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Digital Technologies and Hybrid Model of Healthcare: Perception and Utilization

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Abstract

"Health is wealth" is a very ancient proverb. Social health and community medicine are new areas that have influenced the healthcare approach and health research globally in the last few decades. Health is influenced by various factors such as environmental, biological/genetic, economic, socio-cultural, personal behavior, health care infrastructure, research and development, and existing policies and government schemes. Nowadays, digital health is one new area on which the public as well as private sector has started working. Digital health is the "use of digital equipment to monitor/measure health parameters, accessing online health tips and guides, using health and fitness mobile apps and gadgets (such as Arogya-Setu app, smartwatch, etc.), getting online medicines and assistive devices, online appointment, doctor's consultancy, etc". During and post covid 19, digital technology turned out to be very popular and useful. Various digital gadgets were already in use such as thermometers, oximeters, blood pressure, and many others. In this background, the present study aims to understand the use of digital health and the perception of the health care system in India. The study is based on the secondary as well as primary data. A primary survey of students (under graduation and above and also faculty members, both male and female) was conducted in January 2023 through the online questionnaire. In recent times, digital health has emerged as a new frontier that both the public and private sectors have begun to explore. Digital health involves the use of digital equipment to monitor and measure health parameters, access online health advice and guidance, utilize health and fitness mobile apps and devices (such as the Arogya Setu app and smartwatches), obtain medications and assistive devices online, schedule appointments for online consultations with doctors, and more. The COVID-19 pandemic has significantly boosted the popularity and usefulness of digital technology. Although various digital gadgets, such as thermometers, oximeters, and blood pressure monitors, were already in use, the pandemic accelerated their adoption. Against this backdrop, the primary objective of the present study is to examine the utilization of digital health and its impact on the healthcare system in India. The study relies on both secondary and primary data sources. A primary survey involving students (undergraduates and above) as well as faculty members of both genders was conducted in January 2023 using an online questionnaire.

Keywords: Electronic medical records, digital health technologies, telemedicine and telehealth, hybrid model of healthcare delivery, NHP, ABDM.

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Introduction and Literature Review

Nowadays, having internet facilities and smart gadgets are common and these are used to search the remedies for different health issues. It is well documented that after COVID-19 19 healthcare seekers use online appointment methods to access health care as well as vaccination, consult doctors online along with self-care by reading and watching online videos and articles, use different apps to learn yoga, meditation, nutrition, and ways to happiness. Moreover, digital transformation has taken place as nowadays it can be seen that digital thermometers, blood pressure kits, sugar test kits, smart watches, online classes for fitness and nutrition, psychological health lectures, etc are in practice. Nowadays, having internet access and smart gadgets are common, and they are commonly used to search for remedies for various health issues. It is well-documented that, after COVID-19, healthcare seekers use online appointment methods to access healthcare, including vaccinations. They also consult with doctors online and engage in self-care by reading and watching online videos and articles. People use different apps to learn about yoga, meditation, nutrition, and ways to achieve happiness. Furthermore, digital transformation has become evident, as we now see the widespread use of digital thermometers, blood pressure kits, sugar testing kits, smartwatches, online fitness and nutrition classes, as well as psychological health lectures.

According to the Global Strategy on Digital Health 2020-2025 (WHO), the 2030 Agenda for Sustainable Development Goals (SDGs) highlights that the spread of information and communication technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies. SDG 3 is Health and well-being and in the same line, India also launched "Health in All" in 2017 as a National Health Policy (NHP) emphasizing universal health coverage and affordability, equity, patient-centered, quality care, inclusive, etc. and all this has to be achieved by 2025. Ayushman Bharat is one of the ideas that came in 2017 emphasizing universal health coverage (UHC). Before 2017 India launched the National Health Policy in 1983 (focusing on primary health care services) which was finally revised in 2002 (with a special focus on decentralization of health care services through the private sector). Health is the basic requirement which can help to achieve other goals for sustainable development altogether. According to the Global Strategy on Digital Health 2020-2025 by the World Health Organization (WHO), the 2030 Agenda for Sustainable Development Goals (SDGs) highlights the potential of information and communication technology and global interconnectedness to accelerate human progress, bridge the digital divide, and cultivate knowledge societies. SDG 3 focuses on health and well-being, and in line with this, India launched 'Health for All' in 2017 as part of its National Health Policy (NHP). This policy emphasizes universal health coverage, affordability, equity, patient-centred care, quality, inclusivity, and other key principles, with the goal of achieving these objectives by 2025. Ayushman Bharat, introduced in 2017, is one of the initiatives emphasizing universal health coverage (UHC). Before 2017, India had launched its National Health Policy in 1983, with a focus on primary healthcare services, which was subsequently revised in 2002, with a special emphasis on decentralizing healthcare services through

the private sector. Health serves as a fundamental requirement that can contribute to the achievement of other sustainable development goals.

A study (Global Strategy on Digital Health 2020-25) conducted by WHO in the year 2020- explains the guiding principles, strategic objectives, framework for action, implementation of the strategy and action plan, and how to monitor and evaluate these policies and strategies at the grassroots level. The report (National Digital Health Mission 2020) published by the Ministry of Health and Family Welfare, Government of India elaborates on how to strengthen the accessibility and equity of health services, including a continuum of care with citizens as the owner of data, in a holistic healthcare program approach leveraging IT and associated technologies and support the existing health systems in India. A study, Digital Health in India (Nishith Desai 2022), explains the application of Digital health, Ayushmann Bharat Digital Mission, investment in digital health, legal and regulatory framework, and data protection in the Indian context. Towards strengthening digital health schemes and policies "Ayushman Bharat Digital Mission (ABDM)" India launched in 2021 intends to create the framework required to enable the nation's integrated digital health infrastructure. It will bridge the existing gap among different stakeholders of the healthcare ecosystem through digital highways. Individuals can set up an Ayushman Bharat Health Account (ABHA) under the Ayushman Bharat Digital Mission to manage their medical records. It is a 14-digit number that is used to uniquely identify individuals, authenticating them, and threading their health records. The pandemic's urgency of pushing healthcare limits was indeed supported by digital health. Digital health provided the solution to deal with the surge in emergency care while ensuring on-going and routine care for patients, and provided new possibilities for hospitals, clinics, and care delivery organizations to connect with patients. A study conducted by the World Health Organization (WHO) in 2020, titled 'Global Strategy on Digital Health 2020-25,' explains the guiding principles, strategic objectives, framework for action, implementation of the strategy, and the process for monitoring and evaluating these policies and strategies at the grassroots level. The report 'National Digital Health Mission 2020,' published by the Ministry of Health and Family Welfare, Government of India, elaborates on how to strengthen the accessibility and equity of health services. This includes a continuum of care with citizens as the owners of their data, all within a holistic healthcare program approach that leverages IT and associated technologies to support India's existing healthcare systems. Another study, 'Digital Health in India' (Nishith Desai 2022), explains the application of digital health, the Ayushman Bharat Digital Mission, investments in digital health, the legal and regulatory framework, and data protection in the Indian context. To strengthen digital health schemes and policies, India launched the 'Ayushman Bharat Digital Mission (ABDM)' in 2021, intending to create the framework necessary to enable the nation's integrated digital health infrastructure. It aims to bridge the existing gap among different stakeholders in the healthcare ecosystem through digital highways. Individuals can establish an 'Ayushman Bharat Health Account (ABHA)' under the Ayushman Bharat Digital Mission to manage their medical records. This 14-digit number serves as a unique identifier for individuals, authenticates them, and links their health records. The urgency of the pandemic pushed the limits of healthcare, and digital health played a crucial role in providing solutions. It

enabled the handling of the surge in emergency care while ensuring ongoing and routine care for patients. Additionally, it opened up new possibilities for hospitals, clinics, and care delivery organizations to connect with patients.

According to Jocelyne Fayn Dec (2020), the implementation of medical digital technologies can provide better accessibility and flexibility of healthcare for the public. It encompasses the availability of open information on health and treatment. As per the ITU Council (2023), digital health projects and ICT applications rarely reach scale in the often-fragmented digital health ecosystems which lack engagement and cross-sector collaboration between ICT and Health ministries. 'Dwight Raum (2022), talks about hospitals and health systems, two years of Covid-19 have seen a whipsaw of crises. Digital tools have been rushed in, helping to keep clinics open while enabling innovations in patient communications as well as workforce health and remote patient monitoring. Dave Chaffey (2021) explains that challenges relating to digital transformation are not unique to the pharmaceutical and healthcare sectors and how healthcare and pharma marketing leaders need to look ahead to master digital transformation. Louise Holly et al (2022), analysed national digital health strategies from 10 African countries with large and growing populations of children and youth. National digital health strategies are seen as essential tools for governments to set out their priorities and align governance and aims for digital transformations in health. Pradeep Sylva et al (2020) portray how the COVID-19 pandemic has imposed unprecedented healthcare challenges, both globally and locally. How the application of digital technologies offers great value for overcoming these challenges. 'The World's best Digital Health Strategies' (Roman Mazuryk 2019) explains that every national government needs a strategy for digital medicine to be able to direct the power of health technology to address crises with human resources and to make health care systems stable. The report 'Regulation of digital healthcare in India: Ethical and legal challenges' (Dipika Jain and Edited by Tao_Hsin Tung 2023) acknowledged digital health, law, regulation, informed consent, privacy, etc. in the Indian context. According to Jocelyne Fayn Dec (2020), the implementation of medical digital technologies can provide better accessibility and flexibility in healthcare for the public. This includes the availability of open information on health and treatment. As per the ITU Council (2023), digital health projects and ICT applications rarely reach scale in the often-fragmented digital health ecosystems that lack engagement and cross-sector collaboration between ICT and health ministries. Dwight Raum (2022) discusses hospitals and health systems. Over the past two years of the Covid-19 pandemic, there have been numerous crises. Digital tools have been rushed in, helping to keep clinics open while enabling innovations in patient communications, workforce health, and remote patient monitoring. Dave Chaffey (2021) explains that challenges related to digital transformation are not unique to the pharmaceutical and healthcare sectors. Healthcare and pharma marketing leaders need to look ahead to master digital transformation. Louise Holly et al. (2022) analysed national digital health strategies from ten African countries with large and growing populations of children and youth. National digital health strategies are seen as essential tools for governments to outline their priorities and align governance and goals for digital transformations in health. Pradeep Sylva et al. (2020) discusses how the COVID-19 pandemic has imposed unprecedented healthcare challenges, both

globally and locally. They highlight how the application of digital technologies offers great value for overcoming these challenges. In 'The World's Best Digital Health Strategies' (Roman Mazuryk 2019), it is explained that every national government needs a strategy for digital medicine to be able to harness the power of health technology to address crisis situations with human resources and to stabilize healthcare systems. The report 'Regulation of Digital Healthcare in India: Ethical and Legal Challenges' (Dipika Jain and Edited by Tao_Hsin Tung 2023) acknowledges the importance of considering digital health, law, regulation, informed consent, privacy, and other factors in the Indian context.

Objectives

The objective of this study is to understand the use of digital health and the perception of the health care system in India.

Data Sources and Methodology

The present study is based on the data collected through online mode where 157 questionnaires were filled across sex, and age categories in Delhi. The sample belongs to youngsters (students of under-graduation level and above) and the faculty members at the college level in also for the online survey. The respondent's selection is based on the availability of gadgets and some educational background is required as the study involves the perception of the healthcare system and the utilization of digital health. During COVID-19 most undergraduate students were attending online classes and might have smartphones and laptops and faculty also which is required to respond to the online survey. The present study is based on data collected through an online survey in which 157 questionnaires were completed across various age categories and genders in Delhi. The sample population consists of young individuals, including students at the undergraduate level and above, as well as faculty members at the college level. The respondent selection was determined by the availability of digital devices and some educational background, as the study examines perceptions of the healthcare system and the utilization of digital health. During the COVID-19 pandemic, most undergraduate students were attending online classes, which likely means they had access to smartphones and laptops. Faculty members also had access to these devices, which were necessary for their participation in the online survey.

The questionnaire included various sections, such as:

Health consciousness among respondents based on their age and gender.

Perception of health and the healthcare system, including aspects like health consciousness, the impact of COVID-19 on the healthcare system, and preferences for healthcare methods.

Usage and trust in digital healthcare, covering topics like perceptions of digital health, trust in digital healthcare and devices, plans to use digital gadgets, experiences with online appointments and online medicine, the use of healthcare apps, and watching health-related videos.

The digital healthcare system in India, which included questions about perceptions and opinions regarding the future of the healthcare system in India, opinions on senior citizens' perceptions, the reliability of the healthcare system, opinions on a unified digital health card, India's leadership in digital health, India's capability in digital health, and the present state of India's healthcare system.

Results and Discussion

As Table 1 shows, the female and male respondents in the sample are more or less balanced where in total most of the respondents belong to the 20 to 30 age group which is more than 60 % including 20 years and above followed by 30 to 40 years. Very few (fifty years and above) respondents participated in the study. The survey is basically of college students and faculty members reason being that smart technology in health requires a certain level of education as well as gadgets to respond to the online questionnaire. The study involves the perception of the healthcare system and the utilization of digital health and so such response also required the understanding of the issues and prospects of smart technology in digital health.

Table 1. Demographic Profile of Respondents (in %)

Age	Female	Male	Total
>20	12.7	8.9	21.7
20-30	23.6	19.1	42.7
30-40	8.3	7.6	15.9
40-50	5.1	6.4	11.5
50<	4.5	3.8	8.3
Total	54.1	45.9	100

Source: Online survey by authors, January 2023

Table 1 offers a demographic profile of the respondents, based on data collected in 2023, with percentages presented. It reveals a nearly balanced representation of genders in the survey, where female respondents account for 54.1% of the total, and male respondents make up 45.9%, indicating that both male and female perspectives are well-represented in the survey results. Moreover, the data highlights a diverse age distribution among the respondents. Notably, the Age Group 20-30 emerges as the largest segment, comprising 42.7% of the total respondents. This age bracket likely includes a significant number of college students and faculty members, more likely to possess the necessary educational background and access to digital devices. This aligns with the study's focus on healthcare perceptions and digital health utilization.

Health consciousness, Digital healthcare usage, and trust based on Age and Gender

Examining health awareness among respondents, Digital health perception, engagement with digital healthcare solutions, intentions to incorporate digital gadgets into their healthcare routines, use of online appointments and digital platforms for medication purchases, usage of healthcare-related mobile apps, consumption of health-related videos, articles, or content on digital platforms.

Table 2, Contribution of Digital Health to Improved Healthcare (in %)

Response	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Never	0.6	0.0	0.0	0.0	0.0	0.6%	0.0	0.6	0.0	0.0	0.0	0.6%	1.3
No	0.6	1.3	0.0	0.6	1.9	4.5%	0.0	0.6	0.0	2.5	0.0	3.2%	7.6
Sometimes	5.1	15.3	5.1	2.5	2.5	30.6%	3.2	8.9	4.5	1.9	1.3	19.7%	50.3
Yes	6.4	7.0	3.2	1.9	0.0	18.5%	5.7	8.9	3.2	1.9	2.5	22.3%	40.8
Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100%

Source: Online survey by authors, January 2023

Table 2 summarizes the contributions of digital health to improved healthcare, categorized by responses from different age groups and genders. It indicates that a significant portion of the surveyed population sees a positive contribution from digital health, with a smaller minority expressing doubts about its impact. Notably, younger respondents generally exhibit more positive attitudes toward digital health solutions.

Table 3. Trust over Digital Health Providers and Gadgets (in %)

Response	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
No	1.9	1.9	0.0	0.6	1.9	6.4%	0.6	1.9	1.9	1.9	0.6	7.0%	13.4
Sometimes	4.5	12.1	4.5	3.8	2.5	27.4%	3.8	8.3	2.5	1.3	1.9	17.8%	45.2
Yes	6.4	9.6	3.8	0.6	0.0	20.4%	4.5	8.9	3.2	3.2	1.3	21.0%	41.4
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100.0

Source: Online survey by authors, January 2023

Table 3 presents data regarding trust in digital health providers and gadgets, with the majority of respondents indicating a moderate level of trust in these technologies. Trust levels are generally higher among the 20-30 age group, and only a relatively small percentage (13.4%) of respondents express no trust in these technologies.

Table 4 reveals that the 'undefined' category (84.7%) is the most prevalent in healthcare app usage, with the 20-30 age group being the most active users for unspecified purposes. 'Lab Testing' (0.6%) shows the lowest usage. Both genders have a smaller percentage of respondents (10.8%) who do not use healthcare apps, indicating those who do not use such apps.

Table. 4 Use of Health Care Apps (in %)

Purpose	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Activity Tracking	0.0	0.0	0.6	0.0	0.6	1.3%	0.0	0.0	0.6	0.0	0.0	0.6%	1.9
Consultation, Medicines	0.0	0.6	1.3	0.0	0.0	1.9%	0.0	0.0	0.0	0.0	0.0	0.0%	1.9
Lab Testing	0.0	0.0	0.6	0.0	0.0	0.6%	0.0	0.0	0.0	0.0	0.0	0.0%	0.6
No	0.0	0.6	1.3	1.9	1.9	5.7%	0.0	0.0	1.3	1.9	1.9	5.1%	10.8
undefined	12.7	22.3	4.5	3.2	1.9	44.6%	8.9	19.1	5.7	4.5	1.9	40.1%	84.7
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023.

Table 5. Usage for Health-related Youtube Videos (in %)

Purpose	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Beauty	0.0	1.9	0.0	0.0	0.0	1.9%	0.0	0.0	0.0	0.0	0.0	0.0%	1.9
Food Habits	3.8	1.9	2.5	0.6	1.3	10.2%	1.3	5.7	0.6	3.2	0.6	11.5%	21.7
Hair and Spa	0.6	1.3	0.0	0.0	0.6	2.5%	0.0	0.0	0.0	0.0	0.6	0.6%	3.2
Mental Health	2.5	14.0	2.5	0.6	1.3	21.0%	3.2	7.0	1.9	0.6	0.0	12.7%	33.8
Physical Health	1.9	0.6	3.2	2.5	0.6	8.9%	0.6	1.9	3.8	1.3	1.3	8.9%	17.8
Other (….)	3.8	3.8	0.0	0.6	0.0	8.3%	2.5	4.5	1.3	1.3	0.0	9.6%	17.8
Total Users	12.7	23.6	8.3	4.5	3.8	52.9%	7.6	19.1	7.6	6.4	2.5	43.3%	96.2
Does Not Use	0.0	0.0	0.0	0.0	0.6	0.6%	0.0	0.0	0.0	0.0	0.6	0.6%	1.3

No Answer	0.0	0.0	0.0	0.6	0.0	0.6%	1.3	0.0	0.0	0.0	0.6	1.9%	2.5
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 5 provides data on the usage of health-related YouTube videos. Among the different categories, Mental Health videos have the highest usage, with 33.8%, making it the most prevalent category. Following closely behind are food habits videos, which have a usage rate of 21.7%. Conversely, the category with the lowest usage is Beauty, with only 1.9% of respondents utilizing such videos.

Table 6. Use of Digital-Health related Gadgets (in %)

Gadget	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Blood pressure monitor	0.6	1.3	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.6	1.3	3.8	5.7
Brain Sensing Headband	0.6	1.9	0.0	0.6	0.0	3.2	0.0	0.0	0.0	0.6	0.0	0.6	3.8
Digital Thermometer	1.3	1.3	0.6	0.6	0.6	4.5	0.6	1.9	0.6	0.6	0.0	3.8	8.3
Digital Watch	7.0	14.0	5.7	0.6	1.3	28.7	7.6	10.8	3.2	1.9	1.3	24.8	53.5
Pulse Oximeters	0.6	1.9	1.3	2.5	0.6	7.0	0.0	0.6	1.9	0.0	0.6	3.2	10.2
Undefined use	1.3	2.5	0.0	0.0	0.0	3.8	0.6	3.2	1.3	0.0	0.0	5.1	8.9
Total Users	11.5	22.9	7.6	4.5	2.5	49.0	8.9	18.5	7.0	3.8	3.2	41.4	90.4
Does Not Use	0.0	0.0	0.6	0.0	1.9	2.5	0.0	0.0	0.6	2.5	0.6	3.8	6.4
No Answer	1.3	0.6	0.0	0.6	0.0	2.5	0.0	0.6	0.0	0.0	0.0	0.6	3.2
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1	8.9	19.1	7.6	6.4	3.8	45.9	100

Source: Online survey by authors, January 2023

Table 6 provides data on the usage of digital-health-related gadgets. Among these gadgets, Digital Watches are the most commonly used, with 53.5% of respondents using them. On the

other hand, Brain Sensing Headbands have the lowest usage, with only 3.8% of respondents utilizing them.

Table 7. Degree of Health-Consciousness of Respondents (in %)

Degree of Consciousness	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
No	0.6	3.2	1.3	0.6	0.0	5.7%	0.6	1.3	0.0	0.0	0.0	1.9%	7.6
Sometimes	4.5	5.7	3.2	1.9	0.0	15.3%	0.6	5.7	0.0	1.9	1.9	10.2%	25.5
Yes	7.6	14.6	3.8	2.5	4.5	33.1%	7.6	12.1	7.6	4.5	1.9	33.8%	66.9
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 7 presents data on the degree of health consciousness among respondents, categorized by age group and gender. It reveals that a majority of respondents (66.9%) have a high degree of health consciousness, with a significant portion (25.5%) indicating a moderate level. A smaller percentage (7.6%) falls into the 'No' category, indicating a low degree of health consciousness.

Table 8. Use of Virtual Medical Consultation or Online Pharmacy (in %)

Use	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Never	0.0	0.0	0.0	0.0	0.0	0.0%	0.0	0.6	0.0	0.0	0.0	0.6%	0.6
No	7.6	14.6	0.6	0.6	1.9	25.5%	7.0	9.6	1.3	1.9	1.9	21.7%	47.1
Sometimes	1.9	3.2	0.0	0.0	0.6	5.7%	0.6	0.6	0.0	0.0	0.6	1.9%	7.6
Yes	3.2	5.7	7.6	4.5	1.9	22.9%	1.3	8.3	6.4	4.5	1.3	21.7%	44.6
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 8 offers insights into the use of virtual medical consultations and online pharmacies. It shows that a significant portion of respondents (47.1%) don't use these online healthcare services, with only a negligible 0.6% indicating they never use them.

Table 9. Perspectives on the lack of trust of senior citizens on the Digital-Healthcare (in %)

Perspective	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50 <		>20	20-30	30-40	40-50	50 <		
can not say	9.6	16.6	4.5	3.2	3.8	37.6%	8.9	12.7	3.8	3.2	1.9	30.6	68.2
Right	3.2	5.1	1.9	0.6	0.6	11.5%	0.0	4.5	1.9	2.5	1.3	10.2	21.7
wrong	0.0	1.9	1.9	1.3	0.0	5.1%	0.0	1.9	1.9	0.6	0.6	5.1	10.2
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9	100.0

Source: Online survey by authors, January 2023

Table 9 presents data on senior citizens' trust in Digital Healthcare. The data shows that a significant portion of respondents expressed uncertainty about trust, with 68.2% unable to provide a clear perspective. In contrast, 21.7% expressed confidence in the trustworthiness of digital healthcare, though in a smaller proportion compared to those who were uncertain.

Perception of health and health care system: This includes aspects like health awareness, the impact of COVID-19 on healthcare, preferences in healthcare methods, and the perception of India's digital healthcare system. Respondents were also questioned about their outlook on the future of India's healthcare system, their opinions regarding senior citizens' perceptions, the reliability of the healthcare system, their thoughts on the concept of a digital health card, India's role in advancing digital healthcare, India's capacity for digital health, and the current state of India's healthcare system.

Table 10. Transformative Impact of covid 19 on Health System (in %)

	Female					Female Total	Male					Male Total	Grand Total
Perspective	>20	20-30	30-40	40-50	50 <		>20	20-30	30-40	40-50	50 <		
Maybe	3.2	3.8	1.9	0.0	2.5	11.5	1.3	2.5	1.3	1.9	0.6	7.6	19.1
No	0.6	1.9	0.0	0.6	0.0	3.2	0.0	1.9	0.0	0.6	0.0	2.5	5.7
Yes	8.9	17.8	6.4	4.5	1.9	39.5	7.6	14.6	6.4	3.8	3.2	35.7	75.2
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1	8.9	19.1	7.6	6.4	3.8	45.9	100

Source: Online survey by authors, January 2023

Table 10 presents data on the transformative impact of COVID-19 on the healthcare system. It reveals that a majority of respondents believe COVID-19 had a transformative impact on the healthcare system, with a higher percentage of females expressing this view. Notably, 19.1% of respondents remain uncertain about the extent of this impact.

Table 11. Preferred Healthcare System (in %)

	Female						Male						
Health System	>20	20-30	30-40	40-50	50<	Female Total	>20	20-30	30-40	40-50	50<	Male Total	Grand Total
Allopathy	0.0	1.3	1.3	0.0	0.0	2.5%	0.0	0.0	0.6	0.6	1.9	3.2%	5.7
Ayurveda	1.9	1.9	1.9	0.6	0.6	7.0%	1.3	3.2	0.6	0.6	0.6	6.4%	13.4
Homoeopathy	1.3	0.6	0.6	1.3	1.9	5.7%	0.0	0.6	0.0	0.6	0.6	1.9%	7.6
No	0.6	0.0	0.0	0.0	0.0	0.6%	0.6	0.6	0.0	0.0	0.0	1.3%	1.9
Other	0.0	0.0	0.0	0.0	0.0	0.0%	0.0	0.0	0.6	0.6	0.0	1.3%	1.3
undefined	4.5	12.7	0.6	0.6	0.0	18.5%	5.7	8.9	1.3	0.6	0.6	17.2%	35.7
Yoga	4.5	7.0	3.8	2.5	1.9	19.7%	1.3	5.7	4.5	3.2	0.0	14.6%	34.4
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 11 provides insights into the preferred healthcare systems among respondents, with Yoga (34.4%) and Ayurveda (13.4%) being popular choices. Notably, a significant percentage of respondents either express an undefined preference (35.7%) or have no preference at all.

Table 12. Perspectives on a lifetime Digital Health Card (in %)

	Female						Male						Grand Total
Perspective	>20	20-30	30-40	40-50	50<	Female Total	>20	20-30	30-40	40-50	50<	Male Total	
About the same	0.6	1.3	0.0	1.3	0.0	3.2%	0.6	0.6	0.6	0.6	0.0	2.5%	5.7
Better	2.5	8.9	1.9	1.9	2.5	17.8%	5.1	3.2	3.8	0.6	1.3	14.0%	31.8
Much better	8.9	12.7	6.4	1.3	1.9	31.2%	3.2	14.6	2.5	3.8	2.5	26.8%	58.0
Much worse	0.0	0.0	0.0	0.0	0.0	0.0%	0.0	0.6	0.0	0.0	0.0	0.6%	0.6

No Answer	0.6	0.0	0.0	0.0	0.0	0.6%	0.0	0.0	0.6	0.6	0.0	1.3%	1.9
Worse	0.0	0.6	0.0	0.6	0.0	1.3%	0.0	0.0	0.0	0.6	0.0	0.6%	1.9
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 12 presents data on respondents' perspectives regarding a lifetime digital health card. The majority of respondents, especially females, have a positive outlook on a lifetime digital health card, believing it would significantly improve the healthcare system. Only a very small percentage has a negative perspective on this concept, with some respondents choosing not to answer.

Table 13. India leading towards Digital Health System (in %)

	Female					Female Total	Male					Male Total	Grand Total
Perspective	>20	20-30	30-40	40-50	50<		>20	20-30	30-40	40-50	50<		
Maybe	5.7	6.4	0.6	1.9	2.5	17.2%	2.5	8.9	2.5	0.0	0.6	14.6%	31.8
No	0.6	1.9	0.6	0.6	0.6	4.5%	0.0	1.3	0.0	1.9	0.6	3.8%	8.3
Yes	6.4	15.3	7.0	2.5	1.3	32.5%	6.4	8.9	5.1	4.5	2.5	27.4%	59.9
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1	7.6	6.4	3.8	45.9%	100

Source: Online survey by authors, January 2023

Table 13 presents data on respondents' perspectives regarding India's progression towards a digital health system. The data reveals a mix of viewpoints, with a significant number of respondents expressing optimism about India's transition to a digital health system. The majority of respondents (59.9%) believe that India is indeed moving in this direction, while a notable portion remains uncertain about this transition (31.8%).

Table 14. India capable of adapting to Digital Health Services (in %)

Perspective	Male	Female	Total
Yes	21.6	26.7	24.4
Ways of Adaption:			
No specific way	5.4	7.0	6.3
Digital health services/facilities	4.1	7.0	5.6
Telemedicine	4.1	5.8	5.0
Integrated way	1.4	1.2	1.3

Mental Health	0.0	1.2	0.6
To some extent	5.4	2.3	3.8
Infrastructure Development	0.0	1.2	0.6
Public Awareness	1.4	1.2	1.3
No	2.7	5.8	4.4
Cannot say	4.1	0.0	1.9
No response	71.6	67.4	69.4

Source: Online survey by authors, January 2023

Table 14 presents data on respondents' perceptions of India's ability to adapt to digital health services. The data suggests that a substantial proportion of respondents believe in India's capability to adapt to digital health services. However, a significant number of respondents did not provide a specific response. Some identified potential ways of adaptation, with 'No specific way', 'Digital health services/facilities', and 'Telemedicine' emerging as the most commonly mentioned approaches.

Table 15. Condition of Indian Healthcare System (in %)

Condition	Female					Female Total	Male					Male Total	Grand Total
	>20	20-30	30-40	40-50	50 <		>20	20-30	30-40	40-50	50 <		
Average	0.0	0.6	0.0	0.6	0.0	1.3%	0.0	0.0	1.3	1.3	1.3	3.8%	5.1
Better than before	0.0	0.0	0.6	0.0	0.6	1.3%	0.0	0.6	0.0	0.0	0.0	0.6%	1.9
Good	0.0	0.0	0.6	1.3	0.0	1.9%	0.0	0.0	0.6	0.6	0.0	1.3%	3.2
Improving	0.0	0.0	1.9	0.0	0.6	2.5%	0.0	0.0	0.6	0.0	0.0	0.6%	3.2
Need improvement	0.0	0.6	2.5	1.3	0.0	4.5%	0.0	0.0	0.0	1.3	0.0	1.3%	5.7
No answer	12.7	22.3	1.9	0.6	0.0	37.6%	8.9	18.5	2.5	1.9	1.3	33.1%	70.7
Not Good	0.0	0.0	0.6	1.3	3.2	5.1%	0.0	0.0	2.5	1.3	1.3	5.1%	10.2
Grand Total	12.7	23.6	8.3	5.1	4.5	54.1%	8.9	19.1%	7.6%	6.4%	3.8%	45.9%	100.0%

Source: Online survey by authors, January 2023

Table 15 provides data on respondents' perceptions of the condition of the Indian healthcare system. The table shows that a significant portion of respondents (70.7%) did not provide a specific response regarding the condition of the Indian healthcare system. Among those who did respond, various perspectives exist, with "average" being the most commonly mentioned view.

Table 16. Preference of Healthcare Treatment based on Health issues (in %)

Treatment type	General	Diabetes	Joint Pain	Skin Diseases	Mental Issues	Thyroid	Total
Allopathy	2.3	5.2	0.0	0.0	0.0	0.6	8.0
Home Remedies	0.0	0.6	0.0	0.0	0.0	0.0	0.6
Homeopathy	0.6	0.0	0.6	7.5	0.0	0.0	8.6
Lifestyle Changes	1.1	0.0	0.0	0.0	0.0	0.0	1.1
Yoga	0.6	0.0	10.9	0.0	0.0	0.0	11.5
Physical Exercise	1.1	0.0	0.0	0.0	0.0	0.0	1.1
Naturopathy	0.0	0.0	0.0	0.6	0.0	0.0	0.6
Siddha	0.0	0.0	0.0	0.0	1.1	0.0	1.1
Different treatments for different diseases	0.6%						
No response	63.8%						
No Health Issue	2.9%						

Source: Online survey by authors, January 2023

Table 16 provides data on respondents' preferences for healthcare treatments based on various health issues. Allopathy is the preferred choice for diabetes treatment and home remedies are a less commonly preferred choice overall. Yoga is the most preferred treatment for joint pain (10.9%). Only a small percentage (0.6%) of respondents indicated a preference for different treatments for different diseases, suggesting a personalized approach. A small percentage (2.9%) of respondents indicated that they did not have any health issues.

Summary and Recommendations

The Ministry of Health and Family Welfare (MoFHW) should prioritize the implementation of specific policies related to digital health. This entails not only ensuring the financial accessibility and efficiency of our healthcare system, particularly for the underserved populations but also developing user-friendly and specialized healthcare apps for the wider public. In parallel, public awareness and education campaigns should be incorporated into the strategy to highlight the advantages of digital health initiatives. Collaboration with technology companies and startups can drive innovation in digital healthcare solutions while guaranteeing data security and privacy is of utmost importance.

To ensure equitable access, digital health services need to be expanded to rural and remote areas through affordable connectivity solutions. Monitoring and evaluating the effectiveness of digital health programs and policies through a structured framework is necessary for continual improvement. International collaboration and knowledge sharing should be promoted to harness global best practices. The establishment of a

dedicated regulatory body or framework is pivotal for overseeing and governing digital health initiatives.

Furthermore, investing in training and capacity building for healthcare professionals to adapt to digital healthcare practices is vital. Collaborating with insurance providers to integrate digital health data can lead to more personalized and cost-effective healthcare coverage. Ensuring inclusivity and accessibility for all, regardless of socioeconomic status or geographical location, is a fundamental principle. To foster innovation in the sector, incentives for healthcare providers and institutions to adopt and promote digital health solutions should be put in place. Additionally, encouraging the growth of local digital health startups and entrepreneurs will drive further innovation. Collaborating with educational institutions to train the next generation of healthcare professionals in digital health practices completes the comprehensive approach to advancing digital health in our healthcare system.

In summary, as we find ourselves in the third decade of the 21st century, we are undeniably situated in an age characterized by rapid advancements in science and technology. However, our sample survey has shed light on a noticeable deficit in the realm of digital health and technology. Consequently, it becomes evident that addressing this pressing issue should be a focal point for our efforts moving forward.)

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