

Abstract

This research aims to investigate the gap between access and efficient use of communication technology in less developed rural communities, with a particular focus on rural Indian communities. Economic processes, infrastructure, behavioral and social factors influencing efficient technology adoption in low-income, low-resource, and information constrained communities are explored to identify strategies to overcome these barriers. The potential for media related technologies to uplift rural communities is analyzed, including the emergence of mobile phones as a primary form of media communication infrastructure. The research compares digitization plans and initiatives by less developed country governments to expose limited effort to enhance media exposure and media literacy within rural communities. Common factors that affect the efficient use of technology are lack of investment in local telecommunications infrastructure, lack of diffusion of devices for accessing information, improvement in literacy rates, exposure to a wider range of social norms, and willingness to learn new work and life strategies. Through qualitative data collected from a survey of residents in the Amravati district of Maharashtra, India, and case studies from other developing nations, this research shows the significant impact digitized social and information technology can have on rural communities' quality of life, poverty alleviation, enhanced self-employment, including farming, reduced unemployment for those seeking jobs, and development of other social sectors with critical media literacy. The study emphasizes the need for media literacy and related technological infrastructure to support rural communities ability to innovate and protect these communities from potential adverse impacts of social media misinformation and to encourage increased awareness of and participation in telecommunications and media-related policy-making processes. It should be a major policy goal to improve rural citizens' participation in these policy-making processes.

Keywords: technology, media literacy, rural communities, developing nations, infrastructure, digitization, critical media literacy.

The Gap Between Technology Access and Efficient Use in Rural Communities of Less Developed Nations

By

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Introduction

Over the past decade, economies globally have gone through rapid digitization. Organizations in the public and private sectors have digitized their operations and strived to enhance their quality and efficiency of work. At the same time, with a revolution in consumer electronics, access to and knowledge of information and communication technology amongst the public has increased. Moreover, social scientists view technology access and innovation as a critical step in economic and social development. Broadening technology access through digitization is a potential instrument for bridging the gap between more and less developed countries, as well as reducing inequality within nations.

However, a global crisis which disrupted the traditional flow of income and people—the SARS-CoV-2 virus—made digitization a necessary component in development. Access to digital infrastructure and related software applications served to control/minimize the disruption. Applications designed for use by mobile phones were particularly important in expanding access to all manner of digital platforms. In most regions, individuals using the Internet as a percentage of the total population reached an all-time high. The total number of mobile cellular subscriptions increased from 2019 to 2020 by approximately 63 million in Sub-Saharan Africa, 25 million in South Asia, 5 million in Latin America and Caribbean, and 35 million in Western and Central Africa. In low- and middle-income countries, there were approximately 55 million new mobile cellular subscriptions in 2019-2020.¹

¹“World Development Indicators.” *DataBank*, <https://databank.worldbank.org/source/world-development-indicators>.

The integration of technology into social interactions was found to have significant social, economic, behavioral and political impacts. Communities around the world have implemented and interacted with these digital platforms differently, due to a multitude of social and public policy factors. This is especially the case for rural communities in less developed countries, many of which are deprived of basic infrastructure, not only for internet access, but also for critical health care, education, and employment activities. Digitization in these nations came with the hope and opportunity of uplifting these communities, providing increased access to essential services and non-local markets, and positively impacting standards of living.

This research, keeping the rapid digitization in mind, aims to study technology access and adoption in rural regions of developing nations while focusing on the role that technology plays in their daily lives. It emphasizes critical media literacy within rural communities and the extent to which technology is being used efficiently by rural people to fully benefit from it. It also works to determine the extent to which governments' plans and initiatives have been successful in increasing access to and spreading awareness of media and technology in rural regions.

The scope of this research includes less developed and developing nations in South and East Asia, Western and Sub-Saharan Africa, and Latin America, with a focus on India, which has a rural population of 900 million (65% of the total population) as of 2020.² The arguments in this research are constructed upon quantitative data from online databases and other related studies as well as qualitative data collected through an interview with a doctor in the state of Maharashtra, India, and a

² "Rural Population (% of Total Population) - India." *Data*, <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=IN>.

written-response survey conducted with 139 residents of 11 villages which fall under Amravati district in Maharashtra.

Chapter 1: Foundation

This research is based in the nexus connecting media studies and social science: a holistic view of the entanglement of media access with pre-existent barriers to technology access, as well as efficient use of new media technologies and information diffusion within rural communities. The integration of a political-economic perspective on economic development with theories of the media's role in social change are grounded in studies and research conducted in the global south. It is my understanding that media, as software, and the various hardware and software technologies deployed to transmit and diffuse media are nested within the notion of both media and economic development. The latter is expressed through measured economic and social development indicators. In a sense, the impact of media is embedded within these statistical indicators. Moreover, the rate at which public and private entities make media technologies accessible in less developed nations is fueled, in part, by their economic and social goals. Thus, establishing the economic and social relevance of technology, especially in rural regions, may be considered an untapped economic and social change resource for a nation, not just individual communities. This section does so by providing context to the economic motivations of technology creators and distributors to set the foundation for further exploration in media literacy, core infrastructure development, and media regulation, all of which are necessary for media accessing and diffusing technology that can be effectively and efficiently used, in the context of rural regions.

Development is a term used to describe any form of growth over a period of time. In the context of media, development is the widespread access of digitized information,

videos, transactions, and other formerly analogue only relationships. Economic development depends critically on media development, but is usually viewed as a nation increasing its productivity, improving its capital resources including human productivity, and thus, increasing its total output in the form of rising gross domestic product.³ Moreover, improvements in other factors including employment, healthcare services and facilities, education levels/ literacy rates, household income, and thus, an overall increase in the standard of living and quality of life are considered a part of the process of development. However, all of these factors are influenced by media availability, both informative and entertaining, sometimes both. This is the contemporary mode of communication and knowledge diffusion.

However, mainstream development theories have been criticized for both making unrealistic assumptions and for denying key factors that act as constraints on development, inequality. In the real world, rich nations have benefitted from low-cost labor at home and in poor countries. The gap between the rich and the poor can be hidden within policies when media narratives are biased and/or excluded from the public domain. This context increases the probability of public policy blindness or misunderstanding in both the rich nation and the poor, making it possible for the systematic extraction of wealth from the latter to the former. It may also facilitate unequal accompanied access to healthcare, education, and better/ safe employment. People may misunderstand the causes of their social distress in an environment where accessible independent media is absent. As the global competition for resources, market and political power, generating economic growth simultaneously with greater poverty, more equality in access to facts and exposure of

³ Gross Domestic Product (GDP) is the total value of all the finished goods and services produced within a country's borders in a specific period of time.

false narratives requires, at a minimum, that both rural and urban populations have access to the World Wide Web.

Indian economist and philosopher Amartya Sen emphasizes the importance of looking beyond the mainstream development indices and evaluating an individual's freedom in the social settings of a nation. This approach was termed as the 'Capability Approach' wherein "a person's capability to live a good life is defined in terms of the set of valuable 'beings and doings' to which they have real access."⁴ This approach further re-orientes the positioning of education in terms of its intrinsic value and its instrumental role in wider societal development.⁵ Sen has further emphasized that high quality education/knowledge diffusion at the public school level is key to increasing an individual's capability in all stratas of society.

Therefore, increased access to and quality of both media level and in class education must be established for a country's sustainable development and many development and inequality indicators support this proposition. The Human Development Index contains education as one of its three factors, measured through indices like average schooling years. The Sustainable Development Goals also highlight the importance of education as 'quality education' is one of its seventeen goals, while 'achieving universal primary education' is one of the 8 Millennium Development Goals by the United Nations.^{6,7}

⁴ Wells, Thomas. "Sen's Capability Approach." *Internet Encyclopedia of Philosophy*, <https://iep.utm.edu/sen-cap/>.

⁵ Hart, Caroline Sarojini. "The Capability Approach and Education." *Taylor & Francis*, 3 Sept. 2012, <https://www.tandfonline.com/doi/abs/10.1080/0305764X.2012.706393?journalCode=ccje20>.

⁶ "The 17 Goals | Sustainable Development." *United Nations*, United Nations, <https://sdgs.un.org/goals>.

⁷ "United Nations Millennium Development Goals." *United Nations*, United Nations, <https://www.un.org/millenniumgoals/>.

These organizations also recognize the role of education in poverty alleviation and motivate nations to address this through their development policies and plans. The poverty cycle is a phenomenon wherein poverty persists across generations unless there is intervention from outside parties which provide opportunities to increase household income in order to escape poverty. Education and skill development training provide these opportunities. At the same time, it must be noted that in today's world, a large part of being skilled and educated is being media literate. With the integration of technology in most fields and industries, the demand for human capital with the appropriate technical knowledge has rapidly increased and the pay for the same has risen too. The technological sector has, thus, become an attractive place of employment for first generation high school and college graduates. Moreover, the tech sector offers more flexibility for people to work, such as inactive youth and stay-at-home mothers, thus equipped with technical knowledge can lead to increased household incomes.⁸ Outside of employment, being media literate is becoming essential too as many essential services and other facilities have digitized. Furthermore, technology has become the main medium of communication and of gaining information across communities, geographical boundaries, and industries. Media literacy is, therefore, a measure to be considered in a nation's development and global competitiveness measures.

⁸ Manyika, James. "Technology, Jobs, and the Future of Work." *McKinsey & Company*, McKinsey & Company, 24 May 2017, <https://www.mckinsey.com/featured-insights/employment-and-growth/technology-jobs-and-the-future-of-work>.

Media literacy is largely defined as the ability to “decode, evaluate, analyze, and produce both print and electronic media.”⁹ More recently, this definition from 1992 has been expanded to include aspects of critical thinking such that media literacy should “build an understanding of the role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy.”¹⁰ In order to highlight the differences between the two definitions, media literacy has been categorized into functional and critical media literacy. These are described by researchers Medeiros and Singh as:

“Where functional media literacy refers to an individual’s skills and capacities to use various media and their technical properties, affordances of information and communication technologies such as apps, critical media literacy emphasizes the intersection of skills and capacities with “understandings of ideology, political economy and other forms of power as well as an active audience that struggles to make meaning of a text.””¹¹

With increased access to technological devices such as mobile phones, functional media literacy is rising in most regions. However, while most rural communities of developing and less developed nations do consist of a number of individuals who are functionally media literate, recent studies show that they lack the knowledge to use technology for operations and tasks that have the potential to benefit them in getting higher income, better healthcare, or access to information.

⁹ Aufderheide, Patricia. *Media Literacy: A Report of the National Leadership Conference on Media Literacy*, <https://files.eric.ed.gov/fulltext/ED365294.pdf> . Accessed 30 Dec. 2022.

¹⁰ “What Is Media Literacy? A Definition...and More.” *What Is Media Literacy? A Definition...and More.* | Center for Media Literacy | Empowerment through Education | CML MediaLit Kit™ |, <https://www.medialit.org/reading-room/what-media-literacy-definitionand-more>.

¹¹ Medeiros, Ben, and Pawan Singh. "Addressing Misinformation on Whatsapp in India Through Intermediary Liability Policy, Platform Design Modification, and Media Literacy." *Journal of Information Policy* 10 (2020): 276-298.

Media literacy paired with access to appropriate information and communication technology can maximize the economic capacities of such regions. According to a report by McKinsey, “Indian farmers have a dearth of farm machinery and relatively little data on soil, weather, and other variables. Poor storage and logistics allows produce to go to waste before reaching consumers—\$15 billion worth in 2013.”¹² It further states that digital technology can greatly improve the state of rural regions in India by revolutionizing the agriculture industry and healthcare services and claims the following:

“Precision advisory services—using real-time granular data to optimize inputs such as fertilizer and pesticides—can increase yields by 15 percent or more. After harvest, farmers could use online marketplaces to transact with a larger pool of potential buyers. One such platform, the government’s electronic National Agriculture Market, has helped farmers increase revenue by up to 15 percent. Furthermore, online banking can provide the financial data farmers need to qualify for cheaper bank credit. Digital land records can make crop insurance more available. These and other digital innovations in Indian agriculture can help add \$50 billion to \$65 billion of economic value by 2025.”¹³

¹² Kaka, Noshir, et al. “Digital India: Technology to Transform a Connected Nation.” *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

¹³ Kaka, Noshir, et al. “Digital India: Technology to Transform a Connected Nation.” *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

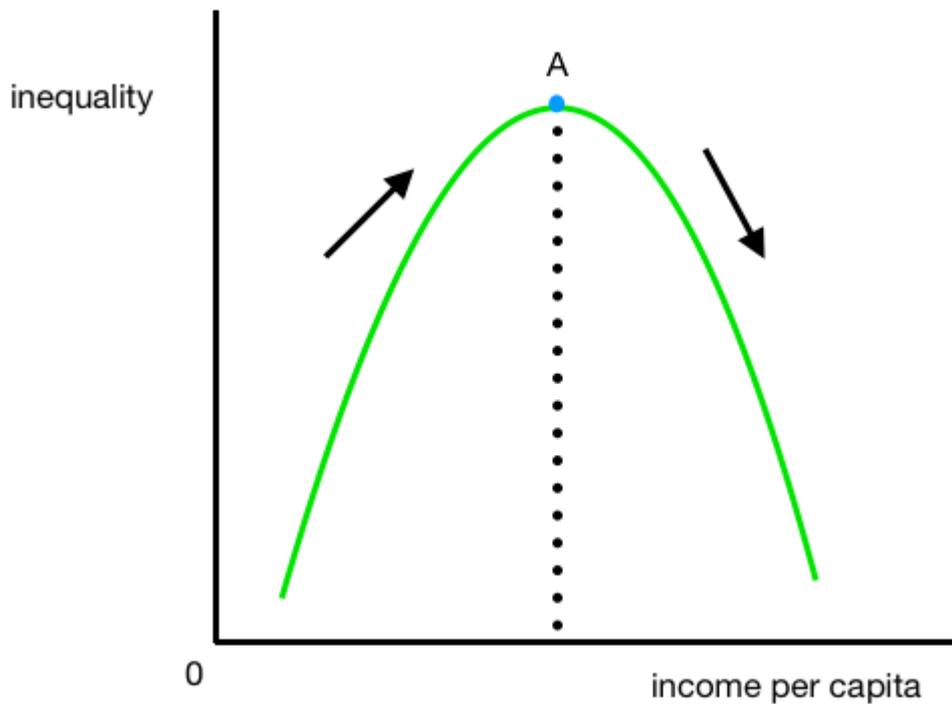
“If telemedicine replaced 30 to 40 percent of in-person outpatient consultations, coupled with digitization in the overall healthcare industry, India could save up to \$10 billion in 2025.”¹⁴

Therefore, effective digitization and technology adoption in rural regions has both economic and social benefits while aiding holistic development of these regions. It must, however, be noted that equal access is a must for the process of digitization to prevent a rise in inequality as a country economically develops.

The consequent issues of economic development and inequality in these rural regions can be further explored through the Kuznets curve model/theory. The Kuznets curve graphs the hypothesis that as a less developed country industrializes, there is a rise in inequality until a point—which on Figure 1 is point ‘A’—after which inequality decreases. The reasoning behind its shape is that in the early stages of development, capital is invested by the wealthy/rich as returns are higher due to low wage labor, mostly in rural areas. This labor then moves from rural to urban areas in search of higher income, better healthcare and education, and other such factors, leaving very few people in rural areas. With large urban populations and a growth in the economy, there is an establishment of a welfare state, democratization, and higher government involvement making efforts to reduce inequality. Inequality thus decreases after point ‘A’ as the country continues to experience economic growth. This explains its inverse ‘U’ shape.

¹⁴ Kaka, Noshir, et al. “Digital India: Technology to Transform a Connected Nation.” *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

Figure 1: Kuznets Curve



One can say that this model states the low cost labor of rural regions to be the reason for investment in the nation and, thus, the starting point of the development process. The movement of this population to urban areas, therefore, creates a problem of its own wherein urban areas become overcrowded, unemployment increases and quality of life decreases. Thus the promise of a better life and higher income from the rural to urban migration is not always a reality. Here, could technology be the solution? Increased connectivity via the internet and electronic devices has been noted to increase access of multiple facilities to residents of rural regions, which were previously only accessible in more developed urban areas or cities. Many types of employment have adopted the digital medium, while education and skill-based training is available and affordable through technology. At the same time, this prompts one to think if the Kuznets curve can be flatter, even completely

horizontal, in the case of complete technological advancement of rural regions given that it brings more opportunities for overall development of the people of the region.

This has been seen for rural regions in many developed nations, however, developing and less developed nations continue to work through weak or partly developed technological infrastructure. Other factors including social biases and wide income differences within these regions could greatly impact the distribution of the knowledge and access to this infrastructure, intensifying inequality further. Moreover, increased and widespread adoption of technology, paired with uneven access, has the potential to further inequality in the job market such that people unable to become media literate get lower income and opportunities. It can, therefore, be asked as to what extent can technology bridge geographical, social, and economic/income gaps. Simultaneously, can inequality decrease as the income per capita increases as per the Kuznets curve diagram in Figure 1 with the additional barriers created by technology for people to enter the job market or even get a sustainable job? In order to answer these questions, the potential benefits and risks/obstacles to technological integration and advancement in rural regions must be considered within the context of the cultures of those regions.

Chapter 2: Digitization

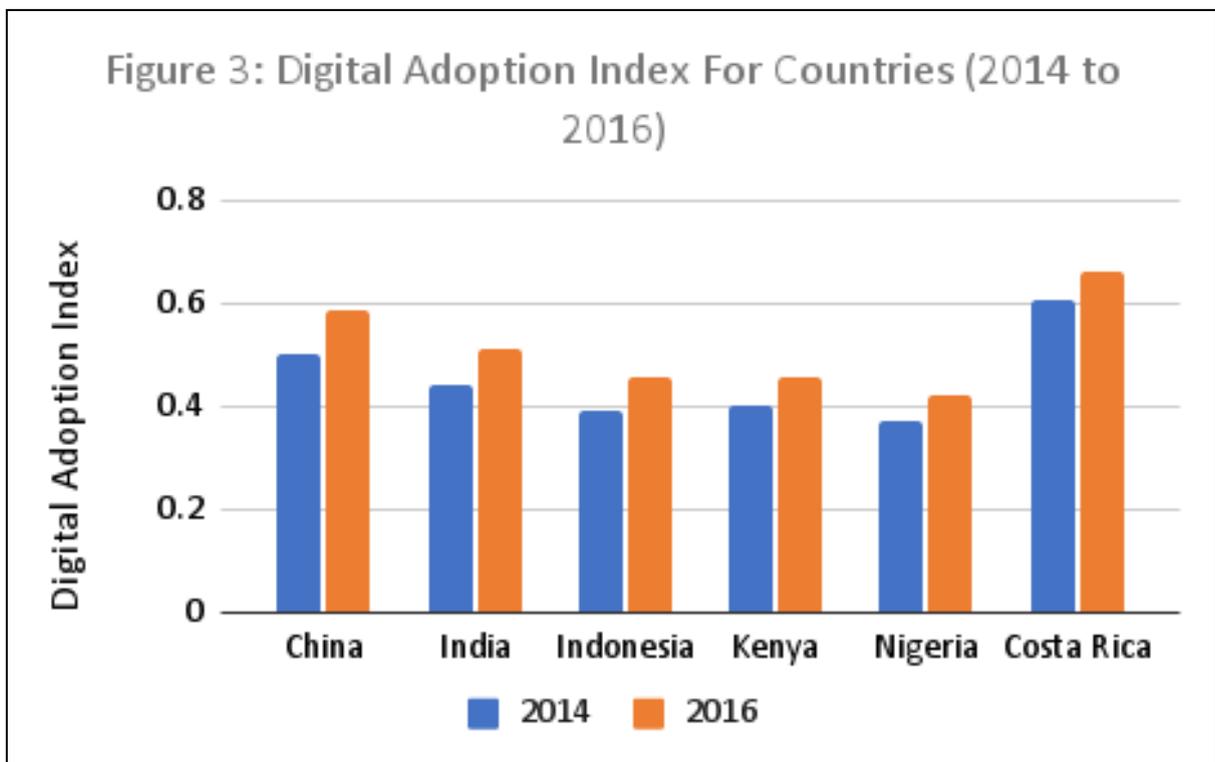
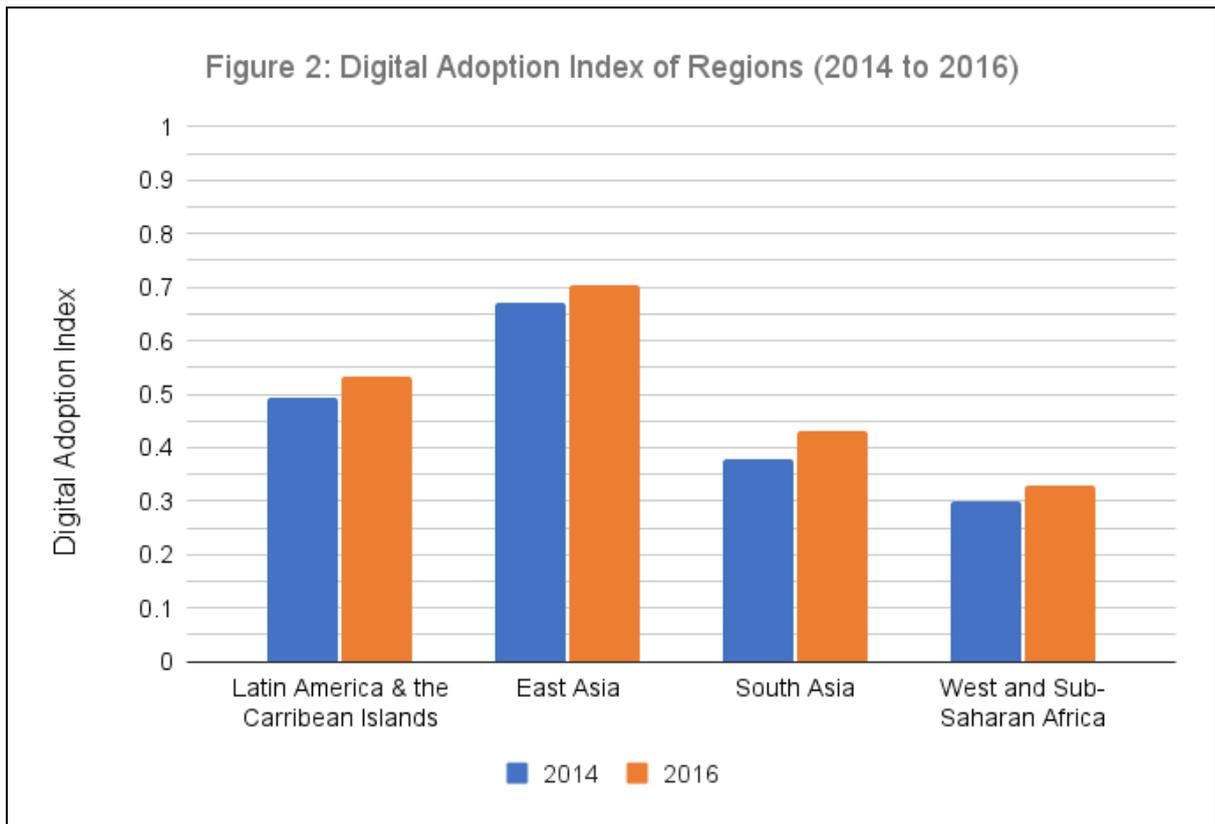
While the previous chapter states the potential positive impact of successful technology adoption in rural regions for developing and less developed nations, this chapter focuses on expanding on various nations' perspectives on digitization through their digitization policies, highlighting their differences as well as showcasing their key pillars. This paper looks at research from the regions of East and South Asia, Western and Sub-saharan Africa, and Latin America to explore the different methods local governments and organizations have established to digitize their communities.

This paper aims to have a global perspective with a local focus, such that the primary research collected is from India but the responses collected are analyzed in a global context with comparisons to other countries. Therefore, it is important to establish a basic understanding of the different regions' takes on the integration of technology in their governance and the daily lives of their citizens.

An index that helps record digitization is the Digital adoption Index (DAI) by the World Bank. The DAI is a worldwide index that measures countries' digital adoption across three dimensions of the economy: people, government, and business. According to the World Bank, by measuring the relative adoption of digital technologies, DAI can assist policymakers in designing a digital strategy with tailored policies to promote digital adoption across different user groups. The index is on a scale of 0 to 1, 0 being no adoption and 1 being complete adoption in all three dimensions.¹⁵ While its most recent data is from 2016, which does not reflect the

¹⁵ World Bank Group. "Digital Adoption Index." *World Bank*, World Bank Group, 17 Aug. 2018, <https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index>.

impact of the COVID-19 pandemic on digitization, the growth from 2014 to 2016 showcases the digital adoption strategies of the regions and nations. The following figures highlight some DAIs for the regions and nations focused on in this paper.



It must also be noted that out of the 17 countries recognized as digital economies globally, only China, India, and Indonesia are developing nations while the rest are developed nations.¹⁶ These can, therefore, be considered models to be followed by other countries that are in the process of digitizing.

In India, technological integration has been stable since the early 2000s while the concept of digitization was one of the selling points of Narendra Modi's government when he first got elected in 2014. Currently, the Digital India Programme is run by the Ministry of Electronics and Technology under the Government of India. It aims to further technological integration in the nation's activities ranging from e-governance to more citizen-based services. There are three main vision areas for the programme. The first one is 'Digital infrastructure as a utility to every citizen infrastructure' which encompasses wide availability of high speed internet along with increased access to information and communication technology, digital identification technology, and online banking services. The second one is 'governance and services on demand' wherein online access to public services provided by the government impacting both private individuals and businesses is focused upon. Lastly, the third one is 'digital empowerment of citizens' which consists of the goals of achieving universal digital literacy¹⁷, making digital resources available in all Indian languages, using collaborative digital platforms for participative governance, and ultimately, making all government documents and certificates digital/digitally accessible.¹⁸

¹⁶ Kaka, Noshir, et al. "Digital India: Technology to Transform a Connected Nation." *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

¹⁷ Sood, Saurabh, and Niti Saxena. "Universal Digital Literacy: a Means to What End?" *ACM Digital Library*, 7 Mar. 2017, <https://dl.acm.org/doi/abs/10.1145/3047273.3047335>.

¹⁸ "Digital India Programme: Ministry of Electronics & Information Technology(Meity) Government of India." *Digitalindia*, <https://www.digitalindia.gov.in/>.

Moreover, international organizations like Facebook have teamed up with Indian organizations to provide free Wi-Fi at selected locations, while other multinational organizations have outsourced technology-intensive work to firms based in India.¹⁹ India also has Aadhaar, the world's largest digital biometric ID system, wherein 1.3 billion people are enrolled as of December 2021.²⁰ On the consumer side, the increased accessibility and affordability of mobile phones has provided a unique platform for further adoption of the three vision areas stated above. This is discussed in further detail in the next chapter (chapter 3). Additionally, the survey conducted for this paper with rural residents provides an important insight into the effectiveness of these above policies and actions. This is as it asks the participants if they have used any digitized essential services such as online banking and online ticket booking as well as if they are willing to learn more about using them. The responses are discussed in later chapters (chapter 3 and 6).

When it comes to China, it has developed to become a global leader in the technology sector. The government is highly invested in advancing the nation's digital technologies and is currently working towards balancing regulatory measures and stimulating innovation.²¹ China has in the past maintained a controlling position

¹⁹ Ghoshal, Anirban. "Facebook Brings Express WIFI to India, Partners with Airtel for 700 Hotspots." *HT Tech*, 5 May 2017, <https://tech.hindustantimes.com/tech/news/facebook-dials-india-with-700-express-wifi-hotspots-partners-with-airtel-to-bring-20-000-more-story-TFmlJ2UpUgweBDcfoaRY8H.html>.

²⁰ Dave, Riddhima. "On Biometric Ids, India Is a 'Laboratory for the Rest of the World'." *The Christian Science Monitor*, The Christian Science Monitor, 25 Apr. 2022, <https://www.csmonitor.com/World/Asia-South-Central/2022/0425/On-biometric-IDs-India-is-a-laboratory-for-the-rest-of-the-world>.

²¹ Woetzel, Jonathan, et al. "How China Became a Digital Leader." *McKinsey & Company*, McKinsey & Company, 16 Sept. 2020, <https://www.mckinsey.com/mgi/overview/in-the-news/how-china-became-a-digital-leader>.

over its industries and even today, demands secure and controllable encryption from its tech firms. However, recent events pitting China against the United States, such as the 2019 blacklisting of Huawei in the U.S., have encouraged the nation to compete more strongly in the global market by encouraging domestic innovation.²² In 2021, China's digital economy was valued at \$7.1 trillion USD, only second to the United States, which accounted for 39.8% of the national GDP. Its 14th Five-Year Plan on Digital Economy Development came out in 2021. This consisted of multiple goals, including enhancing its production and involvement in strategic areas of technologies such as blockchain, quantum information, integrated circuits, and sensors while also pushing for innovation for technologies like 6G. It also aimed to improve governance of its digital economy through laws such as the Data Security Law, Cybersecurity Law, and the Personal Information Protection Law which were all established in 2021. China is also pushing innovation in the online payment category with the first state-led digital currency called the 'digital Yuan' or 'E-CNY'.

On the consumer side, China plans to increase the number of households connected to broadband, with speeds of at least 1 GB, to 60 million households by 2025. This is accompanied with other simultaneous initiatives such as the 'Eastern Data, Western Computing' initiative which target the imbalance in the supply and demand of computing capacity around the nation and work to equalize it.²³

²² Ito, Asei. "Digital China: a fourth industrial revolution with Chinese characteristics?." *Asia-Pacific Review* 26.2 (2019): 50-75.

²³ Wu, Yi. "Understanding China's Digital Economy: Policies and Opportunities." *Understanding China's Digital Economy: Policies, Opportunities, and Challenges*, China Briefing, 20 Oct. 2022, <https://www.china-briefing.com/news/understanding-chinas-digital-economy-policies-opportunities-and-challenges/>.

For Indonesia, there has been rapid growth in people using the internet but the COVID-19 pandemic has further pushed its population to increase their usage of digital devices and digitized services. The nation is now navigating how they can capitalize on this digital transformation. Its primary goals are similar to that of India in terms of its focus on boosting digital connectivity, universalizing access to technological devices and high quality internet, and providing better public services through technology. According to a 2016 McKinsey report, Indonesia can grow its economy by 150 billion USD annually by 2025.²⁴ Moreover, in 2020, the Indonesian Ministry of Finance had forecasted that technology adoption would lead to the nation gaining \$2.8 trillion USD till 2040. However, the obstacles to Indonesia's growth as a digital economy include the digital divide between rural and urban areas. In 2019, the statistic for Indonesian adults with access to the internet in urban areas was 62% whereas in rural areas it was only 36%. There has been overall growth in this percentage in the past decade as in 2011, only 20% of adults in urban areas and 9% of adults in rural areas had access to the internet.^{25 26}

The Indonesian government has announced a four-pronged strategy to accelerate Indonesia's digital transformation called the Digital Roadmap spanning 2021 to 2024. The four focuses include digital infrastructure, digital government, digital economy, and digital society. For digital infrastructure, the government is currently focusing on the completion of its 4G infrastructure and on establishing agencies such as the

²⁴ Das, Kaushik, et al. *Unlocking Indonesia's Digital Opportunity*. McKinsey and Company, Oct. 2016, https://www.mckinsey.com/~media/McKinsey/Locations/Asia/Indonesia/Our%20Insights/Unlocking%20Indonesias%20digital%20opportunity/Unlocking_Indonesias_digital_opportunity.ashx

²⁵ World Bank Group. "Ensuring a More Inclusive Future for Indonesia through Digital Technologies." *World Bank*, World Bank Group, 28 July 2021, <https://www.worldbank.org/en/news/press-release/2021/07/28/ensuring-a-more-inclusive-future-for-indonesia-through-digital-technologies>.

²⁶ Sri, Esther, and Astuti S.A. *The Indonesian Digital Policy: Lessons from PRC's Experiences*, United Nations Conference on Trade and Development, Apr. 2021, https://unctad.org/system/files/official-document/BRI-Project_RP10_en.pdf

National Data Center. For all of this, the estimated budget is \$31.1 billion USD and 98% of this would be financed by the private sector. For digital government, various forms of government data are being consolidated digitally to be shared across central and regional agencies through the One Data Indonesia initiative. Additionally, Indonesia is working towards an E-Government system to increase transparency and accessibility for the public.²⁷ For digital economy, the 'Go Digital, Go Global' initiative aims to digitize 64 million micro, small, and medium enterprises while also fostering a start-up ecosystem. This is as, as previously mentioned, the country can experience massive gains from developing their digital economy. Lastly, for digital society, the nation is using a three-tiered system called the Digital Talent Development approach. This involves providing basic digital skills to the general public, intermediate digital skills like cloud computing to recent graduate and professional level workers, and advanced digital skills to decision makers in the public and private sectors. Another initiative to create a digital society is the National Movement on Digital Literacy.²⁸

Apart from the three digital economies that are also developing countries, nations in other regions are also rapidly optimizing their national policies to develop their digital technology sector. Some of them highlighted in the DAI graph are Kenya, Nigeria, and Costa Rica.

In Sub-Saharan Africa, only 28% of the population was recorded having internet access in 2021. However, Kenya has gotten ahead and Kenyans make a significant

²⁷ Harijadi, Djoko Agung, and Eddy Satriya. *Indonesia's Roadmap to E-Government: Opportunities and Challenges*, https://www.unapcict.org/sites/default/files/2019-01/Indonesia_RoadMap_E_Government.pdf Accessed 29 Dec. 2022.

²⁸ "Indonesia: Digital Economy Opportunities." *International Trade Administration | Trade.gov*, 9 Dec. 2021, <https://www.trade.gov/market-intelligence/indonesia-digital-economy-opportunities>.

part of this percentage. This comes from its past policies such as the 2013 Science, Technology, and Innovation Act as well as ongoing efforts like Vision 2030 which are aimed at improving the nation's standing in the technological field. Kenya has prioritized increasing cell phone ownership and broadband connectivity via mobile devices to 50% of the population. It has also led innovation in the field of digital payment services through initiatives such as M-Pesa, which was supported by the central bank of Kenya and had 40 million regional users in 2020.²⁹

The Kenyan government came out with a Digital Economy Blueprint in 2019 which highlights its five pillars: digital governance, digital business, infrastructure, innovation-driven entrepreneurship, along with digital skills and values. Through these, the government plans to use digital platforms to increase the efficiency of public service delivery, build accessible and affordable infrastructure, and prepare a digitally skilled workforce. Moreover, it is looking to develop digital marketplaces for trade, financial services, and content while supporting homegrown firms to generate goods and services meeting global standards.³⁰

For Nigeria, its ICT sector presently contributes significantly to its GDP. In the second quarter of 2019, ICT was 13.85% of GDP and this percentage was predicted to double with the execution of a digital economy strategy. The government started working towards this in the same year through the establishment of the Ministry of Communications and Digital Economy which is responsible for implementing the

²⁹ Dascoli, Luke. "Fact of the Week: Long-Term Digitalization Policy in Kenya Has Accelerated Economic Growth, and It Brought Digital Payment Services to over 40 Million People in 2020." *Information Technology and Innovation Foundation*, 26 July 2021, <https://itif.org/publications/2021/07/26/fact-week-long-term-digitalization-policy-kenya-has-accelerated-economic/>.

³⁰ Republic of Kenya. *Digital Economy Blueprint*, <https://www.ict.go.ke/wp-content/uploads/2019/05/Kenya-Digital-Economy-2019.pdf> . Accessed 29 Dec. 2022.

National Digital Economy Policy and Strategy. The National Digital Economy Policy and Strategy is for the period 2020-2030 and consists of 8 pillars: developmental regulation, digital literacy and skills, solid infrastructure, service infrastructure, digital services development and promotion, soft infrastructure, digital society and emerging technologies, along with indigenous content development and adoption. Through these, there is a push to develop the physical infrastructure along with technological skills to further integrate technology into Nigeria's economy and Nigerians' lives. It is especially interesting that the government plans give preference to digitally skilled Nigerians for government funded projects.³¹

In Latin America, the COVID-19 pandemic in 2020 led to a 40% increase in the internet traffic. However, 45% of the population—285 million people—still do not have access to the internet.³² Costa Rica, on the other hand, is one of the most technologically developed nations in this region. It started developing policies geared towards digitization about a decade ago, a significant one being the National Telecommunications Development Plan for the period 2015-2021. The result of this was a drastic increase in internet access such that in 2008, there were 4.8 internet subscribers per 100 people whereas in 2016, it was over 97.4 subscribers per 100 people in 2016. The eight pillars of this plan were: connected communities, connected homes, equipping public centers, connected public spaces, solidarity broadband network, ICT population empowerment, national teachers' training

³¹ Federal Ministry of Communications and Digital Economy, *National Digital Economy Policy and Strategy (2020-2030)*, <https://www.ncc.gov.ng/docman-main/industry-statistics/policies-reports/883-national-digital-economy-policy-and-strategy/file> . Accessed 29 Dec. 2022.

³² Melguizo, Angel, et al. "A Faster Path to Digital Transformation in Latin America." *OECD Development Matters*, 2 Mar. 2022, <https://oecd-development-matters.org/2022/03/02/a-faster-path-to-digital-transformation-in-latin-america/>

program on ICTs, and technology platform. These emphasized community development through technology development of the nation.³³

The new National Telecommunications Development Plan for the period 2022-2027 is still in construction. While the government opened up the policy making process to the public, asking for feedback in November 2022, an important aspect has been identified: increasing competition among 5G technology operators. The Costa Rican government also established the Ministry of Science, Information, Technology and Telecommunications (MICITT) to ensure equitable development of this sector. Their work is aimed towards promoting affordability, quality and innovation in telecommunications services for Costa Ricans.³⁴

The role of the government in each of these nations' telecommunications development is intriguing. This is as while most of their infrastructure is funded by the private sector (except that of China), governments are adopting strategies to support this growth while ensuring it is equitable across the country. It can also be seen that the digitization policies of these nations closely align/ are similar to that of China, India, and Indonesia but each nation is at a different stage of digital development. They are each, thus, prioritizing different aspects of digitization, ranging from establishing basic infrastructure to developing ethical and non-restrictive regulatory policies for digital technology. One similarity in many of these nations and their policies is the dependence on mobile phones for providing an

³³ OECD, 2020, *Digital Economy Policy in Costa Rica*, <https://www.oecd.org/costarica/digital-economy-policy-in-costa-rica.pdf> . Accessed 29 Dec. 2022.

³⁴ "BNAMERICAS - National Telecommunications Plan 2022-2027 I..." *BNamericas.com*, BNamericas, 17 Nov. 2021, <https://www.bnamericas.com/en/news/national-telecommunications-plan-2022-2027-is-in-public-consultation-until-friday-november-26>.

affordable and accessible form of technology with the capability of performing a range of tasks, accessing vital information, communication via audio, video and textual mediums, and most importantly, connecting to the internet.

Chapter 3: The Role of Mobile Phones

The previous chapter touches upon digitization plans and policies of various nations. These plans are fueled by the wider availability and access to telecommunications infrastructure through the mobile phone. This chapter discusses the role of the mobile phone in the digitization process and its potential to become a medium for people to easily access financial, healthcare, educational, and agricultural information and services. Additionally, this chapter expands on how each nation has experienced the growth of mobile phones differently. This is as the cost of purchasing a phone and the monthly cost from the service provider varies in every country due to a variety of factors including market competition, demographics of the region, and government policy. Therefore, the potential of the mobile phone is limited when paired with high costs of owning and operating it.

Regardless of varying costs, mobile phone ownership has drastically increased in most parts of the world. In parts of rural Africa, mobile phones were the first modern telecommunications infrastructure of any kind. This is true for many other rural and less-developed regions around the world. In 1999, only 10% of the population in Africa had mobile phones. In 2008, this increased to 60%. According to a study in 2010, this increase in mobile phone usage came even when only a quarter of the population in Sub-saharan Africa had access to electricity. The reduced costs of mobile phones compared to other telecommunications devices furthered their reach and by 2009, mobile phone ownership increased to include more rural, low-income, and older individuals. However, the cost of a 1 minute call off-network is about 40% of a household's daily income in Niger. The price of the cheapest mobile phone in Niger is equivalent to about 12.5 kilograms of millet, which can feed a household for

five days, and in Kenya, the cheapest mobile phone costs half the average monthly income. Thus, mobile phones that are relatively less expensive than before and compared to other technological devices are still out of reach for many households.³⁵

In contrast, India recently experienced a drastic reduction in the cost of mobile phones and mobile data. This has been a result of private sector innovation and increased competition in the Indian telecommunications industry. In 2016, Indian corporation Reliance Industries' subsidiary company 'Jio Infocomm Ltd.' came out with a strategy of pairing virtually free smartphones with mobile service subscriptions which drove competitive pricing and innovation in products and strategies within the national industry.³⁶ There has been a fall in data costs by more than 95% since 2013 and fixed-line download speeds have quadrupled between 2014 and 2017. As a result, per user consumption of mobile data grew annually at 152 percent, which is more than twice the rates in China and the United States.³⁷

There are limited empirical studies on mobile phone adoption, especially in rural regions where the potential benefits of having a mobile phone is incrementally higher. The survey conducted for this research further explores the cost of mobile phone ownership in three rural villages of Maharashtra, India.³⁸

³⁵ Aker, Jenny C., and Isaac M. Mbiti. "Mobile phones and economic development in Africa." *Journal of Economic Perspectives* 24.3 (2010): 207-32

³⁶ "Jio's Journey: One Year of Disruptive Offers and Counting." Edited by Sandhya Dangwal, *India.com*, 5 Sept. 2017, <https://www.india.com/business/jios-journey-free-data-free-voice-and-one-year-of-disruptive-offers-2450256/>.

³⁷ Kaka, Noshir, et al. "Digital India: Technology to Transform a Connected Nation." *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.)

³⁸ Appendix 1: Survey Data Spreadsheet

The survey was conducted in July 2022 and consisted of a questionnaire with 19 questions in Marathi. Responses were collected in written format in three talukas in the Amravati district of the state of Maharashtra in India. A ‘taluka’ or ‘tehsil’ is a group of villages organized as a subdivision of a district. The villages participating in this survey are given in the table below (figure 4). Figure 5 below depicts the geographical locations where the survey was conducted.^{39 40 41}

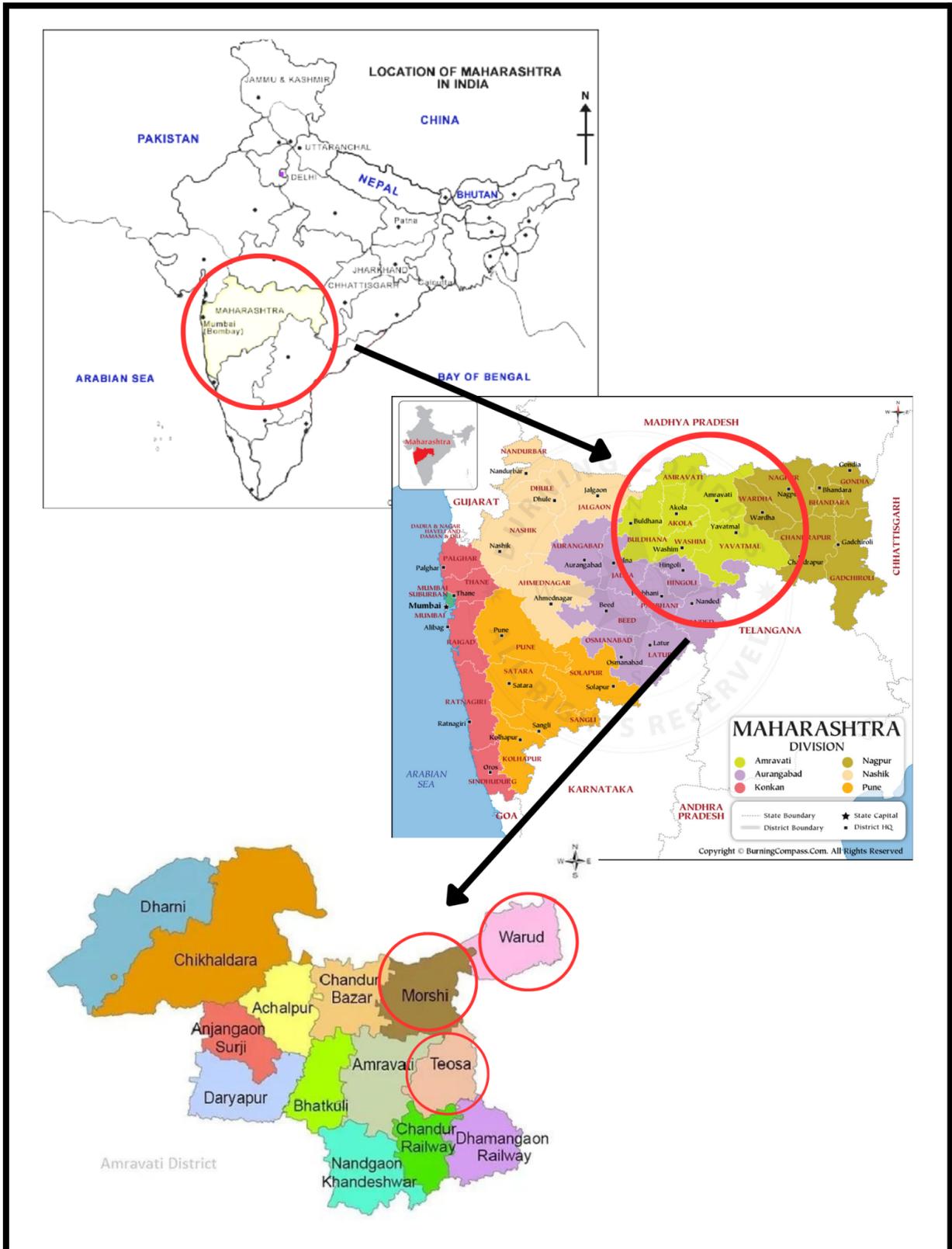
Figure 4: Talukas and villages that fall under it included in survey	
Taluka	Village
Teosa	Talegaon Thakur
	Shendurjana Bazar
	Mozri
	Anakwadi
	Gurudeo Nagar
	Shendola Bk.
	Shivangaon
Morshi	Adgaon
	Shirajgaon
	Shivangaon
Warud	Fatehpur

³⁹ “Women Empowerment by Umed Amravati.” *Amravati Umed*, <https://www.amravatiumed.com/>.

⁴⁰ “Maharashtra Division Map HD.” *BurningCompass*, <https://www.burningcompass.com/countries/india/maharashtra-division-map-hd.html>. Accessed 3 May 2023.

⁴¹ Shukla, Shailesh. "Lessons from the Equator Initiative: Rural Commune's Medicinal Plant Conservation Center, Pune, India." (2004).

Figure 5: Geographical locations of the talukas involved in the survey



As for the demographic information of the survey participants, the following figures display the gender, age, and occupation breakdown. It must be noted that there are participants that have multiple occupations.

Figure 6: Male vs Female Survey Participants

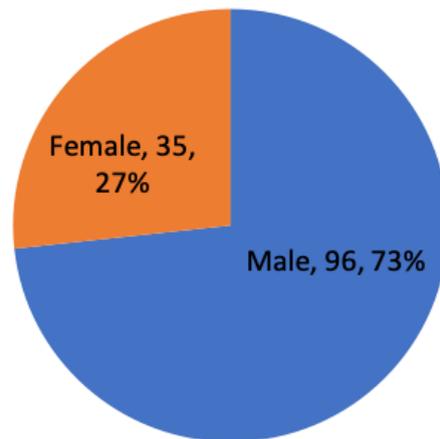
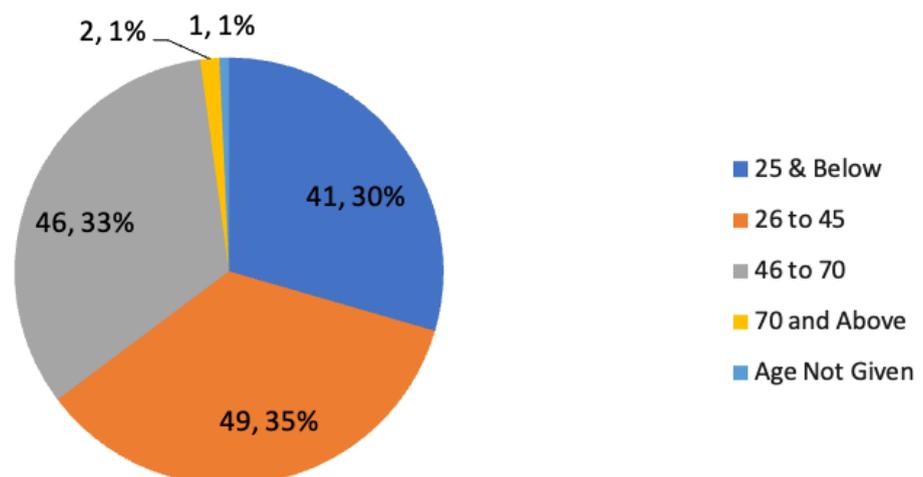


Figure 7: Age Breakdown of Survey Participants



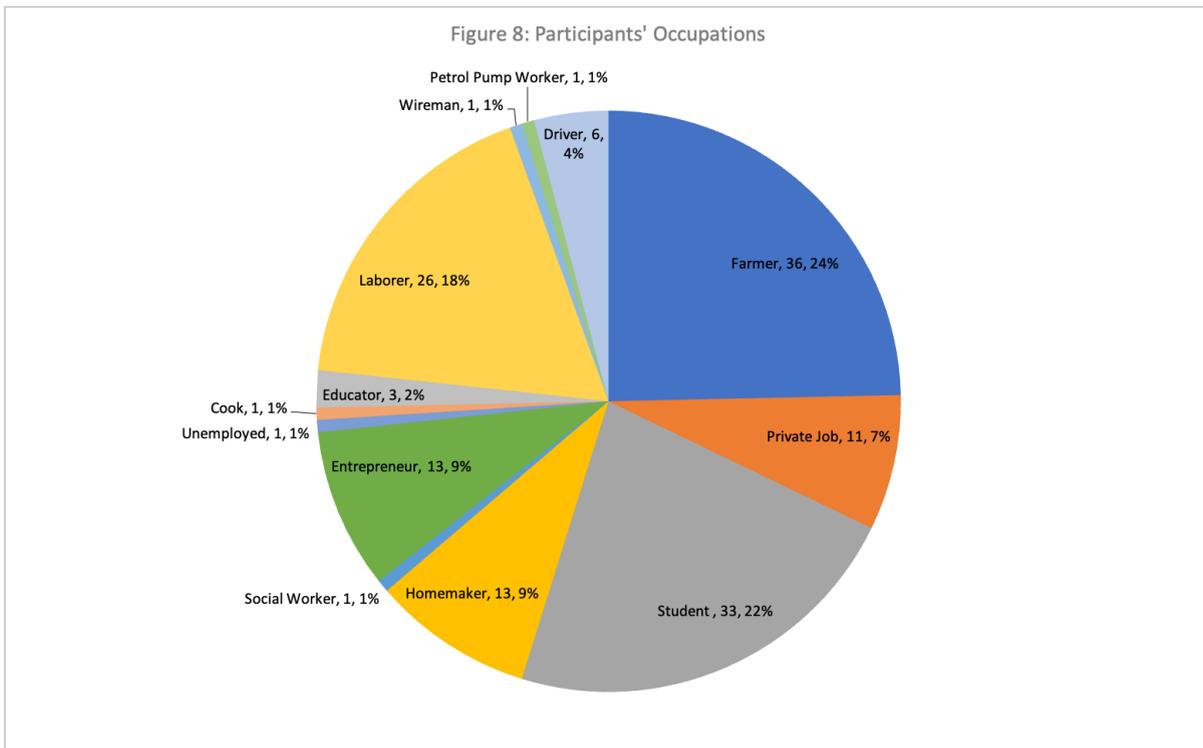


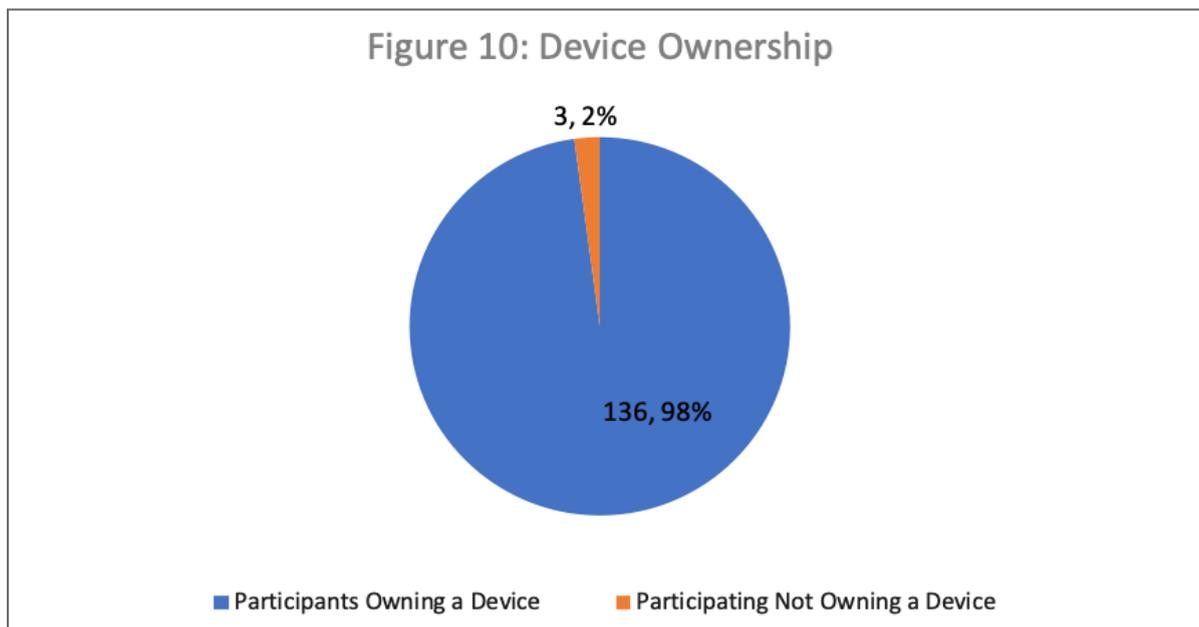
Figure 9:

Occupation	Participants Having the Occupation
Farmer	36
Student	33
Laborer	26
Homemaker	13
Entrepreneur	13
Private Job	11
Driver	6
Educator	3
Social Worker	1
Cook	1
Wireman	1
Petrol Pump Worker	1
Unemployed	1

The figures 8 and 9 show agriculture and education being dominant in the surveyed villages. The survey also reflects that most laborers work on farms and entire

households are involved in farming such that many participants with other jobs also work on their family farms.

The survey provides statistics for ownership of technological devices and the average costs associated with owning and operating a mobile phone in the region. Figure 10 establishes that 98% of the participants own some kind of technological device, which aligns with the above observations of increased access to technology due to increased affordability. Phone ownership in the survey region is significantly high such that 94% of the survey participants own a phone as seen in figure 11. It must be noted that not all the phones are smartphones which limits their capacity to access digitized services and digital platforms.



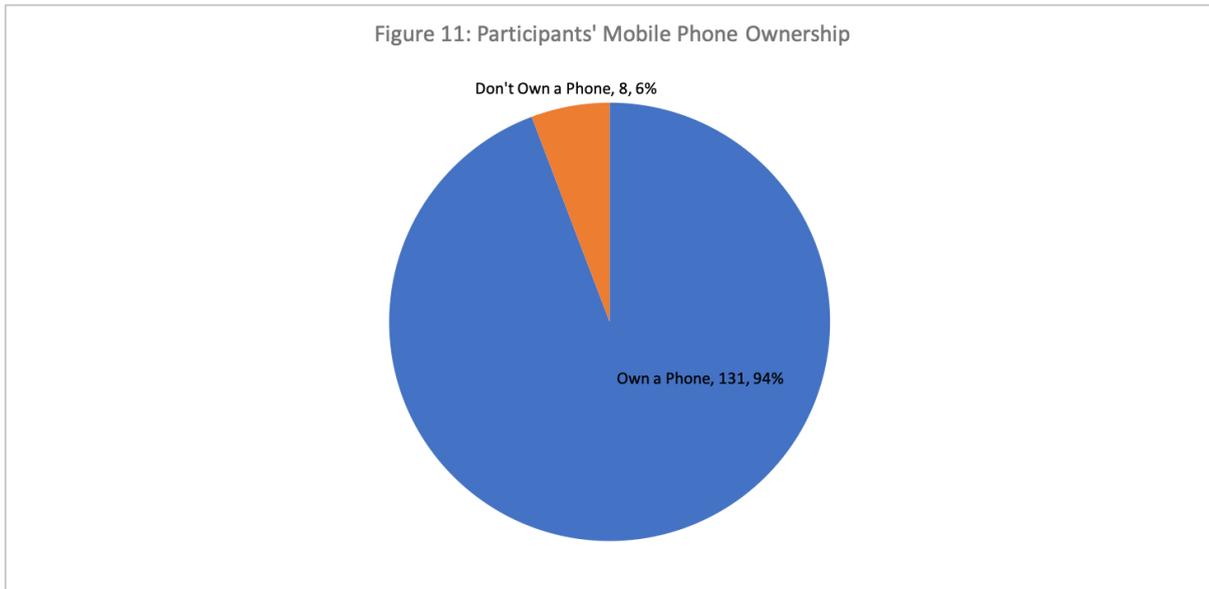


Figure 12 and 13 detail the average amount of money spent on purchasing a mobile phone and the average monthly cost of mobile cellular subscription. The spending by the participants is compared with statistics for average spending in India in recent years. For the average cost of purchasing a mobile phone, the average amount spent by the participants is INR 13,541.86, which is lower than the average selling price of INR 16,323 of smartphones in India in 2022. As for the mobile cellular subscriptions, the average amount spent monthly by participants is INR 217.14, which is more than the average revenue earned per subscriber per month of INR 88.23 by the Telecom Regulatory Authority of India (TRAI) in 2019. Reasons for this include the exclusion of service tax in the TRAI's statistic. Also, technology usage has increased since 2019 as the COVID-19 pandemic and the physical restriction brought by it shifted a lot of work and services to digital platforms. Even after the lockdowns have been uplifted and life in many regions has returned to pre-pandemic conditions, many jobs, healthcare services, education, and other activities have adopted technology for the long term. The pandemic accelerated digitization for developing nations as for many individuals, technology was the only medium available to access any services due to strict lockdowns, travel bans, limited store

timings and inventory, and other such measures. The increased spending of the participants even in rural communities could, thus, be due to more mobile data or internet usage. As seen in figure 8, of the participants, 22% were students who used online classes and school for education and 7% were private job holders/employees who depended on their mobile phones on a daily basis. Additionally, 9% of them who are entrepreneurs mentioned their use of the internet and their mobile phones to start and build their businesses. 24% of the participants who are farmers also described using their mobile phones regularly to stay updated on agricultural schemes by the government, crop and grain market prices, new farming techniques to improve efficiency and yield, and to communicate with laborers (farm workers). The survey participants were all above the age of 18 and in their description of their mobile phone usage, many participants mentioned their child or someone in their household who is of schooling age using their mobile phones for educational purposes. Thus, there are multiple functions and usages of mobile phones that have been utilized differently by the different demographics within the survey participants pool.

Figure 12: Average Cost of Purchasing a Mobile Phone	
Average Selling Price of Smartphones in India in 2022 ⁴²	Average Amount Spent by Participants on Purchasing Mobile Phones
INR 16,323 (198.82 USD, as of March 30, 2023)	INR 13,541.86 (164.99 USD, as of March 30, 2023)

⁴² "Rs 16K is now record average selling price of smartphones in India." *Telangana Today*, 9 May 2022, <https://telanganatoday.com/rs-16k-is-now-record-average-selling-price-of-smartphones-in-india>. Accessed 3 May 2023.

Figure 13: Average Monthly Cost for a Mobile Cellular Subscription	
Telecom Regulatory Authority of India's Average Revenue Per Subscriber Per Month (excluding service tax) for the Year 2019 ⁴³	Average Amount Spent Monthly by Participants on Mobile Cellular Subscriptions
INR 88.23 (1.07 USD, as of March 30, 2023)	INR 217.14 (2.65 USD, as of March 30, 2023)

The statistics used to compare the participants' spending to that of the national average do have limitations. As previously stated, not all survey participants own smartphones. There is a significant difference in the price of smartphones and other phones, also called 'dumbphones'. However, in 2021, 750 million of the 1.2 billion mobile subscribers in India were smartphone users and it is predicted that the number of smartphone users will increase to 1 billion by 2026.⁴⁴ Therefore, the selling price of smartphones in 2022 in India provides a value for comparison that can be considered close to the average amount that an Indian spends on purchasing a mobile phone. On the other hand, the revenue per subscriber earned by the TRAI excludes service tax and is for the year 2019, which precedes the pandemic and does not reflect the changes in technology consumption and usage that have occurred since 2020. Regardless, both statistics provide a base amount representing the national average spending on purchasing phones and monthly cellular subscriptions.

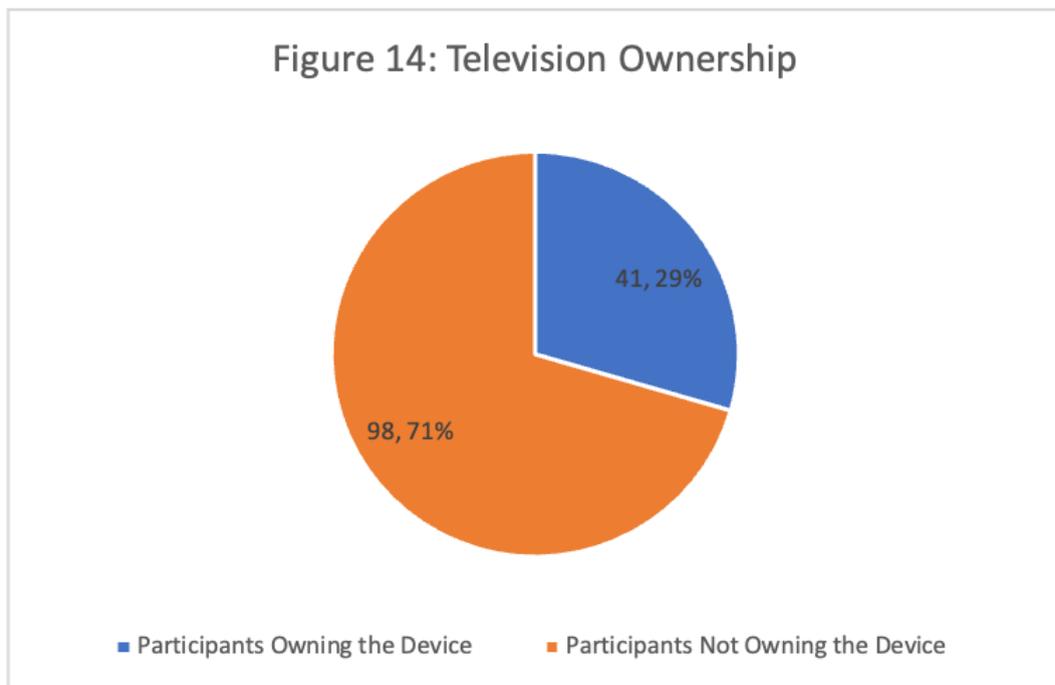
⁴³"Telecom Statistics India-2020." *DOT*, 11 March 2022, <https://dot.gov.in/sites/default/files/2022%2002%2028%20Telecom%20Stats%20STT.pdf>. Accessed 3 May 2023.

⁴⁴ Press Trust of India. "India to have 1 billion smartphone users by 2026: Deloitte report." *Business Standard*, 22 February 2022, https://www.business-standard.com/article/current-affairs/india-to-have-1-billion-smartphone-users-by-2026-deloitte-report-122022200996_1.html. Accessed 3 May 2023.

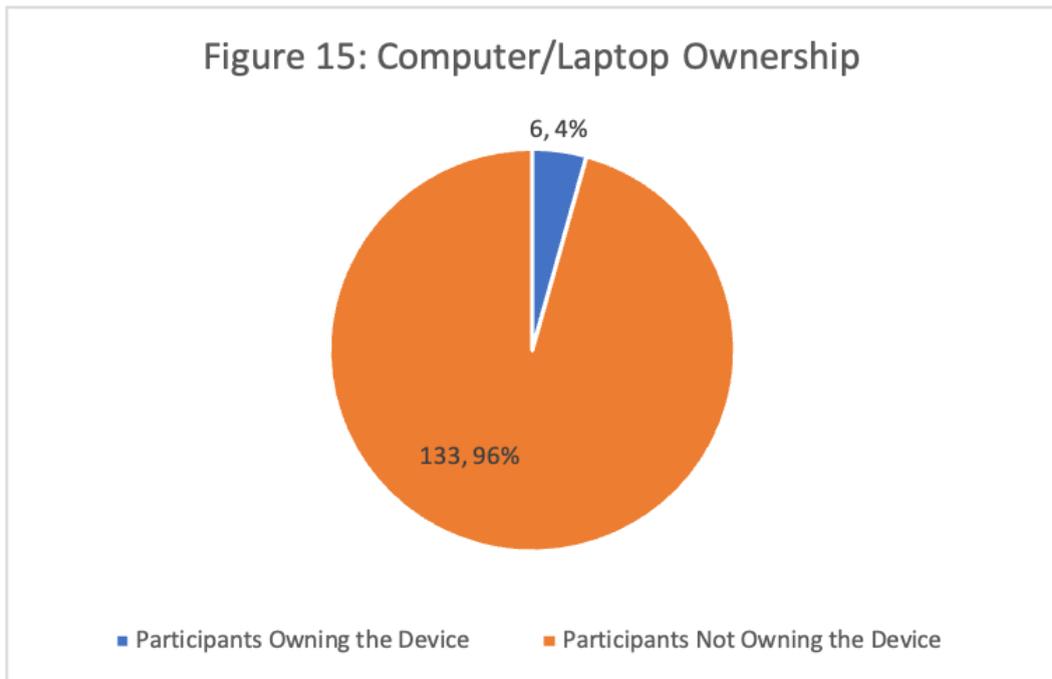
Apart from mobile phones, technological devices owned by survey participants were televisions, laptops and computers, and smart watches. Figure 14 shows television ownership, stating that only 23% of the participants own televisions. There has been a sustained decline in TV subscriptions and ownership in India. The pandemic led to financially strained households giving up their cable connections and cutting costs. At the same time, the rapid growth of OTT (Over-the-Top) video streaming platforms made them a more cost-effective and convenient option which could be accessed from either smart TVs or mobile phones, mobile phones being the ideal choice for the masses. A March 2022 report by the Federation of Indian Chambers of Commerce and Industry (FICCI) along with Ernst and Young on the Indian media and entertainment sector stated that in 2021, online video viewers increased to 497 million while revenue from TV subscriptions fell by 6.7% resulting in the loss of 6 million households with TV subscriptions.^{45 46}

⁴⁵Bansal, Shuchi. "Linear TV's growth story inches towards a dead end." *Mint*, 22 September 2022, <https://www.livemint.com/opinion/columns/linear-tv-s-growth-story-inches-towards-a-dead-end-11663779952306.html>. Accessed 3 May 2023.

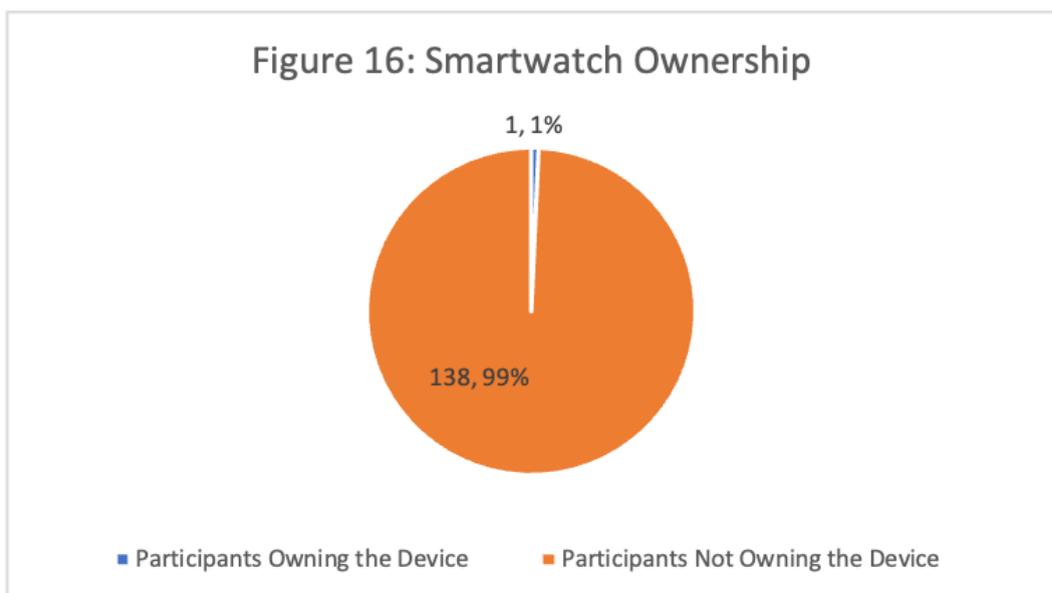
⁴⁶ EY, and FICCI. "EY FICCI M&E Report - Tuning into Consumer." *EY*, March 2022, https://assets.ey.com/content/dam/ey-sites/ey-com/en_in/topics/media-and-entertainment/2022/ey-ficc-i-m-and-e-report-tuning-into-consumer_v3.pdf. Accessed 3 May 2023.



While laptop and computer ownership is higher than smart watch ownership with 6 participants owning these devices, it is significantly lower than TV and mobile phone ownership. This is as most smartphones have evolved to have the capacity to carry out multiple functions of a computer/laptop and many softwares have developed versions compatible with mobile phones. Simultaneously, a large percentage of survey participants have occupations wherein most of the tasks are not technologically intensive and can be conducted using a mobile phone.



Only one participant of the survey owned a smart watch. This participant also owned a mobile phone, TV, and laptop. This could be as smartwatches are relatively new to the Indian market and are considered a luxury good, being priced the same as or higher than the average cost of mobile phones.



With increased ownership of mobile phones worldwide, nations have started digitizing essential and other services in various sectors to increase access and affordability along with, in many regions, making these services available for the first time. This digitization was further accelerated by the COVID-19 pandemic as it stopped movement within nations and placed more barriers to physical access for rural, low-income, and low-resource households. In the past decade, there have been multiple initiatives in developing countries in the agricultural, financial, healthcare, and education sectors.

In the **financial sector**, technology has been adopted to deliver financial services in the form of 'fintech'. In India, since 2009, 1.2 billion people have been enrolled in the world's single largest digital ID program called 'Adhaar'. Adhaar is a 12-digit digital identification number which serves as a proof of identity and proof of address for residents of India.⁴⁷ The Adhaar system falls under the Unique Identification Authority of India established by the government of India under the Adhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016.^{48 49} This has aided India's rapid digitization as it has expedited the spread of other digitized services, especially digitized banking services. In January 2014, 56 million bank accounts were linked to Adhaar. This number grew incrementally. In April 2017, the

⁴⁷ Unique Identification Authority of India. "What is Aadhaar? - Unique Identification Authority of India | Government of India." *uidai*, <https://www.uidai.gov.in/en/16-english-uk/aapka-aadhaar/14-what-is-aadhaar.html>. Accessed 3 May 2023.

⁴⁸ Unique Identification Authority of India. "Unique Identification Authority of India - Unique Identification Authority of India | Government of India." *uidai*, <https://uidai.gov.in/en/about-uidai/unique-identification-authority-of-india.html>. Accessed 3 May 2023.

⁴⁹ "THE AADHAAR (TARGETED DELIVERY OF FINANCIAL AND OTHER SUBSIDIES, BENEFITS AND SERVICES) ACT, 2016 NO. 18 OF 2016 An Act to prov." *uidai*, 13 July 2016, https://uidai.gov.in/images/targeted_delivery_of_financial_and_other_subsidies_benefits_and_services_13072016.pdf. Accessed 3 May 2023.

number of bank accounts linked to Adhaar was 399 million and in February 2018, it rose to 870 million.⁵⁰

Another rapidly digitizing financial sector is the one of Sub-Saharan Africa. It is the only region globally where mobile money transactions make up approximately 10 percent of the gross domestic product (GDP) whereas in Asia, they make up 7 percent of the GDP and in other regions, less than 2 percent.⁵¹ Kenyan mobile banking service 'M-pesa' is Africa's largest fintech platform with operations expanding to Tanzania, Mozambique, Lesotho, Ghana, Egypt, Afghanistan, South Africa, and the Democratic Republic of the Congo. It provides access to financial services including short-term loans, even for people without bank accounts, the only requirement being that they have a mobile phone.⁵² The service transferred a cumulative amount of US \$3.7 billion in 2009, 10% of the nation's GDP, and celebrated reaching 50 million active monthly customers in 2021.⁵³ However, it has been found that most transfers with M-pesa occur in urban areas and that its users tend to be well educated, wealthier, urban, and 'already banked' individuals.⁵⁴ Therefore, the potential for the platform to provide access to financial services to the ones who need it the most—the unbanked populations—is not fully achieved.

⁵⁰ Kaka, Noshir, et al. "Digital India: Technology to Transform a Connected Nation." *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

⁵¹ Sy, Amadou NR. "Fintech in Sub-Saharan Africa: A Potential Game Changer." *International Monetary Fund*, 14 February 2019, <https://www.weforum.org/agenda/2019/02/fintech-in-sub-saharan-africa-a-potential-game-changer>. Accessed 3 May 2023.

⁵²"M-PESA." *Vodafone*, <https://www.vodafone.com/about-vodafone/what-we-do/consumer-products-and-services/m-pesa>. Accessed 3 May 2023.

⁵³"M-Pesa celebrates reaching 50 million customers." *Vodafone*, <https://www.vodafone.com/news/services/m-pesa-celebrates-reaching-50-million-customers>. Accessed 3 May 2023.

⁵⁴ Aker, Jenny C., and Isaac M. Mbiti. "Mobile phones and economic development in Africa." *Journal of Economic Perspectives* 24.3 (2010): 207-32

In the **agricultural sector**, technology is being used to increase the efficiency of farming practices, to increase yield, and to empower farmers through information. In India, land records have been digitized through the Digital India Land Records Modernisation Program which streamlines the process of land dispute resolution.⁵⁵ The Union Minister of State for Rural Development Shri Faggan Singh Kulaste commented that the digitization of land records “provides a level of transparency in land records. There are multiple stages through which ordinary people have to go, which gets irksome for the people. Integrating geospatial technology not only imparts transparency but enables common people to avail their rights without going through an ordeal.”⁵⁶ There has been improvement in the variety of agricultural services available to improve farm management such as the new ‘Uberised’ tractor services in India which enable farmers to rent them as needed instead of investing a large amount of money to buy them.⁵⁷

The increased mobile phone ownership has also given rise to information broadcasting and getting access to agricultural information via text messages. In Africa, farmers can receive the market price information of a variety of goods instantly by typing in a code and sending it as a text message.⁵⁸ This is essentially a type of market information systems (MIS) texting service which is meant to empower rural farmers in gaining more control in the market and fair prices for their goods.

However, there are barriers for the success of such services including low literacy

⁵⁵ DILRMP-MIS | Digital India Land Records Modernization Programme, <https://dilrmp.gov.in/#>. Accessed 3 May 2023.

⁵⁶ “Digitalization of Land Records Will Result in Transparency and Empowerment of Rural India : Shri Faggan Singh Kulaste, Union Minister of State for Rural Development.” 16 Nov. 2022, <https://pib.gov.in/PressReleasePage.aspx?PRID=1876506> . Accessed 3 May 2023.

⁵⁷ Lele, Uma. “How Technology Is Helping India's Rural Poor.” *World Economic Forum*, 2 Oct. 2017, <https://www.weforum.org/agenda/2017/10/india-fourth-industrial-revolution-farming/>.

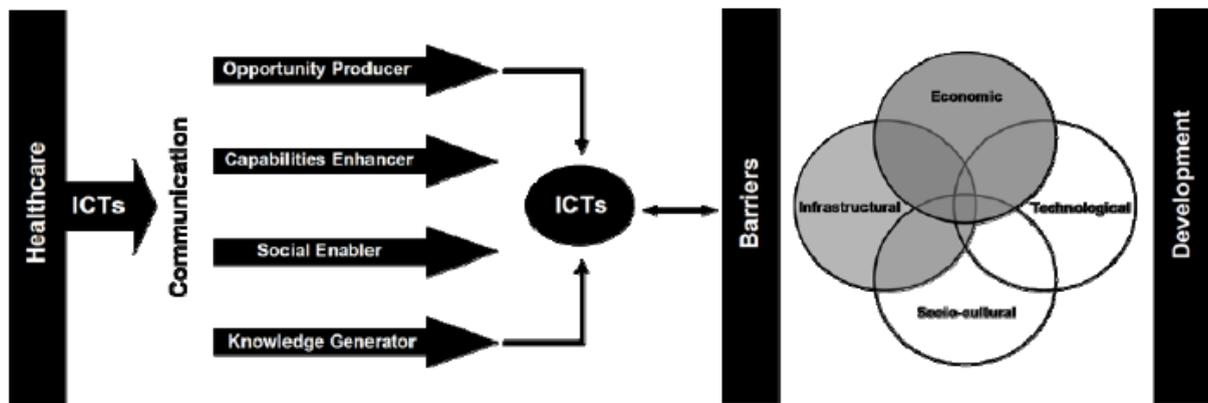
⁵⁸ Aker, Jenny C., and Isaac M. Mbiti. “Mobile phones and economic development in Africa.” *Journal of economic Perspectives* 24.3 (2010): 207-32

rates which make text messages inaccessible, the lack of a possibility to have two-way communication incase people have questions about the information shares, and the limited power that many rural farmers have in terms of demanding fair prices and using market price information to their benefit in other ways.⁵⁹

In the **healthcare sector**, mobile phones have transformed information collection and dissemination processes. The information and communication technology for healthcare (ICT4H) development model uses mobile phones as a healthcare tool with the potential of increasing knowledge and improving healthcare outcomes. It has been used in rural India by community healthcare workers, primarily Accredited Social Health Activists (ASHAs) who are women that mainly aid pregnant women in childbirth, for accessing information as a part of India's National Rural Health Mission Scheme. The conceptual framework of the ICT4H development model is illustrated below. It shows the key benefits and barriers of using mobile phones as healthcare tools. Mobile phones act as an opportunity producer as they work to increase time efficiency and make healthcare slightly affordable as travel can be avoided and diagnosis can be provided in less time. Mobile phones are a capability enhancer as they improve the organization and management of medical data. They are also a social enabler as they facilitate information sharing and relationship building between community healthcare workers and community members. Lastly, mobile phones are knowledge generators as they provide updated medical information to community

⁵⁹ Burrell, Jenna, and Elisa Oreglia. "The myth of market price information: mobile phones and the application of economic knowledge in ICTD." *Economy and Society* 44.2 (2015): 271-292.

healthcare workers and enable them to connect with professionals when needed, which keeps healthcare accessible even when shortages of doctors exist.^{60 61}



ICT's utilization in healthcare is being done in a variety of ways. In Kenya, Malawi, and South Africa, mobile phones are used to give reminders to HIV patients for treatments.⁶² Mobile phones were also used to broadcast important information, news, and government measures at the peak of the COVID-19 pandemic and they were essential in getting information about and registering for vaccinations in India. Figure 26, discussed towards the end of this chapter, expands on how the survey participants used technology during COVID-19 and accessing healthcare services including vaccination information and telemedicine.

Telemedicine is the practice of digitally connecting patients with healthcare providers. It is defined as “the use of electronic information and communication technologies to

⁶⁰ Arul, C. H. I. B., et al. "The hope of mobile phones in Indian rural healthcare." *Journal of Health Informatics in Developing Countries* 6.1 (2012).

⁶¹ Chib, Arul, Michelle Helena van Velthoven, and Josip Car. "mHealth adoption in low-resource environments: a review of the use of mobile healthcare in developing countries." *Journal of health communication* 20.1 (2015): 4-34.

⁶² Aker, Jenny C., and Isaac M. Mbiti. "Mobile phones and economic development in Africa." *Journal of economic Perspectives* 24.3 (2010): 207-32

provide and support health when distance separates the participants.”⁶³ It has become especially important during the pandemic and has previously been extensively used to address the issues of doctor shortages and insufficient healthcare infrastructure in rural villages of less developed nations. In India, replacing 30 to 40 percent of in-person outpatient consultations with telemedicine, as well as digitizing the healthcare industry as a whole, could lead to savings of up to \$10 billion USD by 2025.⁶⁴

To better understand telemedicine practices in India and how effective they are in the rural context, I interviewed Dr. Anil Rohankar. Dr. Rohankar is a practicing pulmonologist and COVID specialist in the Amravati District of Maharashtra and is also the president of the Indian Medical Association Amravati District Branch. He has worked with patients from many villages in and around the district for more than 20 years.⁶⁵ He stated that:

“Telemedicine has improved a lot, particularly in this area where child mortality rate is very high like in tribal areas of Vidarbha region so pediatricians initially were not available in the periphery [areas outside cities] or in tribal areas. Now they have set up clinics over there enabling them to consult senior pediatricians and get their opinion. Through telemedicine, they [senior pediatricians] are prescribing the proper medicines to them [rural patients] and the government machinery and private machinery are providing nutritious

⁶³ Field, Marilyn J., ed. "Telemedicine: A guide to assessing telecommunications for health care." (1996).

⁶⁴ Kaka, Noshir, et al. "Digital India: Technology to Transform a Connected Nation." *McKinsey & Company*, McKinsey & Company, 12 Nov. 2020, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-india-technology-to-transform-a-connected-nation>.

⁶⁵ "Dr Rohankar Anil in Amravati | Find Doctor's Updated Information." *justdoctors.in*, <https://justdoctors.in/doctor/Dr-Rohankar-Anil/DIM2436>. Accessed 3 May 2023.

foods plus medicines to them. So telemedicine is a much better advancement particularly in the case of pediatric cases in tribal groups and in other cases where superspecialists or senior physicians are not available. Now patients could directly approach them via telemedicine, saving time and money both and getting proper treatment.”^{66 67}

However, there are inefficiencies within telemedicine and the overall integration of technology in healthcare which intensify in the context of rural low income and low resource communities. Dr. Rohankar expands on this:

“For telemedicine, we require proper mobile network, Wi-Fi, and other things to be available. Communication [between doctor and patient] should be proper and follow-up [to cases] should be proper because every coin has two sides. There are so many pros of telemedicine—cost and time is saved—but there are also people misusing it. So there should be a complete check on that. Not everybody should be allowed to practice telemedicine because there are so many quacks, particularly in rural and tribal areas, that are taking undue advantage of that. That should be prevented.”

Thus, there is more work to be done in developing as well as standardizing and regulating the digitization of the healthcare sector in India.

In the **education sector**, many new platforms have emerged in educational technology, especially during the pandemic. At the same time, previously existing

⁶⁶ Vidarbha region is the eastern part of the Maharashtra state consisting of the Amravati and Nagpur districts.

⁶⁷ Appendix 2: Interview Transcript - Dr. Anil Rohankar

platforms have renovated and improved their content to target learners of all ages, including people looking to upskill and reskill. During the peak of the pandemic, platforms like Coursera and EdX made thousands of their courses available for free. A report by the International Finance Corporation (IFC) expands on the increased technological integration in the education sector during the pandemic. It states the following in terms of nation-wise developments in the field of educational technology:⁶⁸

“In India, Byju’s, a learning app for grades K–12, has experienced a 60 percent increase in the number of new users—it had 2.8 million paid users in 2019 (Dash 2020). In China, Zhangmen, an online one-on-one tutoring after-school service provider for K–12 students, experienced a near three-digit growth in January–February 2020, compared with the same period in 2019. Etudesk, an online education platform in Africa, is providing free access to students across Côte d’Ivoire and Senegal (Cio Mag 2020). Upskilling and talent-as-a-service companies like Andela and Gebeya in Africa or Revelo in Latin America are repurposing their business models to train workers in the most in-demand skills (Young and Alderson 2020).”⁶⁹

Additionally, mobile phones are being used to promote literacy for adults in Africa. It is previously stated that while technology and mobile phones have become less expensive, they are still a significant cost to a large part of global populations. In

⁶⁸ *The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets*, <https://www.ifc.org/wps/wcm/connect/537b9b66-a35c-40cf-bed8-6f618c4f63d8/202009-COVID-19-Impact-Disruptive-Tech-EM.pdf?MOD=AJPERES&CVID=njn5xG9>. Accessed 3 May 2023.

⁶⁹ *The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets*, <https://www.ifc.org/wps/wcm/connect/537b9b66-a35c-40cf-bed8-6f618c4f63d8/202009-COVID-19-Impact-Disruptive-Tech-EM.pdf?MOD=AJPERES&CVID=njn5xG9>. Accessed 3 May 2023.

many nations like in Niger, text messages are much more cost-effective such that they are one-seventh the price of voice calls. At the same time, text messages have been utilized as a medium to broadcast important messages quickly by governments and enable more efficient information exchange and storage in a variety of contexts. An example stated above is the usage of Market Information Systems (MIS) which collect and distribute market price information via text messages and provide people with economic knowledge that could otherwise be difficult to find.⁷⁰ However, factors including low literacy rates have limited the use of text messages in Niger. Adult learners are now being taught the placement of different numbers and letters on mobile phones and how to send and receive text messages as a part of their regular literacy curriculum.⁷¹

Therefore, while mobile phones have been monumental in providing access to digitized services and these services in the different sectors mentioned above have provided alternate ways to access essential services for many people, there are still challenges for certain demographic groups to access and effectively utilize digitized services. The survey investigates the usage of digitized services in the three talukas. Data collected shows that only 53% of the participants have used a digitized service whereas 47% of participants have not, as illustrated through figure 17. Out of the 47% participants, popular reasonings for not using digitized services were:

- Not having enough information about these services and how to use them
- Not interested or have not paid attention to these advances

⁷⁰ Burrell, Jenna, and Elisa Oreglia. "The myth of market price information: mobile phones and the application of economic knowledge in ICTD." *Economy and Society* 44.2 (2015): 271-292.

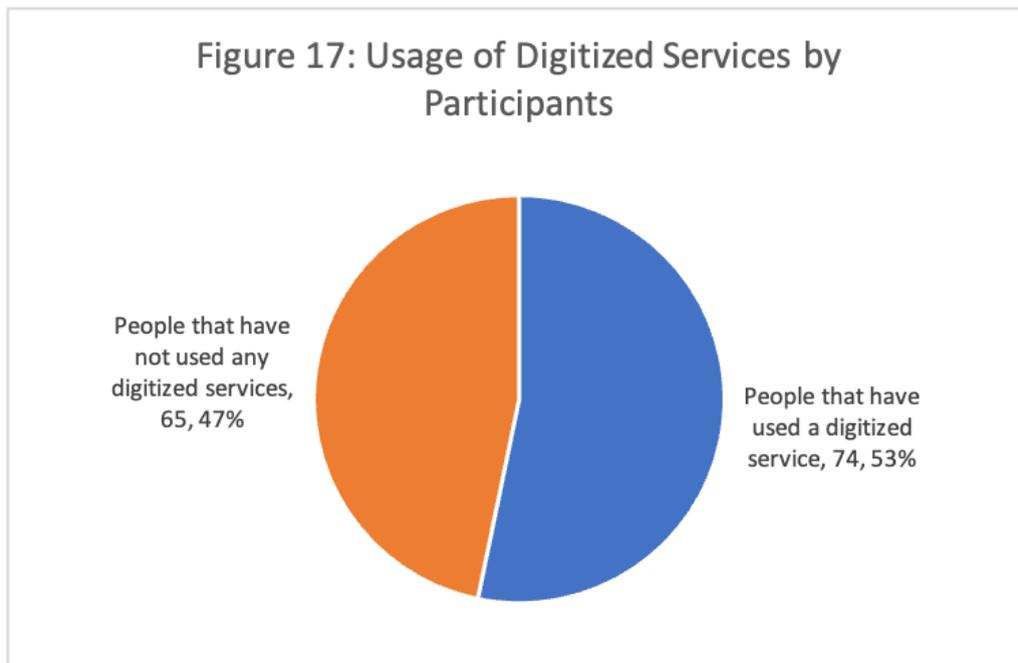
⁷¹ Aker, Jenny C., and Isaac M. Mbiti. "Mobile phones and economic development in Africa." *Journal of economic Perspectives* 24.3 (2010): 207-32)

- Not having a smartphone and only owning a dumb phone⁷²

This statistic displays how the gap between technological development in the nation and technology adoption persists in rural communities. It also emphasizes that, while smartphone ownership in India is high and increasing, there is a part of the population that is still uninformed about being a part of these advances in technology and adopting them for their benefit.⁷³ While the Indian government has been rapidly digitizing essential services, there needs to be a stronger push towards aiding and educating people in the transition from a dumb phone to a smartphone and even making digitized services accessible to dumbphones. A significant factor in the transition in India has been the increased affordability of smartphones and mobile data (internet) access. However, the reasons stated above for the participants not using digitized services have not been effectively addressed. Non-price factors, including behavioral, socio-cultural, and infrastructural factors, need to be further explored in the context of educating more people to utilize digitized services through their smartphones as well as incentivizing people to switch to smartphones from dumbphones. Chapters 4 and 5 expand on these factors.

⁷² A dumb phone, or dumbphone, is a very basic cell phone that cannot connect to the internet (as per the Cambridge Dictionary)

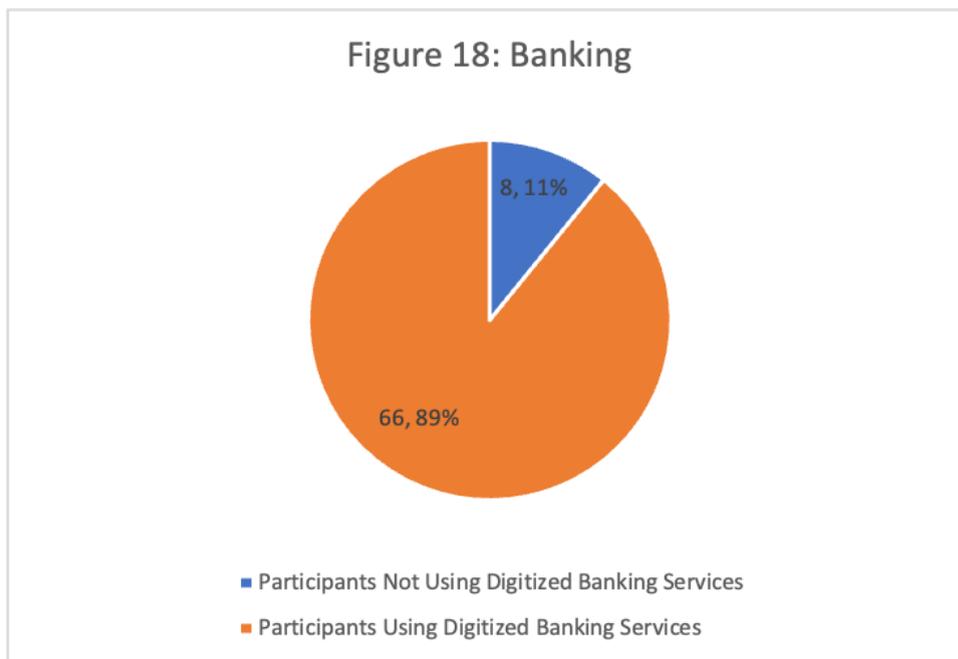
⁷³ A smart phone, or smartphone, is a cell phone that can be used as a small computer and that connects to the internet (as per the Cambridge Dictionary)



Studying the survey responses, the figures 18 to 22 showcase, from the survey participants that have used a digitized service (74 participants, as stated in figure 17), how many participants use the following digitized services: banking, online shopping, digitized ticket booking, agriculture-related digitized services, online educational services, and online food delivery services.

As per figure 18, from the participants using digitized services, 89% have used digitized banking services. It is previously mentioned that the access to the formal banking sector has increased since the introduction of Adhaar. Additionally, India's digital payment volume via phone payment platforms such as PayTM, PhonePay, BHIM, AmazonPay, GooglePay, and ApplePay based on the UPI (Unified Payments Interface) system has increased at an annual average rate of 50% per year from

2017 to 2022 since UPI's establishment in 2016 by India's central bank: the Reserve Bank of India (RBI).^{74 75}



In March 2022, the RBI also introduced a UPI for dumbphones which is estimated to connect around 400 million users in distant rural areas.⁷⁶ This is a move to make digitized services more accessible to dumbphones and sets the example for other sectors to follow. However, the survey was conducted in July 2022 and shows that a significant portion of dumbphone users are not aware of this. Thus, educating rural

⁷⁴ Kearns, Jeff, and Ashlin Mathew. "Digital-Journeys: India embraces mobile money." *International Monetary Fund*, September 2022, <https://www.imf.org/en/Publications/fandd/issues/2022/09/Digital-Journeys-India-embraces-mobile-money-Kearns-Mathew>. Accessed 3 May 2023.

⁷⁵ UPI: Unified Payments Interface (UPI) is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. It also caters to the "Peer to Peer" collect request which can be scheduled and paid as per requirement and convenience. <https://www.npci.org.in/what-we-do/upi/product-overview>

⁷⁶ Kearns, Jeff, and Ashlin Mathew. "How India's Central Bank Helped Spur a Digital Payments Boom." *International Monetary Fund*, 27 October 2022, <https://www.imf.org/en/News/Articles/2022/10/26/cf-how-indias-central-bank-helped-spur-a-digital-payments-boom>. Accessed 4 May 2023.

communities about such advancements and spreading awareness is vital for initiatives like that of the RBI to be effective.

Figure 19 shows that 74% of the digital-service using survey participants use online shopping services. In 2020, the revenue of the e-commerce industry in India was estimated to be 120 billion USD.⁷⁷ The COVID-19 pandemic accelerated the growth of this industry, the online shopper population, and their total spend by 3 to 4 years. By 2030, online retail spending in India is expected to grow to 300 billion USD. A Digital Influence Study by Boston Consulting Group found that in 2021, rural areas in India were responsible for only 10% of the total online retail spending. This is estimated to rise to 18% by 2025 and 24% by 2030.⁷⁸ This is reflected by the figure below.



⁷⁷ Raj, Keerthan, and P. S. Aithal. "Digitization of India-impact on the BOP sector." *International Journal of Management, Technology, and Social Sciences (IJMTS)* 3.1 (2018): 59-74.

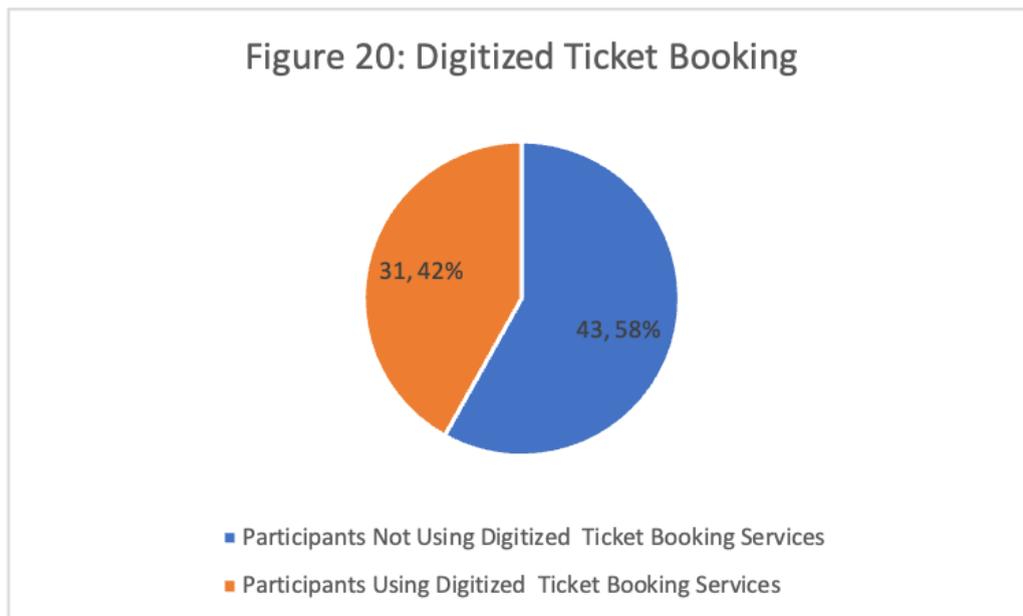
⁷⁸ Jain, Nimisha. "E-commerce in India | Ten things you should know | BCG." *Boston Consulting Group*, 6 July 2022, <https://www.bcg.com/publications/2022/e-commerce-in-india-ten-things-you-should-know>. Accessed 4 May 2023.

Figure 20 displays that 42% of the digital-service using participants use digitized/online ticket booking services. Ticket-booking in this case is limited to transport. Out of all the transport systems in India, the Indian railway system has the deepest roots with a total track length of 71,000 miles, connecting rural India to the rest of the country. In 2002, the Indian Rail Catering and Tourism Corporation (IRCTC) introduced an internet-based ticket booking platform to combat inefficiencies such as agents and middle-men involved in the booking process, inconvenient and time consuming booking process, and most importantly, the lack of visibility in terms of available seats. After its slow start due to multiple bugs and technical issues, the IRCTC introduced a mobile application in 2013-2014 and went cashless in 2018 to promote digitization.^{79 80} In 2020, the IRCTC along with the Centre for Railway Information Systems (CRIS) launched an upgraded e-ticketing and mobile application for booking online railway tickets.⁸¹ These advancements over the years have made ticket booking more convenient, however, the travel restrictions imposed during the pandemic paired with potential barriers including literacy, awareness, and accessibility could have resulted in the figure given below.

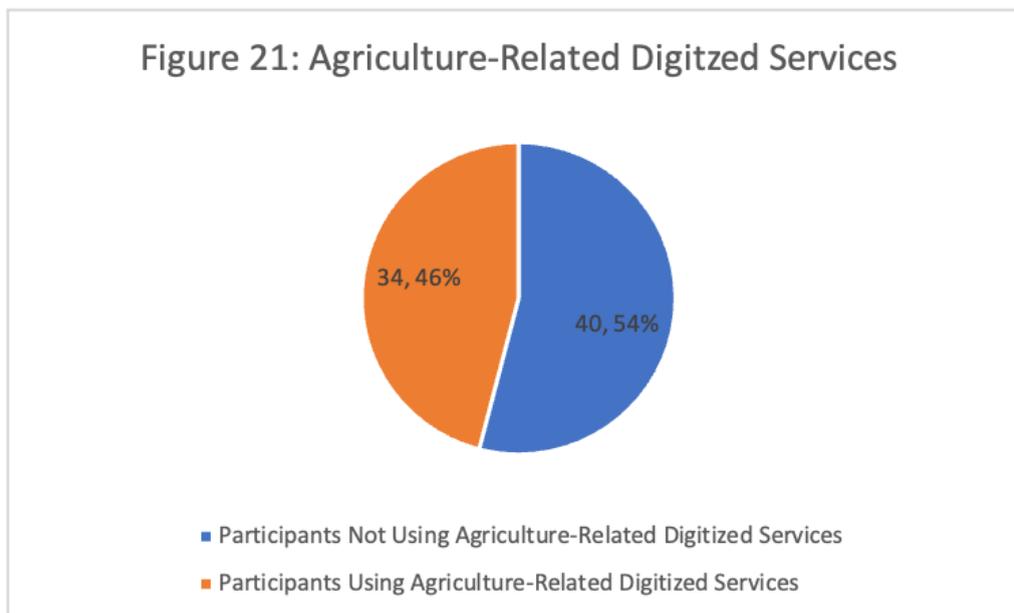
⁷⁹Chirag. "IRCTC – Reinventing the "wheel"? - Technology and Operations Management." *Digital, Data, and Design Institute at Harvard*, 18 November 2016, <https://d3.harvard.edu/platform-rctom/submission/irctc-reinventing-the-wheel/>. Accessed 4 May 2023.

⁸⁰ Nag, Devanjana. "Indian Railways goes cashless; here are recent initiatives by railways to promote digitization." *The Financial Express*, 19 March 2018, <https://www.financialexpress.com/business/railways-indian-railways-goes-cashless-here-are-recent-initiatives-by-railways-to-promote-digitization-1103831/>. Accessed 4 May 2023.

⁸¹ "Indian Railway Launches Upgraded e-Ticketing Website & Mobile App for Booking of Online Railway Tickets." 31 Dec. 2020, <https://pib.gov.in/PressReleasePage.aspx?PRID=1685036> . Accessed 3 May 2023.



From the figure 21 and the survey responses, it is clear that the survey participants are interested and invested in the agricultural sector. 36 of the participants were farmers and 26 were laborers that worked on farms when called/ as needed. Even participants who had an occupation other than farming wanted to keep up with agricultural news and new information in this sector. Figure 21 shows that 46% of the digital-services using participants use agriculture-related digitized services. While this percentage is significant, many farmers still have a traditional mindset in terms of their practices and tools. This is as the negative consequences and costs of experimentation along with the risk involved in adopting new technology and new methods is a significant loss that might or might not be recovered in the next harvest period. At the same time, the younger generation of the agricultural families, which is important in educating others about digitized services and implementing technology, is moving away from farming and rural areas into secondary and tertiary sectors based in urban areas.



An example of an agriculture-related service that was digitized in India is e-NAM. In 2016, the government of India launched e-NAM (National Agriculture Market) which is a pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities.^{82 83} In 2022, it launched the e-NAM Platform of Platforms (PoP) dashboard as a mobile application.⁸⁴ The following extract from an article explains PoP’s capabilities:

“PoP can enable farmers to access the new or missing markets, compare prices of several commodities, and sell the assayed and certified produce to traders and bulk buyers through the PoP mobile app. Farmer collectives or FPOs can access the location of warehouses or market yards given the

⁸² APMC Mandis: APMC (Agricultural Produce & Livestock Market Committee) established under the provision of the APLM Act. APMC mandis, also called APMC yards, are physical locations as a part of the market managed by the APMC. A state can have multiple APMCs and they are regulated by the state government. <https://enam.gov.in/web/stakeholders-involved/Apmcs>

⁸³

“National Agricultural Market.” *Home: eNam*, Ministry of Agriculture, <https://www.enam.gov.in/web/>. Accessed 4 May 2023.

⁸⁴“eNam | Mobile App.” *Home*, <https://enam.gov.in/web/mobile-app>. Accessed 4 May 2023.

*proximity and contact the empanelled service providers of eNAM PoP and avail of such services. For example, Aryadhan, a fin-tech services provider, would extend trade finance options and offer real-time payments to FPOs.*⁸⁵

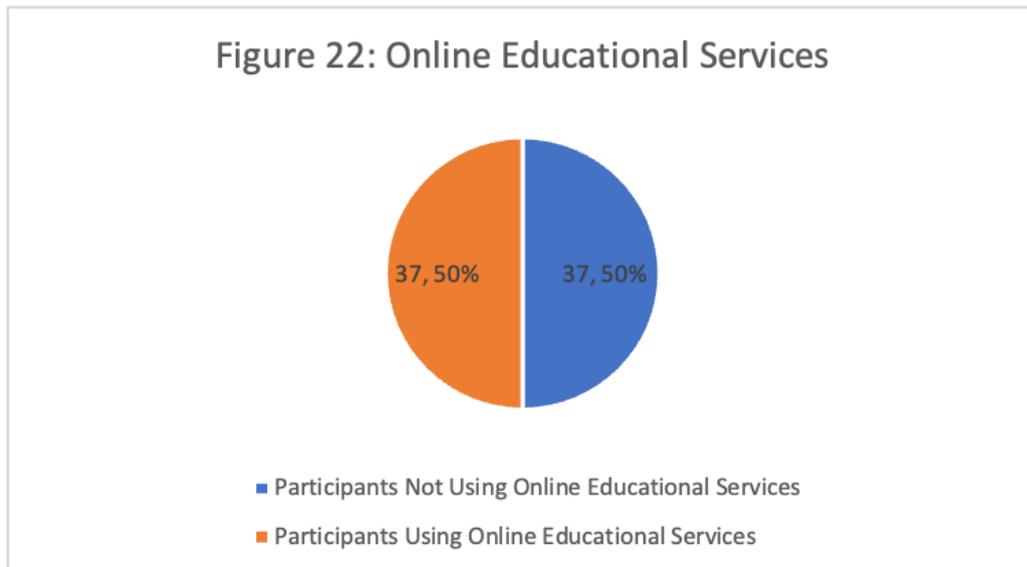
However, the e-NAM has integrated 1361 APMCs from 23 states and 4 union territories out of the 31 states and 8 union territories in India, leaving out a significant area.⁸⁶ There is still a question of the value that this platform brings to farmers and if it is cost-effective for them. Moreover, concerns regarding local and national politics and incentivizing the usage of this service have emerged and are yet to be addressed.

Figure 22 shows that 50% of the digitized-services using participants used online educational services. This is likely due to the impact of the COVID-19 pandemic, which accelerated online schooling and pushed many people to become users of other digital educational platforms and products even after the in-person classes and educational institutions resumed. Participants in the age category of 25 and below repeatedly mentioned using their technological devices for the purpose of education. The statistic below also reflects parents' usage and spending on online educational services and some participants mentioned sharing their mobile phone with their children.

⁸⁵

Dixit, Priyankesh, and Kushankur Dey. "eNAM platform of platforms – Key concerns and way forward." *The Hindu Business Line*, 1 October 2022, <https://www.thehindubusinessline.com/opinion/enam-platform-of-platforms-key-concerns-and-way-forward/article65958249.ece>. Accessed 4 May 2023.

⁸⁶"eNam | APMCs." *Home*, <https://enam.gov.in/web/stakeholders-Involved/Apmcs>. Accessed 4 May 2023.



There has also been a boost in education technology in India providing engaging educational content as an addition and/or alternative to traditional schooling. One of the largest players in this category, which has also been termed India's most valuable start-up, is Byju's. Byju's has more than 150 million registered students and 12,000 teachers on its platform as of December 2022.^{87 88} However, the platform's sustainability is being questioned, given its significant financial losses in 2021 along with it being unaffordable for a large sector of the Indian population.^{89 90} Therefore, the private sector and the technologically innovative products it offers in the education sector cannot be considered as a solution to limited educational resources for rural communities due to accessibility and affordability reasons.

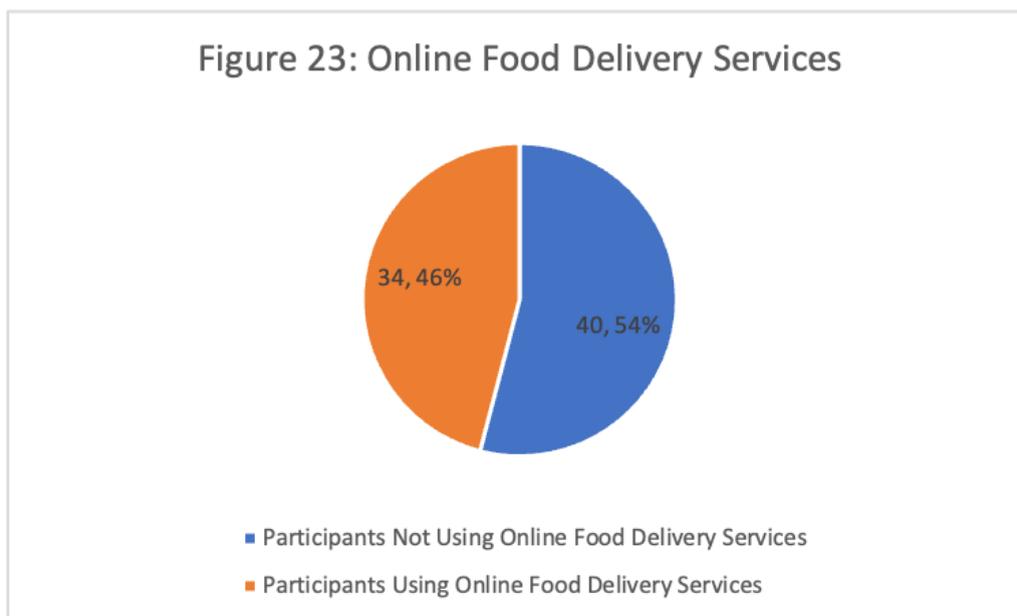
⁸⁷"Learn Math, Coding, Music & Arts Online | BYJU'S USA | BYJU'S Learning | BYJU'S Future School." *Learn Math, Coding, Music & Arts Online | BYJU'S USA | BYJU'S Learning | BYJU'S Future School*, <https://byjus.com/learning/about/>. Accessed 4 May 2023.

⁸⁸"BYJU'S." *LinkedIn*, <https://www.linkedin.com/company/byjus/?originalSubdomain=in>. Accessed 4 May 2023.

⁸⁹Roy, Vaishna. "Byju's staff reveal harsh work conditions, Indian parents say edtech giant pushed them into debt." *Frontline*, 17 December 2022, <https://frontline.thehindu.com/news/investigation-byjus-staff-reveal-harsh-work-conditions-indian-parents-say-edtech-giant-pushed-them-into-debt/article66274546.ece>. Accessed 4 May 2023.

⁹⁰SH, Salman. "Steep losses, high cash burn: Byju's seeks more time to pay \$1.2 bn." *The Financial Express*, 11 January 2023, <https://www.financialexpress.com/industry/steep-losses-high-cash-burn-byjus-seeks-more-time-to-pay-1-2-bn/2943935/>. Accessed 4 May 2023.

Figure 23 showcases that 46% of the digital-services using participants use online food delivery services. It must be noted that the survey questionnaire sent to the participants does not specify grocery or prepared and packaged food delivery. Thus, this statistic represents online delivery of all food-related items.



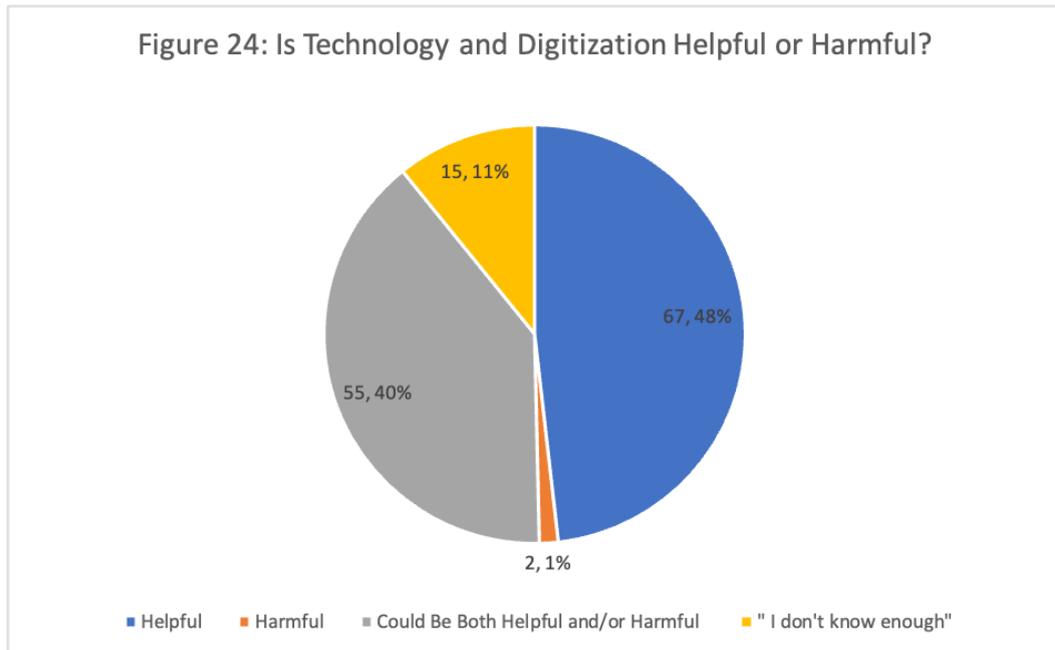
There are multiple food delivery businesses using mobile phone applications to enable users to order food, groceries, and other goods from local stores and restaurants. Larger players in the Indian market include Swiggy and Zomato, however, there are also start-ups specifically aimed at the rural user base. Food Express Online is one such online food delivery platform. The founders of Food Express Online emphasize on not having to compete with the giants in the industry as “there is no minimum order, and as compared to other players in this space, the delivery charge as well as commission from partners are the lowest” and they also “charge the same price at what it is offered by the vendor, unlike any other app in the

industry.”⁹¹ There is still a cultural barrier to spending regularly on ordering take-out in rural communities, which this is quickly changing. The Indian online food industry was estimated to be an \$8 billion market by 2022.⁹² The increase in overall consumer spending is also reflected in the increase in online shopping stated previously.

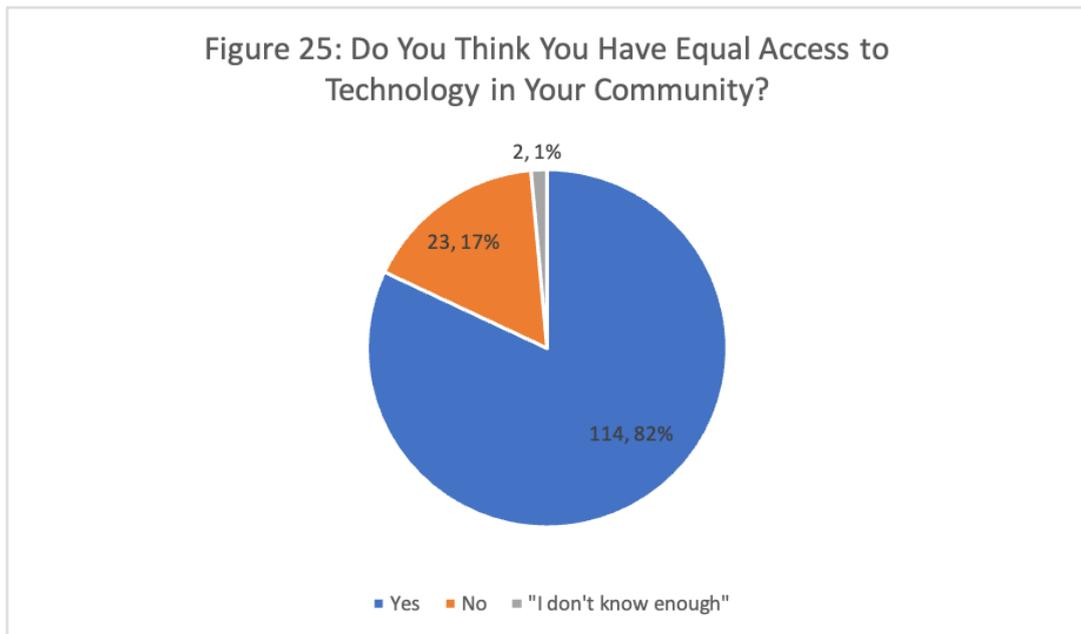
Given the survey responses and the state of digitized services in India above, it can be seen that there is growth and advancement in each sector in terms of digitization and technology. However, it also shows that technology adoption is dependent on multiple factors, including people’s perception of technology. Figure 24 below shows what the survey participants’ perception of technology is when asked about technology and digitization. From the participants, 1% believed technology and digitization is harmful, 48% believed it is helpful, and 40% believed that it can be both depending on how it is used and regulated. What stood out was that 11% of the participants did not provide a clear answer, stating that they do not know enough about technology or digitization to give an informed response or have an opinion.

⁹¹Varshney, Rashi. “[Startup Bharat] How these two friends decided to tap into the food delivery space in rural West Bengal.” *YourStory*, 2 April 2021, <https://yourstory.com/2021/04/startup-bharat-food-delivery-rural-west-bengal-chakdaha>. Accessed 4 May 2023.

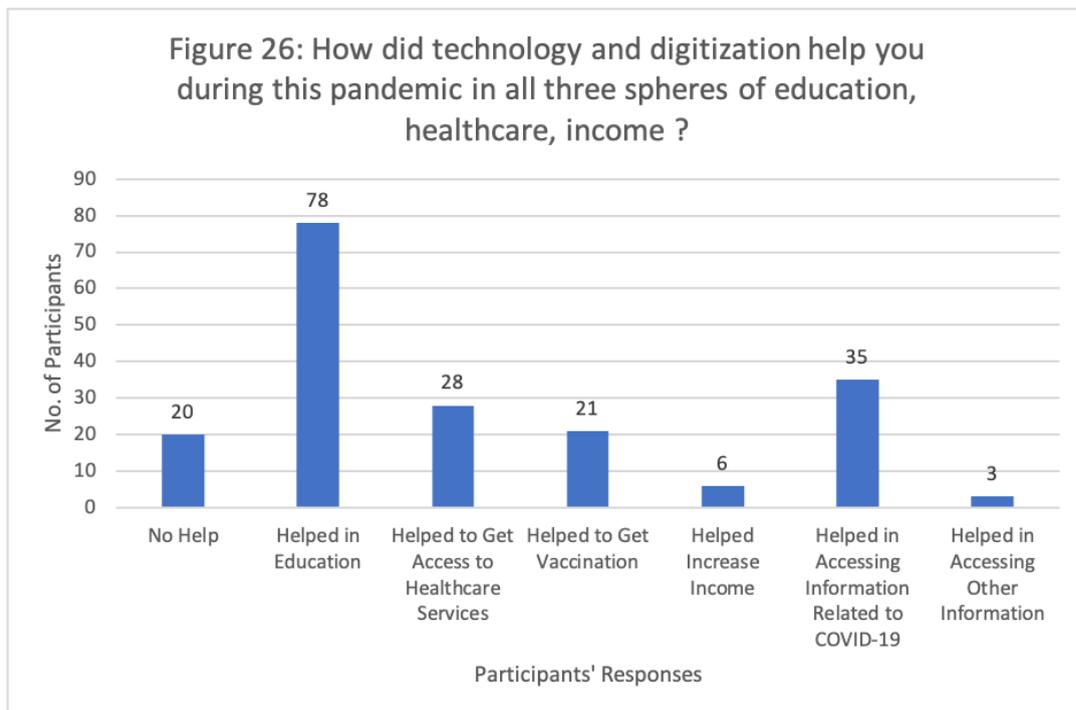
⁹²“Demystifying.” *Boston Consulting Group*, https://web-assets.bcg.com/img-src/Demystifying-the-Online-Food-Consumer_tcm9-238295.pdf. Accessed 4 May 2023.



To get a better understanding of people's perception about technology and access to it, another question was included in the survey questionnaire wherein the participants were asked if, according to them, they have equal access to technology within their community. Figure 25 shows that 82% of the participants believed that they have equal access to technology, 17% of them believed that they do not, and 1% of them believed that they did not know enough to answer this question. The two common reasons given by the participants that chose 'no' for this question were that (1) they did not have the time to pay attention to technology and were busy in their work and (2) their education was incomplete, they were illiterate, or they did not have any skill-based training to operate technological devices and be media literate.



The developments over the past two decades have resulted in increased mobile phone ownership, higher usage of the internet through more affordable mobile data/internet, increased smartphone affordability, and an increased range of digitized services in each sector. Especially during the COVID-19 pandemic, digitized services and increased access to technology helped people in multiple sectors. Survey data in figure 26 highlights the main areas wherein technology and digitization helped the participants, which are access to education, healthcare services, and regularly updated information related to COVID-19.



However, as shown by the data collected from the survey, the gap between accessibility and actual efficient usage still exists in these rural communities. Thus, there is potential for mobile phones to solve many problems by being a catalyst and central to the digitization process. However, as seen through my survey, there are many infrastructural, social, and other kinds of obstacles for people to benefit from the potential of mobile phones paired with digitized services. The next few chapters expand on these obstacles. They discuss the need to further develop telecommunications and other infrastructure to support digitization, study behavioral, social, and cultural factors that affect technology adoption, and develop policies and programs/initiatives based on the collective understanding of resources available paired with the people's willingness to learn.

Chapter 4: Technology Adoption Part 1 – Infrastructure, Literacy, and Governance

The previous chapter highlights the gap that exists between technology access and its efficient usage in the surveyed region. It discusses how, in various less developed nations, digitization has rapidly increased in the past two decades and, now more than ever, people have easier access to technology, digital platforms, and digitized services through mobile phones and relatively lower costs of internet access. This chapter focuses on the barriers to technology adoption and the usage of these technological resources effectively and efficiently. The obstacles include the establishment and quality of infrastructure and education in rural areas. These factors significantly impact people's ability to adopt new technologies, which can be transformative for their communities, and gain various benefits from them.

The key pillars of integrating technology successfully within communities are 'core infrastructure' and 'conditions for usage'. Core infrastructure consists of reliable and consistent access to electricity, affordable mobile phone and internet access, good quality education, skills and knowledge about media and technology (media literacy) along with an awareness and understanding of harmful societal practices like corruption. In order to build the core infrastructure, the conditions for usage such as costs, education, and appropriate application and integration of technology must be fulfilled. Therefore, investing in and developing the basic foundational infrastructure

should be prioritized in order to establish a technologically skilled and digitally literate society.^{93 94}

A weak core infrastructure has the potential to intensify rural issues and cause a delay in the impact that digitization can have on rural communities. This is magnified when rural communities are hit by crises. The recent COVID-19 pandemic uncovered many gaps in information dissemination technologies and telecommunication infrastructures in less developed rural regions. Even before the pandemic, the countries of Sierra Leone, Liberia, and Guinea faced great losses and extremely limited access to resources during the outbreak of the Ebola virus. Undeveloped road systems, telecommunications, transportation services, and ineffective communication channels resulting in delayed information transmission and ineffective public information campaigns were all examples of infrastructural failures that intensified the crisis in the three nations' rural areas, showing the implications of sidelining these regions in their process of digitization.⁹⁵

In India, the government's digitization efforts were structured and formalized under the 'Digital India' Program in 2015. Their website highlights their main objectives, including making at least one person in every household e-literate. Additionally, to build the core infrastructure for information and communication technology, the

⁹³ Op. cit. Klimburg and Zylberberg, 2015; Dalberg Report, Impact of the Internet in Africa: Establishing conditions for success and catalysing inclusive growth in Ghana, Kenya, Nigeria and Senegal, 2013, available at: http://www.impactoftheinternet.com/pdf/Dalberg_Impact_of_Internet_Africa_Full_Report_April2013_v_ENG_Final.pdf

⁹⁴ Schia, Niels Nagelhus. "The Cyber Frontier: Digitalization of the Global South." *European Cybersecurity Journal* (2) (2016): 82-94.

⁹⁵ Gborie, S. "Factors That Contributed to Undetected Spread." *World Health Organization*, World Health Organization, Jan. 2015, <https://www.who.int/news-room/spotlight/one-year-into-the-ebola-epidemic/factors-that-contributed-to-undetected-spread-of-the-ebola-virus-and-impeded-rapid-containment>.

program includes the Department of Telecom and its aim to roll out a National Optical Fiber Network to provide 100 Mbps internet to the country's 250,000 gram panchayats, creating an information highway as a part of the process of digitizing all villages in India.^{96 97} However, 25% of Indian adults were unable to read or write according to a 2017 statistic and the geographical application of new technologies remains limited in rural India such that many rural residents are unaware of technological developments that could potentially benefit them. These factors, along with limited physical and technological connectivity along with literacy and technological skills, are barriers for rural development and work to amplify the gap between the digitization and quality of technology available in urban and rural areas of the nation, leaving rural communities isolated.⁹⁸

An additional problem that arises from this imbalance is rural to urban migration, which has been identified to put more pressure on the environment, government, and infrastructure of cities according to the United Nations.⁹⁹ The last report on urbanization in India in 2011 stated that rural migrants made up 46% of the urban population.¹⁰⁰ As a part of the survey conducted in Maharashtra, participants were asked if a family member has migrated out of the village into a city. The figure below shows that 17 out of the 139 participants agreed to have a family member or more

⁹⁶ Gram Panchayat: A 'gram panchayat' is the local governing body of an Indian village wherein the representatives are directly elected by the villagers.

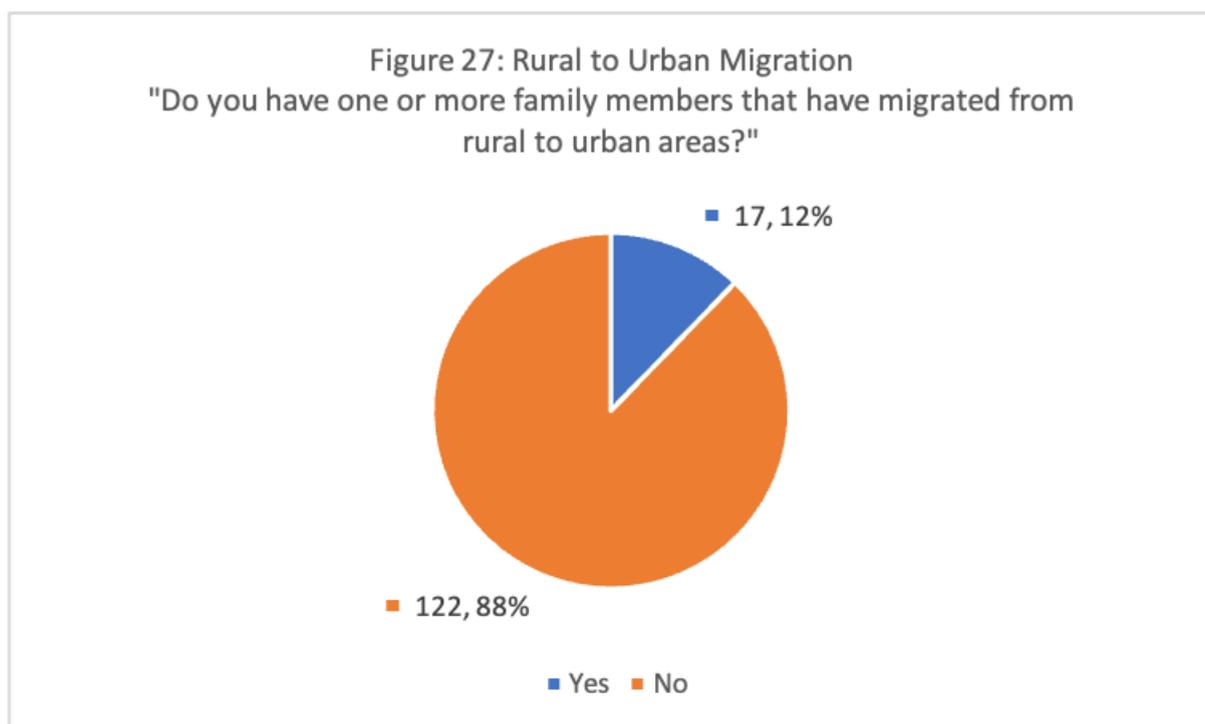
⁹⁷ "Digital India." *Digital India*, <https://digitalindia.gov.in/>. Accessed 4 May 2023.

⁹⁸ Lele, Uma. "How Technology Is Helping India's Rural Poor." *World Economic Forum*, 2 Oct. 2017, <https://www.weforum.org/agenda/2017/10/india-fourth-industrial-revolution-farming/>.

⁹⁹ "68% Of the World Population Projected to Live in Urban Areas by 2050, Says Un | UN Desa Department of Economic and Social Affairs." *United Nations*, United Nations, <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>.

¹⁰⁰ Rajan, S. Irudaya, and R.B. Bhagat. KNOMAD-Global Knowledge Partnership on Migration and Development, 2021, *Internal Migration in India: Integrating Migration with Development and Urbanization Policies*, <https://www.knomad.org/sites/default/files/2021-02/Policy%20Brief%20-%20Internal%20Migrationand%20Urbanization%20-%20India%20Policy%20Brief%2012%20Feb%202021.pdf>. Accessed 2023.

that has/have migrated to an urban area. A factor to consider in this statistic is that many migrants returned to their villages at the start of the COVID-19 pandemic in March 2020 in India, however, since pandemic related restrictions have been lifted, more people are likely to migrate. This reiterates the importance of investing in the core infrastructure of rural areas and its ability to target multiple present problems while also preventing more serious consequences of having partial and inefficient digitization.



In terms of illiteracy, including digital illiteracy, rural areas are at a disadvantage due to low quality and limited educational resources and the distinctness/uniqueness of rural languages. When new technologies are introduced, they are often in languages foreign or less known to the communities, creating a language barrier for rural people to access those technologies. In India, while many new digital technologies and services have been made available in more than 10 Indian languages, there are

387 living languages being used in the nation.¹⁰¹ Moreover, rural Indian villages as well as tribal communities are each known to have their own separate dialects of the languages spoken in their region which strengthens the language barrier.

Interestingly, a mostly illiterate community in Benin, the Yoruba people, found ways to bypass language and literacy barriers as they used signs and specific symbols as well as voice messages on the instant messaging platform 'WhatsApp'.¹⁰² Their development of strategies which enabled them to benefit from ICT and digitization could be replicated in other rural communities and on other digital platforms like WhatsApp. Nonetheless, this does involve creating awareness about the different digital resources and platforms and the features that they come with in order for rural people to adopt these technological advancements.

While there is emphasis on increasing awareness and accessibility of technology in the process of digitization, there must be an evaluation of the appropriateness/practicality of employing or integrating technology in certain initiatives. For example, some organizations in Africa in 2010 had started distributing cash transfers and welfare payments through the medium of mobile phones due to its efficiency. However, there were multiple risks and costs involved in this process that were observed. The people needing these payments the most cannot be assumed to have mobile phones and know how to withdraw the money. This process of mobile transfers is tech-intensive and people might need to find agents or other middle-men to guide them.¹⁰³ This shows that when technology is made integral in

¹⁰¹ *Indian Languages*,

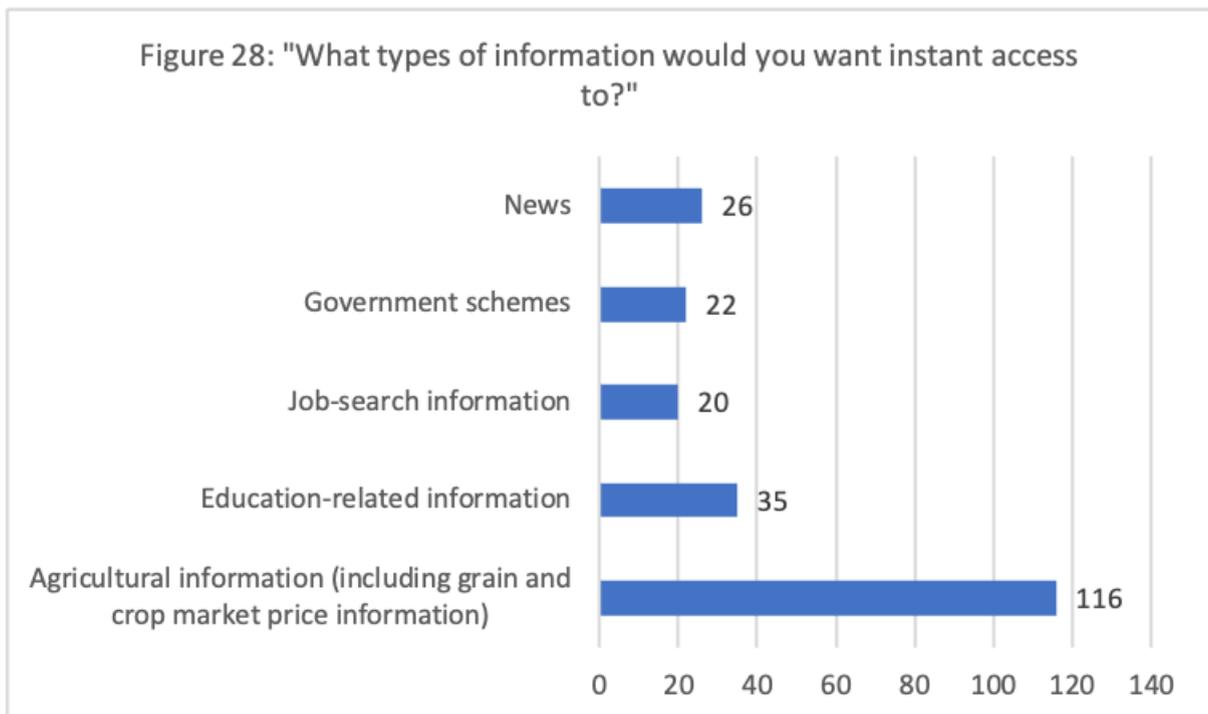
https://www.education.gov.in/sites/upload_files/mhrd/files/upload_document/languagebr.pdf. Accessed 4 May 2023.

¹⁰² Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

¹⁰³ Aker, Jenny C., and Isaac M. Mbiti. "Mobile phones and economic development in Africa." *Journal of Economic Perspectives* 24.3 (2010): 207-32

programs and services meant for communities such as low-income, low-resource, and less developed communities, technology can become a barrier itself. While today ownership and knowledge of mobile phones and other technological devices is higher than in 2010, making assumptions about less developed communities could result in inefficiency, misinformation, and misunderstandings. This emphasizes the need for continued investment in building the core infrastructure to support rural communities and their technology use.

An alternate suggestion could be to understand the types of information that people in these communities want quick access to and to develop technologies along with awareness campaigns to educate the people on the process of accessing that information. As a part of the survey conducted in Maharashtra, the participants were asked about the types of information that they would like more direct and instant access to. Figure 28 showcases the top responses:



From the figure, it can be seen that 116 out of the 139 participants want instant access to agricultural information. This can be separated into (1) agricultural queries and farming practices and (2) market information such as grain and crop market prices. A large part of the participant population is involved in farming and agricultural practices and agriculture is the main economic sector in the surveyed region. Therefore, having more direct access to agricultural news, schemes, grain and crop market prices, along with ways to integrate new practices through streamlined and easy-to-navigate digital platforms or mobile phone applications could greatly benefit farmers. The same is true for other types of information including education, government schemes, news, and job-search information. The government as well as local organizations and NGOs can use this as a first step in increasing media literacy in rural communities.

In India, a mobile phone based application has been privately developed called 'Haqdarshak' wherein people can enter their information and get an instant list of government welfare schemes that they are qualified to apply to. Since its introduction in 2016, the platform has impacted 2.7 million Indian citizens. A unique aspect of their operations is that they work on an assisted-tech model wherein technology is combined with trained support agents that can help and personally assist people from every strata of society—with varying levels of literacy, technological skills and knowledge—to gain access to government schemes and efficiently utilize this technology.¹⁰⁴ This assisted-tech model can, therefore, be considered as a part of

¹⁰⁴“about_hq.” *Haqdarshak*, https://haqdarshak.com/about_hq/. Accessed 4 May 2023.

the core-infrastructure needed to effectively include rural, low-income, and low-resource communities in the process of digitization.

The other side of infrastructural development that must also be considered is the primary involvement of the government which brings power relations into the equation. Access to technology and policies related to media and technology in multiple instances have been shaped and leveraged to fulfill political agendas, creating another set of barriers to access. Examples of these political barriers include government shutdowns, repressive policies, and crackdowns on free speech. In 2016, social media platforms including Facebook and Twitter were blocked in Uganda during elections. More recently, in 2019, the Indian government imposed a communications blackout by cutting off phone and internet connections in the northern state of Jammu and Kashmir. This was as the government anticipated unrest after revoking the state's special status and integrating it with the rest of the country. The shutdown lasted for 18 months, until 2021. India has had the highest number of internet shutdowns globally and in just 2021, internet access was revoked a minimum of 106 times.¹⁰⁵

Access to the internet, digitized services, and other technologies has been strategically used by many governments to control communication channels and information flows. Such practices, which involve making technology integral in accessing a variety of services and then controlling that access in periods where people need it the most, can be considered abusive and repressive. In Uganda, the

¹⁰⁵Bhat, Mehran, and Rina Chandran. "FEATURE-'Living in the stone age': Offline for 18 months in Indian Kashmir." *Reuters*, 28 September 2022, <https://www.reuters.com/article/india-internet-shutdown/feature-living-in-the-stone-age-offline-for-18-months-in-indian-kashmir-idINL8N2YZ245>. Accessed 4 May 2023.

people contested the 2016 shutdown in national courts and people globally are questioning government decisions in regards to governing technology access and cyberspace.¹⁰⁶ Therefore, while this is a matter of security and surveillance, it is also a matter of free speech and people's rights. It brings in the question of who should be able to control ICT, the cyberspace, and information flows and if any regulation strategies can fairly support both democracy and national security. Debates around governing and regulating digital spaces are constantly taking place around the world, especially in countries that are digitizing at a fast pace such as India.

India has rapidly digitized in the past decade. In 2010, the percentage of population using the internet was 7.5% whereas in 2020, it was 43%.¹⁰⁷ In recent years, India has been focused on state dominance in the tech sector, especially targeting social media and OTT platforms. In 2018, the Ministry of Electronics and Information Technology introduced new intermediary rules for these platforms that made it mandatory for them to enable the identification of the primary originator of a message upon legal request, proactively identify acts depicting rape and child sexual abuse or conduct, and display a notice to users trying to access that information.¹⁰⁸ These rules were not fully implemented, primarily as there were concerns about changing the infrastructure holding up user privacy through encryption on these platforms. This started a conversation around the various objectives behind cyberspace regulations placed by the government and started the encryption debate in India.

¹⁰⁶ Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

¹⁰⁷ *World Development Indicators*, <https://databank.worldbank.org/source/world-development-indicators> . Accessed 6 May 2022.

¹⁰⁸ Burman, Anirudh, and Prateek Jha. "Understanding the Encryption Debate in India."

In order to fully understand the debate, one must understand the concept of encryption and cryptography. According to Indian Law, encryption is the process of converting plaintext into text that cannot be deciphered or cannot be accessed without using a decryption process. Another definition in a report by the U.S. National Research Council states:

*“In the traditional application of cryptography for confidentiality, an originator (the first party) creates a message intended for a recipient (the second party), protects (encrypts) it by a cryptographic process, and transmits it as ciphertext. The receiving party decrypts the received ciphertext message to reveal its true content, the plaintext. Anyone else (the third party) who wishes undetected and unauthorized access to the message must penetrate (by cryptanalysis) the protection afforded by the cryptographic process...”*¹⁰⁹

Furthermore, the encryption norm for most consumer-oriented and OTT tech platforms is end-to-end encryption (E2EE). E2EE works to protect the data from being accessed by third parties while it is in transit from the sender to the intended receiver. It does this through a process whereby only devices involved in the communication have access to what is being communicated and a public key is used to encrypt the message as it is being sent whereas a private key, which can only be accessed by the receiver, is used to decrypt it.^{110 111} Its establishment came as a

¹⁰⁹ Burman, Anirudh, and Prateek Jha. "Understanding the Encryption Debate in India."

¹¹⁰ Burman, Anirudh, and Prateek Jha. "Understanding the Encryption Debate in India."

¹¹¹ Lutkevich, Ben, and Madelyn Bacon. "What Is End-to-End Encryption (E2EE) and How Does It Work?" *SearchSecurity*, TechTarget, 25 June 2021, <https://www.techtarget.com/searchsecurity/definition/end-to-end-encryption-E2EE>.

result of increased percentages of populations having mobile phones, making more of their interactions digital and, thus, making their data easier to access by third parties.

Many governments and law enforcement agencies (LEAs) have demanded that the platforms build a backdoor to this encryption process such that the messages can be accessed by them upon request. The framework of encryption, however, is extremely complex and any changes made to weaken encryption to give particular parties access would also give other parties unintended access, increasing security and privacy concerns. According to most experts, there is essentially no way to only give governments and LEAs special access. This is seen, at the core, as a technology issue wherein no successful solution has been found yet.

There are two sides to this debate as well as the overall conversation regarding regulating digital spaces and technology. On one hand, regulations are integral to maintaining the nation's security through digital surveillance. On the other hand, regulations have been utilized by the government to censor speech and information and gain increased control over digital information flows.

India has been in a state of conflict with its neighboring country Pakistan since their separation in 1947. In the history of wars between them, the Kargil war in 1999 stands out. This is as following the war, the Kargil Review Committee stated the need to allocate more attention and resources to encryption and decryption skills and

technologies to strengthen communication within the army.¹¹² The importance of this was emphasized by the fact that India is surrounded by other nuclear powers.

Apart from wars, India has also been at risk of terrorist activity. The attack on its financial capital Mumbai in November 2008 is considered India's first major terrorist attack and it was found that the terrorists used BlackBerry devices to communicate via messaging along with other devices and technologies.^{113 114} E2E encryption has been connected to terrorist organizations and their exploitation of high-tech software. The publication 'How Terrorists Use Encryption' by Robert Graham provides an instance of one such software and explains its abilities:

“On personal computers, the software known as PGP (Pretty Good Privacy), first created in the mid-1990s, reigns supreme for end-to-end encryption. It converts a message (or even entire files) into encrypted text that can be copy/pasted anywhere, such as email messages, Facebook posts, or forum posts. There is no difference between “military grade encryption” and the “consumer encryption” that is seen in PGP. That means individuals can post these encrypted messages publicly and even the NSA (National Security Agency of the United States) is unable to access them. There is a misconception that intelligence agencies like the NSA are able to crack any encryption. This is not true. Most encryption that is done correctly cannot be overcome unless the user makes a mistake.”¹¹⁵

¹¹² “Executive Summary of the Kargil Committee Report.” *Executive Summary of the Kargil Committee Report*:<http://nuclearweaponarchive.org/India/KargilRCA.html>.

¹¹³ Rotella, Sebastian. “In 2008 Mumbai Attacks, Piles of Spy Data, but an Uncompleted Puzzle.” *ProPublica*, <https://www.propublica.org/article/mumbai-attack-data-an-uncompleted-puzzle>.

¹¹⁴ Burman, Anirudh, and Prateek Jha. “Understanding the Encryption Debate in India.”

¹¹⁵ Graham, Robert. “How Terrorists Use Encryption.” *Combating Terrorism Center at West Point*, 16 Nov. 2017, <https://ctc.westpoint.edu/how-terrorists-use-encryption/>.

However, India's newest encryption law is based on the current government's ability to control and govern their own citizen's actions online. The internet, especially social media and OTT platforms, have become the latest spots for people to revolt against the government. In January 2021, farmers in the various states of India participated in widespread protests against the new farm laws that turned violent which were accompanied by a mass online backlash against the government. Social media was seen as the catalyst of this violence by the government and it demanded the platforms to take any content related to it down. This further prompted the government to reassess its policies and in February 2021, it issued a set of new rules titled 'Intermediary Guidelines and Digital Media Ethics Code'. The two main points of this code are the content filtering mandate and the traceability mandate, which essentially require OTT messaging platforms to report information about the originators of messages upon request.¹¹⁶

Consequently, government agencies within India have differing stances on encryption as the previously mentioned Ministry of Electronics and Information Technology is working on the same values as the government while the Telecom Regulatory Authority of India has highlighted that for the new rules to be effective, changes would have to be made that would impact the entire framework of OTT platforms which might weaken their security. It is, therefore, unclear whether cooperation between such agencies on forming cohesive rules would happen anytime soon.

¹¹⁶ Opsahl, Katitza Rodriguez and Kurt. "India's Draconian Rules for Internet Platforms Threaten User Privacy and Undermine Encryption." *Electronic Frontier Foundation*, 22 July 2021, <https://www.eff.org/deeplinks/2021/07/indias-draconian-rules-internet-platforms-threaten-user-privacy-and-undermine>.

It is evident that there are multiple national objectives that are impacted by government policies on encryption within digital platforms. There have also been contrasting viewpoints within the nation's agencies and a more collaborative effort is needed to reduce the adverse effects of any policies on the various stakeholders. This is a multidimensional debate that can be viewed from political, economic, civil rights and liberties, and criminal angles. According to Anirudh Burman and Prateek Jha, authors of 'Understanding the Encryption Debate in India', the right way to view this debate includes answering a few questions, some of which include:

1. *How will the proposed approach affect the security of encrypted information?*
2. *To what extent will the proposed approach affect the country's economic competitiveness?*
3. *Will the proposed approach improve, or at least maintain, existing legal protections against the misuse of surveillance powers?*¹¹⁷

The example of the encryption debate in India essentially highlights how technology has been employed in the nation before the establishment of functional regulatory mechanisms. This is true for many developing and less developed countries, where the digital revolution has also brought concerns regarding digital security and vulnerability of the nation. For countries in the global south, which leapfrogged into the digital age, technology has provided many advantages including improved connectedness and new global opportunities. However, the consistent introduction of new technology has brought new challenges with it whereas legal regulations, state

¹¹⁷ Burman, Anirudh, and Prateek Jha. "Understanding the Encryption Debate in India."

institutions, and other mechanisms to solve these challenges have not been fully established yet. Additionally, public knowledge and skills along with general awareness of the risks and consequences of certain technologies is relatively low in regions like the rural areas of India, where literacy, infrastructure, and other supporting factors to build media literacy aren't developed. This adds to the increased vulnerability of rural communities and the nation from increased access to technology. One way to minimize this is to increase awareness of risks involved when working with or using digital technologies. Additionally, the communities significantly impacted by the presence of technology, such as rural communities, should be made a part of the policy-making and regulating process of social media and other digital platforms and technologies.

The regulation and governance of traditional media channels including television and newspapers/print media in India has been such that the Indian government has gained more control over these media platforms as well as the content they share. Most importantly, even though 65% of the Indian population lived in rural areas in 2020, traditional media platforms' coverage of rural people's issues is drastically limited.¹¹⁸ This was highlighted through a study conducted by the Center for Media Studies media lab which stated that 24-hour news channels and national newspapers' coverage of rural issues including rural indebtedness and farmers' distress, was discontinuous and insufficient. The study reported the following:

“Farmers and agriculture related news constitute not even one percent of total news items of national news channels despite the fact that agriculture

¹¹⁸ “Rural Population (% of Total Population) - India.” *Data*, <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=IN>.

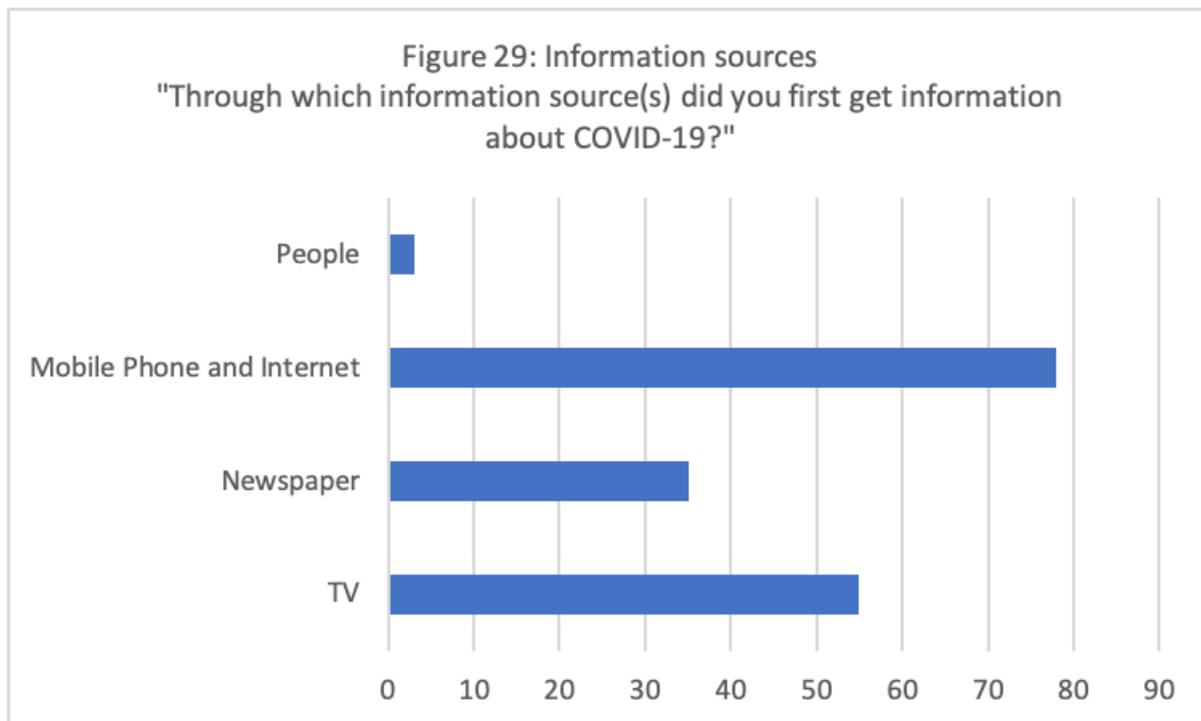
*constitutes 14.2% of the GDP at constant 2004-2005 prices during 2010-2011 as per Central Statistics Office of India.*¹¹⁹

Given the trajectory of the regulation of traditional media platforms in India, the possibility of social media and other digital spaces being regulated and censored in a similar way is concerning. This is especially as these digital spaces are now the only few places where marginalized communities like rural communities can own their narratives and spread awareness about their issues. There has been a growth in rural communities using social media. Of the 143 million Indians using social media in 2015, only 25 million came from rural areas. However, there was a 100% growth in social media users from rural areas from 2014 to 2015 and since then, there has been a constant increase in this value.¹²⁰

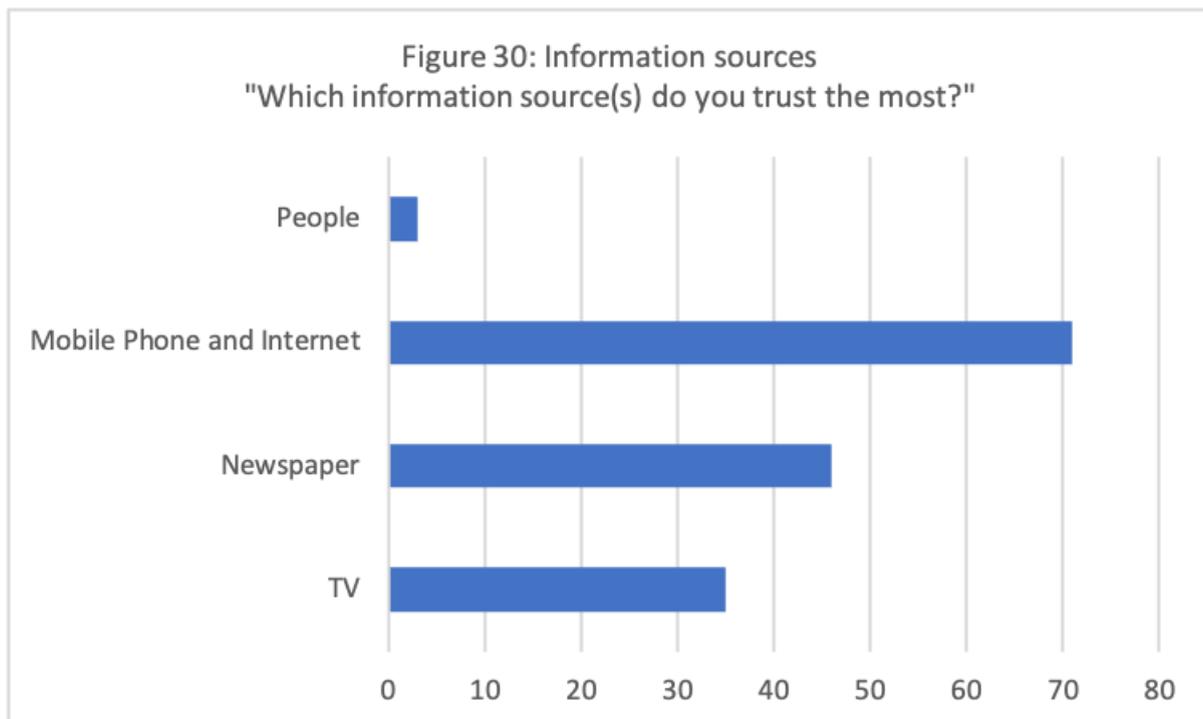
The move for rural communities to new digital media platforms is shown through the survey responses in figure 29 and 30. Participants were asked about the information sources through which they first got to know about the COVID-19 virus as well as information sources that they trust the most. Figure 29 shows that mobile phones paired with the internet was the way that most participants got to know about COVID-19. Traditional media channels including newspapers and television were relatively behind in their reporting of the virus. Thus, even though rural areas usually have more access to them as these are established mediums of information, the 'instant' access to information that mobile phones with the internet give helped spread COVID-19 information faster.

¹¹⁹ Rai, Gupta Anmol, and Zafar Shahila. "Rural India: the next frontier for social media networks." *Int J Eng Res Technol* 2.1 (2013): 1-6.

¹²⁰ Prajapati, Paresh, et al. "Social media, purpose, and use of it: A community-based cross-sectional study in a rural area of a developing nation (India)." *International Journal of Medical Science and Public Health* 9.5 (2020).



When asked about their most trusted information sources, the participants' responses on figure 30 show that most participants trust mobile phones and the internet as mediums of information. Compared to figure 29, there is an increase in the number of participants that chose newspapers as a trusted source of information whereas there is a decrease in the number of participants that chose television. This is most likely connected with the fact that information on a newspaper is filtered through multiple people and usually fact-checked before being published to the public whereas, television and especially news on TV is more focused on sensational topics. In the case of figure 29, TV news is more up-to-date than print news due to the same filtering process mentioned above. In both cases, there is a clear indication that rural people are increasingly using and trusting mobile phone-based and internet-based media.



The lack of coverage and representation through traditional media is likely to have pushed many more rural communities to use new media such as social media platforms. Diving deeper into the usage of social media by rural communities, it is important to analyze the effectiveness of their usage in terms of bringing change in their regions. I have done so by focusing on one section of the rural population—farmers—and analyzing their usage of social media for activism in three separate significant instances as well as their outcomes. This includes actions taken by the government in reaction to the social media movements.

Agriculture continues to be a dominant sector in India and is the largest source of livelihood with more than 260 million people employed as agricultural workers

(2011).¹²¹ Moreover, 82% of farmers are small/marginal and 70% of rural households primarily depend on agriculture for their livelihood.¹²² Media and digital technology have been an essential part of this sector in India as they have been used to spread information about better agricultural practices. However, low literacy rates along with lack of training, low access to local governments and people in power, and low or no infrastructure development are some factors which have limited the growth potential of rural agricultural households.¹²³ Their recent adoption of social media practices, against these obstacles, showcases the potential of bridging the digital divide and other forms of inequality through the internet and social network sites.

One of the earlier instances of farmers using social media was in 2012, when turmeric farmers in the Sangli district of Maharashtra, India, used facebook to gather and communicate about the fallen turmeric prices. This crash in price in the local market was due to an oversupply of turmeric. To discuss the situation, a local farmer from Sangli used social network sites, primarily Facebook, to connect with other turmeric farmers and they collectively decided not to take part in the local auction to restrict supply. The call to boycott went viral and about 25,000 farmers of Sangli participated.¹²⁴ This form of protest, which would typically take months to organize, was organized in 10 days through social media.¹²⁵ An article in The Economic Times

¹²¹ PIB Delhi. "Agrarian Land." *Press Information Bureau*, 4 Feb. 2020, <https://pib.gov.in/PressReleasePage.aspx?PRID=1601902#:~:text=As%20per%20Census%202011%2C%20conducted.144.3%20million%20agricultural%20labourers>.

¹²² "Fao.org." *India at a Glance | FAO in India | Food and Agriculture Organization of the United Nations*, <https://www.fao.org/india/fao-in-india/india-at-a-glance/en/>.

¹²³ Schuler, Paul, and Mai Truong. "Connected Countryside: The Inhibiting Effect of Social Media on Rural Social Movements." *Comparative Politics* 52.4 (2020): 647-669.

¹²⁴ Bhosale, Jayashree. "Turmeric Farmers Stop Auction as Prices Stay Lower." *The Economic Times*, The Economic Times, 23 Jan. 2012, <https://economictimes.indiatimes.com/markets/commodities/turmeric-farmers-stop-auction-as-prices-stay-lower/articleshow/11596937.cms?from=mdr>.

¹²⁵ Ghosal, Sutanuka. "Farmers Using Facebook to Discuss Prices and Plan Strategy." *The Economic Times*, The Economic Times, 11 Feb. 2012, <https://economictimes.indiatimes.com/farmers-using-facebook-to-discuss-prices-and-plan-strategy/articleshow/11847817.cms?from=mdr>.

highlighting the use of social media in Indian agriculture stated: “Literate farmers are using Facebook to create a pan-India community of people growing the same crop, which can mobilize opinion and rapidly transmit information. It's a potent tool.”¹²⁶ ¹²⁷

However, boycotting local markets due to low prices for their crop is not a sustainable strategy for all farmers as they depend on market sales for regular income. After sustained low prices for multiple crops, in 2017, farmer suicides were termed as an epidemic in India. The reason behind this was that farmers were making a loss on their crop yield as they could not sell it at the Minimum Support Price (MSP) and had to sell it at the market price, which was lower than their costs. The MSP is a price above market equilibrium which protects farmers from making a loss due to market changes. According to the All India Kisan Sangharsh Coordination Committee (AIKSCC), a coalition of over 180 farmer organizations, farmers allegedly lost Rs. 35,000 crores (approximately 4 million USD) that year.¹²⁸ This was especially after the current Prime Minister Narendra Modi had promised that farmers would receive a 50% margin on their cost of production during his election campaign.¹²⁹ To raise awareness of this, the AIKSCC started a campaign paired with the hashtag ‘#KisanKiLoot’, which translated to ‘robbing the farmers’. It was primarily on Twitter and highlighted statistics about farmer suicides and their losses while also covering small scale protests. The hashtag gained great traction as

¹²⁶ Srinivas, Nidhi Nath. “Bringing Farmville to Life: How Social Media Empowers Farmers.” *The Economic Times*, The Economic Times, 24 May 2012, <https://economictimes.indiatimes.com/nidhi-nath-srinivas/bringing-farmville-to-life-how-social-media-empowers-farmers/articleshow/13425079.cms>.

¹²⁷ Kaur, Amanjit, and Ramandeep Singh. “Emerging use of social media tools in Indian agribusiness: an overview.” *Indian Journal of Economics and Development* 15.4 (2019): 626-632.

¹²⁸ The Logical Indian. “#KisanKiLoot: An Online Campaign to Highlight How Farmers Have Been Betrayed.” *The Logical Indian*, The Logical Indian, 14 Nov. 2017, <https://thelogicalindian.com/story-feed/awareness/kisankiloot-an-online-campaign-to-highlight-betrayal-to-farmers-by-the-govt/?infinite-scroll=1>.

¹²⁹ Vissa, Kirankumar. “How Long Can India's Farmers Subsidise the Nation?” *The Wire*, The Wire, 20 Nov. 2017, <https://thewire.in/agriculture/farmers-protests-kisan-ki-loot-msp-fair-price>.

it trended at number 1 nationally in 2017 and was also used by prominent journalists and activists.¹³⁰ It is still being used and became popular again during the 2020-2021 farmers' protest against privatization laws.

The farmers' protest in India started at the end of 2020 where farmers all over the country protested against three newly introduced agricultural laws which made space for private investors and reduced the government's role. This was aimed to reduce government intervention in the agricultural sector, which included practices that protected farmers such as subsidies and the minimum support price.¹³¹ This was reported as one of the largest protests in history and social network sites played a key role in this. While traditional media delayed covering it, twitter was largely used to spread general information about the protest. Traditional media platforms such as news channels on television, radio, and newspapers were highly censored and pressured by the government. They even made claims of the protestors being terrorists and anti-nationalists in disguise. This made social network sites the next best alternative for farmers to own their narrative.

The farmers formed their own 'digital army' operating mainly on social network sites in order to combat the misinformation being spread through traditional media platforms and fact-check claims. The tech-savvy children of farmers made the hashtag '#SpeakUpForFarmers', urging celebrities and other influential people to support the movement while spreading awareness of the farmers' struggles. This

¹³⁰ The Logical Indian. "#KisanKiLoot: An Online Campaign to Highlight How Farmers Have Been Betrayed." *The Logical Indian*, The Logical Indian, 14 Nov. 2017, <https://thelogicalindian.com/story-feed/awareness/kisankiloot-an-online-campaign-to-highlight-betrayal-to-farmers-by-the-govt/?infinitemscroll=1>.

¹³¹ Mashal, Mujib, et al. "What Prompted the Farm Protests in India?" *The New York Times*, The New York Times, 27 Jan. 2021, <https://www.nytimes.com/2021/01/27/world/asia/india-farmer-protest.html>.

movement saw massive success with prime minister of Canada Justin Trudeau, global celebrities like Rihanna, and national celebrities like Diljit Dosanjh supporting it. The media reach is such that an infographic by The Economic Times, states that the digital footprint of the protest in terms of followers was 250,000 on Facebook, 120,000 on Twitter, 174,000 on Instagram, and 1.2 million on Youtube. The real reach is said to be higher than these values as many people downloaded and shared posts from these social media platforms on WhatsApp, which is an instant messaging platform.^{132 133 134}

In the three events discussed above, the government's reaction to the usage of social media for activism has varied. It is important to note this as it has the potential to impact the future of digital activism and its effectiveness in the nation.

In the case of the turmeric pricing, the farmers were successful in raising prices for their turmeric supply. They did face some backlash from turmeric traders because of their boycott but they also got the opportunity to present the issue to then Chief Minister of the state Prithviraj Chavan.¹³⁵ Their movement was successful in achieving its goal and it gave them access to local people in power. When it came to the farmer suicide epidemic, the movement directly blamed the government and held

¹³² Ananth, Venkat. "Tractor to Twitter: How Farmers Developed Their Social Media Plan to Convey Their Views." *The Economic Times*, 3 Jan. 2021, <https://economictimes.indiatimes.com/news/politics-and-nation/tractor-to-twitter-how-farmers-developed-their-social-media-plan-to-convey-their-views/articleshow/80075943.cms?from=mdr>.

¹³³ Chaudhury, Saheli Roy. "India Wants to Cut Big Tech down to Size. Critics Say the New Rules May Give the State Too Much Power." *CNBC*, CNBC, 20 Apr. 2021, <https://www.cnbc.com/2021/04/20/indias-social-media-law-puts-big-techs-power-into-states-hands-critics-say.html>.

¹³⁴ Khosla, Prama. "How Social Media Is Driving the Indian Farmers Protests - and Why We Can't Stop Now." *Mashable*, Mashable, 29 Oct. 2021, <https://mashable.com/article/india-farmers-protest-social-media-primer>.

¹³⁵ Bhosale, Jayashree. "Turmeric Farmers Stop Auction as Prices Stay Lower." *The Economic Times*, The Economic Times, 23 Jan. 2012, <https://economictimes.indiatimes.com/markets/commodities/turmeric-farmers-stop-auction-as-prices-stay-lower/articleshow/11596937.cms?from=mdr>.

the prime minister accountable. While it created a lot of awareness around farmers' financial losses, there was no direct response from the government. Some officials said that the prime minister had not made any promises about the 50% margin to farmers' cost of production.¹³⁶ They were quickly proven wrong by the protesters who shared clips of the prime minister's campaign speeches on multiple platforms. Nonetheless, farmers continue to face high costs and low prices for their crops. According to a CNN article, nearly 30 people die by suicide every day in India's agricultural sector, mainly due to overwhelming debt. In 2020, more than 10,000 farmers ended their own lives.¹³⁷

Lastly, in the 2020 farmers' protest, the government faced massive online backlash from all over the world. At some points, the protests turned violent as the government sent police forces to the peaceful protests. Government officials publicly announced that social media was the catalyst of this violence and demanded that social media platforms take down all content related to the protests. This was followed by the introduction of a new set of rules in February 2021 titled 'Intermediary Guidelines and Digital Media Ethics Code' which has been previously described when describing the encryption debate.¹³⁸ While these rules have not fully come into effect, they have started the conversation in the parliament and other spaces about sustaining democracy in cyberspace and the extent of permissible

¹³⁶ The Logical Indian. "#KisanKiLoot: An Online Campaign to Highlight How Farmers Have Been Betrayed." *The Logical Indian*, The Logical Indian, 14 Nov. 2017, <https://thelogicalindian.com/story-feed/awareness/kisankiloot-an-online-campaign-to-highlight-betrayal-to-farmers-by-the-govt/?infinite-scroll=1>.

¹³⁷ Kaur, Gunisha. "The Country Where 30 Farmers Die Each Day." *CNN*, Cable News Network, 17 Mar. 2022, <https://www.cnn.com/2022/03/17/opinions/india-farmer-suicide-agriculture-reform-kaur/index.html>.

¹³⁸ Opsahl, Katitza Rodriguez and Kurt. "India's Draconian Rules for Internet Platforms Threaten User Privacy and Undermine Encryption." *Electronic Frontier Foundation*, 22 July 2021, <https://www.eff.org/deeplinks/2021/07/indias-draconian-rules-internet-platforms-threaten-user-privacy-and-undermine>.

government surveillance on social network sites. With regards to the three laws protested by the farmers, they have been repealed and the government has promised to listen to other demands of the farmers. However, the farmers claim that no action has been taken by the government about their other demands and they are ready to protest again.¹³⁹

Rural farmers' use of social media has empowered them by connecting them to each other as well as other people who are unaware of their problems. It has given power back to the backbone of the nation—rural farmers—while holding the government accountable for its action and inaction. At the same time, one may ask what success looks like for these social media initiatives. Is it the government taking responsibility and accepting their demands or is it real change? In each of the three cases, the protests were accompanied by differing real-world activities paired with their social media activities which in turn impacted their social media reach. This impacted the pressure on the government to come up with a response and not necessarily to come up with a solution. Moreover, all three key issues—crop pricing, farmer suicides, lack of farmer participation in law making—still exist, even though some movements could be considered more successful in spreading awareness and holding the government temporarily accountable. Social media has empowered rural farmers and proven to unify farmers from around the country. The increased awareness about their issues and the ability for them to own their narrative without relying on traditional media or anyone else is significant and never done before. It is, thus, a step in the right direction. However, it is also important to think about how the

¹³⁹ Chhabra, Arvind. "India Farm Law: Seven Months after Repeal, Farmers Are Ready for New Protests." *BBC News*, BBC, 2 July 2022, <https://www.bbc.com/news/world-asia-india-61912110>.

government's increased awareness of social activism, rising potential for digital surveillance, and new laws about social media will impact this.

Nonetheless, by using the technology, infrastructure, and the current quantity and quality of resources available to them in the political context of the nation, these rural communities have started to create the foundation for the empowering and progressive 'new normal' within their communities. This is a move towards redefining rural culture, setting a standard for other rural communities to explore the possibilities of new technologies in a digitized society and to incentivize the adoption of technology for their advantage.

Chapter 5: Technology Adoption Part 2 – Socio-cultural and Behavioral Factors Determining Technology Use

The previous chapter discusses the state of core infrastructure, literacy, governance, and politics in a few developing countries, with a focus on India, and how rural communities have navigated their way through these circumstances to use technology and modern digital media. This chapter extends the conversation to another side of technology adoption, studying factors related to human behavior, age demographics, gender, and culture which all together affect how people use technology and communicate in digital spaces.

The survey conducted in Maharashtra asks participants about what they mainly use their mobile phones for. This, when studied in relation to age and gender provides an insight into how these groups within the rural context use technology. The following tree map and table display the overall data collected about how the participants use their mobile phones.

Figure 31: Responses from all participants on “What do you mainly use your phone for?”	
Communication (Calling and Texting)	77
Entertainment	41
Education (Learning and Teaching)	29
To Set Alarms and See Time	17
To Get Information	17

For Work	14
To Get Agricultural Information and Do Farm-Related Work	16
Internet Use	11
News	10
Online Financial Transactions (Including Online Shopping)	10
No Phone	9
Social Media	8
Photo/Video	7
To Access Health Services	1
Maps	1

Figure 32: How Participants Use Their Phones



- Communication (Calling and Texting)
- Entertainment
- Education (Learning and Teaching)
- To Set Alarms and See Time
- To Get Information
- For Work
- To Get Agricultural Information and Do Farm-Related Work
- Internet Use
- News
- Online Financial Transactions (Including Online Shopping)
- No Phone
- Social Media
- Photo/Video
- To Access Health Services
- Maps

The tree map and table above show that a large number of participants, 74, use their mobile phones for communication (calling and texting), followed by entertainment, 39, and education, 24. This pattern is in line with the observations made in the previous chapters highlighting the need for increased awareness of various digitized services and the potential of mobile phone technology to benefit rural communities. At the same time, it must be noted that rural communities' usage of technology does not always result in an increased standard of living and other such drastic changes.

Rural people can be more conservative in how they use their technological devices. They also have set standard practices in their occupations where technology is minimally used to assist them with that practice instead of changing it to be more efficient. Additionally, access to information via technology is an asset for such communities but they do not always have the power to create change using that information. For example, rural villagers in China and Uganda were given access to a text service that informed them of the market price information of the goods that they sold. It was assumed that they would use that information to maximize their revenue in their agricultural markets, however, in both communities, that information did not lead to any change. In China, rural farmers preferred to use traditional methods of farming, reserving mobile phones and technology for entertainment and communication with relatives. In Uganda, the rural community was involved in fishing. They used their mobile phones to communicate instantly with vendors, etc. and reduce wastage as their good—fish—was perishable but they did not use their phones for anything beyond that. This goes to show that it is difficult to change rural practices instantly. It is also important to note that rural people do not always have the power to negotiate fair prices in local markets and that access to information

does not necessarily translate into real impact for them. Nonetheless, a more personal and consistent effort is needed to empower rural people with access to information through technology.¹⁴⁰

However, in countries like India where there is a large young population, We can further look into the age-wise breakdown of mobile phone usage to identify patterns or certain norms within the surveyed region that informally associate certain technologies and digitized services to certain age brackets. This is presented in the tables and figures below:

Figure 33: Phone Usage For Ages 18 to 25	
Communication (Calling and Texting)	18
Entertainment	12
Education (Learning and Teaching)	20
To Set Alarms and See Time	2
To Get Information	8
For Work	1
To Get Agricultural Information and Do Farm-Related Work	1
Internet Use	8
News	5
Online Financial Transactions (Including	5

¹⁴⁰ Burrell, Jenna, and Elisa Oreglia. "The myth of market price information: mobile phones and the application of economic knowledge in ICTD." *Economy and Society* 44.2 (2015): 271-292.

Online Shopping)	
No Phone	0
Social Media	6
Photo/Video	3
To Access Health Services	1
Maps	1

Figure 34: Phone Usage For Ages 26 to 45

Communication (Calling and Texting)	26
Entertainment	16
Education (Learning and Teaching)	6
To Set Alarms and See Time	3
To Get Information	7
For Work	7
To Get Agricultural Information and Do Farm-Related Work	5
Internet Use	1
News	3
Online Financial Transactions (Including Online Shopping)	4
No Phone	1
Social Media	2
Photo/Video	3

To Access Health Services	0
Maps	0

Figure 35: Phone Usage For Ages 46 to 70

Communication (Calling and Texting)	32
Entertainment	12
Education (Learning and Teaching)	3
To Set Alarms and See Time	11
To Get Information	2
For Work	6
To Get Agricultural Information and Do Farm-Related Work	10
Internet Use	2
News	2
Online Financial Transactions (Including Online Shopping)	1
No Phone	7
Social Media	0
Photo/Video	1
To Access Health Services	0
Maps	0

Figure 36: Phone Usage For Ages 70 and Above	
Communication (Calling and Texting)	1
Entertainment	1
Education (Learning and Teaching)	0
To Set Alarms and See Time	1
To Get Information	0
For Work	0
To Get Agricultural Information and Do Farm-Related Work	0
Internet Use	0
News	0
Online Financial Transactions (Including Online Shopping)	0
No Phone	1
Social Media	0
Photo/Video	0
To Access Health Services	0
Maps	0

In order to make it easier to compare, the data in the tables has been graphically presented below:

Figure 37: Survey Participant's Phone Use

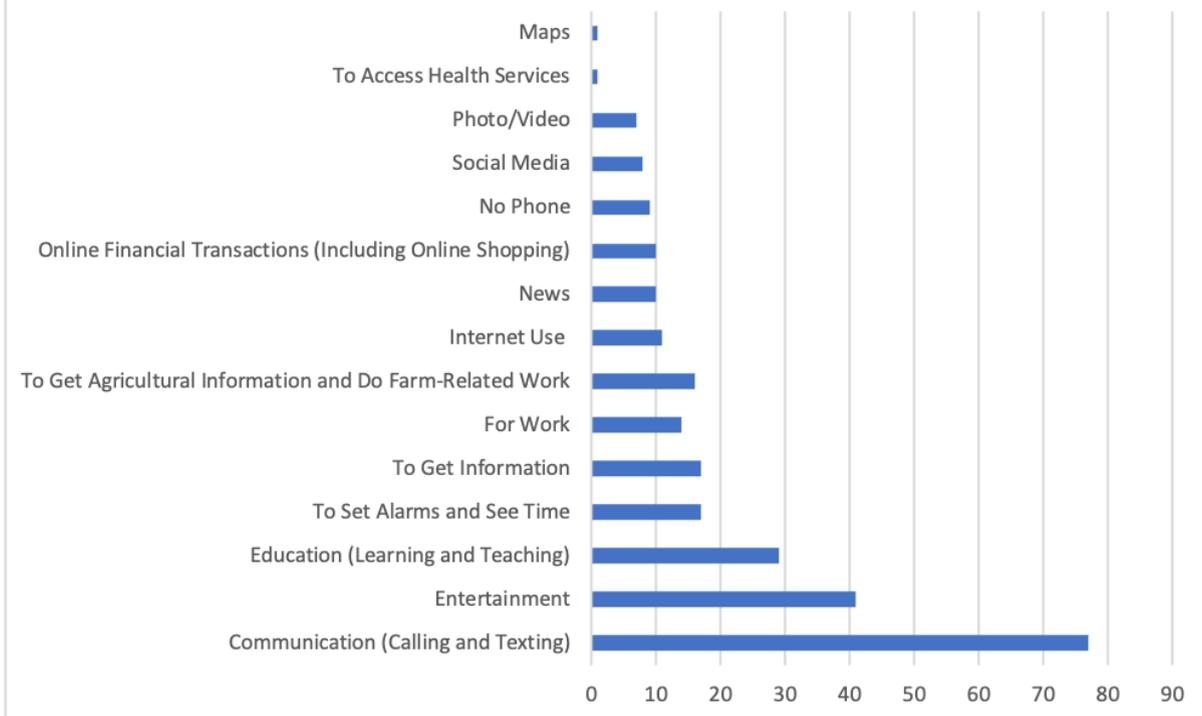
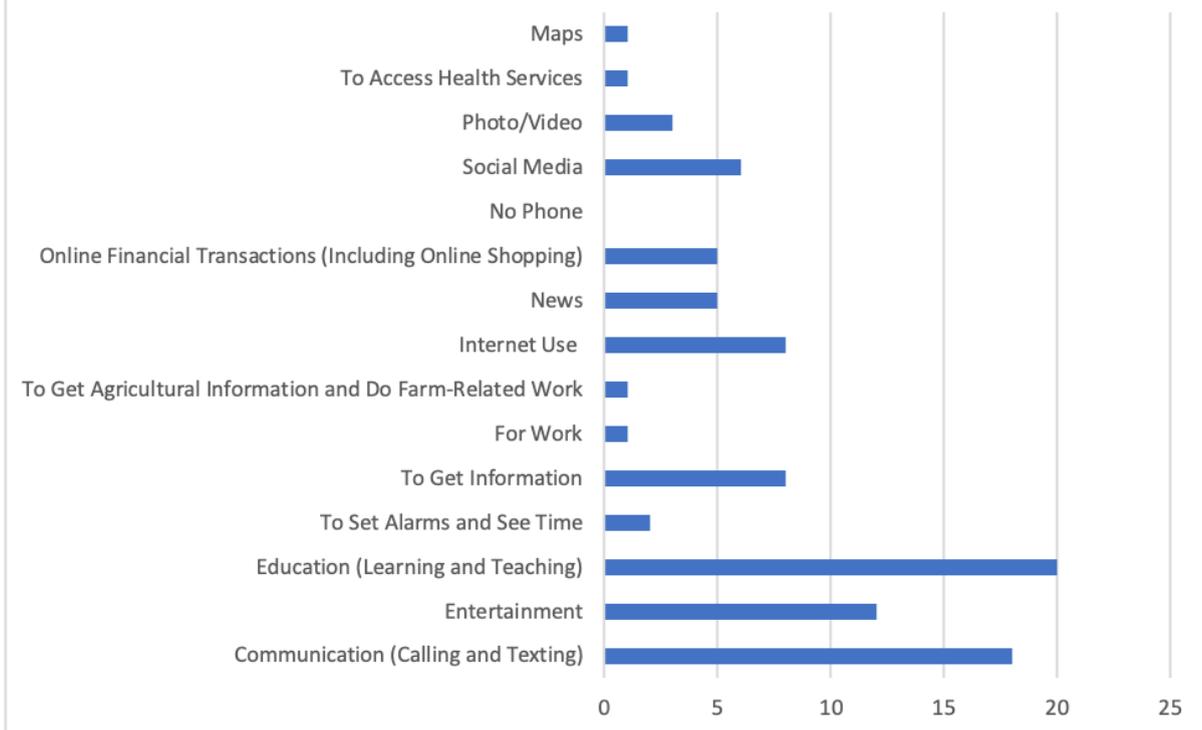


Figure 38: Phone Usage For Ages 18 to 25



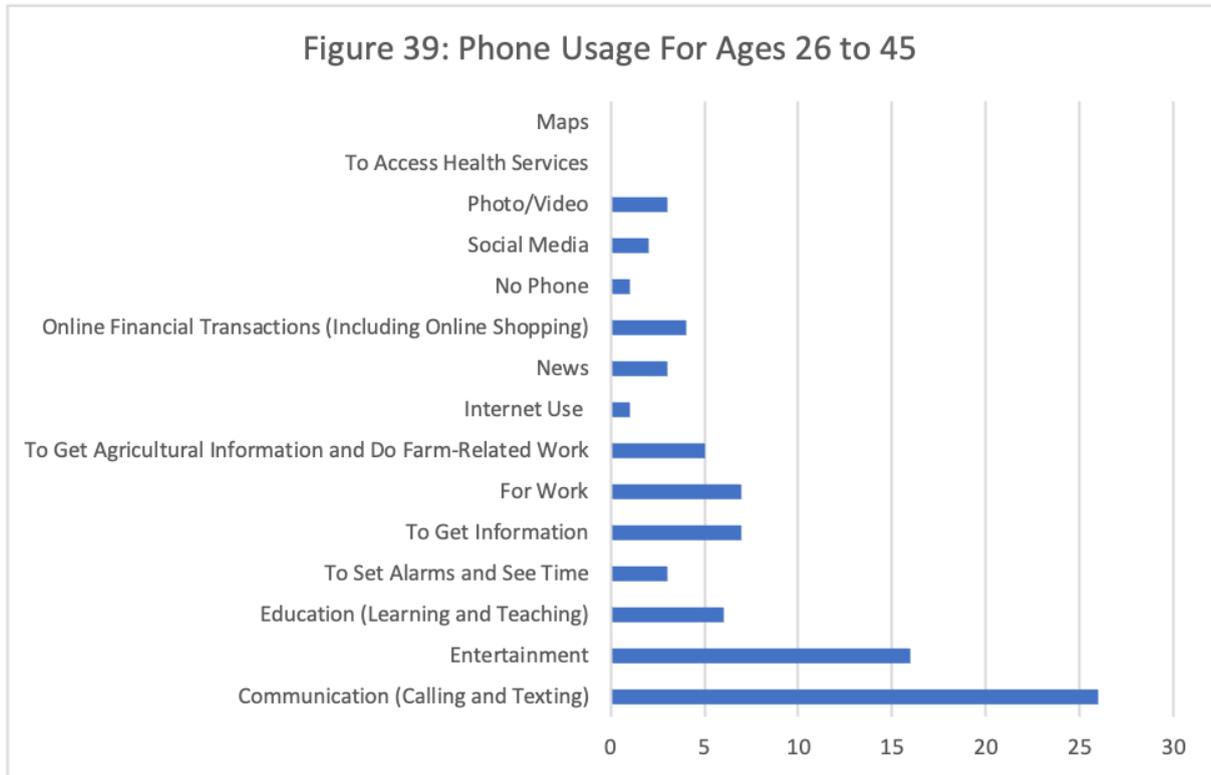


Figure 40: Phone Usage For Ages 46 to 70

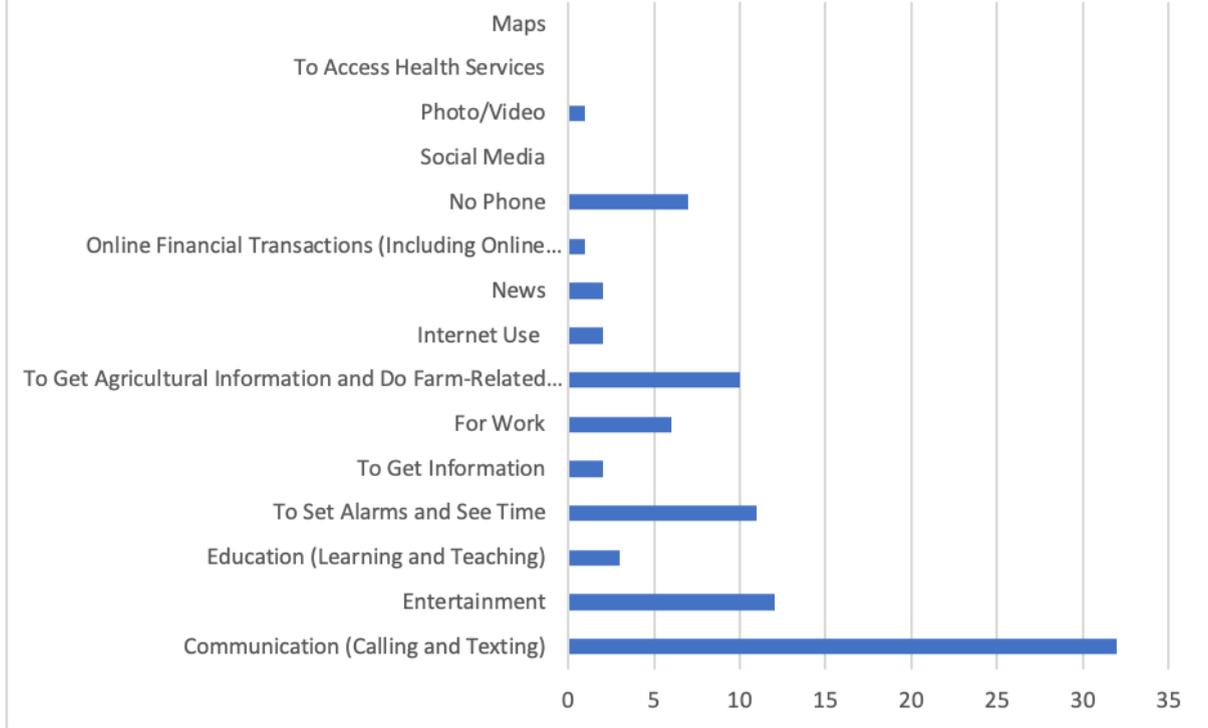
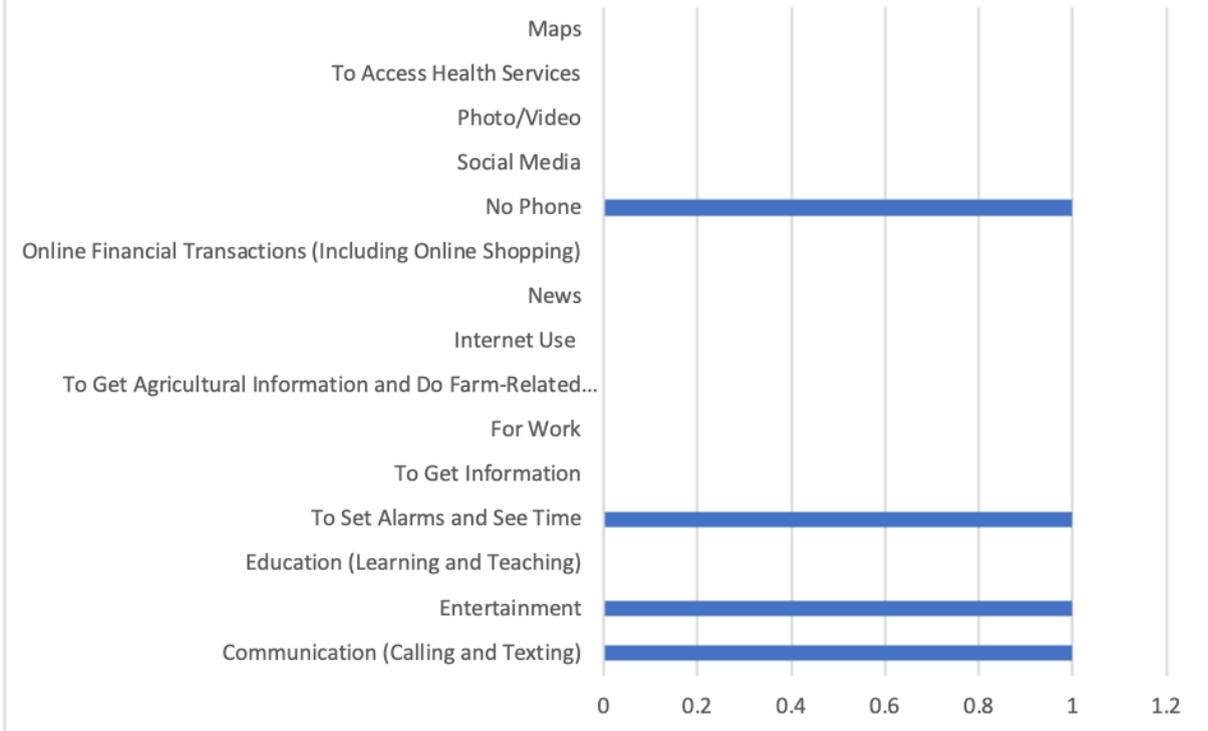


Figure 41: Phone Usage For Ages 70 and Above



Some key observations from each age bracket are:

Participants aged 18 to 25 are the only bracket where communication is secondary, the most used function of the mobile phone being education. This completely aligns with the move towards online classes and the increase in online educational resources available since the COVID-19 pandemic. This is also the age bracket with the highest internet and social media use. Surprisingly, it is not the bracket with the highest number of participants using their mobile phones mainly for entertainment. Participants between the ages of 26 to 45 take the prize for this. This bracket is also the highest in terms of number of participants who use their mobile phones mainly for work. However, compared to the 18 to 25 age bracket where everyone is engaged in utilizing a variety of digitized services and features of the mobile phone, no one in this and other brackets is using their phones more actively for health services or digital maps. The next bracket of participants between the ages of 46 to 70 is especially interesting as seven participants do not have mobile phones. Their usage is also largely communication, entertainment, and collecting agricultural information and doing farm-related work. There is also no one in this bracket that significantly uses their mobile phone for social media but two people do use their phone to access the internet. In the 70 and above bracket, there were only two participants, one of whom did not have a mobile phone. The participants that did have a mobile phone mainly used it for communication, entertainment, and to set alarms and see the time. It can, therefore, be seen that each age bracket has their own distinct pattern of technology usage which also reflects their knowledge and understanding of digitized services and advanced mobile phone-based technology.

Younger rural populations are often more aware of technology as in recent times, ICT has been made an integral part of the national and state curriculums. At the same time, this knowledge is also limited as the infrastructure needed to educate students about ICT is not widely available in rural areas. Initiatives educating the elderly about technology are extremely limited and mostly run by NGOs on a small scale. The Indian government, in its 'Digital India' program states that it plans to have at least one person from each household be digitally literate, however, there have not been any structured initiatives implemented yet to work towards this goal.

As seen above, there are certain infrastructural and social aspects that lead to age becoming a telling factor of how one uses the technology available to them. When it comes to gender, social norms and biases regarding women's/females' use of technology play a monumental role in shaping their access to technology and digitized services as well as their access to media literacy training/education.

Research across less developed nations shows a significant difference in women's mobile phone ownership, internet access, and usage patterns. Women's mobile phone ownership is lower than that of men. A study in Bangladesh supported this observation by showing that women are less likely to have the financial and educational ability to purchase a mobile phone. In terms of education, the educational infrastructure and practices in rural less developed areas are not safe and accommodating for females. Lack of sanitation facilities, safe transport, menstrual products along with social stigmas such as taboos around menstruation

have led to 23 million girls dropping out of school every year in India.¹⁴¹ In Sub-Saharan Africa, it was found that women are less likely to have an official government issued ID which is required to get a SIM card. Additionally, a research based in India suggests that gender attitudes shape societal beliefs about women and technology. Some beliefs are that mobile phones would distract women and expose them to explicit content which would lead to them being less likely to remain chaste before marriage and less focused on their husband, kids, and family after marriage.¹⁴² In India and many other developing and less developed countries, patriarchal structures are prevalent and mostly accepted by both women and men. This has shaped their cultures to develop a certain idea of technology being harmful for women and it being a barrier for women to fulfill their familiar duties and gender roles through beliefs like internet content is inappropriate for wives and daughters. Another significant barrier for women to use technology is gendered violence via technological devices as well as on online spaces. Stalking, bullying, and revenge pornography are some examples. This violence extends into the real world as mobile phones become a subject of conflict in households with a husband controlling the wife's mobile phone.¹⁴³

Through all of these factors, an environment is created wherein it is not safe or encouraging for women to use mobile phones or any other kind of technological

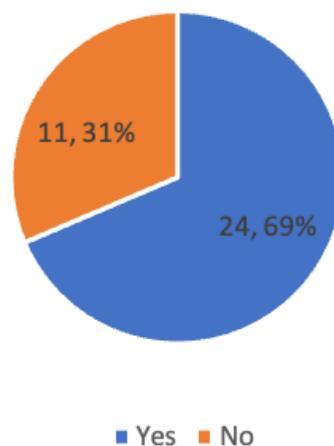
¹⁴¹Mitra, Tania. "23 Million Girls Drop Out Of School Every Year, And It Might Just Increase Now." *Youth Ki Awaaz*, 1 July 2021, <https://www.youthkiawaaz.com/2021/07/why-wash-is-needed-for-girls-education-in-india/>. Accessed 4 May 2023.

¹⁴² Klapper, Leora. "Mobile Phones Are Key to Economic Development. Are Women Missing out?" *Brookings*, Brookings, 10 Apr. 2019, <https://www.brookings.edu/blog/future-development/2019/04/10/mobile-phones-are-key-to-economic-development-are-women-missing-out/>.

¹⁴³ Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

devices. The social and cultural beliefs, which have been active for many years, have made women less confident when it comes to ICT use. This has been termed as the “technology-is-not-for-me-syndrome”. Even in the survey conducted in Maharashtra, this lack of confidence can be seen as when asked about their opinion on technology and if it is helpful or harmful, 5 of the 35 women participants responded with “I don’t understand this”. Additionally, figure 42 showcases their responses when asked if they think they have equal access to technology in their community whereas figure 43 shows that lack of education stood out as a common reason for the women participants’ limited access to technology.

Figure 42: Women Participants' Response to "Do You Think You Have Equal Access To Technology In Your Community?"



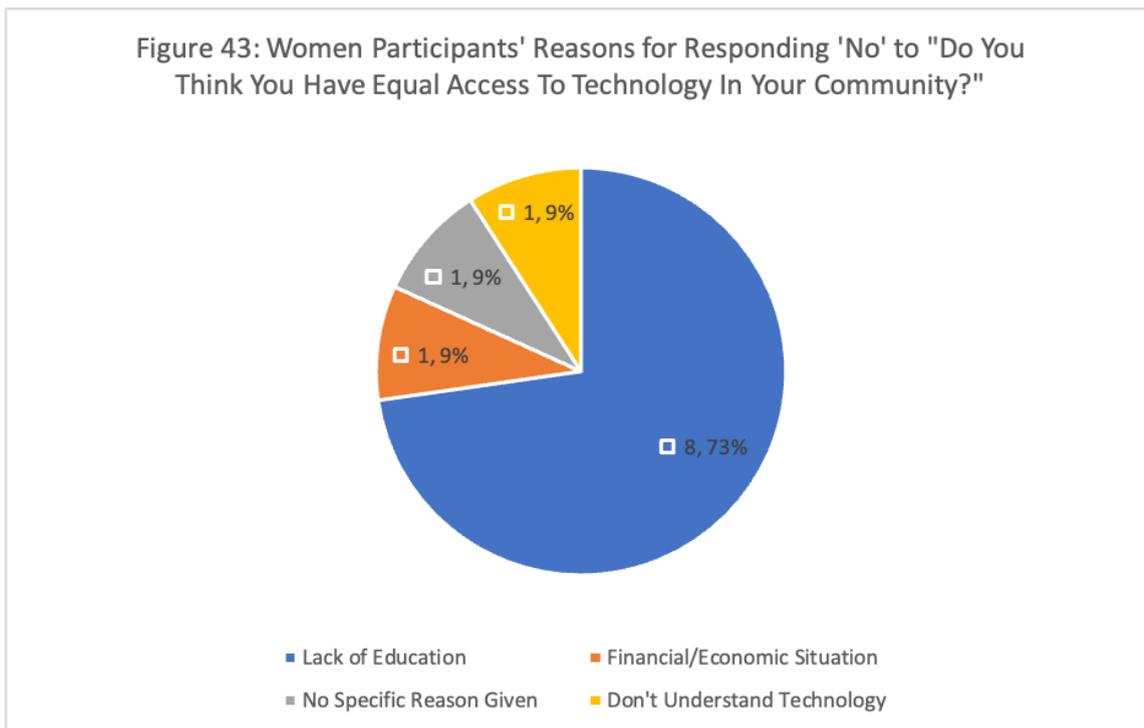
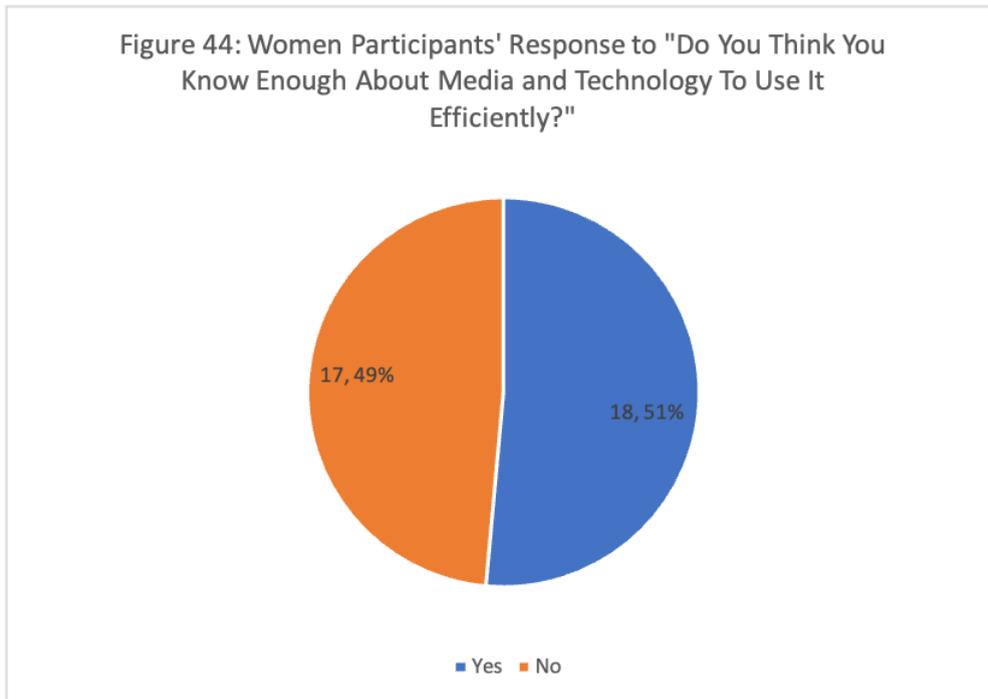
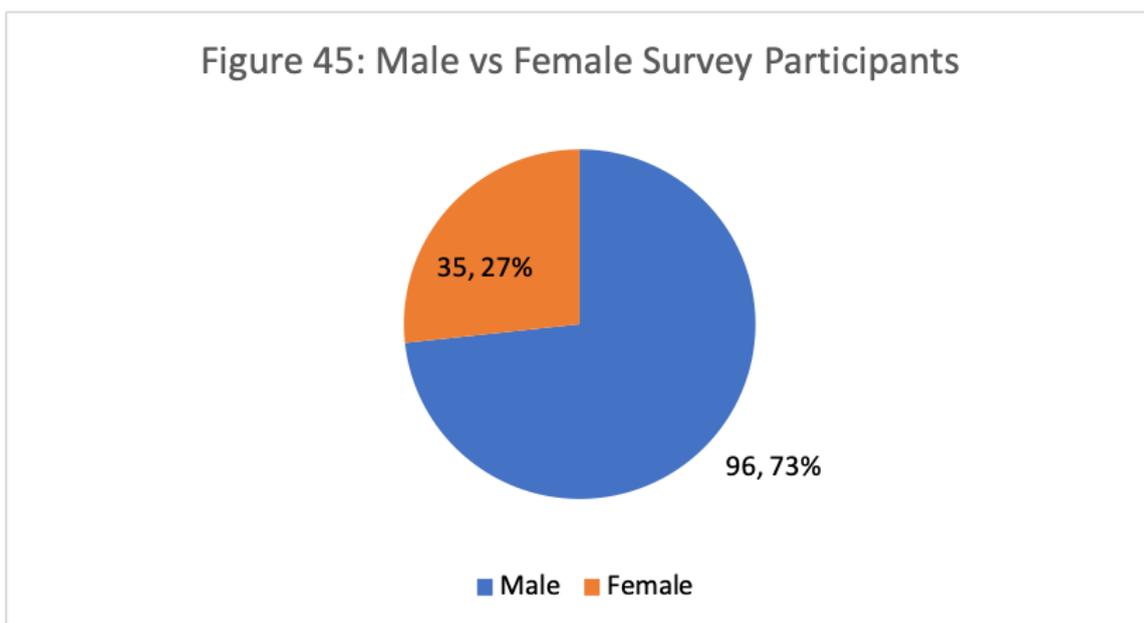


Figure below highlights an important statistic—when asked about whether they think they know enough about media and technology to use it efficiently, 17 of the 35 participants responded “no”. However, 22 out of the 35 participants responded “yes” when asked if they would be interested in knowing more about technology, digitization, and topics such as digital governance and false information, showing their interest in ICT.



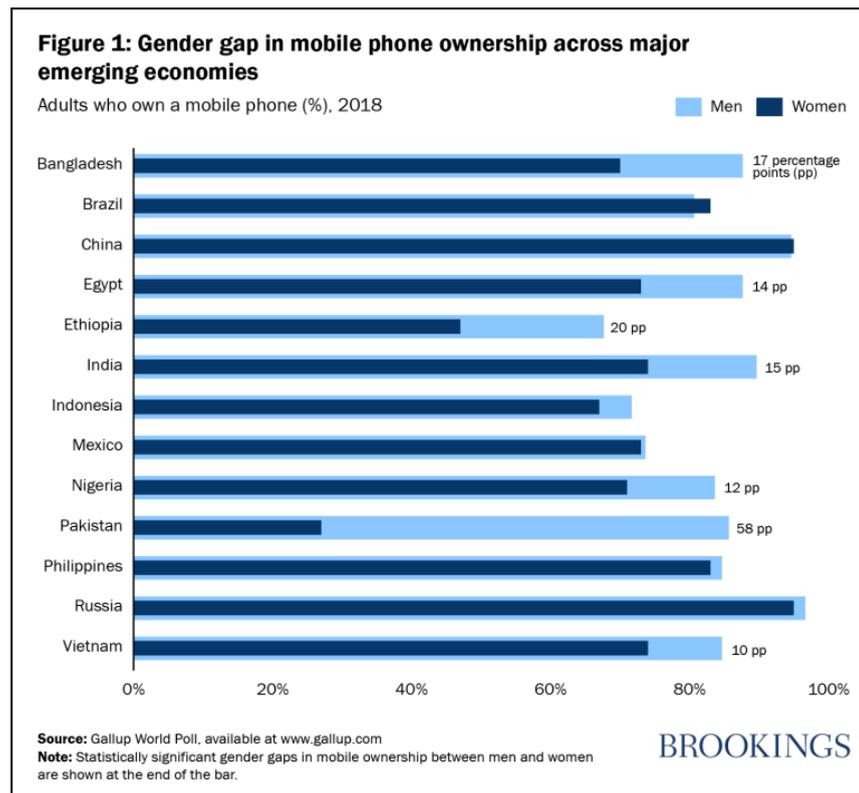
It must be noted that women were only 27% of the participant pool for this survey, as is shown in figure 45 (also mentioned as figure 6 in chapter 3). Another possible limitation could be that the participants were asked to fill in 'participant sex' in the questionnaire for this survey which could be interpreted differently from gender.



In highlighting other statistics, 372 million women were unconnected (not owning mobile phones) and 912 million women were not using mobile internet in Low and Middle Income Countries in 2021. In South Asia, 201 million women were unconnected and the gender gap in mobile phone ownership between men and women was 19% in 2020. The gender gap in mobile internet in South Asia was 41% wherein 38% of South Asian women were using mobile internet and 383 million women were not using mobile internet in 2021.¹⁴⁴ The gender gap in mobile phone ownership across major emerging economies is illustrated below in the graph for 'Gender gap in mobile phone ownership across major emerging economies' from a report by the Brookings Institution.¹⁴⁵ It further reiterates that in India, Bangladesh, and Pakistan, women's mobile phone ownership is significantly lower than that of men.

¹⁴⁴ GSMA, 2021, *The Mobile Gender Gap Report 2021*, <https://www.gsma.com/r/wp-content/uploads/2021/07/The-Mobile-Gender-Gap-Report-2021.pdf>. Accessed 3 May 2023.

¹⁴⁵ Klapper, Leora. "Mobile Phones Are Key to Economic Development. Are Women Missing out?" *Brookings*, Brookings, 10 Apr. 2019, <https://www.brookings.edu/blog/future-development/2019/04/10/mobile-phones-are-key-to-economic-development-are-women-missing-out/>.



While women are less confident than men in using mobile phones and feel that they are less able to learn a new activity on the phone by themselves, it was found that once they carried out a phone-based task, their confidence in being able to do that task again was almost on par with that of male users.¹⁴⁶ This emphasizes the importance of having training initiatives focused on guiding female mobile phone users through the various features of a mobile phone while also educating the larger female population on the importance of knowing how to efficiently use a mobile phone and the internet, especially in rural communities wherein social beliefs are stringent and confidence regarding technology is low. This would also give them access to mobile money, giving them access to more financial services.¹⁴⁷

¹⁴⁶GSMA, 2021, *The Mobile Gender Gap Report 2021*, <https://www.gsma.com/r/wp-content/uploads/2021/07/The-Mobile-Gender-Gap-Report-2021.pdf>. Accessed 3 May 2023.

¹⁴⁷ Klapper, Leora. "Mobile Phones Are Key to Economic Development. Are Women Missing out?" *Brookings*, Brookings, 10 Apr. 2019, <https://www.brookings.edu/blog/future-development/2019/04/10/mobile-phones-are-key-to-economic-development-are-women-missing-out/>.

Additionally, it would make them better prepared for the future of work and make more opportunities available to them, in turn helping many households out of the poverty cycle. Media literacy and ICT training for women would work to empower women in aspects other than technology use as well, creating a foundation for changing established gender roles, societal beliefs and norms, as well as power relations within households.¹⁴⁸ It, thus, has the capacity to lead to a change in the culture of many communities, especially rural communities, and restructure their social hierarchies to reduce inequality and reduce/minimize other bias-related issues which are prevalent in rural communities.

However, a potential limitation to this could be bias against gender non-conforming individuals. The studies and survey mentioned do not further investigate technology usage and the barriers to technology access for non-cis people. In the process of setting up training and education initiatives for women and girls, there needs to be a consideration of non-cis people's access to technology.¹⁴⁹ Their inclusion in this process of digitization and increasing media literacy is the only way to prevent gender-based inequality and retain their access to essential digitized services.

Most research on digital communication, social media, and ICT fails to take culture, geography, language, race, class, gender, and other such topics, into consideration which essentially shape human interaction. The socio-political, cultural, and

¹⁴⁸ Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

¹⁴⁹ Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

behavioral factors unique to a region, in this case unique to India, are important to consider and knowing the impact that these have on digital communication can be foundational in improving the quality of online discourse and make digital spaces safe for all people.¹⁵⁰ Through the example of the use of an instant-messaging platform in India during the COVID-19 pandemic, the upcoming section explores how human behavior and regional culture impact people's usage of digital platforms and communication practices. This is done by analyzing why people engage in the spread of false information on these platforms, what cultural factors act as motivations for them, and how technology can be further developed to work with human behavior and regional culture to mitigate such harmful ICT practices. There is also an emphasis on how these practices can create more harm in rural environments in India and how they could be mitigated in these communities.

Human behavior plays an equally important role as technology in the spread of false information, making the problem 'socio-technical'. The term 'socio-technical' means that when approaching false information, the design of technical systems, human processing capabilities, socioeconomic conditions, human values, and cultural aspects must be considered as interconnected.¹⁵¹ The instant messaging platform analyzed is WhatsApp, which currently has a user base of around two billion people worldwide. To join WhatsApp and most other digital platforms, one only needs a mobile phone, their phone number, and a connection to the internet, all of which have become increasingly available in many developing and less developed nations around the world. In India, due to drastic reductions in the cost of mobile data and

¹⁵⁰ Madrid-Morales, Dani, et al. "Motivations for Sharing Misinformation: A Comparative Study in Six Sub-Saharan African Countries." *International Journal of Communication* 15 (2021): 1200-1219.

¹⁵¹ Puska, Alisson, et al. "WhatsApp and false information: a value-oriented evaluation." *Proceedings of the 19th Brazilian Symposium on Human Factors in Computing Systems*. 2020.

mobile phones, WhatsApp has become one of the cheapest and easiest ways to communicate between individuals and within groups, where one can privately chat or share messages, videos, audio files, images, and many other formats of information within seconds. While these features of the platform have quickly made it the first choice for communicating internationally, they have also become a point of concern due to their ability to further misinformation and disinformation during panic-ridden situations like the COVID-19 pandemic, creating a problem of its own—an infodemic.

Misinformation is characterized as “unintentional false information caused by mistakes, such as typos, biased information or persons’ knowledge that happens to be wrong” while disinformation is characterized as “false information intended to deceive, disorient, generate decision errors, manipulate users’ belief systems and deceive human beings.”¹⁵² Too much information, including misinformation and disinformation in digital and physical environments during a disease outbreak is termed as an ‘infodemic’.¹⁵³ According to the World Health Organization, an infodemic has the ability to cause confusion and risk-taking behaviors that can harm health while furthering the intensity of an outbreak. Factors furthering this infodemic include low cost of access to platforms like WhatsApp, relatively higher cost of fact-checking and regulating shared information, the virality of posts on multiple platforms, and people’s trust in their social networks—which is one of the main sources of pandemic related information.¹⁵⁴

¹⁵² Puska, Alisson, et al. "WhatsApp and false information: a value-oriented evaluation." *Proceedings of the 19th Brazilian Symposium on Human Factors in Computing Systems*. 2020.

¹⁵³ Tan, Edina YQ, et al. "Tracking private WhatsApp discourse about COVID-19: A longitudinal infodemiology study in Singapore." *medRxiv* (2020): 2020-09.

¹⁵⁴ "Infodemic." *World Health Organization*, World Health Organization, <https://www.who.int/westernpacific/health-topics/infodemic>.

A survey in India found that 1 in 2 participants had received COVID-19 misinformation through WhatsApp or Facebook while WhatsApp noted a 40% surge in usage paired with a high volume of message-forwarding activity during the pandemic.¹⁵⁵ The political climate in India has also been unstable through the pandemic. Low trust in government and other official authorities at the start of the pandemic meant that people diverted their trust towards other information sources and were more likely to subscribe to conspiracies. Furthermore, on the topic of politics, it has been observed to be deeply interconnected with false information. An attention cascade model studied by Caetano et al. to characterize how attention affects the dissemination of misinformation in WhatsApp groups found that cascades with misinformation tend to be deeper, reach more users, and last longer in political groups than in non-political groups.¹⁵⁶ ¹⁵⁷ Moreover, religion is deeply embedded in politics as well as people's lives in India wherein the dissemination of harmful political beliefs and religious ideologies is being done on a large scale. "[It's clear] how seriously the political Hindu Right in India takes the online space as an ideological battlefield," Rohit Chopra, a media studies professor at Santa Clara University who is working on a book about Hindu nationalism and new media, told BuzzFeed News.¹⁵⁸ Religion is also the most virally marketed area of knowledge on WhatsApp, closely followed by health, implying that the consequences of misleading information for the Indian public in a health-crisis situation like the pandemic are extremely high.¹⁵⁹

¹⁵⁵ Tan, Edina YQ, et al. "Tracking private WhatsApp discourse about COVID-19: A longitudinal infodemiology study in Singapore." *medRxiv* (2020): 2020-09.

¹⁵⁶ Nobre, Gabriel Peres, Carlos HG Ferreira, and Jussara M. Almeida. "A hierarchical network-oriented analysis of user participation in misinformation spread on WhatsApp." *Information Processing & Management* 59.1 (2022): 102757.

¹⁵⁷ Caetano, Josemar Alves, et al. "Characterizing attention cascades in whatsapp groups." *Proceedings of the 10th ACM Conference on Web Science*. 2019.

¹⁵⁸ Dixit, P. "Viral WhatsApp Hoaxes Are India's Own Fake News Crisis. BuzzFeed News." (2017).

¹⁵⁹ Fouad, Nehal. "Viral marketing effect on digital knowledge acquisition: WhatsApp as a model." *Alexandria* 27.1 (2017): 10-29.

One might, therefore, question why people share and forward possibly misleading messages which can have drastic consequences in the real world. After all, the virality of these messages is based on the decision to share them taken by individuals. According to a report by the Brookings Institution, “the social capital in tightly knit communities on encrypted spaces creates a false sense of security that information can be trusted, while the functionality of the platforms makes source verification and attribution difficult or impossible”.¹⁶⁰ The spread of false information is equated to a digitalized sneeze by characterizing it as the release of “millions of tiny particles that can infect others who come into contact with them.” On WhatsApp groups, this is worse as the power of these viral messages “lies in the credibility and confidence of the message carrier, which is usually a friend or a family member whose purpose is to share new information with others.”¹⁶¹ The false information received from ‘credible’ sources could be further spread through in-person conversations to people not on WhatsApp, having a larger overall impact.

The false information being spread on WhatsApp groups had a significant impact on people’s physical mental health, especially in rural communities. Dr. Anil Rohankar is a pulmonologist and worked as a COVID specialist in the Amravati district of Maharashtra. Reflecting on his experience working as a COVID specialist in the city of Amravati, Maharashtra, and the role that media platforms played, Dr. Rohankar stated:

¹⁶⁰ Gursky, Jacob, and Samuel Woolley. "Countering Disinformation and Protecting Democratic Communication on Encrypted Messaging Applications." (2021).

¹⁶¹ Fouad, Nehal. "Viral marketing effect on digital knowledge acquisition: WhatsApp as a model." *Alexandria* 27.1 (2017): 10-29.

“When the situation got really bad in India, largely after the second wave of the virus, a lot of people got sick because of their own stress and panic. It was also suggested to them to use distractions from the present situation to their advantage and ignore the news or information they get from Facebook and WhatsApp. So yes, many times it was the panic of the pandemic that got to people and in a more rural environment, it is worsened as that panic is accompanied with drastic and uninformed measures which do more harm than good.”

Multiple theories have been studied in the context of sharing messages in communities, such as WhatsApp groups, especially those consisting of family and friends. The STEPPS theory by Jonah Berger states that “social currency, triggers, emotions, public, practical value, and stories” together act as motivations for people to make things go viral, especially within communities.¹⁶² Berger further declared that “emotions drive people to action. They make us laugh, shout, and cry, and they make us talk, share, and buy. So rather than quoting statistics or providing information, we need to focus on feelings.” Another theory that supports Berger’s argument is the Social Identity Theory (SIT) by Henri Tajfel where he argues that “the groups to which people belong serve as an important source of pride and self-esteem because groups give people a sense of social identity”.¹⁶³ In a study

¹⁶² The STEPPS acronym stands for Social currency: shareable information possesses social currency and we share it to look good, Triggers: they are the hooks that keep an idea ‘top-of-mind’ and ‘tip-of-tongue’, Emotion: we share content because it has an emotional effect on us, Public: the more public something is, the more likely people will imitate it, Practical Value: give your audience something that is genuinely useful and beneficial to them, and Stories: create a story or narrative that your user will invest in, with a product or service wrapped up in the middle. (from “Contagious Content: Steps and the Science of Shareability.” *Search Laboratory US*, 17 June 2021, <https://www.searchlaboratory.com/us/2014/07/contagious-content-steps-and-the-science-of-shareability/>.)

¹⁶³ Bakare, Akeem Soladoye, Daha Tijjani Abdurrahman, and Acheampong Owusu. "Forwarding of Messages Via WhatsApp: The Mediating Role of Emotional Evocativeness." *Howard Journal of Communications* (2021): 1-16.

conducted in Zimbabwe with regular WhatsApp users, a leading factor in the users' decision to forward false information was that they felt a sense of civic duty to share the message, which is disguised as important factual information, along with having a 'just in case' attitude by not realizing the adverse real-world impact of a few clicks.¹⁶⁴ This makes it evident that the infodemic is real and must be taken seriously.

Technological solutions can be developed to adapt to human behavior and cultural practices as changes in the platform itself are assumed to take away the responsibility of spreading false information from individuals, the government, and other stakeholders. On April 7th, 2020, WhatsApp introduced a new restriction worldwide where people could share messages identified as 'frequently forwarded' to only one person or group instead of five. This change to one of its core features resulted in a 70% decrease in the spread of highly forwarded messages globally just weeks later, directly targeting the virality of these messages.¹⁶⁵ The pandemic also pushed the instant-messaging platform to attach a heading with every forwarded message which states if it has been forwarded many times or just a few. These are examples of how small changes can change the choice architecture of the platform, making it slightly safer for users. There also seems to be an effort by the platform to establish a stringent process to detect and get rid of accounts/users who could be proactively spreading false information. One such method of detection uses the 'typing indicator.' According to Matt Jones, an engineer at WhatsApp, if the code that

¹⁶⁴ Bowles, Jeremy, Horacio Larreguy, and Shelley Liu. "Countering misinformation via WhatsApp: Preliminary evidence from the COVID-19 pandemic in Zimbabwe." *PloS one* 15.10 (2020): e0240005.

¹⁶⁵ Singh, Manish. "WhatsApp's New Limit Cuts Virality of 'Highly Forwarded' Messages by 70%." *TechCrunch*, TechCrunch, 27 Apr. 2020, <https://techcrunch.com/2020/04/27/whatsapps-new-limit-cuts-virality-of-highly-forwarded-messages-by-70/>.

a spammer has used to automate messaging has never sent a typing indicator before a message, then the company will ban the account.¹⁶⁶

It also introduced a new fact-checking feature in selected countries which enables users to verify if the content of the forwarded message is true using Google search. Messages which have been forwarded five or more times will be flagged by the platform and marked with a fact-checking option. The effectiveness of this feature is not fully known yet but leaving fact-checking as an option to the users can have its own risks. Critiquing this feature, a Business Insider article by Jennifer Still states that “it’s relying on Google to provide search results that may help users decide whether or not the content of a message is reliable, and given that Google isn’t always successful at ensuring false stories don’t rank highly in the search engine, it can be hit or miss .”¹⁶⁷ This problem would be intensified if this feature was introduced in India as the lack of literacy and exposure to more information could cause an information overload, confusing people who do not know exactly what to look for and how. Pratik Sinha of Altnews, a fact-checking website in India, has argued more specifically that those in the remotest areas of India have less experience with the conventions of social media discourse and are thus especially susceptible to misinformation.¹⁶⁸ Nonetheless, this fact-checking feature would not be of much help to them. Therefore, the regional context must be examined to make sure the new features and even new technologies being introduced are appropriate

¹⁶⁶ Puska, Alisson, et al. "WhatsApp and false information: a value-oriented evaluation." *Proceedings of the 19th Brazilian Symposium on Human Factors in Computing Systems*. 2020.

¹⁶⁷ Still, Jennifer. "How to Use WhatsApp's Fact-Checking Feature to Research the Validity of Viral, Forwarded Messages." *Business Insider*, Business Insider, 2 Oct. 2020, <https://www.businessinsider.com/how-to-use-whatsapp-fact-check>.

¹⁶⁸ Medeiros, Ben, and Pawan Singh. "Addressing Misinformation on Whatsapp in India Through Intermediary Liability Policy, Platform Design Modification, and Media Literacy." *Journal of Information Policy* 10 (2020): 276-298.

and don't end up becoming a barrier themselves and create more issues for people to effectively use WhatsApp and other such platforms.

Some ideas to curb the virality of false information on WhatsApp that could work given the limited media literacy in rural communities and the diversity of India are authenticating content with signatures right when it is created and needing more explicit authorization from the user to receive messages from unknown numbers. These promote accountability, trust, and awareness while focusing on the values and behaviors that the platform promotes. These would be more effective in India as they work at the starting point of the problem and hold the creators and sharers of false information accountable, instantly increasing their liability. In Indian society, where one's reputation and social standing has high value for most individuals, such measures for security and informed consent could be effective. This is why paying attention to values is essential when designing and evaluating social systems in order to successfully introduce technological improvements.¹⁶⁹

Medeiro and Singh's research on WhatsApp misinformation in India highlights local initiatives that have been successful in controlling the infodemic on a smaller level. In 2016, local reporter Shivendra Gaur launched Rocket Post, a subscription-based WhatsApp news broadcast service. Gaur utilizes features on WhatsApp to essentially disperse trustable and accurate information and sends his subscribers a code to activate the news bulletin along with alerts through a request to be added to the Rocket Post Live network to avoid the spread of false information. Gaur's model would work efficiently to debunk misleading information in regional contexts and

¹⁶⁹ Puska, Alisson, et al. "WhatsApp and false information: a value-oriented evaluation." *Proceedings of the 19th Brazilian Symposium on Human Factors in Computing Systems*. 2020.

“WhatsApp, in partnership with policymakers, police, and local administration could enlist and incentivize enterprising local journalists to engage in educating subscribers via WhatsApp broadcast list.”¹⁷⁰ Digital platforms like WhatsApp may, thus, find it beneficial to invest in locally grounded media literacy initiatives in India and further explore programs that involve diverse user groups.¹⁷¹ Moreover, this shows that the importance of media literacy cannot be discarded as it is essential in order to utilize the technological features of WhatsApp. Nonetheless, at the core of the problem is the lack of understanding the real world consequences of actions taken in the digital sphere and media literacy must be improved amongst users to mitigate the spread of false information. This is especially as in nations like India, where many users of WhatsApp are not fully aware of the platform’s risks, lack of media literacy has been used as a supporting argument for stringent regulation of these platforms by their governments. Media literacy, thus, has the power to shape cultural norms and change people’s tech practices to be more efficient and productive.

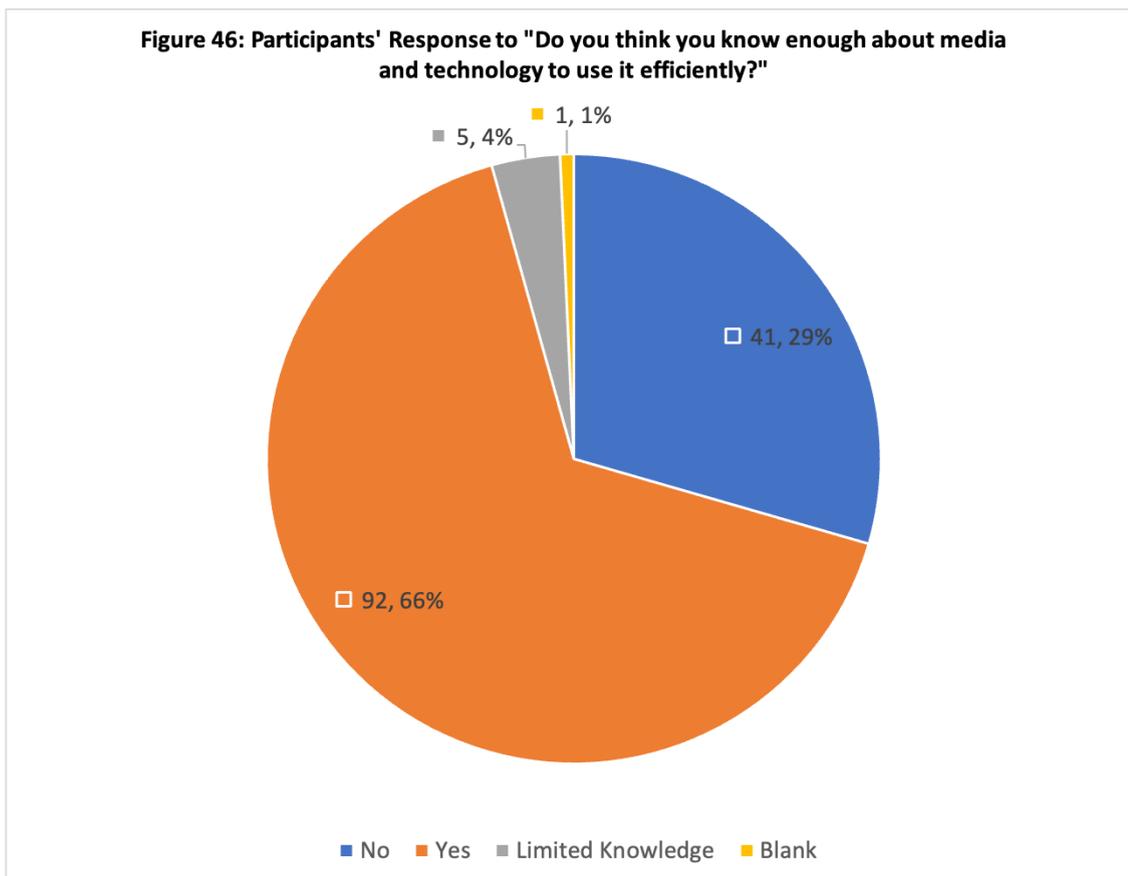
¹⁷⁰ Medeiros, Ben, and Pawan Singh. "Addressing Misinformation on Whatsapp in India Through Intermediary Liability Policy, Platform Design Modification, and Media Literacy." *Journal of Information Policy* 10 (2020): 276-298.

¹⁷¹ Medeiros, Ben, and Pawan Singh. "Addressing Misinformation on Whatsapp in India Through Intermediary Liability Policy, Platform Design Modification, and Media Literacy." *Journal of Information Policy* 10 (2020): 276-298.

Chapter 6: Willingness to Learn – Functional Vs. Critical Media Literacy

The previous chapter, through the example of WhatsApp and the spread of false information, highlights the importance of media literacy in the entirety of the population using technological devices. It also emphasizes that increased media literacy can shape people's technological practices to be more efficient and mindful, thus preventing the spread of more issues like misinformation in digital spaces. This chapter explores the definitions of media literacy and how its understanding has evolved over time into the categories of functional and critical media literacy. It does so by referring to literature and studies from the past two decades and contextualizing them with the findings from the survey conducted in Maharashtra.

In previous chapters, survey data on device ownership, mobile phone usage, digitized services usage, and equal access to technology has been discussed. While these findings roughly indicate the level of technological integration in the participants' lives along with their current technological knowledge and skills, the survey questionnaire explicitly asks the participants about their perception of their knowledge of media and technology. The figure 46 below illustrates the responses to the question “do you think you know enough about media and technology to use it efficiently?”



While 66% of the participants feel confident in their knowledge of using media and technology, the survey findings show that 47% of the participants' haven't used digitized services. Thus, formal and structured media literacy initiatives are likely to benefit more than 34% of the population from figure 46 (combining participants that responded with 'no', 'limited knowledge', and gave no response/ left it blank) and aid in confidence-building around technology and media.

Chapter 1 introduces media literacy and briefly defines it, including functional and critical media literacy. To dive deeper into this topic, I have studied the work of Dr. Shakuntala Banaji and Ram Bhat on media literacy in the context of misinformation in India. I have also gained a deeper understanding of critical media literacy through the work of Douglas Kellner and Jeff Share.

The notion of media literacy has existed since the 1930s, mainly as a means of protecting oneself from media-based scams and crimes. Such scams and crimes through technology, mainly the internet, still exist and target the most vulnerable populations which are the ones who are the least media literate. However, the notion of media literacy has since widened and evolved to become essential for the consumption and production of any type of media and usage of all media technologies. Moreover, media literacy has become a vital tool in practicing democracy through the growing communication networks and technologies worldwide. Digital tools and spaces have become increasingly integrated in people's daily lives, connecting them to each other, the government, and resources and up-to-date information on a variety of topics. The goal of media literacy in the present society is, therefore, captured by Kellner and Share and the profile of a media literate person is described by Aufderheide et al., 1992:

“Media literacy helps people to use media intelligently, to discriminate and evaluate media content, to critically dissect media forms, to investigate media effects and uses, and to produce media messages in various formats” (Kellner & Share, 2019) ¹⁷²

“A media literate person [is someone], and everyone should have the opportunity to become one, [who] can decode, evaluate, analyze and produce both print and electronic media. The fundamental objective of media literacy is critical autonomy in relation to all media. Emphases in media literacy training

¹⁷² Kellner, Douglas, and Jeff Share. *“The critical media literacy guide: engaging media and transforming education.”* Brill Sense, 2019.

range widely, including informed citizenship, aesthetic appreciation and expression, social advocacy, self-esteem, and consumer competence. The range of emphases will expand with the growth of media literacy.”(Aufderheide et al., 1992) ¹⁷³

Media literacy is further expanded into two notions—functional and critical media literacy. Banaji and Bhat describe them as:

“Functional media literacy emphasizes the individual media user’s skills and capacity to use various media – including the technical properties and affordances of information and communication technologies such as smart-phones and apps. Critical media literacy emphasizes the intersection of skills and capacities with understandings of ideology, political economy and other forms of power as well as the notion of an active audience that participates in the struggle to make meaning of any given text.” ¹⁷⁴

There has been a significant push to increase functional media literacy in society and government efforts have also been focused on increasing technology availability and affordability, making more people technology users but not necessarily educating them about media. This has led to many real world consequences including instances of violence that have emerged from digital platforms. Functional media literacy, therefore, is not sufficient. This is especially as other ways of mitigating issues related to digital media on a large scale are costly—organizations dedicated

¹⁷³Aufderheide, Patricia, and Firestone, Charles. M. *“Media literacy: a report of the National Leadership Conference on Media Literacy.” Aspen Institute Wye Center, Queenstown Md., Dec. 7-9, 1992.*

¹⁷⁴ Banaji, Shakuntala, et al. "WhatsApp vigilantes: An exploration of citizen reception and circulation of WhatsApp misinformation linked to mob violence in India." (2019).

to fact-checking can be used but they have limited sources of funding and cannot be used at a large scale for filtering a magnitude of information. Additionally, we cannot rely on the platforms themselves to provide advanced mechanisms for critically analyzing information and we cannot rely on people that are only functionally media literate to know how to use such mechanisms. Another aspect that must be considered is that fact-checking and other advanced tools are mainly available on smartphones and there is a significant population, especially in the rural areas of India, that still owns and uses dumbphones.

While this establishes the need for critical media literacy along with the functional knowledge of using media and technology, it was also observed that some younger people are able to spot misinformation more easily. According to them, this is as they receive a variety of messages everyday with news and other information and they have now learnt to look out for certain factors which highlight that the piece of information is fake. This shows that functional training in media is exposing people to more information which is pushing some to be critical. This can also be seen through the survey responses as, when asked if digitization and technology is helpful or harmful, 40% of the participants believed that the outcome/result of technology is determined by its usage.¹⁷⁵ At the same time, it is established from my research and that of Banaji and Bhat that functional digital literacy about some features does not necessarily equate with or convert into broader critical digital literacy.¹⁷⁶

Critical media literacy expands media literacy to include “different forms of mass communication and popular culture, as well as deepens the potential of literacy

¹⁷⁵ Figure 24, Chapter 3

¹⁷⁶ Banaji, Shakuntala, et al. "WhatsApp vigilantes: An exploration of citizen reception and circulation of WhatsApp misinformation linked to mob violence in India." (2019).

education to critically analyze relationships between media and audiences, information and power.” Kellner and Share further state that in the “media-saturated, technologically dependent, and globally connected” twenty-first century, critical media literacy is essential and that the discussion should be around how to most effectively teach critical media literacy rather than if there is a need for it. There is also an emphasis on how power relations and information are always linked and that being critically media literate also includes being aware of ideologies and political factors that impact communication channels as well as the media being produced and shared. This is as media plays a significant role in creating and shaping cultures and daily practices and has the capacity to either strengthen or completely alter established norms, perspectives, and ideologies. For this reason, Share and Kellner also emphasize alternate media production as a method of critically analyzing and challenging established norms, which is further explored in chapter 7.¹⁷⁷

Therefore, media education consists of a variety of aspects. Kellner and Share summarize the five core concepts are common across definitions of media literacy:

- 1. recognition of the construction of media and communication as a social process as opposed to accepting texts as isolated neutral or transparent conveyors of information;*
- 2. some type of semiotic textual analysis that explores the languages, genres, codes and conventions of the text;*
- 3. an exploration of the role audiences play in negotiating meanings;*

¹⁷⁷ Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

4. *problematizing the process of representation to uncover and engage issues of ideology, power and pleasure;*

5. *examination of the production and institutions that motivate and structure the media industries as corporate profit-seeking businesses (see Kellner & Share, 2005).¹⁷⁸*

In the survey conducted in Maharashtra, participants were asked about their interest and willingness in learning more about misinformation, technology regulation, and such topics that include more advanced and critical thinking. Figure 47 showcases their responses. 67% of the participants stated that they are interested in learning more about these topics. Some comments included in their responses were:

- “Yes because anyone can spread misinformation now so I want to know more about technology and digitization”
- “Because of how much I use my mobile phone, I do want to know more about these topics”
- “Because there is a lot of fraud online, I want to know more about the laws and policies of media and technology”¹⁷⁹

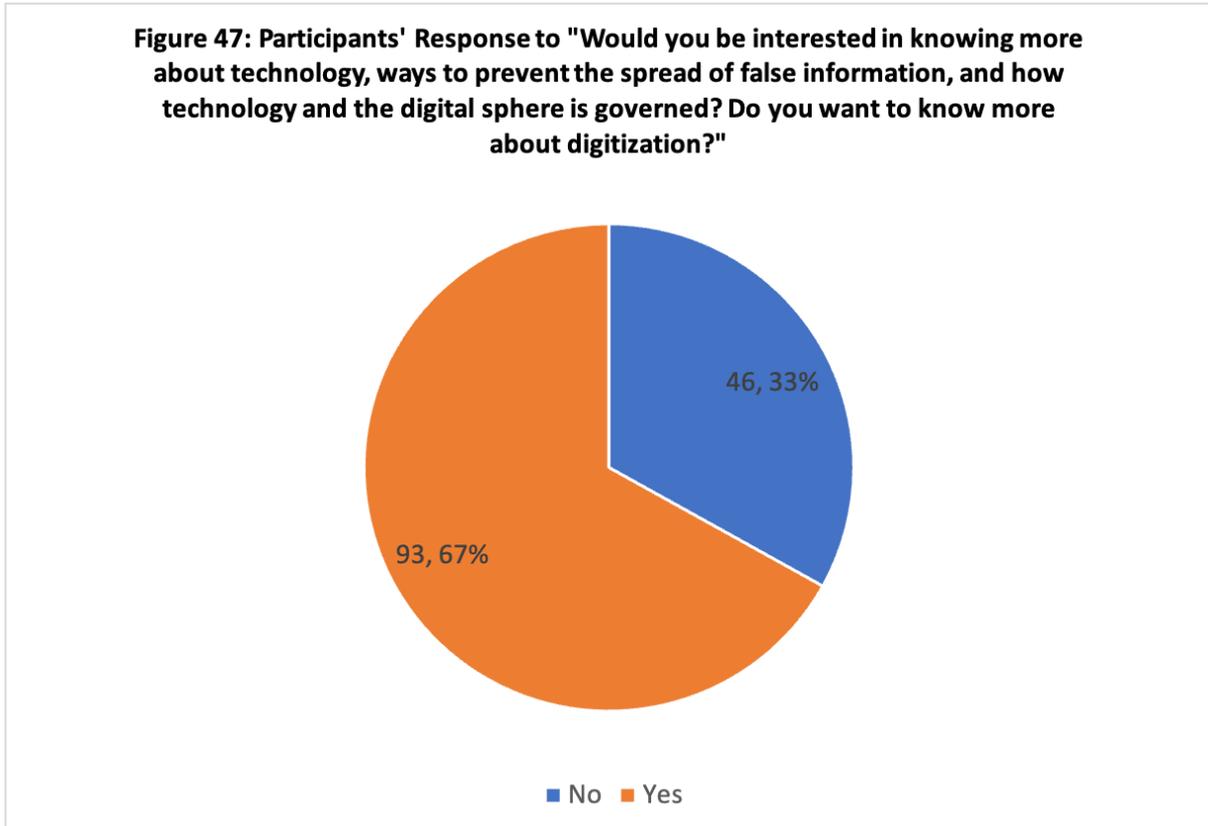
On the other hand, the 33% of participants that showed no interest in learning about these topics had this to say:

- “Because I don’t have an advanced phone, I don’t know about these things”
- “I am not very educated so I didn’t pay much attention to this”

¹⁷⁸ Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

¹⁷⁹ Appendix 1: Survey Data Spreadsheet

- “I am not interested” ¹⁸⁰



The statistics along with the reasoning and comments given by the participants indicate that the population that is already functionally media literate to an extent is interested in becoming critically media literate. Whereas the population that has limited usage of media technology and is not supported by having aspects of a strong core infrastructure, such as a complete education, are satisfied with their current level of media literacy or feel unconfident in reaching a higher level. In

¹⁸⁰ Appendix 1: Survey Data Spreadsheet

chapter 5, the lack of confidence due to education is highlighted when it comes to women. This is reflected in figure 43. Figure 44 in chapter 5 also reflects that 51% of the women participants do not think that they know enough about using media and technology efficiently. The “technology-is-not-for-me-syndrome” is prominent in women and is also seen in the 33% of participants in figure 47 but structured and easily available initiatives for media literacy have the capacity to increase confidence and also fill in the gaps in people’s understanding of technology due to educational factors.¹⁸¹

The ultimate goal of Share and Kellner’s work on critical media literacy is to help students of media literacy “transform themselves into socially active citizens and at the same time transform society into a less oppressive and egalitarian democracy.”

¹⁸² Rural communities and rural people, through media literacy, have the potential to do the same. In today’s times, important conversations including conversations about national policies around gender inequality, citizenship, etc. are rapidly moving online in India due to the government’s censorship of mainstream media platforms and intolerance towards activism against them. In this environment of drastic change and transformation, the nation needs to know rural people’s perspectives, understand their lived experiences, and hear their voices. Moreover, for other people that form the dominant group on most digital media platforms and who in India usually come from urban areas, critical media literacy would give them the

¹⁸¹ Schopp, Kerstin, et al. "Ethical questions of digitalization in the Global South: Perspectives on justice and equality." *TATuP-Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis/Journal for Technology Assessment in Theory and Practice* 28.2 (2019): 11-16.

¹⁸² Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

opportunity to “engage with the social realities that the majority of the world [in this case, the nation] are experiencing.”¹⁸³

The upcoming chapter discusses ways that the surveyed region and other rural regions can integrate media literacy into their existing social structures. It also expands on how increased media and technology consumption and alternate media production by rural communities using the technology available to them can further increase their level of technological knowledge and skills along with the efficiency with which they use digital platforms and media technologies.

¹⁸³ Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

Chapter 7: Suggestions

Chapter 6 expands the definition of media literacy to include alternative media production, a term repeatedly used by Share and Kellner to emphasize challenging present social norms that manifest and reinstate themselves through the media that is regularly consumed. In order to produce this alternative media, it is important to also consume a variety of media that is both enlightening—it opens one up to the rest of the world—and, at the same time, is representative of one's own identity. Sharing content worldwide and producing it easily has been made possible through modern technology like smartphones with multiple features and digital platforms like Youtube along with social media platforms like Instagram and Tiktok. While entertainment is a possible pathway to increase media literacy and efficient technology use in rural areas, this chapter also discusses other initiatives and broader solutions to increase people's access to and efficient use of technology.

From the survey findings, it can be concluded that entertainment is one of the main uses of mobile phones in the surveyed region. This can be seen in figure 32 in chapter 5, where 41 out of the 139 participants chose 'entertainment' when asked what they mainly use their phones for. This was only second to 'communication (calling and texting)', which was chosen by 77 participants. Moreover, street plays and folk performances have been very influential in rural regions while also being successful in disseminating important messages. For example, a study conducted in South India used street plays to spread awareness about children's eye health and found that it was an effective way of reaching large populations and most of the attendees could reproduce the main messages mentioned in the play.¹⁸⁴ Therefore,

¹⁸⁴ Pehere, Niranjana K., and Sreedevi Yadavalli. "Using street plays as a populist way to spread eye health awareness: An experience." *Indian Journal of Ophthalmology* 69.5 (2021): 1298.

entertainment can be a way to increase rural awareness of and interest in technology.

Rural people's fascination with film and media and their willingness to work with these mediums is depicted in the 2021 telugu film 'Cinema Bandi'. The film encapsulates the essence of rural media production as, upon finding camera equipment left behind by a film crew in the village, the villagers explore the equipment and decide to make their own film using it. Everyone in the village is given a new identity through the role that they play in making the film. The rural people also develop a new perspective towards their surroundings in this process of making their own film. It also highlights the lack of core infrastructure as it is their biggest hurdle in their filmmaking. They struggle with being able to charge the camera batteries due to inconsistent electricity in the village. Nonetheless, they are successful in making their film, displaying a sense of accomplishment along with increased confidence in their media and technological abilities.

In India, at the peak of the COVID-19 pandemic, rural areas' consumption of the internet surpassed that of urban areas. The cause of this was more people seeking entertainment online when the nation was in lockdown.¹⁸⁵ Technology gives rural people access to media and information that is more interactive and personal when compared to many government initiatives that use text-based one-way communication mediums like text messages to spread information in rural communities. This content is also more varied, however, it does not often reflect or represent rural stories and people. An Indian entrepreneurial venture is targeting this

¹⁸⁵Bakshi, Rajiv. "Rural India Gets Tech Savvy; Entertainment Industry Driving the Phenomenon." *LinkedIn*, 8 May 2020, <https://www.linkedin.com/pulse/rural-india-gets-tech-savvy-entertainment-industry-driving-bakshi/>.

problem through their platforms called ‘Stage’.¹⁸⁶ Stage is an indigenous OTT platform that focuses on hyper-localized content and is the first of its kind to cater to local dialects and languages. The founder, Vinay Singhal, realized that there were over 19,500 dialects in India and is working towards making ‘Stage’ a “platform for entertainment, connection, and celebration of cultures for all dialect-speaking people of the country.”¹⁸⁷ Such platforms can incentivize more rural people to explore technology and the internet. Practices like searching for certain movies, sharing media, and navigating digital platforms can increase their confidence to use other functions and digitized services as well.

While platforms like ‘Stage’ require ownership and basic knowledge of smartphones and other more advanced technologies, another initiative is bringing entertainment to Indian villages in-person along with opportunities to further media literacy. ‘Digiplex’ mobile theater vans by the company ‘Picture Time’ travel across various villages and set up all-weather canopies that can accommodate up to 120 people.¹⁸⁸ The founder Sushil Choudhary states that this is “an endeavor to bring world class Digital Cinema experience & IOT (Internet of Things) to the people of rural India.”¹⁸⁹ The screening brings in large rural populations and the venues have also been used for state and central governments to spread awareness of new schemes. In 2016, when the nation was going through demonetisation, Digiplex helped rural people download mobile payment applications and showed them how to operate the apps. The venue also provides Wi-Fi. State governments in India have started working closely with

¹⁸⁶STAGE, <https://www.stage.in/>. Accessed 4 May 2023.

¹⁸⁷Daas, Romaa. “Everything we know about STAGE OTT app.” *Lifestyle Asia Hong Kong*, 5 January 2023, <https://www.lifestyleasia.com/ind/whats-on/news-whats-on/stage-ott-app-what-we-know/>. Accessed 4 May 2023.

¹⁸⁸Picture Time – Picture Time Digiplex, <http://picturetime.in/>. Accessed 4 May 2023.

¹⁸⁹Singh, Sanjay. “How rural India gets its dose of entertainment.” *ET Retail*, 10 June 2017, <https://retail.economictimes.indiatimes.com/news/food-entertainment/entertainment/how-rural-india-gets-its-dose-of-entertainment/59084061>. Accessed 4 May 2023.

Digiplex and in recent years, they have seen more women attending screenings. This is a great opportunity to promote media literacy initiatives and, on local levels, spread awareness about digitized services. One limitation might be that high involvement of the government might determine the way that technology is promoted. It is possible that the government limits media literacy to its functional aspect due to its prioritization of surveillance and censorship. Regardless, widening media literacy and increasing awareness of digitized services is the first step towards further exploration of media and technology for rural people.

The examples of the two platforms/initiatives above show how, through entertainment consumption, rural people can be encouraged and incentivized to learn more about technology. On the other hand, there is also value in rural people producing their own media. Both of these aspects build active audiences. Steve Goodman, Founder of Educational Video Center in New York City stated the following on the importance of alternative media production:

“This approach to critical literacy links media analysis to production; learning about the world is directly linked to the possibility of changing it. Command of literacy in this sense is not only a matter of performing well on standardized tests; it is a prerequisite for self-representation and autonomous citizenship.”¹⁹⁰¹⁹¹

¹⁹⁰ Goodman, S. (2003) *Teaching Youth Media: a critical guide to literacy, video production, and social change*. New York: Teachers College Press.

¹⁹¹ Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

Furthermore, Kellner and Share assert that alternative media production should “challenge the master narratives and the systems that make them appear normal” and that the focus should be on socially conscious analysis and media production instead of individualistic self-expression.¹⁹² In the context of rural communities, it is emphasized that media production by rural people should be given the same importance as consumption through increased technology access as it adds to the critical analysis of present media depictions of rural communities and forces rural and other people to question established norms and ideologies of mainstream media. “Spaces must be opened up and opportunities created so that people in marginalized positions have the opportunity to collectively struggle against oppression to voice their concerns and create their own representations,” Kellner and Share state.¹⁹³ Chapter 4 provides examples of how rural people have started using social media and producing content to bring awareness to their issues. Through increased media literacy initiatives, more platforms, media forms, and digital spaces would become accessible for larger rural populations to work and produce their own media with. Rural people will also think critically and become a part of the conversation when government policies or laws are being debated that impact their digital activities and access. The increased interest will also bring in new technologies to the rural areas that could help bridge the gaps between rural and urban areas, especially with regards to resources and opportunities.

Through the cases studied and the data collected for this research, I have some suggestions for media literacy initiatives and how to structure them. There are also

¹⁹² Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

¹⁹³ Kellner, Douglas, and Jeff Share. "Critical media literacy: Crucial policy choices for a twenty-first-century democracy." *Policy Futures in Education* 5.1 (2007): 59-69.

some suggestions that have been discussed in the previous chapters which will be summarized in this section.

In chapter 5, in the context of reducing misinformation on WhatsApp, a local fact-checking organization is mentioned. Investment in local initiatives for fact-checking, media literacy, and any form of education should be increased. This is especially as technology use and media literacy levels are different for different regions, age brackets, and gender groups which is also reflected in the primary data collected from the survey. At the same time, the broadcasting tool used by this organization could also be used as an educational tool for providing people digestible bits of information on media and technology, or also informing the subscribers of the broadcast about media literacy programs or events happening in their areas. Therefore, a small-scale approach like this could be more effective in reaching the target audience.

In chapter 3, Nigeria making media literacy a part of its adult schooling curriculum is discussed. This has the potential to reduce the differences in technology use between the age brackets as identified in chapter 5. The program in Nigeria is more focused on functional media literacy by teaching adult learners about using mobile phones. However, a structured program like this could be expanded to include more advanced knowledge of a variety of technological devices along with aspects of critical media literacy paired with training for alternative media production. Adult media literacy along with adult literacy in general cannot be sidelined by assuming that each household has relatively more media literate and tech-savvy young people or that these young people would continue to live with their older family members.

With the current rural and urban migration patterns, more people are migrating to urban areas and this migrating population largely consists of young people, especially young men, migrating for work.¹⁹⁴ According to the World Bank's World Development Indicators, the urban population as a percentage of total population in India has increased from 33.60% in 2017 to 35.39% in 2021 while the rural population has decreased from 66.40% in 2017 to 64.61% in 2021.¹⁹⁵ Therefore, adult media literacy should be given importance and there should be resources dedicated to work with all age and gender brackets of society that are lacking in technological skills and understanding.

Additionally, already established networks of trained individuals exist in villages in India. The most prominent example is the anganwadis and anganwadi workers. An anganwadi is a rural child care center in India and as of 2018, there were approximately 1,363,000 of them all around India.¹⁹⁶ These centers were mainly established to combat high child mortality rates in India, especially rural regions, and have since become community centers for women and child development. An anganwadi is operated by anganwadi workers who are women trained to educate other women in the village. Such an extensive network could be used to target the gender gap in technology access and use while also changing the villages' beliefs regarding the impact of technology on women. This also has the potential to culturally transform households in rural regions.

¹⁹⁴Soumi, Mukherjee, and K. C. Das. "Youth migration in India: Spatial pattern, characteristics and its linkage with development." (2013).

¹⁹⁵"World Development Indicators | DataBank." *DataBank*, <https://databank.worldbank.org/source/world-development-indicators>. Accessed 4 May 2023.

¹⁹⁶"13.63 lakh Anganwadi Centres (AWCs) of the 14 lakh AWCs sanctioned across the country are operational as on 01.06.2018." *PIB*, Ministry of Women and Child Development, Ministry of India, 30 July 2018, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=181218>. Accessed 4 May 2023.

In chapter 4, the 'Haqdarshak' platform for digital access to personalized information about government schemes is discussed for having an assisted-tech model. This model consists of their digital aspect—the software program—as well as a physical aspect—the organization trains a set of people within villages to help others navigate the digital platforms. These people provide assistance in order to make the services of the platforms available to even those who are less media literate and might not have any technological devices. This model adds a personal touch and allows two-way communication between the trained personnel and rural people. It could be replicated for rural areas especially when any new technology or digital platform is introduced which could benefit rural people.

On a broader scale, the recent advancements in artificial intelligence (AI) through platforms like ChatGPT have shown the potential that AI has in terms of adapting and interacting with people. The recent developments have been monumental such that they are the most human-like interactions that have occurred between a human and a computer. While AI and its algorithms have been identified to have multiple issues such as developing bias and not having the cultural and social context for interactions with people, it has the potential to overcome certain barriers. For example, the language and dialect barrier in Indian rural villages is extremely high. Through AI integration, any digitized services or digital platform could be made more accessible as AI has the capability to learn a magnitude of information and apply it when asked to do so. Therefore, more data from rural regions needs to be collected and worked with to develop AI.

Looking at the bigger picture, media literacy in rural areas is extremely important as the Indian government is looking to regulate technology and digital spaces by prioritizing surveillance and censorship. Technology is an important asset for rural communities and its potential must not be harmed by these regulation policies. There needs to be an increased involvement of rural people in the policy making process and the larger decision-making processes in the nation. This is also true for other countries as there is a global trend of high investment in introduction and regulation of technology but limited/low investment in media literacy. Increased access and interaction with technology is also a way for rural people to get more information and be more aware of their decision making in terms of voting in local and national elections, which is one way of being part of the policy making process.

Conclusion

While development is a priority for India and other nations studied in this research, digitization also provides an opportunity for better standard of living, reduced inequality, increased access to essential services, and increased participation of rural communities in the production of media as well as its regulation.

However, this is only true if technology is adapted to its full potential which requires people to be media literate, more specifically critically media literate. Moreover, their willingness to further their knowledge of ICT and its positive and negative impacts is essential to limit the destructive potential of access to technology. It is also necessary that the technology is appropriately adopted and used to address rural concerns. Programs and initiatives to bridge the gap between low media literacy rates and increased access to technology (in the form of mobile phones) need to be widespread. Some suggestions include:

- Local initiatives for fact-checking, increasing awareness of false information, teaching people about specific digital platforms and technologies
- Integrating the assisted-tech model in rural areas for more support in navigating media and technology
- Using established structures and organizations like Digiplex and the anganwadi system to train and educate people about media literacy
- Exploring artificial intelligence to increase inclusivity and reduce barriers for rural people
- Using entertainment as a pathway to increased media literacy

The nation's core infrastructure—education, electricity, etc.—is a significant barrier and this gap between technology access and efficient use is essentially an infrastructural issue. It is necessary for significant investment in infrastructure to ensure all factors to facilitate reliable and consistent access to technology and the internet are in place. This is especially if the government is relying on digitization of essential services to be the singular solution to their low access in rural regions.

In conclusion, technology adoption is impacted by a multitude of factors, a majority of which are specific to the region and its culture. In the case of India, its economic position determines access to technology as prices of mobile phones and cellular subscriptions are some of the lowest in the world whereas its political, social, and cultural factors determine the limited use of digitized services and more advanced features of technology, showing a need for increased media literacy.

Limitations

While this research aims to present a holistic view of the gap between technology adoption and efficient use in rural areas in developing nations, the primary data collected is from one district in Maharashtra, India. The state of technology and its adoption in terms of age and gender may vary in other districts and regions of India. Moreover, cultural beliefs and social norms also vary within the various states in India which have not been directly taken into consideration when drawing conclusions for the nation.

There are limitations to the primary data collected through the survey. The survey was based on a questionnaire and written responses were collected. This did not give the participants an opportunity to interact with me or discuss the questions. The participants were also randomly selected and not evenly selected as there were more male than female participants and they were not equally spread between the age brackets. This also meant that there are limitations for the data collected and observations made with regards to technology and gender as well as technology and age in rural areas.

In terms of secondary data, as stated in the introduction, a significant amount of research done about digitization and technology adoption in the global south and more specifically in rural areas is done in the context of economic development. My research, thus, used references from economic and media studies sources. The statistics referenced are based on what was most recently collected. Thus, for certain statistics, the information might not be up-to-date. Some of the case studies and research references have been conducted in other countries and contexts. The

conclusions and observations from them may not directly apply to the context of India.

I want to also acknowledge the rapidly changing nature of technology and media and their integration in developing communities. At the same time, my research presents a perspective of the past and present along with strategies for the future which are worth exploring.

Lastly, I want to state that my interest in studying rural areas stemmed from my extended family that resides in rural areas and my paternal grandfather being a rural farmer in the Amravati district that my survey is conducted in. Nonetheless, I want to acknowledge that as a researcher who has not lived in the rural area studied and has spent a limited amount of time in rural communities, there are many more experiences, concerns, and needs of rural people that are not addressed in this research. It would require deep learning, more detailed interviews (in-person), and primary data from a larger population and I hope to expand the scope of my research to cover more issues of rural communities.

Appendix 1: Survey Data Spreadsheet

Sr. No.	Participant Name	Participant Sex	Participant Age	(2) Village	(3) Which technologies do you own (for example: mobile phone, TV, computer)?	(4) What is the approximate cost of your technology?	(5) What is your occupation?	(6) Which technological devices do you use as a part of your occupation (for example: mobile phone, TV, computer)?	(7) Has using these technologies helped you?	(8) Has using these technologies impacted your income or yield?	(9) Through which information source did you first get trust in COVID-19 (for example: mobile phone, TV, newspaper, internet)?	(10) Which information source do you trust the most?	(11) In India, do you use banking, shopping, and other services that are available and in all three spheres of education, healthcare, and income?	(12) How did technology and digitalization help you during this pandemic?	(13) What do you mainly use your mobile phone for?	(14) Do you think you know enough about media and technology to use it and how efficient technology is?	(15) Would you be interested in knowing more about technology? Do you want to know more about digitalization?	(16) What types of information would you want instant access to? (like information about farming, crop prices, ticket booking)	(17) What are your views about the technology infrastructure in your area and the digitalization initiative of the government? Is it helpful or harmful?	(18) Has a member of your family migrated out of the village to a city? If yes, what is their occupation?	(19) Do you think you have equal access to technology as others in your community? If not, why?
1	Lakshmi Anand Vjelkar	female	83	Talegaon, Thakur	mobile phone, TV	Rs. 2,000, monthly bill: Rs. 150	farming	pesticide pump	increase in crop yield, saved labor	Yes, saved labor as I operated the pump	TV	TV	No	helped in healthcare	to call people, listen to music, and check the time	No	No	agricultural information, crop prices, government schemes	I am unable to say	No	Yes, but I never paid attention to it
2	Hritansh Divdhar	male	78	Shendurana Bazar	TV	no mobile	farming	none	Yes, got a lot of information about farming practices	TV	newspaper	newspaper	we don't use any of this	did not get any information	don't own a phone	Yes	Yes	got information about crops	it is going well, it has helped me in my agricultural work and any urgent work	No	Yes
3	Niranjan Kadu	male	46	Shirajgaon, Mojr	mobile phone	Rs. 4,000, monthly bill: Rs. 300	farming	mobile phone	Yes, got a lot of information about farming practices	Yes, got a lot of information about farming practices	TV news and newspaper	TV news and newspaper	No	got information about farming that helped	for farming work	Yes	Yes	farming information	is helpful, helped in farming work	No	Yes
4	Sudhir Debnakar	male		Shirajgaon, Mojr	mobile phone	Rs. 9,500, monthly bill: Rs. 150	farming	mobile phone	No, got some information	Yes, got some information	TV news and newspaper	No	got information for education	to call people, listen to music, and check the time	Yes	Yes	farming information	it is helpful for agricultural work	No	Yes	
5	Prakash Chikte	male	52	Shendurana	mobile phone, TV	Rs. 2,000	farming	none	No, not applicable	don't use/TV not applicable	TV	TV	No	we used my mobile phone to register for the vaccine	to call people, listen to music, and check the time	No	No	agricultural information, crop prices, government schemes	yes it is helpful, has helped get information about agriculture	No	No, I am not well educated so didn't pay attention to it
6	Mala Varare	female	47	Shendurana	TV	don't own a mobile phone	housewife/homemaker	none	No	don't use/TV not applicable	TV	TV	No	no help	don't own a mobile phone	No	No	information I get from TV news	Yes, it is helpful, I was able to use e-crop services (is a mobile app, crop registration and other facilities)	No	No, as I am uneducated
7	Ajay Adikane	male	46	Shendurana	mobile phone, TV	Rs. 12,000, monthly bill: Rs. 250	farming	mobile phone	Yes, got crop insurance, the e and to paperwork more k readed	Yes, I did get crop insurance, the e and to paperwork more k readed	TV	TV	Yes, for shipping and banking	Digital form of health check, and online schooling for kids	to call online work, entertain	Yes	Yes	agricultural information, crop prices, government schemes	Yes, it is helpful, I was able to use e-crop services (is a mobile app, crop registration and other facilities)	No	Yes
8	Asha Vyas	female	52	Shendurana	mobile phone	Rs. 3,000, monthly bill: Rs. 50	housewife/homemaker	none	Yes, a lot of changed in my output	Yes, a lot of changed in my output	internet on my mobile phone	internet	No	my family got information in regards to news education	for entertainment and news	Yes	Yes	got information about new cooking styles and dishes	it is going well, it has helped me in my agricultural work and any urgent work	No	Yes

9	Ramdas Chitke	male	55	Shendod	mobile phone	mobile: Rs. 2,000 , monthly bill: Rs. 50	farming	mobile phone	Yes, got informal farming practices thus there was growth in	Yes, got information on about n fast and in a timely manner thus there was growth in	mobile phone	newspaper	No	No	my family got information on about education	for informal farming education	Yes	Yes	agricultural information	it is going well, it has helped me in my agricultural work and any urgent work.	No	Yes
10	Ashok Mandavane	male	66	Shendod	none	don't own a mobile phone	don't work	none	No	No	newspaper	newspaper	No	No	digital health check	mobile phone	No	No	information about my relatives and their health	can't say	No	No, I don't understand any of it
11	Nandaki Palli	male	54	Talegaon	mobile phone, tractor	mobile: Rs. 1,900 , monthly bill: Rs. 150	farming	tractor	reduced labor work	Yes, can work on multiple farms	newspaper	newspaper	No, don't have enough information about them	was able to get information on buying various farming equipment which eventually lead to increased crop yield	to receive and make phone calls	No	Yes, I am interested	got a variety of information about agriculture and government schemes	it is both helpful and harmful	No	Yes	
12	Shankar Kanhe	male	52	mishri	mobile phone, TV	mobile: Rs. 1,900 , monthly bill: Rs. 150	tractor driver	mobile phone	yes, I get the location of where I have to work through my mobile phone	No	TV	TV	No	No	to see the time, make/recieve calls	No	No	government schemes, fresh news	don't know	No	Yes, but people don't use it that much	
13	Nandaki shor Akhare	male	48	mojri	mobile phone	mobile: Rs. 1,700 , monthly bill: Rs. 50	farming	mobile phone	because my educational is incomplete I don't know much about it	No	newspaper	newspaper	No	No	During COVID, the information available on mobile phones was explained to me by my children	to call the and connect with relatives and extended family	No	I don't understand this	farming information and crop market prices	Due to current facilities we have been able to make adhaar cards and use it to get money/loans	No	Yes
14	Shyam Baysankar	male	48	mojri	car, mobile phone	mobile: Rs. 500 , monthly bill: Rs. 200	private job	mobile phone	Yes, because when I don't have my company duty, I use my devices these devices, I am paid more than some other jobs out there which don't use technological devices	Yes, because when I work for my company using these devices, I am paid more than some other jobs out there which don't use technological devices	mobile phone, newspaper	internet	banking, shopping, and have used quite a few of the online services	was useful for education and healthcare	calling, important work which is mainly through my phone, and sometimes entertain ment	Yes	Yes	to get quick information about other available private jobs	Yes, it is helpful in farming, private jobs and even other ways such as using phone payment in bigger shops with that facility.	No	Yes	

15	Ranjana Khatrasag	female	48	mojri	TV, small mobile phone	mobile: Rs. 1,000, monthly bill: Rs. 99	farming, farm labour, homemaker	mobile phone instructions which farm to go to for work	Yes, I get to see a lot of things on TV, get calls from children and extended family which saves time.	no change in income	TV, everyday I work with other women and I don't also know about COVID-19 through them	I'm not very educated and I don't know much yet	No, I haven't needed this information	our education is stopped by and we got information about COVID vaccinations when at through text messages as well as when to take the second dose, due to initiation our income has deteriorated	call children and extended family, check time messages when at morning alarm	No, I never paid attention to that	No, but I would like to learn more about digitization as everything is digitized now.	government schemes, health and wellness of close friends and family	didn't benefit from government digitizing yet but I think it helps my kids then it would be great	my son lives in the nearby city and keeps visiting often	I don't understand much of this, so only my children use it
16	Arvind Kantak	male	54	mojri	mobile phone, TV	mobile: Rs. 1,500, monthly bill: Rs. 149	farming	mobile phone, pesticide pump has helped with the crop yield	Yes, I connect to people	Yes	TV	newspaper	Yes, through my children	Yes, helped me to get vaccinations and understand the COVID-19 virus	check the time, inform on about crops	No	No, because I don't know much about mobile phones government agricultural schemes	agricultural information, crop market prices, government agricultural schemes	I don't use mobile phones a lot so don't know much	No	No, as I had other family responsibilities so I didn't pay much attention to that
17	Lata Khanbad	female	55	mojri	mobile phone, TV	mobile: Rs. 1,000, monthly bill: Rs. 150	housewife/homemaker	mobile phone	to connect to people	No	TV news	TV news and my son	No	digital health check ups	alarm, make and receive calls, click photos	No	No	government schemes and health of relatives	no benefit to me	No	because I am less educated I don't understand much of this
18	Satish Pognad	male	52	mojri	mobile phone, TV, washing machine	mobile: Rs. 8,000, monthly bill: Rs. 199	I have a clothing store	mobile phone	Yes, to talk about business and click my pictures of clothes	Yes, helped me increase my income	newspaper and talking to others	TV news	No as all my business is offline but in the future I will use it	as my business was shut there was a fall in income	alarm, make and receive calls, click photos	No	No, as I am not very educated so didn't pay attention to this	farming information, grain prices, and agriculture related news	as I haven't taken advantage of this before, I can't say it is helpful or harmful	No	No, as I am not very educated, I myself stay away from such technology
19	Dhanaji Bhekar	male	60	mojri	mobile phone, TV	mobile: Rs. 1,500, monthly bill: Rs. 99	farming	mobile phone	Yes, to check the time and to call farm labor workers	It has helped a little as work is faster	newspaper	newspaper	No	we kept getting all information at home	to connect to people, check time	Yes	more education related information	Yes for agricultural work and urgent work	No	Yes	
20	Vasudev Rao Thral	male	58	mojri	mobile phone	mobile: Rs. 3000, monthly bill: Rs. 150	laborer	mobile phone	No	Yes	newspaper	newspaper	No	yes helped in education	entertainment	Yes	more education related information	Yes, has helped in communication	No	Yes	
21	Chanda bai Ganesh	female	52	mojri	mobile phone	mobile: Rs. 5000, monthly bill: Rs. 100	laborer	mobile phone	Yes, helped me get work	Yes, technology call devices helped me get work at multiple places which helped my income	mobile phone	newspaper	No	yes, education	community	Yes	more education related information	Yes, has helped in communication	Yes	Yes	
22	Indira Sativan	female	65	mojri	mobile phone, TV	mobile: Rs. 1200, monthly bill: Rs. 100	housewife/homemaker	mobile phone	Yes, it connects me with my daughter who lives away from home	No	TV news	My grandson watches the news on TV and mobile phone and tells me	No	In getting vaccination, and got OTP on relatives phone to confirm it	To talk to kids and relatives	No	Because I don't have an advanced phone, I don't know about these things	Health information about relatives, government schemes	No, I have not benefited from digitisation, that's why I don't know if it is enough and efficient.	No	No, because I am not very educated I don't know anything related to that

23	Gopal Kiamrao Kale	male	65	moji	TV	don't own a phone	farmer	tractor, spray machine for pesticides	Yes, helped farming easy	The tractor helped increase yield	TV and newspaper	newspaper	No, I don't now anything related to this yield	During this period, my son could get education at home which helped us.	to talk to people	No	I have no knowledge of this and haven't paid attention to it.	Agricultural information and crop prices	Because I am old don't understand anything about this.	Yes, my son works in the bank	No
24	Kishor Pranodhav Hongdare	male	54	tvsa	mobile phone	Rs. 3000, monthly bill: Rs. 209	farmer	mobile phone	Yes, get information on crops and farming tasks on the farm, can work which from the pesticides mobile phones	Yes, we get to know when to do what tasks on the farm, from the pesticides mobile phones and fertilizers to use which seeds will give good yield. We got all this info from the internet	mobile phone and newspaper	newspaper	No	Not to me but my son could get education at home which helped us.	No	Yes	farm related information, agricultural market, crop prices	Yes it is enough for farmers as farm related work and selling work all happens from one app	No	Yes	
25	Halima Shah	female	48	tvsa	one mobile phone for the family (common)	Rs. 1600, monthly bill: Rs. 120	laborer	none	no	Internet	mobile phone	mobile phone	no	no help	to connect with relatives	No	Yes	farm related information, agricultural market, crop prices, for kids information regarding education	Yes because it helps us use our adhaar card to get money as loans and other banking services have improved due to digitalisation	No	No, due to our economic situation
26	Vinod Bhagat	male	46	tvsa	mobile phone, tv	Rs. 21,000, monthly bill: Rs. 249	business (grocery)	mobile phone	Yes, as mobile phones can be used for making payments	Yes, I was able to buy and sell more goods	mobile phone and newspaper	newspaper	yes, banking, ticket booking, shopping	yes for education and healthcare, helped in getting vaccination	for online work	yes	most information is available but market information about goods to buy and sell would be helpful.	In this field the indian government is constantly developing which is beneficial	No	Yes	
27	Noor Shah Raheem Shah	male	57	tvsa	mobile phone, tv	Rs. 14000, monthly bill: Rs. 399	laborer-driver	mobile phone	before travelling I can get information about that	No	newspaper	internet	no	Yes for my kids' education and we got information about healthcare	entertain ment and communication	Yes	information regarding agriculture	Yes as we can work from anywhere and access banks for anywhere	We can from more rural areas to this place for work	Yes	
28	Sangeet Thakare	female	48	tvsa	mobile phone	Rs. 5500, monthly bill: Rs. 249	housewife	none, but use it in my daily life	no, but I get some information from it	no	newspaper	mobile phone	yes banking	not to me but help in my work	communication	Yes	economic, agricultural and political information	Yes because my son can send money whenever we need it, and buy us things	yes, my son is working in the city and private job	Yes	
29	Malabai Jirapur	female	51	tvsa	mobile phone	Rs. 900, monthly bill: Rs. 120	housewife, laborer	mobile phone	Yes, I get calls from people and also for work	Yes, I got a lot more work through my phone	newspaper	newspaper	no	for healthcare and vaccination	communication and work	Yes	market prices, crop prices	Yes, because this technology has helped me get more work and people can work from anywhere with computers, mobile phones and laptops	no	Yes	

35			mobile phone	mobile: Rs. 900 monthly bill: Rs. 130	farmer	mobile phone	Yes, got info on when crop should be planted and which chemicals to be sprayed	internet on my mobile phone	internet on my mobile phone	banking, farm work online	education	for internet use	yes	yes	agricultural info	Yes, can do work from anywhere, like operating the motor in the farm	no	yes
	Suresh av Vadok ar	male	Shendur ana Bazar	mobile phone	farmer	mobile phone	Yes, to get agricultural info and for online work	internet on my mobile phone	internet on my mobile phone	haven't used any yet	None	community with family	yes	yes	agricultural info	Yes, we can get necessary goods from the dity in the village through the internet	no	yes
	Nilin	male	Shendur ana 50 Bazar	mobile: Rs. unknown - monthly bill: Rs. 299	farm laborer						We got help in the village for healthcare	no use	no	yes	education and agricultural info	Yes, without going to the bank I can get money by showing my adhaar card	no	yes
	Indira 37 Gavli 38	female	Shendur ana 63 Bazar	don't own a phone mobile: Rs. 5000 - monthly bill: Rs. 150	laborer	no use mobile phone	no use	multiple places through phone which increased my income	newspaper TV	no use	education	community and entertainment	yes	yes	education info for family	Yes, helped me in doing my online work, in education during the pandemic	no	yes
	Gajanan Bhure	male	Gurudev 52 nagar	mobile: Rs. 40000 - monthly bill: Rs. 300	laborer	mobile phone	Yes, helped get work and increased income	internet	newspaper	Yes, banking	education	entertainment	yes	yes	crop prices	Yes, helped me in doing my online work, in education during the pandemic	no	yes
	Rajendr a Pannas 39 e	male	Gurudev 57 nagar	mobile: Rs. 40000 - monthly bill: Rs. 300	Dal mill	mobile phone	Yes, helped get work and increased income	internet	newspaper	Yes, banking	education	entertainment	yes	yes	crop prices	Yes, helped me in doing my online work, in education during the pandemic	no	yes
	Pramod 40 Mehre	male	Gurudev 55 nagar	mobile: Rs. 1800 - monthly bill: Rs. 49	teacher	mobile phone	Yes	TV	newspaper	Yes	education	community	yes	yes	agricultural info	Yes, helped kids for education during pandemic	no	yes
	Chanda bal Gepatra 41 o Savde	female	49 Anarkvadi	mobile: Rs. 12000 - monthly bill: Rs. 200	Angarvadi social worker		No, my meetings happen at home	mobile phone	TV, newspaper	No, I don't own a smartphone, I only have a phone with a keypad	related information quickly	To conduct meetings	no	no	health information	Information so far, it is enough for me.	Yes, my son runs a cafe in Amravati city	Yes
	Preful 42 Charpe	male	47 Anarkvadi	mobile phone, TV	farmer	use tractor for farming	Yes, sometimes farming runs my house.	TV	TV, mobile phone	Yes, online shopping	which has helped me.	To use internet mainly	Yes	Yes	agricultural info, grain prices	Yes but it needs more regulation as technology can otherwise turn harmful.	no	Yes
	Lalita 43 Vave	female	Shirajga 49 n, Mojn	None	laborer	don't use	No	TV	TV	Don't have a phone so do not benefit from any of this	Yes helped to get vaccination	no phone	no	government information about tiatives wellbeing	It is helpful for the future generation	no	No, because of being uneducated I did not pay attention to this	
	Pramod Mestira 44 m	male	Shirajga 53 n, Mojn	TV, mobile phone	farmer	mobile phone	don't use Yes, to contact the laborers to work on my farm	TV	TV	No did not use this	No help	to see the time, communication	no	no	agricultural info, grain/crop prices	Yes, this helped us to use our adhaar card to get money	no	No, because I am not very educated

45	Ramesh Daphtad	male	56 n, Mojri	Shirajao TV	don't have mobile: Rs. 2000, monthly bill: Rs. 150	cook	cooking machines	Yes	helped in no	TV	TV	no	my revenue was for vaccination!	no phone no	no	grain prices, wedding orders	Yes, new technologies	No	No	No equal access because of my lack of education
46	Digambhar	male	49 n, Mojri	Shirajao mobile phone, TV	farmer	none	none	no	no	TV	TV	no	using my phone	no	no	agricultural information, crop info, breaking news	I don't know anything about this	no	No, because I am not very educated	
47	Jyoti Ambadkar	female	45 n, Mojri	Shirajao TV	housewife	mixer	Yes, saved time and effort	no	no	TV	TV	no	no	no phone no	no	news, relatives' wellbeing	can't say	no phone	No, because I am not very educated	
48	Bhimrao Vankha	male	51 n, Mojri	Shirajao mobile phone, TV	farmer	pesticide pump	Yes, got a lot of information	Yes, saved the cost of laborers	Yes, through the phone I could get more work quickly	TV	TV	no	education	no	no	agricultural information, crop info, breaking news	Yes, helpful to use adhaar card and get money	no	No, because I am not very educated	
49	Sujeet Kambal	male	24 n, Mojri	Shirajao mobile phone	laborer	mobile phone	Yes, to find	Yes, to find	Got a lot of information	Internet	newspaper	No	education	entertainment	yes	grain/crop prices	Yes, get a lot of information about agriculture	no	Yes	
50	Avnash Bardshe	male	25 a	Shendod mobile phone	student	mobile phone	online	Got a lot of information	Got a lot of information	mobile phone	Internet	yes, online shopping and banking	online education	on, social media	yes	education related info	Yes, for digital education	no	Yes	
51	Devendra Mahore	male	22 a	Shendod mobile phone	student	mobile phone	no	Got a lot of information	Got a lot of information	education news	newspaper	no	education	education	yes	agricultural info, crop prices	Yes, for farm work	no	Yes	
52	Shantanu	male	23 a	Shendod mobile phone	student	mobile phone	no	Information to education	Information to education	Internet and mobile phone	Internet	No did not use this	Yes for education	education	yes	education related info	Yes, for agricultural work for any urgent work	no	Yes	
53	Abhiraj Nistane	male	21 a	Shendod mobile phone	student	mobile phone	Yes, for education	Yes, for education	Internet and mobile phone	Internet and mobile phone	Internet	Yes, have used all of these services	because the college was closed during this period, helped in online education	education	yes	latest news, job search information, relatives' wellbeing	Yes, it is helpful so far but it could also turn harmful in the future	no	Yes	
54	Sanket Male	male	21 Thakur	Talegaon mobile phone, laptop	student	laptop	Yes, has helped a lot for online education	has helped in online education	no	Internet	mobile phone	Yes, have used all of these services	vacination, online transaction	yes	no	government schemes, education info	Yes, saves time	no	Yes	
55	Sarang Dhumad	male	21 Thakur	Talegaon mobile phone	work at a petrol pump	mobile phone	helped in online payment	no	no	mobile phone	mobile phone	Yes, have used all of these services	digital health-check	online transactions	yes	petrol price	Yes, get all info in a few seconds	no	Yes	
56	Shweta Mohre	female	20 Thakur	Talegaon mobile phone	student	mobile phone	Yes, for education	no	no	Internet	mobile phone	Yes, have used all of these services	because the college was closed during this period, helped in online education	social media	yes	news, job search info	Yes, it has benefited everyone	no	Yes	

Suraksh a Gumhad 57 e	female	Talegaon	mobile phone	mobile-Rs. 7000, monthly bill: Rs.200	student	mobile phone	yes	no	TV	mobile phone	shopping	helped in online education	community callon, photo/vi deo, to get informati on	little bit	no	education info, going to the government schemes, school notifications	Yes, my family can access banking without going to the bank and can use their adhaar card to withdraw money.	no	yes
Sanket Vaphad 58 e	male	24 mojr	mobile phone	mobile-Rs. 14000, monthly bill: Rs.240	private company job	company machines	Yes, helps me increasing work faster	Yes, have to put less effort and it is helps me increasing income	mobile phone	mobile phone	services	No, it did not help me as during the lockdown, a lot of private copanies shut down so I had to stay at home	because I have a smartpho ne so I have quite some informati on	Yes	government schemes, breaking news	Yes, makes tasks easier and faster	no	yes	
Gaurav Manapu 59 e	male	24 mojr	mobile phone	mobile-Rs. 10000, monthly bill: Rs.150	clothing store	mobile phone, for communication	yes	Yes, saved time and cost as didn't have to travel as much	newspaper	TV	no	did not help	communi callon, alarm	no, have very little knowldg	no	breaking news, market prices	yes	no	yes, but I don't use a lot of technology
Jugal Phurse 60 e	male	25 mojr	mobile phone, 3 wheeler vehicle	mobile-Rs. 12000, monthly bill: Rs.250	driver	mobile phone	yes	Yes, all my business is through my phone which makes it easy and I earned more money as I got more mobile customers	mobile phone, TV	mobile phone	services	reduced	communi callon, informati on, socia media	no	agricultural info, grain prices government schemes, job search information, daily news	Yes, made things easier	no	yes	
Ajay Lanjivar 61 e	male	25 mojr	mobile phone	mobile-Rs. 14000, monthly bill: Rs.200	student	mobile phone	yes, helped me complete my educatio n	no	mobile phone	newspaper and mobile phone	yes, online education	helped in online education "arogya setu" app	communi callon, internet, alarm	yes	education and health	yes	In a way it is helpful but another side of it exists, which is harmful	no	yes
Kunal Khadask 62 e	male	22 mojr	mobile phone	mobile-Rs. 17000, monthly bill: Rs.400	student	mobile phone	no	yes, got a variety of informatio n from the internet for education and easier farming little impact on my business crop yield	mobile phone and internet, newspaper	TV	yes, these are classes and all very beneficial and have made life easier for me	Yes, as I am a student helped me attend online education and farming work	yes, and this has helped me a lot	no	agricultural info and scientific/techno logical info	process but because of this the common people's lives have gotten faster.	yes, my elder brother is in Pune city working in a private company	yes	
Sahil Madode 63 y	male	22 mojr	mobile phone, 4 wheeler car	student and farmer	mobile phone	yes, helped me complete my educatio n	no	yes, made education easier farming little impact on my business crop yield	mobile phone and internet, newspaper	TV	yes, these are classes and all very beneficial and have made life easier for me	Yes, as I am a student helped me attend online education and farming work	yes, and this has helped me a lot	agricultural info and scientific/techno logical info	process but because of this the common people's lives have gotten faster.	yes, my elder brother is in Pune city working in a private company	yes		

107	Nikhil Kandure	male	28	mojri	mobile phone, 2 wheeler vehicle	mobile: Rs. 18000, monthly bill: Rs.239	wireman	mobile phone, meter	helps me work faster	no	yes, almost all	got all info in a timely manner	community, e-commerce, shopping info, photo	yes, get all info	yes	helpful as all healthcare schemes and the electricity got interrupted	no	yes			
108	Yogesh Kharkar	male	30	mojri	mobile phone, 2 wheeler vehicle	mobile: Rs. 1700, monthly bill: Rs.180	private job	mobile phone, electric machine	yes, difficult tasks are made easier, can do some online meetings	the pump enabled me to go to multiple farms and offer this spraying service to them so that helped increase income	TV	Internet	yes, almost all	lockdown- company was shut so benefit	community, e-commerce, online shopping, info, entertainment	I don't want to pay attention to that but I want to know more about digitization	agricultural info, grain prices, agricultural info	no	yes		
109	Dilip Nimkar	male	45	mojri	mobile phone, TV	mobile: Rs. 90000, monthly bill: Rs.199	farmer	mobile phone, pesticide pump	saved my time	got timely information which helped increase my yield	TV	TV	no	helped in farming	community, working on the farm	no, don't pay much attention to that	agricultural info, medicine prices, helpful, saves time	no	yes		
110	Divakar Hive	male	45	mojri	mobile phone		farmer	mobile phone	no	because of the mobile phone there was a change in my yield	news	newspaper	no	education	for farm work	yes	helpful for farm work and urgent	no	yes		
111	Akshay Yavle	male	35	mojri	mobile phone	mobile: Rs. 90000	farmer	mobile phone	no	there was a change in my yield	mobile phone	newspaper	no	increase in yield	for farm work, entertain	Internet	no	helpful for farm work and urgent	no	yes	
112	Sandeep Jodge	male	40	mojri	mobile phone	monthly bill: mobile: Rs. 14000, monthly bill: Rs.249	laborer	mobile phone	no	yes, because it helped us get solar energy, get info on which manure to use and when which all increased the farm yield	news and internet	news	yes, education info	education	getting info	yes	agricultural info	helpful for farm work	no	yes	
113	Rahul Dahoke	male	27	ivasa	mobile phone	mobile: Rs. 17500, monthly bill: Rs.250	farmer	mobile phones sometimes	no	yes, all my work is through these devices and this has helped me get more	newspaper	TV, mobile phone	haven't used any yet	education for my child	community, doing any work from home	no	yes	Technological services are available to us in limited ways. It is helpful and can do everything from home.	no	yes	
114	Ajay Gulraide	male	36	ivasa	mobile phone, computer		private job	mobile phone, computer	contracts	contracts	newspaper	Internet	have used all aspects	vacation, education, online work, so all	community, work, news	yes	yes	education info, economic info, job search info	work is online	no	yes

115	Pankaj Shende	male	42 Trusa	mobile phone	mobile-Rs. 8000, monthly bill: Rs.250	private job	mobile phone	yes	Yes as I can communicate with other companies too as part of my job and there was a communi an cation with increase in my phone if I salary as am not getting physical work	mobile phone, newspaper	internet	banking, shopping	education (family) healthcare- vaccination	communi cation, important work, entertain ment	yes	yes	job search info	helpful for banking and online payments	no	yes	
116	Gajanan Ingole	male	44 Trusa	mobile phone, TV	mobile-Rs. 20000, monthly bill: Rs.250	laborer	mobile phone	yes, which me get helped my income	TV	newspaper	newspaper	yes, banking	education	communi cation, entertain ment	yes	yes	education for family, agricultural info	helpful for online work, children's education	no	yes	
117	Pramod Hari Avhad	female	26 Trusa	mobile phone	mobile-Rs. 15000, monthly bill: Rs.249	student	mobile phone	no, but helped in will help in examinat getting job info	TV	internet	internet	banking, ticket booking, shopping	education	educatio n, news	no	yes	all info should be available fast, education info and job search info	helpful yes, because I can make work related payments from anywhere	no	yes, they are also in confection	yes
118	Sagar Mahure	male	29 Trusa	mobile phone, TV	mobile-Rs. 12000, monthly bill: Rs.299	contruction	mobile phone	yes, has helped in yes, can farm get info on which educatio chemicals n for my of use on child, farms and and in other healthcar agricultur e. also all info in along with banking new and shopping as info	mobile phone	newspaper, mobile phone	newspaper, mobile phone	banking, ticket booking, shopping, and healthcare other online work	education, healthcare got helpul info	internet, entertain ment, educatio n, banking	yes	yes	agricultural info, education info, etc needs	it is important as all work like paying bills, banking, farm work, entertainment, etc needs	no	yes	
119	Sanjay Chaudh	male	41 Bazar	mobile phone, TV		farmer	mobile phone	yes, can communi cate with other laborers and get to a lot of more when needed	mobile phone	mobile phone	mobile phone	yes, banking	yes, has helped my income a lot for work	communi cation, entertain ment, yes	yes	yes	agricultural, political info	helpful for farm work	no	yes	
120	Sagar Asode	male	34 Bazar	mobile phone	mobile-Rs. 15000, monthly bill: mobile-Rs. 3500,	laborer	mobile phone	Use it to control the solar energy devices	mobile phone	newspaper, TV, mobile phone	mobile phone	none	education for kids	communi cation, entertain ment, yes	yes	yes	agricultural, political info	helpful for farm work	no	yes	
121	Manoj Durade	male	34 Bazar	mobile phone	mobile-Rs. 17500, monthly bill: Rs.249	farmer	mobile phone	yes, helped me in my work as can do it	internet	internet	internet	all	healthcare- vaccination	communi cation, entertain ment, yes	yes	yes	education and job search info	harmful because I think there are a lot of financial scans going on especially in banking scams	yes, I have come from other village for the private job	yes	
122	Pankaj	male	34 Bazar	mobile phone		private job	mobile phone, laptop	yes, for work	internet	internet	internet	all	healthcare- vaccination	communi cation, entertain ment, yes	yes	yes	education and job search info	harmful because I think there are a lot of financial scans going on especially in banking scams	yes, I have come from other village for the private job	yes	

123	Ashish Konde	male	Shendurj ana 32 Bazar	mobile phone	mobile: Rs. 13000, monthly bill: Rs.250	student	mobile phone	yes, internet has helped in education and other work	newspaper and internet	internet	banking, shopping	education	education	yes	yes	education, job search info	helpful for education	no	yes
124	Shubham Bhekar	male	Shendurj ana 26 Bazar	mobile phone	mobile: Rs. 12000, monthly bill: Rs.250	student, laborer	mobile phone	yes, for work and because I am a laborer	newspaper, mobile phone	mobile phone	none	none	community	yes	yes	education, agricultural info	helpful for education and online transactions	no	yes
125	Preraj Devde	male	Shendurj ana 28 Bazar	mobile phone	mobile: Rs. 12000, monthly bill: Rs.299	private job	mobile phone	yes, to do my job better	internet	internet, newspaper	yes, banking, ticket booking, shopping	yes, education for kids	community, online work	yes	yes	job search info, daily news	helpful, for online businessman	yes, my uncle who is a	yes
126	Nitin Gavde	male	Shendurj ana 32 Bazar	mobile phone	mobile: Rs. 9000, monthly bill: Rs.299	laborer	mobile phone	yes, get info about market prices, can do many tasks	mobile phone, newspaper	newspaper	none	yes, healthcare	community, entertainment	no	yes	agricultural info, education for kids	helpful, get work from cities also	no	yes
127	Kishor Vasnik	male	Shendurj ana 37 Bazar	mobile phone	mobile: Rs. 10000, monthly bill: Rs.300	grocery store owner	mobile phone	yes, has increased income, customers pay online	internet, mobile phone	mobile phone	none	healthcare, info on precautions for covid	to connect with customer	no, have limited info	yes	agricultural info, classes for beauty parlor	helpful, but people don't have much information and awareness about this	yes, security supervisor	yes
128	Chaya Gajthly	female	Shendurj ana 36 Bazar	mobile phone	mobile: Rs. 25000, monthly bill: Rs.500	beauty parlor owner	mobile phone	yes, helped me expand my business online	internet, mobile phone	mobile phone	yes, banking, shopping	internet taught me new things, look at business which helped my income	yes, my business and laws are online	yes, because there is a lot of fraud online, so I want complete info about	yes	share market, new items	helpful for youth shop	yes, hardware	yes
129	Nayan Pachh	male	Shendurj ana 28 Bazar	mobile phone, 2-wheeler	mobile: Rs. 7000, monthly bill: Rs.299	young entrepreneur	mobile phone, calculator	yes, got more work and chemical related info	internet, newspaper	mobile phone, newspaper	banking, shopping	healthcare, education	agricultural info	yes	farm info, job search info	helpful, for education, online payments	no	yes	
130	Sagar Raut	male	Shendurj ana 33 Bazar	mobile phone	mobile: Rs. 92000, monthly bill: Rs.249	farm laborer	mobile phone	yes, helped me expand my business online	internet, mobile phone	internet	banking	healthcare, education	agricultural info	yes	farm info, job search info	helpful, for education, online payments	no	yes	
131	Pallavi Chaudh	female	Shendurj ana 29 Bazar	mobile phone, TV	mobile: Rs. 94000, monthly bill: Rs.299	student	mobile phone	yes, helps me in my business	newspaper, internet	newspaper, internet	yes	vaccination, online education	education	yes	agricultural info, grain prices	yes, helpful	no	yes	
132	Shilal Chovre	female	Shendurj ana 31 Bazar	mobile phone, TV, laptop	mobile: Rs. 2500, monthly bill: Rs.150	student	mobile phone, laptop	yes, helps me in my business	internet	internet	yes	online education	online classes	yes	ticket booking	yes, helpful	no	yes	
133	Sunil Maralle	male	45 Anarkvadi rickshaw	mobile phone, auto rickshaw	1 drive my own auto rickshaw	1 drive my own auto rickshaw	yes, helps me in my business	newspaper	newspaper	newspaper	yes, I don't have much info on this	community, vaccination	community, vaccination	no	market prices, agricultural info	all work can be done from home which makes people lazy so it is harmful	no	no, because my education isn't enough for that	

Pankaj Vigne	male	41 Anakvadi	mobile phone, flour making machine	mobile: Rs. 19,500 mobile: Rs. 8000, monthly bill: Rs. 150	farmer, flour mill	flour making machine	yes	yes, flour machine business gives income everyday	mobile phone	farm	Yes, have used all of these services (phonepay)	My sister outside the country speaks english so I can record it and google translate it	to get info, I learn from the young people around me	yes, have some info, if I don't know anything	no	to learn new things	helpful for good work but harmful is not used well	no	no, familial responsibilities so don't have much time
Prashan	male	40 Anakvadi	mobile phone, TV	mobile: Rs. 10,250 mobile: Rs. 6000, monthly bill: mobile: Rs. 1800,	farmer	mobile phone	yes	no	TV	TV	no	education	entertainment to get info, to see the time.	yes	no	agricultural info, grain prices	helpful	no	yes
Kishor Khawale	male	40 Anakvadi	mobile phone, TV	mobile: Rs. 10,250 mobile: Rs. 6000, monthly bill: mobile: Rs. 1800,	farmer	yes, mobile phone	yes	no	TV	TV, newspaper	yes, banking	education	news, agricultural info, to see time, alarm	yes	yes	agricultural info	helpful, for farm work and urgent	no	no
Anup Adikar	male	38 Shirhod	mobile phone	Rs. 200	farmer	mobile phone	yes, got info	yes	mobile phone, newspaper	newspaper	yes	education	agricultural info, to see time, alarm	yes	no	agricultural info	helpful, for farm work and urgent	no	yes
Ranjana Garhe	female	35 on Shivanga	mobile phone, TV	Rs. 100	housewife	mixer	yes, for cooking	no	TV	TV	no	healthcare	healthcare	no	yes	relatives' health info, breaking news	helpful	no	yes
Bhazal Savai	male	Shendurj Bazar	mobile phone	Rs. 249	farmer	mobile phone	less tasks in our farm	yes, can get more info which helps in agriculture	mobile phone, TV	mobile phone	banking	education, healthcare	agricultural info	yes	yes	agricultural info, education, gain prices, market related info	helpful for some work as speeds it up, some goods are expensive but cheaper online	no	yes

Appendix 2: Interview Transcript - Dr. Anil Rohankar

Interview Date: 25 July 2022

Interviewer: Dnyaneshwari Haware

Interviewee: Dr. Anil Rohankar

Interview Location: Dr. Rohankar's residence, Amravati, Maharashtra, India

Dnyaneshwari: The information collected from this interview will be used solely for the purpose of my research. Do you consent to that?

Dr. Anil Rohankar: Yes, I fully agree.

Dnyaneshwari: The first question is: How do you think healthcare provision in India has changed in the past decade?

Dr. Anil Rohankar: The number of hospitals and number of clinics, particularly peripherally in rural areas have increased. They have also increased the number of seats for admission in medical colleges. So the number of doctors is much more than the last 20 years. And facilities are available at peripheral centers also. So healthcare facility has positively increased everywhere and is accessible to everybody now.

Dnyaneshwari: How do you think the pandemic affected healthcare provision, especially in rural regions?

Dr. Anil Rohankar: The pandemic has affected healthcare provision in rural areas, definitely. Because there were so many cases particularly in the second wave (of COVID-19) which had emerged in rural areas and they were not prepared. The healthcare facilities were not prepared to tackle that situation so there was a lot of problem in the availability of drugs, ventilators, oxygen cylinders or oxygen, and there were no beds available at many places (hospitals). So it has affected a lot.

Dnyaneshwari: Compared to urban areas and cities, how much technological integration has happened in the healthcare sector here?

Dr. Anil Rohankar: Here, particularly in diagnostics, we have got so many facilities available. We have got newer diagnostic tools available, particularly in radiology, pathology, and all fields of diagnostic tools have improved a lot and there are also newer technologies and drugs which are very helpful for treatment of the patients. Roads and Basic infrastructure has also improved so access to rural areas and for rural people to come to cities has become easier and communication has increased because of the mobile network and everything so it has improved a lot

Dnyaneshwari: What is your general opinion about telemedicine?

Dr. Anil Rohankar: Telemedicine has improved a lot, particularly in this area where child mortality rate is very high like in tribal areas of Vidarbha region so pediatricians initially were not available in the periphery or in tribal areas so they had set up clinics over there and consult senior pediatricians and they get their opinion and through telemedicine they are prescribing the proper medicines to them and the government machinery and private machinery are providing nutritious foods plus medicines to them. So telemedicine is a much better advancement particularly in the case of pediatric cases in tribal groups and in other cases also where superspecialists or senior physicians or specialists are not available so patient could directly approach them via telemedicine, saving time and money both and getting proper treatment.

Dnyaneshwari: I was studying about telemedicine and it says that there were initiatives in the early 2000s but the telemedicine guidelines, the strict formal guidelines, that had been proposed around 10 years ago only got approved in 2020 in the pandemic. I mean the pandemic was a period where we needed that. Do you think there are any risks about telemedicine which is why they were holding off on approving guidelines? What do you think about all of this?

Dr. Anil Rohankar: The government wants to control everything. They want all controls in their hand. Telemedicine is very good. In the pandemic also there were situation where I have and everybody has treated patients from far away. We had got video calls, we could see their physical status. The only that was not possible, was directly touching the patient and checking them. But otherwise telemedicine

everybody has done for COVID positive patients. Those patients who were on home isolation, we used to get daily video calls with them so we could see the patient and see the saturation and all other parameters we can observe and we can prescribe them drugs. It was approved in 2020 at the start of the pandemic but later when the second and third wave was over the government had again added some clauses to it and it is more strict so everybody cannot practice telemedicine. You have to take approval. There are many issues about identification of the physician, their qualification, and communication. So many issues have been raised by the National Medical Commission (NMC) so it is not possible for everyone now to practice telemedicine. They will have to go for proper approval from the NMC to start their telemedicine clinics.

Dnyaneshwari: Do you have any suggestions for policies or initiatives that could make telemedicine or something on those lines more effective, especially in rural areas, or anything you think that can increase the quality of rural healthcare right now?

Dr. Anil Rohankar: First thing, rural healthcare, particularly in rural and tribal areas, poverty is the main issue. Whatever I prescribe them or whatever any doctor prescribes them, they should have the purchasing power. Particularly in a few areas, protein deficiency, malnutrition is very much in rural areas and supplementation is very costly so it should be provided by the government. Now these mother and child welfare schemes are providing a lot of things. For telemedicine, we require proper mobile network, wifi, and other things to be available, communication should be proper and follow-up should be proper because every coin has two sides. There are so many pros of telemedicine—cost and time is saved—but there are also people misusing it. So there should be a complete check on that. Not everybody should be allowed to practice telemedicine because there are so many quacks, particularly in rural and tribal areas that are taking undue advantage of that. That should be prevented.

Dnyaneshwari: Lastly, during the pandemic the government created the Arogya Setu App and then there were other initiatives where technology was highly involved but how useful were those things really?

Dr. Anil Rohankar: The Argoya Setu App was just used commonly for contact tracing. The app was continuously watching you and your whereabouts. They used to geotag or localize the person in any area. So if somebody who has visited that area, their app was showing an orange color meaning high risk. So that was not very useful in diagnosing cases. It was mainly used for contact tracing. You are continuously observed by the government, that was the main thing. Your location has to be on, wherever you have been, they are observing. Nothing more than that.

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