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INDIA'S DIGITAL REVOLUTION: UNLOCKING SOCIAL WELFARE THROUGH HEALTHTECH INNOVATION



INDIA'S DIGITAL REVOLUTION UNLOCKING SOCIAL WELFARE THROUGH HEALTHTECH INNOVATION

“This first year of Ayushman Bharat has been a resolution, a dedication and a process of learning. It is the power of India's resolve that we are running the world's largest health care scheme with success in India. And behind this success is a sense of dedication, and goodwill. This dedication belongs to every state and Union Territory of the country; this dedication belongs to thousands of government and private hospitals in the country; this dedication belongs to every employee, every medical practitioner, Ayushman Mitra, Asha workers, social organisations, public representatives, that is, everyone.”

PM Narendra Modi

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To give wings to MeitY's vision of promoting technology innovation, start-ups and creation of Intellectual Properties, a nodal entity called MeitY Start-up Hub (MSH) has been setup under its aegis. MSH is a dynamic, singular and collaborative platform for tech startup community towards building meaningful synergies in the Indian start-up space. MSH's quick value additions to domestic tech startups in terms of improving scalability, market outreach and domestic value addition and setting up innovative partnerships with various stakeholders has been a key differentiator in MSH's efforts to catapult the tech startup ecosystem in the country.

MSH is acting as a hub and ensuring synergies among all the TIDE 2.0 Centres, theme-based incubation centres, domain specific Centre of Excellences on Emerging Technologies and other existing platforms for facilitating criss-crossing of technology resources, sharing best practices and ideas across the entire gamut of innovation and startup ecosystem.

About the Federation of Indian Chambers of Commerce & Industry (FICCI)

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. FICCI encourages debate, engages with policy makers and civil society, and articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

About The Dialogue™

The Dialogue™ is a public policy think tank with a vision to drive a progressive narrative in India's policy discourse. Founded in 2017, we believe in facilitating well-researched policy debates at various levels to help develop a more informed citizenry, on areas around technology and development issues. The Dialogue™ has been ranked as the world's Top 10 think tanks to watch out for, by the Think Tank and Civil Societies Programme (TTCSP), University of Pennsylvania in their 2020 and 2021 rankings.

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1. INTRODUCTION

In the era of rapid digitisation, intelligent devices, and widespread internet access, India is swiftly progressing towards becoming a digitally empowered society and knowledge-driven economy. The healthcare sector in India is one of the most revolutionised and impacted sectors of this increased digitisation. Over the past few years, this sector in India has witnessed remarkable growth, achieving a staggering Compound Annual Growth Rate (CAGR) of 22% from 2016 to 2022, catapulting its market size from US \$110 billion to an impressive US \$372 billion.¹

According to the World Health Organisation (WHO), health technology encompasses the “application of organised knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of life”.² This broad definition includes various sub-segments of the healthcare ecosystem, such as med-tech, artificial intelligence (AI), robotic process automation, and consumer health. Additionally, it encompasses different types of businesses and business models engaged in critical healthcare processes such as distribution, supply chain management, diagnosis, data management, and rehabilitation.³ Although healthtech represents just a fraction of the comprehensive healthcare ecosystem, its growth potential, ability to deliver efficient healthcare services, and capacity to reach even the most marginalised populations have captured the attention of regulators, investors, and scholars alike.

The Indian healthtech industry has witnessed explosive growth in recent years, with projected market value expected to reach US \$5 billion by the end of 2023⁴ and surge to an impressive US \$25 billion by 2025.⁵ Notably, India has emerged as a leading destination for venture capital (VC) financing in the healthtech sector, attracting significant investments totalling US \$4.4 billion between 2016 and 2021. In 2021 alone, the sector secured US \$1.9 billion in VC funding.⁶ This substantial inflow of investment has empowered healthtech startups to develop cutting-edge technologies, resulting in a growing number of patients embracing digital healthcare

¹ Indian Healthcare Industry Analysis | IBEF. (2022, December 1). India Brand Equity Foundation. <https://www.ibef.org/industry/healthcare-presentation>.

² World Health Organization. (n.d.). Medical devices. World Health Organization. <https://www.who.int/teams/health-product-policy-and-standards/assistive-and-medical-technology/medical-devices#:~:text=What%20is%20health%20technology%3F,and%20improve%20quality%20of%20life>

³ How healthtech is shaping the industry - tatacapitalhealthcarefund.com. (n.d.) https://tatacapitalhealthcarefund.com/content/dam/tata-capital/health-care-funds/pdf-file-HowHealthtechishapingtheindustry_May2021.pdf

⁴ Health Tech India 2023. (2023, February 1). <https://healthtechindia.in/>

⁵ Rautela, I. (2023, June 29). Indian healthtech market to reach \$25 billion by 2025: Report. The Hindu BusinessLine. <https://www.thehindubusinessline.com/economy/indian-healthtech-market-to-reach-25-bn-by-2025-report/article67023315.ece>

⁶ Patwardhan, N. (2021, November 25). India ranks fourth globally for VC investments in healthtech space since 2016: Report. Live Mint. <https://www.livemint.com/companies/news/india-ranks-fourth-globally-for-vc-investments-in-healthtech-space-since-2016-report-11637846268745.html>

solutions. The COVID-19 pandemic presented a multitude of challenges for both citizens and the government.⁷ It brought to light the harsh realities faced by marginalised populations, exacerbating the long-term effects of decades-old income inequalities on their access to healthcare.⁸ While there was a decrease in out-of-pocket expenditure in the healthcare sector in 2020, indicating reduced utilisation of health services, 2021 witnessed positive growth with increased public investment in healthcare and wellness. The Indian government's prioritisation of the healthcare sector played a significant role in driving this increased spending.⁹

Notably, amidst the chaos caused by the pandemic, numerous healthtech startups emerged, driven by the government's efforts to foster entrepreneurship in this sector.¹⁰ As more people sought remote healthcare solutions, tele-consultations, digital wellness, e-diagnostics, online pharmacies, and other alternatives experienced a surge in demand. The government bravely confronted the situation by steadily increasing budget allocations for the healthcare sector year-on-year and encouraging innovative and cost-effective solutions through startup initiatives.¹¹

According to the Constitution of India, health as a subject falls under the State List (List II, subject 6) whereby states have the authority to legislate and take action on these subjects. As the pandemic struck, India, being the second most populous country, faced immense challenges, particularly in densely populated states. However, states exhibited remarkable resilience during those difficult times, thanks to the efficient state administrations, effectively supported by the central government's prompt measures, including releasing significant funds and implementing nationwide welfare programs.¹²

It is becoming increasingly clear that the future of healthcare will heavily rely on the capabilities, goods, and services created by innovators in the healthtech sector. While investors and innovators continue to develop unique products and services for this

⁷ Nimavat, N., et. al., (2022, July 25). Covid-19 pandemic effects on the distribution of healthcare services in India: A systematic review. World journal of virology. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9372784/>

⁸ Raman, R., Rajalakshmi, R., Surya, J., Ramakrishnan, R., Sivaprasad, S., Conroy, D., Thethi, J. P., Mohan, V., & Netuveli, G. (2021, January 1). Impact on health and provision of healthcare services during the COVID-19 lockdown in India: A Multicentre cross-sectional study. BMJ Open. <https://bmjopen.bmj.com/content/11/1/e043590>

⁹ Share of government health expenditure in total health expenditure increases from 28.6 per cent in FY14 to 40.6 per cent in FY19. Press Information Bureau. (n.d.). <https://pib.gov.in/PressReleasePage.aspx?PRID=1894902>; see also World Health Organization. (n.d.-a). Global spending on Health: Rising to the pandemic's challenges. World Health Organization. <https://www.who.int/publications/item/9789240064911>

¹⁰ Anupam, S. (2022, February 10). Six healthtech startups that hit the spotlight with their fight against covid-19. Inc42 Media. <https://inc42.com/features/six-healthtech-startups-that-hit-the-spotlight-with-their-fight-against-covid-19/>

¹¹ Union budget 2023-24 - transformational for Healthcare Sector. Hindustan Times. (2023, February 10). <https://www.hindustantimes.com/brand-stories/union-budget-2023-24-transformational-for-healthcare-sector-101676024724734.html>

¹² Ram. A. (2020). Central government's response to the COVID-19 pandemic (Apr 7-13, 2020). PRS Legislative Research. <https://prsindia.org/theprsblog/central-government%E2%80%99s-response-to-the-covid-19-pandemic-apr-7-13-2020?page=51&per-page=1>; see also Ghoge K. (2020). Maharashtra government got ₹28K-crore from Centre in three months to fight Covid pandemic, says Fadnavis. Hindustan Times.

market, the government is primarily responsible for evaluating the overall utility of these innovations in relation to the larger public interest.

2. HEALTHTECH FOR ALL

Realising the long-term detrimental effects of the pandemic on ordinary citizens and the heavily taxed domestic healthcare system, the Indian government has pioneered the realisation of new digital solutions. During the pandemic, tele-medicine and online pharmacies emerged as an essential part of healthcare services and saw a remarkable increase in patient and physician use. The WHO defines tele-medicine as “the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies to exchange valid information for diagnosis, treatment, and prevention of disease and injuries.”¹³ It includes consulting one’s doctor via phone network or even video interfaces such as Zoom, Skype, and WhatsApp.

During the pandemic, numerous healthcare providers ramped up their digital products to integrate tele-consultation platforms, including hospitals and online pharmacies, accelerating the telemedicine sector's growth. The Indian telemedicine market is expected to reach \$1.8 bn by 2025, with a CAGR of 23.9% from 2019 to 2025.¹⁴ The pandemic brought attention to the necessity for a streamlined, all-inclusive tele-consultation platform that includes all key stakeholders. A comprehensive platform for tele-consultations has become necessary for healthcare delivery in India, lasting well beyond the restrictions imposed by the pandemic. While hospitals, pharmacies, and other organisations previously tried to digitise some of their value chains, these were never fully achieved, and there continued to be processes that needed to be processed offline. The pandemic highlighted the necessity of digitally integrating each phase of healthcare systems and building an ecosystem incorporating all key stakeholders, including patients, medical practitioners, insurance companies, etc.

In 2019, the Indian government released its own telemedicine service, eSanjeevani, which has two variants: (i) eSanjeevani Ayushman Bharat-Health and Wellness Centre, a provider-to-provider telemedicine platform which facilitates teleconsultation for patients who walk into these centres; and (ii) eSanjeevaniOPD, which is a patient-to-doctor tele-medicine service to enable people to get outpatient services in the confines of their homes.¹⁵ Notably, post the pandemic, the utility and reach of these services has increased manifold. Tele-medicine has already served over 114 million patients at over 115,000 Health & Wellness Centres through 15,700+ hubs and over 1100 online OPDs serviced by more than 225,000 medical practiction-

¹³ Telemedicine - World Health Organization. (n.d.-b).

https://apps.who.int/iris/bitstream/handle/10665/44497/9789241564144_eng.pdf?sequence=1.

¹⁴ India telemedicine market: Focus on consultation cost, set-up cost, return on investment, Infrastructure Landscape, global trends, market opportunities, COVID-19 impact, and Competitive Landscape. (2020) BISresearch. (n.d.). <https://bisresearch.com/industry-report/india-telemedicine-market.html>

¹⁵ Esanjeevani. eSanjeevani. (n.d.). <https://esanjeevani.mohfw.gov.in/#/>

-ers as of April 2023.¹⁶

To support the overall ecosystem and ensure long-term stability, the government has implemented enabling guidelines, such as the "Telemedicine Practise Guidelines: Enabling Registered Medical Practitioners to Provide Healthcare Using Telemedicine," issued in March 2020. These guidelines establish norms and protocols governing all aspects of telemedicine practice, including physician-patient relationships, issues of liability and negligence, management and treatment procedures, patient consent, medical records maintenance, and patient records' privacy and security.

¹⁶ Esanjeevani. eSanjeevani. (n.d.-a). <https://esanjeevani.mohfw.gov.in/#/about>

3. ROLE OF INDIA'S DIGITAL PUBLIC INFRASTRUCTURE IN REVOLUTIONISING HEALTHCARE

Emerging and disruptive technologies have been leveraged to overcome existing obstacles in the healthcare system, focusing on efficiency, accessibility, accuracy, cost reduction, and time-saving measures. Deloitte's study revealed a rise in healthcare investments from 2018-2019, prior to the pandemic's disruptive impact.¹⁷

Digital health solutions have the potential to revolutionise global healthcare, promoting and safeguarding people's health and well-being. Over the past decade, the Indian government has made unprecedented investments in research and development, combining technologies like blockchain, virtual reality, robots, and AI with drugs and healthcare. The primary objective is to bridge the gap between traditional healthcare methods and technology-driven solutions. These innovations have led to breakthroughs in consumer welfare, including early-stage detection of life-threatening diseases,¹⁸ improved radiology scans¹⁹, efficient health insurance management²⁰, and more.

¹⁷ Health Tech Investment Trends: How are investors positioning for the future of health? (2020). Deloitte Insights. https://www2.deloitte.com/content/dam/insights/us/articles/6459_Health-tech-investment-trends/DI_Health-tech-investment-trends.pdf

¹⁸ Niramai (n.d.). Niramai. <https://www.niramai.com/>

¹⁹ Home: Qure AI for Healthcare. Qure AI | AI to enable accessible, affordable & timely care across the globe.(n.d.). <https://qure.ai>

²⁰ Vitaraya. (n.d.) Vitaraya. <https://www.vitrayatech.com/>

3.1 The Last Mile Benefits Facilitated by Ayushman Bharat Digital Mission

Cognizant of healthtech's potential to streamline healthcare processes and make them more accessible to the general population, the Indian government formulated significant policies and structural reforms. In 2017, the National Health Policy was released, envisioning a digitised healthcare system in India.²¹ This policy laid the foundation for the Ayushman Bharat Digital Mission (ABDM) launched in 2021.²² ABDM aims to establish a national health information network and architecture by 2025, providing a secure and interoperable healthcare system. It enables the accessibility and portability of health records between the public and private sectors. ABDM utilises Digital Public Goods (DPGs) to enhance the availability, accessibility, affordability, and acceptability of healthcare. Citizens, healthcare providers, digital innovations, and other stakeholders collaborate to promote fair digitisation of healthcare nationwide, thanks to interoperability frameworks, open protocols, and consent artefacts provided by ABDM.²³ Key aspects of ABDM include promoting inclusivity, ensuring accessibility irrespective of internet connectivity, free-of-cost registration, voluntary participation, opt-out options, verified health registries as the single source of truth, and a privacy-by-design framework to protect personal data.²⁴

Within this national ecosystem, various elements are developed to make different systems interoperable and efficient. These include health IDs, health records, health facility registries, health information providers, health information users, and more. The Ayushman Bharat Health Account (ABHA) health ID, introduced under ABDM in 2021, revolutionised the Indian healthcare system.²⁵ ABHA enables beneficiaries to access their medical records, participate in public health programs and schemes, and securely share records with hospitals and medical institutions, eliminating the need for physical queues and concerns about record loss.

Under ABDM, the government has also developed policies and programs aligned with the draft Health Data Management Policy.²⁶ This policy establishes a data protection framework for all participants in the healthcare system, including healthca-

²¹ National Health Policy, 2017 - Ministry of Health and Family Welfare. (n.d.-c). <https://main.mohfw.gov.in/sites/default/files/9147562941489753121.pdf>

²² NHA: Official website ayushman Bharat Digital mission. NHA | Official website Ayushman Bharat Digital Mission (n.d.). <https://www.abdm.gov.in/>

²³ Sharma, R. S., Rohatgi, A., Jain, S., & Singh, D. (2023). The ayushman bharat digital mission (ABDM): Making of India's DigitalHealth Story. CSI Transactions on ICT. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10064942>

²⁴ National Health Authority. (2021). A brief guide on Ayushman Bharat Digital Mission (ABDM) and its various building blocks. In ABDM. Retrieved July 6, 2023, from https://abdm.gov.in:8081/uploads/ABDM_Building_Blocks_v8_3_External_Version_eabbc5c0f3_4_a96f40c645.p df

²⁵ Abha number: ABDM. ABHA number | ABDM. (n.d.). <https://healthid.ndhm.gov.in/> Ayushman Bharat digital mission -

²⁶ ABDM. (n.d.-b). https://abdm.gov.in:8081/uploads/Draft_HDM_Policy_April2022_e38c82eee5.pdf

-re providers, regulators, patients, and healthcare professionals. Other noteworthy initiatives include the ABDM Sandbox²⁷, a software testing environment adhering to detailed guidelines;²⁸ the Unified Health Interface Initiative, an open protocol for various digital health services facilitating appointment booking²⁹, tele-consultation, service discovery, and more; and the Health Data Retention Policy³⁰, ensuring record retention and compliance with applicable laws at healthcare facilities.

The integrated digital health infrastructure built upon ABDM forms a lucrative opportunity in healthcare,³¹ driven by the technological revolution in India, government policies and interventions, the rise of healthtech startups, the pandemic's impetus towards digital healthcare, and the growing public awareness of health and wellness.

3.2 Repurposing Aarogya Setu and CoWIN for greater citizen welfare

Under the ABDM scheme, the government repurposed two crucial applications: Aarogya Setu and CoWIN, which were vital in monitoring and managing the pandemic. Aarogya Setu was initially developed as a COVID-19 contact tracing, syndromic mapping, and self-assessment tool by the National Informatics Centre under the Ministry of Electronics and Information Technology. It utilised contact tracing technology to inform users of potential COVID-19-positive contacts they may have encountered daily. If any contacts tested positive, the application would notify the user. Additionally, the application provided medical recommendations to prevent the spread of the pandemic.³² It had upwards of 240 mn downloads as of September 2022.³³

CoWIN, released in 2021, served as an end-to-end solution for tracking registration, appointments, identity verification, vaccination, and certification of COVID-19 vaccination. It played multiple roles throughout the vaccination delivery chain, including administrative management, vaccine supply chain monitoring, citizen

²⁷ Sandbox.abdm.gov.in. (n.d.). <https://sandbox.abdm.gov.in/>

²⁸ NDHM sandbox - ABDM. (n.d.-f). https://www.abdm.gov.in:8081/uploads/sandbox_guidelines_b39bccc23e.pdf

²⁹ NHA: Official website ayushman Bharat Digital mission. NHA | Official website Ayushman Bharat Digital Mission. (n.d.).<https://abdm.gov.in/collaborative-development>

³⁰ Consultation Paper on proposed Health Data Retention Policy - ABDM. (n.d.-c). https://abdm.gov.in:8081/uploads/Consultation_Paper_on_Health_Data_Retention_Policy_21_28557f9a6a.pdf.

³¹ Sharma, R. S., Rohatgi, A., Jain, S., & Singh, D. (2023a). The ayushman bharat digital mission (ABDM): Making of India's Digital Health Story. CSI Transactions on ICT. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10064942/>

³² Aarogya Setu. (n.d.). <https://www.aarogyasetu.gov.in/>

³³ Mukhopadhyay, S. (2022, September 26). Aarogya Setu, Cowin to be used for health issues other than covid as well. Livemint. <https://www.livemint.com/news/india/aarogya-setu-cowin-to-be-used-for-health-issues-other-than-covid-as-well-11664156906037.htm>

enrollment, vaccination status updates, and issuance of vaccination certificates.³⁴ CoWIN's citizen-centric design and user-friendly interface simplified the registration process, facility selection, and vaccine type selection. After vaccination, users received digital vaccine certificates with QR codes for convenient storage and verification.

Efforts by the government in capacity building and defining roles and responsibilities at various levels (state, district, block, and village) streamlined the vaccination process and enabled efficient record-keeping. CoWIN's integration of the entire vaccine production process on a single platform facilitated the swift expansion of India's vaccination program.³⁵ CoWIN's success garnered international attention, with 76 countries expressing interest in adopting the platform.³⁶ Both Aarogya Setu and CoWIN were instrumental in monitoring, controlling, and preventing the spread of the pandemic and showcasing the potential, efficiency, and convenience of tech-enabled health services. To date, CoWIN has facilitated approximately 2 billion vaccination doses, benefiting around 1.1 billion individuals at an impressive speed, surpassing any similar demographic and geographic country worldwide.³⁷ Former CEO of the National Health Authority, Dr. R.S. Sharma, announced plans to repurpose Aarogya Setu as India's health and wellness application and CoWIN as a health management information system for small doctors' clinics and nursing homes.³⁸

The integration of Aarogya Setu within the ABDM framework allows individuals to access other digital health services while maintaining a common pool of medical history. The ABHA number links old and new medical records, including prescriptions, lab results, and hospital records. Users can securely share these records with registered health professionals and service providers. Furthermore, the CoWIN platform has been expanded to include the Universal Immunization Programme, making locating vaccination clinics and camps easier. The application sends immunisation reminders and provides digitally verified vaccination certificates. CoWIN is continually evolving, with plans to incorporate new blood and organ donation areas. Additionally, it will serve as a Health

³⁴ The actors and operations of a Digital Delivery Platform: Cowin. Dvara Research Blog. (n.d).

<https://www.dvara.com/research/blog/2021/06/16/the-actors-and-operations-of-a-digital-delivery-platform-cowin/>

³⁵ Cowin in India: The Digital Backbone for the COVID-19 vaccination program. Exemplars in Global Health. (n.d.). <https://www.exemplars.health/emerging-topics/epidemic-preparedness-and-response/digital-health-tools/cowin-in-india>

³⁶ Chandna, H. (2021, July 5). Cowin goes global, 76 countries want to use India's Covid vaccination platform software. ThePrint. <https://theprint.in/health/cowin-goes-global-76-countries-want-to-use-indias-covid-vaccination-platform-software/689817/>

³⁷ Cowin Dashboard. CoWIN Dashboard. (n.d.). <https://dashboard.cowin.gov.in/>

³⁸ Ians. (2022, September 26). Cowin, Aarogya Setu to be repurposed into India's health apps. Deccan Herald. <https://www.deccanherald.com/national/cowin-aarogya-setu-to-be-repurposed-into-indias-health-apps-1148386.html>

Management Information System (HMIS) for healthcare professionals.³⁹

These initiatives within the Ayushman Bharat pillars demonstrate the government's commitment to creating a reliable and interoperable digital health infrastructure. Individuals can utilise these technologies and obtain an Outpatient Department (OPD) card, eliminating the need for long hospital queues.

3.3 The Transformative Effect of India's Healthtech Revolution on the Society

The shift towards digital health has necessitated the development of simple, safe, accessible, and convenient digital tools. Central applications like Aarogya Setu and CoWIN exemplify initiatives prioritising the end customer while enabling healthcare facilities.

These state-of-the-art healthtech initiatives have transformed lives, even those residing in the country's remotest corners with limited financial resources and connectivity. India's pan-India vaccination drive garnered global recognition as the government efficiently monitored vaccination levels and conducted vaccination drives nationwide. Using innovative delivery methods,⁴⁰ such as drones and boats, to reach remote areas like the Sundarbans showcased India's commitment to providing equitable healthcare access⁴¹.

Real-life stories highlight the positive impact of these initiatives. Pooja Puri, a software engineer from Punjab, was able to register with the CoWIN portal and receive vaccination within two days.⁴² Aiswary Soni, a resident of Chattisgarh, successfully navigated his way around the city using the Aarogya Setu application and easily located vaccination centres in his locality.⁴³ Even police officials, working tirelessly on the frontlines, assisted citizens in registering on the

³⁹ Perappadan, B. S. (2022, August 1). Cowin to gird universal immunisation. The Hindu. <https://www.thehindu.com/sci-tech/health/cowin-technology-to-be-repurposed-for-healthcare-operations/article65706052.ece>; Suggest a tagline for repurposed Cowin. MyGov.in. (2023, February 13). <https://www.mygov.in/task/suggest-tagline-repurposed-cowin/>.

⁴⁰ PTI. (2021, October 4). Covid-19 vaccine delivery through drones starts in northeast. The Hindu. <https://www.thehindu.com/news/national/covid-19-vaccine-delivery-through-drones-starts-in-northeast/article36822489.ece#:~:text=%E2%80%9CThis%20is%20for%20the%20first,for%20administration%20at%20the%20PHC>

⁴¹ PTI. (2021, October 4). Covid-19 vaccine delivery through drones starts in northeast. The Hindu. <https://www.thehindu.com/news/national/covid-19-vaccine-delivery-through-drones-starts-in-northeast/article36822489.ece#:~:text=%E2%80%9CThis%20is%20for%20the%20first,for%20administration%20at%20the%20PHC>

⁴² Ministry of Electronics and Information Technology, Government of India. (n.d.). <https://www.meity.gov.in/writereaddata/files/75-DI-Success-Stories.pdf>

⁴³ Ministry of Electronics and Information Technology, Government of India. (n.d.). <https://www.meity.gov.in/writereaddata/files/75-DI-Success-Stories.pdf>

CoWIN application to access vaccination schemes.⁴⁴ These personal accounts build confidence and trust in the government and its welfare initiatives, encouraging more people to access public healthcare systems and supporting the government's efforts to improve healthcare infrastructure.⁴⁵

The government's initiatives have demonstrated the immense potential of health technologies to reach every individual in the country and bolster the overall healthcare infrastructure. The transformative effect of these digital health initiatives goes beyond individual experiences. It has ushered in a new era of healthcare delivery that is more inclusive, efficient, and patient-centric. By leveraging technology and data-driven solutions, the government has bridged gaps in healthcare access and empowered citizens to take control of their health.

The widespread adoption of digital health tools has paved the way for advancements in remote monitoring, tele-medicine, and personalised healthcare. Patients can now consult with doctors through tele-consultations, eliminating the need for physical visits and reducing the burden on healthcare facilities. Remote monitoring devices enable real-time tracking of vital signs, allowing healthcare providers to intervene proactively and provide timely interventions.

Moreover, digitising health records and establishing a national health information network has facilitated seamless information exchange between healthcare providers. This has improved care coordination, reduced medical errors, and improved patient outcomes. Physicians can access comprehensive medical histories and make well-informed decisions, leading to more accurate diagnoses and personalised treatment plans.

⁴⁴ Ministry of Electronics and Information Technology, Government of India. (n.d.).

<https://www.meity.gov.in/writereaddata/files/75-DI-Success-Stories.pdf>

⁴⁵ Building confidence in the COVID-19 vaccine in India. UNICEF India. (2021). UNICEF.

<https://www.unicef.org/india/stories/building-confidence-covid-19-vaccine-india>

4. THE RAPID INSURGENCE OF ENTREPRENEURSHIP AND INNOVATION IN THE DIGITAL HEALTH ECOSYSTEM

The healthcare landscape in India has witnessed a significant surge in healthtech startups, offering a wide range of services that simplify the lives of patients and healthcare practitioners alike. These startups have revolutionised how individuals access healthcare services, providing convenient and efficient solutions for diagnostics, medications, surgical processes, post-operative care, fitness training, and remote patient monitoring. Through these innovative platforms, individuals can make informed decisions about their health from the comfort of their homes.

The impact of these healthtech startups extends beyond routine healthcare processes, addressing specific needs and requirements of different demographics. For instance, they provide crucial support to women during pregnancy, childbirth, and breastfeeding while offering technologies to improve the lives of the elderly⁴⁶ and differently-abled individuals⁴⁷. These technologies include smart wheelchairs, wearable hip guards, and adaptive solutions that help them navigate and thrive in an ever-changing environment.

Recognising the private sector's potential in driving healthcare innovation, the government has actively encouraged investments in the production, manufacturing, and research and development of healthtech solutions. To facilitate this, the government has permitted 100% Foreign Direct Investment (FDI) in green-field investments for the pharmaceutical and healthcare sector under the automatic route.⁴⁸ This supportive policy environment has attracted domestic and international investors, fueling the growth of the healthtech ecosystem in India. Furthermore, the government's Start-up India program has played a crucial role in nurturing and promoting the growth of healthtech startups.⁴⁹ By providing a conducive environment for innovation and entrepreneurship, the program has fostered a competitive landscape that drives continuous improvement and offers consumers a wide range of unique solutions. Presently, India is home to approximately 8,000 health technology startups, with an estimated market

⁴⁶ Ambika Pandit / TNN / Oct 2, 2021. (n.d.). Startups step in for elderly with smart solutions for Accessible Healthcare and travel: India News - Times of India. The Times of India. <https://timesofindia.indiatimes.com/india/startups-step-in-for-elderly-with-smart-solutions-for-accessible-healthcare-and-travel/articleshow/86693006.cms>

⁴⁷ Gandzeichuk, I. (2020, February 14). Council Post: Tech Innovations: A Helping Hand To People With Disabilities. Forbes. <https://www.forbes.com/sites/forbestechcouncil/2020/02/14/tech-innovations-a-helping-hand-to-people-with-disabilities/>

⁴⁸ FDI In India | FDI Consultant | FDI Companies | FDI Opportunities 2022. (2022, July 5). FDI India. <https://www.fdi.finance/>

⁴⁹ Mookim, A. (2023, March 27). Health tech start-ups: New stars of India's healthcare ecosystem. Times of India Blog. <https://timesofindia.indiatimes.com/blogs/voices/health-tech-start-ups-new-stars-of-indias-healthcare-ecosystem/>

value of US \$2 billion and an impressive growth rate of around 40%.⁵⁰ The rapid growth of healthtech startups in India showcases technology's immense potential in transforming healthcare delivery. These startups are revolutionising access to healthcare services and driving economic growth and job creation. With continued support from the government, the healthtech sector in India is poised to make even greater strides, positively impacting the lives of millions and propelling the nation towards a healthier future.

In a commendable initiative, ARMMAN introduced mMitra, a free mobile voice call service providing crucial preventive care information to expectant and new mothers. While establishing such programs is essential, their success largely hinges on adherence. To combat the significant retention challenge in these public health programs, a collaboration was fostered between the global tech company Google, IIT Madras, and ARMMAN. They developed an AI technology capable of identifying women likely to discontinue the program early. Such preemptive identification allows ARMMAN to tailor interventions, ensuring that more women remain engaged, positively impacting maternal health outcomes.⁵¹

⁵⁰ Mookim, A. (2023, March 27). Health tech start-ups: New stars of India's healthcare ecosystem. Times of India Blog.

<https://timesofindia.indiatimes.com/blogs/voices/health-tech-start-ups-new-stars-of-indias-healthcare-ecosystem/>

⁵¹ Gupta S., Google for India 2022: Announcing concerted efforts with AI for India's changing digital needs, 19 Dec, 2022, <https://blog.google/intl/en-in/company-news/inside-google/google-for-india-2022-ai-announcements/>

5. POTENTIAL FOR GLOBAL INTEGRATION

The exemplary achievements of healthtech in delivering healthcare to even the remotest corner of the country stand as a global benchmark for digital health and a stellar example in the realisation of Sustainable Development Goals. Post-pandemic, India has emerged as a global pioneer in healthtech innovations and research and in demonstrating to the world and the global south, specifically, the methods and pathways that governments should take when scaling such healthtech innovations. The Indian healthtech ecosystem stands apart in its pragmatic approaches towards interoperability and scaling that keep the end customer in mind while formulating and implementing its policies and initiatives.

5.1 Championing Interoperability

Interoperability concerns are essential in formulating, maintaining, and processing healthcare systems; they must be integrated at the foundational, structural, and semantic levels. It enables health data exchange, application interfaces, and standards among organisations and institutions to enable seamless information mobility. Further, it reduces the amount of administrative work within and outside the institution and prevents obstacles in accessing patients' health information. It is critical to ensure the integration of interoperable technologies within existing healthcare processes in a manner that enhances the network of systems and does not obstruct the existing infrastructure.⁵²

India has always put a special emphasis on enabling interoperability, even more so after the pandemic. As discussed above, the same is done primarily by integrating Electronic Health Records (EHRs),⁵³ health IDs, leveraging the potential of emerging technologies and telemedicine, and related services. As was also discussed in the G20 Panel Discussion held by the 2nd Health Working Group, governments must focus on making highly interoperable systems, and for national digital transformation, nations must focus on a person-centred digital journey which India has successfully championed.⁵⁴

⁵² Digital Healthcare Interoperability. (2016, October). In GSMA. GSMA. Retrieved July 6, 2023, from <https://www.gsma.com/iot/wp-content/uploads/2016/10/Interoperability-report-web-version-final.pdf>

⁵³ Notification on Electronic Health Record Standards-2016. (2016, December 30). In Ministry of Health and Family Welfare Ministry of Health and Family Welfare, Government of India. Retrieved July 6, 2023, from <https://main.mohfw.gov.in/sites/default/files/17739294021483341357.pdf>.

⁵⁴ Panel Discussions held as part of 2nd G20 HWG meeting side event. (n.d.). Press Information Bureau. <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1917917>

5.2 Ensuring Benefits for All

Another key characteristic of the Indian healthtech landscape is its focus on scalability - modifying extant technologies to suit other needs or adapting to the increasingly diverse populations. Scalability in healthtech is crucial as it enables economic maintenance costs that can support innovative healthcare models and produce better outcomes. Achieving scalability in a country as culturally and geographically diverse as India is a challenging task, especially considering the sharp urban-rural digital divide and financial and social inequalities.⁵⁵

Indian healthtech initiatives, including start-ups, have demonstrated the versatile potential of technology and devices - by investing in technologies such as cloud computing, AI, and Big Data or by employing and streamlining efficient data management processes. India's experience in scaling technologies in other sectors (technology such as the Unified Payment Interface) has only aided its efforts in scaling services such as CoWIN during the pandemic.⁵⁶ Efficient usage of technology and of human resources is important for the healthtech sector to not only effectively manage high volumes of data and accordingly cater to the public but also to swiftly adapt to the changing demographic and geography.

5.3 Accessibility and Last-Mile Delivery

While interoperability and scalability invariably play a critical role in attaining accessible and equitable healthcare delivery, stakeholders from the industry and the government must plan their initiatives and interventions, paying heed to the last-mile concerns. Indian healthtech initiatives - be it by the government or private sector - have focussed primarily on adapting their initiatives to reach the end consumer right from their inception. Regarding tangible accessibility, national initiatives such as the ABDM aim to provide access to a network of healthtech services accessible via smartphones and computers; it is meant to supplement the existing healthcare system and not substitute it. Under CoWIN, the government has further provided access to individuals who have no access to the internet or smart devices by routing such services through Common Services Centres (CSCs) at the panchayat and grassroots levels.⁵⁷

⁵⁵ Sharma. V. & Tulsaney. T. (2023, May 30). The role of digital health in improving access to healthcare services in rural India. Times of India Blog. <https://timesofindia.indiatimes.com/blogs/voices/the-role-of-digital-health-in-improving-access-to-healthcare-services-in-rural-india/>

⁵⁶ CoWIN in India: The Digital Backbone for the COVID-19 Vaccination Program. (n.d.). CoWIN in India: The Digital Backbone for the COVID-19 Vaccination Program | Exemplars in Global Health. <https://www.exemplars.health/emerging-topics/epidemic-preparedness-and-response/digital-health-tools/cowin-in-india>

⁵⁷ Can't access CoWIN? Here's how you can still get Covid-19 vaccine. (2021, March 1). Deccan Herald. <https://www.deccanherald.com/national/cant-access-cowin-heres-how-you-can-still-get-covid-19-vaccine-956847.html>

6. OPPORTUNITIES FOR SCALABILITY

Recognising the immense potential of healthtech in strengthening the country's healthcare system, which the pandemic has significantly impacted, the Indian government has prioritised investments in innovation, research and development, and the scaling of technologies to benefit the entire nation. As India holds the G20 presidency, there is a unique opportunity to export and scale its healthtech innovations worldwide, particularly to the global south. To facilitate collaboration and the exchange of technologies and innovation, India can leverage the following strategies:

- **Harmonisation of Key Digital Health Principles:** At the G20 level, it is crucial to establish consensus among government and industry stakeholders regarding key principles for the innovation and application of healthtech in the healthcare ecosystem. This will promote universality in adopting healthtech innovations globally, support and nurture startups, and contribute to creating a unified healthcare ecosystem.
- **Fostering Centre-State Communication and Coordination:** India's complex federal structure serves as an exemplary model of effective centre-state cooperation and coordination. The country can share its administrative knowledge and experiences in maintaining communication and coordination among and within states for healthcare. This knowledge exchange can benefit other G20 countries in managing their own healthcare systems.
- **Leveraging India's Start-up Potential:** With the support of the Indian government and industry players, India has emerged as a thriving hub for healthtech startups. To further enhance the growth and success of these startups, the central and state governments should continue formulating pro-health tech policies and regulations, ensuring a smooth and conducive business environment. This will pave the way for a more inclusive and equitable healthcare system.
- **Collaboration and Knowledge-Sharing:** G20 governments can play a critical role in supporting the healthtech sector by facilitating information exchange among countries with diverse demographics and geographies. Sharing strengths, knowledge, and lessons learned from the pandemic will contribute to collective learning and help countries develop effective strategies for tackling healthcare challenges.
- **Creating Awareness and Promoting Adoption:** G20 countries should prioritise raising awareness about the potential, merits, and challenges of healthtech solutions. By ensuring individuals have access to information and understanding about digital health, they can make informed decisions regarding their own health and well-being.

The Indian healthcare system has emerged from the pandemic with greater strength, resilience, and innovation. It has established itself as a powerhouse with one of the world's largest social health programs, exceptional research and development facilities, and a thriving ecosystem of healthtech startups. India should actively exchange knowledge and information with other countries, foster collaboration between the private and public health tech sectors and leverage its startup potential to realise the vision of a healthy and digitally advanced India. As India presides over the G20, its emphasis on digital health can serve as a blueprint for other jurisdictions, enabling them to learn from India's experiences and launch similar programs to accelerate their own digital health projects and improve health outcomes for their populations.

