

Geography of digital development and its socio-economic determinants in India

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Abstract

Digital development is seen as a capability and asset that has the potential to empower and accelerate growth and progress in all aspects of human life from the economy to society, politics, communication to production and exchange of knowledge, etc. It has become an inevitable determinant of human development in the age of knowledge. Govt. of India envisions that the e-development of the country will act as an engine for transition into a developed nation and an empowered society. This paper attempts to measure the state of digital development in India and explores its socio-economic determinants. The study tries to examine the levels of digital divide across regions, social groups, income groups, age, sex, occupation, religion and education. Data from secondary sources such as International Telecommunication Union, 2022 and National Family Health Survey, 2019-21 have been used for the study. A Digital Development Index has been computed across regions to examine its spatial pattern. The findings of the study suggest that India lags behind significantly in terms of Digital Development at global scale. Spatial pattern of digital development across states reveals that states such as Bihar, Jharkhand, Odisha, Madhya Pradesh and Tripura are in poor condition, whereas Kerala, Maharashtra, Haryana, Punjab and Delhi are relatively in good condition. Socio-economic determinants are found to be playing a pivotal role in shaping digital development in the country. There is a significant level of digital divide across regions and different socio-economic levels.

Keywords: *Digital development; digital technologies; information and communication technology; digital divide; digital India; socio-economic determinants; spatial distribution.*

Introduction

The contemporary world is running on the shoulders of digital technologies. Digital technologies have enabled regions and communities to have better economic productivity and life experience more efficiently. The modern digital technologies such as mobile phone, computer, laptop and the internet have become inevitable elements of human life today. Its access, availability and usage promote and complements human

development. The Government of India has been emphasising on increasing digital development through its grand Digital India programme. Digital development led digitalization has impacted the role and function of space and time breaking the barrier of space and time. It is imperative therefore to study how digital development is impacting the digital geographies. Issues related to access, availability, usage, benefits,

challenges and experiences of digital technology among people and regions are relevant issues to explore for its development implication. The world is facing challenges of 'Digital Divide' across regions, socio-economic groups, gender, age etc. Pick *et al* (2021) defines 'Digital Divide' as differences in access, use and outcomes of information and communication technology (ICT) between people or economy. Ilavarasan (2013) sees digital divide as it reflects existing status quo as dominant group reap the benefits and suppressed groups suffer.

There is no field untouched by the influence of digital technology today. During the Covid pandemic and subsequent lockdown, digital technology brought great relief to the economy and growth worldwide.

A new domain of study has been introduced in the discipline of geography, namely Digital Geography which deals with the question of how world interacts with digital technology that shapes the cities and development, health, education, politics, economy, society, culture and environment (Ash *et al* 2018). Ash *et al* (2015) have argued that the world has taken a digital turn, which is altering many geographies and has transformed the discipline and the geography of the world. Malecki (2000) believed that digital world is highly unregulated. Digital interaction and flow produces digital space, which could be a matter of study for the geographers to study the spatial nature of digital space.

National Education Policy, 2020 urges universities and academic institutions to adopt interdisciplinary approach in teaching and research. Interdisciplinary characteristics of geography as discipline has been its core basic foundation. Geography as a discipline

receives ideas, concepts, theories and methodological approaches from various other discipline ranging from science, social sciences, humanities, literatures, etc. The emergence of digital geography can be one such example of interdisciplinary subject matter. Geographers however accord special significance to spatial dimensions as core of their study.

Geographers have evinced much interest in analysing the impact of digital development in different aspects and branches of the discipline. Opinions on the impacts however are highly contrasting. Qureshi (2022) for instance studied the implication of ICTs in the lives of war affected people in giving them voice and it could become handy for the oppressed class and the marginalized. He further argued that network communication enables people to realize their agency and sovereignty. Harris (2016) and Unwin and Unwin (2017) had an opposite take on digital development. They argued that the digital development has accentuated social inequality and has failed the poor. Many have argued that ICT is of no great value and could even be detrimental to the less developed world, particularly for the economically and socially underprivileged sections of the population (UNDP, 2004). On the other hand Hasan *et al* (2022) argue that ICT has remarkable potential for establishing social justice and elevating individual freedom. Since access of ICT among indigenous people is very low, adoption of ICT among them will enlarge their social development. Researches find positive relationship between ICTs and Sen's Capability Approach.

Use and adoption of ICTs among aged, weaker sections, poor, illiterate, person with disability, etc. varies greatly despite

government's many e-governance initiatives. ICT has been seen as a tool in improving the efficiency and better targeting the delivery of the benefit of rural and urban development programmes and poverty alleviation schemes. It has been argued that the internet is no longer a luxury in the modern world. Brazil, Spain, Greece, and Finland have made a legal obligation to provide the internet universally at an affordable price. Access to the Internet has been made a basic human right in Estonia in the year 2000. The Supreme Courts of Costa Rica and France had passed an order to make internet access a subject of a fundamental right (Canazza 2018 cited in Devara 2020). Government of Kerala has recently launched a development programme wherein free internet service is being provided to poor households.

In India, diffusion of ICT benefits remains limited to a few because the poor and rural areas experience widespread illiteracy, high access cost, inadequate ICT infrastructure, which have created digital divide (Cecchini *et al* 2002). Devara (2020) convincingly argue that the huge digital divide in the country is providing fuel for growing inequality in India.

Millennium Development Goal 8 talks about the partnership between private sectors and governments in getting benefit out of information and communication technologies. The goal 9 of the Sustainable Development Goals speaks about ensuring affordable digital access and increasing its spread in developing countries by 2020. Goals 4, 5, and 17 specifically target to apply ICT in higher education, women empowerment and innovation capacity respectively (Heeks, 2018). The Government of India has come up with various programmes to develop digital infrastructure and make people digitally

empowered. National e-Governance Plan, e-Kranti and Digital India are some of the primary initiatives. National e-Governance Plan have the objective to provide e-governance services to common man through common service centres and different other outlets. It is expected that this plan will help the government to make services more efficient, transparent and affordable for the people. This plan was envisioned to ensure government services must reach the people residing in the remotest region of the country. Digital India programme was launched in the year 2015 with the vision to transform India into a digitally empowered society and knowledge based economy. The Bharat Net and the Prime Minister's WiFi Access Network Interface (PM-WANI), a digital development initiative under Digital India Programme seeks for universal broadband connectivity in the country (Kedia *et al* 2021).

In this background, it imperative to assess the levels of digital development in India and its spatial access across regions of the country. This research also measures the digital divide in the country and explores how socio-economic determinants play their role in digital development. The findings of the study will have policy implications and give way to further research.

Objectives

The specific objectives of the research include the following:

- a. To examine the levels of digital development across states in India,
- b. To examine the role of socio-economic determinants in digital development in India and
- c. To examine the digital divide across regions, social groups, religion,

Table 1: List of digital development indicators

List of Digital Development Indicators		
Availability and Access	Usage	Digital Skill
Percentage of HH with Mobile Phone	Percentage of Women who ever used the Internet	Percentage of Women able to read text message (sms) on mobile phone
Percentage of HH with Computer	Percentage of men who ever used Internet	
Percentage of HH with Internet	Percentage of Women use Mobile Phone for Financial Transaction	
Percentage of Women Own Mobile Phone	Percentage of men use Mobile Phone for Financial Transaction	
Percentage of Men Own Mobile Phone		

age, gender, income, education and occupation.

Methodology

Quantitative approach has been adopted to achieve the objectives of this study. Adequate indicators of digital development have been chosen by an extensive review of literatures. As many as ten indicators of digital development were identified to assess the access, availability and usage of digital technologies at households and the individual level. Digital development index was calculated using equal weight method. All the indicators were normalized as given below:

Method of Normalization:
$$\frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

The sum total of normalized values of each indicator were computed to find the composite value. The composite value was further divided by the total number of indicators to find a standard score. The standard scores for all the states were classified using standard deviation to find the class interval which reflects different levels of digital development and digital divide across regions. Data was further put into ArcGIS software to map the spatial distribution of

digital development and digital divide across states.

Data source

National Family Health Survey 2019-21 (NFHS-5) data has been used as a key source of data. The total sample in NFHS are from 636699 households covering 724115 women and 101839 men in India. Other different data sets such as Census, National Sample Survey, Indian Human Development Survey were also used to find out the relevant set of information related to digital development (Table 1). However, it was found that NFHS data sets stand out highly relevant providing adequate source of information for this particular study.

Findings

Digital development in India

Based on International Telecommunication Union (ITU) data 2022, the total number of online users in the World is 5.3 billion which is 66 percent of the world's population. India's rank among all countries based on some major ICT indicators is relatively poor, ranked at 117 out of total 151 countries

Table 2: Digital development across rural-urban regions in India (Value in percentage)

Digital development indicators	India	Urban	Rural	R-U Digital Divide
HH with mobile phone	93.27	96.74	91.54	5.2
HH with computer	9.33	19.27	4.39	14.88
HH with internet	48.84	64.57	41.03	23.54
Women own mobile phone	53.95	69.36	46.61	22.75
Women use mobile phone for financial transaction	22.5	30.91	16.55	14.36
Women who ever used internet	33.34	51.78	24.56	27.22
Men own mobile phone	91.34	95.29	89.17	6.12
Men use mobile phone for financial transaction	27.69	40.79	19.99	20.8
Men who ever used internet	54.2	69.96	45.53	24.43
Women able to read text message (sms) on mobile phone	59.29	73.76	52.24	21.52

Source: NFHS-5, 2019-21, (HH = Household)

in the year 2021 in terms of active mobile-broadband subscription per 100 inhabitants. The top five countries for the same indicator were Vanuatu, United Arab Emirates, Japan, Poland and the United States and bottom five countries were Somalia, Burundi, Congo, Syrian Arab Republic and Madagascar. In terms of ‘fixed broadband subscriptions per 100 inhabitants’ across 151 countries too, India still ranks at 117. Only in terms of the percentage of individuals using internet, India’s position improves slightly ranking 110 across world’s 152 countries in the year 2020. The top five countries were United Arab Emirates, Bahrain, Qatar, Kuwait and Iceland and the bottom five countries were Uganda, South Sudan, Burundi, Chad, Central African Republic and Democratic Republic of Congo.

Rural-urban digital divide

Table 2 and Figure 1 show the magnitude of digital development and digital divide across regions in India. The percentage of households with mobile phone in India was 93.27. There is a digital divide of 5.2 percentage points between urban and rural India. The percentage of households with

internet in India was 48.84, whereas in rural India it was 41.03 percent and in urban India it was 64.57 percent. Only 33.34 percent of women in India reported that they have used internet, however for rural women it was even lower at 24.56 percent whereas for urban women it was 51.78 percent (Table 2 and Fig. 1). Table 2 shows the significant levels of digital divide between rural and urban India. Rural India lags behind the urban India in all the indicators of digital development. Table 2 also reveals that a significant proportion of the people in India have poor access of digital technologies.

Gender digital divide

Figure 2 shows glaring level of digital divide between the two sexes with regard to ownership of mobile phones. 91.34 percent men in India own mobile phone whereas only 53.95 percent women in India own mobile phone. Interestingly the male female gap in using mobiles for financial transaction is less compared to the use of internet. For example, 27.69 percent men have used mobile phone for financial transaction, while it is 22.5 percent for women but 54.2 percent men have

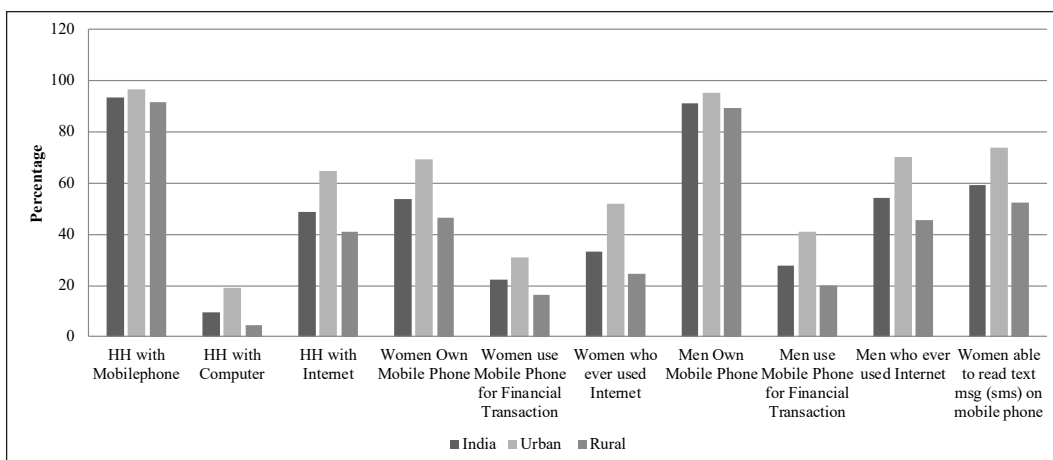


Fig. 1: Digital development across rural-urban regions in India
Source: Calculated by the authors from NFHS-5, 2019-21

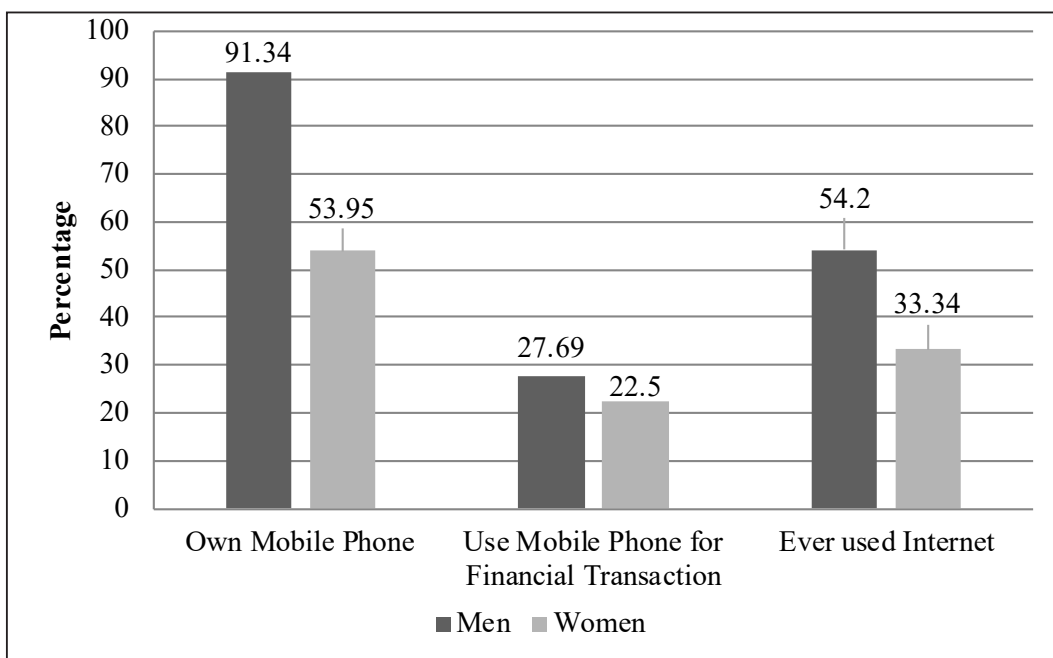


Fig. 2: Gender digital divide in India
Source: Calculated by the authors from NFHS-5, 2019-21

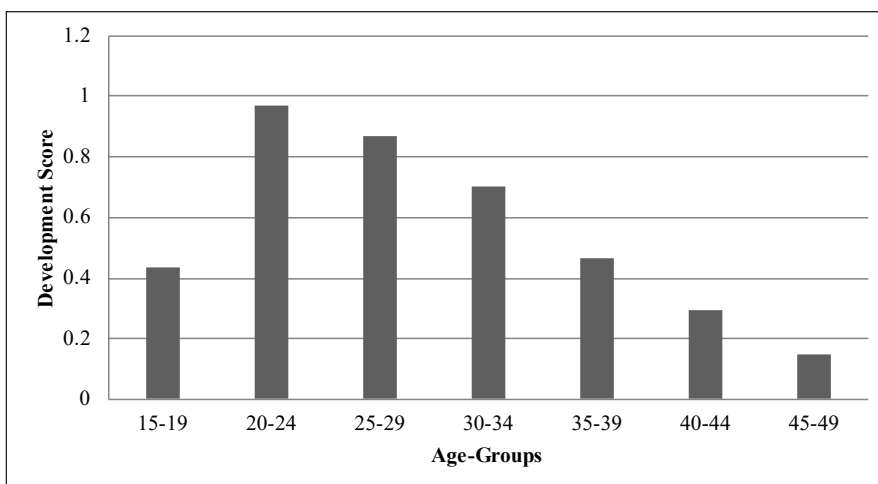


Fig. 3: Digital development across age groups
Source: Calculated by the authors from NFHS-5, 2019-21

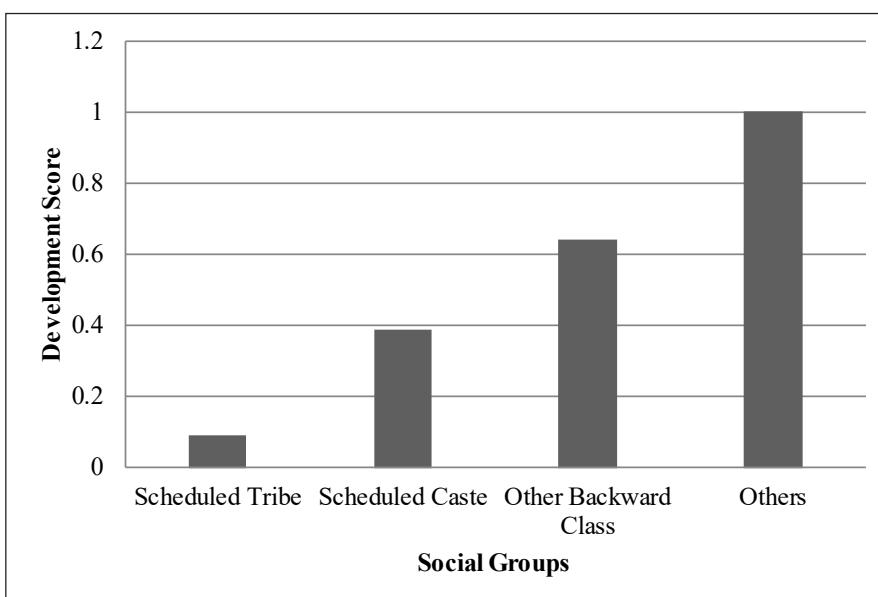


Fig. 4: Digital development across social groups in India (Aggregate Level).
Source: Calculated by the authors from NFHS-5, 2019-21

used mobile phones for accessing internet, while it is only 33.34 percent among women (Fig. 2). Gender digital divide has been a concerning challenge for governments. The digital inclusion of women is of considerable

importance as it is expected to minimize the existing gender inequality (Bala and Singhal, 2018). The United Nation therefore declared the theme for International Women’s Day 2023 as “DigitALL: Innovation and

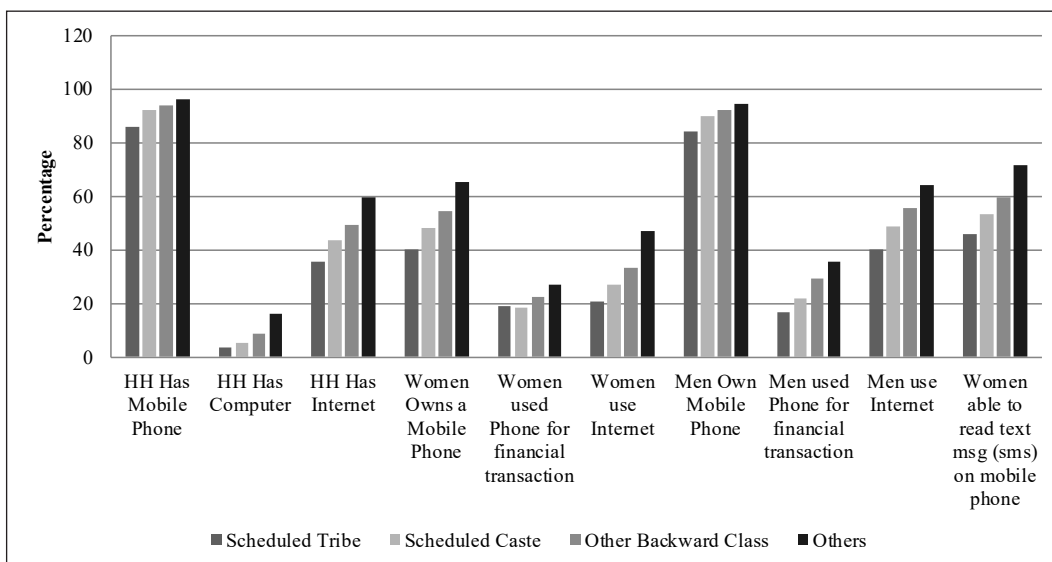


Fig. 5: Indicator-wise status of digital development across social groups in India.

Source: Calculated by the authors from NFHS-5, 2019-21

Technology for Gender Equality”. Women’s equal participation and share in all spheres is must for the development. India can utilize its human resources at greater extent by reducing gender digital divide.

Digital development across age

Figure 3 shows that the 20-24 age group in India has the highest level of digital development with 0.9 score followed by 25-29, 30-34, 35-39, 15-19, 40-44 and 45-49 age groups (Fig. 3). Expectedly, younger people have the highest level of digital development compared to relatively older population who need digital inclusion in India. India is also experiencing digital dividend and its development benefits will be high if individuals have greater access to digital technologies.

Digital development across social groups

Figure 4 and 5 show the levels of digital development across social groups. The socially and economically deprived segment such as the scheduled tribe (ST) population has the lowest level of digital development. The scheduled castes (SC)- the other most marginalized segment- is marginally ahead of their counterparts in scheduled tribes. The most privileged class designated as ‘Others’ has the highest level of digital development. It is evident that the socially and economically deprived segment is also digital more deprived. Figure 5 shows identical pattern for each indicator of digital developmental where the ‘Others’ lie at the top followed by other backward caste (OBC), SC and ST at the bottom of the ladder. The hierarchical order of caste structure and social inequality is clearly discernible in figures 4 and 5. Though SC and ST remain at the lower level, percentage of women using phone for financial transaction among STs is marginally higher than the SCs.

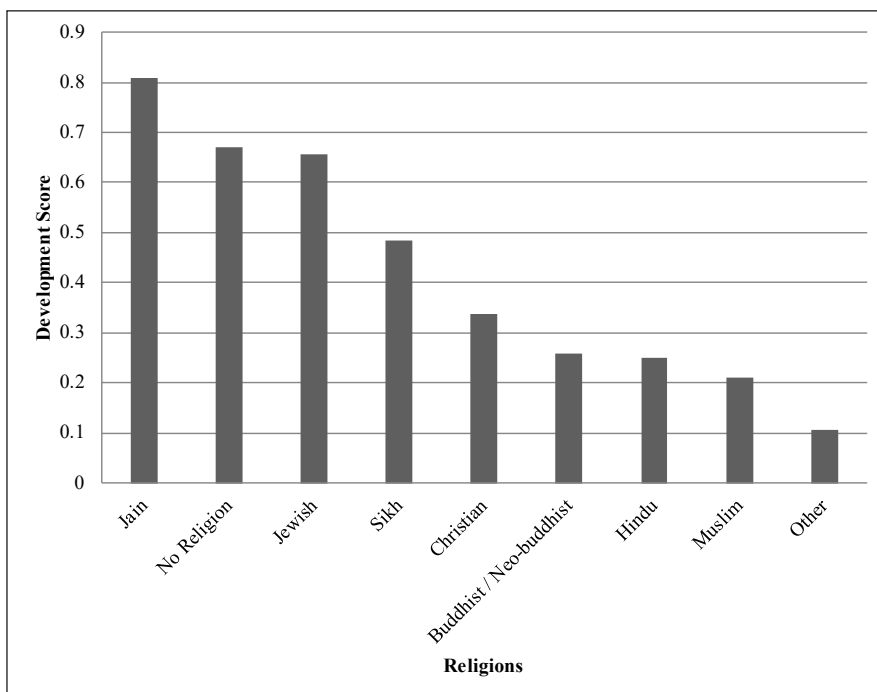


Fig. 6: Digital development across religion
Source: Calculated by the authors from NFHS-5, 2019-21

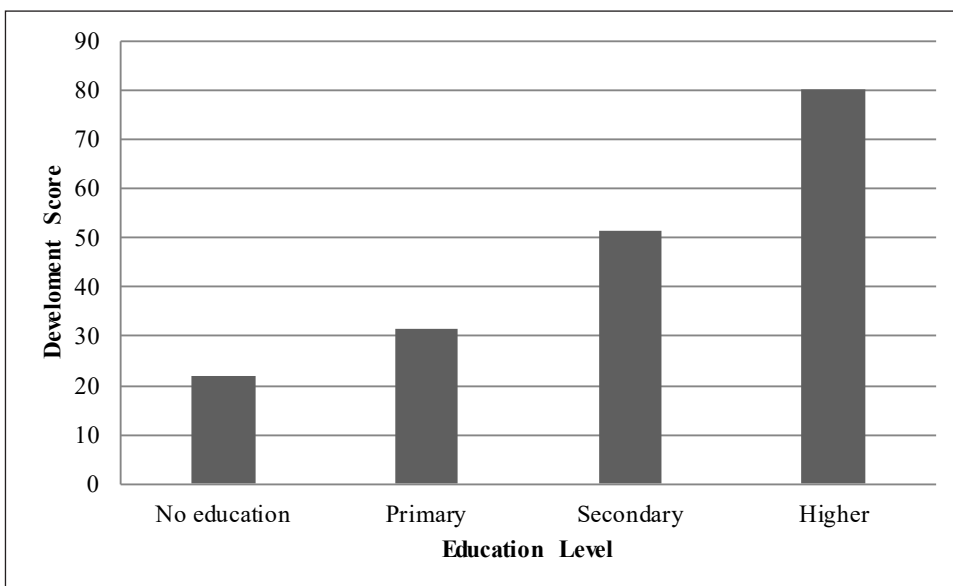


Fig. 7: Digital development across educational levels
Source: Calculated by the authors from NFHS-5, 2019-21

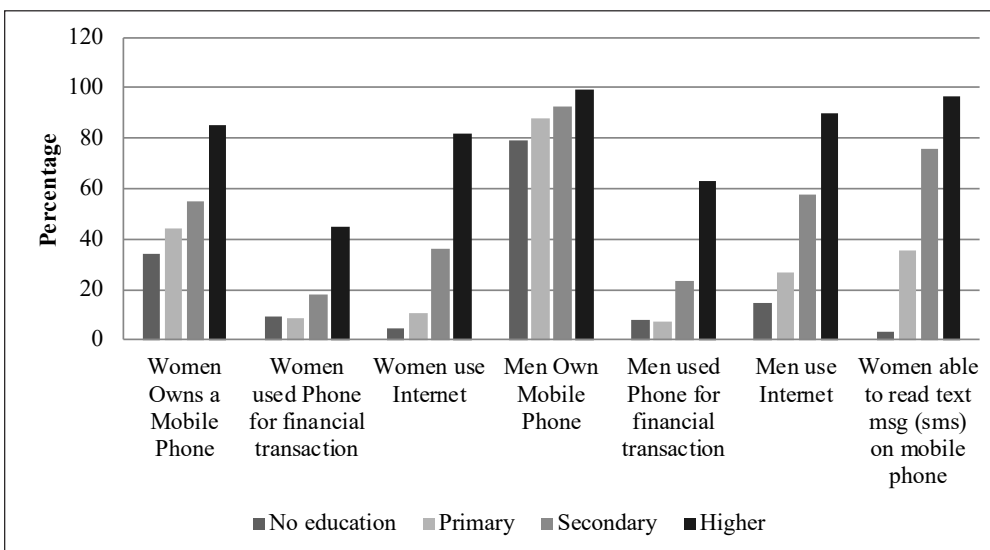


Fig. 8: Indicator-wise digital development across educational level

Source: Calculated by the authors from NFHS-5, 2019-21

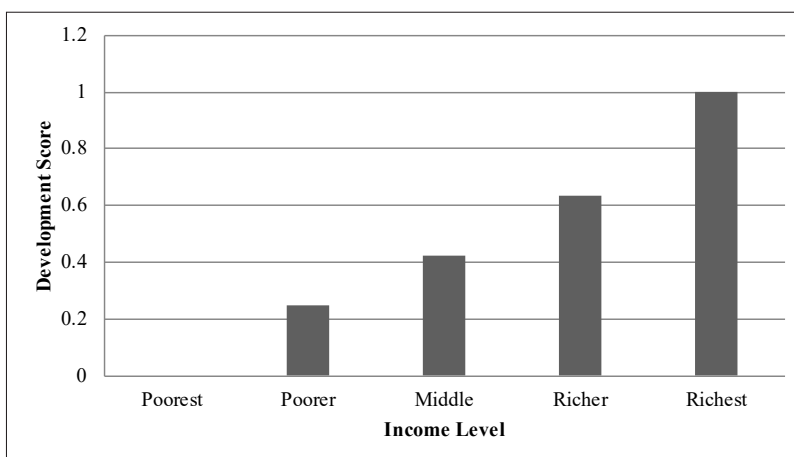


Fig. 9: Digital development across income levels

Source: Calculated by the authors from NFHS-5, 2019-21

Digital development across religious groups

Digital development across religion in India reveals interesting pattern. Figure 6 shows that the highest level of digital development among the Jain community followed by those who have no Religion, Jewish, Sikh,

Christian, Buddhist/Neo-Buddhists, Hindus, and Muslims. Significantly the Muslim have lower digital development compared to all other religious groups. However, Hindu religion itself lags far behind the Jains, Jews, Sikhs and Christians.

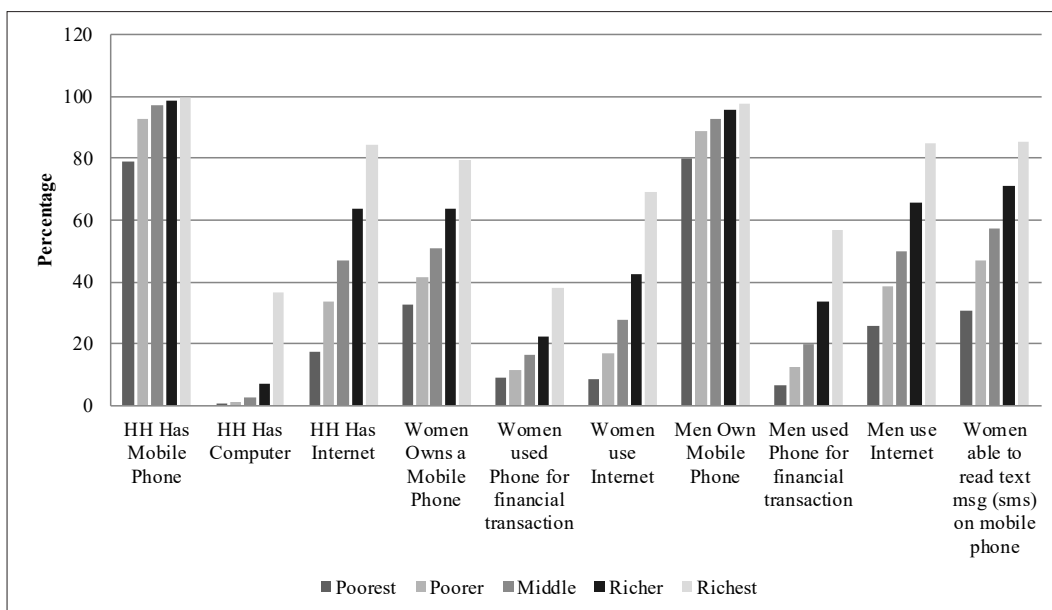


Fig. 10: Indicator-wise digital development across wealth.

Source: Calculated by the authors from NFHS-5, 2019-21

Digital development across educational level

Figure 7 and 8 show the levels of digital development across educational levels and also by each indicator. It is expected that the level of digital development will be positively associated with literacy and educational attainment of the people which is clearly established (see Fig. 7). This is true for both sexes and for all types of mobile use as evident from figure 8. The importance of education in digital development is undeniable.

Digital development by income and wealth

Wealth of a household and individuals plays vital role in achieving greater levels of digital development. Figure 9 and 10 show the similar pattern. Higher level of wealth is associated with higher levels of digital development and vice versa (Fig. 9 and 10). Digital technologies are still expensive

for many among the economically weaker section. As of now government of India does not provide any incentive for accessing digital technologies at individual and household level. Economically weaker section finds it difficult to purchase digital tools and services. There level of digital divide between poorest and richest in India is glaring.

Digital development across occupation categories

Figure 11 shows the relation between digital development and occupation types which clearly shows noticeable differentiation of Digital Development across occupation groups. Certain occupations require digital technologies to function particularly people working in professional/technical/managerial, clerical or sales related fields. People involved in agriculture, and skilled and unskilled manual labour have lower levels of digital development (Fig. 11) as

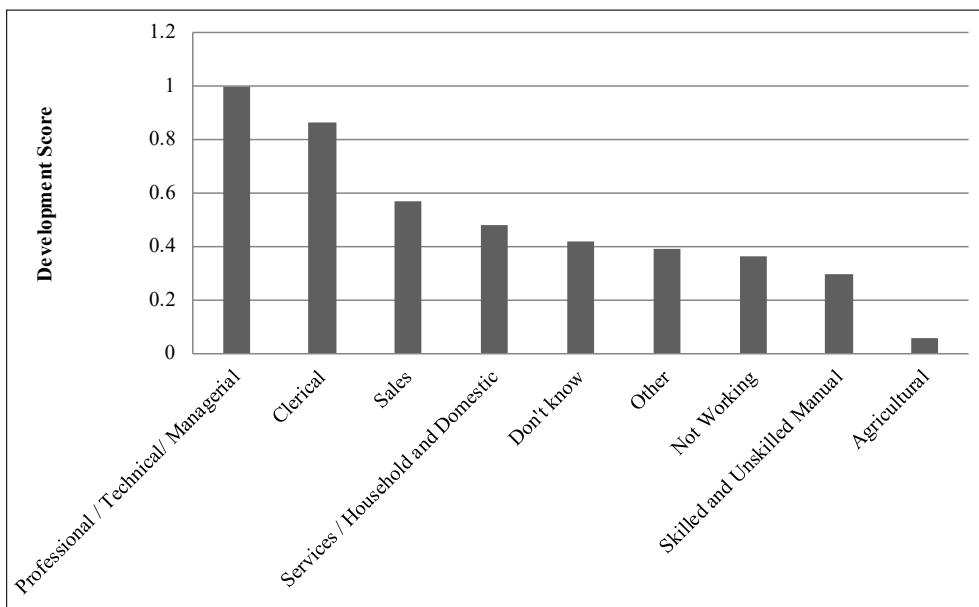


Fig. 11: Digital development across occupation
Source: Calculated by the authors from NFHS-5, 2019-21

these occupations do not necessarily need digital tools to function. People in service sector have relatively better levels of digital development.

Spatial pattern and digital divide

Spatial pattern of digital development in India is uneven across different states of India (see Fig. 12 and Table 3). Digital development is more in the states of Jammu & Kashmir, Ladakh, Punjab, Himachal, Delhi, Sikkim, Mizoram, Goa and Kerala-states and union territories which have smaller population. The lowest level of digital development was found in Uttar Pradesh, Bihar, Jharkhand, Odisha, West Bengal, Madhya Pradesh, Chhattisgarh, Gujarat, Andhra Pradesh, Odisha, Telangana, Assam, most of them with large population (Fig. 12).

The states of India are classified into three different groups with respect to digital

development: (1) Major states (2) North East and Hill States (3) Union Territory (UT) and city-states. Among the major states of India, the top five states in terms of digital development are: Kerala, Punjab, Tamil Nadu, Haryana and Karnataka. The bottom five states in the same category are Bihar, Odisha, Chhattisgarh, West Bengal and Madhya Pradesh. Sikkim and Mizoram lie at the first and second highest rank in the group of North East and Hill states. Meghalaya and Tripura lie at the bottom two rank in the same category. In the UT and city-state category Goa and Chandigarh occupy top two positions respectively and Dadar and Nagar Haveli, Daman and Diu and Andaman and Nicobar lie at the bottom positions (Table 3).

Rural-urban digital divide across states

There is a significant rural-urban digital divide across states in India. Figure 13 shows that Gujarat, Maharashtra, Madhya Pradesh,

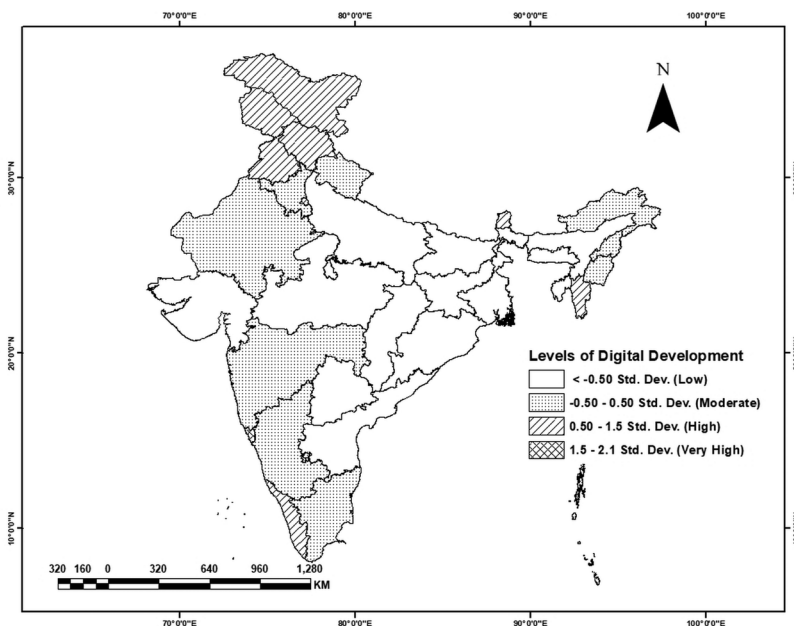


Fig. 12: Inter-state variation in digital development

Source: Authors, based on NFHS-5, 2019-21

Chhattisgarh, Jharkhand, West Bengal exhibit the highest level of rural-urban digital divide where rural areas lag far behind the urban areas. On the other hand rural-urban digital divide in states like Kerala, Jammu & Kashmir, Ladakh, Haryana, Punjab, Uttarakhand, Tamil Nadu is minimal (Fig. 13). The spatial pattern suggests that the high rural-urban divide corresponds to the Central Indian Tribal Belt partly expanding to North Eastern tribal region having significant forest cover also (Fig. 13). In the coming years, the divide between rural and urban might see a decline as government is now prioritizing development of rural digital infrastructure in the country.

Figure 14 to 17 show the spatial pattern of digital development across states for each indicator separately. In terms of percentage of households with mobile phone, north western states of India perform much better

and states located in central India such as Madhya Pradesh, Chhattisgarh and Odisha lag behind (Fig. 14A). In terms of percentage of households with computer, states such as Jammu & Kashmir, Ladakh, Punjab, Haryana, Sikkim, Mizoram, Maharashtra, Tamil Nadu and Kerala are better placed whereas states located in central, and central northern India have lower degree of achievement (Fig. 14B). In terms of percentage of household with internet, the northern and western India is in better position while Bihar, Telangana, Andhra Pradesh, Odisha and Kerala are comparatively worse (Fig. 14C). In terms of percentage of women who own mobile phone, Central India and North Central India lag behind their counterpart in Northern hill states, north east and south India (Fig. 14D). The share of women using phone for financial transaction is higher in the states such as Karnataka, Arunachal Pradesh,

Table 3: Digital development across states.

Major States	Digital Development Score	Rank	NE and Hill states	Digital Development Score	Rank	UT and City states	Digital Development Score	Rank
Kerala	0.644369267	1	Sikkim	0.755608	1	Goa	0.879607	1
Punjab	0.604023099	2	Mizoram	0.621925	2	Chandigarh	0.841936	2
Tamil Nadu	0.556796709	3	Himachal Pradesh	0.598206	3	Delhi	0.782469	3
Haryana	0.541948401	4	Nagaland	0.527391	4	Puducherry	0.729105	4
Karnataka	0.480547713	5	Arunachal Pradesh	0.515624	5	Ladakh	0.623213	5
Maha-rashtra	0.446734839	6	Uttara-khand	0.49435	6	Jammu and Kashmir	0.592821	6
Rajasthan	0.409243666	7	Manipur	0.488453	7	Laksha-dweep	0.560944	7
Telangana	0.351187695	8	Assam	0.255945	8	Dadra and Nagar Haveli & Daman and Diu	0.45472	8
Gujarat	0.311406382	9	Megha-laya	0.247559	9	Andaman and Nicobar Islands	0.423559	9
Uttar Pradesh	0.2995286	10	Tripura	0.175999	10			
Jharkhand	0.260374503	11						
Andhra Pradesh	0.240337531	12						
Madhya Pradesh	0.219861342	13						
West Bengal	0.193781322	14						
Chhattis-garh	0.180222684	15						
Odisha	0.169133206	16						
Bihar	0.159541333	17						

Source: Calculated by Authors from NFHS-5, 2019-21

Jammu Kashmir, Ladakh, Punjab, Haryana compared to the remaining. Fewer women in states of Bihar, West Bengal, Meghalaya, Tripura and Manipur (Fig. 15A) use mobile phones for financial purposes.

The share of women who used Internet ever was highest in northern, western and southern India whereas central India and north eastern India have the lowest share (Fig. 15 B). The percentage of men who own

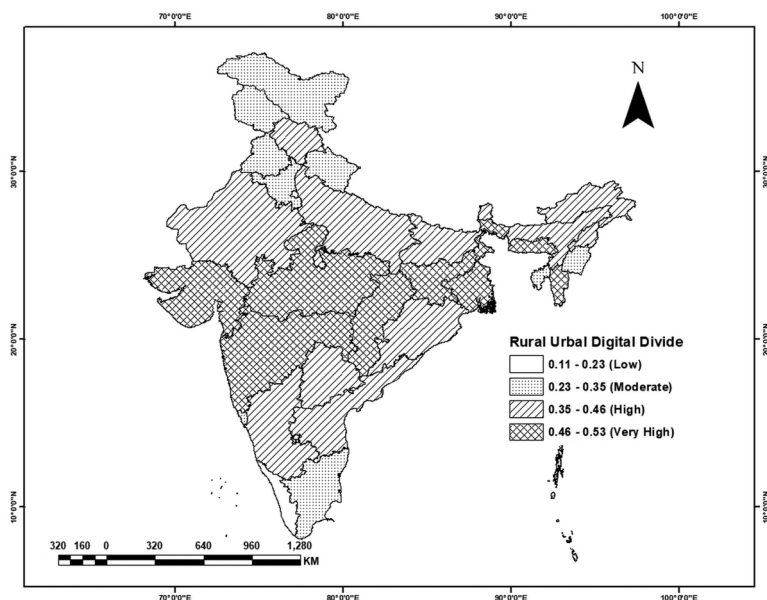


Fig. 13: Interstate variation in Rural-urban digital divide

Source: Based on NFHS-5, 2019-21

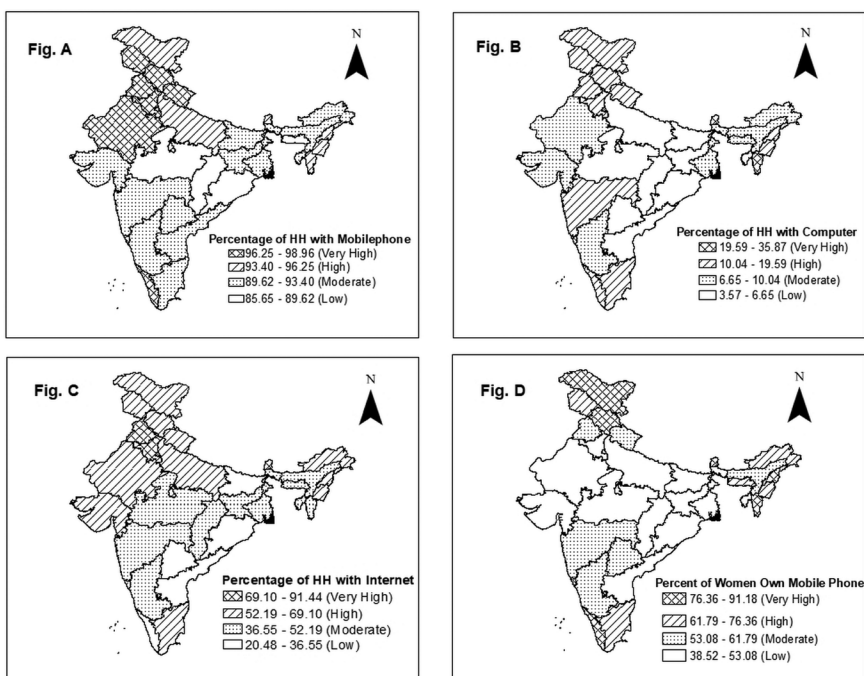


Fig. 14 (A to D): Indicator wise spatial distribution of digital development.

Source: Based on NFHS-5, 2019-21

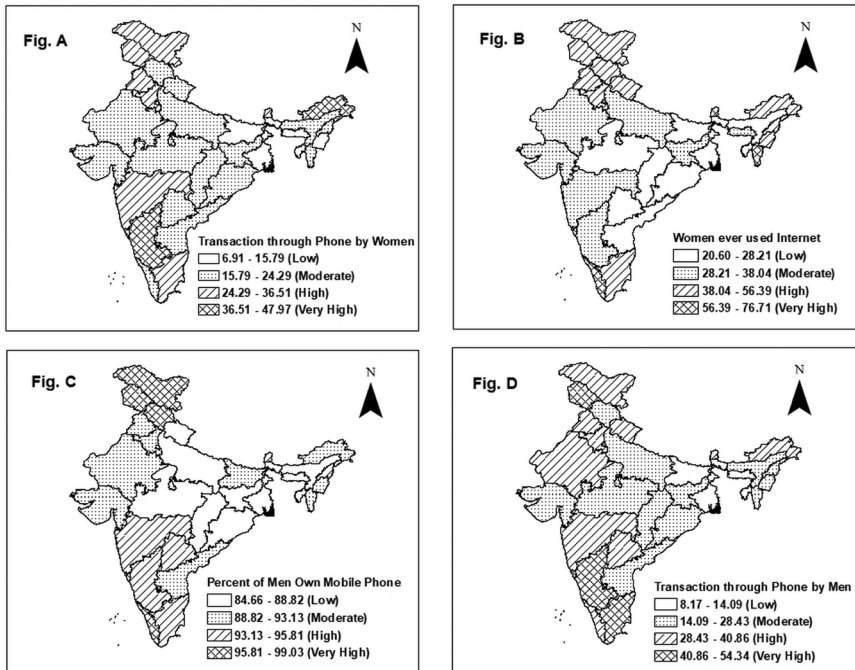


Fig. 15 (A to D): Indicator wise spatial distribution of digital development
Source: Based on NFHS-5, 2019-21

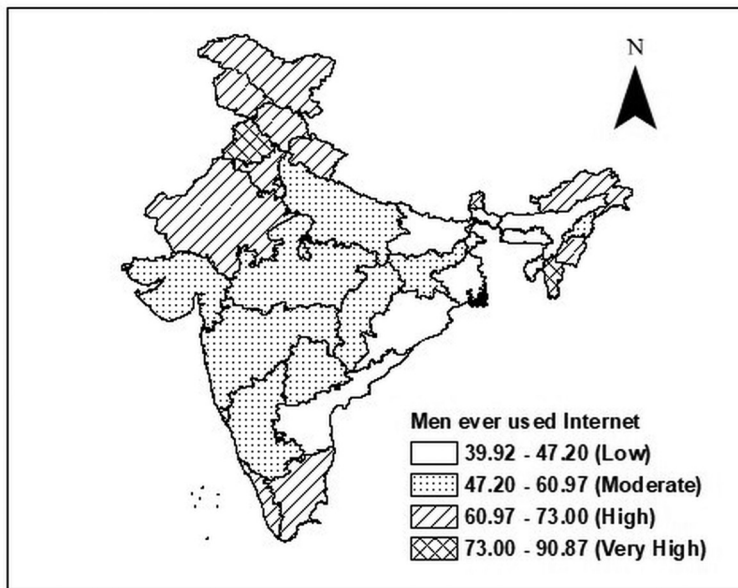


Fig. 16: Interstate variation in percentage of men ever used internet
Source: Based on NFHS-5, 2019-21

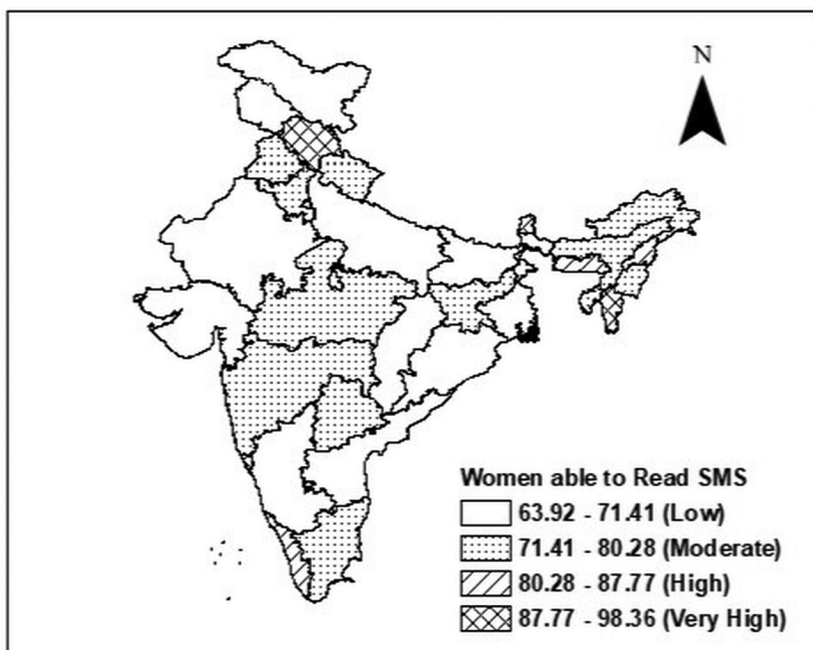


Fig. 17: Interstate variation in percentage of women able to read SMS

Source: Authors, based on NFHS-5, 2019-21

mobile phone is higher in northern hilly states and southern India and lowest in central and northeastern India (Figure 15 C). The share of men using mobile phone for financial transaction is higher in Karnataka, Tamil Nadu and Jammu Kashmir and the same is lowest in Bihar, West Bengal, Meghalaya and Tripura (Figure 15 D). The share of men who ever used internet is higher in north, north western and southern region however it is lowest in north eastern, and south eastern states (Fig. 16). The share of women who are able to read mobile text message is higher in Himachal Pradesh, Sikkim, Mizoram, Meghalaya, Nagaland, Goa and Kerala and lowest is in Jammu Kashmir, Ladakh, Uttar Pradesh, Bihar, Rajasthan, Gujarat, Bengal, Odisha etc., (Fig. 17).

Conclusion

State of digital development in India lags behind significantly from most countries of the world in terms of most digital indicators and there is glaring rural-urban digital divide too. Besides, there is significant regional disparity across different states. The country is also characterized by remarkable digital divide across gender, age, social groups, education, occupation, wealth, etc. There is a need to focus on digitally deprived regions, communities and individuals in order to achieve universal digital development which is what is the need of the time. Government needs to work more and accelerate the progress towards creating strong digital infrastructure in the country. There is a need to focus more on enhancing education and digital literacy among people in general and digitally weaker

sections in particular. Provisions of free and quality access of digital technology for weaker sections with equity can become a possible measure in minimizing the digital divide. The cost of internet should be affordable as it is as essential as the availability of clean drinking water, electricity and transport services. Digital divide can fuel social disparity; hence it is important to address it systemically for greater social inclusion.

Competing interest

The corresponding author declares that they have no conflict of interest.

References

- Ash, J., Kitchin, R., & Leszczynski, A. (2018). Digital turn, digital geographies? *Progress in Human Geography*, 42(1), 25-43.
- 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.
- Cecchini, S., & Prennushi, G. (2002). *Using information and Communication technology to reduce poverty in rural India*. The World Bank.
- Devara, R. (2020). Broadband Internet Access: A Luxury or Right. *Economic and Political Weekly*, 55(48), 21-25.
- Hasan, N., Bao, Y., & Miah, S. J. (2022). Exploring the impact of ICT usage among indigenous people and their quality of life: Operationalizing Sen's capability approach. *Information Technology for Development*, 28(2), 230-250.
- Heeks, R. (2018). *Information and Communication Technology for Development (ICT4D)*. Routledge.
- Ilavarasan, P. V. (2013). The digital divide in India: Inferences from the information and communication technology workforce. In: Massimo Ragnedda and Glenn W. Muschert (ed.), *The Digital Divide: The Internet and Social Inequality in International Perspective*, 309-316. London: Routledge advances in sociology.
- Kedia, M., Kathuria, R., Raj, A., Sekhani, R., & Sinha, S. (2021). *Building an Inclusive Digital Society for Rural India*, Indian Council for Research on International Economic Relations (ICRIER), New Delhi, India.
- Leszczynski, A., Ash, J., & Kitchin, R. (2018). *Digital Geographies*. SAGE.
- Malecki, E. J. (2002). The economic geography of the Internet's infrastructure. *Economic geography*, 78(4), 399-424.
- Pick, J., Sarkar, A., & Parrish, E. (2021). The Latin American and Caribbean digital divide: a geospatial and multivariate analysis. *Information Technology for Development*, 27(2), 235-262.
- Qureshi, S. S. (2022). Digital transformation at the margins: a battle for the soul of self-sovereignty. *Information Technology for Development*, 28(2), 215-229.
- Singh, S., & Singh, G. A. (2021). Assessing the Impact of the Digital Divide on Indian Society: A Study of Social Exclusion. *Research in Social Change*, 13(1), 181-190.
- UNDP (2004). *ICT and Human Development: Towards Building a Composite Index for Asia*. Elsevier.
- Unwin, P. T. H., & Unwin, T. (2017). *Reclaiming information and communication technologies for development*. Oxford University Press. www.digitalindia.gov.in, accessed on Nov. 17th, 2022.

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