

**Study on
Knowledge, Attitude, and Practices of using Telemedicine
in Healthcare Services in Amritsar City**

Dissertation Submitted to



The IIHMR University, Jaipur

**For the partial fulfilment for the award of the degree of
Master of Business Administration in Hospital and Health
Management
(2019-2021)**

By

Dr. Nikita Arora (0949),

Under the Supervision and Guidance of

Dr. Nutan P. Jain

2021



DECLARATION

I hereby declare that this dissertation titled, “**Knowledge, Attitude, and Practices of using Telemedicine in Healthcare Services in Amritsar City**” is the Bonafede record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Dr. Nikita Arora

Date: June 21, 2021



COMPREHENSIVE EYE EXAMINATIONS & LATEST FACILITIES FOR

- *PHACO (STITCHLESS CATARACT SURGERY)
- *ZYOPTIX LASIK LASER (SPECTACLE REMOVAL)
- *PHAKIC IOL
- *TRAUMA
- *CONTACT LENSES
- SUPER-SPECIALITY CLINIC FOR
- *CORNEA
- *RETINA
- *GLAUCOMA
- *SQUINT & OCULOPLASTY
- *PAEDIATRIC & NEURO OPHTHALMOLOGY



EYE-Q
SUPER-SPECIALITY
EYE HOSPITALS

14-Jun-21

CERTIFICATE

This is to certify that **Nikita Arora** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIMR University, Jaipur has successfully completed her Internship at Eye-Q Vision Pvt Ltd. during **22-Mar-21** to **10-May-21**.

Authorized Signatory


Sumit Bhadani

Vice President - HR
Eye-Q Vision Pvt. Ltd.

EYE-Q VISION PRIVATE LIMITED

Corporate Office : First Floor, Nursing Home 1, Sector - 46, Gurgaon - 122 002 | Tel. : 0124-4245460

CIN NO. U85121DL2006PTC152865

Registered Office : UG1, Suneja Tower 1, Janakpuri District Center, Janakpuri, Delhi-110058

Website: www.eyeqindia.com

NIKITA ARORA

III

CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that dissertation titled, “**Knowledge, Attitude, and Practices of using Telemedicine in Healthcare Services in Amritsar City**” is a record of the research work undertaken by **Nikita Arora** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

I wish her all success in all his future endeavours.

Faculty Guide
IIHMR University, Jaipur
Date

School Dean
IIHMR University, Jaipur
Date

NIKITA ARORA

IV

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **“Knowledge, Attitude, and Practices of using Telemedicine in Healthcare Services in Amritsar City”** and submitted by **Nikita Arora, Enrolment no :- 0949** under the supervision of **Dr. Nutan P Jain** for award of MBA in Hospital and Health Management of the University carried out during the period from 19/03/2021 to 21/06/2021 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Nikita Arora

MBA-HM 24

NIKITA ARORA

V

ABSTRACT

Introduction: Advancements in healthcare has been strengthening day by day with incorporation of Information Technology. The MOHFW's e-health strategy brings telemedicine use to improve the healthcare accessibility of patients and also make it easier for healthcare providers to connect with patients especially focused on rural and remote areas. Telemedicine may be a solution to provide immense benefit to the public, and a new form of doctor-patient interaction may be accepted in future in India.

The study objectives were:

- (i) To review the literature, articles, national and international guidelines on the Telemedicine.
- (ii) To study the knowledge, attitude, practices of using Telemedicine in Healthcare Services in Amritsar City.
- (iii) To identify the various facilitating factors and barriers to use the Telemedicine in healthcare services.

Methodology: A cross sectional descriptive study was carried out online among population of Amritsar city to study the knowledge, attitude, practices of telemedicine services. A total of 150 individuals were contacted but completed responses were received from 100 participants only. The respondents include all such persons (men and women) who were in the age bracket of 18-65 years, possess or have access to mobile phone/ laptop/ desktop with internet facilities and comfortable in using such devices; can read and write English; and belonged to Amritsar City. A self-administered questionnaire was shared with the participants digitally using google form. The study was conducted during March to June 2021. Data was analysed in terms of percentages.

Result: The results revealed that more than 80% of the respondents were aware of telemedicine services but they did not about what kind of services can be avail through the telemedicine. About 45% of the respondents have positive attitude towards telemedicine services. It is believed by the people that services can be easily available with speed and at low cost with the help of telemedicine technology. About one-half of the respondents would like to practice and recommend it to their friends and peers. More than 70% of the people prefer WhatsApp and feel that it could be the best technology to opt the consultation remotely.

Key words: Telemedicine, Teleconsultation, Digital health, National Digital Health Mission, WHO, MOHFW.

ACKNOWLEDGEMENT

The opportunity provided to do dissertation under my university was enriching and valuable experience. I am highly obliged to have met so many experience professionals who led me throughout my study period I am sincerely grateful to them for sharing their truthful and illuminating views on several issues related to the project.

I would like to acknowledge, first and foremost I am extremely thankful to my faculty at IIHMR- Jaipur and specially my **Mentor Dr. Nutan P Jain (Professor)** for being my support all through the dissertation who inspired, guided, and helped me to complete my dissertation. I take this moment to recognize their contribution gratefully.

I would like to express my special thanks to **Dr. PR Sodani (President, IIHMR University, Jaipur)** for giving us valuable suggestions on various course and for timely updating us with dissertation guidelines.

I recognize this opportunity as a big milestone in the development of my career. I will strive to use the knowledge and skills gained in the best possible way.

Lastly, I want to express my respect and love to my parents, siblings, and my friend **Mr. Chandan Gulati** for constant encouragement and motivation in my higher studies.

Sincerely,

Dr Nikita Arora

TABLE OF CONTENT

Contents

1) Abstract.....	vi
2) Acknowledgement	vii
3) List of tables and figures	ix
4) List of Abbreviations	x
5) Introduction.....	1
6) Study question and Objective	3
7) Rationale	3
8) Review of literature.....	4
9) Methodology	9
10) Results	10
11) Conclusion	22
12) Recommendations	23
13) References.....	24

LIST OF TABLES AND FIGURES

List of tables

Table 1. Snapshot of Literature review.....	9
Table 2. Percent distribution of respondents by their age.....	16
Table 3. Percent distribution of respondents by their marital status.....	16
Table 4. Percentage distribution of Covid related information.....	17
Table 5. Percentage distribution of knowledge about telemedicine services.....	19
Table 6. Percentage distribution of knowledge about telemedicine organization.....	19
Table 7. Percentage distribution of knowledge about technologies used in telemedicine.....	20.
Table 8. Percentage distribution of knowledge about the branches of telemedicine services.....	20
Table 9. Percentage distribution of knowledge about services offered through telemedicine.....	20.
Table 10. Percentage distribution of attitude of respondents on telemedicine services...	21.
Table 11. Percent distribution of respondent's comfort on using telemedicine services....	22
Table 11. Percentage distribution of respondent's comfort on using telemedicine services.....	23.
Table 12. Percentage distribution of preference of using telemedicine services.....	23.
Table 13. Percentage distribution of respondents by their practice towards telemedicine services.....	24
Table 14. Percentage distribution of respondents on willingness to pay for telemedicine.	24

List of figures

Fig1. NDGHM Building blocks.....	12.
Fig 2. Moving Health data with User Consent.....	13
Fig 3. Active participants of Top Public and private HMIS/LIMS organizations.....	13

ABBREVIATIONS

IT	Information Technology
WHO	World Health Organization
MOHFW	Ministry of health and family welfare
ICT	Information and Communication Technology
KAP	Knowledge, Attitude, Practices
NDHM	National Digital Health Mission
HMIS	Hospital management information system
NIC	National Informatics Centre
CDAC	Centre for Development of Advanced Computing
TM	Telemedicine
TH	Telehealth
HRI	Health research institute
ATA	American Telemedicine Association
CMS	Centre of Medicaid and Medicare
FGD	Focused Group Discussions

Study on Knowledge, Attitude, and Practices of using Telemedicine in Healthcare Services in Amritsar City

INTRODUCTION

Advancements in healthcare has been strengthening day by day with incorporation of Information Technology (IT). There is irresistible corroboration (<https://www.dovepress.com/telehealth>) that developing countries can also take advantage from telemedicine services and other IT applications used in healthcare. [5]

Telemedicine becomes outlook as worthwhile groove for taking an advantage from the medical resources and infrastructures in the resource-limited healthcare system. Access, quality, and affordable, equity are key affairs have afforded by both developed and developing countries in healthcare services [5] Telemedicine is the use of electronic information and communication technology to bring forth and pillar medical care and management remotely, while patient support and professional health education, public health, and healthcare and hospital administration when COVID period unconnected the participants is considered as telemedicine.[6-8] Innovative Technology information and tele mechanics (ICTs), such as computers, cell phones, artificial intelligence and Internet are transforming how individuals connect with each other, look for and converse and counsel, and enriching their lives. These technologies have exceptional possibilities to help direct contemporary global health problems. [9] Telemedicine play vibrant role in patient cantered medical care delivery starting from consultation to diagnosis and management including follow ups and future treatment plans. [5]

In 2010, “World Health Organization ([WHO](#)), defines e-health as the cost-effective use of Information and Communication Technology (ICT) in the stand of health services, health surveillance, education, knowledge, and research.” [6] Despite the exceptional assurance of telemedicine, to date, its implementation in India has achieved little success with low utilization. [10-12].

“The Ministry of Health and Family Welfare (MOHFW) accustomed the e-health strategy and brings the telemedicine use to improve the healthcare accessibility of patients and also make it easier for healthcare providers to connect with patients especially focused on rural and remote areas.” [7]

Since, In the health sector telemedicine is transpiring technology to smooth the way for the adoption, it pre-eminently requires the knowledge and attitude and practices information of using telemedicine in health services among people. [13–15].

NDHM was launched by the PM Modi on 15 Aug 2020 with the agenda of bringing digital health system in the country. On August 2020, “The National Digital Health Mission (NDHM) brought up with the objective to develop the needful pillar to support the integrated digital health infrastructure of the country. [24] It will bridge the existing gap amongst different stakeholders of healthcare ecosystem with help of technology and highways of digital era.” The accomplishment of NDHM is look forward to crucially upgrade the competent, productive, and clarity of health service delivery overall. Patients will be able to securely store and access their medical records (such as prescriptions, diagnostic reports, and discharge summaries), and share them with health care providers to ensure appropriate treatment and follow-up. Healthcare providers are encouraged to use electronic health records and electronic medical record software’s for entering the patient data. It will digitally secure patient’s data as well as maintains the privacy and confidentiality. They will also have access to more accurate information on health facilities and service providers. Further, they will have the option to access health services remotely through tele-consultation and e-pharmacy. NDHM will empower individuals with accurate information to enable informed decision making and increase accountability of healthcare provider. NDHM will strictly follow the HIPPA laws and encourage all the providers and healthcare organization to follow the HIPAA rules and secure the protected health information[21]

Opportunities of NDHM:

- The current strong public digital infrastructure provides opportunities to streamline healthcare information through digital management.
- The experience of AB-PMJAY can be leveraged to expand the reach of digital health to all residents and develop an open and inter-operable health management system that empowers residents, healthcare providers, the Government, and researchers.
- Emerging technologies such as artificial intelligence, the internet of things (IoT), blockchain and cloud computing provide additional opportunities for facilitating a more holistic digital health ecosystem, that can increase the equitable access to health services, improve health outcomes and reduce costs.

About Telemedicine

The term “Telemedicine” was fabricated in late 1970s which means “healing at distance”. With the use of ICT access and medical care can be improved. [6] First time it was started in military and space technology, at that time televisions were used to provide the care to patients by the specialist. Also, it is used in mental hospitals by psychiatrist to provide the care. [11] Over the past decade, recent advancements in ICTs by the society drives the telemedicine in the developing countries as well.

Dr. Jay H Sanders, “Father of the telemedicine” represented the first application of **telemedicine** into correctional healthcare, and in 1991 he designed the telemedicine system for the State of Georgia that interfaced with rural hospitals, public health facilities. He is also an adjunct professor of medicine at Johns Hopkins School of Medicine and a founding board member and president emeritus of the American Telemedicine Association (ATA).

In India, Telemedicine was formally **launched** on March 30th, 2000, when Bill Clinton— the then president of the United States— commissioned the first **telemedicine** unit in the Southern **India**. ISRO (**Indian** Space Research Organization) made a modest beginning in **telemedicine** in **India** with a **Telemedicine** Pilot Project in 2001, linking Chennai's Apollo Hospital with the Apollo Rural Hospital at Aragonda village in the Chittoor district of Andhra Pradesh.

From 2020 Covid 19 becomes the main driver and brings the telemedicine into picture in tier 2 and tier 3 cities as well. Many healthcare start-ups initiatives become the strongest pillar in this unprecedented time of covid and introduce the telemedicine services.

Four elements of the Telemedicine are:

- Provides clinical support.
- Connecting people and overcoming the geographical barriers.
- Use various types of ICTs.
- Improve the access to healthcare.

Telemedicine Practice Guidelines

“Ministry of Health and Family Welfare prepared the guidelines on telemedicine in partnership with NITI Aayog on 25 March 2020.” These guidelines will provide information on various aspects of telemedicine including information on technology platforms and tools available to medical practitioners and how to integrate these technologies to provide health care delivery. It also spells out how technology and transmission of voice, data, images, and information should be used in conjunction with other clinical standards, protocols, policies and procedures for the provision of care. Where clinically appropriate, telemedicine is a safe, effective and a valuable modality to support patient care. Like any other technology, the technology used for telemedicine services can be abused. It has some risks, drawbacks, and limitations, which can be mitigated through appropriate training, enforcement of standards, protocols, and guidelines. These guidelines, therefore, should be used in conjunction with other national clinical standards, protocols, policies and procedures.” the document mentioned. Guidelines were introduced for the Registered Medical Practitioners (RMP) so that they can follow and exercise them without compromising the quality of the care. [5]

There are seven elements that are required to be considered before initiating any telemedicine consultation:

1. Context
2. Patient and Registered Medical Practitioner identification
3. Communication mode
4. Consent
5. Various types of consultation
6. Evaluation of patient
7. Management of patient

Teleconsultation services must be enough as per the context and must be fitted as per the patient's interest and will. Providers should look at the telemedicine technology and their appropriacy as per the diagnosis. The Registered medical practitioner shall uphold the alike quality and level of healthcare as in in-person consultation but also maintain intrinsic limits of the services. Patient's identity by name, age, email ID, address, phone number, registered ID or any other identification proof as per the requirement should be confirmed and verified by the registered medical practitioner.

RATIONALE

During COVID-19 pandemic the healthcare systems and the community had an unprecedented opportunity to make a concerted effort to increase access and coverage. Even if the urban areas have better healthcare services but during COVID lockdown, it was difficult to avail services by visiting the health facilities physically. Telemedicine was an opportunity to improve health-care services delivery using information and communication technologies in various ways. Therefore, it was important to study the community awareness about the telemedicine services.

Most of the studies were conducted to capture Healthcare providers 'perspectives but based on the search in this study made, no study was found from community perspective. Therefore, this study was conceptualised.

STUDY QUESTIONS

- What are the national and international guidelines on the telemedicine?
- What is the knowledge, attitude, practices regarding Telemedicine Services in Amritsar City?
- What are the facilitating factors and barriers to use the Telemedicine in healthcare services?

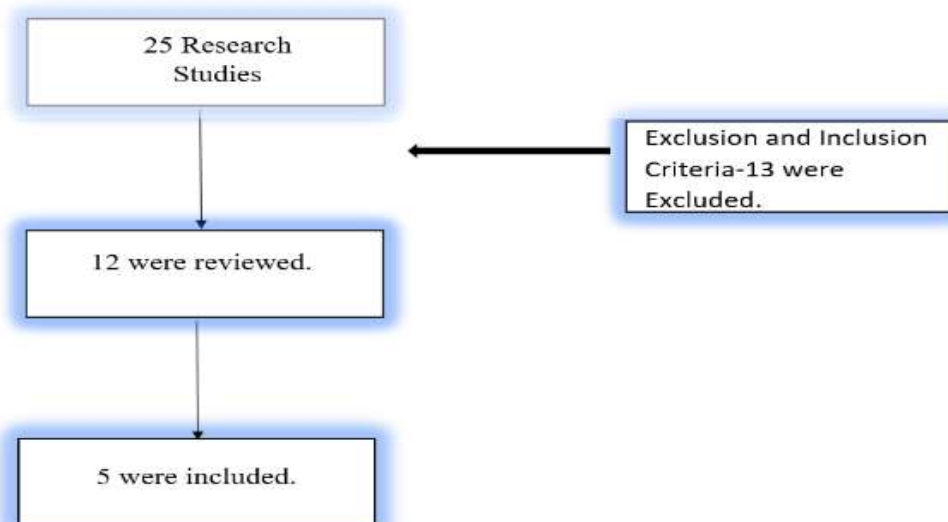
STUDY OBJECTIVES

- To review the literature, articles, national and international guidelines on the Telemedicine.
- To study the knowledge, attitude, practices regarding Telemedicine Services in Amritsar City.
- To identify the facilitating factors and barriers to use the Telemedicine in healthcare services.

REVIEW OF LITERATURE

Search Strategy- Search engines like PubMed, Research gate, Google scholar, Science Direct, PR publication websites like Inc42, Daily Hunt, and Blogs and White papers were explored.

Literature review was carried out to understand the concept of telemedicine and various national and international guidelines and barriers of telemedicine service. The sources of data include public database of studies done, journals, online magazines, and brochures on digital health. Official websites of healthcare start-ups providing telemedicine services like Practo, HCAH, Credi Health, Docs App, Doc-online, Med-life were explored. The author could get 25+ reviewed papers published during last 20 years by using various keywords like digital health, healthcare analytics, healthcare IT, telemedicine services, teleconsultation, NDHM.



(a) **“Digital Health -Heaven or Hell”, (KPMG 2016) which** detailed about, “ how telemedicine technology can drive the quest for the efficient and high quality of care.” Healthcare landscape is rapidly changing globally where digital technologies are increasing day by day. Hospital chains, Healthcare start-ups are bringing the technology among people and playing vital role in enhancing the quality of through telemedicine services. Great expectations of new technology is not only increasing the quality care but also contributing in

strengthen the productivity and turnaround time of hospitals. KPMG explore the opportunities which can drive the improvement of care:

- Standard workflows and decision support.
- Patient engagement.
- Better Coordinated care.
- Improved Access to healthcare services.
- Improve resource management.
- Affordable care

Study concludes that Telemedicine technology is propelling different element association between patient and healthcare provider which needs the prowess for both. Rather than individual pursuit telemedicine services support and healing art as a team

As the traditional barriers are broken on the community, social and mental health care as well as on primary care and secondary care. For example, the recent hospital outpatient department framework looks increasingly outmoded in a world where providers can offer advice to all the patients remotely. However, willingly, or unwillingly COVID pandemic somehow force the people to use the telemedicine technology while sitting safe at home. It is helping the patients as well as saving many resources of the healthcare organizations. Multi-skilled staff with a range of core therapeutic skills are likely to become an increasingly core part of the workforce.

(b) Telehealth- Breaking down adoption barriers 2019 conducted by Infosys stated that telehealth has triple aim of healthcare which are,

- Improving the patient care experience through better quality and satisfaction.
- Improving the health and treatment outcomes of the population.
- Reducing the per capita cost.

According to “American Medical Association, approximately 75% of the doctors’ visits could be handled with telemedicine services. From past few years staggering growth has been seen from 5% in 2017 to 22% in 2019”. But after the global pandemic this range reaches up to 55%. In spite of all the efforts, in developing countries and less developed countries telehealth is not employed yet. There are many challenges and barriers in the pathway of adopting this change.

There are various barriers which are impacting the adoption of the telemedicine services:

1. Technical barriers
2. Behavioural barriers
3. Financial barriers

Technical Barriers: Some people have lack of knowledge and access to the technical abilities. They have less knowledge to operate the services. Many studies have shown that telehealth services are not reliable as compared to regular patient-physician model, there are more chances of having error.

Data security and privacy issues are one the reason because some people cannot rely on technology as they be afraid that their personal data may be disclosed online.

Technical problems and bandwidth issues is the biggest barrier as there is insufficient infrastructure and medical equipment from the physician end. Low interoperability and lack of the standard procedures. According to the survey interoperability telemedicine services is most desired factor to increase the adoption of the telemedicine services.

Behavioural Barriers: Different people have different mind-set. There is hinderance pertaining to the perception of people. Some people have lack of equipment knowledge and scepticism about new changes and approaches. Telemedicine services broadly possible with Internet of medical technology and this would be difficult for both patient and physician to adopt this change.

Some have mind-set that there is risk of fraud in telemedicine services. In one study it shown that receiving the care through telemedicine is not accurate. So, patient's trust and awareness on virtual care quality is still wobbling.

Financial Barriers: High set up cost of telemedicine services is one of the common barriers in adoption of telemedicine services. A major obstacle is upfront cost to the hospitals, healthcare providers, expensive equipment, and infrastructure also the maintenance. With respect to the patients, not all the patients have will to spend one time consultation fee of doctor for virtual care because they have mind-set that provider are not good enough to justify their treatment through telemedicine services. Most of the countries are still encountering difficulty on their well-planned thoughts to drive an imperishable expansion path for telemedicine sector.

(c)Telehealth -Future of healthcare [PwC Health research institute (HRI) in 2015], claimed that telehealth leverages the two-way real-time communication between the patient and the doctor. According to the study, in the hospital's telehealth consultations resolve shortages, improve outcomes, and reduce costs. 37% of doctor said that 1/3 visits can be done virtually with the help of teleconsultations. Also in the Healthcare start-ups, they started attracting private sector funding with promise growth. There are some new entrants who brings the Kiosk to provide the telehealth. 48% of the consumers were surveyed by HRI indicated that they would be willing to pay for an online services or app that could diagnose and prescribe based on the signs and symptoms described by user.

(d) Telemedicine and Health IT Bridge, [American Telemedicine Association (ATA), 2011]. This study identify the bridge between Telehealth and healthcare IT and shows how the virtual care can be obtained with mutual interest with HIT initiatives. The aim of telemedicine and Health IT are synergistic. Telemedicine is the way to connect and provide virtual care by providers to patients through digital platform whereas Health IT is complimenting telemedicine by enabling the component to the delivery services over the distant. Health IT enhances the utility of telemedicine.

Health IT includes interoperable HER which contains all the data of patients and that can authorize provider to view and assess all the important data and required details about the patient and telemedicine is facilitated by access to an EHR. Use of HER improved the quality of care delivered by telehealth mechanism.

Centre of Medicare and Medicaid (CMS) also encourages for adopting the telehealth services. CMS evaluate the providers with various measures for their quality treatment. These measures are known as QPP measures. CMS is also bridging the gap of Healthcare IT and Telemedicine and pushing the system towards the technology. During Covid, CMS launched new measures of telehealth services called modifiers to fulfil the MIPS programme by the provider.

Telemedicine and health information have made great strides towards improving the availability of specialty care and provider / patient education resources, despite geographic and economic factors that have historically hampered access by segments of the population.

Table 1: SNAPSHOT OF LITERATURE REVIEW

Title	Author	Date/Year	Objectives	Methods	Key findings
“Telehealth- Breaking down adoption barrier”	Yogesh Puranik, Gaurav Sharma	2019	To bring and break down all the barrier of telemedicine	36 interviews were conducted with leaders of healthcare organizations who have been actively pursuing a digital strategy over many years, as well leading technology suppliers	The telehealth industry is at cusp of economical, structural, cultural and financial changes that will revolutionize the way in which we access and provide healthcare.
Digital health: heaven or hell?	Mark Brinell, Richard Bakalar, M.D,Ash Shehata	2016	To direct the quest for well planned , high standard healthcare	This study was gathered through an extensive secondary research of the existing literature on health technology’s impact on productivity and quality of care.	Technology is driving significantly different relationship between patient and provider This requires new skills for both. Provider will develop new coaching skills in order to “activate” and engage people in their care, adaptable to the wide range of patient capabilities that will persist
“Telehealth -Future of healthcare	PwC Health research institute (HRI)	2015	To determine the benefits of telehealth	Primary data collected through survey by HRI	48% of the consumers were surveyed by HRI indicated that they would be willing to pay for an online services or app that could diagnose and prescribe based on the signs and symptoms described by user.
“Telemedicine and Health IT Bridge”	American Telemedicine Association (ATA)	2011	To bridge the telemedicine and Health-IT	Primary data collected through survey by ATA	This study identify the bridge between Telehealth and healthcare IT and shows how the virtual care can be obtained with mutual interest with HIT initiatives. The goals of telemedicine and Health IT are synergistic

METHODOLOGY

Study Design: The Cross-sectional study was conducted to assess the knowledge, attitude, and practices of using telemedicine services.

Study Respondents- The respondents included all such persons (men and women) who were in the age bracket of 18-65 years, possessed or have had access to mobile phone/ laptop/ desktop with internet facilities and comfortable in using such devices; can read and write English; and belonged to Amritsar City.

Duration of Study- Study was conducted for the period of three months from 21st March to 21st June 2021.

Sampling and Sample Size- Purposive sampling and snowball methods were used.

At the first level, a list of potential respondents was developed whose contact details like phone number, email, WhatsApp, Facebook accounts the researcher, or their family members (including extended family members) have.

At the next step, a list of the persons between 18-65 years was prepared. Keeping in view the lesser respondent rate for e survey; as well as refusal, the friends and relatives who are not included in the final list were further be asked to share the survey tool to their contacts.

A self-administered online survey google form was used as a tool to gather the primary data. The e survey tool had two sections: consent and the questionnaire. Those respondents who have consented, they could access to the questionnaire. Otherwise, the survey was closed by mentioning thanks.

Questionnaire was shared with 150 people of Amritsar city through the social media. Out of them 137 people accessed the form and out of them 37 (%) individuals did not give their consent. Then, 100 complete responses were considered for the survey.

Data Collection Methods:

The e-survey method (Google form) was used for the survey. Both closed and open-ended questions were asked. The questionnaire included items on socio-demographic, knowledge, attitude, and practice about telemedicine services. The attitudes related statements were rated 5-likert scale. The practice preference related questions were also presented on rating scale, where the respondents had to tick the most appropriate option.

All the data collected kept confidential under ethical considerations. Data was analysed in terms of percentages using Ms-excel and presented in Tabular forms.

RESULTS

“The Government of India” launched “National Digital Health Mission (NDHM) on 15 August 2020.” Objective of NDHM is “To strengthen the accessibility and equity of health services, including continuum of care with citizen as the owner of data, in a holistic healthcare programme approach leveraging IT & associated technologies and support the existing health systems in a ‘citizen-centric’ approach”. The mission introduced the concept of Health-Id for all citizens of India. It was implemented by National Health Authority of India. The policy part is issued by “Ministry of Health and Family Welfare” while “National Health Authority” actually runs the implementation kind of on the ground level. It will provide digital building blocks of healthcare.

The “NDHM will be designed, developed, deployed, operated, and maintained by the Government in accordance with the guiding principles as laid out in NDHB. The NDHM seven guiding principles [17] are as follows”:

- NDHM will be wellness-centric and wellness-driven - Wellness centres and mobile screening teams will be strengthened through real-time access to personal health records.
- Keeping in view privacy and security concern, - A National Policy on Security of Health Systems and Privacy of Personal Health Records will be developed, in accordance with the PDP Bill 2019. All the building blocks that require handling personal health records will be designed to comply with such a policy at the outset. As it especially deals with health data, this mission puts control of health data in citizen’s hands. As per the underlying principles of health data management, patients are having control and they are deciding what they want to do with their health data. All records and their components will be owned and controlled by individuals (ndhm.gov.in/documents/ndhm_strategy_overview)

- NDHM will educate and empower individuals to avail a wide range of health and wellness services - Mass awareness and education will be promoted through use of appropriate platforms and a portfolio of Health Apps.
- NDHM systems will be designed to be inclusive - Specialized systems will be designed to reach out to the “unconnected”, digitally illiterate, remote, hilly, and tribal areas.
- NDHM will be designed to measure and display the performance and accountability of all health service providers - Real-time monitoring of performance of all health institutions and professionals against agreed KPIs will be done across service levels of the health sector and published.
- NDHM will have a national footprint and will enable seamless portability across the country through a Health ID – Personal Health Identifier, with supporting blocks, including adoption of Health Information Standards will play a pivotal role in national portability.
- The eco-system of NDHM will be built basing on the principle, “Think big, start small, scale fast” - NDHM will adopt a combination of strategies like taking a minimalistic approach for designing each building block, prioritizing, and sequencing of the development/ launch of these blocks, and designing a technology architecture that can rapidly and agilely scale horizontally and vertically.

Building blocks (Fig 1) of healthcare are digital component, every block is called as Digital Public Goods. These goods are developed by government and used by anyone in the public ecosystem. Building blocks consist of health Id, which is way to identify digitally an individual in a health transaction. There is health professional registry so that they started with doctors so there are way to identify doctors in context of digital transaction.

For example: They can visualize it in case of telemedicine and of course which is participating facility where this transaction actually happened. So, health facility registers is as that. Telemedicine, e-pharmacy, Health claims platform, Health Analytics, Medical devices are all initial building blocks. The National Digital Health Mission will have fairly long life. Over the next decade to see NDHM make significant differences in terms of what it does on various things on healthcare side.

NDHM Building Blocks

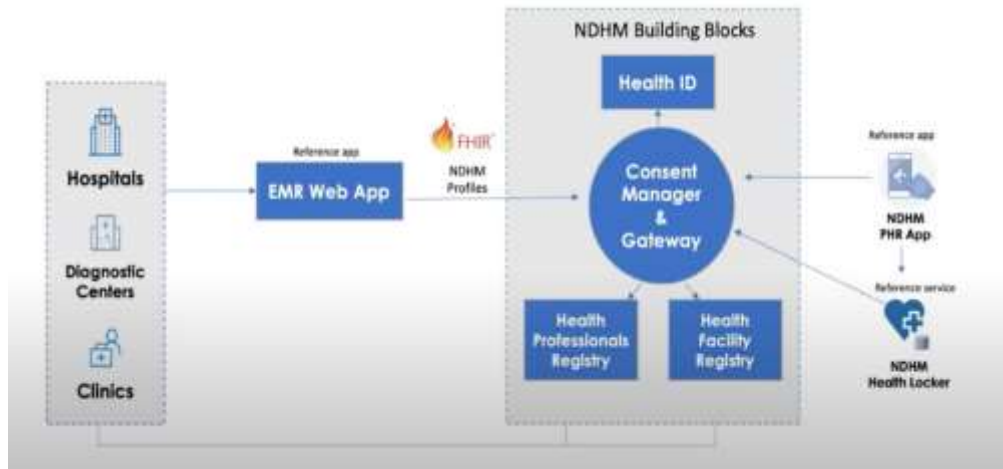


Fig 1. NDHM Building blocks

In figure 1, the bunch of hospitals, clinics and diagnostics that are likely to have some software and the software's use to actually become NDHM compliant which make sure that they are holding the health record. India is moving to a completely standardized highly structured data format. There is use of Fast Healthcare Interoperability Resources, it is an international standard for health data formats having all the data in PDF and can access through FHIR app and download it and share it. Also, the standard coding system will be used. So, even if to look at health data on mobile app that would need to implement a specification that is call as health information user specifications and that is how data can be accessed. There is another construct called Health locker, "Health Lockers are software service providers who offer long term storage of records to individuals. Health Lockers behave like HIUs (Health information user) when they are receiving health records of the user from healthcare providers. Health Lockers behave like an HIP (Health information providers) when the individual shares his records from his Health Locker (Figure 1). Apart from Health records from recognized healthcare providers, Health Lockers also can store user uploaded health records." Since having federal architecture many users prefer to store their own data, so health locker is the personal store where one can actually pull all of these health data and can keep copy.

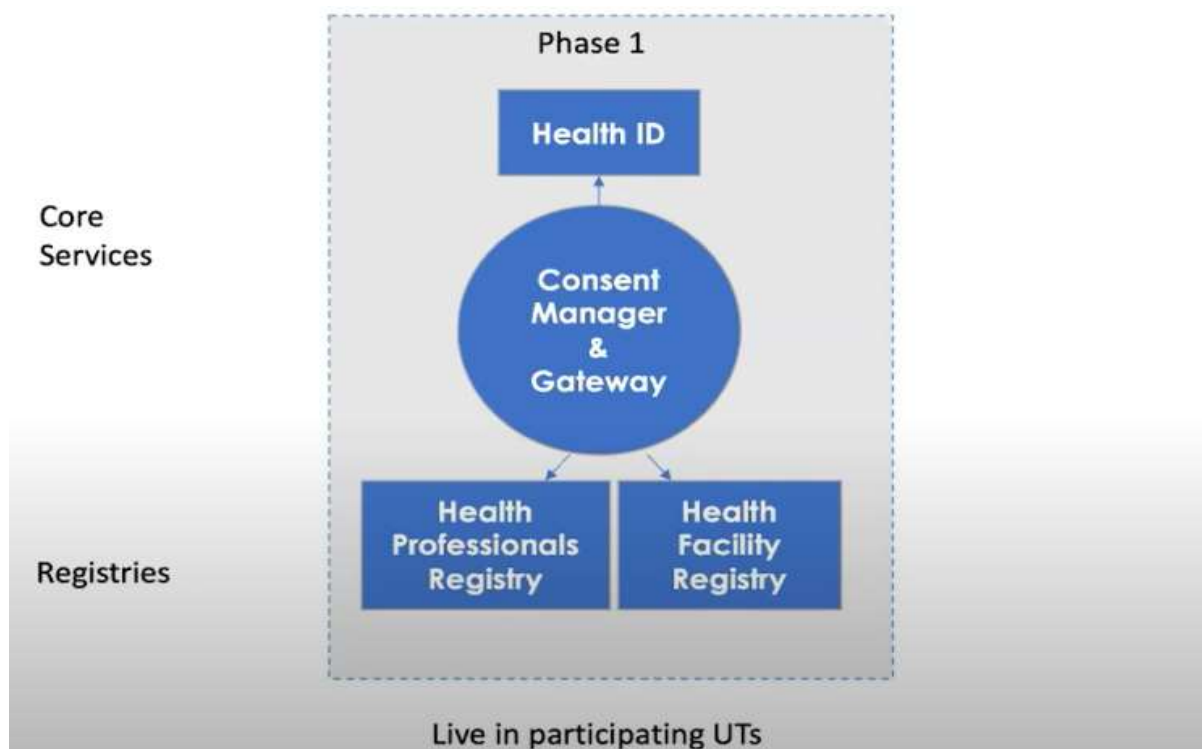


Fig 2. Moving Health data with User Consent

As per NITI Ayog, “The key enabling concept to consider in the development of digital health is called ‘normalization’”. In the past, master registries would be present in each application. So, for example, if the application needed reference to a specific doctor/provider, that application had its own provider registry which served the application. If provider registry might appear in 10 or more applications. When there is a need to change the table, each application’s registry would need to get updated. This becomes a huge nightmare as the number of copies of the data proliferate. Once they reach 10 or more, it is nearly impossible to keep all copies in sync. Hence, there is a need for a shared table, or master registry, which contains authoritative information in one place and needs to be updated one time for all applications to learn of the change. This is an obvious improvement over the old method. Provider registry is list of all providers (doctors and certain other caregivers) who are authorized to treat patients by virtue of their licensure and/or empanelment to a health insurance scheme. Facility Registry is list of all health facilities, public and private, with information about their level, size, location, services offered, etc. ([nitiaayogfinalbook.pdf](#)) (Figure 2)

NDHM is incorporated with Ayushman Bharat Scheme and also many other government participants become the part of the NDHM, like E- Arogya, E- hospitals (NIC), E-Shushrut (CDAC). Private Hospitals involved are Apollo, Medanta, Columbia Asia, Max Healthcare, Fortis, Paras Healthcare, Oncquest and Dr Lal Path labs, Healthcare start-up which involved are Practo, Live on, Docon, Bajaj FinServ, Navia, Healthcoco. (Figure 3)



Fig 3. Active participants of Top Public and private HMIS/LIMS organizations

To summarize, NDHM is like bunch of building blocks where information moves from Hospital to Mobile phone. It is acting like control layer. NDHM itself do not have access to any personal health data. At best, it has only access to aggregated data stream that talk about for policy making. So, there is by design come up with an architecture where the government or any entity cannot really create one single system which has huge amounts of health data that may be make it much easier to hack or also have lots of issues on comprising of privacy and security. NDHM empower the movement of health data while keeping security and privacy in the front. Change of adoption into healthcare for digital healthcare will happen. India is innovative country and whole class of player will come into service those who are not yet digital.

The survey results were presented in three sections: socio-demographic, COVID-related experiences, knowledge, attitude, and practice towards telemedicine services were asked.

Socio-Demographic Characteristics of Respondents:

Of the total 100 participants, both males (52 percent) and females (48 percent) participated in the study. The average age group of the respondents was 30 years. More than half of the respondents between 26-35 years age group followed by 18-25 years age group (36 percent) ([Table 2](#)).

About 55 percent of respondents were unmarried, 43 percent of the respondents were married, and remaining were not preferred to disclose their status. ([Table 3](#))

Table 2: Percent Distribution of Respondents by their Age

Age	%
18-25 years	36
26-35 years	51
36-45 years	9
46-55 years	2
55-65 years	2

Table 3: Percent Distribution of respondents by their Marital status

Marital Status	%
Unmarried	55
Married	43
Prefer not to say	1
Widow	1

About 24 percent of the respondents were Post Graduated, followed by Graduates (54 percent), diploma holders (13 percent) and rest of them had their education up to 12th and 10th standard. All the respondents were asked about COVID-related questions if any of them or their family members have had COVID infection. Of these, 43percent of the respondents or their family members had COVID infection.

Table 4: Percentage distribution of the respondents by their COVID related experiences (n=43)

Item	n	%
Level of severity among those who suffered from COVID		
Mild- (no need was felt to discuss medical personnel or go to health facility)	23	54
Moderate- (accessed hospital / health facility, and after testing consulted, come back and quarantine)	13	30
Severe – (serious, hospitalized etc.)	7	16
Type of “pathy”		
Allopathy	33	78
Homeopathy	5	12
Ayurvedic	5	12
Type of health facility/ provider		
Registered medical practitioner in a private hospital	15	35
Registered medical practitioner in a private clinic.	9	21
Govt. hospital	13	30
Chemist	6	14
Opted telemedicine	13	30
Call	3	23
WhatsApp	6	46
Mobile App	2	15
Registered on site	2	15
Needed hospitalization (Yes)	13	30
Current status of the patients (Alive)	33	77
Had Health problem other than covid (Yes)	16	37
Post-covid symptoms like severe body ache along with lethargy	6	37.5
Diabetes	4	25
Hypertension	1	6
Skin infection	1	6
PCOD	1	6
Restlessness, Weakness	1	6
Anaemia	1	6
Knee problem	1	6

Questions related to other health problems were asked, and also about the severity of the COVID-19 infection, mode of consultation and treatment they opted during their infection, health stream they had chosen. According to the survey, 54 percent of them had mild symptoms, 30 percent of them had moderate and 16 percent had severe symptoms. 77 percent of respondents rely on allopathic stream of medicine and remaining were on Ayurvedic and Homeopathy.

Approximately 54 percent respondents used to get their treatments from registered medical practitioner in a private hospital and 30 percent were from Govt. Hospitals and remaining 14 percent were directly from chemist. Approximately 30 percent among of them opted for Telemedicine services during their COVID infection remaining 70 percent opted Traditional patient- physician mode of care. Almost 70 percent of respondents had taken Offline treatment and remaining through the online mode like WhatsApp, Audio call, website, and mobile app. Out of all the Covid patient 70 percent recovered at home and 30 of them were hospitalized. 76 percent of covid patients got recovered.

Apart from this 62 percent of respondents also have any other health problems other than covid like Diabetes, Hypertension, Polycystic Ovarian Disease, Weakness, Restlessness, Knee pain, Anaemia, and some of them have had Post covid symptoms. 39 percent of them were on regular medicines and 65 percent were taking medicines frequently. ([Table 4](#))

Knowledge of respondents on Telemedicine services

Knowledge of respondents on telemedicine services was recorded, ([Table 5](#)). Depicts that 83 percent of respondents heard about telemedicine services and others did not have any idea about this service. They were asked about kind services they knew like Audio, video consultation, m-health, RPM. 44 percent knew about all services and 7 percent have no idea about any of the above services and remaining respondents knew some of services. 69 percent respondents believed that WhatsApp was only method of telemedicine services and remaining others have knowledge about some other platforms as well.

Table 5 Percentage distribution of Knowledge about telemedicine services (n= 83)

Item	%
Have Knowledge on Telemedicine services	83
Know the type of telemedicine services	
All	44
Audio Consultation	17
Video Consultation	24
None	7
M-health (the practice of medicine and health care over mobile devices, tablets, PDAs, and computers.)	4
Remote patient monitoring	4
Know Platforms of telemedicine	
WhatsApp	69
CALL	10
Mobile App, website	10

From table 6 it was depicted that 51 percent of respondents were aware about the organizations providing telemedicine services, and out of them 25 percent knew that it could be Hospital-chains, 10 percent people knew about healthcare Start-ups and 10 percent knew about kiosks and only 6 percent were aware about all the organizations.

Table 6. Percentage distribution of Knowledge about telemedicine organization (n=51)

Item	%
Have Knowledge about organization providing telemedicine services	51
Type of organization	
Hospital chains	25
Healthcare start-up	10
Telemedicine Kiosks	10
All	6

From table 7 it was depicted that 60 percent of respondents had knowledge about technologies used in telemedicine services. Out of them only 28 percent respondents knew all technologies like telemedicine kit, software, laptop, App, internet facility, mobile medical devices. 14 respondents have idea telemedicine software and remaining have had knowledge about few of them. 40 percent of them were clueless.

**Table 7. Percentage distribution of Knowledge about technologies used in telemedicine.
(n= 60)**

Item	%
Have knowledge Technologies used in the Telemedicine	60
Kind of technologies	
All	28
Telemedicine Kit	5
Telemedicine Software	14
Laptop or PC	3
App	5
Internet facility	3
Mobile Medical Devices	2

From results it was observed that only 34 percent of respondents have knowledge about the branches of telemedicine services. 15 percent have knowledge only about teleconsultation services and only 10 percent have knowledge about all the branches of telemedicine services. 66 percent of people were not aware about any branches of the telemedicine services. (Table 8)

**Table 8. Percentage distribution of Knowledge about the branches of telemedicine services
(n=34)**

Item	%
Have Knowledge of Branches of Telemedicine services	34
Types of Branches	
Teleconsultation	15
All	10
Teleradiology	6
Tele-monitoring	3

Results indicated that only 34 percent respondents knew the services offered by telemedicine and remaining were not aware about telemedicine services. (Table 8)

**Table 9. Percentage distribution of Knowledge about services offered through telemedicine
(n=34)**

Have knowledge Services offered through telemedicine		
Item	n	%
General consultation	26	70
Mild disease like cold, cough	8	22
Advice related to medicine	1	3
Diagnosis , treatment, and prognosis	2	5

It was interpreted that 34 percent of respondents have knowledge about the services offered through telemedicine services. Out of them few services they know and would like to opt were general consultation, mild diseases, medicine advice, diagnosis, and prognosis.

Attitude of respondents on Telemedicine services

Table 10. Percentage distribution of respondents by their attitudes towards Telemedicine services					
Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Telemedicine is convenient way to receive care.	27	46	17	7	3
Telemedicine is compatible with current pandemic like situation	41	44	12	3	0
Telemedicine services saves time	36	47	16	1	0
Telemedicine services is cost saving	37	37	20	6	0
Telemedicine services reduce the number of visits to health facility	46	40	11	2	1
Telemedicine is future of healthcare	37	38	19	3	3
Telemedicine is viable approach for providing care to the patients	31	37	23	7	2
People in general prefer Telemedicine	23	23	28	17	9

Respondents were asked few questions to know their attitude towards telemedicine services. 5- Likert scale rating was given to question with option of Strongly agree, agree, neutral, disagree and strongly disagree. Responses were recorded as shown in table 10. and observed that 46 percent of them were found that telemedicine is convenient way to receive care. Almost 44 percent believed that telemedicine is compatible and best way to receive the care in current pandemic situation.

About 46 percent respondents strongly agreed that telemedicine services reduced the visit to healthcare facility. Approximately 47 percent respondents believed that telemedicine services save the time and 37 percent of them strongly agreed that it also save the cost of health services.

Findings on survey revealed that 37 percent of respondents found that telemedicine is viable approach for providing care to the patients and 23 percent of them would recommend

preferring the telemedicine to others and half of them respondents believed that telemedicine is the future of healthcare. (Table 10)

Practice of respondents on telemedicine services

Finding from survey revealed that 87 percent of respondents would like to avail the telemedicine services and 13 percent of them were not interested.

Results revealed that 69 percent respondents were partially comfortable using telemedicine services while 16 percent respondents were fully comfortable others were not availed or not at all comfortable (Table 11). Out of them 57% of the respondents would prefer to practice the telemedicine services through WhatsApp call and remaining of them would prefer website, zoom call and mobile app.

Table 11. Percentage distribution of Respondents by their comfort on using telemedicine services (n=87)	
Level of comfort on using Telemedicine	%
Fully Comfortable.	16
Partially	69
Not at all	15
Various platforms for using Telemedicine services	
Item	%
WhatsApp Call	57
Zoom call	20
Through registration of website	14
Mobile App	9

Results shown that 89 percent respondents prefer the telemedicine services on general symptoms like Cold, cough, fever. Only 8 percent respondent prefer it for infectious diseases like allergies, TB, malaria and remaining 3 percent favoured telemedicine for long term diseases like cancer, diabetes, heart related problems. (Table 12)

Table 12. Percentage distribution of Diseases prefer for telemedicine(n=100)	
Preference of Diseases for Telemedicine services	%
General: Cold, Cough, Mild fever ,Disease like typhoid	89
Infectious: allergies, malaria, TB	8
Long-term diseases like Cancer, diabetes, heart related.	3

Similarly, like attitude, respondents were asked question to know their practice toward telemedicine services using 5-likert scale. Results in table 13 revealed that 34 percent of respondents would definitely be sure on using telemedicine services. Almost 50 percent of them would like to gain more knowledge on telemedicine and about 55 percent of them would refer the telemedicine to their friends and peers. (Table 13)

Table 13. Percentage distribution of respondents by their practice towards Telemedicine services (n=100)					
Item	Definitely	Possibly	Probably	Probably not	Definitely not
Prefer to use telemedicine	34	31	30	3	2
Prefer to gain more knowledge on telemedicine	50	30	13	4	3
Refer telemedicine to family and peers	55	21	19	3	1

Respondents were asked about their willingness to pay for telemedicine services. Results revealed that respondents were willing to pay 1000 rupee (INR) on an average. About 44 percent of them prefer to spend between [600-1000] rupee followed by 29 percent would prefer [100-500] and remaining were gone above 1000 rupees and highest up to 3000 rupees. (Table 14)

Table 14. Percent distribution of the respondents by their willingness to pay for telemedicine services. (n=100)

Willingness to pay (INR)	n	%
100-500	29	29
600-1000	44	44
1100-1500	7	7
1600-2000	9	9
2100-2500	7	7
2600-3000	4	4

DISCUSSION

As the telemedicine is an emerging trend and necessity throughout the globe. It is very necessary to find ways to ensure availability of healthcare services for all persons. Telemedicine with its ability to reach the remote places can be a very viable approach to receive the same.

As per the previous studies done on telemedicine services revealed that in today's world of information technology, the use of telemedicine in healthcare is becoming an important tool among health care systems. Telemedicine services can be advantageous to those who have limited access to health care services or have limited healthcare facilities. Telemedicine services has powerful market potential. In the coming years, it is expected that it will grow at a compound annual growth rate (CAGR) of 14 percent. The well-being market enabled by digital technologies (mobile applications, devices) is rapidly growing as well.

In India NDHM is launched and technocrats are working towards it. Telemedicine cannot be a perfect solution for all problems, but it is feasible to reaching to the unreached. Despite having potential, it is not implemented the way it should be. Lack of awareness and cultural appropriateness might have restricted it. The results revealed that respondents are very much willing to learn about telemedicine, but the myth prevails that it requires very sound knowledge of technology to avail the telemedicine services.

CONCLUSION

As telemedicine is a modern concept in health care services, its implementation has not been as much satisfactory and successful. It may be concluded that there is an opportunity for telemedicine to be fully integrated in the health care system under Ayushman Bharat if appropriate training and education is provided to health care professionals. The barriers to implementation of telemedicine solutions was the perception “too expensive” underdeveloped infrastructure.

Study conducted in Amritsar city, revealed that respondents have good knowledge regarding telemedicine benefits, but they are not aware of telemedicine availability, technology, and its aspects. Vast people shown positive attitude towards telemedicine. People were positive towards digital consultation with the doctors and most of them agreed that incorporation of telemedicine would strengthen the healthcare system. The usage of telemedicine services was found to be very low among respondents. The reason could be same, there is need to know the technical aspect of telemedicine and also the lack of awareness regarding such services.

“WHO urges all the countries to enable the development and use of innovative telemedicine solutions to assist health-care professionals working in both urban and rural areas to provide community-specific services, including mobile telemedicine solutions to overcome the barrier”.

There is need to build strategy on existing resources and infrastructure, and introduce other simple, low-cost telemedicine solutions within the context of the community to provide the basis for evaluation and further adoption. Also, it is important to consider improving users’ knowledge of the technology and demonstration its competencies and benefits because ample knowledge and affirmative opinions of the technology are key factors to reassure users to use the technology in the future.

REFERENCES

1. D. S. Edirippulige, A. C. Smith, J. Young, and R. Wootton, "Knowledge, perceptions and expectations of nurses in e-health: results of a survey in a children's hospital," *Journal of Telemedicine and Telecare*, vol. 12, no. 3, pp. 35–38, 2006.
2. N. Demartines, O. Freiermuth, D. Mutter, M. Heberer, and F. Harder, "Knowledge and acceptance of telemedicine in surgery: a survey," *Journal of Telemedicine and Telecare*, vol. 6, no. 3, pp. 125–131, 2001.
3. [https://www.dovepress.com/telehealth-in-the-developing-world-current-status-and-future-prospects-peer-reviewed-fulltext-article-SHTT#:~:text=Telehealth%20is%20still%20not%20integrated,management\)%2C%20and%20many%20others](https://www.dovepress.com/telehealth-in-the-developing-world-current-status-and-future-prospects-peer-reviewed-fulltext-article-SHTT#:~:text=Telehealth%20is%20still%20not%20integrated,management)%2C%20and%20many%20others).
4. P. Whitten, B. Holtz, and L. Nguyen, "Keys to a successful and sustainable telemedicine program," *International Journal of Technology Assessment in Health Care*, vol. 26, no. 2, pp. 211–216, 2010.
5. Telemedicine_MOHFW%20guidelines%5B9669%5D.pdf
6. Field J, editor. Telemedicine: a guide to assessing telecommunications in health care. Washington DC: National Academy Press; 2006. p. 271.
7. Telehealth Programs. Health resources and service administrations, <https://www.hrsa.gov/rural-health/telehealth/index.html> [Accessed 21 February 2019].
8. Wootton R. Recent advances in telemedicine. *Br Med J* 2001; 323:557–60.
9. Ryu S. Telemedicine: opportunities and developments in member states: report on the second global survey on eHealth 2009 (Global Observatory for eHealth Series, Volume 2). *Health Inform Res* 2012; 18:153–5.
10. D. Wamala and K. Augustine, "A meta-analysis of telemedicine success in Africa," *Journal of Pathology Informatics*, vol. 4, no. 1, p. 6, 2013.

11. A. Dasgupta and S. Deb, "Telemedicine: a new horizon in public health in India," Indian Journal of Community Medicine Official Publication of Indian Association of Preventive and Social Medicine, vol. 33, no. 1, p. 3, 2008.
12. M. Kifle, F. C. Payton, V. Mbarika, and P. Meso, "Transfer and adoption of advanced information technology solutions in resource-poor environments: the case of telemedicine systems adoption in Ethiopia," Telemedicine and e-Health, vol. 16, no. 3, pp. 327–343, 2010.
13. D. S. Edirippulige, A. C. Smith, J. Young, and R. Wootton, "Knowledge, perceptions and expectations of nurses in e-health: results of a survey in a children's hospital," Journal of Telemedicine and Telecare, vol. 12, no. 3, pp. 35–38, 2006.
14. Nirupam Bajpai and Manisha Wadhwa, "Reimagining Healthcare with " India's National Digital Health Mission: 2020"
15. Mark Britnell, Richard Bakalar, M.D, Ash Shehata, "Digital health: heaven or hell? :2016"
16. https://ndhm.gov.in/documents/ndhm_strategy_overview
17. https://ndhm.gov.in/home/guiding_principles
18. https://ndhm.gov.in/documents/hip_hiu_Policy
19. Yogesh Puranik, Gaurav Sharma, "Telehealth- Breaking down adoption barrier: 2019".
20. PwC Health research institute (HRI) , "Telehealth -Future of healthcare : 2015"
21. American Telemedicine Association (ATA), "Telemedicine and Health IT Bridge: 2011"
22. C. Dockweiler and C. Hornberg, "Knowledge and attitudes as influencing factors for adopting health care technology among medical students in Germany," Journal of International Society for Telemedicine and eHealth, vol. 2, no. 1, p. 7, 2014.
23. F. Shiferaw and M. Zolfo, "(e role of information communication technology (ICT) towards universal health coverage: the first steps of a telemedicine project in Ethiopia," Global Health Action, vol. 5, no. 1, article 15638, 2012
24. <https://ndhm.gov.in/home/ndhm>