

Navigating the Digital Divide in India: A Comprehensive Guide

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Abstract

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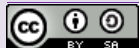
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Purpose of the study: This paper attempts to gain insights into the manner in which the first-level digital divide contributes to the more pervasive second-level divide associated with the manner of and motivation for digital usage across social groups.

Methodology: The study used data from the Government of India's NSS 75TH round survey (2017-18) on social consumption and education. Binary logistic regression is used as a statistical method that can estimate the probability of an outcome, such as affordability or accessibility, based on one or more predictor variables.

Main Findings: Findings reveal that, for marginalized groups, class location plays an underlying role in propagating the first-level digital divide. Furthermore, when assessing the second-level divide in digital accessibility, socio-cultural factors perpetuate inequalities. The variable of gender shows that improved financial capacity to afford digital devices does not guarantee increased access to digital skills. Gender-based stereotypes act as deterrents, steering women away from engaging with computers.

Applications of this study: The research seeks to highlight digital exclusion among vulnerable communities, aiming to address this gap to fulfill the primary objective of the Sustainable Development Goal "Leaving No One Behind" and thereby contribute to the establishment of an equitable society.

Novelty/Originality of this study: Many existing studies rely on outdated data, prompting a need for a fresh perspective using updated datasets. This study seeks to investigate digital disparities within different segments of Indian society, utilizing recent data from a nationally representative survey. Given the absence of information on the digital divide at the second stage in India, this study addresses India's digital inequality crisis by exclusively examining the first level, which revolves around the affordability and physical ownership of digital resources.

INTRODUCTION

The need to foster social inclusion in India has become particularly pronounced in the aftermath of digital interventions, which often disproportionately leave out marginalized communities. "Digital divide" as a phrase found its first usage in the 1990s, to refer to the unequal affordability and accessibility, initially concerning computers, and later with the Internet, Information and communication technologies (ICT), and other digital resources (Rogers et al., 2013; Van Dijk, 2017). When used judiciously, digital technologies have the power to positively transform the socio-economic realities of developing countries. For this reason, research on the digital divide has now begun to focus on diverse datasets coming from countries like India, South Africa, and Brazil, among others. However, unlike developed regions, where the challenge to physical ownership of digital resources has almost been overcome and the primary obstacle now is to address the differential skill levels in usage due to age, geography, level of education, etc., in developing countries, ICT implementation is faced with the double burden of inequitable physical ownership and lack of skill enhancement (Han et al., 2024; Freitag & Carmago-Borges, 2024; Lythreitis et al., 2022; Mathrani et al., 2020).

In the context of India, the central government's initiative to provide internet service through Videsh Sanchar Nigam Limited (VSNL) began in 1995, with six cities initially benefiting from the program. In 1999, the National Telecom Policy created opportunities for various Internet service providers, leading to an improvement in services and a reduction in costs. VSNL remained the sole provider of internet services in India for the first four years until private operators were invited to offer their services in November 1998. These operators had the freedom to choose their international gateways and tariffs. In the aftermath of this, the country witnessed a 20% monthly increase in broadband usage. Following this, the year 2000 also marked a transformative shift in terms of digitalization, with the introduction of the Information Technology Act 2000, which was meant to legalize e-commerce and other electronic transactions by the Parliament of India (Information Technology Act, 2000). According to the Internet and Mobile Association of India (IAMAI), by 2006, the number of Internet users had risen significantly to 37 million. During the same period, active users increased from 21.1 million in March to 25 million in September (Internet World Stats - Usage and Population Statistics, 2022). As per the latest estimate provided by Integrated Web Services in 2022, there are over 1,50,000,00 more internet users in India than before (Figure 1).

The infrastructure to provide low-cost and effective Internet connectivity to the farthest corners of the country has steadily developed with the introduction of cheap data packages by big telecom companies. Digitalization, coupled with the advent of social media, has undoubtedly improved the ease of living for many Indians. However, the expanding complexity and quick structural change vis-à-vis digitalization have failed to account for a sizable section of the population being excluded from digital technologies and, consequently, national governance and other developmental activities. In the contemporary moment, the government has further proposed a complete re-haul of the Internet laws through the Digital India Act 2023, which will introduce a new national data governance policy. Specifically, the act aims to address the existing divides in the digital landscape through more responsible adoption of technological solutions. However, after these fresh developments, it becomes even more crucial to deliberate upon ways to comprehensively bridge the gap between population groups with varying degrees of affordability and accessibility to digital technology.

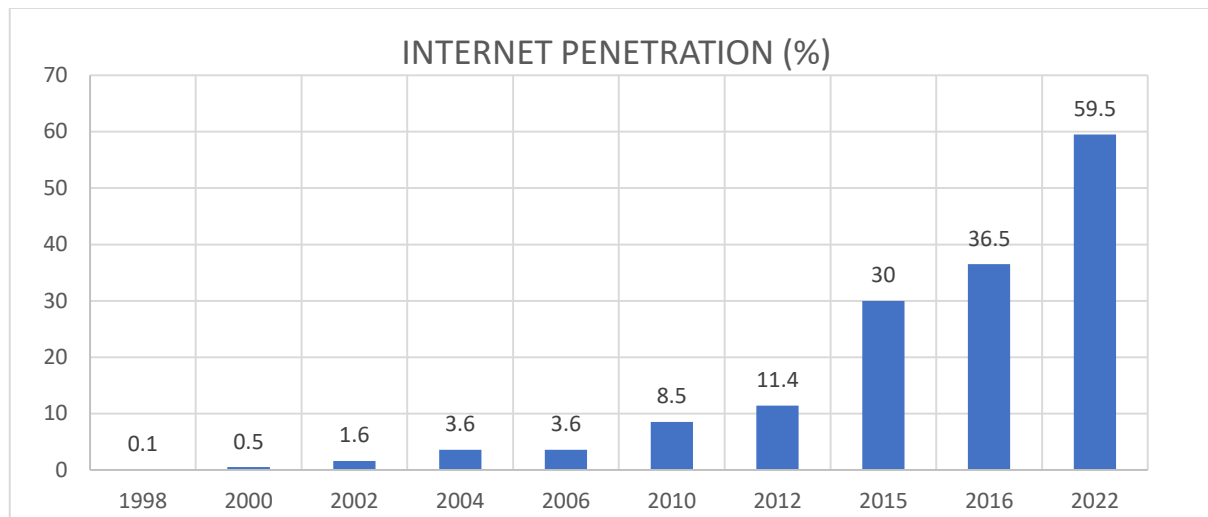


Figure 1: An overview of the start and history of internet usage in India

Source: Internet World Stats (2022), <https://www.internetworldstats.com/>

Research Objectives

Keeping this in mind, this paper attempts to fulfil the following research objectives

1. Firstly, it attempts to look closely at a nationally representative dataset, specifically, the National Sample Survey (NSS) 75th Round. It uses statistical analyses to draw insights into the nature, extent, and impact of inequality in digital service usage.
2. Secondly, it situates findings based on secondary data within relevant sociological theory in order to address how governments, policy-makers, and academics can work towards a more digitally inclusive future.

Such a standpoint will help us understand how the digital divide is not merely a question of affordability or accessibility; instead, it is more pervasive and is both a product of social inequality and, at the same time, replicates it.

LITERATURE REVIEW

India's digital divide is a tripartite crisis. The first level of the gap has to do with the disparity in physical ownership of computers, the Internet, and other resources for people, followed by the second level gap, which addresses differential digital skills, manners, and motivations for usage. Finally, the third level gap reflects on the benefits of the use and consequent level of empowerment among social groups (Muschert & Ragnedda, 2017).

Concerning the first-level digital divide, existing research has established that inequality in India, like in other social systems, is rooted in the workings of deeper social structures such as caste, gender, religion, and disparities based on education and region (Aswathi & Haneefa, 2020). Mammen et al. (2022) examined the impact of the digital divide between the Global North and the Global South through a comparative study of the USA and India. Specifically, in the context of India, they found that the digital divide exacerbates existing social and economic inequalities in rural and marginalized communities. Khan and Ghadially (2010) revealed alarming data concerning the relationship between first-level digital divide and religious identity. According to their study on ICT use among Muslim youth in India, both male and female students in the sample were deprived of computer ownership and Internet connection at home, further underscoring the impact of religious identity on ownership of digital technology. Kamath (2018) has noted that Dalits in India face discrimination and exclusion from mainstream digital spaces and are forced to rely on alternative, often informal networks and channels for the use of technology and information. Potnis (2016), in their study, has also explored the impact of gender on digital divide, identifying how it is a critical factor that needs to be considered in the design and implementation of digital services, particularly in rural areas where women in low-income households face greater barriers to use of computers. In the context of educational status, the COVID-19 pandemic has been an eye-opener for

understanding the digital divide scenario. Many students from low-income families and marginalized communities have limited ownership of digital devices, internet connectivity, and online learning platforms. As a result, they face difficulties in keeping up with their studies, and their learning outcomes are adversely affected ([Karunakar, 2021](#)).

Based on the above-mentioned scholarship, this study reveals two significant gaps in the literature and seeks to fill them. Firstly, most studies have presented findings based on almost a decade-old dataset and therefore require a re-look with the help of updated datasets. This study attempts to document digital inequalities across various strata of Indian society with the help of data from a recently conducted nationally representative sample survey. Secondly, due to a paucity of data on the second-level of digital inequality, the crises of digital inequality have been examined by focusing exclusively on the first level of the divide, which concerns itself with the level of physical ownership of digital resources, or, in other words, digital affordability. By analyzing this dataset about not just affordability but also digital accessibility, our study aims to understand the effect of initial digital divide on the broader second level divide, specifically examining how it influences the way different social groups use and engage with digital technologies, along with their motivations for doing so.

THEORETICAL FRAMEWORK

This paper is informed by the sociological discourse produced by Max Weber, Pierre Bourdieu, and Manuel Castells. It hopes to arrive at new approaches to studying digital stratification based on unequal affordability and accessibility. [Weber \(2018\)](#) has been a proponent of the notion that studies on the source of inequality in contemporary society must move beyond class-based affiliations and consider the concepts of status and power. This paper contends that the organization of digital life is contingent upon the interplay of such categories as class, status, and power. In doing so, it utilizes the Weberian cultural perspective to further elaborate on the underlying causes of the digital divide. Several empirical studies have incorporated Weber's conceptual apparatus to show how social groups with greater economic resources, political power, and superiority in terms of cultural markers can own and access ICT-based resources more significantly ([Ragnedda & Muschert, 2015](#)). This imbalance has created new ways for the elite to form and reproduce cliques, further improving the life chances of those already financially and socially endowed.

Further, Weber's treatise will be related to the theoretical toolkit provided by sociologist Pierre Bourdieu. The field of digital inequalities is ripe for analysis from a Bordieusian point of view, specifically his analysis of forms of capital. According to Bourdieu, capital can be defined as accumulated forms of labor, which can further be delineated into three types: social, economic, and cultural. Economic capital refers to purely individual material assets. Cultural capital may be social assets such as education, dressing style, etc., that facilitate mobility in a stratified society. Social capital implies membership in a group or a collection of resources that lead to a network of relationships with mutual recognition. Scholars have crucially applied this framework to the emergent field of digital divide studies by conceptualizing and operationalizing what is known as 'digital capital'. Digital capital accounts for the advantages accrued to an individual or group due to the difference in ownership of and access to digital technologies, along with digital skills and competencies ([Ragnedda & Riui, 2020](#)). Those with greater existing economic, social, and cultural capital use this advantage to enhance their digital affordability and accessibility, thereby further triggering a new form of inequality and reinforcing the traditional forms.

Finally, following the intellectual footsteps of [Castells \(2000\)](#), it is possible to argue that the very basis of a network society is the binary structure of inclusion/exclusion, which manifests through the digital inequality between the privileged and disprivileged. However, the exclusion is of a qualitatively different kind. Castells has argued that while in the earlier stage of industrial capitalism, the underclass who belonged to peripheral regions were exploited, in the new structure of the network society, it may be observed that these groups are made entirely irrelevant. Castells notes that the persisting social, cultural, and educational limitations of access to ICT can dictate the social networks that shape dominant culture. However, Castell's scholarship is somewhat hopeful in that he offers positive directions for social change under current conditions. He claims that the historical subject, formed by a collective of marginalized identities, will cause structural change by uprooting the network society's instrumental rationality based on capitalist informationalism. Ultimately, Castells looks to social movements and the formation of collective identities as a solution to the digital divide, while admitting that such solutions are contingent upon certain ICT developments. Therefore, a complete and total transformation of the network society may not be possible since at least some constructive elements must be preserved. These theoretical frameworks offered by Weber, Bourdieu, and Castells make a strong case for a crucial link between unequal access to information and global crises such as poverty, violence, and exclusion.

METHODOLOGY

Data Source

The National Sample Survey (NSS) is a large-scale household survey conducted by the Government of India to gather socio-economic data. The NSS collects information periodically, with the 75th Round in 2018 focusing on social consumption and education. This Round aimed to build indicators related to education, including participation in the education system, educational expenditure, and indicators for those not currently attending education. It also gathered data on computer and internet usage. The survey covered 14,285 Field Survey Units (FSUs) across rural and urban areas, comprising 1,13,757 households and 5,13,366 individuals aged 3 to 35 years. Therefore, the NSS 75th Round is beneficial for the present analysis, which has been carried out using data based on the 513,427 people living in the sample households ([Government of India, 2019](#)).

Variables

In this study, the dependent variables were categorized as follows: firstly, affordability, which comprised of two main components, whether the household owns a computer and whether any members of the household have internet facilities; and secondly, accessibility, which also comprised of two main components, whether persons of age five years or older were able to operate a computer, and whether persons of age five years or older were able to use the Internet. Affordability reflects the financial ability of an individual to own digital gadgets by paying, while accessibility refers to the level of digital literacy and skill.

A range of socio-demographic predictors were considered, such as (1) Educational Status encompassing illiteracy, literacy without Formal education, Primary and Upper Primary Schooling, Secondary and Higher secondary education, and Graduation and above; (2) caste, including Scheduled Tribe, Scheduled castes, Other Backward Classes and Others; (3) gender, comprising Male and Female; (4) Region involving Rural and urban; and (5) Religion which includes Hinduism, Islam, Christianity, Sikhism, and Others. The choice of these variables is guided by existing literature that was reviewed.

Statistical Analyses

The analysis of the data was carried out using Stata 15, employing both bivariate and multivariate analyses to pinpoint the factors connected to the accessibility and affordability of digital technologies in India (Kalan et al., 2020). A contingency table was utilized to examine the variations in the affordability and accessibility of digital technologies based on socio-demographic characteristics (Statsols, 2023). In the initial stage, binary logistic regression using sample weight was employed to comprehend the overall impact of predictor variables on both the affordability and accessibility of digital technologies. The selection of binary logistic regression was based on the dichotomous (binary) nature of the response variable. In the subsequent phase, a bivariate logistic regression was employed to evaluate the correlation between the dependent variable and individual independent variables. The odds ratios obtained from this analysis were labelled as "unadjusted" odds ratios since these models didn't incorporate adjustments for other variables. Independent variables lacking statistical significance were omitted from the final regression model. For the category of transgender (under the variable Gender), the p-value of digital affordability is equal to 0.34, and the p-value of digital accessibility is equal to 0.25. Similarly, for the category of Zoroastrianism (under the variable Religion), the p-value for digital affordability is equal to 0.018, while the p-value for digital accessibility is equal to 0.102. The variables that did not show a statistically significant link were then removed, and only those that did were included in the multivariate regression model. We utilized the variance inflation factor (VIF) (Bhandari, 2024). The variance inflation factor (VIF) quantifies the rise in regression coefficient variance resulting from multicollinearity in the model. According to recommendations, values of VIF greater than four should be examined further, and values greater than ten should be corrected due to significant multicollinearity. Nonetheless, our regression model's VIF values all remained below four, suggesting that multicollinearity is not a serious worry. The final logistic regression findings included 95% confidence intervals (CI) and odds ratios, accompanied by matching p-values.

FINDINGS

Factors Influencing Digital Affordability

The outcomes of the multivariate logistic regression were presented as adjusted odds ratios. The final model revealed that residence, religion, caste, gender, and educational status were the statistically significant factors determining the purchasing power or affordability of digital technologies among people in India (see Table 1). The findings further highlight that individuals residing in urban areas in India are 2.9 times more likely to afford digital technologies than those in rural areas. Similarly, the likelihood of having digital affordability is significantly less among individuals practicing Islam (odds ratio [OR] = 0.69, Confidence Interval [CI] = 0.66-0.71) in comparison to Hinduism. Conversely, individuals following Sikhism, Christianity, and other religions have 2.91 times, 1.59 times, and 1.91 times higher odds of affording digital technologies than those following Hinduism respectively.

In the same way, the odds ratio of digital affordability is notably higher among the Scheduled Caste (SC) group (OR = 1.19), Other Backward Classes (OBC) (OR = 1.66), and Other groups (OR = 2.82) compared to those from the Scheduled Tribe. Females have a slightly higher likelihood of digital affordability (OR = 1.08, CI=1.05-1.11) than males. Individuals who are literate without formal education have 1.18 times higher digital affordability than those in the illiterate category. Similarly, those who have completed primary and upper primary education, secondary and higher secondary education, and graduation or above have 1.37, 2.78, and 6.18 times higher affordability than illiterate persons, respectively.

Table 1: Adjusted odds ratios and 95% confidence intervals for digital affordability in India

Background Characteristics	Odds Ratio	P-value	95% Confidence Interval	
			Lower	Upper
Sector				
Urban	2.90	0.00	2.83	2.98
Religion				
Islam	0.69	0.00	0.66	0.71
Christianity	1.59	0.00	1.49	1.68

Sikhism	2.91	0.00	2.71	3.14
Others	1.91	0.00	1.62	2.25
Caste				
SC	1.19	0.00	1.13	1.25
OBC	1.66	0.00	1.58	1.74
Others	2.82	0.00	2.68	2.96
Gender				
Female	1.08	0.00	1.05	1.11
Educational Status				
Literate Without Formal Education	1.18	0.00	1.13	1.23
Primary & Upper primary	1.37	0.00	1.32	1.43
Secondary & higher secondary	2.78	0.00	2.68	2.89
Graduation & above	6.18	0.00	5.87	6.51

Source: NSS 75th Round (2017–18), <https://microdata.gov.in/nada43/index.php/catalog/151/study-description>

Factors Influencing Digital Accessibility

Table 2 presents the findings of a multivariate logistic regression examining the association between digital accessibility and selected socio-demographic variables. The results suggest that individuals residing in urban areas in India are 2.07 times more likely to be digitally literate as opposed to those living in villages. Further, likelihood of having accessibility to digital resources is significantly lower among followers of Islam (OR = 0.94, CI= 0.90-0.98) compared to Hinduism. Conversely, individuals practicing Sikhism (OR = 1.64, CI=1.52-1.77), Christianity (OR = 1.61, CI=1.51-1.72), and Other religions (OR = 1.74, CI=1.74-1.75) have higher odds of digital literacy compared to Hinduism. The odds ratio of digital accessibility is notably higher among individuals belonging to the Scheduled Caste (SC) (OR = 1.08, CI =1.02-1.14), Other Backward Classes (OBC) (OR = 1.24, CI= 1.19-1.30), and Other categories (OR = 1.56, CI =1.48-1.64) compared to those from the Scheduled Tribe. Similarly, the probability of digital literacy is significantly lower for females (OR = 0.59, CI =0.57-0.60) compared to males. In the same way, Individuals who are literate without formal education (OR = 0.15, CI = 0.14-0.16) and those who have completed primary & upper primary education (OR = 0.34, CI = 0.33-0.35) are less likely to have digital literacy. Conversely, individuals with secondary & higher secondary education (OR = 1.55, CI =1.49-1.60) and graduation & above (OR = 7.63, CI =7.23-8.04) are more likely to have access to digital technologies compared to those who are illiterate. It demonstrates that digital accessibility is influenced by various factors, including residence (urban vs. rural), religion, caste, gender, and level of education. These findings provide insights into the relationship between these factors and digital literacy, highlighting the disparities and inequalities in accessing digital technologies.

Table 2: Adjusted odds ratios and 95% confidence intervals for digital accessibility in India

Background characteristics	Odds Ratio	P-value	95% Confidence Interval	
			Lower	Upper
Sector				
Urban	2.07	0.00	2.01	2.13
Religion				
Islam	0.94	0.00	0.90	0.98
Christianity	1.61	0.00	1.51	1.72
Sikhism	1.64	0.00	1.52	1.77
Others	1.74	0.00	1.47	2.05
Caste				
SC	1.08	0.00	1.02	1.14
OBC	1.24	0.00	1.19	1.30
Others	1.56	0.00	1.48	1.64
Gender				
Female	0.59	0.00	0.57	0.60
Educational Status				
Literate without Formal Education	0.15	0.00	0.14	0.16
Primary & Upper primary	0.34	0.00	0.33	0.35
Secondary & Higher Secondary	1.55	0.00	1.49	1.60
Graduation & Above	7.63	0.00	7.23	8.04

Source: NSS 75th Round (2017–18), <https://microdata.gov.in/nada43/index.php/catalog/151/study-description>

DISCUSSION

Thinking Through the Determinants of Digital Affordability and Accessibility

Region: The NSS 75th Round data reflects a resource-strapped situation where urban Indian residents have double the likelihood of digital affordability compared to their rural counterparts. Over the years, even as India has solidified its position as a global IT superpower, the gap between those with access to IT and those without it has only been reinforced

through regional disparities. Community, school, or district-level computer training centers remain the first point of contact for most rural residents, and first-hand experience of using computers is sporadic. While it is true that the structural facets of poverty keep rural India away from internet affordability, it is also integral to look closely at the broader discourse surrounding technology in the everyday life of rural India. Computers and mobile phones are essential not only because of their perceived role in facilitating technical know-how for school expansion and crop cultivation but also because they hold immense symbolic value vis-à-vis class mobility and modernity. In rural households, being able to afford computers and mobile phones often marks a shift away from traditional occupations in agriculture towards more competitive jobs in urban areas. In light of these factors, we should understand the linkages between digital affordability and aspirations towards social mobility. When considering digital accessibility, findings suggest that rural citizens have poorer access than their urban counterparts. This crisis is much more complex than just the internet and smartphone penetration question. While in recent times, web applications like eSanjeevani have tried to use ICT to improve the health prospects of India's villages (Bajpai & Wadhwa, 2021), poor accessibility hinders the empowerment of rural citizens. This is due to a lack of functional digital skills, especially among groups that are victims of social prejudice, such as rural women and deprived castes. However, efforts towards up-skilling have recently been made, most notably the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA). Much more must be done to close the rift between the connected and the unconnected.

Drawing upon Castells (2000), we can argue that this uneven affordability and accessibility of digital resources directly result from an unequal socio-economic system based on wealth gaps and social marginality. Given that more than half of India resides in rural areas, telecom industries should ensure greater reach of digital networks to remote areas that are left out of the inclusion discourse. Moreover, public and private stakeholders should also conduct digital literacy and awareness campaigns to improve rural citizens' knowledge of computer, laptop, and smartphone usage. While this data points to a significant trend, it also must be mentioned that rural and urban regions have variations within themselves. Even more granular data will be required to analyze the disparity between under-resourced versus affluent residential areas within urban regions (Laskar, 2023).

Religion: When it comes to religious faith, analyses of the NSS 75th Round reflect that the reach of digital technologies is limited to Sikhs and Christians, followed by Hindus, Other religions, and then Muslims. Of all the four major religious groups, Sikhs and Christians are in a relatively better position concerning digital affordability than Hindus and Muslims. This can be traced to the country's overall economic prosperity of Sikhs and Christians (Tong, 2022). It is also evident that of all religious communities, the digital divide affects the Muslim community most pervasively. One possible explanation for this is that Muslims are the most deprived community on the job market and are also the minority community with the lowest living standard in India. Rural Muslims survived on 338 INR per month, while the situation is marginally better for urban Muslims, who stayed on 550 INR a month (NCAER, 2004-2005). This results in poor affordability of digital resources since private sector offerings of even the cheapest data plan in India out-price these numbers.

Further, this study reflects that digital accessibility is closely tied to one's ability to utilize a broad range of digital devices (Pangrazio et al., 2020). Specifically, the findings point towards poor digital accessibility of Muslims, once again indicating a rot far deeper than the first level gap of affordability. Research has documented how Muslims have been at the receiving end of acts such as cyberbullying and online hate speeches from majoritarian groups on digital platforms (Aswathi & Haneefa, 2020). Due to these practices, the usage of computers and presence on online forums may be perceived as a threat to religious identity by Muslims and further drive down state efforts toward cyber-literacy among the Muslim populace.

Applying Weber's comparative historical sociology to these findings, we can argue that even when adopting technological resources, dominant socio-cultural factors such as religion become crucial, as it works in conjunction with class positions and deprives certain communities of legitimacy. In the case of Muslims, digital affordability and accessibility in India remain asymmetrical because historically embedded differences in politics and culture constrain the possibility of open consumerism for them. Even in a post-Sachar era, government interventions towards improving ownership of and access to digital resources for Muslims have been lopsided. Moreover, incitement of violence against Muslims has become common across digital platforms, and these factors drive down both digital affordability and accessibility for the Muslim community.

Tribe and Caste: Our analyses' results further reinforce the linkages between existent marginalization based on tribe/caste groups and emergent forms of the digital divide. According to the data, Scheduled Tribes (STs) experience the poorest affordability of ICTs. To understand the unique causes and consequences of digital exclusion for STs, we must first understand the historical deprivation of STs in comparison to the non-ST population. Most villages with a majority of ST households tend to be a part of the daily wage workforce where income is irregular and meagre. This, coupled with prolonged periods of income loss, means that the capacity to buy phones, computers, and even data packs is significantly poor among STs (Malik & Akhtar, 2022). Even in terms of digital accessibility, the ST population fares worse in comparison to other social groups owing to their vulnerability to digital exploitation and abuse. The digital divide has manifested in a way that specifically makes it harder for tribal girls and women to afford and access digital resources. Tribal girls and women are at the cusp of more than two marginal identities. Owing to this, they face problems such as gendered division of labor at the household level and maligning of character due to prejudicial notions at the societal level. This creates an ecosystem of cumulative disadvantage for tribal girls and women when it comes to their freedom to afford and access digital resources (Nayak & Alam, 2022).

Differential access to digital resources also leads to a stark divide between dominant and marginalized castes in India. Although their affordability is higher compared to tribal communities, the durability of caste ensures that the well-intentioned goals of diversifying livelihoods through ICT have not taken shape. Ownership of computers, phones, and laptops is considered a matter of prestige in Indian households since these are not merely a technological artifact but a medium of communication (Kamath, 2018). This fact complicates the issue of ownership of technical resources by deprived castes since laptop and mobile phone distribution tends to be more among the powerful upper castes, and the digital sphere reflects their social and cultural articulations. Further, OBCs are relatively more capable of affording digital technologies, while Other groups comprising privileged castes have the highest affordability. This indicates the graded nature of inequality in India and proves that social grouping is a unique marker of digital affordability. The poor outcome for SCs, in terms of digital accessibility, also shows that the struggle for self-respect and dignity within the larger Dalit discourse has not yet transformed the caste-regulated digital public sphere, where SCs remain largely subjugated. New theorizations on the Dalit standpoint have noted this complex relationship between caste and technology since notions about Dalits being 'weak' and 'non-meritorious' spill into online platforms. They cannot be combated with affirmative action policies like public sector employment (Rajam et al., 2021).

Using Bourdieu, one can interpret the reality of differential digital affordability and accessibility more robustly. Bourdieu criticized the importance of economic factors and acknowledged that certain social, cultural, and symbolic forms of capital allow for the reproduction of power and hierarchies. In this case, since social and economic capital tends to be concentrated in a cluster of privileged castes at the top of the hierarchy, it gets further converted into digital capital, strengthening their upper-caste dominance.

Gender: The findings of the current dataset are particularly intriguing since women are seen to be performing slightly better than men concerning digital affordability as a metric. This seems like a positive outcome for Indian women; however, such a hasty conclusion is unlikely to survive scrutiny. The affordability of digital devices for women may not lead to inclusion in terms of access since patriarchal social norms and lower levels of digital skills impede women's usage. Women in India are not only more likely to be unpaid or underpaid workers, but most of them also have to shoulder the burden of caregiving in a traditional Indian household owing to gender roles and institutional structures. This leaves them with limited time dedicated to learning new technical skills. Further, scientific and technological education and overall education are generally not prioritized for women and girls. Thus, the likelihood of them being able to use the Internet goes down significantly (Antonio & Tuffley, 2014). The analyses of NSS 75th Round data on digital affordability and accessibility thus clearly suggest higher affordability for women compared to men due to improved household economic conditions. However, accessibility to digital resources for women remains poor when compared to men due to specific socio-cultural barriers.

Building on appropriations of Bourdieu's formulation of capitals, scholars have developed the notion of digital capital and this finding can also be used to examine how varying levels of digital capital tend to be gendered. Feminist scholars have noted that gender has a strong connection to the building of social capital because girls and women are given a secondary position in comparison to men, so their access to literacy, education, and health resources is curtailed (Burt, 1998). Extending this argument, one could also conclude that accumulating digital capital through the affordability and accessibility of online resources is heavily subjected to the aforementioned gendered mechanisms of control.

Educational Status: Findings also reflect a strong relationship between the affordability of digital resources and educational status in India. Those with formal education, specifically primary or secondary schooling, are likely to have more affordability than those without formal education. This likelihood sharply increases for those with an undergraduate degree. The lack of digital affordability among those with poor educational status reflects low-income prospects of under-educated youth. It indicates the difficulty they face concerning the economic ownership of digital devices. Often, it proves to be an added burden on top of other, more pressing expenses in the household. Laptops, computers, and smartphones have become crucial for development, but for those with poor educational status, the income level remains far below the price point of such devices. Further, for such low-income families, broadband connectivity may also be challenging to afford, widening the learning gaps and keeping the educational levels low. In terms of accessibility, once again, this study notes that those without formal education, such as primary or secondary schooling, fare poorly compared to those with formal education. Having an undergraduate college degree also significantly improves one's likelihood of accessing digital resources. This can be linked to the declining learning levels in schools and colleges. In 2016, 24.7% of children in secondary schools could read simple English sentences in 2022, the number declined to 24.5% (ASER, 2022). Lowered learning levels in basic education indicate a far more significant challenge within the Indian education system before one can come to the issue of digital literacy. Therefore, while policy directives like the National Education Policy 2020 underscore the need to make online tools a part of our pedagogic system, the curriculum in most schools and colleges is still compelled to follow the chalk-talk teaching method until learning levels improve.

Invoking Castells again, it is possible to argue that in the information age, the internet crucially determines the kinds of skills and competencies required of the labor force. Thus, those who cannot afford it and are not well-versed in its usage are deemed less useful to the labor market. However, by combining Castells' argument with the writings of Henry Giroux, it may be possible to work our way out of this puzzle (Castells, 2000). Much like Castells, Giroux argues that if institutional forms of education can be combined with new media technologies, then Internet diffusion and up-skilling for poorly educated people will also become part of the welfare agenda. In other words, governments can be trained to close

the technology gap created by background factors such as educational disparity. Apart from government initiatives, non-profit and private sector collaborations must aim for better digital literacy and empower those with poor education levels by acquiring skills to navigate the digital landscape.

CONCLUSION

The findings of this study underscore that rural inhabitants, Muslims, women, and those from marginalized groups such as SC and ST, along with individuals with limited education, encounter heightened challenges in digital affordability and accessibility.

findings can be divided into two sections. Regarding digital affordability, even though class was not studied as a variable, it was recurrently invoked to explain the purchasing constraints of marginalized groups. Market prices for digital services have been revealed as incongruent with the income levels of these groups, suggesting a need to lower entry-level prices and align them with income distributions. In sociological terms, efforts must be recommended to elevate the perceived importance of technology while integrating digital resources into the spending priorities of marginalized groups.

Further, in analyzing digital accessibility, societal and cultural factors persistently perpetuate inequalities. Despite women's improved affordability, gender-based stereotypes and unpaid care work hinder their access to online information and digital skills. Initiatives for gender sensitization and challenging stereotypes are crucial for fostering digital inclusion. This study argues for a reciprocal relationship between affordability and accessibility, emphasizing the need for concerted efforts to promote digital affordability and skill development for vulnerable groups, ultimately fostering digital equity and inclusion.

LIMITATION AND STUDY FORWARD

Bridging the digital divide in India is a complex problem that requires a multi-dimensional approach. This paper tried to provide an evaluation of the existing scenario on the basis of latest data from the NSS. It should be noted, however, that the NSS does not provide data at the district or neighbourhood level, and therefore, the authors had no reference point for the accessibility and affordability of digital services at a more granular scale. Future studies must be focused on more in-depth analyses of these problems by collecting primary data on the consumption and expenditure of digital services, so that more robust analyses can be facilitated.

CONFLICT OF INTEREST AND ETHICAL STANDARDS

During the conduct of this study, no conflicts of interest were present with the current organisation of the authors or with any other entity. This assertion is based on a thorough self-assessment and a commitment to maintaining the highest standards of academic integrity and objectivity throughout the research process. Everything has been referenced according to the standards of the APA 7th Reference Guide.

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AUTHOR'S CONTRIBUTION

Ashwani Dubey and Anushka Sinha, the first co-authors of the manuscript, have done the data curation as well as analysis; they have prepared all tables and diagrams. Anushka Sinha and Ashwini Dubey have worked to build the theoretical framework and discussion points within the manuscript. Dr. Aditya Raj, the second author, has conceptualised the manuscript, and provided editorial revisions.

REFERENCES

1. Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. *Future Internet*, 6(4), 673–687. <https://doi.org/10.3390/fi6040673>
2. ASER: Annual Status of Education Report. (2022). *ASER: Annual Status of Education Report*. <https://asercentre.org/>
3. Aswathi, P., & K, M. H. (2020). Attitude towards Information Technology and Digital Divide: A Study among Students in Universities in Kerala, India. *Library Philosophy and Practise E-journal*. <https://digitalcommons.unl.edu/cgi/viewcontent.cgi>
4. Bajpai, N., & Wadhwa, M. (2021). *National Teleconsultation Service in India: eSanjeevani OPD*.
5. Bhandari, A. (2024). *Multicollinearity | Causes, effects and detection using VIF (Updated 2024)*. Analytics Vidhya. <https://www.analyticsvidhya.com/blog/2020/03/what-is-multicollinearity>
6. Burt, R. S. (1998). THE GENDER OF SOCIAL CAPITAL. *Rationality and Society*, 10(1), 5–46. <https://doi.org/10.1177/104346398010001001>
7. Castells, M. (2000). Materials for an exploratory theory of the network society. *The British Journal of Sociology*, 51(1), 5–24. <https://doi.org/10.1080/000713100358408>
8. Consequences and Challenges. Social and Political Research Foundation. <https://sprf.in/digital-divide-and-the-scheduled-tribes-in-india-extent-consequences-and-challenges/>

9. Freitag, A. P., & Camargo-Borges, C. (2024). The Digital Bow: Exploring the potential of digital presence for Indigenous Community-Based tourism in Brazil. *Tourism Planning & Development*, 1–19. <https://doi.org/10.1080/21568316.2024.2307974>
10. Han, J., Yang, S., & Troin, M. (2024). Reducing the “digital divide” to reap the “digital dividend”: spatial differences and convergence of the digital economy in cities of China. *Frontiers in Sustainable Cities*, 6. <https://doi.org/10.3389/frsc.2024.1283604>
11. India - Household Social Consumption: Education, NSS 75th Round Schedule-25.2 July 2017-June 2018 - Overview. (n.d.). Microdata.gov.in. <https://microdata.gov.in/nada43/index.php/catalog/151/study-description>
12. India Policy Forum, 2004-05 - NCAER | Quality. Relevance. Impact. (2023, February 23). NCAER | Quality. Relevance. Impact. <https://www.ncaer.org/publication/india-policy-forum-2004-05>
13. Information Technology Act, 2000. (2000). <http://indiacode.nic.in/handle/123456789/1999>
14. Internet World Stats. (2022). Usage and Population Statistics. <https://www.internetworldstats.com/>
15. Kalan, M. E., Jebai, R., Zarafshan, E., & Bursac, Z. (2020). Distinction between two statistical terms: multivariable and multivariate logistic regression. *Nicotine & Tobacco Research*, 23(8), 1446–1447. <https://doi.org/10.1093/ntn/ntaa055>
16. Kamath, A. (2018). “Untouchable” cellphones? Old caste exclusions and new digital divides in peri-urban Bangalore. *Critical Asian Studies*, 50(3), 375–394. <https://doi.org/10.1080/14672715.2018.1479192>
17. Karunakar, B. (2021). India’s education sector: impact and alternatives during COVID-19. *International Journal of Pluralism and Economics Education*, 12(1), 89. <https://doi.org/10.1504/ijpee.2021.118153>
18. Khan, F., & Ghadially, R. (2010). Empowerment through ICT education, access and use: A gender analysis of Muslim youth in India. *Journal of International Development*, 22(5), 659–673. <https://doi.org/10.1002/jid.1718>
19. Kularski, C. M. (2012). *The Digital Divide as a Continuation of Traditional Systems of Inequality*.
20. Laskar, M. H. (2023). Examining the emergence of digital society and the digital divide in India: A comparative evaluation between urban and rural areas. *Frontiers in Sociology*, 8. <https://doi.org/10.3389/fsoc.2023.1145221>
21. Lindell, J. (2020). Digital Capital: A Bourdieusian Perspective on the Digital Divide. *European Journal of Communication*, 35(4), 423–425. <https://doi.org/10.1177/0267323120935320>
22. Lythreathis, S., El-Kassar, A., & Singh, S. K. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change*, 175, 121359. <https://doi.org/10.1016/j.techfore.2021.121359>
23. Mammen, J. T., M, R. D., & Kumar, R. G. (2022). North–South digital divide: A comparative study of personal and positional inequalities in USA and India. *African Journal of Science, Technology, Innovation and Development*, 15(4), 482–495. <https://doi.org/10.1080/20421338.2022.2129343>
24. Malik, S and Akhtar N. (2022). Digital Divide and Schedule Tribes in India: Extent
25. Mathrani, A., Sarvesh, T., & Mathrani, S. (2020). Digital Gender Divide in Online Education during Covid-19 Lockdown in India. 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE). <https://doi.org/10.1109/csde50874.2020.9411378>
26. Nayak, K. V., & Alam, S. (2022). The digital divide, gender and education: challenges for tribal youth in rural Jharkhand during Covid-19. *DECISION*, 49(2), 223–237. <https://doi.org/10.1007/s40622-022-00315-y>
27. Pangrazio, L., Godhe, A., & Ledesma, A. E. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-learning and Digital Media*, 17(6), 442–459. <https://doi.org/10.1177/2042753020946291>
28. Potnis, D. (2016). Inequalities creating economic barriers to owning mobile phones in India. *Information Development*, 32(5), 1332–1342. <https://doi.org/10.1177/0266666915605163>
29. Ragnedda, M., & Muschert, G. W. (2015). Digital Divide| Max Weber and Digital Divide Studies — Introduction. *International Journal of Communication*, 9, 6. <https://ijoc.org/index.php/ijoc/article/view/4424>
30. Ragnedda, M., & Muschert, G. W. (2017). *Theorizing digital divides*. <https://doi.org/10.4324/9781315455334>
31. Ragnedda, M., & Ruii, M. L. (2020). Digital capital: A Bourdieusian perspective on the digital divide. Emerald Publishing Limited.
32. Rajam, V., Reddy, A. B., & Banerjee, S. (2021). Explaining caste-based digital divide in India. *Telematics and Informatics*, 65, 101719. <https://doi.org/10.1016/j.tele.2021.101719>
33. Rogers, A., Castree, N., & Kitchin, R. (2013). A Dictionary of Human Geography. In Oxford University Press eBooks. <https://doi.org/10.1093/acref/9780199599868.001.0001>
34. Samudra, A. (2022). Gendering the digital divide in India. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.4112879>
35. Statsols. (2023). Contingency Table template. <https://www.statsols.com/templates/contingency-table>
36. Tong, Y. (2022). India’s Sex Ratio at Birth Begins To Normalize.
37. Van Dijk, J. A. G. M. (2017). Digital Divide: Impact of Access. In P. Rössler, C. A. Hoffner, & L. Zoonen (Eds.), *The International Encyclopedia of Media Effects* (1st ed., pp. 1–11). Wiley. <https://doi.org/10.1002/9781118783764.wbieme0043>
38. Weber, M. (2018). Class, status, party. In Routledge eBooks (pp. 56–67). <https://doi.org/10.4324/9780429494468-7>
39. Yadugiri, M. A., & Bhasker, G. (2005). The Information Technology Act, 2000. In *Foundation Books* (pp. 482–511). <https://doi.org/10.1017/upo9788175968660.018>