
DIGITAL DIVIDE IN INDIA: AN ECONOMIC ANALYSIS OF DETERMINANTS, INEQUALITY, AND INCLUSIVE GROWTH

Dr. Chanda AppaRao

Associate Professor of Economics

KRR Government Arts and Science College(A) Kodad

aprchanda@gmail.com

Abstract

This paper examines the economic dimensions, structural determinants, and policy implications of the digital divide in India. Grounded in theories of human capital, labor market search frictions, endogeneity, and network externalities, the study evaluates empirical data up to 2024 from official sources including the Ministry of Statistics and Programme Implementation's Comprehensive Annual Modular Survey (2022–23) and the Telecom Regulatory Authority of India. The analysis reveals significant disparities across four distinct tiers: the access divide, usage divide, digital skills divide, and outcomes divide. Although gross wireless internet subscriptions have expanded rapidly—exceeding 950 million subscribers—deep structural inequalities persist across rural-urban geographies, gender lines, income quintiles, social groups, and regions. Personal computer ownership remains limited to 4.2% of rural households compared to 21.6% in urban areas, while functional digital skills required for online banking, productivity tasks, and formal labor market participation remain concentrated among socioeconomically privileged demographics. The paper demonstrates that digital exclusion reinforces income inequality, restricts labor market matching efficiency, and creates persistent poverty traps. To foster inclusive economic growth, India must transition from basic telecommunications infrastructure expansion toward target-oriented device access, deep human capital development, localized interface design, and universal broadband connectivity.

Keywords

Digital divide, Inclusive Growth, Digital Exclusion, Social Stratification

Introduction

In modern economic theory, access to information and communications technology (ICT) is no longer conceptualized as a consumer amenity or a secondary welfare measure. Rather, digital infrastructure functions as an essential factor of production, a public medium for market exchange, and a structural determinant of individual economic mobility. In an increasingly digitized macroeconomy, an individual's capacity to participate in formal labor markets, access formal credit, acquire human capital, and interact with social welfare systems is fundamentally constrained or enabled by digital connectivity and technological capability.

The central research question of this study is: How do structural inequalities in digital infrastructure, device ownership, skill acquisition, and platform usage influence economic opportunities, labor productivity, and inclusive growth in India? Furthermore, through what theoretical economic mechanisms does digital exclusion perpetuate pre-existing income, gender, and regional disparities?

India presents a compelling case study for development economics. Over the past decade, the country has spearheaded rapid digital infrastructure development, establishing a world-leading Digital Public Infrastructure (DPI) and achieving low mobile data tariffs¹. Aggregate figures report impressive milestones: total internet subscriptions reached 954.40 million by March 2024 and 970.16 million by December 2024³. However, underneath these aggregate figures lies a complex landscape of structural inequality. Macro-level subscriber counts obscure deep disparities across rural and urban geographies, gender identities, income classes, and social groups. Understanding these economic dimensions is vital for evaluating whether India's digital transition serves as an economic equalizer or as an amplifier of pre-existing socioeconomic divides.

Objectives

- To study digital disparities in rural & urban areas.
- To study the digital divide in gender perspective.
- To study the various digital facilities in India
- To study the digital divide in and Socioeconomic Inequality perspective

The State of Digital Access in India

Empirical evidence from official government sources—primarily the Ministry of Statistics and Programme Implementation's (MoSPI) Comprehensive Annual Modular Survey (CAMS) 2022–23 (NSS 79th Round) and reports from the Telecom Regulatory Authority of India (TRAI)—provides a detailed quantitative mapping of India's digital landscape.

Telecommunications Infrastructure and Subscriber Base

By March 2024, India's total internet subscriber base reached 954.40 million, expanding to 970.16 million by December 2024³. Wireless connections dominate the telecommunications landscape, accounting for 928.96 million subscribers (95.75% of total internet connections) in late 2024, whereas wired internet subscriptions remained limited at 41.21 million⁴. Broadband internet connections (defined as speeds $\geq$ 512 Kbps) numbered 944.96 million, while narrowband connections declined to 25.20 million⁴.

Disparities in Subscriber Densities and Survey Metrics

A critical methodological distinction exists between supply-side administrative data published by regulatory bodies and demand-side household sample surveys conducted by statistical agencies. TRAI statistics measure active SIM card subscriptions reported by telecommunications service providers. Because urban residents frequently maintain multiple SIM cards across different devices or networks, urban tele-density figures routinely exceed 130%⁴. In contrast, MoSPI's CAMS 2022–23 provides demand-side household survey data measuring unique individual and household device possession and internet usage, eliminating duplicate counting⁵.

According to TRAI data for late 2024, urban internet subscribers stood at 111.64 per 100 population, compared to 44.99 per 100 population in rural areas⁶. Similarly, wireline tele-density in urban centers reached 7.19%, while in rural India it stood at a sparse 0.33%⁶.

Device Ownership and Hardware Constraints

The CAMS 2022–23 survey reveals that while 95.1% of Indian households possess a mobile

telephone (including basic feature phones), only 9.9% possess a personal computer or laptop⁵. In rural areas, household computer ownership drops to 4.2%, compared to 21.6% in urban households⁵. Smartphone ownership exhibits broader reach, with 85.5% of Indian households possessing at least one smartphone (82.1% in rural areas versus 91.3% in urban areas)¹⁰.

Digital Skills Distribution

Among youth aged 15–24 years, 84.8% report the ability to use the internet (82.1% rural versus 91.8% urban)⁵. However, functional skill levels decline sharply as task complexity increases. While 78.4% of youth can send messages with file attachments (74.9% rural, 87.3% urban) and 71.2% can use copy-and-paste tools, only 26.8% possess the combined skills to search for information, send emails, and execute online banking transactions simultaneously (21.0% in rural areas versus 40.2% in urban centers)⁵.

Indicator	Dec 2023	Mar 2024	Dec 2024
Total Internet Subscribers (Millions)	936.16	954.40	970.16
Broadband Internet Subscribers (Millions)	904.54	924.07	944.96
Wireless Internet Subscribers (Millions)	897.59	914.13	928.96
Wired Internet Subscribers (Millions)	38.57	40.27	41.21
Overall Tele-density (%)	85.23	85.69	84.45
Urban Tele-density (%)	133.76	133.72	131.37
Rural Tele-density (%)	58.56	59.19	58.29

Urban Internet Subscribers per 100 Population	110.66	—	111.64
Rural Internet Subscribers per 100 Population	43.06	—	44.99
Monthly Wireless ARPU (INR)	152.55	153.54	181.80

Source: Telecom Regulatory Authority of India (TRAI) Performance Indicator Reports³.

Indicator Description	Rural (%)	Urban (%)	All India (%)
Households possessing telephone / mobile phone	94.2	97.1	95.1
Households possessing at least one smartphone	82.1	91.3	85.5
Households possessing a computer (Desktop/Laptop)	4.2	21.6	9.9
Households with internet facility within premises	83.3	91.6	86.3
Youth (15–24 years) able to use internet	82.1	91.8	84.8

Youth skill: Send message with file attachment	74.9	87.3	78.4
Youth skill: Copy-and-paste digital tools	67.1	81.8	71.2
Youth skill: Search info, send email, & perform online banking	21.0	40.2	26.8

Source: Ministry of Statistics and Programme Implementation (MoSPI), Comprehensive Annual Modular Survey (CAMS) 2022–23 (NSS 79th Round)⁵.

Economic Determinants of the Digital Divide

The uneven distribution of digital access and capabilities across Indian society is driven by underlying structural economic factors.

- A. Household Income and Hardware Affordability
- B. Educational Attainment and Linguistic Barriers
- C. Market Failures and Telecommunications Infrastructure
- D. The Endogenous Feedback Loop

Rural–Urban and Regional Dimensions

Rural India faces structural bottlenecks, including unreliable electrical grid infrastructure, poor backhaul bandwidth, and low wireline broadband penetration⁶. As noted, wireline tele-density in rural areas stands at 0.33%, leaving rural connectivity heavily reliant on mobile wireless networks that suffer from spectrum congestion and peak-hour bandwidth degradation⁶.

Regional disparities across Indian states further highlight the spatial dimension of the digital divide. Higher-income states with robust infrastructure exhibit significantly superior tele-density and internet access rates compared to lower-income states¹.

Data from TRAI reveals striking state-level divergences:

1. **High-Penetration States:** Kerala boasts a rural tele-density exceeding 215%, reflecting high human capital, remittance inflows, and physical infrastructure investments⁸. Himachal Pradesh demonstrates a rural tele-density of 85.72%, supported by state-level rural infrastructure investments⁶. Maharashtra and Delhi maintain high overall tele-density levels driven by commercial concentration and urban density¹.
2. **Lagging States:** In contrast, Bihar registers the lowest rural tele-density at 44.16%, closely followed by Madhya Pradesh at 41.76% to 44.74%⁶. States such as Chhattisgarh, Jharkhand,

and Uttar Pradesh also exhibit low rural tele-density and internet penetration rates¹.

Service Area / State	Overall Tele-density (%)	Rural Tele-density (%)	Infrastructure & Economic Profile
Kerala	High (>100)	215.31	Highest rural connectivity; strong remittance economy & human capital ⁸
Himachal Pradesh	~130.00	85.72	Strong rural infrastructure rollout and public service delivery ⁶
Maharashtra (incl. Mumbai)	~103.00	~67.00	High urban concentration and commercial digital adoption ⁸
Uttar Pradesh (East & West)	~68.00	~50.00	High population density; moderate rural connectivity lags ⁸
Madhya Pradesh	~67.00	41.76 – 44.74	Low rural tele-density; significant rural infrastructure gaps ⁶
Bihar (incl. Jharkhand)	~60.00	44.16	Lowest rural tele-density; lower per capita income & infrastructure ⁶

Source: Telecom Regulatory Authority of India (TRAI) Performance Indicator Reports⁶.

Gender and Socioeconomic Inequality

The Gender Digital Divide

Gender economics emphasizes that intra-household resource allocation is governed by bargaining power and social norms. In many Indian households, digital devices—especially high-value

smartphones and computing assets—are controlled by male household heads².

Oxfam India data indicates that Indian women are 15% less likely to own a mobile phone and 33% less likely to use mobile internet services than men¹. Women account for only approximately one-third of total internet users in the country¹. Micro-data from CAMS confirms this gap among adults (aged 15 and above): in rural India, while 80.7% of males own a mobile phone, only 48.4% of females own one¹⁰. Urban areas show a similar gap, with 90.0% male ownership versus 71.8% female ownership¹⁰. Similarly, rural female internet usage (last 3 months) stands at 57.6%, compared to 72.1% for rural males¹⁰. This gendered digital exclusion limits female labor force participation, restricts flexible remote work opportunities, and hinders female micro-entrepreneurs from scaling enterprises.

Intersectionality with Social Stratification

Socioeconomic stratification by caste and tribe interacts directly with digital access. According to survey data analyzed in the Oxfam Inequality Report, Scheduled Caste (SC) and Scheduled Tribe (ST) households exhibit systematically lower computer and internet adoption rates compared to General and Other Backward Classes (OBC) categories¹. General category households demonstrate a higher likelihood of possessing computing assets and home broadband connections¹. When social disadvantage intersects with rural location and female gender, the compound probability of digital exclusion increases significantly, restricting social mobility.

Conclusion

The digital divide in India is a complex economic issue closely linked to pre-existing inequalities in income, education, gender, social group, and geography. While national aggregate connectivity statistics demonstrate rapid progress—reflected in nearly 970 million internet subscribers and widely utilized digital payment rails—granular household survey data reveals persistent structural exclusions⁴. Personal computer access remains unavailable to over 95% of rural households, female mobile phone ownership lags significantly behind male ownership, and intermediate digital skills required for formal employment remain limited⁵.

Addressing these disparities is critical for India's long-term economic growth and social mobility. Digital exclusion functions as an economic bottleneck, restricting labor market matching efficiency, constraining agricultural price realization, limiting female labor force participation, and perpetuating income inequality. Bridging this divide requires shifting public policy from gross infrastructure rollout targets to targeted hardware provision, intermediate skill development, vernacular interface standards, and universal rural broadband connectivity. By ensuring equitable access to digital tools and capabilities, India can promote broader economic participation and achieve sustainable, inclusive growth across all segments of society.

References

1. India Inequality Report 2022: Digital Divide - Current Affairs - NEXT IAS, <https://www.nextias.com/ca/current-affairs/05-12-2022/india-inequality-report-2022-digital-divide>
2. India Inequality Report 2022 - Arthan Learning Resources, <https://blog.arthancareers.com/india-inequality-report-2022/>

3. Information Note to the Press (Press Release No.36/2024) "Indian Telecom Services Performance Indicator Report" for the - Telecom Regulatory Authority of India, https://www.trai.gov.in/sites/default/files/2024-08/PR_No.36of2024.pdf
4. Results of Comprehensive Annual Modular Survey, July 2022- June 2023 - Press Information Bureau, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2063571>
5. The Indian Telecom Services Performance Indicators October–December, 2024 New Delhi, India, https://www.trai.gov.in/sites/default/files/2025-04/QPIR-Dec-24%2024_04.pdf
6. MoSPI released the 'Comprehensive Annual Modular Survey: July 2022- June 2023', <https://affairsccloud.com/mospi-released-the-comprehensive-annual-modular-surveyjuly-2022-june-2023/>
7. The Indian Telecom Services Performance Indicators July – Sep, 2022 New Delhi, India, https://www.trai.gov.in/sites/default/files/2024-09/QPIR_03022023_0.pdf
8. Information Note to the Press (Press Release No.20/2024) - Telecom Regulatory Authority of India, https://tra.gov.in/sites/default/files/2024-08/PR_No.20of2024.pdf
9. “Indian Telecom Services Performance Indicator Report” for the Quarter October-December, 2024 - Press Information Bureau, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2124056>
10. The Digital Divide in India: Challenges and Governmental Responses - The Law Institute, <https://thelaw.institute/cyberspace-technology-and-social-issues/digital-divide-india-challenges-government-responses/>