

## STUDY ON IMPACT OF COVID-19 ON 5A's of TELEMEDICINE

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### **Abstract**

*COVID-19 lockdown restricted movement throughout the world. The whole world was quarantined and a large number of populations faced stressful situations in other aspects of daily life such as unexpected economic downturn, the higher burden on non-communicable diseases, lifestyle changes, various mental health issues, etc. There was a need for innovative and unique solutions to help and address the critical shortage of healthcare providers not only for those who were infected with COVID-19 but also for those who may require medical attention. During this critical situation, telemedicine services resurfaced and become an asset, with greater importance to the health-care delivery spectrum. The rate at which implementation of telemedicine services are occurring throughout the world, it becomes necessary for the organizations to understand the needs of the people who opt for such services. While several healthcare providers and systems have turned to telemedicine to maintain contact with their regular patients to minimize their risks of direct contact, the rate of adoption of this technology among patients hitherto accustomed to face-to-face consultation is uncertain, particularly in developing countries like India. The adoption can be measured with help of five variables i.e. Availability, Affordability, Accessibility, Accommodation, and Acceptability. Aims and objectives:*

*The purpose of this study is to analyze impact of COVID-19 pandemic on telemedicine services provided post onset of pandemic in the year 2020. The study intends to evaluate these changes with help of five dimension of healthcare access to namely Affordability, Availability Accessibility, Accommodation and Acceptability and how the telemedicine services have been in use to provide the remote healthcare to the patients in need during this period. 5A's of Telemedicine will be assessed thoroughly based upon the set parameters and from the perspective of end user of the telemedicine i.e. patients, with the help of structured questionnaire. The study, therefore, attempts to evaluate the 5A's of telemedicine from the patient perspective during the pandemic period.*

**Result:**

*Majority of the respondents either strongly agreed or somewhat agreed all the 5A of telemedicine has improved during this pandemic.*

**Conclusion:**

*Affordability of telemedicine has improved post pandemic and has become cost effective owing to reduction in travel and reimbursement for telemedicine consultation. In case of availability of telemedicine has improved with respective to specialty consultations and more hospitals have opened telemedicine post pandemic in order to keep up with their foot fall and revenue. Accommodation with respect to languages, user friendly apps has been found very useful during pandemic. Accessibility has seen tremendous improvement due to the availability of smart phones and hi-speed internet. Finally, all the above factors have helped to improve the acceptability of telemedicine during this pandemic situation*

**Introduction**

The evaluation of any technology with human interaction like telemedicine is complex due to variations in definition, system configuration, and possible outcomes. Hence, it's important from the onset to explain the essential requirements for evaluation and, if implemented properly, what can be learned from such an attempt. Bashshur, R. L. (1995) identified two types of research questions which were found appropriate for evaluation of telemedicine services. First, the biomedical research, which includes issues related to clinical effectiveness and safety, and secondly the type of questions pertaining to health services such as effects of telemedicine services on health care delivery and its acceptance by both the providers and clients. The concept of access to healthcare is the key indicator of the performance of any health care system around the world. The importance of service delivery to the people in need has resulted in the measurement of utilization and access has a prominent role in the health policy literature of any country.

Five dimension of access to healthcare namely, Affordability, Availability Accessibility, Accommodation and Acceptability reflects the relationship about characteristics and expectations of the clients who are utilizing the services [1]. All these factors play an important role in assessing the access to the healthcare services and are related to each other. The importance of this interrelation and fit between provider and client influences the way the healthcare services are utilized by the client[2]. The proof of complete utilization of the services cannot be determined merely by the presence of the facility. Evaluation of such services requires a set framework to know about the effectiveness as well as efficiency of the services. Thus, study intends to analyze telemedicine services with the help of these parameters especially the changes that occurred post onset of COVID-19. The concepts about the 5A's are explained below:

- **Affordability:** The relationship of prices of services and provider insurance or deposit requirements with the Client income, ability to pay, and existing health insurance. Client perception of worth relative to total cost is concern here
- **Availability:** Relationship of the volume and type of existing services and resources to the client's volume and type of needs
- **Accessibility:** Relationship between the location of supply and location of the clients taking account travel time, cost and transportation resources
- **Accommodation:** Accommodation reflects the extent to which the provider's operation is organized in ways that meet the constraints and preferences of the client. Of greatest concern

are hours of operation, how telephone communications are handled, and the client's ability to receive care without prior appointments.

- **Acceptability:** Relationship of clients' attitudes about personal and practice characteristics to the actual characteristics of the existing providers as well as providers' attitudes about acceptable personal characteristics of the clients.

## Material and methods

The research will be involving collection of data to quantify the objectives by conducting primary research. It aims to seek precise measurement & analysis of target concepts by doing surveys, with the help of structured questionnaires. The initial draft of the questionnaire will be shared with 20 experts in the field for confirming the validity and reliability of the statements and the Likert scale framed. The statements were sent to the field experts in the excel sheet clearly stating the objectives and variables used in the research. They were asked to retain, modify, delete, or add any points for the existing statements made. Post validation necessary changes will be made in the questionnaire before circulating it among the selected sample for recording responses. Random sampling technique will be used for selecting the representatives for the survey. The criteria for the sample selection are as follows:

- Inclusion criteria:
- Indian population will be considered
- Age groups of 18 years and above are eligible for recording responses
- Any person who had experience of telemedicine service at least once post onset of COVID-19, which includes both COVID-19 and Non COVID-19 patients
  - Exclusion criteria: Physician or healthcare professional as the study intend to capture only the perceptions of telemedicine from patient point of view.

Table 1: List of questions asked for assessing each parameter

Affordability	1. Price or charge for telemedicine was affordable with respect to income earned during COVID19	2. New schemes were introduced by Insurance companies to provide reimbursement of telemedicine expenses after onset of COVID19	3. After onset of COVID19, I purchased new device to get telemedicine service	4. Various payment methods, cashback or coupons, installment bill payment options were provided for telemedicine after onset COVID19	5. Telemedicine saves expenses like transportation, OPD, etc.
Availability	6. Telemedicine is used widely not only for COVID19 care but also for other diseases (example general consultation, diabetes).	7. Most of the hospitals has telemedicine facility for COVID19	8. After onset of COVID19, specialist doctors are also available for telemedicine services.	9. Telemedicine availability saves waiting time in hospital.	10. After onset of COVID19, Telemedicine services were feasible even with fewer staffs.
Accessibility	11. New apps which were developed after onset of COVID19 helped in accessing telemedicine easily.	12. There was a steady and secure net connectivity to transmit audio and video for interaction with the doctor during COVID19 period	13. The commonly available video chat methods for example:- Whatsapp, Google meet, Webex, Skype, are reliable for communication with doctors	14. User friendly apps and technology are required for better interaction with the physicians.	15. Telemedicine centers are more accessible than apps available in your own devices
Accommodation	16. Telemedicine has come more into use after onset of COVID19 as it has become available in various languages.	17. Telemedicine services are helpful in accommodating basic consultation need especially during social distancing	18. Telemedicine has become feasible for patient 24/7 after onset of COVID19	19. After onset of COVID19, new data privacy guidelines issued by Government of India made Telemedicine more secure.	20. With increase in smart devices, telemedicine services is able to capture real time health information of the patients like temperature, BP, Blood sugar levels etc. for better diagnosis
Acceptability	21. Telemedicine consultation was comfortable for healthcare consultation during COVID 19 lockdown.	22. After onset of covid19 increase in use of telemedicine services, there is a threat to data privacy of patients	23. Once normality is restored, I would still prefer/recommend telemedicine consultations	24. After onset of COVID19, wide range of age groups are utilising telemedicine services.	25. In spite of COVID19 I still prefer visiting hospital for consultation over telemedicine. 805

Self structured Questionnaire was prepared with five question in each parameter (Table no.1). It was forwarded to experts in the field for the validation. Responses were collected and questions were retained, modified, deleted or added based upon the suggestions provided. Finally questionnaire was circulated electronically to sample population. The purpose of using an online platform is to cover a maximum number of sample representatives during the COVID-19 pandemic. 300 responses were received. Data was exported, analyzed and interpreted.

## Results

Affordability of telemedicine is represented in Fig.1. Q1 was meant to understand the affordability of telemedicine with respect to income earned and 27% of the response denotes neutral, which means that the price was manageable by the user. There is a one percent difference between neutral & agree, 26% agree that the telemedicine services are affordable through which we can draw a conclusion that telemedicine was quite affordable. In Q2, 27% of people agreed that there are new insurance schemes and reimbursement for telemedicine expenses and for Q3, 24% of people strongly disagree that they did not purchase any new device in order to get telemedicine service, wherein 9% people strongly agree that they purchased new device for telemedicine service. 18% strongly agree and 6% strongly disagree when asked in Q4, about the various payment methods available for telemedicine services, as majority of responses are positive, we can depict that telemedicine services have different payment options, cash back and also provide installment services. In Q5, majority of respondents (30%) strongly agree that telemedicine saves their expense like transportation, fuel, toll charge, OPD etc. whereas 14% are neutral about it and on contrast 2% of respondents' state that they strongly disagree in terms of savings, showing that there is majority of people feel its affordable.

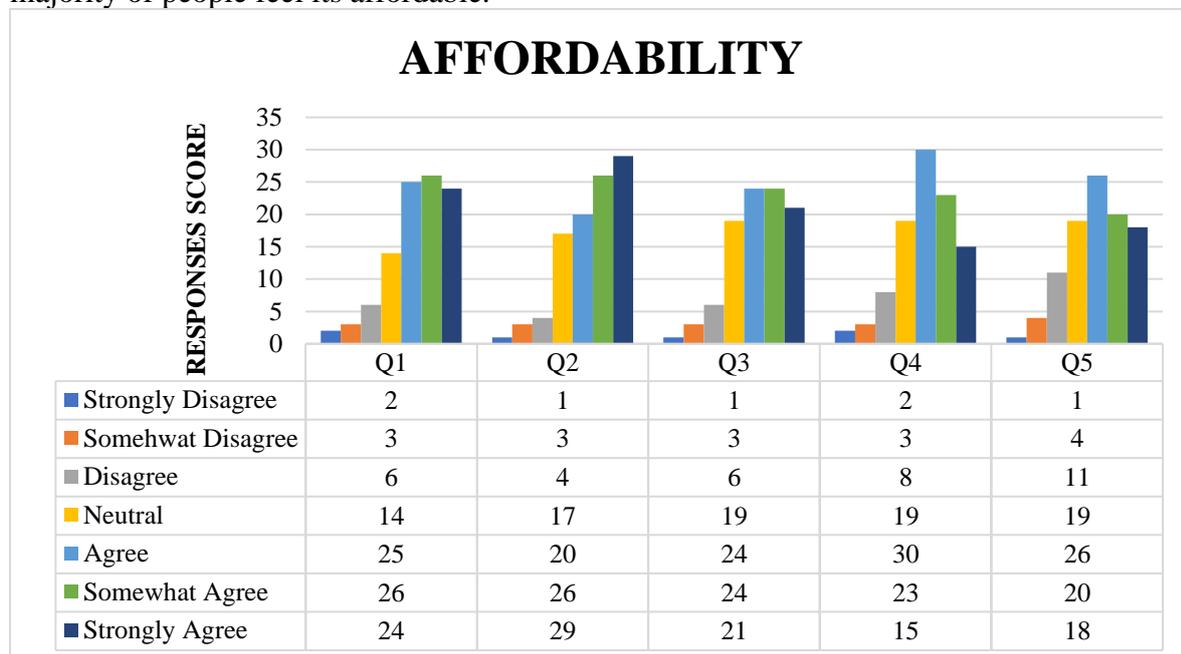


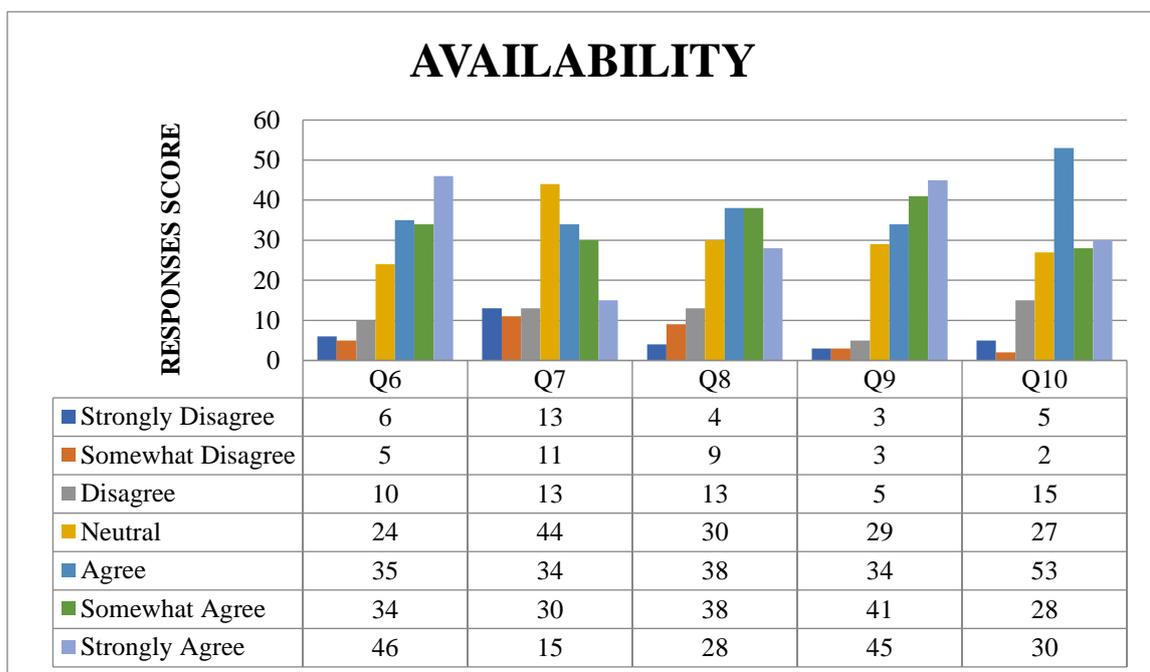
Figure 1: Affordability of Telemedicine Services

Fig.2 representing the availability of telemedicine services, wherein Q6 was about usability of telemedicine for COVID -19 and other diseases, most of the respondents (28.7%) strongly agreed which shows Telemedicine is not only used for COVID-19 care but also used for other medical conditions. And only 3.8% of people disagreed to this statement. In Q7 people were asked about availability of telemedicine in hospitals. Most of the respondent chooses

neutral i.e. 27.5% of people which shows most of the people are not aware about the availability of telemedicine in different hospital. Although some of them has agreed to the statement and only 8% of the respondents were disagreeing to the statement. In Q8 most of the respondent agreed to the statement that specialist doctors are available for the telemedicine services. Only 8% of the people disagreed to the statements, which explains that In India not only general doctors are assigned for telemedicine but also specialist doctor are available for telemedicine facility. Q9 was about telemedicine is saving waiting time in the hospital. Most of the respondent (28.1%) strongly agreed to the statement whereas only 3% of the respondent disagreed, which shows when earlier people use to visit a hospital they had to wait in a long queue; scenario has changed in the era of pandemic. Q10 was about telemedicine feasibility ever after fewer staff. 33.1% of the respondent agreed to the statement whereas only 9% of them disagreed to the statement, which shows that COVID-19 has not affected the feasibility of telemedicine.

Figure 2: Availability of Telemedicine Services

Fig.3 representing the accessibility parameter of the telemedicine shows that most of the people agreed to have access to the applications which were developed after onset of COVID-19(Q11). Approximately 3% of the people strongly disagreed to not having access to the applications. Then, when asked Q12, majority of them, i.e., 26%, agreed to having a steady and secure net connectivity for transmitting audio and video for interaction with the doctor and approx. 7% of people disagreed to having good connectivity. This indicated that even though there was a net connectivity for interactions with the physicians, still few of them faced issue in contacting with the doctors. Next, nearly 16% strongly agreed that commonly available video chat methods are reliable for communication with physicians (Q13). However 18% were in favor of “neutral” and approx. 7% disagreed on these video



chat methods being reliable. When asked about if they think user friendly apps and technology is required for better interaction with physicians (Q14), 28% of the people strongly agreed to this. Nearly 3% disagreed to this statement. Then 22% of the people strongly agreed to have telemedicine centers being more accessible than apps in devices (Q15). 24% of people selected “neutral” which indicates that they are in favor of both

telemedicine centers and apps .However 12% disagreed to this and believed that applications are more accessible that telemedicine apps.

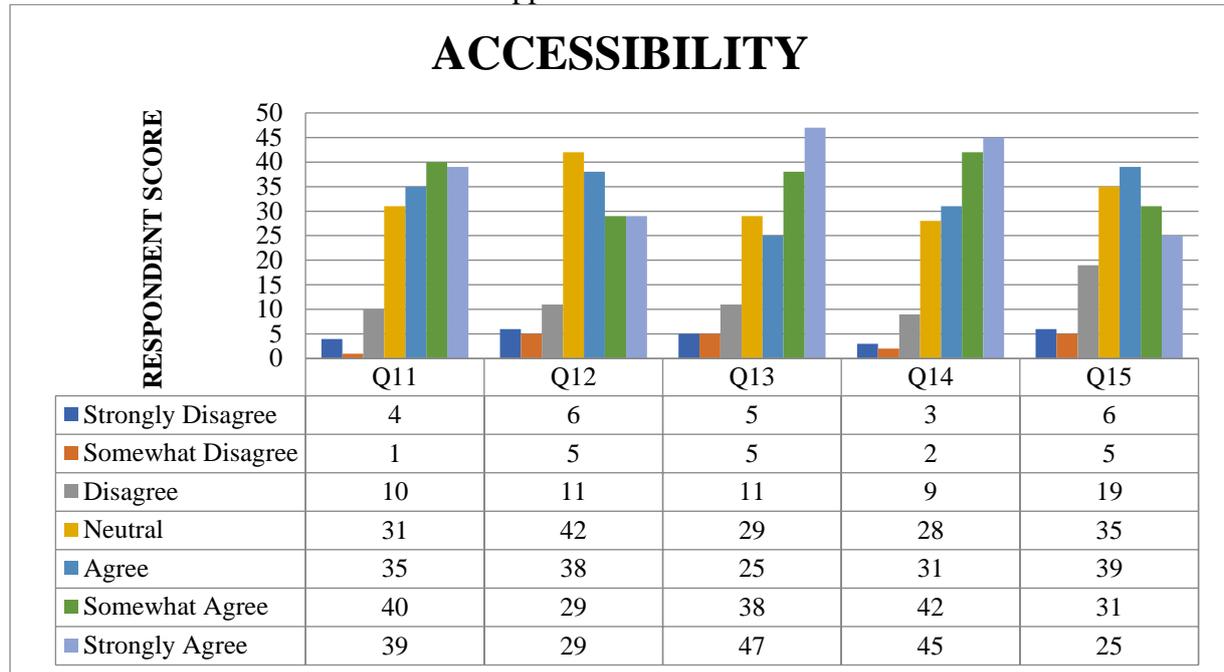


Figure 3: Accessibility of Telemedicine Services

Fig.4 showing responses on the accommodation of telemedicine service shows that 25% of respondents agree that telemedicine has come more into use after the onset of COVID-19, whereas 6% respondents disagree to it in Q16. 29% of respondents strongly agree to Q17, which stated that telemedicine service has been very much helpful to maintain social distancing and are accommodating basic consultation; on the other hand 1% respondents strongly disagree to it. When asked about the feasibility of telemedicine services, in Q18, 24% of respondents agree as well as somewhat agree, whereas 6% disagree and 3% somewhat disagree. As majority of responses are positive, we can state that telemedicine services are feasible. 30% of respondents agree to Q18, which state about the introduction to data privacy guidelines by Government of India that made the telemedicine more secure on the contrast, 8% of respondents disagree to it. In Q20, when asked about the capturing of real time health information of patient for better diagnosis, 26% respondents agree to it whereas 11% disagree to it.

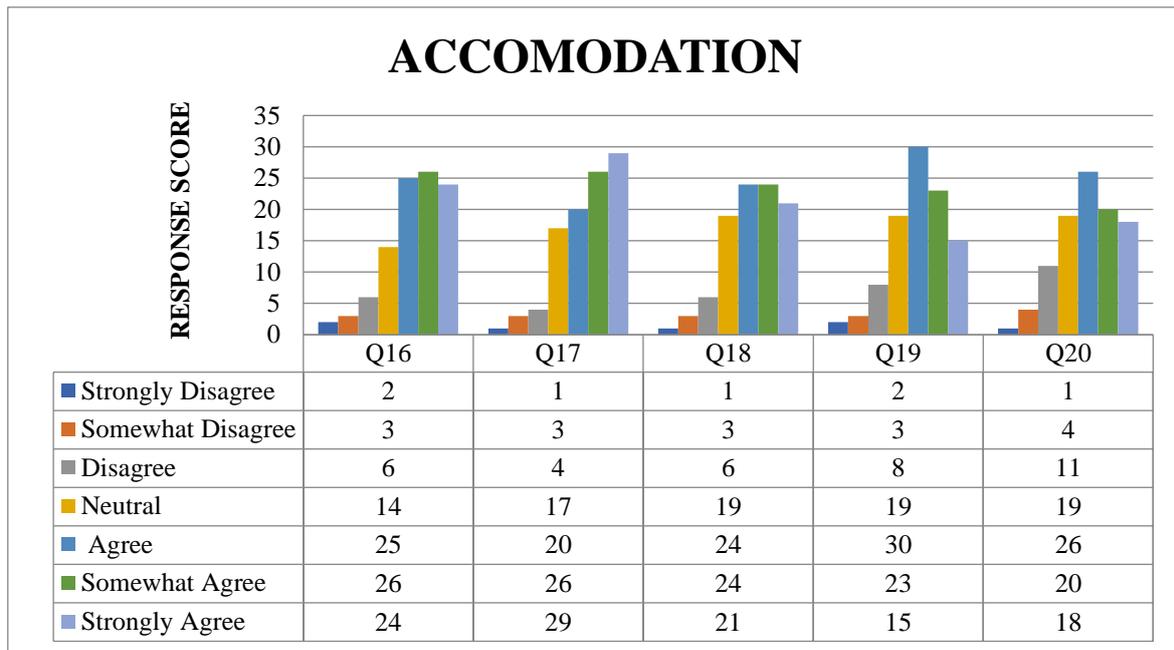


Figure 4: Accommodation of Telemedicine Services

As seen in the Fig .5 which represents the acceptability parameter, in Q22 where people were asked about the threat regarding data privacy while using telemedicine services, only 7% of the people disagreed to this fact. Most of the responses were towards agree and strongly agree scale, which shows that though there was an acceptance of telemedicine services due to the COVID-19 scenario, people were concerned about this fact of privacy. However, majority of persons strongly agreed that the telemedicine provided comfortable care in the period of COVID-19 lockdown. 28% of people strongly agreed to the comfort of telemedicine in Q22. Comfortability (Q22) was highest in the strongly agree scale. When asked about the preference of using telemedicine even after COVID-19 (Q23) most of them accepted that they were willing to use these services during even after the pandemic ends. It shows the willingness of the people towards telemedicine services and its adaptation. Similar responses are seen in the Q24 as well; here people were questioned about their perception of whether a wide range of people from different age groups are willing to avail telemedicine services. Based upon their experiences, 27 percent of people somewhat agreed to this statement and 22% of the people strongly agreed to it. It is clearly evident that the pandemic has improved the attitude of the people towards using telemedicine services. Q25 focused on whether this willingness for telemedicine services will be there even after the pandemic ends.

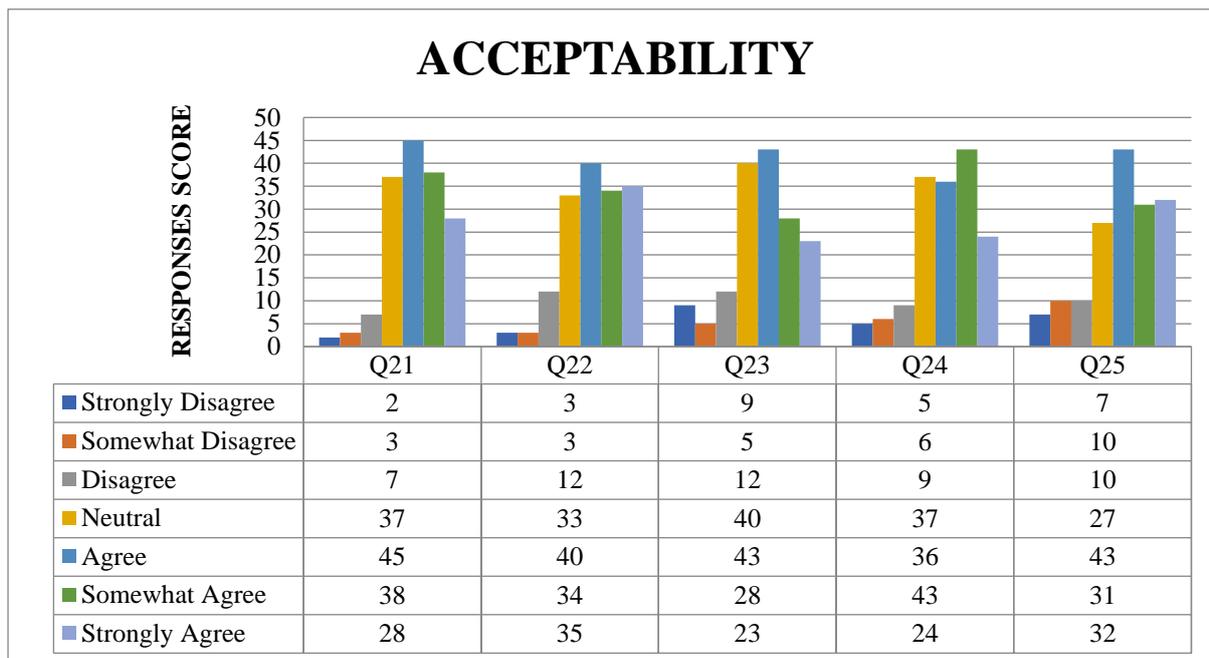


Figure 5: Acceptability of Telemedicine Services

There was increasing response towards the agreeeness scale showing the change in the mindset of people to avail services in the comfort of their home. Thus, it can be said that fifth A - Acceptability of telemedicine has improved drastically post COVID1-19 lockdown in India.

## Discussion

### 1.1. Affordability

While considering to study about the affordability of telemedicine various factors are to be included. These factors include income, expenditure, savings, costs etc. This study on affordability of telemedicine is done to understand whether there are any fluctuations in spending on telemedicine with respect to the income earned. Many cost theories are associated in order to study the affordability. De la Torre-Diez I et al (2015) fundamentally selected a few articles identified with cost adequacy on telemedicine and examined the writing audit to demonstrate the cost viability of telemedicine [3]. The affordability changes or take shifts based on different aspects. Income range, occupation. Geography/location etc. play a key role in deciding whether to use the telemedicine service or continue with the normal procedure. New schemes, reimbursement and other benefits help the users to afford and adopt telemedicine services. Insurance facilities in telemedicine can be more beneficial to those who are of low-income categories. Portnoy J et al (2020) explained about the need of telemedicine and encouraged the telemedicine approach, nearly all health plans and large employers offer some form of coverage for telemedicine services. Telemedicine is very beneficial in saving travel time and costs [4]. Navjit W et al (2017) stated that telemedicine usage has saved 5,345,602 miles of travel distance along with complete saving of 4,708,891 minutes or 8.96 years, and \$2,882,056 of total travel costs [5]. With the advancement of technology and inclusion of schemes and benefits, the telemedicine is quiet affordable and majority of the respondents agreed that telemedicine is cost effective.

### 1.2. Availability

Telemedicine is widely used for disease treatment, irrespective of COVID-19 care. As Ghosh, A et al (2020) has mentioned in their article about use of telemedicine for diabetic

patients during pandemic [6]. They have talked about how telemedicine has made it easier for diabetic patient to consult a doctor during the pandemic time. People can consult not only general doctors but can also consult their specialist doctors like cardiovascular doctors, gastrointestinal doctors etc. Peine A et al (2020) has mentioned in their research article that in Germany people do not have to waste their time consulting general doctor, they can directly connect with their specialist doctors[7]. With the responses we got, it is clear that in India also people can consult their specialist doctors through telemedicine can consult with them which according to people also feels that's it has decreased the transportation time and waiting time in the hospital. Telemedicine is not dependent upon the presence of staff. Availability of few staff can make the telemedicine feasible for people. Many people has left and lost their jobs because of COVID -19 fear and lockdown. In rural area only few staffs are available and sometimes doctors are not available, but with the result we got from our survey, we can say that if rural area will have good infrastructure and internet connectivity then also rural people can access the care through telemedicine even with fewer staff. Harma N et al (2020) has mentioned that only 2% of doctors are available in rural area [8]. However, people were not so sure about availability of telemedicine facility in all hospital.

### **1.3. Accessibility**

When we study about the telemedicine accessibility to people in COVID-19 various factors are to be included. These factors are related to development of new application, net connectivity, user friendly applications for interactions with physicians, telemedicine centers accessibility etc. New apps which developed after onset of COVID-19 helped in accessing telemedicine easily and also made the patient physician interaction smooth. For interacting with patients applications such as Skype, Microsoft teams, Updoox or VSee were used by physicians. There are other tools also which can be used for example Face time, Zoom, WebEx etc. in US as stated by Bokolo Anthony Jnr (2020). Also the net connectivity is an important factor to consider. Only with a good net connection the diagnosis images, treatment and consultation can be done and many people strongly agreed to have a good and secure net connectivity [9]. Bagchi S (2006) he mentioned that ISRO has setup HealthSAT satellite which helped people in connecting with the physicians without any network issue and also this helped in sending the diagnostics details of patients to doctors more easily[10]. Sorting the patient before arrival with triage method made the telemedicine services easily accessible. With the help telemedicine monitoring and screening, oxygen level, blood pressure was reported to care team [11]. Telemedicine helped in accessing the services and connecting to the doctor easily.

### **1.4. Accommodation**

Non-urgent cases those were treated through telemedicine which is online consultation with the doctors using laptops, smart phones, computers etc said by Safadi K et al (2020). The telemedicine use has been very comforting as it is helpful in maintaining social distancing as well as non urgent cases can be treated online without the fear of virus transmission [12]. Telemedicine has been very much into use in performing basic eye movement examination patients were instructed and sample video was provided. A good computer or phone application was used for communication. Samita M Heslin et al (2020) said that asymptomatic patients were not treated and emergency care beds were occupied by them so they designed a telemedicine program for patients present in the emergency department, because of the higher risk of spreading the COVID-19 to staff and other patients, in addition to conserving PPE [13]. Many people lack care due to disability, non-availability of doctors or even may be due to distance. Telemedicine will be a convenient solution for individuals because a lot of time will be saved by traveling as well as waiting in the queue, whereas now home care is feasible. Along with saving money and time, telemedicine helps people who cannot drive (disabilities) and have a higher risk of fall will be prevented.

Majority of respondents have a positive opinion on telemedicine usage as they have agreed that telemedicine is accommodating with its services along with the benefits it is providing.

### **1.5. Acceptability**

While considering to study about the acceptance of telemedicine various factors are to be included. These factors determinants, such as usability, relevancy and usefulness as well as contextual factors like daily routines, motivation and the associated psychological factors. Few studies were conducted to study about the theoretical aspects of acceptance of technology to understand the attitude and perception towards using telehealth services [14]. But one major disadvantage for studying the acceptance theoretically is that they were not designed for study in healthcare or hospital setting as it includes certain factors such fear, pain, and/or physical burdens. Thus qualitative study is required to understand this aspect in a hospital. Telemedicine is a way of encouraging equal access to healthcare in the rural regions which has lesser healthcare professionals for providing care. The services are readily acceptable in this region as there is a need for the care [15]. As seen in the responses for the acceptability of telemedicine in India it is seen that the mentality of people towards using telemedicine services as improved after the pandemic has started. The lockdown measures of the government have restricted the movement of the people which has eventually led to boon of telehealth for primary care. Few respondents has strongly agreed that they are willing to continue the use of services even post pandemic as this scenario has help them understand the ease and use of the telemedicine services.

### **Recommendations**

With soaring rates of infection, Pandemic has also created havoc through the world economy. To adjust and serve the demanding needs of those who are fighting COVID-19 crisis as well as other diseases ,the healthcare industry continues to evolve and innovate new ways to balance the healthcare delivery system. Digital options came as a boon to both deliver and reduce the chances for cross infection through virtual care. The Economic Survey 2019-20 revealed information regarding existing shortage of doctors in India. WHO recommends the ratio of doctor-population be 1:1000 while in India it is 1:1456 [16]

National Digital India Mission introduced by Prime Minister Narendra Modi will enable more technology adoption by Indian population, increasing usage of smartphones, mobile apps, with better connectivity and cheaper data. Digital health enables overall transformation of the health care system as Government of India is committed to provide equality in quality care and better health outcomes with use of telemedicine services. Many Health and Wellness Centers are connecting the patients, doctors as well as creates communication between specialists and other providers through such platforms by providing best possible care. Guidelines was issued by health ministry on March 26, 2020 on telemedicine which allowed doctors to provide virtual care as well as provide prescriptions which reduced cross infection for healthcare professionals as well as patients. Burden on family, caregivers and other social factors will be reduced. Telehealth not only paved path for the frontline staffs to perform COVID-19 treatment but also other urgent-care. Increasing gap of rural–urban health divide can be fixed with help telemedicine and telehealth as it is the cheapest and fastest way for managing this pandemic. It will also reduce the rate at which medical professionals are getting affected by COVID-19 while serving the patients that is lesser exposure to viruses/infections in the times of such outbreaks/pandemic.

## Conclusion

Telemedicine will also help filtering and sorting the patients who needs special care and hospitalization for example COVID-19 care, acute illness, elective or non elective etc. Physicians can advise them about medication by checking the symptoms of patients using tele-conferencing, and suggest remedies, tests and refer them to a healthcare facility in case if it is necessary. Social distancing and mass quarantine had made it difficult for Non COVID-19 patients with chronic illness to visit hospitals where telemedicine will aid in screening them remotely providing access to healthcare providers. COVID-19 patients received care in the healthcare institutions which invested in telemedicine to ensure timely and adequate healthcare. Access to more healthcare data will aid both doctors and nurses to ensure quality care and provide a comprehensive structure for communication, data privacy, medical ethics, fees, procedures, drugs and so on. Medical professionals' especially senior doctors are not tech savvy and lack virtual awareness as well as exposure to technology in field of medicine. Disasters and pandemics like COVID-19 pose various challenges in providing healthcare to mass population. Proper implementation of telemedicine in India will reduce barriers to access and create equality in the health system. Research aims to find whether there has been a considerable change in the provision of telemedicine services post onset of COVID-19.

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