

Digital Access for Girls in India: Examining the Socio-economic Factors

Rahul Pal¹, Dr. Poulami Chatterjee², Dr. Diparna Jana³

¹PhD scholar, Department of Economics and Politics, Visva-Bharati (University), Santiniketan, West Bengal, India.

²Assistant Professor, Economics Department, St. Xavier's University, Kolkata, India.

³Assistant Professor, Xavier Law School, St. Xavier's University, Kolkata, India.

DOI: <https://doi.org/10.5281/zenodo.18922701>

Published Date: 09-March-2026

Abstract: Using large-scale unit-level data from the Comprehensive Annual Modular Survey (CAMS, 79th round, 2022-2023), we can observe that not only inter-regional but also intra-regional and intra-state inequality persist in girls' digital access in India. Digital infrastructure is penetrating widely, but exclusive ownership of phones is low among teenage girls, especially in rural areas. Also, the social (caste, religion), household (parental education, student age, family income), and geographical (location) factors play a significant role in exclusive digital access and internet use among girls in India. There are significantly deprived and marginal segments in society which have been historically excluded from technological advancements. This exclusion has long-term implications for gender parity in high-growth sectors and for the broader goal of inclusive and sustainable development.

Keywords: Digital access, Socio-economic Barriers, Internet use, India.

JEL classifications- O12, J16, O33, O53

1. INTRODUCTION

"Rajasthan caste panchayat bars women from using smartphones, triggers protest"—24 Dec, 2025, *The Indian Express*.

Digital access for all is an important developmental aspect in the 21st century. The SDG goals strongly recognise digital literacy and access. SDG-4 focuses on quality education by promoting ICT skills for employment and lifelong learning. Also, improving internet access is central to achieving SDG 9 (Industry, Innovation, and Infrastructure). These developments should be achieved by everyone, regardless of gender, as mentioned in SDG 5 (gender equity). However, even after 75 years of independence, women were found to be less likely than men to own a mobile phone in India (Dreze & Sen 2013; UNICEF 2024), and also 18% less likely to use the internet than men (Ministry of Health and Family Welfare, Government of India, 2021). Many women in India still use basic handsets for limited purposes and are often not user-friendly.

Existing studies focusing on this issue of digital access often use the digital divide lens to explain differences in digital access and use between men and women. Several frameworks have been developed to study and explain the digital gender divide, such as Van Dijk and Hacker (2003), Warnecke (2017), Nath and Barah (2017), and Duvendack et al. (2023). Warschauer (2004) and Van Dijk (2006) argued that digital inclusion is not simply a matter of access to devices but also of usage capabilities, socio-economic background, and institutional support. In the Indian context, the digital divide is both infrastructural and socio-cultural. The GSMA (2022) Mobile Gender Gap Report shows that women in South Asia are significantly less likely than men to own mobile phones or use mobile internet. A gap guided by affordability, literacy, safety concerns, and social norms. These findings resonate with Desai et al. (2018), who, using data from the India Human Development Survey (IHDS), highlight that even within households with adequate digital resources, girls often experience lower access due to gendered prioritisation. However, there is limited literature on women's mobile phone access, use, and its determinants in India. There are a few context-specific studies in the Indian context. In rural Maharashtra, Potnis (2016)

found that cultural factors like the long power distance between men and women, the gender roles defined by Indian society for women, women's attitudes of avoiding uncertainty, and collectivistic practices create economic barriers. Owing to the economic disadvantages created by the above cultural factors, it is challenging for women to earn enough to afford the least expensive mobile phone handsets. Bala and Singhal (2018) explore the extent of the gender digital divide in Uttar Pradesh, focusing on the availability, access time, and use of the internet. They have found that patriarchal norms and household responsibilities restrict women from using mobile phones before marriage. Using Household Social Consumption data, Banerjee (2020) investigates the first-level digital divide (ownership of a computer and access to the internet) and the second-level digital divide (an individual's skill to use a computer and the internet) and argues that there exists a large first-level and second-level digital divide between the disadvantaged caste groups and unreserved/general groups in India. Bhallamudi (2022) studied adolescents across high- and low-income classes in Mumbai and found that the intersection of gender and class creates varying standards of 'respectable femininity' and class distinctions that enable or constrain girls' access to mobile phones. Islam and Manchanda (2023) conducted a primary survey in three locations – Delhi, Uttar Pradesh (UP), and Bihar. The study shows that lack of ownership of mobile phones, concerns about privacy, and family restrictions may constrain the purposes for which women use digital technology. In the context of Telangana, India, Anand & Pandey (2025) found that semi-urban teenage girls are disadvantaged in terms of proficiency in computer skills. However, a recent comprehensive macro study on the determinants of digital access among adolescent girls in the Indian context is missing. Filling this gap is the intended attempt of this paper. The study is motivated by the recognition that improving digital access is not merely a technological intervention, but a multidimensional developmental imperative with implications for gender parity, innovation capacity, and inclusive economic growth. We have organised the paper as follows: Sections 2 and 3 cover the objectives and methodology, respectively. In Section 4, we focused on digital access and its determinants. Finally, in section 5, we conclude.

2. SPECIFIC OBJECTIVES OF THE STUDY

- To identify the socio-economic and demographic factors that determine exclusive mobile phone ownership among adolescent girls aged 15-21 years in India.
- To identify the socio-economic and demographic factors that are associated with internet usage among adolescent girls aged 15-21 years in India.

3. METHODOLOGY

We have used the Comprehensive Annual Modular Survey (CAMS, 79th round, 2022-2023) report published by the Government of India. As our primary focus is on adolescent girls, we selected 15- to 21-year-old girls for our study. This particular age group represents late adolescence/young Adulthood (APA, 2018). We modelled digital access among adolescent girls as a function of socio-economic and household characteristics. Household income, religion, caste, the household head's educational level, and location (urban/rural) were included as explanatory variables. We have used descriptive tables and confirmatory tests for our study. In every confirmatory test, we have used a clustered robust standard error to address state-specific locational impact.

4. DIGITAL ACCESS AMONG ADOLESCENT GIRLS IN INDIA

Table 1: State-wise digital access among Adolescent girls in India

States	Girls aged between 15-21 years							
	Access to Phone (Shared+ Exclusive)		Exclusive access of Phone		Internet access through all devices (shared+ Exclusive)		Per-family mobile phones	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Jammu & Kashmir	87.51	95.15	21.95	39.66	81.97	92.75	3.16	3.52
Himachal Pradesh	94.56	96.75	39.59	49.51	88.57	94.67	2.91	2.90
Punjab	94.79	94.82	21.71	39.96	89.39	91.54	2.52	2.89
Chandigarh	100	100	37.92	12.34	99.55	100	3.09	2.54
Uttarakhand	89.67	91.02	24.57	42.52	87.34	93.82	2.54	2.98
Haryana	91.54	83.60	23.59	30.41	92.66	85.44	2.81	3.21

Delhi	93.38	98.06	41.13	59.30	85.49	98.03	3.38	3.43
Rajasthan	91.94	89.24	16.55	32.17	73.60	82.01	2.48	2.86
Uttarpradesh	86.14	91.30	6.29	16.02	65.47	81.23	2.18	2.66
Bihar	86.42	90.00	16.81	21.26	66.67	83.95	2.54	2.90
Sikkim	95.73	95.34	65.26	62.31	94.87	94.32	3.79	3.70
Arunchal Pradesh	81.95	83.22	50.02	68.22	65.84	76.29	3.27	3.20
Nagaland	96.66	99.59	34.93	72.62	89.17	99.10	2.96	3.28
Manipur	95.57	96.53	55.11	73.37	91.19	96.40	3.90	3.93
Mizoram	95.87	98.26	50.45	79.76	95.24	99.17	3.63	4.18
Tripura	87.31	87.78	26.47	40.49	75.18	81.57	2.07	2.34
Meghalaya	76.54	87.94	34.05	53.44	79.09	90.63	3.03	3.65
Assam	86.80	94.28	28.67	62.92	73.04	89.35	2.51	2.92
West Bengal	89.52	97.75	18.83	37.36	78.42	91.18	2.15	2.67
Jharkhand	95.11	94.74	12.35	23.91	77.79	88.14	2.29	2.84
Odisha	87.93	88.24	17.32	37.17	71.07	80.94	1.95	2.38
Chattisgarh	83.07	93.23	16.35	36.85	71.57	90.66	2.01	2.73
MadhyaPradesh	93.16	96.63	11.94	30.20	79.90	88.40	2.24	2.89
Gujarat	91.03	84.95	17.59	37.64	81.29	80.37	2.48	2.94
Dadra & Nagar Haveli	86.87	95.72	15.66	44.52	82.39	93.62	2.54	2.72
Maharashtra	92.51	94.39	23.28	51.45	84.95	92.37	2.42	3.27
Andhra Pradesh	95.82	97.12	24.48	37	84.78	91.01	2.17	2.41
Karnataka	97.73	94.37	34.10	49.34	87.01	89.61	2.79	2.80
Goa	98.39	100	51.19	68.35	96.73	98.28	3.56	3.60
Lakshadeep	76.67	84.45	35.43	84.85	68.15	100	3	3.58
Kerala	98.41	98.93	54.14	55.69	98.64	99.11	3.16	3.21
Tamilnadu	97.50	96.32	36.17	55.77	81.65	89.78	2.71	2.83
Puducherry	99.19	97.78	47.52	45.32	96.34	96.41	2.98	3.24
Andaman & Nicobar	98.90	99.84	45.25	46.83	92.83	92.13	3.50	2.92
Telangana	96.32	93.90	25.52	49.15	90.13	90.44	2.52	2.75
Ladakh	82.26	87.74	48.07	68.49	83.34	94.63	4.53	4.08

Computed from CAMS 79th round unit-level data

We have considered four variables in Table 1 — phone access (shared and exclusive), exclusive phone ownership, internet access via all devices, and the average number of mobile phones per family — to understand how structural socio-economic disparities and embedded social norms affect digital access and use. Exclusive ownership serves as a proxy for the ability to use a device privately for one's own purposes, whether for online learning, mobile banking, or private communication. Our analysis reveals that digital access among girls across India's states and union territories represents a distinct picture of regional inequality. While basic connectivity via shared household devices is becoming increasingly widespread, the autonomous digital access remains unevenly distributed. The most immediately visible image is the persistent urban-rural disparity. Across every state in India, urban areas have higher percentages in nearly all categories. This urban advantage includes better telecommunications infrastructure, higher average incomes, and greater proximity to digital literacy resources. However, the urban-rural disparities are neither uniform nor absolute. There are some exceptions: in the state of Haryana, rural internet access exceeds that of urban areas, and in Gujarat, shared phone access is higher in rural areas than in urban areas. These exceptions may have arisen due to agrarian prosperity/or specific state-led digital initiatives in rural districts, or both. A profound inter-state and inter-regional variation also exists. The north-eastern states, along with Kerala and Goa, appear to be leaders in nurturing digital autonomy for adolescent girls. North-eastern states are mostly characterised by a matrilineal culture, in which daughters inherit ancestral property and family wealth. Kerala, a leader in the human development index, shows near saturation in shared phone access and remarkably high exclusive mobile ownership.

On the contrary, adolescent girls in some north-central Indian states, such as Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, and Jharkhand, are experiencing digital deprivation in the case of exclusive phone access. Even when a mobile phone enters the family (as shown by the per-family phone data, which is not drastically lower than the national average), it is less likely to be under the personal control of a young girl. In the case of internet use (shared or exclusive), the gap between urban and rural areas is no longer as pronounced as it once was, as most handsets in India now offer internet connectivity at affordable prices. However, there are exceptions such as Uttar Pradesh, Assam, and Bihar. These states ranked very low in terms of internet use. In some states, such as Kerala and Haryana, the percentage of internet users is higher than the percentage of mobile phone users, as many students have access to laptops that also connect to the internet. The "Per-family mobile phones" gives us disaggregated information for intra-household analysis. The number of per-family mobile phones ranges from approximately 2.0 to 4.5, indicating that multi-phone households are now quite common across all states. A household with three phones may still allocate them to the male members (preferably sons), leaving daughters dependent on shared use. The higher per-family phone numbers in regions like Ladakh, the north-eastern states, and Goa are associated with higher exclusive access for girls, implying that device saturation reduces intra-family resource competition and may make it more socially acceptable for a woman to own a mobile phone. However, there are exceptions, as some states with moderate phone penetration rates (such as Punjab) still exhibit low exclusive female access to mobile phones. This confirms that device availability is a necessary but insufficient condition for gendered digital inclusion. As a proxy of digital access, we have considered exclusive phone access and internet use. We have constructed two logit models to estimate the likelihood of phone access and internet use among girls.

4.1 Determinants of Exclusive Phone Access

Model-1

$$Exc. Phn. Access_i = \beta_0 + \beta_1 mpce_i + \beta_2 age_i + \beta_3 Hh. head.edu_i + \delta_1 location_i + \gamma_j \sum_{j=1}^n caste_{ij} + \alpha_k \sum_{k=1}^n religion_{ik} + \mu_i \dots\dots\dots 1)$$

i= individual , μ_i = Stochastic error term

In our first empirical specification, we treat exclusive phone access as a binary dependent variable. The dependent variable being binary in nature, can take values 0 and 1: 0 for "no" and 1 for "Yes". Where, γ_1 , γ_2 , and γ_3 are the coefficients of caste dummies. We consider the general/unreserved category as the base in the Caste dummy. α_1 , α_2 , and α_3 are the coefficients of religion dummies, and we took Hindu as our base category. δ_1 is the coefficient of the location dummy. As a proxy for income, we used monthly per capita expenditure (MPCE). Reference Groups: All comparisons are relative to the omitted/base category (Rural, Upper Caste, Hindu).

Table 2: Regression result for Exclusive Phone access

Dependent variable- Exclusive access to the Phone	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Religion dummy Base= Hindu	0	.	.	.	.	.
Islam	-.293	.165	-1.78	0.07	-.616	.029	*
Christian	.998	.213	4.68	0.00	.58	1.416	***
Other religion	.81	.35	2.31	0.02	.123	1.497	**
Caste Dummy Base= UR	0	.	.	.	.	.
ST	-.146	.169	-0.86	0.38	-.477	.186	
SC	-.532	.1	-5.34	0.00	-.727	-.337	***
OBC	-.26	.102	-2.54	0.01	-.46	-.059	**
Education level of the Household head	.065	.005	14.37	0.00	.056	.074	***
MPCE	0.00002	0	7.85	0.00	0	0	***
Location dummy(rural=base)	0	.	.	.	.	.
Urban	.652	.073	8.98	0.00	.51	.794	***

Age of the member	.382	.015	24.91	0.00	.352	.412	***
Constant	-8.924	.305	-29.26	0.00	-9.522	-8.326	***
Mean dependent var	0.267		SD dependent var		0.443		
Pseudo r-squared	0.148		Number of obs		72431		
Chi-square	1636.054		Prob > chi2		0.000		
Akaike crit. (AIC)	71676.330		Bayesian crit. (BIC)		71777.424		
*** $p < .01$, ** $p < .05$, * $p < .1$							
<i>We have applied the clustered robust standard error at the state level.</i>							

Computed from CAMS 79th round unit-level data

Interpretation of the result

Muslim girls are significantly less likely to have exclusive phone access compared to Hindus. Christians and Other religions show positive, highly significant coefficients, with Christians having the highest likelihood of exclusive phone access among all religions. Both SC (Scheduled Caste) & OBC categories show a negative, highly significant relationship; coming from an SC background has one of the most substantial negative impacts on exclusive phone access compared to the General category. Interestingly, the ST (Scheduled Tribe) coefficient is not statistically significant. Higher levels of education among the household head strongly correlate with an individual's likelihood of having their own Phone. The coefficient of Monthly Per Capita Expenditure (MPCE) is positive and significant. Even though the coefficient is small, it confirms that higher household wealth increases the probability of exclusive phone access. The Urban coefficient is positive and significant, which implies that urban girls have significantly higher log-odds of owning an exclusive phone than rural girls. Age of the Member is a powerful predictor. As individuals get older (within the range of this dataset), they are significantly more likely to gain exclusive access to a mobile device. The results highlight an apparent digital inequality, driven by several socio-economic and demographic factors.

4.2 Determinants of Internet use

Model-2

$$\text{Internet. use}_i = \beta_0 + \beta_1 \text{mpce}_i + \beta_2 \text{age}_i + \beta_3 \text{Hh. head.edu}_i + \delta_1 \text{location}_i + \gamma_j \sum_{j=1}^n \text{caste}_{ij} + \alpha_k \sum_{k=1}^n \text{religion}_{ik} + \varepsilon_i \quad \dots\dots\dots(2)$$

i = individual, ε_i = Stochastic error term

The dependent variable can take only two values: 0 for "no" and 1 for "Yes". Where, γ_1 , γ_2 , and γ_3 are the coefficients of caste dummies. We consider the general/unreserved category as the base in the Caste dummy. α_1 , α_2 , and α_3 are the coefficients of religion dummies, and we took Hindu as our base category. δ is the coefficient of the location dummy. As a proxy for income, we used monthly per capita expenditure (MPCE). All comparisons are relative to the omitted/base category (Rural, Upper Caste, Hindu).

Table 3: Regression result for Internet use

Dependent variable- Internet use	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Religion dummy Base= Hindu	0	.	.	.	.	.
Islam	-.354	.085	-4.17	0.00	-.52	-.187	***
Christian	.525	.177	2.97	0.00	.179	.872	***
Other religion	.428	.219	1.96	0.05	0	.856	*
Caste dummy Base= UR	0	.	.	.	.	.
ST	-.522	.102	-5.10	0.00	-.723	-.322	***
SC	-.423	.081	-5.20	0.00	-.582	-.263	***
OBC	-.192	.085	-2.26	0.02	-.359	-.026	**

Education level of the household head	.079	.004	19.32	0.00	.071	.087	***
MPCE	0.00008	0	10.13	0.00	0	0	***
Location dummy(rural=base)	0	.	.	.	.	.
Urban	.418	.054	7.72	0.00	.312	.524	***
Age of the member	.156	.01	16.26	0.00	.137	.175	***
Constant	-2.77	.2	-13.84	0	-3.162	-2.377	***
Mean dependent var	0.807		SD dependent var		0.395		
Pseudo r-squared	0.110		Number of obs		72431		
Chi-square	1300.224		Prob > chi2		0.000		
Akaike crit. (AIC)	63332.951		Bayesian crit. (BIC)		63434.045		
*** $p < .01$, ** $p < .05$, * $p < .1$							
<i>We have applied the clustered robust standard error at the state level.</i>							

Computed from CAMS 79th round unit-level data

Interpretation of the result

Our results show that religion plays an important role. Muslim girls are significantly less likely to have Internet usage compared to Hindus. Other religions and the Christian dummy show a positive, highly significant coefficient. The SC (Scheduled Caste), ST (Scheduled Tribe), and OBC categories show a negative, highly significant relationship; coming from an ST background has one of the most substantial negative impacts on Internet usage compared to the General category. Higher levels of education among the household head is also a positive and significant factor. The coefficient of Monthly Per Capita Expenditure (MPCE) is positive and significant. Even though the coefficient is small, it confirms that higher household wealth increases the probability of Internet use for girls. The Urban coefficient is positive and significant, which implies that urban girls have significantly higher log-odds of Internet use than rural girls. Age of the Member is also a significant factor, as most teenage girls use shared internet at home. The result highlights an apparent digital inequality in internet access, driven by socio-economic and demographic factors.

5. CONCLUSION

From our above analysis, we can observe that not only inter-regional, but also intra-regional and intra-state inequality persist in girls' digital access in India. Digital infrastructure is penetrating widely, but exclusive ownership of phones is low among teenage girls, especially in rural areas. Also, the social (caste, religion), household (parental education, student age, family income), and geographical (location) factors play a significant role in exclusive digital access and internet use among girls in India. There are substantially deprived and marginal segments in society which have been historically excluded from technological advancements, and semi-feudal patriarchal norms further compounded this. This exclusion has long-term implications for gender parity in high-growth sectors and for the broader goal of inclusive and sustainable development. Due to a lack of qualitative data on social norms, attitudes towards women, and other social factors in large-scale datasets, we are unable to examine these micro-level factors. Large-scale primary data, rigorously analysed, could address these gaps.

ACKNOWLEDGEMENT

The authors are recipient of Indian Council of Social Science sponsored collaborative research project. The article is largely an outcome of their research work sponsored by ICSSR. However, the responsibility for the facts stated, opinions expressed and the conclusions drawn is entirely that of the authors.

REFERENCES

- [1] American Psychological Association. (2018). Late adolescence. In *APA dictionary of psychology*. Retrieved [01.03.2026], from <https://dictionary.apa.org/late-adolescence>
- [2] Anand, P., & Pandey, A. (2025). Factors Affecting Digital Adoption Among Teenagers in a Semi-Urban District of India: Implications for Gender Equality. *SAGE Open*, 15(2), 21582440251343381.
- [3] Bala, S., & Singhal, P. (2018). Gender digital divide in India: a case of inter-regional analysis of Uttar Pradesh. *Journal of Information, Communication and Ethics in Society*, 16(2), 173-192.

- [4] Barboni, G., Field, E., Pande, R., Rigol, N., Schaner, S., & Moore, C. T. (2018). A Tough Call: Understanding barriers to and impacts of women's mobile phone adoption in India. *Evidence for Policy Design, Harvard Kennedy School*, 2018-10.
- [5] Bhallamudi, I. (2022). Daughters, devices and doorkeeping: How gender and class shape adolescent mobile phone access in Mumbai, India. *Information, Communication & Society*, 25(6), 851-867.
- [6] Dreze, J., & Sen, A. (2013). An uncertain glory: India and its contradictions. In *An uncertain glory*. Princeton University Press.
- [7] Duvendack, M., Sonne, L., & Garikipati, S. (2023). Gender inclusivity of India's digital financial revolution for attainment of SDGs: Macro achievements and the micro experiences of targeted initiatives. *The European journal of development research*, 35(6), 1369-1391.
- [8] GSMAssociation. (2023). The Mobile Gender Gap Report 2023.
- [9] Islam, A., & Manchanda, P. (2023). *Gender Inequalities in Digital India: A survey on digital literacy, access, and use* (Vol. 5). Digit Working Paper No.
- [10] Ministry of Education, Government of India. (2021-22). AISHE (All India Survey on Higher Education)
- [11] Ministry of Health and Family Welfare, Government of India. (2021). National Family Health Survey (NFHS-5), 2019-2021.
- [12] Nath, M., & Barah, P. (2017). Digital India and women: Bridging the digital gender divide. In *Proceedings of the 10th international conference on theory and practice of electronic governance* (pp. 302-310).
- [13] Potnis, D. (2016). Culture's consequences: Economic barriers to owning mobile phones experienced by women in India. *Telematics and Informatics*, 33(2), 356-369.
- [14] Rajam, V., Reddy, A. B., & Banerjee, S. (2021). Explaining caste-based digital divide in India. *Telematics and Informatics*, 65, 101719.
- [15] Tyers-Chowdhury, A., & Binders, G. (2021). What we know about the gender digital divide for girls: A literature review. <https://www.unicef.org/eap/media/8311/file/What>
- [16] United Nations Children's Fund (UNICEF). Digital Solutions for Empowering Adolescent Girls in South Asia: A Regional Analysis Report. UNICEF, Kathmandu, 2024.
- [17] Van Dijk, J. A. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4-5), 221-235.
- [18] Van Dijk, J., & Hacker, K. (2003). The digital divide as a complex and dynamic phenomenon. *The information society*, 19(4), 315-326.
- [19] Vikram, K., Chen, F., & Desai, S. (2018). Mothers' work patterns and Children's cognitive achievement: Evidence from the India Human Development survey. *Social science research*, 72, 207-224.
- [20] Warnecke, T. (2017). Social innovation, gender, and technology: Bridging the resource gap. *Journal of Economic Issues*, 51(2), 305-314.
- [21] Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. MIT press.