

# Telemedicine – To Accept or forfeit, the Registered Medical Practitioners' Perception: A Cross-Sectional study in Tamil Nadu.

Dr. Gopinath T Thiruvalluvan<sup>1</sup>, Dr. Sakthivel M<sup>2</sup> Dr Sree Aarthi D<sup>3</sup> and Buvnesh Kumar M<sup>4</sup>

<sup>1</sup>Associate Professor, Department of Community Medicine, Meenakshi Medical College Hospital and Research Institute, Meenakshi Academy of Higher Education and Research (MAHER), Kanchipuram, India.

<sup>2</sup>Assistant Professor, Department of Community Medicine, Meenakshi Medical College Hospital and Research Institute, Meenakshi Academy of Higher Education and Research (MAHER), Kanchipuram, India.

<sup>3</sup>Postgraduate, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai, Saveetha Institute of Medical and Technical Sciences (SIMATS)

<sup>4</sup>Professor, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai, Saveetha Institute of Medical and Technical Sciences (SIMATS)

\*Corresponding Author  
Buvnesh Kumar M

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**Abstract:** *Introduction:* Telemedicine utilises electronic information, communication technologies to deliver & support health care services with challenges like readiness and acceptance of medical staff, need for training and the unavailability of facilities providing telemedicine. So the study was done to assess the perception of clinicians in Tamil Nadu about telemedicine. *Methods:* After obtaining clearance from the Institutional Ethical Committee, this Cross – Sectional study was conducted among Registered Medical practitioners of the state from January to March 2023. With sample size of 440, Clinicians from Tamil Nadu who consented to participate in the study were included. Data collected via Google Forms was imported into Microsoft Excel for further analysis using Jamovi software, leveraging the R package functionalities with p value <0.05 considered as significant. *Results:* Approximately 51% of participants manifested a discernibly positive orientation, while a slightly lesser 49% exhibited a negative predisposition towards telemedicine. Mild positive correlation was observed between security and familiarity, security and ease of use, ease of use and advantages, ease of use and necessity, as well as necessity and advantages while mild negative correlation discerned between security and necessity. *Conclusion:* A key finding of positive perceptions includes cost reduction but fear of disrupting doctor-patient relationships and compromising patient care effectiveness is also a factor. Participants also acknowledged the essential role of telemedicine in providing healthcare to underprivileged populations while legal issues are still a concern which needs to be addressed.

**Keywords:** Telemedicine, Virtual Medicine, Clinicians, Communications, Healthcare system, eHealth, mHealth, Health Services Accessibility.

## INTRODUCTION

Telemedicine refers to the utilization of electronic information and communication technologies to deliver and support healthcare services when the participants are separated by distance[1]. Telemedicine has gained significant attention, especially during the COVID-19 pandemic, as a means to provide remote treatment while minimizing exposure to protect medical practitioners and patients.[2] The acceptance of telemedicine by physicians is crucial for its effective use, and understanding their perceptions, skills required, and the perceived challenges, risks, and benefits is essential.[3] Studies have shown that factors such as performance expectancy, effort expectancy, compatibility, facilitating conditions, perceived incentives, and social influence significantly impact health professionals' behavioural intention to accept telemedicine technology.[4]

Furthermore, most medical interns have a positive perception of telemedicine and are willing to use it in their daily clinical practice & positive perceptions among patients especially during COVID-19.[5][6]. Telemedicine practice guidelines released by Government of India & its usage in military hospital to

during COVID-19 shows the way forward [7][8] Moreover, the acceptance of telemedicine among patients, including older adult patients with cancer, has been found to be generally favourable but tailored interventions to address facilitators and barriers of the acceptance of telemedicine among older adults have not been explored extensively.[9-10]. Challenges such as the need for training, the unavailability of facilities providing telemedicine, readiness and acceptance of medical staff are present [11 -13]. Hence this study was done to assess the perception of clinicians in Tamil Nadu about telemedicine.

## MATERIALS & METHODS:

After obtaining clearance from the Institutional Ethical Committee, this Cross – Sectional study was conducted among Registered Medical practitioners of the state from January to March 2023. Clinicians from Tamil Nadu who consented to participate in the study were included & Clinicians from other states of India were excluded from the study. Since very limited literatures were available in this topic, sample size calculation was done with an assumption that 50% of clinicians have positive perception about telemedicine. Considering 95%

confidence interval, absolute precision of 5 and 10% non-response rate the minimum sample size required for this study was finalised as 440.

The state of Tamil Nadu was divided purposively into 4 zones, namely North, South, East And West. Each zone was considered as a cluster. Indian Medical Association (IMA) of the districts were considered as units for sampling frame. 5 IMAs respectively from four zones were selected with the help of simple random sampling. The chosen IMA was approached for sending the questionnaire to their members. Exponential Non-discriminative Snowball sampling technique was deployed for data collection.

A structured and validated questionnaire developed by Haleh Ayatollahi et al from Iran University of Medical Sciences with a Cronbach’s alpha coefficient of 0.73 was used for the study.[14]. Data was collected using a web based self-administered questionnaire (Google forms). The mean scores for individual sections were computed, along with the overall mean score. Participants scoring below the mean were assigned to the negative category, while those surpassing the mean were categorized into the positive category. Data collected via Google Forms was imported into Microsoft Excel for further analysis using Jamovi software, leveraging the R package functionalities. The chosen level of significance, denoted by a p-value of < 0.05, adheres to standard academic conventions.

## RESULTS:

In this research study, a comprehensive analysis was conducted with a diverse group of participants with gender parity, comprising individuals predominantly within the age range of 30 to 50 years. A significant proportion of participants possessed a work experience of less than 10 years, and nearly half were employed in private hospital settings (Table 1). The study sought to explore the perspectives of clinicians regarding telemedicine, revealing intriguing insights into their beliefs and apprehensions. Notably, a considerable percentage of clinicians (30.6%) expressed the belief that telemedicine has the potential to reduce the transportation costs incurred by patients. Additionally, 35.3% of participants held the view that telemedicine contributes to the reduction of overall patient care costs.

On the other hand, a noteworthy proportion (21.9%) of clinicians expressed concerns about the possible disruption of the doctor-patient relationship due to telemedicine. Similarly, 26.8% believed that the implementation of telemedicine might compromise the effectiveness of patient care. Furthermore, 32.2% of respondents expressed apprehensions about unauthorized access to patient medical records facilitated by telemedicine, while 32% believed it could lead to an increase in malpractice.

**Table I: Demographic distribution of the study participants**

| S.NO | Variable               | n   | %     |
|------|------------------------|-----|-------|
| 1    | <b>Age</b>             |     |       |
|      | 30to50years            | 184 | 41.1% |
|      | <30 years              | 167 | 37.3% |
|      | >50 years              | 97  | 21.7% |
| 2    | <b>Gender</b>          |     |       |
|      | Males                  | 232 | 51.8% |
|      | females                | 216 | 48.2% |
| 3    | <b>Work experience</b> |     |       |
|      | <10 years              | 226 | 50.4% |
|      | 10to20years            | 119 | 26.6% |
|      | 20to30years            | 91  | 20.3% |
|      | >30 years              | 12  | 2.7%  |
| 4    | <b>Work place</b>      |     |       |
|      | GovernmentHospital     | 148 | 33.0% |
|      | Ownclinics             | 84  | 18.8% |
|      | Privatehospital        | 216 | 48.2% |

**Table II: Distribution of domain wise scores of the study participants**

| S.NO | Domain        | Mean ±SD    | Minimum value | Maximum value |
|------|---------------|-------------|---------------|---------------|
| 1    | Familiarity   | 20.6 ± 4.53 | 7             | 35            |
| 2    | Advantages    | 20.6 ± 4.57 | 7             | 35            |
| 3    | Disadvantages | 24.3 ± 4.31 | 8             | 40            |
| 4    | Necessity     | 18.4 ± 3.72 | 6             | 30            |
| 5    | Easeofuse     | 17.8± 3.81  | 6             | 30            |

|   |          |           |   |    |
|---|----------|-----------|---|----|
| 6 | Security | 18.6±4.39 | 6 | 30 |
|---|----------|-----------|---|----|

**Table III: Distribution of study participants, based on familiarity in each domain.**

| S.NO | Domain               | N   | %     |
|------|----------------------|-----|-------|
| 1    | <b>Familiarity</b>   |     |       |
|      | Lessfamiliar         | 239 | 53.3% |
|      | Morefamiliar         | 209 | 46.7% |
| 2    | <b>Advantages</b>    |     |       |
|      | Lessadvantageous     | 237 | 52.9% |
|      | Moreadvantageous     | 211 | 47.1% |
| 3    | <b>Disadvantages</b> |     |       |
|      | Lessdisadvantageous  | 154 | 34.4% |
|      | Moredisadvantageous  | 294 | 65.6% |
| 4    | <b>Necessity</b>     |     |       |
|      | Not needed           | 209 | 46.7% |
|      | Needed               | 239 | 53.3% |
| 5    | <b>Easeofuse</b>     |     |       |
|      | Difficultto use      | 228 | 50.9% |
|      | Easytouse            | 220 | 49.1% |
| 6    | <b>Security</b>      |     |       |
|      | Securityisless       | 265 | 59.2% |
|      | Securityisgood       | 183 | 40.8% |

**Table IV: Correlation matrix of domains among study participants**

| Pearson's Correlation |    | Familiarity | Advantages | Disadvantages | Necessity | Easeofuse | Security | Total Score |
|-----------------------|----|-------------|------------|---------------|-----------|-----------|----------|-------------|
| Familiarity           | r  | -           |            |               |           |           |          |             |
|                       | df | -           |            |               |           |           |          |             |
|                       | p  | -           |            |               |           |           |          |             |
| Advantages            | r  | 0.020       | -          |               |           |           |          |             |
|                       | df | 446         | -          |               |           |           |          |             |
|                       | p  | 0.674       | -          |               |           |           |          |             |
| Disadvantages         | r  | -0.040      | 0.168      | -             |           |           |          |             |
|                       | df | 446         | 446        | -             |           |           |          |             |
|                       | p  | 0.404       | <.001      | -             |           |           |          |             |
| Necessity             | r  | -0.032      | 0.223      | 0.100         | -         |           |          |             |
|                       | df | 446         | 446        | 446           | -         |           |          |             |
|                       | p  | 0.502       | <.001      | 0.035         | -         |           |          |             |
| Easeofuse             | r  | 0.011       | 0.215      | -0.008        | 0.212     | -         |          |             |
|                       | df | 446         | 446        | 446           | 446       | -         |          |             |
|                       | p  | 0.815       | <.001      | 0.860         | <.001     | -         |          |             |
| Security              | r  | 0.194       | 0.065      | -0.026        | -0.221    | 0.108     | -        |             |
|                       | df | 446         | 446        | 446           | 446       | 446       | -        |             |
|                       | p  | <.001       | 0.172      | 0.589         | <.001     | 0.022     | -        |             |
| Total Score           | r  | 0.449       | 0.629      | 0.441         | 0.418     | 0.440     | 0.362    | -           |
|                       | df | 446         | 446        | 446           | 446       | 446       | 446      | -           |
|                       | p  | <.001       | <.001      | <.001         | <.001     | <.001     | <.001    | -           |

Interestingly, a substantial number of clinicians (34.1%) acknowledged the essential role of telemedicine in providing healthcare to underprivileged populations. Additionally, 20.5% of participants believed that telemedicine could contribute to a reduction in clinicians' errors, while 29.6% perceived it as a tool for enhancing clinicians' skills. Concerns related to the legal aspects of telemedicine technology were also highlighted, with 30.8% of participants expressing the need for legal clarification specifically for patients. Furthermore, a significant majority (35.5%) advocated for the establishment of a robust framework to safeguard data confidentiality and prevent breaches when utilizing telemedicine.

Domain wise scores of the participants as well as poor and good performers in each domain is depicted in Table 2 & 3 respectively. The present investigation reveals a balanced distribution of perspectives within the study cohort. Approximately 51% of participants manifested a discernibly positive orientation, while a slightly lesser 49% exhibited a

negative predisposition towards telemedicine. We did not find any statistical significant difference in scores between different age groups, gender, work experience & place of work. The examination of the total scores of study participants revealed a noteworthy positive correlation with each of the six discerned domains. Specifically, a mild positive correlation was observed between security and familiarity, security and ease of use, ease of use and advantages, ease of use and necessity, as well as necessity and advantages.

The positive correlation elucidated that as participants exhibited an increased perception of security, there was a concurrent elevation in their familiarity with the telemedicine paradigm. Similarly, a positive correlation was noted between security and ease of use, signifying that heightened perceptions of security were concomitant with increased perceptions of the system's ease of use. Furthermore, a positive correlation was established between ease of use and perceived advantages, as well as between ease of use and perceived necessity, underlining the interconnectedness of these domains. Concurrently, a mild negative correlation was discerned between security and necessity. This implies that heightened perceptions of security were inversely associated with the perceived necessity of the telemedicine system. Notably, all of these observed correlations attained a high level of statistical significance, reinforcing the robustness and reliability of these findings ( $p < 0.001$ ).

## DISCUSSION:

These findings underscore the complex and multifaceted nature of clinicians' perceptions towards telemedicine, reflecting both optimism about its potential benefits and reservations regarding its impact on traditional healthcare practices. As well as emphasize the importance of addressing legal and ethical considerations to ensure the successful integration of telemedicine into contemporary healthcare systems. The nuanced relationships unveiled in these correlations emphasize the intricate interplay among various domains influencing participants' perceptions of telemedicine. Such empirical insights contribute substantively to the comprehension of the multifaceted dynamics inherent in the adoption and acceptance of telemedical technologies within healthcare contexts. The observed statistical significance bolsters the credibility of these correlations, lending credence to their potential implications for both research and practical applications in the field of telemedicine.

In a cross-sectional study conducted by Nainsi Gupta *et al.* at a prominent institution in Western India, the findings indicated that 69% of surveyed doctors found telemedicine implementation feasible and perceived it as a valuable tool for healthcare providers, particularly amidst the challenges posed by the COVID-19 pandemic. Conversely, ShehnazHansotiFaryal A Khan *et al.*, in their study conducted in Lahore, Pakistan, reported an unfavorable general opinion among healthcare professionals towards telemedicine. It is noteworthy that this study included the perspective of nurses. [15,16]. In a study focusing on military doctors and nurses by Soyeon Park *et al.*, a notable 72.6% of participants expressed the necessity of telemedicine in military healthcare settings. Factors such as voluntariness of use, performance expectancy, social influence, and facilitating conditions were identified as positively influencing the intention to use telemedicine. Notably, this study challenges conventional perceptions held by doctors, emphasizing the urgency for comprehensive analyses of factors influencing the voluntary adoption of telemedicine among military healthcare professionals. [17]. Satvik N. Pai conducted a cross-sectional study

among 142 orthopedic surgeons across India, all of whom were current users of telemedicine. The results indicated a significantly positive perception of telemedicine, with the primary perceived benefit being easier access for patients, particularly in the context of follow-up visits. Approximately 80% of orthopaedic surgeons deemed teleconsultation most suitable for follow-up appointments, despite encountering technical challenges such as poor video/audio/connectivity and difficulties in viewing radiographs and MRI films. The study highlights an increasing inclination among practitioners towards telemedicine for follow-up visits. [18]. In a similar vein, Alexander D. Tan *et al.* conducted a study among ophthalmologists in the Philippines. The findings suggested a generally satisfied perception of telemedicine in ophthalmology, particularly in terms of usefulness, quick follow-ups, simplicity, and ease of use. However, there was a slight dissatisfaction reported with its effectiveness. These nuanced insights contribute to the academic discourse on the varied perceptions of telemedicine within specific medical specialties and geographical contexts. [19]. The findings across various studies indicate a spectrum of perceptions regarding telemedicine among healthcare professionals. While some doctors in Western India view it as feasible and beneficial, healthcare professionals in Lahore, Pakistan express an unfavorable opinion. In the military context, there is a recognized need for telemedicine, with factors like voluntariness, performance expectancy, and social influence influencing its acceptance.

Orthopaedic surgeons in India generally perceive telemedicine positively, particularly for follow-up visits, despite facing technical challenges. Ophthalmologists in the Philippines express satisfaction with certain aspects of telemedicine but report dissatisfaction with its overall effectiveness. These diverse conclusions underscore the need for context-specific strategies to address healthcare professionals' concerns and facilitate the effective integration of telemedicine. The disparity in perceptions towards telemedicine among healthcare professionals can be attributed to a variety of factors, including but not limited to, Cultural and Regional Differences, Healthcare System Variations, Professional Background and

Specialization, Experience and Exposure, Patient Demographics, Technological Challenges, Impact of COVID-19, Training and Education, Sample size, Sampling technique, Methodology. Understanding these factors and tailoring strategies to address the specific concerns of healthcare professionals in different contexts can contribute to a more successful integration of telemedicine into healthcare practices.

## CONCLUSION:

In this research study, a diverse group of participants, representing both genders, provided insights into their perspectives on telemedicine. Key findings include positive perceptions such as the potential for cost reduction (transportation and overall patient care costs). Participants also acknowledged the essential role of telemedicine in providing healthcare to underprivileged populations. Some believed it could reduce clinicians' errors and enhance their skills. Positive correlations were identified among various domains, emphasizing the interconnectedness of factors such as security, familiarity, ease of use, advantages, and necessity. However, a mild negative correlation was observed between security and necessity, suggesting an inverse relationship between perceptions of security and the perceived necessity of the telemedicine system. However, concerns were expressed, including the fear of disrupting doctor-patient relationships and compromising patient care effectiveness. Legal aspects like expressing the need for legal clarification for patients, and advocating for a robust framework to safeguard data confidentiality remains an issue.

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