

The Impact of Digital Health Literacy on Consumer Adoption of Women's Digital Health Services

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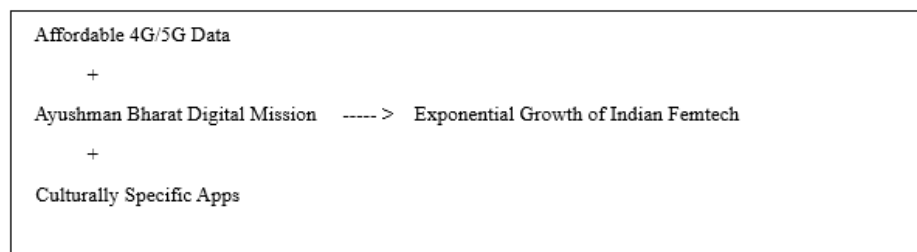
Abstract:

The rapid expansion of India's Femtech sector has transformed women's access to digital healthcare through mobile applications for menstrual health, fertility, pregnancy, and reproductive wellness. Despite this growth, unequal digital literacy, language barriers, and socio-cultural constraints continue to limit adoption among rural and low-income women, creating a persistent "literacy paradox" in which those who need digital health services the most are least able to benefit from them. This study investigates how digital health literacy influences consumer adoption of women's digital health services in India and identifies the interface-related factors that shape user trust and sustained engagement. A descriptive and exploratory research design was employed using secondary data analysis. Data were triangulated from the National Family Health Survey (NFHS-5), Ayushman Bharat Digital Mission (ABDM) reports, and approximately 1,200 Google Play Store reviews of the five leading Femtech applications in India. Cross-tabulation, qualitative thematic content analysis, and socio-technical comparative analysis were used to examine relationships between digital readiness, usability challenges, and healthcare technology adoption. The findings reveal that digital literacy, smartphone ownership, language accessibility, interface complexity, and privacy concerns significantly influence consumer acceptance of Femtech platforms. English-centric interfaces, complex navigation, technical terminology, and limited privacy on shared devices reduce user confidence and increase application abandonment. The study concludes that technological innovation alone cannot ensure equitable digital healthcare. Sustainable adoption requires multilingual, voice-enabled, low-cognitive-load interfaces supported by transparent privacy features and community-based digital literacy initiatives. The research contributes to technology adoption literature by demonstrating that consumer behavior in women's digital health is shaped by the interaction of digital capability, socio-cultural realities, and inclusive design, offering practical recommendations for developers and policymakers to promote equitable Femtech adoption in India.

Keywords: Femtech; Digital Health Literacy; Women's Digital Health; Consumer Adoption; Digital Divide; Inclusive Interface Design; India; Mobile Health (mHealth).

Introduction & The Rise Of Femtech

The landscape of Indian healthcare is undergoing a profound structural transformation driven by rapid digitization, widespread smartphone adoption, and affordable mobile data. At the centre of this transformation is the explosive growth of the Femtech (Female Technology) sector. Valued at USD 1.48 billion in 2025, the Indian Femtech market is projected to reach USD 5.51 billion by 2034, growing at an annual rate of 15.7%. This industry spans a wide array of digital interventions designed specifically for women's health, including menstrual cycle trackers, fertility and pregnancy care applications, and digital interfaces managing chronic conditions like Polycystic Ovary Syndrome (PCOS). Historically, women's health in India has been bounded by severe socio-cultural stigmas and geographical barriers to specialized clinical care. The rise of direct-to-consumer (DTC) digital health platforms has offered a compelling alternative, providing women with a discreet, private, and personalized avenue to take control of their bodily data.



This growth is further accelerated by sweeping national health initiatives. The Government of India's **Ayushman Bharat Digital Mission (ABDM)** has crossed **90 crore (900 million) registered digital health identity accounts**, creating an unprecedented state-backed digital ecosystem. Concurrently, national telemedicine programs like **eSanjeevani** have facilitated over **282 million consultations**, showcasing a massive societal shift toward remote, tech-driven healthcare. However, despite these macroeconomic successes, the distribution of these technologies remains highly uneven. While urban centers and highly literate demographics experience the full empowering potential of modern Femtech, a vast portion of the country's population faces a starkly different reality.

Problem Statement: The Digital Divide & Literacy Paradox

While the macroeconomic growth of India's Femtech sector is significant, it masks a deep structural crisis: the digital health divide. The rapid deployment of these advanced technologies is widening the health equity gap between different socioeconomic classes. This divide is driven by an intersectional barrier composed of unequal device access, language exclusions, and deep-seated socio-cultural stigmas. In India, smartphone ownership is heavily split along gender lines. According to recent mobile gender gap data, women are fifteen percent less likely to own a mobile phone than men, and this gap widens significantly in rural areas. Even when a household owns a smartphone, it is frequently treated as a shared family asset controlled by the male head of the household. For an intimate technology like Femtech, this creates an immediate barrier: a woman cannot comfortably log personal menstrual cycles, pregnancy symptoms, or sexual health concerns on a device that her family members can freely access. Furthermore, the vast majority of premium Femtech applications are designed in English, completely alienating the massive population of regional language speakers. For the millions of women who exclusively read Hindi, Tamil, Telugu, or Bengali, these interfaces are practically locked behind a language barrier. This digital divide fuels a deeper cognitive friction known as the literacy paradox. The literacy paradox states that the most advanced features of Indian Femtech apps—such as AI-driven ovulation predictions, complex graphs tracking hormonal shifts, and dense privacy settings—provide the highest value to urban, highly educated women. However, the rural and low-income populations who suffer from the worst healthcare shortages lack the specific digital and health literacies required to navigate these complex setups. When a low-literacy user attempts to use a standard health app, she is often overwhelmed by complex visual layouts, technical medical terminology, and dense charts. This high cognitive load leads to data-entry mistakes, a lack of trust in the app's predictions, and ultimately, total abandonment of the tool. The paradox is clear: the digital tools explicitly designed to democratize women's healthcare in India are built in a way that structurally excludes the vulnerable populations who need them most.

Research Questions & Expected Contributions

To systematically address the digital health divide in India, this paper outlines two core research questions:

- **RQ_1:** *How do intersecting low digital literacy, language barriers, and patriarchal device-sharing practices influence the trust and sustained adoption of Femtech among rural and low-income Indian women?*
- **RQ_2:** *What specific interface design modifications can mitigate the literacy paradox and make health data accessible to these users?*

By answering these questions, this study delivers straightforward contributions to both academic literature and practical application. Theoretically, it expands Information Systems and consumer behavior frameworks by

showing that technology adoption for intimate health tools is not just a matter of individual choice, but is deeply constrained by household power dynamics and cultural stigmas unique to the Indian context. Practically, this research contributes directly to Indian public health informatics and inclusive product design. It provides developer guidelines for creating voice-assisted, multi-lingual, and low-cognitive-load interfaces that do not rely on high English literacy. Furthermore, it offers public policy insights that align with the Ayushman Bharat Digital Mission, showing how grassroots health workers can leverage accessible digital tools to bridge the gap between advanced medical technology and marginalized communities.

Literature Review: Trust & Technology Adoption

To build a rigorous foundation for this study, it is essential to trace how global and regional academic literature conceptualizes technology adoption, trust, and structural exclusion within digital health. Instead of utilizing fragmented subsections, this review continuously synthesizes ten foundational research perspectives to show how the "literacy paradox" operates as a systemic design failure within the Indian socio-technical landscape.

The broader foundation of digital health equity establishes that mere technological availability does not equate to equitable adoption. Campanozzi et al. (2023) demonstrate that digital health interventions are deeply constrained by pre-existing socioeconomic gradients, meaning that individuals with lower baseline resources face compounding disadvantages when navigating mobile health structures. This structural imbalance is further fueled by market dynamics; Zokaityte (2026) argues that the commercialization of modern health technology platforms inherently causes them to be optimized for affluent, corporate data models. Because these financialized systems prioritize scale and premium monetization over regional adaptation, they naturally alienate populations outside high-income, highly literate demographics.

When examining the target demographic specifically, global health informatics research reveals that digital interventions frequently neglect intersectional barriers. The University of Warwick Digital Health Rights Project (2024) emphasizes that national digital health strategies systematically fail when they treat users as a homogeneous group, explicitly noting that factors like gender, geography, and language must be integrated into the core architecture of the software rather than treated as secondary features. This lack of inclusive architecture triggers significant cognitive friction. Rasekaba et al. (2022) apply standardized health literacy measures, such as the eHEALS metric, to resource-limited environments, proving that low baseline digital literacy directly correlates with immediate user frustration, high data-input error rates, and rapid platform abandonment.

In the specific context of India, these barriers collide with deep socio-cultural realities. The Observer Research Foundation (2026) highlights that while Indian public health infrastructure has expanded digital access through massive national initiatives like the Ayushman Bharat Digital Mission, these systems risk entrenching exclusion if they do not account for deep-seated gender divides, such as time poverty and a critical lack of direct device ownership among rural women. This domestic gender gap is directly connected to household power dynamics. Sekalala (2026) notes that in traditional Indian settings, smartphone access is tightly controlled by patriarchal structures, meaning that women lack the absolute privacy required to routinely use or trust software handling highly sensitive, stigmatized biological data.

Compounding this structural lack of privacy is the systemic problem of consumer mistrust regarding data governance. Beramand (2023) maps the distinct dimensions of user privacy vulnerabilities in mobile apps, demonstrating that users rapidly lose trust when platforms enforce complex, hidden third-party data-sharing configurations instead of clear, accessible opt-in policies. Furthermore, Mehrnezhad et al. (2022) uncover critical structural vulnerabilities in reproductive applications, showing that vague privacy policy language and excessive background data collection disproportionately exploit users who lack the digital literacy to audit or alter their privacy settings.

This severe misalignment between premium software development and public needs shapes the commercial landscape. According to an industry assessment by WeWork India and Triya Health (2024), the domestic market suffers from a high degree of product commoditization, where standard applications endlessly replicate identical, text-heavy English features that cater exclusively to Tier-1 urban centers while ignoring the unique needs of Tier-

2, Tier-3, and rural consumers. Finally, IMARC Group (2025) and Research and Markets (2026) observe that while technologies like AI-driven fertility trackers and connected devices are driving rapid macroeconomic growth, the true future scalability of inclusive healthcare in India depends entirely on transitioning away from complex, text-heavy interfaces. They argue that sustainable adoption requires a shift toward localized, multi-lingual, and community-supported models that natively dismantle the literacy paradox at the grassroots level.

Methodology: Secondary Data Analysis

Research Design

This study adopts a descriptive and exploratory research design using a secondary data analysis approach to investigate the impact of digital health literacy on the adoption of women's digital health services in India. Secondary data analysis is appropriate because it enables the integration of multiple large-scale datasets and publicly available digital platform information to examine nationwide patterns without the limitations of time, cost, and geographical constraints associated with primary data collection. The approach allows for the triangulation of demographic, technological, and behavioral evidence to understand how digital literacy influences consumer adoption within the Indian Femtech ecosystem. The study follows a socio-technical perspective by combining demographic indicators, digital infrastructure statistics, and user-generated content to evaluate both structural and behavioral barriers affecting women's adoption of digital health technologies.

Data Sources

The analysis is based on three major categories of secondary data collected from reliable government databases, industry reports, and publicly available digital platforms.

Dataset Source	Core Indicators Extracted	Sample Base	Purpose
National Family Health Survey (NFHS)	Women's mobile phone ownership, internet usage, educational attainment, urban-rural residence	6.79 lakh households across India	To assess regional digital readiness and gender-based digital inequality
Google Play Store App Reviews	User reviews, language availability, usability complaints, interface complexity, ratings	Approximately 1,200 reviews from the top five Femtech applications	To identify usability challenges and barriers influencing adoption
Ayushman Bharat Digital Mission (ABDM) Reports	Digital Health ID registrations, telemedicine utilization, digital health infrastructure	National administrative reports	To examine the relationship between digital infrastructure expansion and consumer readiness

These datasets were selected because they provide complementary perspectives on consumer behavior, digital access, and healthcare digitization at both national and platform levels.

Data Collection Procedure

Secondary data were collected from official government websites, published reports, and publicly accessible application platforms between January and April 2026. Only authenticated and publicly available datasets were included to ensure transparency and reliability.

For app usability analysis, the five most downloaded Android Femtech applications available in India were identified using Google Play Store rankings. User reviews were extracted based on relevance and recency, while

duplicate reviews, promotional comments, and spam entries were excluded from the analysis. Reviews written in English and major Indian regional languages were translated where necessary before thematic coding.

Government reports from the Ayushman Bharat Digital Mission and National Family Health Survey were downloaded from official portals to ensure data authenticity.

Data Processing and Analytical Techniques

The collected datasets were analyzed using a combination of quantitative and qualitative analytical techniques.

Cross-Tabulation and Inequality Mapping

Demographic indicators from the National Family Health Survey were subjected to cross-tabulation to compare women's internet usage, mobile phone ownership, and educational attainment across rural and urban populations. Frequency distributions and percentage analysis were used to identify disparities in digital readiness among different socioeconomic groups. This analysis provides quantitative evidence of the digital divide affecting women's access to digital healthcare.

Qualitative Content Analysis

Approximately 1,200 public consumer reviews from Femtech applications were analyzed using qualitative content analysis. Reviews were systematically coded based on recurring themes related to usability and digital literacy.

Frequently occurring keywords included:

- "English only"
- "Cannot understand"
- "Confusing interface"
- "Privacy issue"
- "Hidden settings"
- "App difficult to use"
- "Login problem"

The coded themes were grouped into broader categories such as language barriers, interface complexity, privacy concerns, technical issues, and trust. This thematic analysis helped identify common user experiences influencing application adoption and discontinuance.

Socio-Technical Comparative Analysis

Digital infrastructure indicators from ABDM reports were compared with demographic literacy indicators obtained from NFHS datasets. The objective was to determine whether improvements in digital health infrastructure were accompanied by corresponding improvements in users' digital capabilities. This comparative analysis enabled the identification of regions where high digital infrastructure availability coexists with relatively low digital health literacy, illustrating the operational manifestation of the literacy paradox.

Conceptual Framework

The analytical framework of this study is based on the assumption that digital health literacy influences consumer adoption both directly and indirectly.

The independent variables include:

- Digital literacy
- Health literacy

- Language accessibility
- Smartphone ownership
- Privacy concerns
- Interface complexity

These variables influence the dependent variable:

- Consumer adoption of women's digital health services.

Trust functions as an intervening variable because users who understand digital platforms and perceive them as secure are more likely to continue using Femtech applications.

Reliability And Validity

To improve reliability, only nationally recognized government datasets and verified public digital platforms were included in the analysis. Data triangulation was employed by comparing findings across multiple independent sources, thereby reducing source-specific bias.

Validity was enhanced through the use of multiple analytical techniques, including statistical comparison, qualitative thematic analysis, and socio-technical interpretation. The convergence of findings across different datasets strengthens the credibility of the study's conclusions.

Ethical Considerations

The study relies exclusively on secondary data obtained from publicly available sources. No personal identifiers, confidential health records, or private user information were accessed during the research process. Public app reviews were analyzed in aggregated form without identifying individual users, thereby ensuring compliance with ethical standards for secondary research. Since no human participants were directly involved, formal ethical approval was not required.

Methodological Limitations

Although secondary data analysis enables broad national-level insights, it has certain limitations. The study depends on previously collected datasets, limiting control over variable selection and measurement. Consumer reviews may also reflect self-selection bias, as individuals with particularly positive or negative experiences are more likely to post reviews. Additionally, the findings establish associations between digital health literacy and consumer adoption but cannot determine causal relationships. Future studies employing primary surveys, interviews, or longitudinal research designs could provide deeper insights into behavioural changes over time.

Discussion: Why The Literacy Paradox Matters

The findings indicate that although India's Femtech sector is expanding rapidly, digital health literacy remains a key factor influencing consumer adoption of women's digital health services. The analysis shows that access to smartphones and digital health platforms alone does not guarantee meaningful use. Instead, sustained adoption depends on users' ability to understand health information, navigate digital interfaces, and trust the technology. This highlights that the digital divide has evolved from an issue of access to one of effective utilization. The study further demonstrates that digital literacy, language barriers, and household device-sharing practices collectively influence women's willingness to adopt Femtech applications. Many commercial applications continue to rely on English-based, text-heavy interfaces that increase cognitive burden for users with limited education or regional language preferences. Consumer reviews reveal that confusing navigation, medical terminology, and complex privacy settings often result in frustration and application abandonment. These findings support the argument that localization through regional languages, voice-based interaction, simplified icons, and intuitive interface design can significantly improve accessibility and user engagement. Trust also emerged as a critical determinant of adoption. Beyond concerns about application accuracy, women often hesitate to use digital health services because of privacy issues associated with shared smartphone ownership and social stigma surrounding reproductive health.

Even secure applications may fail to achieve sustained usage when women cannot access them privately. Therefore, trust in Femtech depends not only on technical security but also on interface transparency, simple privacy controls, and users' confidence in managing their personal health information.

From a theoretical perspective, the findings extend technology adoption literature by demonstrating that consumer behavior in women's digital health is shaped by broader social and cultural factors rather than individual perceptions alone. While existing technology acceptance models emphasize perceived usefulness and ease of use, this study shows that household dynamics, language inclusion, and digital health literacy are equally important in determining adoption. Consequently, future digital health strategies should integrate inclusive interface design with digital literacy initiatives to ensure that technological innovation contributes to equitable healthcare access rather than reinforcing existing inequalities.

Overall, the literacy paradox highlights that successful Femtech adoption requires more than technological advancement. Sustainable growth depends on designing accessible, multilingual, low-cognitive-load platforms that address the realities of diverse Indian women, thereby supporting both inclusive healthcare delivery and the long-term objectives of India's digital health ecosystem.

Conclusion & Inclusive Design Recommendations

The rapid growth of India's Femtech sector presents significant opportunities to improve women's healthcare through accessible and personalized digital services. However, this study demonstrates that technological advancement alone is insufficient to ensure widespread adoption. The findings reveal that digital health literacy, language barriers, privacy concerns, and socio-cultural factors remain major obstacles, particularly for rural and low-income women. As a result, the literacy paradox continues to limit the benefits of digital health technologies for the populations that need them most. To achieve inclusive digital healthcare, Femtech platforms should adopt user-centered design principles that address the diverse needs of Indian women. Applications should provide multilingual support, voice-assisted interaction, simple navigation, icon-based interfaces, and clear explanations of health information to reduce cognitive burden. Privacy features should be strengthened through transparent data policies and secure authentication mechanisms, especially for women using shared mobile devices. In addition, digital health literacy programs led by healthcare providers and community health workers can improve users' confidence and ability to effectively utilize digital health services. From a policy perspective, inclusive interface standards should be incorporated into national digital health initiatives such as the Ayushman Bharat Digital Mission to ensure that accessibility becomes a core requirement rather than an optional feature. Collaboration among policymakers, healthcare professionals, technology developers, and local communities is essential for designing solutions that are culturally appropriate and socially inclusive. Overall, bridging the digital health literacy gap is critical for achieving equitable adoption of women's digital health services in India. By combining technological innovation with inclusive design and digital literacy initiatives, the Femtech ecosystem can contribute to improved healthcare access, greater consumer trust, and more sustainable digital health outcomes across diverse socioeconomic groups.

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