



## TELEMEDICINE - CHANGING THE HEALTHCARE SERVICES

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**ABSTRACT** Telemedicine is the use of electronic information to communication technologies to provide and support healthcare when distance separates the participants. The primary focus of this study is to understand the perception of people related to telemedicine in Delhi NCR by a structured questionnaire. This study focuses on what telemedicine is and how it has grown in India. Telemedicine has a wide variety of applications in patient care, education, research, administration as well as public health. Since more than half of Indian population lives in rural areas this has made bridging the gap easier and mobile telehealth centers all across India help cater to a large number of individuals. There are still a lot of gaps that need to be filled and telemedicine has the potential to bridge this distance and facilitate healthcare. For this study Delhi NCR region was selected to collect data from a sample of 90 people. The scope of this study is to find out the scenario and possibilities of growth of telemedicine in India.

**KEYWORDS :****CHAPTER 1: INTRODUCTION**

Healthcare industry in India comprises of hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. The industry is growing at a tremendous pace owing to its strengthening coverage, services and increasing expenditure by public as well as private players. Growing incidence of lifestyle diseases, rising demand for affordable healthcare delivery systems due to the increasing healthcare costs, technological advancements, the emergence of telemedicine, rapid health insurance penetration and government initiatives like e-health together with tax benefits and incentives are driving healthcare market in India. Healthcare industry in India is projected to reach \$372 bn by 2022.

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- The hospital industry in India, accounting for 80% of the total healthcare market, is witnessing a huge investor demand from both global as well as domestic investors. The hospital industry is expected to reach \$132 bn by 2023 from \$ 61.8 bn in 2017; growing at a CAGR of 16-17%.
- The Indian Medical Tourism market is expected to grow from its current size of \$3 bn to \$7-8 bn by 2020
- The diagnostics industry in India is currently valued at \$4 bn. The share of organized sector is almost 25% in this segment (15% in labs and 10% in radiology).
- The primary care industry is currently valued at \$13 bn. The share of organized sector is practically negligible in this case.

Telemedicine is not a new concept but it has seen a new surge recently, this academic research is conducted in Delhi NCR to figure out people's thoughts on telemedicine/telehealth and to see if this sector has growth potential.

Telemedicine is the practice of caring for patients remotely via apps, gadgets, website, etc.; when the provider and patient don't seem to be physically present with one another. Modern technology has enabled doctors to consult patients by using HIPAA compliant video-conferencing tools. allows health care professionals to evaluate, diagnose & treat patients using telecommunications technology. The approach has been through a striking evolution in the last decade.

Telemedicine was originally created as a way to treat patients who were located in remote places, far away from local health facilities or in areas of with shortages of medical professionals. While telemedicine is still used today to address these problems, it's increasingly becoming a tool for convenient medical care. Today's connected patient wants to waste less time in the waiting room at the doctor, and get immediate care for minor but urgent conditions when they need it.

According to American Telemedicine Association (ATA), "Telemedicine is the natural evolution of healthcare in the digital world". World Health Organization (WHO) has defined telemedicine

as, "the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities." The word "telemedicine" literally translates to 'healing at a distance'. It often is used as the umbrella term to cover health care service delivery in addition to other activities such as education, research, health surveillance, and public health promotion.

Over the past several decades, as the use of wireless broadband technology has become more advanced and cell phone and internet use has grown tremendously. Patient education with images and videos, transfer of medical images like X-rays and scans, and real-time audio and video consultations became a reality. Improvement in internet infrastructure such as bandwidth communication speeds, information storage databases, web service backups, standard formats for data transmission, encryption, password protection, HIPAA (Health Insurance Portability and Accountability Act of 1996) guidelines, digitalizing information and establishment of EMRs (electronic medical records) made e-health and telemedicine stress-free and cost effective.

Telemedicine uses current computing gadgets belonging to the patient or physician and inexpensive self-owned system like cell phone cameras, wearable biosensors, etc., for collecting clinical data which made it less difficult to use without special training. The current telemedicine practices lessen travel expenses, saves time, reduces medical costs, provides easier access for the common place guy to specialist medical professionals and doctors without disrupting their daily responsibilities and schedules. It additionally makes the life of healthcare providers smooth by lowering the weight of physical appointments and cancellations. It also enables better patient – doctor relationships as they can stay in contact and discuss issues from the comfort of their homes instead of the constant travel and OPD/ Appointment delays.

In India, providing In-person healthcare is challenging, particularly given the large geographical distances and limited resources. One of the major advantages of telemedicine can be for saving of cost and effort especially of rural patients, as they need not travel long distances for obtaining consultation and treatment. In this type of scenario, telemedicine can provide an optimal solution for not just providing timely and faster access. It would also reduce financial costs associated with travel. It also reduces the inconvenience/impact to family and caregivers and social factors.

**CHAPTER 2: AIM & OBJECTIVE****AIM:**

The aim of this research project is to understand the present scenario of telemedicine & it's scope in the future in Indian healthcare sector.

**OBJECTIVES:**

1. To study people's perception of telemedicine.

2. To evaluate the level of awareness regarding telemedicine.
3. To analyse the expectations of consumers.
4. To study the usage of telemedicine in Delhi NCR

### CHAPTER 3: LITERATURE REVIEW

#### 3.1 Telemedicine :

The delivery and facilitation of health and health-related services including medical care, provider and patient education, health information services, and self-care via telecommunications and digital communication technologies is known as telemedicine.

As per WHO it is "The delivery of health-care services, where distance is a critical factor, by all health-care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and the continuing education of health-care workers, with the aim of advancing the health of individuals and communities."

#### 3.2 History :

The field of telemedicine has changed drastically from its inception. It was only about fifty years ago that a few hospitals internationally started experimenting with telemedicine to reach patients in remote locations. But with the rapid changes in technology over the last few decades, telemedicine has transformed into a complex integrated service used in hospitals, homes, private physician offices, and other healthcare facilities.

The concept of telemedicine started with the birth of telecommunications technology, the means of sending information over a distance in the form of electromagnetic signals.

But it wasn't until the early 20th century that the general population started to use these technologies, and imagine they could be applied to the field of medicine. In 1925, a cover illustration of the Science and Invention magazine featured an odd invention by Dr. Hugo Gernsback, called the "teledactyl." The imagined tool would use spindly robot fingers and radio technology to examine a patient from afar, and show the doctor a video feed of the patient. While this invention never got past the concept stage, it predicted the popular telemedicine definition we think of today – a remote video consult between doctor and patient.(10)

Several decades later, in the 1950's, a few hospital systems and university-based medical centres experimenting with how to put concept of telemedicine into practice. Medical staff at two different health centres in Pennsylvania about 24 miles apart transmitted radiologic images via telephone. In 1950's, a Canadian doctor built upon this technology into a Tele-radiology system that was used in and around Montreal. Then, in 1959, Doctors at the University of Nebraska were able to transmit neurological examinations to medical students across campus via a two-way interactive television. By 1964, they had built a telemedicine link that allowed them to provide health services at Norfolk State Hospital, 112 miles away from campus.(11)

A major role in this was played by NASA and ISRO. The setting up of the National Telemedicine Taskforce by the Health Ministry of India, in 2005, paved way for the success of various projects like the ICMR-AROGYASREE, NeHA and VRCs(1). Telemedicine also helps family physicians by giving them easy access to speciality doctors and helping them in close monitoring of patients. Different types of telemedicine services like store and forward, real-time and remote or self-monitoring provides various educational, healthcare delivery and management, disease screening and disaster management services all over the globe. Even though telemedicine cannot be a solution to all the problems, it can surely help decrease the burden of the healthcare system to a large extent.

In an attempt to coalesce the available public health data and provide easy access, the Ministry of Health in the Government of India has taken up projects like Integrated Disease Surveillance Project (IDSP), National Cancer Network (ONCONET), National Rural Telemedicine Network, National Medical College Network and the Digital Medical Library Network (2). Setting up of standardized telemedicine practice guidelines by the Department of Information Technology in the Government of India, and setting up of a National Telemedicine Task Force by the Health Ministry, in 2005, were some of the other positive steps by the government. International projects like the Pan-African eNetwork Project and the SAARC (South Asian Association for Regional Co-operation) Telemedicine Network Projects have also

been taken up as an initiative of the External Affairs Ministry (3), strategically placing Indian telemedicine in the global scenario.

A few noteworthy examples of the successfully established telemedicine services in India include mammography services at Sri Ganga Ram Hospital, Delhi; oncology at Regional cancer centre, Trivandrum; surgical services at Sanjay Gandhi Postgraduate Institute of Medical Sciences, School of Telemedicine and Biomedical Informatics, and many more. Telemedicine also finds its use in places where large populations occasionally/periodically gather at a point of time, where provision of medical care becomes the need of the hour; for example, the Government of Uttar Pradesh practices telemedicine during Maha Kumbhamelas(4)

Telemedicine is one field which was successful in invoking a keen interest in the private sector and making them take an active part in public health management. Some of the current major Indian private sector players in telemedicine include Narayana Hrudayalaya, Apollo Telemedicine Enterprises, Asia Heart Foundation, Escorts Heart Institute, Amrita Institute of Medical Sciences and Aravind Eye Care. They function with support from the central and state governments and from organizations like ISRO who guide them with appropriate and updated technology(5)

In the past few years, ISRO's telemedicine network has come a long way. It has expanded to connect 45 remote and rural hospitals and 15 super specialty hospitals. The remote nodes include the islands of Andaman and Nicobar and Lakshadweep, the hilly regions of Jammu and Kashmir, Medical College hospitals in Orissa and some of the rural/district hospitals in other states.(7)

#### 3.3 Current scenario in India:

India is one of the top 10 countries in the telemedicine market in the world. The early adoption of a regulatory framework will help the segment grow rapidly. Over the years, India has seen considerable growth in the telemedicine sector. The telemedicine industry has a bright future and may become a multi-billion industry in the next 5 years.

The growth could be due to the lack of more experts and medical practitioners as well as issues with access from remote locations in India. WHO recommends a doctor-population ratio of 1:1000 while the current doctor population ratio in India is only 0.62:1000. This deficit is partly being made up by the active telemedicine services in various parts of the country.

Telemedicine services in the country come under the combined jurisdiction of Ministry of Health and Family Welfare and the Department of Information Technology. Telemedicine division of MoHFW, GOI has set up a National Telemedicine Portal (7) for implementing a green field project on e-health establishing a National Medical College Network (NMCN) for interlinking the Medical Colleges across the country with the purpose of e-Education and a National Rural Telemedicine Network for e-Healthcare delivery.(7)

As a constituent of the e-health wing of the National Health Portal (NHP), National Digital Health Authority of India (NDHAI)/National e-health authority (NeHA) is being set up with a vision of achieving high quality health services for all Indians through the cost-effective and secure use of ICTs in health and health-related fields. (1) To ensure safe data transmission during telemedicine practices, MoHFW has developed a set of Electronic Health Records (EHR) standards in 2013 and a revised version of the same in 2016. (8) Telemedicine practices in India are also extended to the fields of traditional medicine. The National Rural AYUSH Telemedicine Network aims to promote the benefit of traditional methods of healing to a larger population through telemedicine.

Village Resource Centre (VRC): The VRC concept has been developed by ISRO to provide a variety of services such as tele-education, telemedicine, online-decision support, interactive farmers' advisory services, tele-fishery, e-governance services, weather services and water management. The VRCs not only act as learning centres and but also provide connectivity to speciality hospitals, thus bringing the services of expert doctors to the villages. Nearly 500 such VRCs have been established in the country. (9)

AROGYASREE is another internet-based mobile telemedicine conglomerate that integrates multiple hospitals, mobile medical specialists and rural mobile units/clinics. The project is an initiative of Indian Council of Medical Research (ICMR). They have collaborated

with a team of scientists from University of Karlsruhe, Germany who are working on the design of an ECG jacket which can be used for the continuous monitoring of a patient's ECG without hospitalization.

### 3.4 Applications of Telemedicine:

**a. Healthcare delivery** – Telemedicine helps in service delivery to patients at home or to patients who can't travel to avail services for various reasons.

**b. Healthcare management** – Management of health records of patients as well as ensuring the security of those records.

**c. Screening of Diseases** – screening of diseases can be done by real-time diagnostic techniques in telemedicine, example could be the diabetic screening project by MDRF.

**d. Patient monitoring** – Wearables are used to monitor patient health and progress during the treatment outside hospitals.

**e. Mobile health clinics** – they help in providing quick access for a remote location to physicians and specialists.

**f. Education** – Video conferencing helps in educating healthcare professionals and patients worldwide related to any health related topic.

### 3.5 Advantages of Telemedicine:

**a. "More convenient, accessible care for patients** – More accessible, convenient healthcare for patients is the driving force behind the telemedicine field. It has the power not only to break down typical geographical barriers to care access, but to make the entire healthcare delivery model more convenient to patients.

**b. "Saves on Healthcare costs-** Telemedicine has the power to cut our healthcare spending by reducing problems like medication non-adherence and unnecessary ER visits, and making typical doctor visits more efficient.

**c. "Extends access to consults from specialists** – Telemedicine will help a medical practice or hospital system to immediately expand access to niche medical specialists. This makes it easy for primary care doctors to consult medical specialists on a patient case, and for patients to see a needed specialist irrespective of their location.

**d. "Increasing patient engagement** - Today's patient lives in a highly connected world & expects a different kind of care experience where they are more connected with their doctors. Telemedicine engages patients by allowing them to connect with their doctor more frequently, in a convenient way. That means more questions asked and answered, a stronger doctor-patient relationship is formed and patients feel empowered.

**e. "Better quality patient care** - Telemedicine makes it easier for providers to follow-up with patients & make sure everything is going well. Whether they're using a more extensive remote patient monitoring system to watch the patient's heart, or doing a video chats to answer medication questions after a hospital discharge – telemedicine overall leads to better care outcomes.

## CHAPTER 4: METHODOLOGY

This is a primary research to find out what people/ patients think about Telemedicine and what is its scope in the healthcare industry. The sample population was from Delhi – NCR. The mode of primary data collection was a questionnaire floated by WhatsApp and e-mail. The questionnaire was in form of "Google forms".

The sampling technique used was snowball sampling. snowball sampling is a nonprobability sampling technique where existing study subjects recruit future subjects from among their acquaintances. Thus the sample group is said to grow like a rolling snowball. As the sample builds up, enough data is gathered to be useful for research. When virtual social networks are used, then this technique is called virtual snowball sampling.

The sample size was of 90 people from Delhi NCR region for this small exploratory research to understand people's take on the ever growing telemedicine sector in India. The questionnaire was a small compact one with open ended question to understand people's thoughts regarding the present and future of telemedicine sector in India. It was worded in a way that everyone could easily understand and respond to.

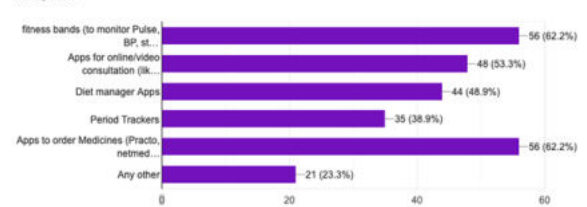
## CHAPTER 5: RESULTS & DISCUSSIONS

The survey people filled brought out some amazing observations by their individual and unique responses. The responses tell us about the consumers' perception related to telemedicine as a platform for healthcare service delivery. It also shows some light on what consumers believe will be the future for telemedicine as a healthcare service platform since it is predominantly based on what consumers want and need. The sample size is of 90 individuals from Delhi NCR region.

1. 91.1% of the sample was aged between 20-30 years.
2. 52% respondents were male and 47.8% were female.
3. Out of all 90 respondents 3 people have surprisingly never consulted a doctor for any issues in the entirety of their lives.
4. In the age of technology and most respondents being between the age of 20-30 years, as many as 51.1% have never heard of this term before and have no idea what this is all about.
5. Considering that 51.1% people have never even heard of this term this was not a surprise. 76.7% of the population have never used telemedicine technologies.

Are you familiar with any of the following telemedicine platforms?

90 responses



6. This question however gave us the impression that people are aware of the technology just not the umbrella term under which these all come. As we can see about

- 62.2% people knew about the fitness bands.
- 53.3% people knew about video consultation applications.
- 48.9% people knew about applications that help them in managing their diets.
- 38.9% people knew about applications that track, record and evaluate mensural cycles as well as help in monitoring any related diseases.
- 62.2% people knew about applications where they can order regular prescriptions for home delivery.
- 23.3% people also knew about different other applications in the same context.

7. The results for next question weren't surprising, since people have previously answered that 76.7% haven't used them ever.

- 7.8% people use them daily.
- 7.8% people use them weekly.
- 43.3% people use them once in a while.
- 41.1% people have never used any in their entire life.

8. As per the responses, 60% people would prefer using the telemedicine channels for consultations. While 40% of the respondents would still prefer the Traditional OPD consultation even in current scenario of this pandemic.

9. According to people's responses 65.6% believed that telemedicine is a more efficient mode to avail healthcare services in terms of money, time and safety. While 34.4% favoured the traditional modes of healthcare services.

10. When asked if they would be comfortable and satisfied with at home services that telemedicine offers the responses were mixed and that's understandable as most of these people have never availed these services.

- 35.6% people said that they would be satisfied & comfortable.
- 8.9% people said that they would not be satisfied & comfortable.
- 55.6% people said that it is a possibility of either situations, but assuming that they might be satisfied and comfortable.

11. When asked if they think that telemedicine has a strong potential to be more utilised in the future majority response was positive.

- 63.3% said YES.
- 32.2% said it is a possibility but they are not sure.
- 4.4% said a straight NO.

12. For the open ended question about their thoughts on the

telemedicine the responses were very positive. Some of the responses are quoted below.

i. "Telemedicine can become the future for healthcare industry when we see how nations are vigorously developing telemedicine will be efficient and easily accepted by majority in terms of various factors."

ii. "A great move in healthcare department. This must be promoted and should create awareness among people to use it in best possible way."

iii. "It is a good initiative actually. As most of the diseases don't require physical visit to the doctor. Also most of the time doctor asks few questions and based on your response he prescribe some medicines."

iv. "Telemedicine is a good alternative for providing healthcare to all in every part of the country."

v. "I think more and more people should start using this ( During this lockdown ) These apps can be really helpful during this time. ( Be it diet plans, Medicine order and check ups ) Since my parents are diabetic - they have to order medicines regularly. So some of these apps are really helping them."

vi. "In near future this would be the best option for ensuring everyone can avail healthcare facilities in the comfort of their homes."

## CHAPTER 6: CONCLUSION

The results of this small research show us that telemedicine is still in growth phase and has a lot of potential for growth in our country.

However there is a lack of knowledge and awareness amongst general public. My open ended question at the end of the questionnaire asking peoples thoughts suggest that people are open to this concept and appreciate it yet lack proper knowledge about it.

India is a huge country with an extremely large population, 1,377,122,402 as of 2020 worldometer count; that is 17.7% of world's population. India has a large demand of medical facilities, which with the help of telemedicine could potentially be met ,if proper technological awareness and training could be given to the public. Which in today's tech savvy society would not be a trouble.

Our consumer is looking forward to any new developments in the healthcare sector which would make it easier, comfortable, economic & time saving for them to avail healthcare services on the palm of their hands with wearable gadgets and mobile apps with no hassle and all the perks of technological advancements to make healthcare easily accessible to all.

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