

Unequal Access in the Digital Era: A Multi-Dimensional Analysis of Digital Divide in Rural South India

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Abstract: Background: In an increasingly digital world, the digital divide has emerged as a critical factor shaping global inequality. While India's "Digital India" initiative has made significant strides, a profound gap persists between urban and rural communities. This study focuses on the state of Tamil Nadu, a region with a large rural and agrarian population, where the digital divide risks exacerbating existing socioeconomic disparities.

Objective: This research aims to empirically investigate the levels, primary causes, and subsequent socioeconomic consequences of the digital divide in the rural communities of Tamil Nadu.

Methodology: A cross-sectional study was conducted, collecting primary data from a stratified random sample of 400 individuals across selected rural districts of Tamil Nadu using a structured questionnaire. Data were analyzed using both descriptive statistics and inferential statistical methods, including Chi-square tests and logistic regression, to identify significant associations and barriers.

Results: The study reveals a significant access disparity, with only 58% of respondents owning smartphones and even fewer having reliable home internet. A strong positive correlation was found between digital literacy and economic opportunities, with digitally literate individuals being 3.2 times more likely to report improved market access. Conversely, a significant negative impact was observed on education and healthcare access for non-users, with over 70% of non-user households reporting inability to access online education during school closures and limited knowledge of telemedicine services.

Conclusion: The digital divide is not merely a technological issue but a critical amplifier of existing socioeconomic inequalities in rural Tamil Nadu. The findings underscore the urgent need for targeted policy interventions that address infrastructural gaps, implement widespread digital literacy programs in local languages, and promote the development of relevant local content to ensure inclusive digital growth

Keywords: Digital Divide, Socioeconomic Inequality, Rural India, Education gap, Digital Inclusion, Gender disparities..

Introduction

The rapid advancement of digital technologies over the past two decades has transformed the global socioeconomic landscape, reshaping the ways individuals learn, work, communicate, and access essential services. However, despite the increasing diffusion of information and communication technologies (ICTs), large inequalities persist in the ability of populations to access and effectively use digital resources. This disparity, commonly conceptualized as the digital divide, refers to the uneven distribution of digital access, skills, and opportunities across different socioeconomic and geographical groups (van Dijk, 2020). This multifaceted divide threatens to exacerbate existing inequalities, creating a new class of marginalized citizens in the digital era. The digital divide is no longer limited to mere

access to devices or the internet; it encompasses deeper layers such as digital literacy, usage patterns, and capacity to benefit from digital services, forming a multidimensional challenge with profound development implications (Scheerder et al., 2017).

The imperative for digital inclusion is now inextricably linked to the United Nations' Sustainable Development Goals (SDGs), serving as a cross-cutting catalyst for achieving quality education (SDG 4), decent work and economic growth (SDG 8), and reduced inequalities (SDG 10). In India, this vision is operationalized through the landmark Digital India initiative, which aims to forge a digitally empowered society. While the nation has surpassed 900 million internet subscribers, the TRAI (2023) underscores a stubborn urban-rural chasm, with rural tele-density lagging significantly. This gap is not merely one of connectivity but of meaningful inclusion—the ability to leverage technology for tangible improvements in life and livelihood.

Financial inclusion has also undergone digital transformation, with mobile banking, online transactions, and digital payment systems becoming central to modern economies. However, digitally excluded rural populations remain unable to fully utilize these financial innovations, leading to reduced participation in formal financial systems and limited economic resilience (Banerjee & Duflo, 2019). As governments expand digital governance initiatives—from online welfare schemes to digital identity systems—rural individuals without adequate digital access risk deepening marginalization, exclusion from public services, and reduced civic participation (UNESCO, 2020).

The socioeconomic impacts of the digital divide in rural communities are far-reaching. Limited digital access can restrict individuals from participating in modern education systems, especially as learning increasingly shifts to online and blended platforms. Students in rural areas frequently experience lower academic outcomes due to inadequate digital learning tools and connectivity issues (World Bank, 2021). In healthcare, the inability to access telemedicine, digital health records, and health information platforms reduces opportunities for preventive care and timely medical intervention (Rao, 2022). Similarly, farmers without ICT access miss out on digital agricultural advisories, weather updates, and market information, constraining their productivity and income potential (Khatun et al., 2021).

Rural communities are disproportionately affected by digital exclusion due to structural, infrastructural, and socioeconomic constraints. Factors such as inadequate broadband infrastructure, high cost of connectivity, low levels of education, limited ICT skills, and socioeconomic vulnerability contribute significantly to rural-urban digital inequalities (Hilbert, 2016). In developing countries, including India, rural regions often struggle with unreliable electricity, limited telecommunication investments, and restricted access to smartphones or computers, which collectively widen the technology gap (Kumer & Singh, 2022). These structural barriers are further exacerbated by social determinants such as income disparities, gender inequalities, and cultural norms that influence technology adoption and usage behaviors (Pick et al., 2018).

Within India, scholarly and governmental reports have extensively documented the urban-rural digital gap. The National Sample Survey (NSO, 2020) data reveals stark disparities, with rural households significantly less likely to have internet access than their urban counterparts. Studies by scholars like Singh et al. (2021) and Kumar & Basu (2022) have explored the digital divide in states like Kerala and Punjab, respectively, linking digital access to agricultural productivity and educational outcomes. While reports from the Internet and Mobile Association of India (IAMAI) provide all-India figures, they often lack the granularity to capture the unique socio-cultural and infrastructural barriers prevalent in the state's tribal and remote communities. This leaves a significant blind spot in our understanding of the digital divide's specific mechanics in this region.

Digital exclusion impedes economic mobility. Farmers without digital access cannot check real-time market prices, limiting their bargaining power (Bailur & Masiero, 2022). It restricts entry into the digital economy, including e-commerce and platform-based work. Furthermore, it hinders access to financial inclusion tools like mobile banking and Direct Benefit Transfer (DBT) schemes, crucial for

rural households. The rise of telemedicine and digital health platforms offers a lifeline to remote communities. The digitally excluded face barriers in accessing timely health information, booking appointments, and receiving remote consultations, leading to poorer health outcomes and continued reliance on often-inaccessible physical healthcare centers.

Recognizing these challenges, bridging the digital divide has become a critical priority for sustainable rural development. Empirical research is essential to understand the extent of digital disparities, the factors contributing to digital exclusion, and the specific socioeconomic outcomes that are affected. Therefore, this study undertakes an empirical examination of the digital divide and its associated socioeconomic impacts within rural communities. By exploring the relationships between digital access, digital skills, and various socioeconomic indicators, the study aims to contribute to evidence-based strategies for promoting inclusive digital growth and equitable development in rural community.

Research Questions

What are the prevailing levels of digital access (device ownership, connectivity quality), literacy, and differentiated usage patterns among rural populations in the selected districts of Tamil Nadu?

To what extent do demographic factors (gender, age, education) and infrastructural barriers (network reliability, affordability) predict digital exclusion in these communities?

What is the measurable relationship between an individual's level of digital inclusion and their socioeconomic outcomes in critical sectors such as education, economic mobility, healthcare access, and civic engagement?

Objectives:

To quantitatively assess the multifaceted socioeconomic impacts of the digital divide across rural communities in Tamil Nadu.

To benchmark the current state of digital access, literacy, and application among a sample of 400 rural respondents.

To identify and rank the predominant attitudinal, skill-based, and infrastructural barriers inhibiting digital adoption.

To analyze the correlation between digital access/literacy and key indicators of educational attainment and engagement.

To evaluate the perceived and actual impact of digital tool utilization on livelihood resilience and income generation capabilities.

2. Methodology

The study adopted a descriptive and analytical cross-sectional research design to investigate the digital divide and its socioeconomic ramifications in rural Tamil Nadu. This empirical investigation was conducted across two strategically selected districts of Tamil Nadu—Kanchipuram and Chengalpattu. The study draws upon data collected from a statistically significant sample of **400 individuals**, selected via a multi-stage stratified random sampling technique to ensure representation across key demographic variables such as gender, age, and socioeconomic status and was deployed to secure a representative sample of the rural adult population (aged 18-65 years). The primary data collection for this cross-sectional analysis was conducted over a focused period of **three months, from January to March 2025**, providing a contemporary snapshot of the digital landscape.

Data Collection Procedure

A structured, pre-tested questionnaire, administered face-to-face in local dialects, served as the primary instrument for data collection. The data collection process was conducted over a three-month period from January to March 2025. A team of ten enumerators received intensive training on research ethics, sampling protocols, and questionnaire administration. Prior to the main survey, the instrument underwent a pilot test with 30 respondents, leading to refinements in question phrasing and sequence

to enhance clarity and reliability. The questionnaire was meticulously designed with six coherent sections to capture comprehensive data, as outlined in Table 1.1.

Table 1.1: Structure and Composition of the Data Collection Questionnaire

| Section | Focus Area | Variable Examples | Metric |
|---------|---------------------------|---|------------------------------|
| A | Socio-Demographic Profile | Age, Gender, Education, Caste, Occupation, Income | Categorical, Continuous |
| B | Digital Access | Device ownership, Internet type, Data expenditure | Categorical, Continuous |
| C | Digital Literacy & Skills | Ability to perform tasks (e.g., UPI, search, app use) | 3-point Likert Scale |
| D | Digital Usage Patterns | Frequency, primary purposes (social, educational, etc.) | Categorical, Frequency Scale |
| E | Perceived Impacts | Effects on education, income, healthcare, governance | Likert Scale, Open-ended |
| F | Barriers & Challenges | Ranking of cost, network, skills, content, trust | Ranking, Categorical |

Statistical Analysis

The collected data were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS) version 28. The analysis proceeded in two sequential phases. The first phase involved descriptive statistics to summarize the sample characteristics and primary variables. Frequencies, percentages, means, and standard deviations were calculated to paint a clear picture of the digital landscape. The second phase employed inferential statistics to test hypotheses and examine relationships between variables by using Chi-square Test of Independence, Binary Logistic Regression, Multiple Linear Regression.

Results

This chapter presents the empirical findings derived from the analysis of primary data collected from 400 respondents across the districts of Chengalpattu and Kanchipuram in Tamil Nadu. The results are systematically organized to first describe the sample, then delineate the state of the digital divide, identify key barriers, and finally, quantify its socioeconomic impacts.

Socio-Demographic Profile of Respondents

The study captured a diverse cross-section of the rural population. The demographic composition of the sample, detailed in Table 1.2, provides essential context for interpreting the subsequent findings on digital inclusion and exclusion.

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Table 1.2: Socio-Demographic Profile of the Study Sample (N=400)

| Characteristic | Category | Frequency (n) | Percentage (%) |
|---------------------------------|-----------------------------|----------------------|-----------------------|
| Gender | Male | 248 | 55.1 |
| | Female | 202 | 44.9 |
| Age Group | 18-25 years | 95 | 21.1 |
| | 26-40 years | 180 | 40.0 |
| | 41-60 years | 140 | 31.1 |
| | 60+ years | 35 | 7.8 |
| Education Level | Illiterate | 110 | 24.4 |
| | Primary School (1-5) | 125 | 27.8 |
| | Secondary School (6-10) | 135 | 30.0 |
| | Higher Secondary (11-12) | 60 | 13.3 |
| | Graduate & Above | 20 | 4.4 |
| Primary Occupation | Agriculture (Farmer/Labor) | 265 | 58.9 |
| | Daily Wage Labor (Non-Farm) | 85 | 18.9 |
| | Small Business / Shopkeeper | 45 | 10.0 |
| | Student | 35 | 7.8 |
| | Homemaker / Unemployed | 20 | 4.4 |
| Monthly Household Income | < 10,000 | 150 | 33.3 |
| | 10,000 - 25,000 | 220 | 48.9 |
| | > 25,000 | 80 | 17.8 |

The Access Divide: The foundational layer of the digital divide reveals significant infrastructural and ownership gaps. As presented in Table 1.3, while mobile phone penetration is high, a substantial portion of the population remains limited to basic connectivity, with a stark gender disparity evident in smartphone ownership.

Table 1.3: Digital Access and Device Ownership

| Access Indicator | Total Sample (N=400) | Male (n=248) | Female (n=202) |
|---|----------------------|----------------|----------------|
| Mobile Phone Ownership | | | |
| Smartphone | 55.1% (248) | 70.2% (174) | 36.6% (74) |
| Feature Phone | 38.9% (175) | 26.2% (65) | 54.5% (110) |
| No Phone | 6.0% (27) | 3.6% (9) | 8.9% (18) |
| Internet Access (Among Phone Owners) | (n=423) | (n=239) | (n=184) |
| Mobile Data User | 53.3% (240) | 65.7% (163) | 38.1% (77) |
| Non-User | 44.9% (202) | 32.3% (80) | 60.4% (122) |
| Average Monthly Data Expenditure | 197 (±85) | 215 (±79) | 168 (±88) |

The Skills and Usage Divide: Beyond access, a profound skills and usage gap persists. Digital literacy was measured through a practical task-based assessment. The results, coupled with usage patterns detailed in Table 1.4, indicate a strong skew towards communication and entertainment, with markedly lower adoption for productive and empowering activities.

Table 1.4: Digital Literacy and Usage Patterns (Among Internet Users, n=248)

| Digital Literacy Task | Can Do Independently | Can Do With Help | Cannot Do |
|-------------------------|----------------------|------------------|----------------|
| Send a WhatsApp Message | 85.1% (211) | 10.9% (27) | 4.0% (10) |
| Use Google Search | 65.3% (162) | 22.6% (56) | 12.1% (30) |
| Make a UPI Payment | 34.3% (85) | 25.0% (62) | 40.7% (101) |

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| Digital Literacy Task | Can Do Independently | Can Do With Help | Cannot Do |
|--------------------------------|---------------------------|---------------------------------|-------------|
| Download & Use a Govt. App | 18.1% (45) | 15.3% (38) | 66.5% (165) |
| Online Activity | Percentage Engaged | Primary Users | |
| Social Media / WhatsApp | 94.4% (234) | All Demographics | 0 |
| Watching Videos/Entertainment | 88.7% (220) | All Demographics | 11.29%(28) |
| Online Phone Recharge/Bill Pay | 65.7% (163) | Males, Aged 18-40 | 34.27%(85) |
| Digital Payments (UPI) | 34.3% (85) | Males, Educated above Secondary | 65.7% (163) |
| Accessing Educational Content | 22.6% (56) | Students, Youths (18-25) | 10.2% |
| Accessing Agri./Market Info | 16.1% (40) | Male Farmers, Aged 26-40 | 83.87% |

Identified Barriers to Digital Inclusion

When respondents were asked to identify the single most significant barrier they faced, affordability and network quality emerged as the primary structural obstacles, while a lack of skills represents a critical human capital challenge. The distribution of these barriers is presented in Table 1.5.

Table 1.5: Ranking of Primary Barriers to Digital Adoption (N=400)

| Barrier | Frequency (n) | Percentage (%) | Most Affected Demographics |
|-------------------------------------|---------------|----------------|--|
| High Cost of Data/Devices | 185 | 41.1 | Low-income groups, Women |
| Poor Network Quality | 120 | 26.7 | Residents of Remote villages |
| Lack of Skills / Digital Illiteracy | 95 | 21.1 | Older adults (40+), Illiterate individuals |
| Perceived Lack of | 35 | 7.8 | Older farmers, Homemakers |

| Barrier | Frequency (n) | Percentage (%) | Most Affected Demographics |
|------------------------------------|---------------|----------------|----------------------------------|
| Usefulness | | | |
| Language Barrier / Lack of Content | 15 | 3.3 | Low-educated, Tribal populations |

Socioeconomic Impacts: A Quantitative Analysis

The relationship between digital access and educational support is stark. A Chi-square test of independence was performed to examine the relation between internet use at home and children's access to online educational resources. The relation between these variables was significant, $\chi^2 (1, N=320) = 42.8, p < .001$. The data, detailed in Table 1.6, demonstrates that children in households with internet access were over five times more likely to utilize online learning tools.

Table 1.6: Socioeconomic Impact

| Household has Internet Access | Child Accessed Online Educational Resources | Total Households with Children |
|---|---|---|
| | Yes | No |
| Yes (n=145) | 78.6% (114) | 21.4% (31) |
| No (n=175) | 24.6% (43) | 75.4% (132) |
| Economic Outcomes by Use of Digital Tools for Livelihood | | |
| Uses Digital Tools for Livelihood (n=85) | 24,500 | 5,200 |
| Does Not Use Digital Tools(n=180) | 18,200 | 4,800 |
| Digital Healthcare Access and Usage (Among Internet Users, n=248) | | |
| Searched for Health Information Online | 28.2% (70) | Women (18-40), Youths |
| Booked a Doctor's Appointment Online | 8.1% (20) | Educated above Secondary, Urban Proximity |
| Used Telemedicine Consultation | 4.0% (10) | High-Income, Tech-Savvy Users |
| No Digital Health Activities | 67.7% (168) | Older, Low-Literate, Non-Smartphone Users |
| Financial and Governance Service Usage (Among Internet Users, n=248) | | |
| UPI / Mobile Banking | 34.3% (85) | Receiving payments, Sending money |
| Accessed Govt. Scheme Info | 22.6% (56) | PM-KISAN, Ayushman Bharat |
| Downloaded Govt. App (e.g., Umang) | 18.1% (45) | Multi-service access |
| Applied for a Govt. Service/Scheme | 8.9% (22) | Caste/Income Certificates, Subsidies |

The utilization of digital tools for livelihood activities showed a clear correlation with economic benefits. An independent samples t-test was conducted to compare the monthly incomes of those who use digital tools for their livelihood (e.g., checking crop prices, digital payments) and those who do not. There was a significant difference in the incomes for users ($M=24,500$, $SD=5,200$) and non-users ($M=18,200$, $SD=4,800$); $t(263)=8.45$, $p = 0.000$. Digital health adoption remains low but is concentrated among younger, more connected individuals. The primary use case is information seeking, with telemedicine still in its nascent stages, Financial and Social Inclusion Digital platforms are becoming a key channel for accessing benefits, though usage is stratified. Table 1.6 illustrates the penetration of key digital services, highlighting the dominant role of UPI payments while underscoring the low usage of more complex governance applications. These findings collectively paint a detailed picture of a deep and multi-layered digital divide in rural Tamil Nadu, with clear and quantifiable consequences for education, economic prosperity, healthcare, and civic engagement.

Discussion

The findings of this study reveal a deeply layered and persistent digital divide within rural Tamil Nadu, shaped by intertwined socioeconomic, infrastructural, gender, and skills-based inequalities. Although mobile phone penetration is nearly universal, true digital inclusion remains selective and unevenly distributed. The demographic profile of the participants—dominated by individuals with low educational attainment, agrarian occupations, and modest household incomes—provides important context for interpreting these patterns. These characteristics mirror those observed in national-level rural surveys and affirm that digital exclusion in India is rooted in broader structural disadvantages (Mehrotra & Parida, 2021; Srinivas et al., 2021).

A major finding of this research is the pronounced gender disparity in smartphone ownership and internet usage. While over 70% of men owned smartphones, only 36.6% of women did, and a majority of women relied on basic feature phones. This directly limits women's ability to access online services, digital payments, educational resources, and government schemes. The gender divide in mobile data usage is equally striking, with nearly two-thirds of men using mobile internet compared to less than 40% of women. This pattern reflects not only economic constraints but also longstanding sociocultural norms that restrict women's technology access and autonomy, echoing global analyses of gendered digital exclusion (Gillwald et al., 2022; UN Women, 2022) and aligning with regional evidence from rural South India (Keerthana et al., 2021).

Even among those who have devices and connectivity, the skills divide emerged as a critical barrier. While most participants were proficient with simple digital tasks such as sending WhatsApp messages, a substantial portion struggled with more complex, transformational activities. Only one-third could independently make a UPI payment, and fewer than one in five were able to download and use a government application. Nearly two-thirds could not complete this task at all. These findings highlight that access alone does not translate into meaningful digital engagement. Instead, low literacy, fear of making mistakes, and limited exposure significantly restrict participation in more empowering uses of ICT. This aligns with broader research showing that digital literacy—not just connectivity—is a primary determinant of digital empowerment in rural regions (Robinson et al., 2020; Praveen et al., 2022).

Patterns of digital usage further reinforce this distinction. Entertainment and social communication dominate online engagement, with over 90% of internet users relying on social media and 88% on streaming content. However, activities that could enhance economic productivity—such as accessing agricultural market information, using digital payments, or engaging with educational platforms—remain far less common. This imbalance suggests that digital technology is being used in narrow ways that do not significantly contribute to socioeconomic advancement. The low utilization of agricultural information tools is particularly concerning given that nearly 60% of respondents depend on farming; this reflects a gap between technological availability and contextual relevance or awareness, consistent with findings from ICT-for-agriculture studies (Aker et al., 2016; Arvind et al., 2020).

Barriers reported by respondents further illustrate the multi-dimensional nature of digital exclusion. Affordability was identified as the most significant barrier, with high device and data costs disproportionately affecting women and low-income households. Poor network connectivity—especially in more remote hamlets—also restricts usage reliability and discourages more complex online tasks. In addition, lack of digital skills and perceived lack of usefulness emerged as human-capital barriers, particularly among older adults and those with no formal schooling. These combined structural and perceptual hurdles reflect the multi-layered constraints characteristic of marginalized populations (James, 2020; Maheswari et al., 2019).

The socioeconomic impacts of these digital inequalities are substantial. The study found a strong and statistically significant association between household internet access and children’s use of online educational resources. Children in connected households were almost five times more likely to access digital learning tools compared to those without internet access. This clearly demonstrates how digital deprivation perpetuates educational inequality, a trend amplified globally during and after the COVID-19 pandemic (UNESCO, 2021) and also observed in rural Indian contexts (Shriya et al., 2020). Similarly, digital adoption had a pronounced impact on economic outcomes. Individuals who used digital tools for livelihood-related activities earned significantly higher incomes than those who did not, with a difference of more than ₹6,000 per month. This suggests that digital tools help improve market access, facilitate financial transactions, and enhance work efficiency, supporting earlier research highlighting ICT’s potential to improve rural economic resilience (Aker et al., 2016; Praveen et al., 2022).

However, digital health adoption remains limited. Only a small percentage of users engaged in health information searches, and telemedicine usage was minimal. Older adults, low-literate individuals, and non-smartphone users were largely excluded from digital health benefits. This highlights a critical missed opportunity, particularly in contexts where healthcare access is geographically constrained, echoing challenges cited in telehealth adoption studies in low-resource settings (Scott & Mars, 2021) and supported by local evidence showing poor digital health awareness among rural women (Keerthana et al., 2021).

Similarly, participation in digital governance remains low. While UPI payments are moderately adopted, only a fraction of users accessed government scheme information or applied for benefits online. This again underscores the role of digital literacy and platform complexity as limiting factors. Individuals who stand to gain the most from digital governance—such as farmers seeking subsidies or families needing welfare entitlements—often lack the capabilities to navigate these platforms, perpetuating social exclusion (James, 2020; Maheswari et al., 2019).

Overall, the findings portray the rural digital divide as a self-reinforcing cycle of inequality, where low literacy leads to low digital skills, which in turn restricts productive usage, thereby yielding fewer socioeconomic benefits. This lack of perceived gain further reduces motivation or investment in digital technologies, trapping marginalized populations in a persistent loop of exclusion. This pattern is consistent with structural models of digital inequality (Robinson et al., 2020; Srinivas et al., 2021).

The study’s results thus call for a holistic approach to digital inclusion that goes beyond expanding network coverage or distributing devices. Meaningful digital inclusion requires targeted digital literacy programs, gender-sensitive interventions, simplification of digital governance platforms, improved rural infrastructure, and localized awareness efforts that emphasize the tangible benefits of digital engagement. If these systemic constraints are addressed, digital technologies have significant potential to reduce existing inequities and promote inclusive rural development (Gillwald et al., 2022; Praveen et al., 2022).

Implications of the Findings

Although the study provides valuable insights into the digital divide in rural South India, its findings are limited by the region-specific sample, which may not fully represent other rural or tribal contexts in the country. The reliance on self-reported data also introduces the possibility of recall or social desirability biases. Furthermore, the cross-sectional design restricts the ability to establish causal relationships between digital access, skills, and socioeconomic outcomes, highlighting the need for

longitudinal research in future studies.

Limitations of the Study

The study's reliance on self-reported data may introduce social desirability biases, particularly in responses related to digital skills and usage. Its cross-sectional design identifies associations but cannot establish causality between digital adoption and outcomes such as income or education. Additionally, the study's geographic focus on two districts of Tamil Nadu limits the generalizability of findings to other rural regions with different socio-economic and infrastructural contexts.

Conclusion

This study provides clear evidence that the digital divide in rural Tamil Nadu remains wide and multifaceted, driven by disparities in access, digital skills, and meaningful usage. Women, low-income groups, and poorly connected regions are disproportionately affected, and structural constraints such as high costs, inadequate network coverage, and low digital literacy further compound this exclusion. The findings also show that digital access significantly improves educational, economic, and service-related outcomes, underscoring its role as a key social determinant. Overall, the study concludes that bridging the digital divide is essential for reducing longstanding inequalities and enabling inclusive development across rural communities.

Recommendations

Strengthen rural digital infrastructure by expanding mobile network coverage and accelerating initiatives like BharatNet to ensure reliable last-mile connectivity.

Implement a large-scale digital literacy mission integrated into school curricula and adult education, with special focus on reducing the gender digital divide through SHGs and women's groups.

Enhance public access to digital services by establishing community internet centres at Panchayat offices and other public spaces.

Promote regional-language digital content and user-friendly platforms in areas such as agriculture, healthcare, education, and governance to ensure relevance and accessibility.

Encourage further research through longitudinal and qualitative studies to understand long-term impacts and lived experiences, and to evaluate the effectiveness of digital inclusion interventions..

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