no)
- **Internet availability** (regular, intermittent, none)

- **Digital literacy**, assessed by self-reported ability to use mobile applications and access online health information
- **Use of digital health services**, including teleconsultation, online appointment booking, or use of health-related mobile applications

Participants were categorized into groups with adequate or limited digital health access based on a composite assessment of these indicators.

Dependent Variables

Preventive Healthcare Utilization

Preventive healthcare utilization was assessed using self-reported measures, including:

- Participation in routine health check-ups
- Blood pressure screening
- Blood glucose testing
- Preventive consultations with healthcare providers

Preventive healthcare utilization was considered present if participants reported undergoing at least one preventive health service within the past 12 months.

Data Analysis[18]

Data were entered into Microsoft Excel and analyzed using IBM SPSS software. Descriptive statistics were used to summarize sociodemographic characteristics, digital health access indicators, and preventive healthcare utilization patterns. Frequencies, percentages, means, and standard deviations were calculated as appropriate.

Bivariate analyses were conducted to examine associations between digital health access and preventive healthcare utilization. Multivariable logistic regression analysis was performed to identify independent predictors of preventive healthcare utilization while adjusting for potential confounders, including age, gender, education, and socioeconomic status. Results were reported as odds ratios (ORs) with corresponding 95% confidence intervals, and a p-value of less than 0.05 was considered statistically significant.

Ethical Considerations[19]

Ethical approval for the study was obtained from an institutional ethics committee prior to data collection. Participation in the study was entirely voluntary, and written informed consent was obtained from all participants. Confidentiality of participant information was strictly maintained, and data were used solely for research purposes. Participants were informed of their right to withdraw from the study at any stage without any consequences.

Results

Sociodemographic Characteristics of the Study Population

A total of 432 participants completed the community-based survey and were included in the final analysis. The mean age of participants was 41.6 ± 13.2 years, with ages ranging from 18 to 78 years. Slightly more than half of the participants were male (53.2%), while females constituted 46.8% of the sample. The majority of participants resided in urban areas (61.1%), with the remaining 38.9% from semi-urban communities.

Educational attainment varied across the sample, with 27.5% having completed primary education or less, 38.2% secondary education, and 34.3% holding a graduate degree or higher. Approximately 44.7% of participants reported monthly household income below the median income level for the study area[20].

Table 1. Sociodemographic Characteristics of Participants (N = 432)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–29	86	19.9
	30–44	142	32.9
	45–59	126	29.2
	≥60	78	18.1
Gender	Male	230	53.2
	Female	202	46.8
Residence	Urban	264	61.1
	Semi-urban	168	38.9
Education	≤Primary	119	27.5
	Secondary	165	38.2
	Graduate & above	148	34.3
Income level	Below median	193	44.7
	Above median	239	55.3

Prevalence of Digital Health Access [21]

Overall**,** 71.5% of participants reported owning a smartphone, while 28.5% did not have access to a smartphone. Regular internet availability was reported by 63.9%**,** whereas 21.8% had intermittent access and 14.3% reported no internet access. Adequate digital literacy was observed in 58.6% of participants.

Based on the composite digital health access score, 247 participants (57.2%) were categorized as having adequate digital health access, while 185 participants (42.8%) were classified as having limited digital health access.

Table 2. Digital Health Access Indicators

Indicator	**Category**	**n (%)**
Smartphone ownership	Yes	309 (71.5)
	No	123 (28.5)
Internet access	Regular	276 (63.9)
	Intermittent	94 (21.8)
	None	62 (14.3)
Digital literacy	Adequate	253 (58.6)
	Limited	179 (41.4)
Composite digital access	Adequate	247 (57.2)
	Limited	185 (42.8)

Preventive Healthcare Utilization [22]

Among the total participants, 61.8% reported utilizing at least one preventive healthcare service within the past 12 months. Blood pressure screening was the most commonly reported preventive service (54.6%), followed by blood glucose testing (47.9%) and routine health check-ups (39.4%).

Participants with adequate digital health access demonstrated significantly higher utilization of preventive healthcare services compared to those with limited access.

Table 3. Preventive Healthcare Utilization Patterns

Preventive Service	Utilized n (%)
Routine health check-up	170 (39.4)
Blood pressure screening	236 (54.6)
Blood glucose testing	207 (47.9)
Any preventive service	267 (61.8)

Association Between Digital Health Access and Preventive Healthcare Utilization
Preventive healthcare utilization was significantly higher among participants with adequate digital health access (74.5%) compared to those with limited access (45.9%) ($\chi^2 = 36.82$, $p < 0.001$).

Table 4. Digital Health Access and Preventive Healthcare Utilization

Digital Access Level	Preventive Care Utilized n (%)	Not Utilized n (%)
Adequate (n=247)	184 (74.5)	63 (25.5)
Limited (n=185)	85 (45.9)	100 (54.1)

Multivariable Logistic Regression Analysis [23]
Multivariable logistic regression analysis was performed to identify independent predictors of preventive healthcare utilization. After adjusting for age, gender, education, income, and place of residence, digital health access remained a strong and significant predictor of preventive healthcare utilization.

Participants with adequate digital health access were 2.83 times more likely to utilize preventive healthcare services compared to those with limited access (AOR = 2.83; 95% CI: 1.91–4.20).

Higher education level and older age were also independently associated with increased preventive healthcare utilization.

Table 5. Predictors of Preventive Healthcare Utilization (Logistic Regression)

Variable	Adjusted OR	95% CI	p-value
Adequate digital access	2.83	1.91–4.20	<0.001
Age ≥45 years	1.67	1.12–2.48	0.012
Graduate education	1.94	1.28–2.93	0.002
Above median income	1.41	0.96–2.08	0.076
Urban residence	1.22	0.83–1.80	0.312

Summary of Key Findings [24]
The results demonstrate substantial inequality in digital health access within the community and reveal a strong epidemiological association between digital access and preventive healthcare utilization. Digital health access emerged as an independent determinant of preventive care uptake, even after controlling for sociodemographic factors. These findings highlight digital access inequality as a critical public health issue with direct implications for preventive healthcare delivery.

Discussion

The present community-based survey provides epidemiological evidence on digital health access inequality and its association with preventive healthcare utilization among adults in

India. The findings demonstrate that access to digital health resources is unevenly distributed within the community and that these disparities are significantly associated with differences in preventive healthcare uptake. Even after controlling for key sociodemographic factors, digital health access emerged as an independent predictor of preventive healthcare utilization, underscoring its relevance as an emerging determinant of population health.

One of the key findings of this study is the substantial proportion of participants experiencing limited digital health access. Despite the widespread penetration of mobile technology in India, a considerable segment of the population lacked regular internet access, adequate digital literacy, or engagement with digital health services. This highlights that digital inclusion cannot be assumed solely on the basis of device ownership. Instead, digital health access should be understood as a multidimensional construct encompassing connectivity, skills, and effective use. From an epidemiological standpoint, failure to account for these dimensions may lead to underestimation of health inequalities linked to digital exclusion.

The observed prevalence of preventive healthcare utilization in this study, although higher than that reported in some earlier community-based studies, remains suboptimal given the rising burden of non-communicable diseases in India. Preventive services such as blood pressure and blood glucose screening were more frequently utilized than routine health check-ups, suggesting that preventive care is often episodic rather than systematic. This pattern may reflect symptom-driven healthcare seeking behavior, limited awareness of comprehensive preventive care, and fragmented engagement with primary healthcare services.

A central finding of this study is the significantly higher utilization of preventive healthcare services among participants with adequate digital health access. Individuals with better digital access were more likely to report routine health check-ups and screening for common chronic conditions. This association persisted after adjusting for age, education, income, and residence, indicating that digital health access exerts an independent influence on preventive healthcare behavior. These findings align with the growing body of international literature suggesting that digital health tools can facilitate preventive care by improving access to health information, appointment scheduling, reminders, and remote consultations.

From a public health perspective, digital health platforms may enhance preventive healthcare utilization through multiple mechanisms. Digital access enables individuals to seek health information proactively, increasing awareness of disease risk factors and the importance of early detection. Telemedicine and online appointment systems can reduce logistical barriers such as travel time and waiting periods, which are commonly cited obstacles to preventive care in community settings. Additionally, digital reminders and health monitoring applications may reinforce adherence to recommended screening schedules and follow-up visits.

The findings also reveal that education level and age were significant predictors of preventive healthcare utilization. Older adults and individuals with higher educational attainment were more likely to utilize preventive services, consistent with previous epidemiological studies. However, the strong association between digital health access and preventive care suggests that digital inclusion may partially mitigate traditional socioeconomic barriers. This has important implications for health equity, as targeted digital health interventions could potentially improve preventive care uptake among populations that are otherwise disadvantaged.

Interestingly, income and urban residence were not independently associated with preventive healthcare utilization after adjustment, suggesting that digital health access may act as a mediating factor between socioeconomic status and healthcare utilization. This finding supports the argument that digital health access inequality represents a distinct and actionable public health issue rather than a mere proxy for broader socioeconomic disadvantage. Addressing digital disparities could therefore contribute to narrowing gaps in preventive healthcare utilization across different population groups.

The implications of these findings are particularly relevant in the context of India's ongoing digital health transformation. National initiatives aimed at expanding digital health infrastructure and promoting telehealth services have the potential to improve preventive care delivery at scale. However, the present study highlights the risk that such initiatives may inadvertently widen health inequalities if digital access and literacy gaps are not adequately addressed. Populations with limited digital resources may be excluded from the benefits of digital health innovations, reinforcing existing disparities in preventive healthcare utilization.

Community-based strategies are essential to ensure that digital health interventions are inclusive and equitable. Public health programs should prioritize digital literacy training, particularly for older adults and individuals with lower educational attainment. Integrating digital health support into primary healthcare settings, such as community health centers, may help bridge the gap between digital and non-digital populations. In addition, hybrid models that combine digital and face-to-face preventive services may be necessary to ensure continuity of care for individuals with limited digital access.

The findings of this study also have implications for epidemiological surveillance and health system planning. Digital health platforms generate large volumes of health data that can support disease monitoring, risk assessment, and targeted interventions. However, if digital data predominantly represent digitally connected populations, surveillance systems may fail to capture the health needs of digitally excluded groups. This could lead to biased estimates of disease prevalence and preventive care coverage, ultimately affecting resource allocation and policy decisions.

The COVID-19 pandemic has further emphasized the importance of digital health access in maintaining healthcare continuity during public health emergencies. While digital platforms played a crucial role in enabling remote care, the pandemic also exposed deep-rooted digital inequalities. The present study adds to this evidence by demonstrating that digital access disparities extend beyond crisis contexts and have enduring implications for routine preventive healthcare utilization.

Despite its strengths, this study has certain limitations that should be acknowledged. The cross-sectional design precludes causal inference, and the observed associations should be interpreted as correlational. Self-reported data may be subject to recall bias or social desirability bias, although efforts were made to minimize these effects through structured interviews. Additionally, the use of convenience sampling may limit the generalizability of the findings to other settings. Nevertheless, the community-based approach and inclusion of multiple digital access indicators enhance the relevance and robustness of the results.

Future research should consider longitudinal designs to examine causal pathways between digital health access and preventive healthcare utilization. Qualitative studies could provide deeper insights into individual experiences, perceptions, and barriers related to digital health

use in community settings. Further exploration of gender-specific and rural-urban differences in digital health access may also inform targeted interventions[25].

In conclusion, this study contributes to the growing epidemiological evidence that digital health access inequality is a significant determinant of preventive healthcare utilization in community populations. Addressing digital disparities should be recognized as a public health priority and integrated into broader strategies aimed at strengthening preventive healthcare systems. By promoting inclusive digital health policies and community-based interventions, it may be possible to enhance preventive care uptake and improve population health outcomes in India.

Conclusion and Public Health Implications

This community-based epidemiological study highlights digital health access inequality as a significant and independent determinant of preventive healthcare utilization among adults in India. The findings demonstrate that individuals with adequate access to digital health resources are substantially more likely to engage in preventive healthcare behaviors, including routine health check-ups and screening for common chronic conditions. These associations persist even after accounting for key sociodemographic factors, underscoring the importance of digital access beyond traditional determinants of healthcare utilization.

The results suggest that digital health access is not merely a technological issue but a public health concern with direct implications for health equity and disease prevention. As India continues to experience a growing burden of non-communicable diseases, strengthening preventive healthcare utilization is essential for reducing morbidity, mortality, and healthcare costs. Digital health platforms have the potential to support these goals by enhancing health awareness, improving service accessibility, and facilitating continuity of care. However, the benefits of digital health innovations can only be realized if access is inclusive and equitable.

From a policy perspective, the findings emphasize the need to integrate digital inclusion strategies into national and state-level public health programs. Efforts to expand digital health infrastructure should be accompanied by targeted initiatives to improve digital literacy, particularly among older adults, individuals with lower educational attainment, and socioeconomically disadvantaged groups. Community-based digital health education programs, delivered through primary healthcare centers and community health workers, may play a critical role in bridging digital gaps and promoting preventive healthcare utilization.

The study also underscores the importance of adopting hybrid models of healthcare delivery that combine digital and face-to-face services. Such models can ensure that individuals with limited digital access are not excluded from preventive care while still leveraging the efficiency and scalability of digital health tools. Additionally, public health planners should consider digital access indicators when designing preventive healthcare interventions and evaluating program coverage, as digital exclusion may mask unmet preventive care needs within communities.

In conclusion, addressing digital health access inequality represents a critical opportunity to strengthen preventive healthcare systems and advance health equity in India. By prioritizing inclusive digital health strategies, policymakers and public health practitioners can enhance preventive healthcare utilization and contribute to improved population health outcomes.

Strengths, Limitations, and Future Research

Strengths

One of the key strengths of this study is its community-based design, which allows for the examination of preventive healthcare utilization in real-world settings beyond formal healthcare facilities. This approach enhances the public health relevance of the findings and provides insights into population-level behaviors that are often underrepresented in hospital-based research.

Another strength lies in the multidimensional assessment of digital health access. By incorporating indicators such as smartphone ownership, internet availability, digital literacy, and actual use of digital health services, the study provides a comprehensive understanding of digital health access inequality. The use of multivariable regression analysis further strengthens the findings by accounting for potential confounding factors and identifying independent predictors of preventive healthcare utilization.

Limitations

Despite these strengths, the study has several limitations that should be considered when interpreting the results. The cross-sectional design limits the ability to establish causal relationships between digital health access and preventive healthcare utilization. Longitudinal studies are needed to determine the temporal direction of these associations.

The reliance on self-reported data may introduce recall bias or social desirability bias, potentially affecting the accuracy of reported preventive healthcare utilization and digital health use. Additionally, the use of a convenience sampling technique may limit the generalizability of the findings to other regions or populations. Future studies employing probability-based sampling methods could enhance representativeness and external validity.

Future Research

Future research should explore longitudinal and interventional study designs to better understand causal pathways between digital health access and preventive healthcare behavior. Qualitative studies may provide deeper insights into individual perceptions, cultural factors, and barriers influencing digital health engagement in community settings.

Further investigation is also needed to examine subgroup differences, including gender-specific, rural–urban, and age-related variations in digital health access and preventive healthcare utilization. Evaluating the effectiveness of targeted digital literacy interventions and community-based digital health programs could inform evidence-based policy development.

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