Digital Inclusion among the Tribes of Doda: Challenges, Gaps, and Pathways Forward

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Abstract

The paper explores digital access and skill improvement among tribal communities in the Doda district of Jammu and Kashmir. It analyses the obstacles to digital participation, levels of digital literacy, and the motivations for engaging with digital technologies. The research involved 100 participants who provided quantitative data on their internet usage, device ownership, and skill levels, along with qualitative interview insights. The findings indicate that while many individuals own smartphones and frequently use the internet, their activities are largely limited to essential tasks. Only a small percentage possess advanced skills such as coding. The main barriers preventing greater use of digital tools include high costs, difficulties with reading and writing, and issues related to language or culture. Despite these challenges, most participants recognise the potential benefits of digital services. The study emphasises the need for targeted initiatives to bridge the digital divide. Recommended strategies include making internet access more affordable, implementing programs to teach digital skills, and creating content in local languages.

Keywords: Tribes, Digital Access, Digital Literacy, Digital Inclusion, Doda

Introduction

Digitalisation has transformed modern society, revolutionising access to information, education, employment, and essential services. However, not all communities benefit equally from these advancements. The digital divide, the gap between those with and without access to digital resources, remains a pressing issue, particularly among marginalised and isolated groups such as tribal communities. Digital exclusion deepens existing socioeconomic inequalities, limiting economic mobility, education, and civic participation opportunities. For tribal populations in India, digital access is hindered by multiple interconnected factors. Many tribal communities live in remote and rural areas where poor infrastructure and unreliable networks restrict consistent connectivity. Even where internet services are available, affordability remains a significant barrier, with high device and data costs making access unattainable for many. Low literacy rates compound the issue, as digital engagement often requires basic reading, writing, and technological skills. Additionally, cultural and linguistic barriers deter adoption, as much online content is unavailable in local tribal languages, reducing its perceived relevance.

Jammu and Kashmir is home to a diverse tribal population, many of whom are in the early stages of mainstream development while maintaining distinct cultural identities. These communities rely primarily on forest resources, daily wages, and traditional agriculture, earning low, non-remunerative incomes. The scattered and remote nature of their settlements further restricts access to education, healthcare, and employment opportunities. The Doda district, which has a tribal population of 39,216 (3.07% of the state's total tribal population), is particularly affected by these challenges. The Gujjars and Bakerwals, the largest tribal groups in the region, engage in pastoralism and seasonal migration, which limits their exposure to modern technology and digital resources.

However, despite these significant barriers, digital technology holds immense potential for empowering

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tribal communities by bridging educational gaps, enhancing financial inclusion, and improving access to government services. Digital literacy and affordable internet access can enable tribal youth to acquire new skills, access remote learning, and connect to broader economic opportunities. To address these knowledge gaps, this research examines the digital divide among the tribes of the Doda district, exploring digital access, skill levels, and barriers while analysing the socioeconomic and cultural factors shaping digital participation. It aims to provide policy-oriented recommendations to bridge the digital gap and promote inclusive digital development in these communities.

Research on digital inclusion demonstrates that equitable access to digital tools and services is increasingly recognised as essential for socio-economic development. Access to digital resources fosters employment, education, healthcare, and civic participation, particularly for marginalised communities (Jones & Dewey, 2021). In tribal regions, digital technologies have the potential to bridge economic disparities by enabling e-commerce, expanding employment opportunities, and promoting tourism (Meena, 2017; Kumar & Prasad, 2020). However, structural and social barriers hinder meaningful digital participation among these populations.

Previous research has identified several key barriers to digital inclusion in tribal communities. The digital divide in rural and tribal areas remains stark, primarily due to inadequate infrastructure, unreliable electricity, and weak telecommunications networks. While urban centres benefit from high-speed internet and widespread access to digital tools, many tribal communities struggle with poor connectivity, limiting their ability to engage in digital activities (Sharma et al., 2018). Bhatia and Verma (2021) highlight that mobile devices are the primary means of internet access in tribal regions, as computers and tablets remain prohibitively expensive. However, reliance on mobile phones constrains more advanced digital engagement, such as e-learning and online job applications, which require stable internet and larger screens. Government efforts like BharatNet aim to expand rural broadband access, but logistical challenges and limited awareness often impede these initiatives (Singh & Das, 2019).

Financial constraints further deepen digital exclusion. High device and data costs prevent many tribal households from sustaining regular internet access, reinforcing a cycle where limited digital exposure reduces economic opportunities (Reddy & Gopinath, 2018). Educational barriers compound affordability challenges; low literacy rates in many tribal areas prevent individuals from acquiring even basic digital skills, limiting their ability to navigate online platforms or engage in digital transactions (Patel & Chaturvedi, 2020). Additionally, cultural factors such as language barriers and traditional knowledge systems restrict participation. Much digital content is designed for urban populations and is unavailable in tribal languages, making it inaccessible to large sections of these communities (Mitra et al., 2019).

Emerging Trends and Community Adaptation

Despite these barriers, research indicates that younger members of tribal communities increasingly recognise digital skills as vital for economic and social mobility. Community-led digital initiatives, such as localised training programs and mobile-based learning platforms, have shown promising results in enhancing digital literacy (Mohanty & Das, 2021; Thomas & Gopal, 2019). These initiatives succeed when they integrate culturally relevant teaching methods and provide content in local languages, ensuring accessibility for tribal populations (Pandey & Singh, 2020).

Policy interventions also play a crucial role in reducing the digital divide. Studies recommend subsidised internet access, affordable digital devices, and targeted skill-building programs as effective strategies for technological participation (Patnaik et al., 2019; Raj & Sinha, 2022). Additionally, digital education through mobile-based learning and community centres can help bridge knowledge gaps, particularly among tribal youth (Garg & Pathak, 2021). Evidence from successful initiatives in other rural areas demonstrates that when digital literacy programs are designed with local needs in mind, they contribute significantly to poverty reduction, employment generation, and social empowerment (Mishra & Roy, 2018).

Addressing digital barriers in tribal communities is not merely a matter of technological expansion but also social equity and economic empowerment. The existing literature highlights how targeted interventions such as infrastructure investments, localised digital literacy programs, and affordable internet services can transform tribal communities by enabling greater participation in education, employment, and governance. However, challenges related to affordability, literacy, and cultural adaptations persist. A deeper understanding of these barriers can guide policy frameworks that ensure sustainable digital inclusion, bridging the gap between tribal and mainstream populations.

While existing research provides valuable insights, a focused examination of tribal communities in Jammu and Kashmir remains necessary to understand region-specific challenges and opportunities.

Methodological Framework

Research Design: Building on the identified gaps in existing research, this study employs a mixed-methods research design to analyse digital inclusion among tribal communities in the Doda district, Jammu and Kashmir. Integrating a combination of quantitative and qualitative approaches, the research aims to comprehensively understand digital access, skill levels, and community perceptions in four remote villages: Gandoh, Dhadkai, Dhadhar, and Shalie. These villages were selected based on their geographic isolation and varying levels of infrastructure, ensuring that the study captures diverse experiences within the district.

Sampling Strategy: A purposive sampling method was used to select participants aged between 25-55 years. This age group was selected because adults aged 25-55 represent the primary workforce demographic most likely to engage with digital tools for employment, education, and essential services. This demographic also has the greatest potential for economic impact from digital inclusion initiatives. The demographic composition was deliberately designed to capture variations in educational attainment and gender representation, enabling analysis of how these factors influence digital inclusion patterns.

One hundred participants were selected, with 25 respondents from each village to ensure a balanced representation. Efforts were made to include participants across gender, occupation, and education levels to provide a more nuanced understanding of digital engagement across different demographic groups.

Data Collection Methods: The study utilised a structured questionnaire to collect data, incorporating closed-ended and open-ended questions to capture statistical trends and personal insights into digital experiences. The questionnaire was designed to explore four core dimensions of technological access: *Awareness of Digital Technology* – Understanding familiarity with and exposure to digital tools. *Digital Skills and Usage* – Assessing how individuals use digital devices for communication, work, education, and other activities. *Barriers to Digital Adoption* – Identifying challenges related to affordability, literacy, infrastructure, and cultural factors. *Perceived Relevance of Digital Technology* – Evaluating how participants perceive the role of digital tools in improving their livelihoods, education, and social mobility.

To enhance the survey data, qualitative interviews were conducted with selected respondents to gain deeper insights into the region's socio-cultural and economic factors shaping digital access. These interviews provided a richer context for interpreting the statistical data. The following section presents the key findings from this comprehensive data collection effort.

Results

The study encompassed 100 participants representing a diverse demographic profile across four tribal villages in Doda district. The sample maintained gender parity with equal representation of males and females (50% each), ensuring balanced perspectives on digital inclusion experiences. Participants ranged in age from 18 to 55 years, capturing both younger adults entering the workforce and established community members with varying life experiences. The educational profile revealed significant diversity: 15% of participants had no formal education, 25% had completed tenth grade, 30% had finished twelfth grade, 20% held undergraduate degrees, and 10% possessed postgraduate qualifications. This educational stratification provides a comprehensive framework for analysing how literacy levels influence digital adoption patterns and technological engagement within tribal communities. As a respondent named Ishtiaq Ahmad noted, "*I completed my 12th grade, but I still find it difficult to use digital platforms efficiently.*" On the other hand, another respondent, Faizan, who has a postgraduate education, mentioned, "*Digital access has helped me stay informed and connected with the world.*"

The study reveals a complex relationship between digital access, skills, and broader socioeconomic implications. The high level of smartphone ownership (75%) and daily internet usage (60%) reveal a noteworthy penetration of digital technology in these communities.

Access to Digital Technology

Internet connectivity analysis revealed that 80% of tribal community members in Doda district have access to internet services, while 20% remain digitally disconnected. However, this access demonstrates significant gender disparities, with 85% of male participants having internet connectivity compared to 75% of female participants, highlighting the persistent digital gender gap in tribal communities. Device ownership patterns show a strong preference for mobile technology, with 75% of participants owning smartphones as their primary digital access point. Computer ownership remains limited at 30%, while 10% still rely on basic feature phones without internet capabilities. The gender divide extends to device ownership, where 80% of males own smartphones and 40% own computers, compared to 70% of females owning smartphones and only 20% owning computers. Internet usage frequency indicates that 60% of participants access the internet daily, while 25% use it

weekly, suggesting regular but not universal engagement with digital platforms. Regarding access locations, 45% primarily use the internet at home, 25% in public spaces, and 20% at work, indicating varied connectivity contexts within the community. This high dependence on mobile phones aligns with broader trends in rural and tribal regions, where mobile-first digital adoption is prevalent due to affordability and ease of use. This smartphone dependency, while enabling basic digital access, limits engagement with advanced applications requiring larger screens and stable connectivity, particularly affecting women and low-income households.

However, digital engagement appears to be limited primarily to basic information access and social media, with only 20% possessing advanced digital skills such as coding and cybersecurity. This gap indicates that while infrastructure for digital access is present, the depth of engagement with digital resources is lacking. Nazia, a respondent from the Gujjar tribe, captured this limitation, stating, "*I can use WhatsApp and YouTube, but anything more feels beyond my reach,"* reflecting the struggle many face in progressing beyond basic digital functions. Thus, the present study's findings, which identify major barriers to and enablers of digital engagement in rural and tribal contexts, align with prior research on digital inclusion. Sharma (2020) noted that in the twenty selected northern Indian districts, people are heavily invested in owning mobile phones but are less involved in skill-enhancing activities using phones. Similarly, Singh and Gupta (2019) stated that while 65% of the tested respondents had access to a smartphone, only 18% possessed the skills required for performing higher-level digital tasks, such as using e-banking or e-governance.

Digital Skills

The study highlights a clear divide in digital skills, with younger and more literate individuals exhibiting higher proficiency in essential digital tasks. Digital competency analysis reveals a clear stratification based on educational background and age demographics. Overall, 55% of participants can send emails, 40% use digital payment systems, 30% engage in online banking, and only 20% possess advanced skills such as coding. Educational attainment significantly influences digital proficiency: among graduates and postgraduates, 80% can send emails, 70% use digital payments, and 60% access online banking services. In contrast, participants with tenth-grade education or lower show substantially lower proficiency rates, with only 35% capable of sending emails, 20% using digital payments, and 15% engaging in online banking. Age demographics further influence digital engagement, with younger participants (18-35 years) demonstrating higher competency rates, 70% can send emails, 65% use digital payments, and 50% access online banking, compared to older participants (36-55 years) who show lower engagement rates of 40% for emails, 20% for digital payments, and 10% for online banking. Advanced digital skills, including coding and cybersecurity, remain limited across all demographics, with only 10% of younger and 5% of older participants having any exposure to these technologies.

Barriers to Digital Adoption

Barrier analysis identified cost as the primary obstacle to digital adoption, cited by 60% of participants, followed by literacy challenges affecting 40% of respondents, accessibility issues impacting 20%, and language or cultural barriers mentioned by 10% of participants. Despite these challenges, 85% of participants recognise the relevance of digital services to their lives, indicating strong potential for digital inclusion initiatives. Motivational factors driving digital engagement centre primarily on social growth (40% of participants) and employment opportunities (35% of participants), suggesting that digital literacy programs aligned with these aspirations could achieve significant community impact and sustained engagement. Many respondents expressed frustration with the financial burdens of digital participation; as Rubina put it, *"I cannot pay for internet service every month. Sometimes, I have to choose between food and connectivity."* This illustrates the direct impact of economic constraints on digital engagement, as the potential benefits of digital access remain out of reach without affordable internet options and devices. These findings align with Agarwal and Kaur's (2020) research, which identified high data tariffs, low income, and limited awareness as key barriers to digital participation among rural populations in India. Further, the study described how economic barriers are not only of the nature of simply being unable to afford digital assets but also influence how technology can be used, with a focus on low cost, low investment, short-term top up and a lack of long-term focus on developing skills.

Low literacy levels exacerbate this challenge, especially for individuals who struggle with basic reading and writing skills, putting them at a heightened risk of being excluded from the digital economy. As Irfan, who is 42 years old, explained, *"Even if I had a smartphone, I do not think I could use it well enough to learn new skills. It is difficult without proper guidance."* This reveals the systemic issue where low literacy limits digital access and prevents individuals from accessing educational resources that could improve their economic prospects. Additionally, Gupta (2019) pointed out that literacy challenges were

the most fundamental factor hindering access to digital technologies among those in disadvantaged regions. The overall trends of this study revealed that inconvenient internet access due to illiteracy leads to limited use of internet facilities, and even when they are unable to access smartphones, their use was primarily for recreational, not for training purposes. These findings confirm the situation identified in Doda, where the lack of literacy hinders users from accessing numerous digital instruments independently, and consequently, they need face-to-face assistance.

Additionally, cultural and language factors pose significant barriers, with 10% of respondents citing these as obstacles to digital adoption. Many community members face language difficulties, as digital platforms predominantly operate in Hindi or English rather than local dialects. Danish Muhammad, who studied primary education, says, *"Most websites and apps are in English or Hindi. I do not understand them well,"* emphasising the need for localised, accessible content that resonates with community values and practices.

Perceived Relevance and Motivation

Despite the barriers, 85% of respondents believe digital services are relevant to their lives, with motivations for digital engagement primarily driven by social growth (40%) and employment opportunities (35%). As one respondent named Zubair, a postgraduate, mentioned, this indicates the community's aspirations: *"Learning digital skills is important because it can help me get a job,"* which demonstrates the connection between digital literacy and economic opportunity. Recognising digital services as essential for enhancing social connections and economic prospects highlights the community's openness to digital literacy initiatives, which could significantly improve their quality of life. Similar studies indicate that the digital divide persists due to financial constraints and inadequate facilities. Roy and Bhatia (2019) argue that the Internet connection costs have remained high, challenging rural people. Similarly, the participants also stated that if the internet connection prices are reduced or made cheaper, they will be more active in digital learning, which states that cost and availability are the main barriers to participation. Most of the participants during the interview expressed the community's hope for change: "*If there were programs to make internet access cheaper, more of us could use it to improve our lives."* In contrast, Iyer and Thomas (2021) examined the impact of the digital access initiatives started by the state government in some parts of southern India. The researcher also found that free, low-cost devices and digital skills training increased activity, making the content more localised in language. This indicates that the affordability problems can be resolved with concrete program measures that would confirm the digital material to the socio-cultural contextual experience of the rural and tribal population. These findings have significant implications for policy development and community empowerment initiatives, as discussed below.

Discussion

The findings from this study reveal significant insights into digital inclusion among tribal communities in Doda district, with implications extending beyond technological access to broader socio-economic empowerment and policy development.

Socio-Economic Implications: The broader socio-economic implications of these findings are profound. Improved digital access and skills could lead to better educational outcomes as individuals can engage with e-learning platforms and access a broader range of information. A respondent named Shazia shared, "I want to use the internet to help my children with their studies, but I often feel intimidated by technology." This response emphasises how increased digital access could empower parents to support their children's education, ultimately leading to improved literacy and economic prospects.

Digital inclusion has already been documented in the literature as bearing great socio-economic value in improving education and social outcomes. Desai and Sharma (2021) have argued that digital literacy plays a crucial role in educational outcomes for disadvantaged groups, with parents becoming more interested in using technology for learning. Their research showed that parents with adequate digital literacy levels were more prepared to oversee and influence their children's learning process, thereby promoting a culture of learning and future earnings prospects within the family. This aligns with the present study, in which participants also shared a common desire to use online materials to assist their children in their academic endeavours.

Integrating digital technologies can also foster social cohesion by connecting individuals and groups, facilitating the sharing of resources, and promoting community engagement. This potential for social growth was captured by Salman, a graduate student from Bakarwal, who noted, "Digital skills help us connect and share, even if we live far apart in this region." This sentiment emphasises the community's recognition of digital platforms as tools for social connection, empowering individuals and encouraging active participation in their communities. Additionally, Rao and Singh (2020) noted that digital skills promote social inclusion since, through technology, people living in different locations

and coming from different backgrounds can work, share equipment, and participate in forums. These respondents identified that their community members feel welcome on digital platforms, as digital platforms help in communication and collaboration, which corresponds to the respondents' feelings in Doda.

Furthermore, the economic implications extend to employment opportunities and income generation. The study's finding that 35% of participants are motivated by employment opportunities suggests that digital inclusion could serve as a pathway to economic mobility. Digital skills can enable tribal community members to access remote work opportunities, participate in the digital economy, and develop entrepreneurial ventures that leverage online platforms for marketing and sales.

Policy and Implementation Considerations: The findings from Doda's tribal communities resonate with national and global digital access and skills development trends. In India, government initiatives like the Digital India campaign aim to increase digital literacy and bridge the digital divide by making government services accessible online. However, significant disparities persist, particularly in rural and marginalised communities. For example, rural internet penetration in India is 29%, compared to 55% in urban areas, and marginalised groups often face compounded barriers to access and skills development. This is particularly evident in Doda, where socio-economic factors and limited infrastructure exacerbate community members' challenges.

Based on the study's findings, several policy interventions emerge as priorities. First, the high cost barrier (identified by 60% of participants) necessitates subsidised internet access programs and affordable device distribution schemes specifically targeted at tribal communities. The government could implement tiered pricing structures that make basic internet services financially accessible to low-income households.

Second, addressing the literacy barrier (40% of participants) requires developing culturally sensitive digital literacy programs. These programs should be delivered in local languages and incorporate traditional learning methods that resonate with tribal communities. The establishment of community digital centres staffed with trained facilitators could provide ongoing support and training.

Third, the infrastructure challenges require targeted investment in telecommunications networks in remote tribal areas. This includes not only expanding connectivity but also ensuring a reliable electricity supply to support digital devices and internet access points.

Contrasting this, Iyer and Thomas (2021) examined the impact of digital access initiatives started by state governments in some parts of southern India. The researchers found that free, low-cost devices and digital skills training increased activity when content was made available in localised languages. This indicates that affordability problems can be resolved with concrete program measures that would adapt digital material to the socio-cultural contextual experience of rural and tribal populations.

Implementation strategies should also consider the cultural and social structures of tribal communities. Programs that engage community leaders and incorporate traditional knowledge systems are more likely to succeed. Additionally, gender-specific interventions are necessary to address the digital gender gap identified in the study, where 85% of males have internet access compared to 75% of females.

Theoretical Framework Application: These findings can be better understood through the lens of social capital theory. Pierre Bourdieu's concept of social capital provides a valuable framework for understanding the broader implications of digital access and skill development in Doda's tribal communities. Bourdieu's theory suggests that digital skills and resources act as cultural capital assets that can increase individuals' social mobility and inclusion. For these communities, limited access to digital tools restricts economic and educational opportunities and hinders the accumulation of social and cultural capital necessary for broader societal participation.

Understanding the intersectionality of gender, age, and socio-economic status is critical to comprehending the complexities of digital access and skills within Doda's tribal communities. The survey revealed that women from low-income households face more significant challenges accessing digital resources. A female respondent, Hina Begum, remarked, "I want to use the internet to help my children, but I often feel intimidated by technology," revealing broader societal and familial expectations that limit women's engagement with technology. Additionally, low-income households struggle to afford devices or reliable internet connections. The digital divide observed in this study reflects what scholars term "digital inequality" – where access alone is insufficient for meaningful participation in the digital economy. The study demonstrates that even when basic access exists (80% have internet access), the quality of engagement remains limited, with only 20% possessing advanced digital skills. This aligns with Van Dijk's (2020) framework of digital divide, which emphasises that inequality persists through four successive types of access: motivational, material, skills, and usage access.

The study's intersection of economic constraints, low literacy, and cultural barriers underscores how structural inequalities are reproduced in the digital age, leaving marginalised groups with fewer resources to

engage meaningfully in an increasingly online world. The cultural barriers identified by 10% of participants, particularly language difficulties with digital platforms, highlight how digital technologies can inadvertently reinforce existing cultural hierarchies when they fail to accommodate local languages and cultural practices.

Thus, implementing affordable, culturally relevant digital literacy initiatives could significantly bolster the social capital within these communities, promoting a more inclusive digital future. The theoretical framework suggests that successful digital inclusion programs must address not only technical skills but also cultural relevance, economic accessibility, and social support systems that enable sustained engagement with digital technologies.

Conclusion

This comprehensive examination of digital inclusion among tribal communities in Doda district reveals a multifaceted digital divide shaped by four primary factors: limited technological access, insufficient digital literacy, significant financial constraints, and persistent cultural barriers. While internet penetration is growing, gender disparities, affordability issues, and inadequate infrastructure continue to hinder meaningful digital participation. Addressing these challenges requires focused interventions that go beyond connectivity to build digital skills and create locally relevant content. Addressing this digital divide requires a multi-pronged approach combining infrastructure development, educational initiatives, and policy interventions. Specifically, implementing subsidised internet programs, establishing community-based digital skill development centres, and creating affordable device distribution schemes represent essential first steps. Culturally relevant digital content in tribal languages and localised training programs can further enhance digital literacy and make technology more accessible and valuable for these communities. By empowering tribal youth, women, and economically disadvantaged groups, digital inclusion can become a social and economic transformation tool.

Future research should focus on evaluating the long-term impact of digital literacy programs and identifying the most effective strategies for promoting digital adoption in tribal communities. A holistic approach combining infrastructure improvements, skill-building, and policy support is essential to ensure that tribal communities in Doda can fully participate in the digital age, unlocking opportunities for education, employment, and economic development.

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