

# Prevalence of Access to Technology in India: Evidences from Census 2011 and MIS 2021

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#### Abstract

Role of technology in modern society is so much essential that life without access to technology, either digital or non-digital, shall remain impractical. However, prevalence of access to modern technology indicates disparities in developing countries like India. There are conspicuous evidences of 'technology divide' or 'digital divide' prevailing in India in terms of gender gap or rural-urban disparity or socioeconomic inequality or geographical isolation regarding access to various forms of technology like computer, internet, radio, telephone (landline & mobile), television, air cooler/conditioner, other home utility machines/gadgets (e.g. water filter, electric cooker/boiler, microwave oven, vacuum cleaner, washing machine, refrigerator etc.), transport services & personal vehicles, banking & financial services and so on. For example, NSS data from 2017-18 states that among the poorest 20 per cent households in India, only 2.7 per cent have access to a computer. Moreover, only 8.9 per cent of the households are able to access internet facilities. The present study explores the prevalence of access to certain forms of technology on the basis of data given by the Census of India 2011 and the Multiple Indicator Survey (MIS), NSS 78th Round (2020-21) estimates. It seeks to find out any existence of technology divide and its prevalence in India using disparity measures. The findings of this study reveal that there are acute disparities in technological access across regions in India as well as cross sections of the population. The state must provide the necessary infrastructure, technical support and incentives to address the existing technological divide. Government policies nowadays to give technology access need to be group-specific or region-specific interventions rather than based on general norms.

Keywords: Technology, Access, Divide, Disparity, India

#### 1. INTRODUCTION

Technology plays such an important role in current society that it would be impossible to live without it, whether it be digital or analogue. Access to technology refers to the availability of technological devices and services to a person, and the skills to use them. Modern lifestyle is intertwined with one or other forms of technology. The ubiquity of access to contemporary technology, however, suggests inequalities in



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developing nations such as India. In India, the term "technology divide" or "digital divide" (Pick et al., 2015; Agrawal et al., 2018) is evident in the gender gap, rural-urban disparity, socioeconomic inequality and geographical isolation with regard to access to various forms of technology, such as computers, the internet, radios, telephones (landline and mobile), televisions, air coolers and air conditioners, other home utility machines and gadgets (such as water filters, electric cookers and boilers, microwave ovens, vacuum cleaners, washing machines, refrigerators etc.

India is regarded as a leader in software development and a popular location for services facilitated by information technology (IT). According to a report of the MOSPI, India supplies about 28% of the IT and BPO skills among the 28 low-cost nations. However, it is imperative to measure the nation's digital gap, which includes the gender and urban-rural inequalities, as well as the use of community Internet access centres by low-income users. According to NSS data from 2017–18, only 2.7% of India's 20 percent poorest families had access to a computer. Furthermore, just 8.9% of the households have access to internet services.

There are a few recent studies on access to technology in India during the last one or two decades, in which technological development have occurred in a large scale (Agarwal et al., 2016; Agrawal et.al, 2018; Asrani, 2022; Bhattacharya et al., 2022; Jadhav et al., 2024). Bhattacharya et al. (2022) studied uneven access to technology among children in India based on the NSS data of 2017-18 and found prevalence of digital divide among them. Their study particularly confines to the use of digital technology which are computer devices integrated with internet. Jadhav et al. (2024) also focusses on the prevalence of computer literacy in India based on the NSS data of 2020-21. These studies indicate the clear existence of digital divide in the forms of regional disparities, social hierarchies and gender gap in the context of computer literacy in India. Most of the recent studies are limited to a few types of digital technology. There are various other forms of technology (mentioned above), digital as well as non-digital, which are equally important in rising people's standard of living and industrialisation of the economy (Naudé et al. 2015; Zelenkov et al., 2020).

In this context, the present study considers a wider range of technologies currently in use at large and the need for understanding of recent levels and trends in access to the various forms of technology in India. The objective of this study is to explore the prevalence of access to selected forms of technology in India at national and state levels. Further, this research intends to find out the disparities in access to these technologies.

#### 2. DATA & METHODS

This study is an exploratory research adopting descriptive methods. In the present study, prevalence of access is indicated by percentage of households or persons having access to a specific technology. Disparity in access is calculated as the difference in the percentage prevalence of access between population groups such as rural and urban populations (Rural-Urban divide), male and female populations (Gender gap).

This research is primarily based on the following two secondary datasets:



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1. Household Series, Census of India, 2011, Office of the Register General of India.

2. Multiple Indicator Survey (MIS), National Sample Survey (NSS) 78<sup>th</sup> Round, 2020-21, National Sample Survey Organisation, Ministry of Statistics and Programme Implementation (MOSPI), Govt. of India.

The Census 2011 being the last one conducted so far, is used here as the most reliable source of data at national and state levels. The Household series provide information on household access to various kinds of technology (see Table-1). These data are collected in the census under the Housing Schedule column no. 19 to 27 (Amenities available to the household) and column no. 28 to 34 (Assets possessed by the household).

The Multiple Indicator Survey of NSS 78<sup>th</sup> Round which was conducted during 2020-2021, is taken into consideration for this study as recent source of data. This survey also provides information on household or individual access to various forms of technology (see Table-2&3), some of which are similar with those of the census data facilitating comparison and analysis of changing trends. In this survey, such data are collected under Block 3 (col. 11 & 14), Block 4 (col. 16 - 19, 38, 42, 43, 45) and Block 5 (col. 8 - 16) of MIS Schedule 5.1 (NSSO, 2023).

The limitation of MIS data is that it is sample data. Therefore, the findings of analyses based on this data source are only weighted estimates. Nonetheless, the given standard error of the survey data being reasonably low, the findings of the analyses are still reliable (NSSO, 2023).

#### 3. **RESULTS & DISCUSSIONS**

Various forms of technologies are taken into consideration in this study based on data availability as well as relevance of common use. As listed in Table-1&2, these types of technologies are very common in present day-to-day life. For example, technology like electricity, cooking gas, radio, television, mobile telephone, banking services etc. have more or less become basic necessities (Poser, 2009). On the other hand, luxurious forms of technology like Computer (desktop/laptop), two-wheeler or four-wheeler vehicle, air cooler, air conditioner etc. are also incorporated in the analysis. 'Digital' is the buzzword of today's world in technology discourse. It refers to Information and Communication technology which are based on or integrated with the Internet service (Agrawal et al., 2018.) Nowadays, technologies are more and more turning into digital forms such as smartphone, smart TV, computer, banking service, artificial intelligence etc. Some of these are also included in this analysis.

#### 3.1 Prevalence of Access

In 2011, only three forms of technology viz. electricity, banking service and mobile phone were accessed by more than 50 percent of the total households in India (see Table-1). Recently, prevalence of access has fairly improved in case of electricity, LPG cooking, mass media, mobile phone and banking service in 2021 (see Table-2). It is worthwhile to mention that 98.9 percent of the households in India have got access to electricity in 2021. According to the latest report of the World Bank, 99.5 percent of total population in India have access to electricity against the world average of 91.6 percent (World Bank, 2023). Increase in



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access to LPG/PNG cooking from 28.5% to 62% during 2011-2021 is commendable. Still, 38 percent of the total households could not use LPG for cooking as of 2021. These households depend on firewood and cowdung cake for cooking, which are more polluting and unhealthier specially for women.

In the MIS (2020-21), it is asked "whether any of the household member has access to any of these mass media viz. internet, newspaper, magazine, radio, television etc.?"(NSSO, 2023). These mass media technologies provide significant insights on exposure to modern lifestyle and development of human capital (Tarišková, 2017; Wei, 2006). It is found that a big share (77.5%) of households in India has access to one of these mass media. The shortcomings of this prevalence are mostly in rural areas.

Data of access to mobile telephone is collected from the question: "whether an adult person (15+ years of age) uses any mobile telephone with active sim card for the last three months?" (NSSO, 2023). It is found that 70.2 percent of the adult population in India could have access to mobile telephone some time or other in 2021. It is reported that the tele-density of cellular mobile connectivity in India has reached 82.23 percent of the total population by February, 2025 (TRAI, 2025). Mobile phone penetration was fast and widespread in India during the last two decades being driven by factors like affordability of mobile devices and tariffs, rapid expansion of mobile networks, and growing investment in telecom infrastructure being boosted by government's 'Digital India' mission and its initiatives (Agrawal, 2021).

Use of banking services is informed by the survey question: "whether an adult person (15+ years of age) has an account individually or jointly in any bank/ other financial institution/ mobile-money-service provider?" (NSSO, 2023). It is estimated that 87.2 percent of the adult population of India have access to banking services in 2021. Significant increase in the access to banking services during 2011-2021 can be explained by the introduction of the Pradhan Mantri Jan Dhan Yojana launched in 2014 to boost financial inclusion specially in rural areas (Gupta et al., 2022) and implementation of Direct Benefit Transfer (DBT) model in welfare programmes like pension schemes, subsidies, scholarships etc.(Paramasivan et al., 2018) Increase in mobile telephone and banking services are complementary to each other. While access to mobile phone facilitates use of banking services, opening a bank account requires a person to have a personal mobile number. This is how prevalence of access to them has been growing in tandem.

Some other forms of technology viz. computer, broadband internet, two-wheeler motorcycle, four-wheeler vehicle, air cooler and air conditioner are put into analysis. Prevalence of access in these technologies are relatively low. Because, access to these technologies generally occurs among higher income quartile of households with better standard of living. Bhattacharya et al. (2022) found that households in higher MPCE quartiles are more likely to possess computer devices and to access internet facilities. Only 9.5 percent households possessed computers (desktop or laptop) in 2011. Prevalence of access to two-wheeler motorcycle and four-wheeler vehicle were 21 percent and 4.7 percent respectively in 2011. There is no updated information available for these three technologies in the MIS (2020-21). It is estimated that use of computer devices increased to 11 percent (4% in rural and 23% in urban areas) of total households in India in 2017-18 (Bhattacharya et al., 2022).

In response to the question: "whether the household is having broadband access within the premises?", 41.8 percent of the households in India affirm access to it in 2021. Here, broadband access mostly refers



to fast internet connections which are received through either optical fibre or 4G/5G mobile network. Recently, internet penetration has been boosted with smartphone penetration in India. According to TRAI (2025) report, total number of broadband internet subscribers in India was 944.04 million as on February, 2025. Based on this figure and the projected population of India, prevalence of access to broadband internet is estimated to be 66.9 percent of the total population in India.

Access to computer and internet having already discussed, this analysis can be further refined into the usage of Information & Communication Technology (ICT), also popularly called 'digital technology'. Nine parameters are adopted to measure the prevalence of ICT skills among persons aged 15-29 years (see Table-3). These parameters can clearly show the true picture of access to digital technology as they are specific operations for use of ICT. The first parameter i.e. "ability to copy or move a file or folder in a computer" is an example of basic ICT skills and is estimated to be possessed by 41.7 percent of the target population in 2021. Moving on to another parameter, 26.7 percent of target population is able to send e-mails with attached files. It is found that fewer population have access to more difficult ICT skills. For examples, 20.9 percent of the population is able to find, download, install and configure software; 19.9 percent is able to transfer files between a computer and other devices; 12.7 percent is able to connect and install new devices; 10 percent is able to use basic arithmetic formulae in a spreadsheet; 8.6 percent is able to create presentation with presentation software; and only 2.4 percent is able to write a computer program using programming language. Although mobile phone and internet penetration are going high in India, access to ICT operational skills is relatively low. This hinders creation of large human capital in the ICT sector and forms 'digital divide' in India (Pick et al., 2015; Asrani, 2022; Bhattacharya et al., 2022).

#### 3.2 Disparities in Access

Rural-Urban divide is an appropriate measure of disparity in prevalence of access to technology since it depends on economic wellbeing of households and infrastructure development (Anil, et al. 2024). It is observed in the analysis that access to technology is more prevalent in urban areas than rural areas. There was wide rural-urban divide in access to various technologies such as electricity, LPG/PNG, television, computer, internet, two-wheeler and four-wheeler vehicles as in 2011 (see Figure-1). It indicates the prevailing economic inequalities between rural and urban areas in India.

During the period 2011-2021, the rural-urban divide in access to certain technologies is estimated to have narrowed down in India; e.g. electricity, LPG, mobile telephone, banking (see Figure-2). Household access to electricity in India has been fairly balanced between rural and urban areas in 2021 so much so that the rural-urban divide has been almost negligible. Rural electrification initiatives taken up the government contributed a lot in achieving it. For example, the Deen Dayal Upadhyaya Jyoti Yojana, replacing erstwhile Rajiv Gandhi Grameen Vidyutikaran Yojana, was launched in 2015 to strengthen transmission and distribution to provide continuous power supply in rural areas. The Pradhan Mantri Sahaj Bijli Har Ghar Yojana, also called Saubhagya Scheme was launched in 2017 to cover un-electrified villages and households. As a result, the Energy Statistics India 2024 reported that all the villages in India have been electrified by March, 2022 (NSO, 2024).



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Access to LPG for domestic cooking has increased faster in rural than urban areas so that the rural-urban divide has decreased from 53.6 percent in 2011 to 39.6 percent in 2021. Government subsidy schemes like the Pradhan Mantri Ujjwala Yojana (PMUY) are crucial in boosting LPG connections in rural areas thereby narrowing down rural-urban divide in India. The PMUY scheme was launched in 2016 to provide subsidy to 50 million LPG connections to women of BPL (below poverty line) families in India. However, this disparity is still large enough to hinder balanced development in India. In case of banking services too, rural-urban divide has been narrowed down to almost nil. Government's financial inclusion programmes like the Pradhan Mantri Jan Dhan Yojana and implementation of DBT model lay emphasis in rural areas, thus helping uplift of rural households and members to equally access banking facilities.

Mobile phone penetration has been widespread and rapid in rural India due to several factors like affordability, government initiatives, infrastructure development, growing awareness and desire of people for this technology (Jain et al., 2007). It is observed that its prevalence is relatively high in the North Indian states where population density is not only high but also rural population is large (see Figure-3). Thus, rural-urban divide in access to mobile telephone has been significantly narrowed down in 2021. It is worthwhile to note that the rural-urban divide is still relatively wide in prevalence of access to mass media, broadband internet, ICT skills, air cooler and air conditioner. Lack of affordability by households and lack of infrastructure in rural areas are main factors of this existing divide.

The scale of 'digital divide' in India can be conspicuously shown in terms of rural-urban disparity and gender (male-female) gap in access to ICT operational skills (see Table-3). Here, it is observed that these types of disparities are invariably evitable across various parameters for the use of ICT ranging from simple tasks like copying a file or sending an email, to more difficult tasks like writing a computer program. Household income and educational attainment are more instrumental in bringing down digital divide rather than other socio-demographic factors (Agrawal et al., 2018). Access to ICT among women is restricted by factors like education and skill possession, income level, employment status and social status (Agarwal et al., 2016).

#### 3.3 Regional variations

This study finds variations in prevalence of access to technology across regions and states in India. As of 2011, the North, North-east and Central regions of India had lower prevalence of access to most of the selected technologies. States like Uttar Pradesh, Bihar, Jharkhand, Rajasthan, Madhya Pradesh, Chhattisgarh, Odisha, Assam, Arunachal Pradesh etc. had consistently lower prevalence than the national level (see Figure-3&4). On the other hand, the North-west, South and South-west regions of India comprising states/UTs like Punjab, Haryana, Himachal Pradesh, Delhi, Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Goa, Gujarat etc. had higher prevalence than the national level. Similar variations in prevalence of access to banking services, mass media, LPG for cooking, broadband internet, air cooler and air conditioner are found in 2021 as well (see Figure-5). It is observed that relatively backward regions and states tend to have lower prevalence as compared to more developed regions and states of India.



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Jadhav et al. (2024) also found that most of the under-performing states in ICT skills held from the Northern and North-eastern regions of India, which are economically and socially backward as compared to the Southern states. Thus, they concluded that regional variation in access to ICT is depended on the relative performances of the states in availing socio-economic, educational and health opportunities. A few anomalous patterns of regional variations can be found in case of certain technologies like mobile telephone, four-wheeler vehicle, air conditioner etc. Here, certain factors other than economic development affect the prevalence (Agrawal, 2021). For example, high population base and density in the North and North-west region are factors of high prevalence of mobile phone access. Another example is that weather and climatic conditions are important factors of access to air conditioner.

#### 4. CONCLUSION

To sum up, this study of the prevalence of technological access has encompassed various devices or skills or services which represent a wide range of technology currently in use. Electricity is one of the technological products essential for wellbeing of our daily life. The findings of this research reveal that India has nearly achieved universal access to electricity. In addition to this, prevalence of access to LPG, mobile telephone and banking services are considerably high, although there are still shortfalls in these cases. As these technologies are becoming basic necessities for every adult individual, there will be huge demand for the same in the domestic market of India in the coming decade or so. For example, in the case of LPG for cooking, 62 percent of total households used it in 2021 with an increase of 33.5 percentage points from the mark of 2011. The remaining 38 percent of the households in India are yet to use LPG for cooking and shall be using progressively based on the past trends. In case of mobile telephone too, growth of its access prevalence is fast i.e. 0.27% per month or 3.11 million new subscribers per month (TRAI, 2025). Based on the TRAI (2025) report and Census of India 2011 Population projections report by NCP (2019), it is estimated that about 170 million persons of adult population (15+ years of age) are yet to get mobile telephone access in rural areas in 2025-26, while there is near universal access in urban areas. This is one prime example of existing digital divide in India.

The implementation of the Direct Benefit Transfer (DBT) model in welfare programs and the Pradhan Mantri Jan Dhan Yojana introduced to promote financial inclusion particularly in rural areas, can be attributed to the notable increase in access to banking services between 2011 and 2021 (Gupta et al., 2022; Paramasivan et al., 2018). Other types of technology, such as computers, broadband internet, motorcycles, four-wheelers, air coolers, and air conditioners are accessed by limited number of households in India. Because households with higher incomes and a higher level of living are more likely to have access to these technologies. In other words, it can be considered that there is still wide scope of market for these technological products from both supply and demand sides.

The proliferation of smartphones in India has increased the use of broadband internet. According to TRAI (2025), 66.9% of Indians are estimated to have access to broadband internet nationally. India has a high rate of internet and mobile phone adoption, but comparatively few people have access to ICT operational skills. This creates a "digital divide" in India and impedes the development of significant human capital in the ICT sector (Pick et al., 2015; Asrani, 2022). The gender (male-female) and rural-urban disparities in access to the aforementioned technologies make the extent of India's "digital divide" quite evident.



Factors such as education and skill level, income, employment status, and social standing limit women's access to ICT (Agarwal et al., 2016). According to Agrawal et al. (2018), household income and educational attainment have a greater impact on closing the digital divide than other socio-demographic characteristics.

Technological access in India is characterised by stark regional variations subject to several factors like socio-economic development, population distribution and density etc. Access to the majority of the chosen technologies was less common in India's north, northeast, and central areas. States with continuously lower prevalence than the national average were Uttar Pradesh, Bihar, Jharkhand, Rajasthan, Madhya Pradesh, Chhattisgarh, Odisha, Assam, and Arunachal Pradesh. It has been noted that, in comparison to India's more developed regions and states, comparatively underdeveloped areas and states typically have lower incidence (Agrawal, 2021).

#### 5. POLICY RECOMMENDATIONS

It is recommended that state must provide ample infrastructure required for enhancing ICT skills into school and college students so that existing digital divide can be narrowed down. The required infrastructure should comprise computers, stable internet connectivity, un-interrupted power supply, teaching manpower, exclusive digital laboratories and smart classrooms. Beyond this, technology divide can also be addressed by government intervention through improvement of physical infrastructure, incentives and subsidies for BPL households. While the technological disparities remain among minority groups or marginalised sections or backward regions, government policy to provide technology access need to be group-specific or region-specific intervention rather than norm-based (Jadhav et al., 2024).

#### 6. APPENDIX: TABLES & FIGURES

Forms of technology	Percentage (%) of households* having access to the technology						
	Total	Rural	Urban	<b>Rural-Urban Divide</b>			
Electricity	67.3	55.0	93.0	38.0			
LPG/PNG for Cooking	28.5	11.4	65.0	53.6			
Banking services	58.7	54.4	67.8	13.4			
Radio/Transistor	19.9	17.3	25.3	8.0			
Television	47.2	33.4	76.7	43.3			
Computer/Laptop	9.5	5.2	18.7	13.5			
Computer with Internet	3.1	0.7	8.3	7.6			
Mobile phone	59.2	51.2	76.1	24.9			
Two-wheeler motorcycle	21.0	14.3	35.2	20.9			
Four-wheeler vehicle	4.7	2.3	9.7	7.4			
Source: Census of India 2011, Household series, Table-12							
*Institutional households are excluded.							

Table-1: Prevalence of Access to Selected Technologies in India (2011)



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Forms of technology	Percentage (%) of households having access to the technology					
rorms of teenhology	Total	Rural	Urban	Rural-Urban Divide		
Electricity	98.9	98.5	99.6	1.1		
LPG for Cooking	62.0	49.4	89.0	39.6		
Mass media (internet, newspaper, magazine, radio, TV etc.)	77.5	70.4	92.7	22.3		
Broadband internet	41.8	32.1	62.4	30.3		
Air cooler	14.1	10.4	21.9	11.5		
Air conditioner	4.9	1.2	12.6	11.4		
	Percentage of population (15+ years of age) having access to the technology					
	Total	Rural	Urban	Rural-Urban Divide		
Mobile telephone	70.2	65.3	81.4	16.1		
Banking services	87.2	87.1	87.5	0.4		
Source: NSS 78 <sup>th</sup> Round, Multiple Indicator Survey, 2020-21.						

Table-2: Prevalence of Access to Selected Technologies in India (2021)

#### Table-3: Prevalence of Access to ICT Skills and Disparities in India (2021)

Parameters of ICT skills	Persons aged 15-29 years having ICT skills (in percentage)			
	All persons	Rural-Urban Divide	Male-Female Gap	
Able to <i>copy or move</i> a file or folder	41.7	27.3	13.7	
Able to <i>copy and paste</i> information within a document	39.4	27.8	13.0	
Able to send <i>e-mails</i> with attached files	26.7	26.0	9.0	
Able to find, download, install and <i>configure</i> software	20.9	18.5	7.9	
Able to <i>transfer files</i> between a computer and other devices	19.9	21.6	7.7	
Able to connect and install new devices	12.7	16.6	5.4	
Able to use basic arithmetic formulae in a <i>spreadsheet</i>	10.0	14.6	3.0	
Able to create <i>presentation</i> with presentation software	8.6	12.5	2.5	



Able to write a <i>computer program</i> using programming language	2.4	3.9	1.2	
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Source: NSS 78<sup>th</sup> Round, Multiple Indicator Survey, 2020-21.



Figure-1: Prevalence of Access to Selected Technologies & Rural-Urban Divide in India (2011)

Source: Census of India 2011, Household series, Table-12





Figure-2: Prevalence of Access to Selected Technologies & Rural-Urban Divide in India (2021)

Source: NSS 78th Round, Multiple Indicator Survey, 2020-21.



Figure-3: Access to Electricity, LPG/PNG, Computer and Mobile phone in States/UTs of India (2011)



Source: Census of India 2011 Booklet: Houses household amenities and assets data 2011 – visualizing through maps.

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Source: Census of India 2011, Household series, Table-12







Source: NSS 78<sup>th</sup> Round, Multiple Indicator Survey, 2020-21.

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