



**Doctors' Perspectives On The Effectiveness Of Telemedicine
Consultations In Managing Patients With Chronic Conditions
In Kerala**

Research dissertation presented in partial fulfilment of the requirements
for the degree of
MSc in Pharmaceutical Business and Technology
Griffith College Dublin

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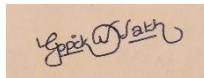
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Candidate Declaration

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I certify that the dissertation entitled “Doctors' perspectives on the effectiveness of Telemedicine consultations in managing patients with chronic conditions in Kerala” submitted for the degree of MSc. Pharmaceutical Business and Technology is the result of my own work and where reference is made to the work of others, due acknowledgment is given.

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Dedication

This dissertation is dedicated to my parents and family for their unwavering support, encouragement, and sacrifices throughout my academic journey. I also extend this dedication to my teachers and mentors, whose guidance, knowledge, and inspiration have shaped my learning and made the successful completion of this work possible.

Acknowledgements

I would like to express my heartfelt gratitude to all my supervisors and mentors for their invaluable guidance and support throughout the research process.

I am also thankful to all the faculty members of the department, my parents and friends for their encouragement and insights.

Abstract

This dissertation investigates Kerala physicians' opinions regarding the use of telemedicine in the treatment of chronic illnesses. The growing significance of digital healthcare delivery, especially in situations where continuity of care and accessibility are critical, served as the impetus for the study.

Introduction: The research background, justification, goals, and questions were presented, establishing telemedicine as a game-changing instrument in India's healthcare system. The study was framed using the Technology Acceptance Model, which emphasises perceived utility and ease of use in driving adoption, and it described the issue of limited access to consistent chronic disease care.

Literature Review: A review of the literature based on both domestic and international data was provided in the study. It looked at patient outcomes, adoption barriers, the efficacy of telemedicine in chronic care, and pertinent theoretical frameworks. The study was justified by identifying gaps, especially the need for context-specific evidence on doctors' perspectives in India.

Methodology: This chapter described philosophy, design, data collection and analysis in detail. Senior specialists in Kerala participated in qualitative interviews and quantitative survey data as part of a mixed-methods approach. In order to ensure rigour, reliability, and ethical compliance, sampling, data collection methods, and analytical techniques, such as thematic analysis and statistics analysis using graphics like pie charts, were described.

Results and discussion: Physicians believed that telemedicine was useful for facilitating ongoing monitoring, decreasing hospital stays, and increasing treatment adherence. However, its potential was constrained by issues like inadequate internet connectivity, a lack of integrated diagnostic support, and digital illiteracy. These findings were discussed in light of previous research and theoretical understandings, reaffirming the significance of perceived utility, usability, and supportive infrastructure in the adoption of telemedicine.

Conclusion: This chapter concluded the study, summarising findings, acknowledging limitations, and offering practical and academic recommendations. It suggested strategies including structured training, digital literacy initiatives, infrastructural integration, and theory-based future research. The reflection underscored the importance of evidence-based approaches in guiding telemedicine practices and policy.

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1. Introduction

1.1 Overview, background and context

The introduction chapter is important in the study to provide an overall outline of the research, including the significance of the study purpose, problem statement, rationale, aims and objectives. The transformative approach of telemedicine in the healthcare context has been significantly developing usage and adoption to support remote consultation. It has been identified that chronic disease conditions such as hypertension, diabetes and rheumatoid arthritis have higher prevalence in India. In this regard, hypertension is one of the most effective and concerning chronic disease conditions prevailing in India and has a higher risk among the young age group (Gupta *et al.*, 2024). Intervention and implication of telemedicine practices in managing the hypertension condition of patients have been valuable to provide blood pressure monitoring at home and videoconferencing for consultation (Yatabe *et al.*, 2021). Moreover, telemedicine has been effective for providing medical consultation in conditions like diabetes, hypertension and rheumatoid arthritis (Ma *et al.*, 2022a). The developing adoption and implication of telemedicine has been recognised since COVID-19 (Nagaraja *et al.*, 2024)). Therefore, beneficial outcomes of remote consultation have been the key factor to influence a high rate of adoption and implication of telemedicine consultation.

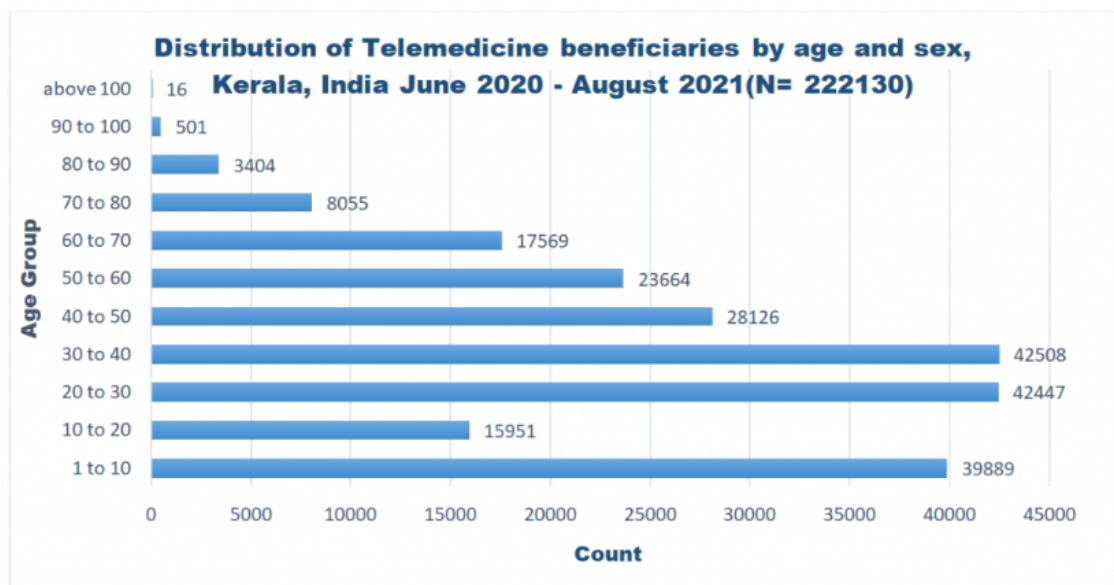


Figure 1: Telemedicine beneficiaries in Kerala, India (Source: Government of India, 2021)

In supporting telemedicine consultation adoption and implementation, government programs and initiatives have been a supportive factor in sustaining the effectiveness. In India, particularly in Kerala, under the eSanjeevani program number of beneficiaries of telemedicine has increased to 39889 between the age groups of 1- 10 years (**Figure 1**) (Government of India, 2021). Despite the significant public health and medical intervention, in Kerala, higher prevalence of hypertension has been accounted for 54% and diabetes with 68% (Jana and Chattopadhyay, 2022). Therefore, improving the adoption and implementation of telemedicine evaluation of perceptions of doctors is relevant to support chronic disease management across the region.

1.2 Research Purpose

Aim: “The aim of this study is to explore perspectives of doctors on the effectiveness, challenges and patient outcomes related to telemedicine consultations for chronic disease management.”

In this research, the concern is studying the varied opinions of doctors regarding the feasibility and success of telemedicine consultation in the provision of chronic disease control in Kerala. This study aims at a detailed, comprehensive knowledge of the attitudes and perceptions towards the use of telemedicine consultation to treat chronic diseases like hypertension, diabetes, and so on by doctors in the state of Kerala. The empirical data of evidence-based insights have high applicability in an attempt to give informed choices and should be part of the policies to develop telemedicine provisions and sensitising measures to maintain active health delivery. The cumulative evaluation of various factors proves the influence of the perception of doctors and effectiveness, which can be used to design effective means of implementation of telemedicine practices in the management of chronic diseases throughout the region.

1.3 Significance and Justification of the Study

It has been found that intervention via telemedicine can be used to provide a good and cost-effective experience in delivering intervention by providing clinical efficacy and patient engagement, and maintenance of remote consultation. Nevertheless, telehealth

consultation and practices lack a significant element of offering the scope of the physical examination of the patient (Eyrich *et al.*, 2022). Also, recent interventions aimed at enhancing the process of virtual physical examination involved elaborating a scope of thorough evaluation of the physical health (Tong *et al.*, 2024). The telemedicine consultation is an economical method of cutting down the treatment expenses of patients (Salsabilla *et al.*, 2021). With reference to long-term chronic disease conditions, lower treatment costs help the group of patients within a set limit of health expenditure.

This has been captured in the view of doctors in India, whereby opinions were put on the idea of paying less with Telemedicine consultation, which determines less expenditure on health care by the patients (Nagaraja *et al.*, 2024). Moreover, as far as Kerala is concerned, the prevalence of chronic diseases is rampant among people by presenting health-related problems to the community (Jana and Chattopadhyay, 2022). Since the analysis of the perception of the doctors regarding the effectiveness of telemedicine and the difficulties towards implementation of telemedicine consultation are being analysed, the same shall be of great use to give informed decision-making support to the policy makers, the public health professionals and the health care experts to manage diseases effectively. Consequently, the study has applied in analysing and responding to insights and perceptions of the doctors to be used in offering telemedicine consultation to treat chronic disease conditions in Kerala to enable sustainable health.

1.4 Rationale of the study

Valuable outcomes and beneficial effectiveness of telemedicine for providing remote consultation with video confidence at reduced cost have a positive influence on long-term chronic disease management. However, challenges related to legality and economy have been create barriers for transforming health services with telemedicine consultation (Eyrich *et al.*, 2022; Hadian *et al.*, 2024). In this regard, analysing the perspectives of doctors about the effectiveness of telemedicine in terms of improving accessibility to affordable services with remote consultation has potential for improving overall health across the region. This study focused on the analysis of barriers and challenges faced by doctors in adopting telemedicine consultation to support chronic disease management is valuable to improve the sustainable health of the population in Kerala. Therefore, this study is relevant to ensure improved chronic disease management within limited cost and

high accessibility for patients in Kerala, promoted by positive attitudes and perceptions of doctors.

1.5 Nature and scope of the problem

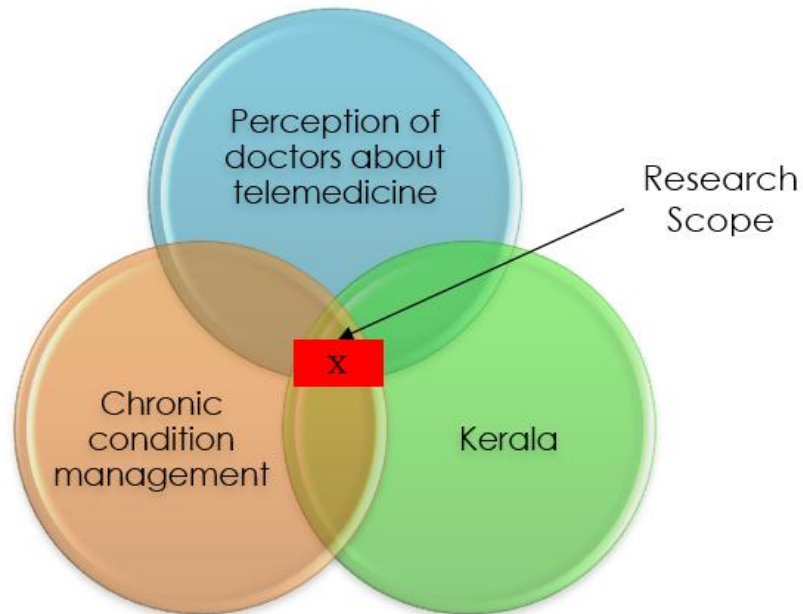


Figure 2: Purpose of the study

(Self-developed)

Telemedicine consultation has been offered promising solution for developing high accessibility and affordability of healthcare services. However, the challenge associated with insufficient physical examination, technology, legality, and economic efficiency as barriers has hindered the effectiveness of telemedicine services (Eyrich *et al.*, 2022; Hadian *et al.*, 2024). This problem has a negative impact on promoting long-term chronic disease management supported by healthcare professionals, such as doctors, to implement and adopt telemedicine consultation. Moreover, the beneficial and advantageous outcome of telemedicine to provide virtual consultation by using video conference and providing uninterrupted health services during situations like the COVID-19 pandemic has been effective to support the continuity of medical services (Shrestha, 2020). Drawing from the above evaluation, it has been identified that analysing existing challenges and barriers affiliated with telemedicine consultation is required to be analysed from the perspectives of doctors to ensure efficient adoption and implication to sustain chronic disease

management in regions like Kerala, where hypertension and diabetes are highly prevalent. Therefore, addressing challenges and assessing the perception of doctors have been relevant to extend the scope of the study to support policy intervention and public health strategies to improve chronic disease management within limited cost and high accessibility in Kerala.

1.6 Research Objective

“To analyse perceptions of doctors about the effectiveness of Telemedicine consultations in managing chronic disease conditions in Kerala.”

“To identify key impacts of telemedicine consultations on patient outcomes as reported by doctors in Kerala.”

“To evaluate key challenges faced by doctors in using telemedicine for managing chronic diseases in the region.”

“To recommend strategies for improving the application and use of telemedicine by doctors in managing chronic disease conditions in Kerala.”

1.7 Research questions

What is the perception of doctors in Kerala about the effectiveness of telemedicine consultation for managing chronic disease conditions?

How do doctors perceive the impact of telemedicine consultation on patient outcomes in Kerala?

What are the key challenges experienced by doctors in the use of telemedicine consultation in managing chronic disease conditions in Kerala?

What strategies are effective for developing the use of telemedicine by doctors in providing chronic disease management in Kerala?

1.8 Hypothesis

H0: There is no significant effectiveness of telemedicine consultation provided by doctors in Kerala for managing patients with chronic disease.

H1: There is a significant effectiveness of telemedicine consultation provided by doctors in Kerala for managing issues with chronic disease.

1.9 Structure of the Study

Chapters	Description
Chapter 1: Introduction and objectives	The introduction chapter provides an outline for research background, rationale, significance, aim, objectives and hypothesis.
Chapter 2: Critical literature review	Critical literature review presents a comprehensive representation of the concept, findings and key insights from existing literature.
Chapter 3: Research methodology and methods	The methodology chapter provides an evaluation of selected methods and justification of appropriateness to be used in this study.
Chapter 4: Presentation and analysis of findings	This chapter provides a presentation of data and highlights key findings derived from the analysis to meet the key research objectives or questions.
Chapter 5: Conclusion and Recommendations	The conclusion provides a summarisation of the overall study by meeting research objectives. Further, presents limitations of the study and recommendations for future work.

Table 1: Structure of dissertation

1.10 Summary

Rapid adoption and growth in the implementation of telemedicine are relevant to ensure high accessibility and reduction of cost for healthcare expenditure for patients. It has been identified that positive attitudes and perceptions of doctors about the reduction of

payments by the implementation of telemedicine are advantageous in the context of India. However, a lack of physical examination and insufficient technological infrastructure have hindered the effectiveness of telemedicine. The analysis of perspectives of doctors in Kerala about telemedicine for managing chronic disease has been relevant to support sustainable health outcomes within a limited cost.

2. Literature Review

2.1 Overview

Literature review is important to provide a comprehensive understanding and knowledge of a particular study area and topic. The key importance of this chapter is to provide a wide range of insights derived from existing studies. The purpose of the literature review chapter is to build a critical evaluation by focusing on similar and dissimilar findings from previous literature. Furthermore, this chapter provides a significant evaluation of the diversified prospects of telemedicine consultation and its effectiveness in disease management. In the context of developing critical evaluation, diversified existing studies are used to identify challenges. Theoretical underpinning is relevant to provide conceptualisation for evaluating the adoption and acceptance of telemedicine by doctors to support chronic disease management. Therefore, identification of the gap in existing literature has paved the way for further study in the context of analysing the perspectives of doctors related to telemedicine consultation.

2.2 Overview of telemedicine consultation

Telemedicine consultation is highly dependent on digital technologies to promote remote healthcare services by meeting modern medical practice needs. According to the viewpoint of Haleem *et al.* (2021), telemedicine is a highly cost-effective consultation approach to provide quality services by reducing the chances of disruption. During the COVID-19 pandemic, global adoption and acceptance of telemedicine have been significantly high (OECD, 2024). The remote consultation by using telemedicine practice has been relevant to control disease transmission and ensure improved accessibility to medical treatments and health care. On this similar note, Ezeamii (2024), assessed that telemedicine has a positive influence in reducing the cost for patients to travel. However, the limitation of telemedicine is mainly reflected lack of opportunities for physical checkups (Haleem *et al.*, 2021a). **For instance**, Apollo Hospital in India has been offering Telemedicine Services for 25 million delivered consultations with 800+ telemedicine centres (**Figure 3**) (Apollo Telehealth, 2019). Therefore, it can be stated that telemedicine consultation by using effective digital technology infrastructure to ensure positive healthcare outcomes requires to focus on improving the scope for alternatives to mitigate the consequences of a lack of physical checkups.

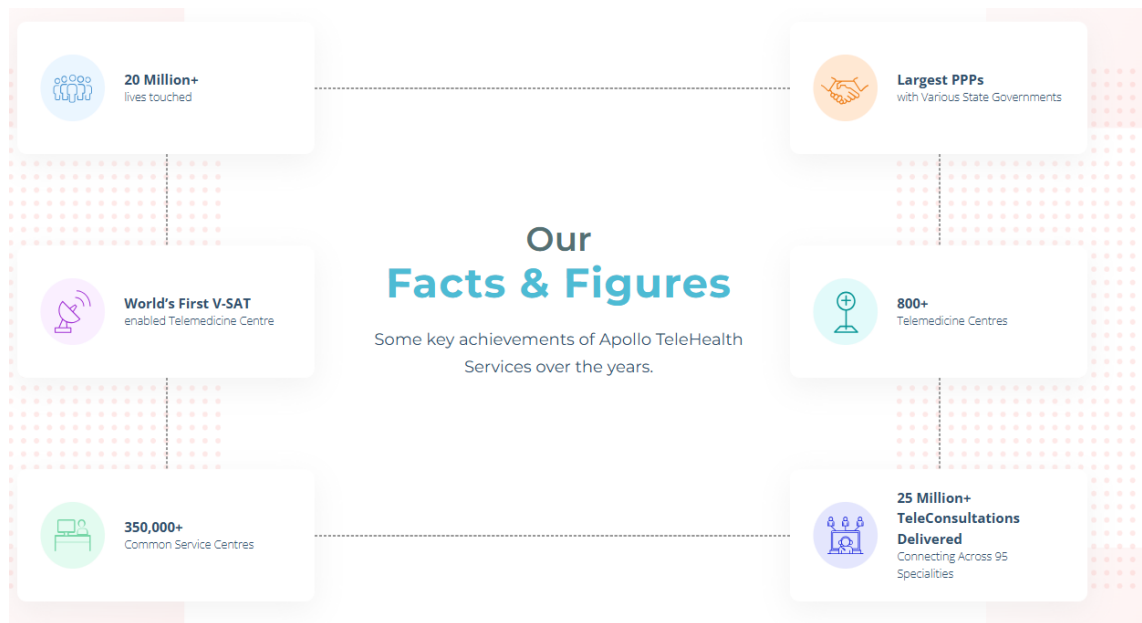


Figure 3: Telehealth outcomes at Apollo Hospital (Source: Apollo Telehealth, 2019)

Awareness and conceptualisation of telemedicine among healthcare professionals are significant to sustain proper medical treatments for patients. The primary study by Meher *et al.* (2009), analyses that awareness and attitudes of doctors in India towards telemedicine have a significant positive impact on developing healthcare services and patient outcomes. However, a lack of sufficient knowledge among doctors has become a significant barrier to sustaining efficient intervention of telemedicine (Meher *et al.*, 2009). In this regard, the implementation and design of effective training programs for healthcare professionals is relevant to ensure the development and successful implementation of telemedicine consultation. Moreover, the study by Ma *et al.* (2022), used a comprehensive literature review and analysed that chronic diseases such as hypertension, diabetes and rheumatoid arthritis have been positively managed by telemedicine intervention. Driven from this evaluation, it can be stated that beneficial outcomes of long-term care and self-management provided by telemedicine consultation are relevant to manage chronic diseases within a limited cost with high accessibility.

2.3 Effectiveness of Telemedicine in Disease Management

The effectiveness of telemedicine in managing chronic disease was widely debated among medical professionals who are creating a high burden of conditions like hypertension and diabetes. The majority of healthcare professionals appreciate the

efficiency of telemedicine, particularly for routine follow-ups, interaction and clinical decision-making. According to Meher *et al.*, (2009), a majority of doctors across India identify telemedicine as a very important tool, however emphasise the requirement for a well-organised training programme for the growth of effective use.

Apart from that, Kruse *et al.* (2017), highlighted that telemedicine helps to improve patient follow-up, health monitoring and medication adherence, which improves stability in the chronic condition. Although physicians argued that the lack of physical assessment compromised diagnostic accuracy in various complex cases. The study of Haleem *et al.* (2021), asserted that while doctors appreciate the logistical convenience of the use of teleconsultations, they are concerned about compromised decision-making because of the absence of physical interaction. *For instance*, the e-Sanjeevani platform, from Kerala, is one type of telemedicine service which witnessed a wide adaptation at the time of the COVID-19 pandemic and serves people have chronic illness (The Economic Times, 2020). Government Medical College in Thiruvananthapuram has reported that the telemedicine system has facilitated continuity of care for diabetic and hypertensive patients. Different healthcare conditions utilise telemedicine in primary care settings, like chronic kidney disease used by 0.8%, palliative care by 0.4%, diabetes mellitus used by almost 9.60% and hypertension used around 6.90% (Parthasarathi *et al.*, 2024) (*Figure 4*). Therefore, the analysis suggests that while telemedicine can supplement care, it cannot fully replace traditional clinical consultations in chronic disease management.

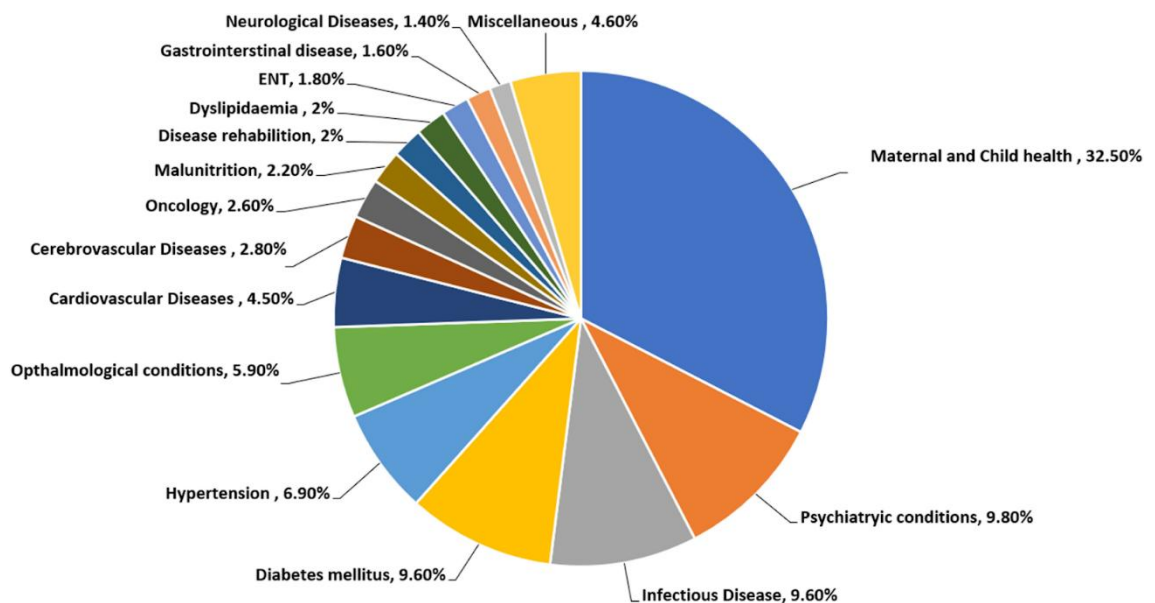


Figure 4: Dependent healthcare conditions use telemedicine services (Source: Parthasarathi et al., 2024)

2.4 Perspective and opinions of doctors on telemedicine

Telemedicine consultation acceptance and adoption are significantly influenced by attitudes, perceptions and opinions of health care professionals such as doctors. In this regard, general physicians are doctors who have reflected their positive attitudes and awareness of telemedicine consultation to sustain health care accessibility and provide services through remote consultation. According to the point of view of Meher *et al.* (2009), doctors have reflected significant outcomes for satisfactory results of telemedicine interaction with patients. In extending this study, key facilities provided by Telemedicine in terms of saving time, money, and high accessibility have developed a relationship between doctors and patients. Drawing from the above evaluation, it can be evaluated that cost-effectiveness and saving of time are major influencers for developing positive attitudes and perspectives of doctors to promote telemedicine consultation.

In recent days, it has been identified that the healthcare system has faced major problems related to inadequate access and inefficient allocation of resources. The study by Miller (2002), identified that doctor-patient communication has a positive influence on developing their satisfaction, understanding and psychological well-being through telecommunication practices. Furthermore, to an extent, it has been found that Telemedicine consultation enables face-to-face sessions between doctor and patient to develop interaction and engagement to support better execution of high-quality health care services (Meher *et al.*, 2009). Therefore, it can be evaluated that positive attitudes and perception of doctors regarding telemedicine adoption and acceptance have significant relevance for improving patient-doctor interaction high high-quality services and better management of diseases.

The perspectives of Indian doctors on the use of telemedicine have evolved over the past decades, especially following the release of “Telemedicine Practice Guidelines in 2020.” Based on cross cross-sectional study by Nagaraja *et al.* (2024), it was found that almost 93% of the surveyed doctors believe that television supports reducing the risk of the pandemic for healthcare providers, with approximately 60% using it for live video consultation. Although Standing *et al.* (2016), highlighted that the consequences, like

poor insurance coverage and lack of consistent financial incentives, remain, there is a determination to sustain the use of telemedicine. Additionally, the doctor has also expressed the requirement for better integration of telemedicine into the traditional workflow because it can ensure long-term healthcare growth and adaptation.

It has been observed that telemedicine was used for non-mutually exclusive purposes, including video consultation, online payment, remote self-monitoring, remote patient monitoring, and online pharmacy prescriptions visits by paramedics. Among all these perspectives, a major aspect of using television is to make a video consultation with healthcare professionals, which was supported by more than 60.4% and online pharmacies for prescription were over 10.1% and patient monitoring was supported by 14.9% (Nagaraja *et al.*, 2024), (*Figure 5*).

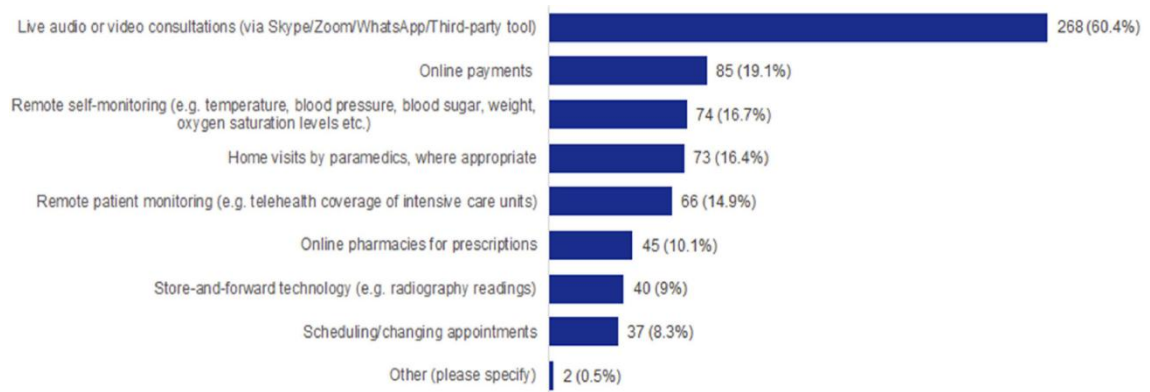


Figure 5: Different perspectives of the use of telemedicine in healthcare (Source: Nagaraja *et al.*, 2024),

2.5 Prevalence and importance of chronic disease management

Chronic diseases have a significant impact on health conditions with long-lasting consequences that can be managed or controlled by medical consultation. In this regard, it has been identified that noncommunicable diseases are responsible for 74% of deaths worldwide, and the diseases mainly include chronic conditions such as diabetes, cardiovascular diseases, cancer and chronic respiratory diseases (World Health Organization, 2025). In India, around 5.87 million deaths have occurred due to non-communicable diseases (Nethan *et al.*, 2017). In the context of telemedicine services, chronic disease management has been significantly influenced by mentoring, diagnosis, monitoring, and consultation (*Figure 6*) (Ma *et al.*, 2022b). Drawing from this evidence,

it can be stated that chronic diseases have a significant influence on the death rate in the population and require significant public health and medical intervention for the reduction of disease burden.

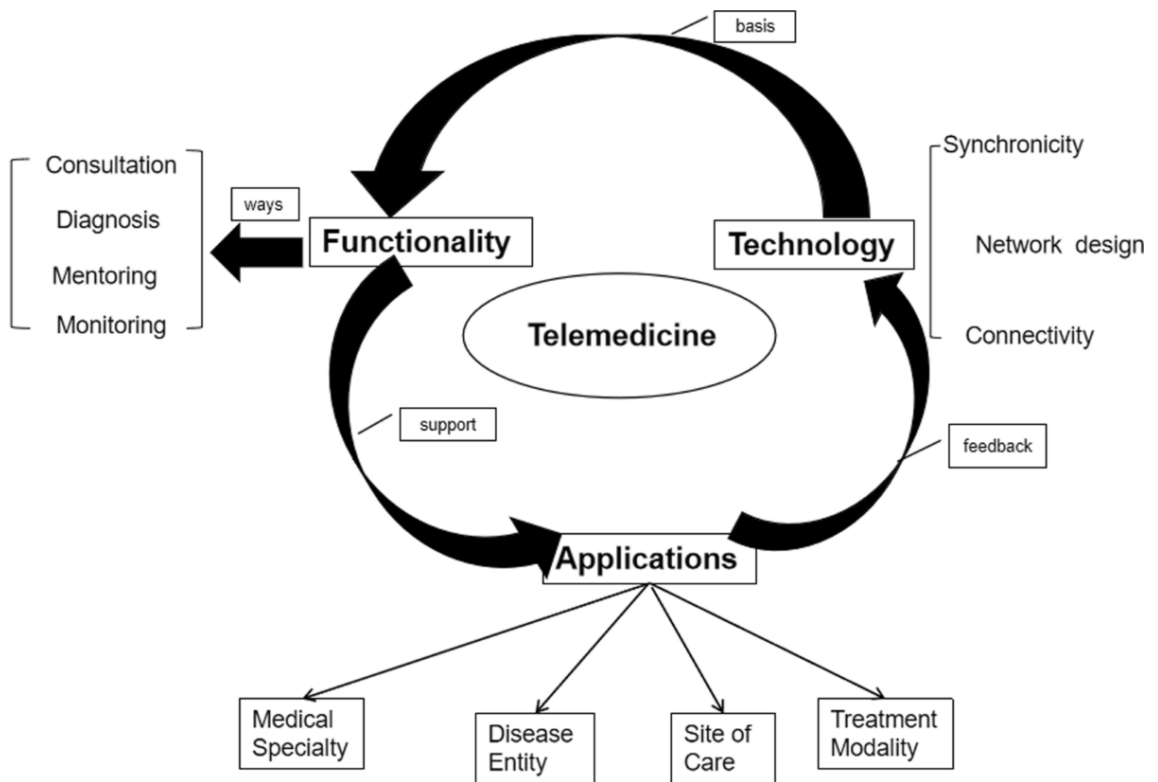


Figure 6: Telemedicine in chronic disease management (Source: Ma et al., 2022)

Chronic disease management has been incorporated within health policies to improve patient conditions like diabetes and hypertension by providing lifestyle modification and medication support. According to the viewpoint of Sikula and Kurpas (2024), health policies, including management of chronic disease conditions by providing medication and lifestyle modification, have significant importance in improving disease prevention, leading towards better health outcomes. Similarly, Chan (2021), stated that chronic disease management with developing self-management activities has a positive impact on reducing disability and death worldwide. Diseases like chronic respiratory disease, diabetes mellitus, cancer and cardiovascular disease are the major chronic diseases which not only affect the health of individuals and communities but also increase health expenditure in the population (Chan, 2021). Corbett *et al.*, (2020), assessed that the

COVID-19 pandemic has been the driving force for a higher rate of adoption of telemedicine to sustain patient care, avoiding disruption.

Telemedicine consultation, including video consultation and over-the-phone communication with patients, has been relevant. However, it has been identified that patients with chronic disease conditions have faced major challenges in accessing efficient medical treatments and services despite the implication of telemedicine consultation (Corbett *et al.*, 2020). The reasons for inadequate chronic disease management with telemedicine intervention have been specifically affected by non-adherence, poor health care literacy, lack of involvement in the decision-making process, and confusion among patients and providers (Corbett *et al.*, 2020). Therefore, chronic disease management is relevant to reduce global death rates by providing significant consultation services with improving strategic interventions for supporting health conditions and outcomes.

Despite significant progress, the implementation of telemedicine continues to experience substantial challenges. Almathami *et al.* (2019), stated that the technological infrastructure, especially in this semi-urban and rural region, restricted the reliability of teleconsultation. Apart from that, data privacy concerns and unclear medico-legal frameworks reduce the confidence of doctors in fully adopting remote platforms. Moreover, a lack of standardised training programmes and technical support also contributed significantly to the operational challenges among older practitioners and familiar with the digital healthcare tool. The major telemedicine methods include mobile applications, online consultation, and remote monitoring that improve efficiency and cost of chronic disease management, as you can see in the **Figure.7** (Yu *et al.*, 2023).

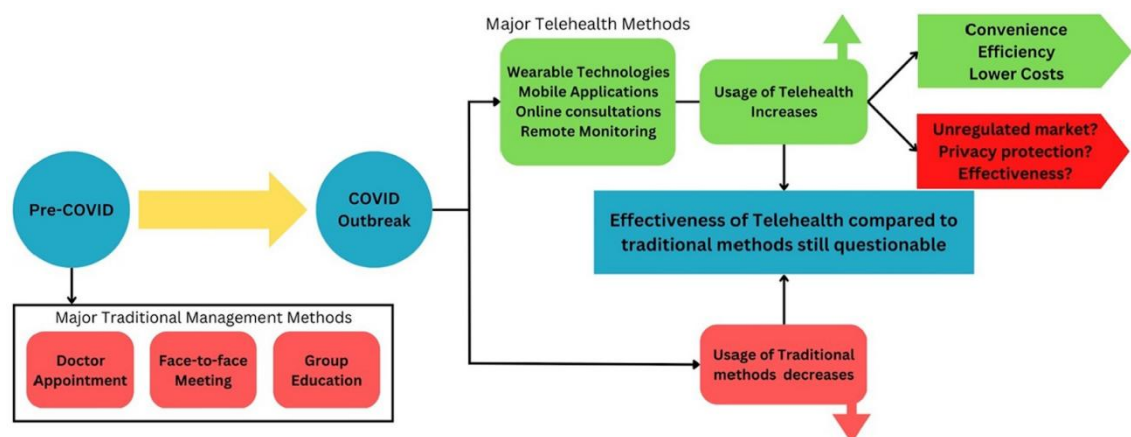


Figure 7: The shift of chronic disease management (Source: Yu et al., 2023)

At the time of the pre-COVID scenario, major traditional management methods used by healthcare organisations, like doctor appointments, group education and face-to-face meetings, however, the COVID-19 outbreak changed the healthcare scenario. Thus, it has been observed that the usage of traditional methods declines in healthcare with an inclination towards telemedicine in chronic disease management.

2.6 Trends and outcomes of telemedicine e-consultation in chronic disease management

The telemedicine consultation approach has emerged as a transformative tool for digital health care to ensure cost-effectiveness and convenient services. In the study by Patel *et al.* (2021), identified that 30.1% of all visits during the pandemic situation were provided by telemedicine consultation, and this reflected an increased visit by 23-fold compared to the pre-pandemic phase. Patel *et al.* (2021), utilised medical records of outpatient visitors for analysis of telemedicine consultation impact and reflected significant outcomes of reduced cost with increased audio-video visits. In the context of India, it has been identified that the National Telemedicine Task Force established by the Health Ministry of India has focused on diversified projects such as VRCs and ICMR-AROGYASREE to improve accessibility and adoption of telemedicine consultation for close monitoring of patients (Chellaiyan *et al.*, 2019). Similarly, the American Telemedicine Association has opined that telemedicine is the natural evolution of healthcare in the digital world (Chellaiyan *et al.*, 2019). Drawing from the above evaluation, it can be stated that telemedicine trends and outcomes are significantly growing due to the major advantage of providing efficient communication between doctors and patients. Similarly, it also influences the development of trust and the building of rapport for better patient outcomes by using audio and video in digital consultation. Hence, the adoption and implication of telemedicine has potential scope for developing the accuracy of diagnosis and uninterrupted care services for chronic patients.

The utilisation of telemedicine in chronic disease management has seen a remarkable change, especially following the COVID-19 pandemic. This growth has been driven by the recruitment for remote care solutions, technology readiness, and improved access. Gajarawala and Pelkowski (2020), highlighted that recent trends have indicated a

transition towards a hybrid care model that combines daily consultation with a periodic in-person visit to ensure holistic monitoring. Apart from that, chronic diseases like hypertension, arthritis and diabetes significantly suitable for remote management because of their long-term treatment requirements and the need for regular patient engagement and monitoring. The outcome of the telemedicine intervention has demonstrated promising clinical benefits. As stated by Ma *et al.* (2022), telemedicine consultation, along with telemonitoring, specifically enhanced glycaemic control in diabetes patients (HbA1c reduction), and led to a notable reduction in systolic blood pressure in hypertensive individuals.

For instance, Tata Health has developed 11 telemedicine units and two mobile medical units to reach nine blocks of the district of Uttar Pradesh (Tata Trusts, 2025). It has been understood that a positive impact on medication adherence along with minimisation of emotional distress in patients with rheumatoid arthritis. The findings of the study have emphasised the importance of telemedicine is not just a clinical management tool, although it enhances the well-being and compliance of a patient. Furthermore, Contreras *et al.* (2020), emphasised that real-time video consultation, along with remote patient monitoring, has supported physicians in adjusting medications. This consultation also provides lifestyle counselling, dietary planning and detecting complications early, leading to the enhancement of a long-term outcome. The treatment procedure followed a telemedicine culture that added a telemedical care unit to diagnose, treat, and monitor through virtual monitoring, fixing appointments, collecting information about the patient and maintaining confidentiality (Haleem *et al.*, 2021) (**Figure 8**). These increased utilisation of variable devices and health apps also supports making self-management contributions to a better health literature and patient empowerment.

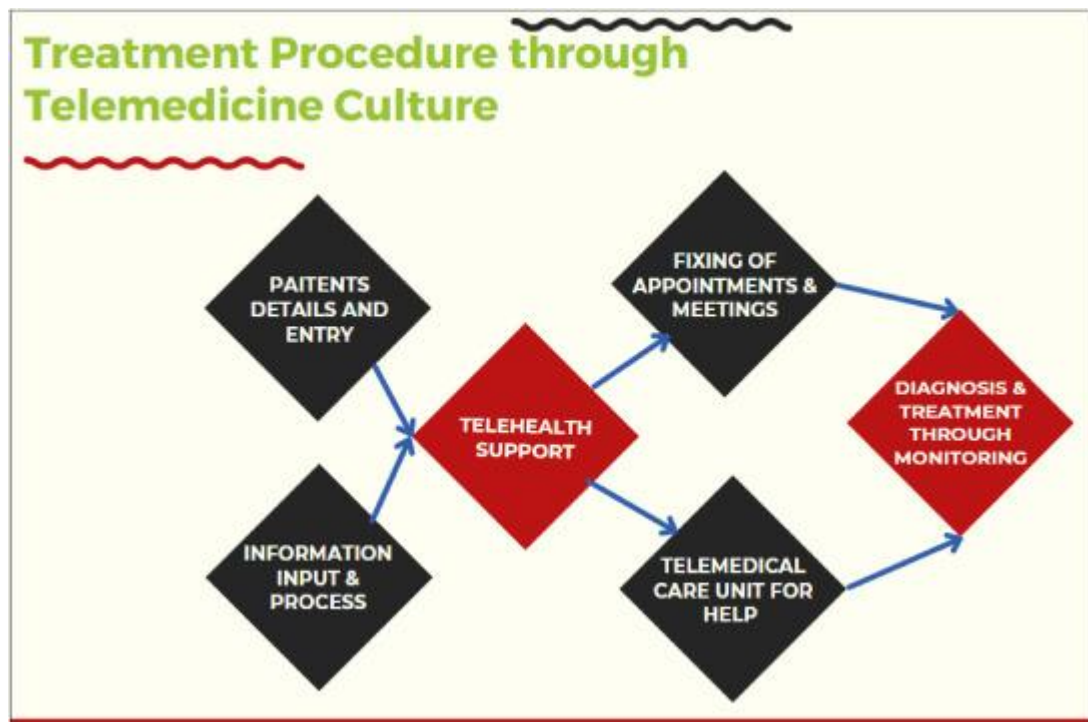


Figure 8: Treatment procedure by telemedicine culture (Source: Haleem et al., 2021)

2.7 Patient Outcomes and Satisfaction

The healthcare system and public health services have been focused on improving the patient satisfaction level to meet higher engagement and awareness. According to the viewpoint of Pogorzelska and Chlabicz (2022), telemedicine consultation is one of the most convenient tools to provide remote medical care and also offers an alternative to face-to-face consultation. In this similar aspect, it has been identified that the implication of telemedicine during the COVID-19 pandemic has been relevant to improve patient satisfaction (Pogorzelska and Chlabicz., 2022). On the other hand, it has been identified that patient satisfaction with telemedicine services among the vulnerable population has been reflected in inadequate and inefficient outcomes due to existing challenges (Kee *et al.*, 2024). The factors, such as a lack of English language proficiency among patients, have been identified as barriers to communicating with physicians for sustaining treatment and telemedicine services (Kee *et al.*, 2024). For instance, Apollo Telehealth services have reflected positive patient feedback on services to increase their confidence (*Figure 9*) (Apollo Telehealth, 2019). Therefore, it can be evaluated that patient outcomes and satisfaction related to telemedicine have a positive influence on developing

engagement; however, existing barriers need to be managed by policy intervention to sustain efficiency in services.



Testimonials

Trusted by many eminent patients, corporate and government professionals

“Its my sheer pleasure to take services from my dietician of Apollo Remote Healthcare, she is super friendly and very helpful. My health has improved and with her support I especially want to mention that I always feel confident and positive about my health and future condition. I believe in my dietician and wish her the best in her career and personal life.



Anonymous
Patient



***Figure 9: Patient positive feedback on telemedicine services at Apollo Hospital
(Source: Apollo Telehealth, 2019)***

Healthcare services in India, including providing telemedicine consultation during the COVID-19 pandemic, have been significant in sustaining healthcare services. A literature review conducted by Kaur *et al.* (2022), identified that the quality of services provided by the telemedicine consultation has been the major factor influencing the satisfaction level of patients. However, improvement of telemedicine services is required for assessing effective communication with patients and management of chronic diseases to ensure reduction of exposure to the disease risk (Kaur *et al.*, 2022). Moreover, it has been identified that adoption of telemedicine services has been rapidly growing in developing

countries such as South Africa, and it facilitated the saving of 95% of face-to-face consultations for the reduction of disease burden (Kaur *et al.*, 2022). Drawing from this comprehensive evidence, it can be stated that the adoption and implication of telemedicine has a positive health facilitating a high level of satisfaction among patients. Patient outcome and satisfaction have emerged as critical indicators of the success of telemedicine in chronic disease management. The study of Bajgain *et al.* (2023), has revealed that virtual consultation enhanced disease control, patient-reported outcomes and treatments. The telemedicine platform has provided timely access to care to the patient, minimises travel burden, and enables continuous monitoring that improves the overall experience and engagement of a patient. Additionally, management of conditions of patients like diabetes and hypertension reported better lifestyle adherence along with medication compliance because of frequent virtual follow-ups and reminders. Satisfaction is also influenced by communication quality, perceived attentiveness, and ease of access to health care facilities at the time of virtual interaction.

As per the study of Sim and Lee (2021), patients often expressed a high level of satisfaction with telehealth services when the platforms are user-friendly and support two-way interaction. Although disparities in digital literacy, lack of technology access continue to affect the satisfaction of patients among the rural and elderly population. Therefore, existing challenges and issues faced by both health care providers and patients need to be managed by effective policy strategies and interventions of frameworks to support high-quality services.

2.8 Factors affecting telemedicine adoption

Telemedicine consultation generally depends on the major implications of digital tools and technologies for providing audio and video consultation across remote regions. In the study by Garavand *et al.* (2022), identified that telemedicine is an important technology to deliver health services remotely by health professionals. Therefore, technological infrastructure has been the key factor for supporting the efficient implementation and adoption of the telemedicine approach and practices to sustain community health and public health deliverables. Moreover, Ganapathy (2022), stated that the implication of telecommunication has been relevant to ensure effective training of doctors to sustain digital health services. For instance, Apollo in India has been focused on providing

telehealth activities to ensure efficient services through the development of knowledge and understanding of doctors with suitable training programs (Ganapathy, 2022). Therefore, telecommunication focusing on improving interaction for doctors has been a relevant factor in influencing telemedicine adoption.

On the other hand, it has been identified that digital literacy is another factor to affects the adoption of telemedicine (Cheshmehzangi *et al.*, 2022a). Higher digital literacy has supported the quick and efficient adoption of telemedicine, whereas lower digital literacy creates barriers for the implementation of telemedicine. Conversely, Saha (2024), identified that rural areas in India have been identified to have a preexisting disadvantage of Inadequate health care services. Thus, it can be evaluated that factors such as technological infrastructure and digital literacy have been the major drivers of the adoption of telemedicine.

Implementation of Telemedicine has been focused on effective adherence towards the policies and regulatory frameworks provided by the government. Cheshmehzangi *et al.* (2022), analyse that the lack of standardised telemedicine pathways has led affected negligence in digital consultation. Conversely, Haimi (2023), stated that Inadequate reimbursement and a lack of sufficient infrastructure have been affecting the adoption and implementation of telemedicine in health care. In extent, it has been found that reimbursement and licensing have been the major factors affecting significant implementation of telemedicine to support high-quality services within limited cost and high convenience. Drawing from the overall evaluation, it can be inferred that factors such as regulatory standards, licensing and infrastructure are the key factors influencing the adoption and implementation of telemedicine.

2.9 Challenges associated with the implementation of telemedicine by doctors

Implementation of Telemedicine has been found to be affected by several issues and challenges related to intervention and adoption by doctors. Raju and Sistla (2022), identified that the lack of accreditation of telemedicine facilities has led to a developed fear among the users as well as the providers. The lack of uniformity of telemedicine regulation has been the key challenge to stimulate this type of situation. It has a significant negative impact on healthcare providers, including doctors, to enhance their negative attitudes and perspectives toward telemedicine for managing diseases. On the other hand,

according to the viewpoint of Arora *et al.* (2024), integrating telemedicine has a greater challenge related to system-level issues with existing infrastructure. Moreover, to some extent, it has been found that a lack of data security has developed a barrier for the adoption of telemedicine to facilitate effective healthcare services with cost-effective and convenient consultation. Apart from this, it has been identified that telemedicine consultation has significant limitations associated with a lack of physical examination of the patient. For instance, Fortis has reflected significant issues faced by doctors and implications of telemedicine with limited intervention for physical examination of patients (Fortis, 2022). Therefore, inadequate physical examination can raise questions about the accuracy of treatment and diagnosis with adequate services.

Arora *et al.* (2024), used a secondary literature review and identified that the lack of digital literacy, particularly among older adults in rural areas, has increased resistance to adopting telemedicine consultation. In particular, limited understanding and knowledge about the use of smartphones and external barriers such as poor Internet connectivity in rural regions have reduced efficient support for the adoption of telemedicine (Arora *et al.*, 2024)). In addition, lack of funding and high resistance towards the change have also influenced the adoption of telemedicine (Arora *et al.*, 2024)). Drawing from these overall evaluations, it can be stated that intervention of training programs, community outreach and facilitating family involvement can improve adoption of telemedicine.

Despite growing interest, several consequences restricted the seamless adoption of telemedicine services by doctors. One of the major barriers is ***resistance to change*** significantly among senior practitioners who are accustomed to the traditional face-to-face model. Concerns about diagnostic accuracy, especially in the absence of physical examination, reduce confidence in the virtual consultation. Apart from that, Khan *et al.* (2025), stated that doctors often ***lack adequate training and knowledge*** in the telehealth platform, leading to hesitation and underutilization of available digital tools. ***Legal ambiguities*** regarding malpractice liability, consent protocol, and jurisdiction also complement the adaptation of the telemedicine services. These concerns are heightened at the time of dealing with sensitive and chronic crises, where continuity of care is very important. For instance, in Germany, despite having good regional infrastructure, doctors reported low engagement with telemedicine because of strict privacy regulations and

unclear reimbursement policies (Richter and Silberzahn, 2020). These illustrate that the technological readiness, along with an insufficient supportive policy framework as well as institutional clarity, are equally important to encourage widespread clinical integration.

2.10 Strategies used by doctors for the adoption and use of telemedicine

Telemedicine consultation and practices have become an integral part of providing management for chronic diseases and healthcare services at a limited cost and with high efficiency. According to the viewpoint of Nagaraja *et al.* (2024), the free telemedicine service and e-Sanjeevani in India have been focused on providing digital health services with telemedicine intervention. The cross-sectional internet-based survey among medical doctors across India has shown that free telemedicine services have been relevant to support the adoption of telemedicine to improve health outcomes (Nagaraja *et al.*, 2024)). On the other hand, Bilbiie *et al.* (2024), evaluated that subjective norms and intention of doctors have been a positive factor in influencing the adoption and use of telemedicine. It has been identified that perceived understanding and knowledge about the usefulness of telemedicine among doctors have improved implication and adoption for managing patients. Saha (2024), identified that Apollo Hospital in India have been focused on developing digital transformation by adopting telemedicine with telehealth activities and telecommunication training of staff. Hence, strategic intervention and adoption of positive subjective norms and usefulness of telemedicine among doctors have potential relevance for developing acceptance by reducing resistance in supporting chronic disease management.

Moreover, it has been found that the acceptance and adoption of telemedicine by doctors have been significantly influenced by the strategic intervention of providing training. Garavand *et al.* (2022), stated that training of staff for suitable technology has been relevant to improve their knowledge and understanding to sustain high acceptance for digital health technologies, facilitating telemedicine consultation. However, licensing issues have been a major challenge for supporting the implementation of digital health technologies. Furthermore, the strategic intervention of providing training on digital innovations among physicians has reduced resistance and improved their acceptance. ***For instance***, in India, AIIMS has established a telemedicine hub to facilitate services for patients 24*7 with video consultation options by using WhatsApp, Skype and Google

Duo (The Economic Times, 2020). Thus, government initiatives for promoting telemedicine acceptance and adoption, along with collaborative efforts, have the potential for improving health outcomes in chronic disease management.

In order to facilitate the implementation of telemedicine, doctors have increasingly relied on the structured adaptation strategy that aligns with the clinical workflow. One common approach added the integration of a telemedicine platform with an electronic medical record, allowing seamless access to the patient histories at the time of virtual consultation (Zhang and Saltman, 2021). Moreover, many practitioners who adopted asynchronous communication methods like pre-consultation questionnaire and remote question monitoring for managing time effectively and preparing a more personalised treatment plan. Additionally, continuing with the professional training is another important strategy with doctors enrolling in a telemedicine certification programme and attending open courses to stay updated on best practices as well as legal requirements. For example, in Australia, rural general practitioners utilised a mobile-based teleconsultation app in collaboration with a tertiary care hospital for managing chronic disease patients remotely (Hall Dykgraaf *et al.*, 2021). The hub-and-spoke model has repeated a positive outcome in bridging rural health care gaps.

2.11 Theoretical framework

2.11.1 Technology acceptance model

The technology acceptance model explains that acceptance of technology depends on two major variables, such as perceived usefulness (PU) and perceived ease of Use (PEOU) (*Figure 10*). The concept of this model suggests that individual behaviour is more likely to adopt new technology driven by their belief that it enhances performance and is easy to use. According to the viewpoint of Davis (1986), the technology acceptance model has been widely used to explain the perception of individuals for accepting new technology. Beyond its fundamental components, the model has evolved to include behavioural and contextual elements relevant to healthcare in the telemedicine domain. The subjective norms, like peer influence, institutional endorsement patient demand, have increasingly shaped the willingness of the practitioner to engage with technology. In the chronic disease management decision, the doctors are often guided by a professional network and

policy alignment, particularly at the time of exploring policies that are supported by the government.

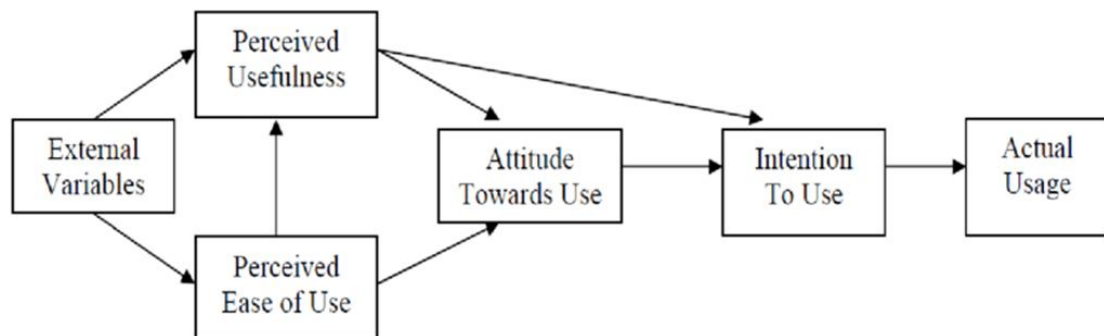


Figure 10: Technology acceptance model (Source: Davis, 1986)

Another critical extension is the *facilitating condition* that refers to the presence of a training module, integration into clinical workflow, and technical support. Additionally, it can be stated that without such enablers, even a technologically proficient professional may be reluctant to transform from conventional practices. Furthermore, trust in system reliability, especially concerning patient data confidentiality, has emerged as the most significant determinant of sustained telemedicine use. The concept of TAM provides practical insight for perceived usefulness among doctors to support the adoption of telemedicine to promote patient monitoring, mentoring, diagnosis and consultation. Bîlbîie *et al.* (2024), identified that the implication of the concept of TAM has been relevant to evaluate the adoption of telemedicine technologies by doctors to promote efficient healthcare services. Similarly, perceived ease of use of telemedicine among doctors in Kerala has relevance to developing implications of video and audio consultation for chronic disease management. Therefore, TAM offer a useful conceptualisation for analysing the perception and attitudes of doctors towards telemedicine as a new technological approach for developing chronic disease management of patients in Kerala.

2.12 Conceptual Framework

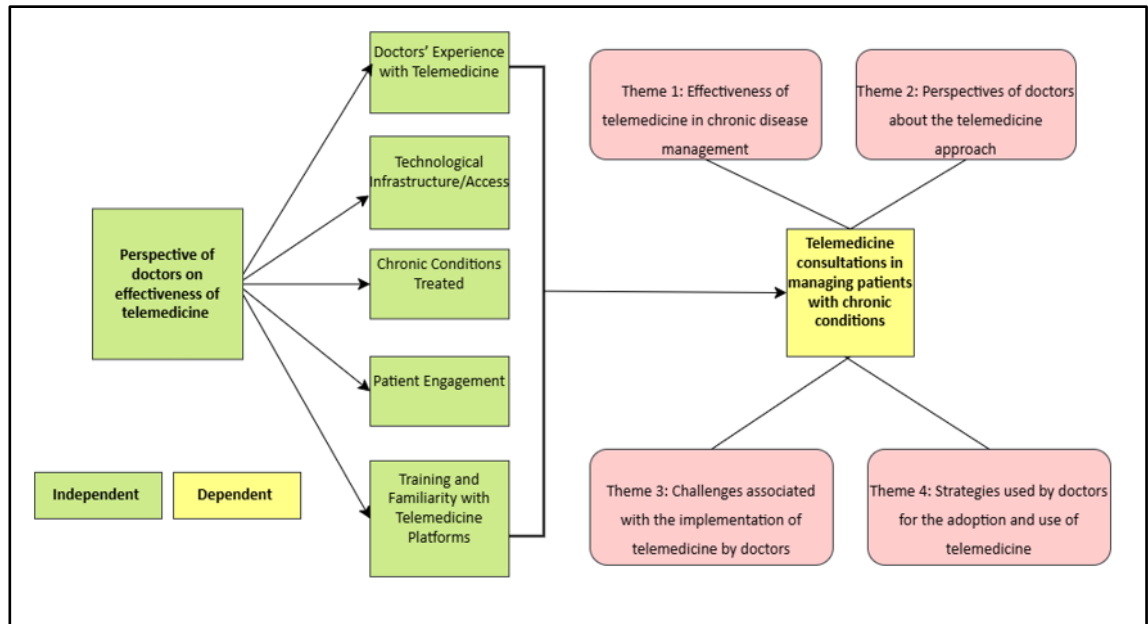


Figure 11: Conceptual framework

The above conceptual framework (**Figure 11**), identifies perspectives of doctors on the effectiveness of telemedicine as an independent variable to influence the Implementation and outcome of telemedicine consultation in managing chronic disease patients as a dependent variable.

Effectiveness of telemedicine and perception of doctors

Telemedicine consultation, including audio and video consultation services, provides a cost-efficient and convenient diagnosis solution for patients. Telemedicine is significantly effective in providing uninterrupted remote services for patients. Miller (2002), highlighted that telemedicine can alter the communication dynamic between doctor and patient with the help of reducing nonverbal cues like posture and eye contact, as these elements are very important to develop trust, especially in long-term chronic care. Additionally, the perception of doctors regarding telemedicine is transforming not only by technological familiarity but also through observed patient outcomes. As per the study of Meher *et al.* (2009), awareness level among Indian doctors influences their attitude towards telemedicine, which directly affects the adoption rate. Furthermore, belief of the doctor in the usefulness of telemedicine, particularly in chronic care, mostly impacted their willingness to replace the traditional face-to-face method. The technology

acceptance model has suggested that both perceived usefulness and ease of use are important in technological implementation.

In Kerala, this means that doctors who examine tangible benefits like patient adherence and enhancement of health monitoring are more likely to endorse telemedicine. It has been understood that the non-verbal cues improve the digital communication channel that fosters effective doctor-patient rapport and manages chronic illness. Thus, positive outcomes and significant effectiveness of telemedicine align with the perception of doctors to ensure efficient treatment of patients with chronic disease conditions.

Chronic disease management and telemedicine

Chronic diseases such as diabetes, cardiovascular diseases, cancer and respiratory diseases have been significantly diagnosed by telemedicine intervention. During the COVID-19 pandemic telemedicine consultation approach has been widely adopted to ensure continuity in services despite significant challenges. Many teleconsultations eventually require impulsive follow-ups because of diagnostic uncertainties (Maya, 2024). Chronic disease management has benefited extensively from the repetitive and structured nature of telemedicine intervention. The study of Ma *et al.*, (2022), has demonstrated that digital consultation enhances long-term outcomes for diseases like diabetes, arthritis, and hypertension, which require consistent follow-up along with patient engagement.

Additionally Corbett *et al.* (2020), highlighted that the use of telemedicine minimises the destruction of treatment continuity during the time of the COVID-19 pandemic among the vulnerable population. Based on the policy perspectives, it can be stated that telemedicine complements lifestyle-based intervention, supporting doctors to monitor dietary compliance and physical activity through digital practice. These dual mechanisms of treatment and behaviour modification strengthen the implementation of telemedicine in the chronic disease care, particularly in low-resource management rural areas of Kerala. Therefore, the positive influence of telemedicine on chronic disease management has reflected a significant relationship to the effect of adoption and implementation by doctors.

Challenges in implementation and telemedicine adoption

Digital literacy among elderly patients and medico-legal uncertainties, along with inadequate training of physicians on telehealth platforms, further complicate its implementation the healthcare practices. Other challenges, such as a lack of technology infrastructure, limited funding and inadequate knowledge among doctors, have been key barriers to the implementation of telemedicine. Lack of technological infrastructure, digital literacy inefficiency, lower funding and inadequate knowledge among doctors have influenced telemedicine adoption. The implementation challenges have been multifaceted, spanning infrastructure, regulatory constraints and lack of literacy. As stated by Cheshmehzangi *et al.* (2022), the digital divide, especially in rural areas where Internet access is limited and now lacks uniform regulation and accreditation, enhances hesitancy among healthcare providers because of medical legal ambiguities. In India, resistance among elderly populations because of poor digital literacy, as well as unfamiliarity with telemedicine among doctors, hinders broadband acceptance. Ganapathy (2022), highlighted that the implementation of a targeted training and development programme on a user-friendly platform can mitigate these issues. The findings have the requirement for religion religion-specific solution in Kerala, including local language support and a simplified platform that encourages participation by both providers and patients.

Patient satisfaction and telemedicine

Telemedicine services have a positive influence on developing patient engagement and satisfaction by developing their confidence, and face-to-face interaction improves the relationship. Moreover, it has been recognised that telemedicine has the potential impact on developing healthcare access for remote regions in India; however, the successful intervention requires focusing on addressing challenges and barriers. Similarly, the technology acceptance process has been a critical factor within strategic innovation to support the reduction of the impact of the high cost of implementation and poor reimbursement policies in the health care system by the adoption of telemedicine (Garavand *et al.*, 2022). Additionally, Pogorzelska and Chlabicz (2022), confirmed that telemedicine consultation normally yields high patient satisfaction because of convenience and lower travel costs. In Kerala, the adoption of e-sanjeevani has enabled widespread use, especially during the time of the pandemic, allowing chronic patients to

maintain continuity of care. However, recognise that linguistic and cultural consequences are a very crucial concern that can undermine satisfaction in a diverse setting.

Thus, tailoring telehealth services with a culturally competent communication strategy becomes more imperative. The study of Kaur *et al.* (2022), has made a link between service quality for satisfaction and stressed the importance of consistent technological support along with timely follow-ups. It has been analysed that telemedicine not only satisfies patients, however, encourages repeat engagement significantly in the context of chronic disease care. Therefore, it can be stated that telemedicine intervention has a significant influence on developing patient satisfaction.

Strategies for the implementation of telemedicine and doctor perception

Strategic intervention of establishing a telemedicine hub and providing training for staff about telehealth activities has been relevant to increase positive attitudes among doctors. It has been beneficial to develop a positive perception of doctors related to telemedicine with an efficient training program and by focusing on the development of government initiatives, as well as collaborative efforts. Hence, strategic interventions have a positive influence on telemedicine implementation and adoption by doctors to sustain chronic disease management in Kerala. In order for telemedicine to be implemented effectively, physicians' clinical practices must be in line with technology readiness. Clear medico-legal frameworks, continuous technological assistance, and user-friendly platforms can all greatly increase adoption and perception. Furthermore, mentorship programs and peer-led initiatives assist in boosting the confidence of apprehensive practitioners, creating a cooperative atmosphere that facilitates the long-term integration of telemedicine into standard care.

The government-driven initiatives, as supported by professional societies, can develop a positive culture across telemedicine, making it a regular feature in chronic disease management. The cumulative impact of financial, educational, and strategic interventions improved long-term implementation of telemedicine.

2.13 Literature gaps

Existing studies have been widely focused on the evaluation of diversified approaches of telemedicine and their impact on the healthcare system and services. The previous study

by Miller (2002), analysed telemedicine consultation and practices in association with doctored and patient communication prospects. However, this study was inefficient in evaluating attitudes and perceptions of doctors regarding telemedicine implications and adoption. Conversely, the study by Meher *et al.* (2009), evaluated the perception and awareness of doctors and patients about telemedicine. However, this study has been inefficient in providing an in-depth critical evaluation of strategic interventions and challenges faced by doctors in sustaining and improving telemedicine consultation, particularly in the context of Kerala. Therefore, the present study focused on fulfilling the existing gaps by analysing of perception of doctors towards telemedicine consultation to support chronic disease management in Kerala.

2.14 Conclusion

Telemedicine consultations have been widely adopted at a significant rate since the COVID-19 pandemic. The cost-effectiveness, convenience and efficient services have been the major beneficial outcomes of telemedicine consultation. It has a positive influence on developing satisfaction among patients by increasing their confidence. However, challenges associated with a lack of digital literacy, inadequate technology infrastructure and limited funding affected the inadequate adoption of telemedicine. Telemedicine enhances chronic care delivery; however, its success depends on technology access, supportive policies and training that ensure sustained and equitable doctor-patient engagement. Therefore, strategic intervention of training collaboration and establishing hubs is relevant to ensure telemedicine implementation.

3. Methodology and Research Design

3.1 Overview

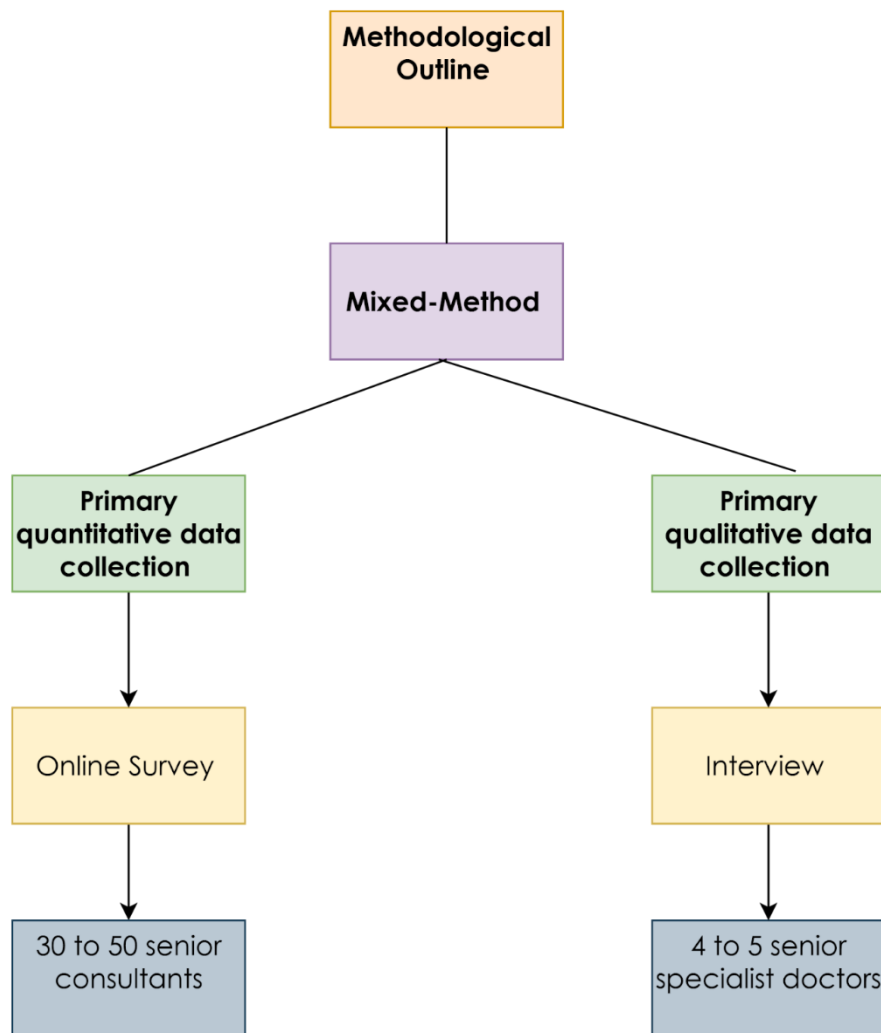


Figure 12: Methodological outline

The methodology chapter is all about choosing the right type of methods and techniques to facilitate the completion of the research. The essentiality of the chapter relies on the establishment of the validity and reliability of the findings, which is needed to ensure that the conduct of the research was significant. The Research Onion paradigm has laid out various methods, strategies, and techniques that are helpful for research navigation (*Figure 13*). Hence, through these methodological levels, the present research has had the opportunity to make conclusive remarks on the effectiveness of telemedicine in the management of chronic diseases in Kerala.

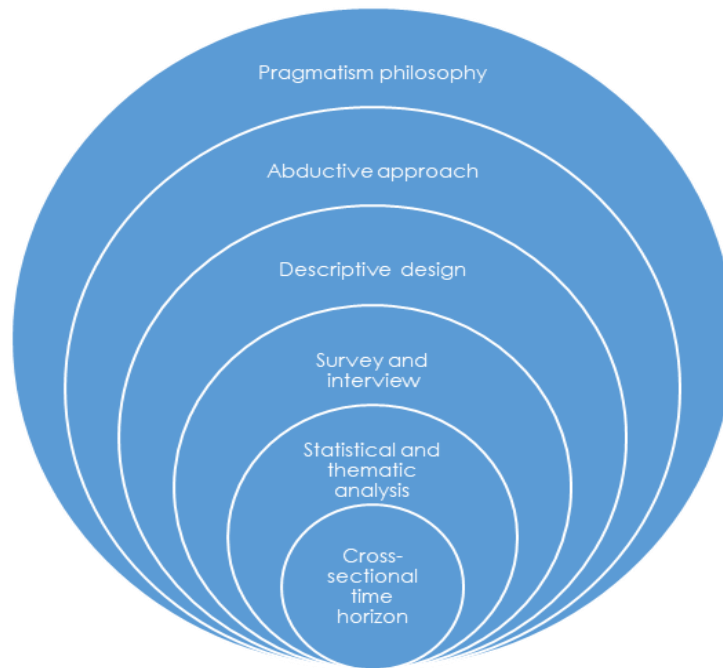


Figure 13: Research Onion (Source: Saunders et al., 2019)

3.2 Research Philosophy and Approach

The use of the concept of pragmatism research philosophy in the context of analysing diversified viewpoints of doctors has been relevant. Similarly, it has focused on the perspectives of doctors about the effectiveness of telemedicine for managing chronic disease conditions and has higher relevance in aspects of health care services. The concept of pragmatism research philosophy has been concerned about human experience beliefs and actions which are shaped by individual historical experiences (Kaushik and Walsh, 2019). Such conceptualisation is applicable in analysing subjective and objective existence that is influenced by behaviour and action of individuals. The research has based pragmatism research philosophy in the study aimed at analysing the perception and attitudes of doctors based on a subjective and objective context of the effectiveness of telemedicine. Allemang *et al.* (2021), applied mixed-methods research to the study of complicated social problems to consider patient-based outcomes with the connotation of the concept of pragmatism research philosophy. Thus, the philosophy of pragmatism has served useful in the application of both qualitative and quantitative data gathered by interviewing the participants, of whom are mainly, senior consultants of Kerala origins, to determine effectiveness, issues and patient outcomes prevalent in the utilization of daily medicine intervention.

This paper has considered the abductive research methodology to interpret the approach of physicians to theorise about the efficiency of telemedicine in the regulation of chronic diseases in Kerala based on the quantitative and qualitative data derived. The abductive theorisation identified the point of origin in a crude theory to give conclusions in a big picture depending on the findings (Okoli, 2021). In this same respect, it has been discovered that as regards the implication of the abductive research approach, the study has been pertinent to this case to centre on observations that are gathered through interviews and surveys to give a general confirmation to enhancements in sustainable health services by the means of the intervention of telemedicine.

3.3 Research design

In the study, a descriptive research method has been adopted in the analysis of the primary quantitative data to be analysed using the online survey. A descriptive study will be applicable when determining the distribution of one or more variables (Aggarwal and Ranganathan, 2020). In this respect, responses of doctors to the survey were analysed using descriptive research design to reveal diversified variables, including: challenges on efficacy of telemedicine, outcomes of patients and the interrelationships among them. On the same note, descriptive research design used in this study has been effective in measuring quantitative data in analysing trend outcomes and patterns of telemedicine intervention on chronic diseases management in Kerala by physicians. Hence, it has been prudent to adopt descriptive research design in the study to determine the sharing of variables and relate to the variability so to influence the realization of a sustainable health outcome in the implementation of telemedicine by physicians in Kerala.

This study considers narrative research design in analysing the interview data to understand perception of doctors regarding the usefulness of telemedicine in management of chronic diseases such as diabetes in Kerala and hypertension, the study evaluated how doctors perceived telemedicine and the effectiveness of telemedicine in managing diabetes and hypertension and other chronic diseases in Kerala. The implication of narrative research design in the analysis of qualitative data applies to a scenario in which the responses are gathered through the thorough evaluation of the participants (Liu, 2023). In this sense, this research has employed the narrative research design to analyse individual responses acquired through the interview method in order to illuminate the

subjective reality in the implication and adoption of the telemedicine. Moreover, narrative research design has played a useful role in this research to offer a detailed insight of qualitative data by examining each narrative answer in determining the presence of challenges, patient outcomes and the role of telemedicine in the process of chronic disease management. Therefore, narrative design has played a major role in the present study to critically examine responses to interview questions so as to address the key research intentions of examining the subjective reality of the implication of telemedicine by physicians in Kerala.

3.4 Research Strategy

The research study has taken up the quantitative and qualitative research strategy in the analysis of both subjective and objective reality of the perception of doctors of the effects of telemedicine in the management of chronic diseases. Measurable data in quantitative format are applicative in giving an in-depth insight about the ability to make a decision with a facility of data driven decision-making(Lim, 2023). In this regard, the study has given priority to primary quantitative data in the evaluation process of a complete picture of the views of doctors regarding use of telemedicine to treat chronic illnesses. Moreover, data obtained through interviews have been helpful to understand the opinion and perception of doctors towards the effects of telemedicine in treating hypertension and diabetes as a chronic disease in Kerala in a qualitative way. Thus, primary quantitative and qualitative research approaches have been applicable in this study to answer trends and patterns in the adoption of Telemedicine and the detailed effects in perception of the doctors to facilitate the management of the chronic diseases.

3.5 Research choice

In this investigation, the mixed-method research option was adopted to test the views of doctors regarding the effectiveness of telemedicine in treating the conditions of chronic diseases in Kerala on the basis of primary quantitative and qualitative data. Mixed method of research provides the blend of both qualitative and quantitative form of data to track a critical and complete idea of complicated phenomena (Halcomb, 2018). The use of surveys has been effective in collecting quantitative data, whereas interviews have enabled this study to collect qualitative insights about the effectiveness of telemedicine in managing chronic disease conditions by doctors. The implication of mixed-methods

research decision has been useful in this study to develop both subjective and objective information in order to overcome the problem and reasons that can lead to successful adoption and generate obstacles in the introduction of telemedicine in Kerala.

3.6 Collection of Primary Data

3.6.1 Sources

The key quantitative data has been gathered through the help of a survey conducted among 30 to 50 senior consultants of Kerala. The senior consultants have been recruited from healthcare organisations from Kerala, and followed by inclusion and exclusion criteria (*Table 2*). The survey process has been very pertinent in the attainment of measurable responses to evaluate the objective reality to the perception of the doctors on the effectiveness of telemedicine. The area of perceived effectiveness related questions, challenges and patient outcomes related questions has been put into consideration to develop a structured questionnaire (*Appendix A*). As it has been found, a survey constitutes the most appropriate method of collecting quantitative data in health research (Maida *et al.*, 2022). Consequently, telemedicine turns out to be a recent revolutionary practice in the healthcare setting, which has greatly been pertinent to be examined through the application of a survey method of data collection exploring primary quantitative information.

Inclusion criteria	Exclusion criteria
<p>Senior consultants and specialist doctors from Kerala.</p> <p>Experienced in using telemedicine.</p> <p>Involved with managing chronic disease patients.</p> <p>Minimum experience of 1 year.</p>	<p>Other professionals from the healthcare setting, rather than doctors.</p> <p>Do not have experience in providing telemedicine.</p> <p>Do not have knowledge and experience in managing chronic disease patients.</p> <p>Lower experience than a minimum 1 year.</p>

Table 2: Inclusion and exclusion criteria

The use of the interview method as the means of collecting primary qualitative data has been facilitated by targeting 4 to 5 senior specialist doctors working in Kerala. They have been recruited from the hospitals in Kerala and contacting professional associations of medicine in the region to access the participants. The major source of presenting in-depth insights and understanding about the effectiveness of patient outcomes, challenges and strategies to improve sustainable health has been specialised doctors of Kerala who extensively use telemedicine. The interview has important implications to the qualitative research that seeks to gather information premised on the experience and opinion of people (Mwita, 2024). The interview conducted with a group of specialised doctors in Kerala has helped in shedding some light to the important information based on their experience on the telemedicine use to manage chronic diseases with provided interview questions (*Appendix B*). Thus, the main qualitative data with interviews have provided a high consideration of the research objectives studying the subjective context of the effectiveness of telemedicine through the prism of doctors.

3.6.2 Access and Ethical Issues

The locating of participants has been geared towards specialist doctors in the hospitals and contacting professional associations of medicine in Kathakali. The important research aim, objectives, purpose and scope are explained to all the participants. In this regard, to ensure that the study is ethically viable, informed consent has been given to the participants prior to carrying out an interview or the survey. This piece of study has concentrated on establishing confidentiality and data security through password-coded digital folders deposited in the university cloud system. The study has been focused on ethical considerations and guidelines provided by Griffith College. The identifiable data of all the participants is to be preserved so to guarantee their anonymity. This study has adhered to general principles of data protection in order to ensure intactness and protection of the storage of data. Data Protection Act 2018 offers a means of regulation procedure that involves regulating the misuse of individual data (Government of the UK, 2018). In complying with this regulatory compliance, the study has concentrated on keeping the highest levels of confidentiality and privacy of information that is gathered from the people involved.

3.7 Sampling technique

The purposive sampling has been utilised in this study in regard to targeting participants of the survey and interview. Sampling purpose is an applicable method to apply in reaching the most appropriate and matched sample size in the population in line with the aim and objectives of the research (Campbell *et al.*, 2020). Purposive sampling would be applicable in this study to concentrate on the selection of senior consultants and specialist doctors in Kerala, so that it could address the aim and objective, which would include the effectiveness of telemedicine by doctors. The study aimed at examining the perception of 30 to 50 doctors regarding the efficacy of telemedicine in Kerala, which was substantially examined by involving the purposive sampling of the participants who were selected through senior consultants and specialist doctors who have prior experience in the use of telemedicine. Based on Survey Monkey Calculator, it has been identified that the initial selection of population size was 45 and the confidence level was 95% with a margin of error of 5%. However, only 41 participants responded to the survey by showing voluntary consent and interest in the survey to maintain the validity and reliability of the study (*Figure 14*).

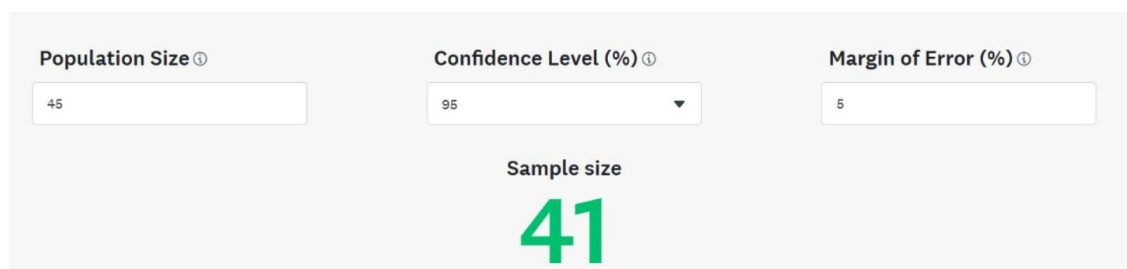


Figure 14: Survey Monkey calculator (Source: SurveyMonkey, 2024)

3.8 Approach to Data Analysis

A data analysis statistical technique has proved to help to carry out the survey-based research work with satisfactory results. This method has specifically been used in order to get numerical considerations through the descriptive analysis of the results represented in pie charts. Based on the opinion of Sethi, (2025), the requirement of validity and control of analytical processes in a study forms another reason behind the necessity of employing a statistical method. All of these tests have aided in analysing insights regarding predictors of telemedicine and examining relationships between research variables.

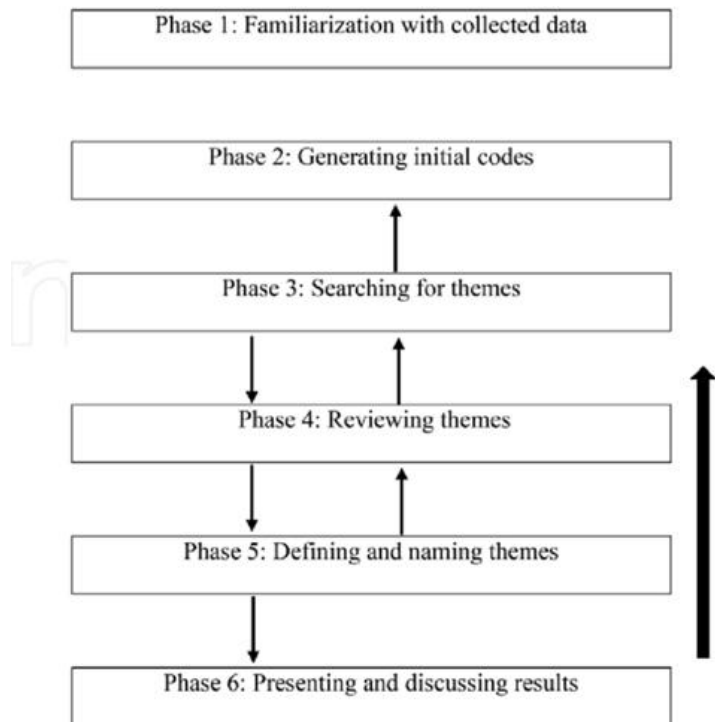


Figure 15: Thematic analysis process (Source: Braun and Clarke, 2006)

In order to analyse the interview-based data, the thematic analysis technique has complemented the study. **Figure 15**, shows six processes, such as data familiarisation, creating initial codes, looking for themes, defining and naming themes, and producing a report, which are categorised under the thematic technique (Braun and Clarke, 2006). This technique has helped significantly by concentrating on the interview transcripts. This has been followed by generating codes and creating themes that reflect the use of telemedicine by doctors to treat chronic diseases in Kerala, all of which have been linked to the research objectives.

3.9 Time horizon

The time horizon that has effectively supported the achievement of study findings within a limited period of time is a cross-sectional method. Andal-Saniano *et al.* (2024), have stated that observing variables of a study from a single moment defines cross-sectional studies, which are both descriptive and analytical. Under this method, the inclusion and exclusion criteria have been first established in the research to determine the procedure for the collection of both qualitative and quantitative data at a single time. This has helped

to know the prevalence of telemedicine consultations, which is used as a strategy by doctors to reach patients in Kerala.

3.10 Methodological limitations

The sole dependency on collecting primary data may reflect a limitation for the comprehensive evaluation and review of secondary sources. Similarly, this study focused on collecting data from senior consultants and specialist doctors from Kerala, which highlights the key limitation for providing the perception and attitudes of other stakeholders involved with the implementation of telemedicine. Furthermore, limitations associated with lower sample size due to time and resource constraints might affect the generalised confirmation and conceptualisation for a wider context. In addressing this limitation and ensuring the credibility of the study, the implications of mixed-method approach have been relevant to provide higher generalizability. Similarly, purposive sampling ensured significant alignment of the target sample with key aims and objectives to validate the findings.

3.11 Conclusion

The pragmatism research philosophy supported this study to analyse the subjective and objective reality of the effectiveness of telemedicine perceived by doctors in Kerala. An abductive research approach has been used to develop the theory based on observation from interviews and surveys. Mixed-method research has a significant influence in assessing trends and patterns based on quantitative data and the in-depth impact of the perception of doctors over the adoption of telemedicine for chronic disease management. Pie chart analysis is used for analysing quantitative data, and the thematic analysis technique is utilised for analysing interview transcripts.

4. Presentation and Discussion of the Findings

4.1 Overview

This chapter aims to critically analyse both the collected qualitative and quantitative data to generate valuable findings to determine the effectiveness of telemedicine consultations in managing chronic conditions of patients in Kerala. In this chapter, both pie chart and thematic analyses have been performed to gather relevant findings by analysing both qualitative and quantitative data. The examined findings were then further discussed properly to understand their potential to build a connection with the past literature and theoretical knowledge. The completion of this chapter helped in determining the potential of the collected data to achieve the targeted research objectives.

4.2 Pie chart analysis: Quantitative Data

4.2.1 Demographic analysis

3. What is your area of specialty?

41 responses

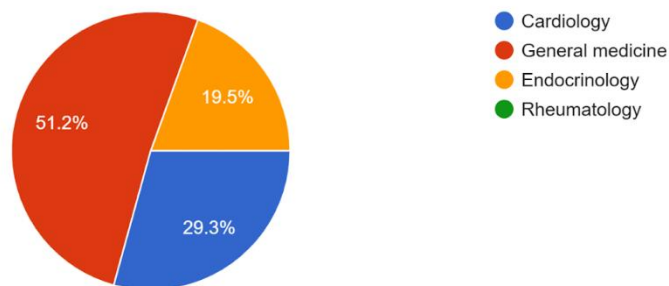


Figure 16: Participant's Speciality area

The pie chart shows the proportion of specialties amongst 41 doctors who were surveyed. General medicine prevails with 51.2% of the respondents. The next is cardiology at 29.3 and endocrinology at 19.5. No responses were registered to rheumatology. This is the allocation of the distribution, which is to be relatively generalist and cardiology-oriented [Figure 16].

4. How many years of experience do you have in practice in telemedicine?

41 responses

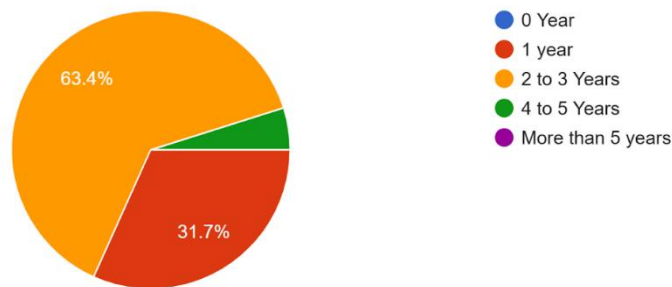


Figure 17: Participant's year of Experience

The graph shows the experience of telemedicine in the setting of 41 physicians. Most of the respondents (63.4%) have two to three years of experience. Thirty-one point seven % have one year of experience. It is a minority (4.9%) who have four to five years of experience. The number of participants who stated the use of telemedicine for zero or more than five years was 0 and 0, respectively [Figure 17].

5. What is your age?

41 responses

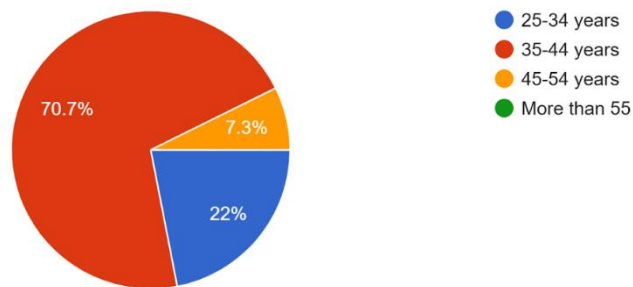


Figure 18: Age of participants

The pie chart shows the proportion of the age of 41 telemedicine practitioners. Most doctors (70.7%) lie between the ages of 35-44 years. 22% fall in the age group 25-34 years. 7.3 % falls into the 45-54 group. None of the respondents was aged more than 55 years [Figure 18].

4.2.2 Objective-based analysis

6. How effective do you find telemedicine consultation for managing chronic disease condition?
41 responses

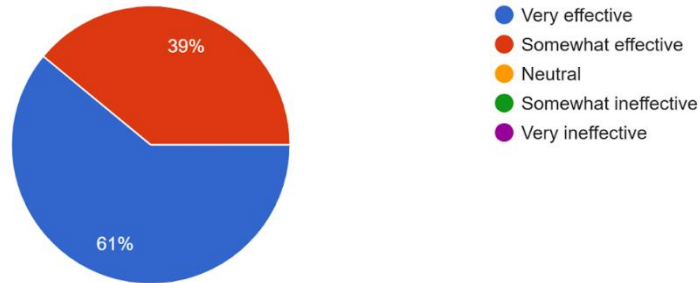


Figure 19: Telemedicine consultation

The chart represents an estimation of 41 physicians on telemedicine efficacy in the management of chronic illnesses. 61 % approve it as being very effective, whereas 39% of them approve it as being somewhat effective. None of the respondents selected neutral, somewhat ineffective or very ineffective. This opinion poll testifies to a high level of professional confidence in telemedicine to facilitate the continued care of chronic diseases in the Kerala healthcare environment [Figure 19].

7. As for your experience, which chronic disease is best managed by implication of telemedicine practice?
41 responses

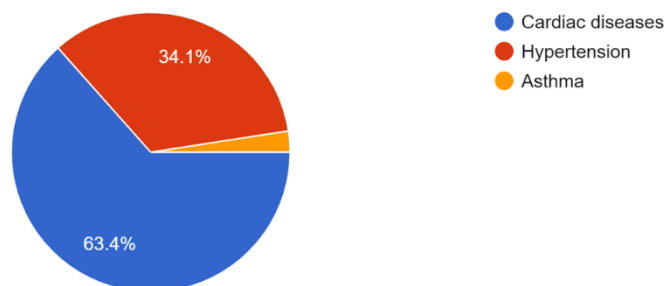


Figure 20: Management of chronic disease

The pie chart shows the perception of 41 physicians toward telemedicine efficacy as per condition. Relative to remote management, 63 % identify card-related illnesses as the

most susceptible illnesses. 34 % choose hypertension. Few (2%) found that asthma is best suited to telehealth. These answers show that clinicians regard cardiovascular tracking and long-term blood pressure management as the processes that can be supported by remote consultation methods especially well [Figure 20].

8. How often do you rely on telemedicine follow-up consultation for chronic disease management?
41 responses

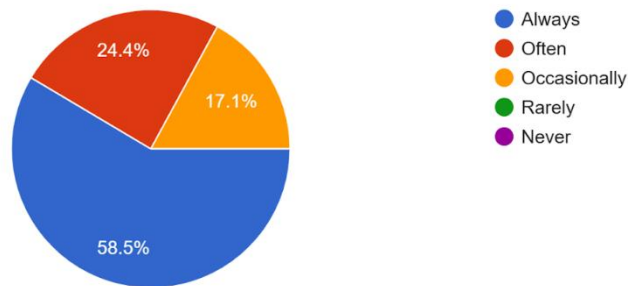


Figure 21: Follow-up consultation

The chart or chart summary compares the use of telemedicine among 41 physicians in the follow-up of chronic diseases. 59 % tend to always utilise remote consultations. 24 % tend to set virtual follow-ups. 17% use telehealth sessions on a random basis. Avoidance and wanting responses are not common, and they do not manifest with very high scores, pointing to the normalcy of the use of telemedicine in terms of continuous management of chronic conditions by practising doctors in Kerala [Figure 21].

9. How often do telemedicine consultations provide improved medication adherence among chronic disease patients?
41 responses

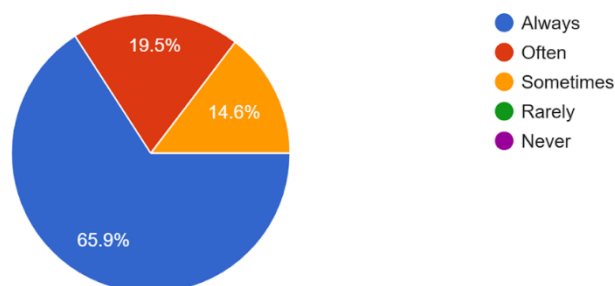


Figure 22: Improved medication adherence

The chart demonstrates what 41 physicians witnessed in terms of adherence advantages because of telemedicine. 66% report having improved medication adherence always. 19% indicates new gains to be frequently observed. 15% note that there are occasional profits. None of the respondents specifies that adherence enhancement is rare or absent. These findings indicate that the perception that Kerala doctors have towards telehealth follow-ups is largely the view that it is a credible source of enhancing patient compliance [Figure 22].

10. Which is the most common outcome that has improved because of implication of telemedicine in chronic disease management?

41 responses

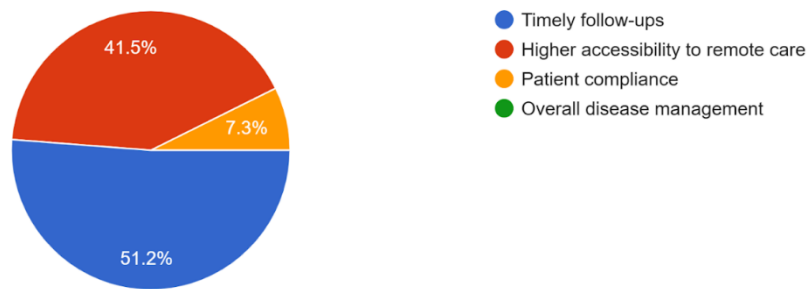


Figure 23: Common outcome

The diagram responds to 41 physicians regarding the outcomes of telemedicine in chronic care. Most respondents (51%) chose to name the timely follow-ups as the main improvement. 42% point out improved access to remote care. 7% improvement in patient compliance. None of the respondents chose management of the disease holistically. These findings demonstrate that Kerala doctors are mostly interested in telehealth in terms of providing consistent care over time and increasing access to care [Figure 23].

11. In your opinion, what is the main benefit of telemedicine in chronic disease management and care?

41 responses

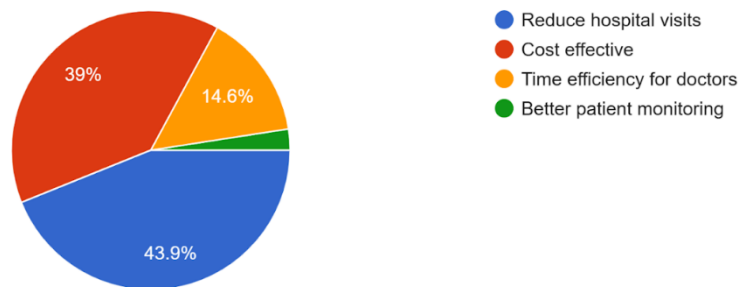


Figure 24: Main benefit

The chart presents the evaluation of 41 physicians as to the greatest advantage of telemedicine in chronic care. 44 % mention a low hospital usage. 39 % in terms of this cost effectiveness. 15% focus on the efficiency of time by doctors. 2% indicates superior patient surveillance. These data indicate that Kerala healthcare professionals attach the most significant importance to telehealth in reducing the number of cases that require inpatient care, decreasing care expenses and at the same time saving time for clinicians [Figure 24].

12. According to your viewpoint, how significant is the lack of physical examination in Telemedicine consultation for managing chronic disease conditions?

41 responses

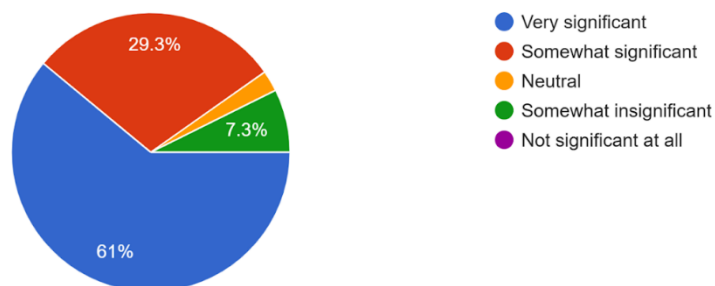


Figure 25: Significance

The chart shows that 41 physicians responded to the importance of missing physical examination in telemedicine in chronic care. 61 % of respondents refer to this limitation as highly significant. 29 % also consider it significant to some extent, and 7% regard it as significant to some extent. 2% are neutral. Such conclusions give rise to the concerns of Kerala doctors, who specify that without in-person evaluations, the correctness of diagnostic conclusions is quite questionable [Figure 25].

13. What is the most common and primary challenge you have faced during conducting elements in practice and consultation?

41 responses



Figure 26: Common challenge

The chart shows the key problems of 41 doctors when practising telemedicine. 56 % record poor technical and infrastructural support. 27 % mention the lack of digital literacy of the patients. One in six cites unproductive and bad Internet connectivity. None of the respondents indicated clinical assessment issues or protocol non-adherence. These results are indicative of infrastructure deficiencies at the system level and patient training requirements in the telehealth services in Kerala [Figure 26].

14. How often do you find difficulties in building doctor-patient rapport during telemedicine consultation?

41 responses

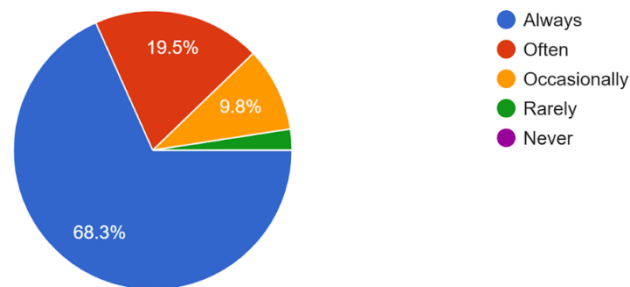


Figure 27: Difficulty

The chart represents the frequency of rapport-building difficulties of 41 physicians in telemedicine. 68 % must always face the difficulties. The number of effectively facing issues is 19%. There are occasions when 10 % report problems. The 2% hardly report any rapport gaps. None of the respondents said that they had never experienced issues with the rapport. These findings demonstrate there is no exception to relationship barriers in virtual chronic care consultations in Kerala [Figure 27].

15. According to your experience and viewpoint, which aspect of telemedicine limits your capability to manage chronic disease conditions efficiently?

41 responses

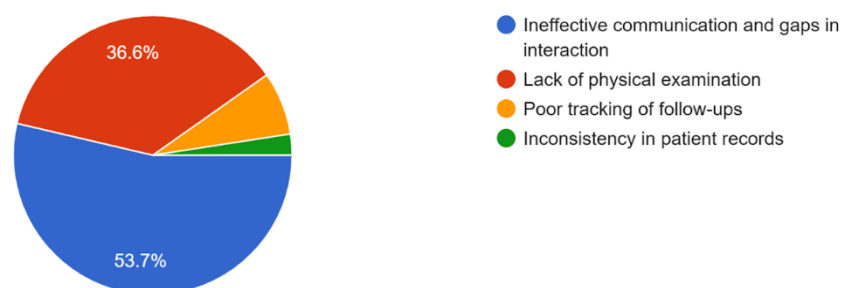


Figure 28: Limitations of Telemedicine

The pie chart shows the opinion of 41 physicians concerning the restrictions in telemedicine in caring for chronic patients. In more than 50% (53.7%), ineffective

communication and a lack of interaction are noticed. 36.6 % mention the inability to conduct a physical examination. Almost 10 % complain of low follow-up tracking. A small minority (2.4 %) respond to inconsistencies in patient records. These results highlight the key operational issues of the Kerala virtual consultations [Figure 28].

16. What form of training would be relevant to improve your use of telemedicine for chronic disease management?

41 responses

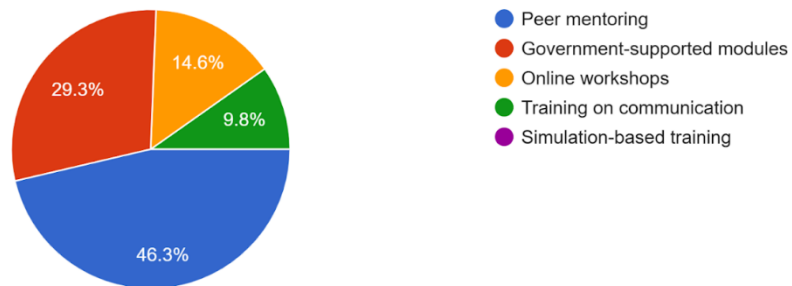


Figure 29: Training needed for better Telemedicine

Almost half of the physicians surveyed (46.3%) prefer peer mentoring for the increase of telemedicine skills in chronic care. Modules supported by the Government are approved by 29.3 % of the applicants. 14.6 % of all doctors are drawn towards online workshops. Only one-in-ten participants wanted focused communication training with zero selecting simulation-based training. These preferences represent realistic, practical learning priorities by clinicians in Kerala [Figure 29].

17. Which would be the most effective for improving your experience with telemedicine for chronic disease management and care?

41 responses

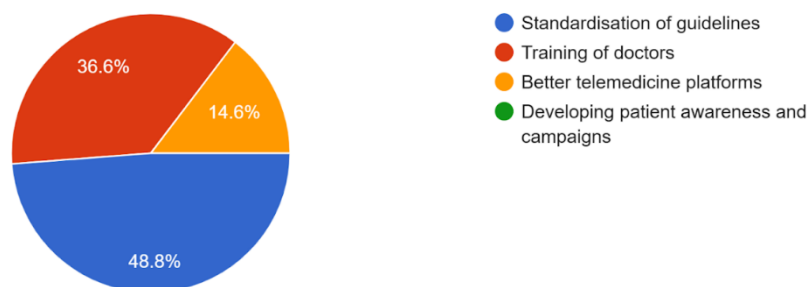


Figure 30: Most effective experience

Almost half of the respondents (48.8%) believe standardising telemedicine guidelines can contribute most to chronic care. The second highest is training doctors at 36.6%. The top interests are in better telemedicine platforms by 14.6%. None of the participants chose to implement patient awareness campaigns. Such findings demonstrate the desire of clinicians to develop clear guidelines and personnel training [Figure 30].

18. Which of the following support services do you think should be incorporated within telemedicine platforms for better chronic disease management?

41 responses

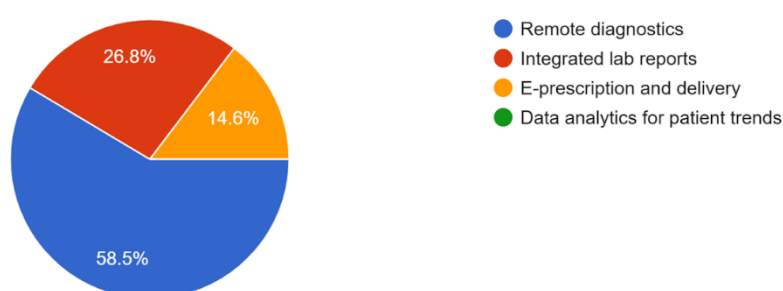


Figure 31: Support service

Most clinicians (58.5%) focus on remote diagnostics as a part of a telemedicine platform to increase chronic care. Access via lab report integration is available at 26.8%. Home delivery of E-prescription is selected by 14.6%. None of the respondents preferred patient-trend analytics. Such preferences reflect the priorities of doctors to use direct diagnostic tools rather than data-oriented analysis [Figure 31].

4.3 Thematic analysis: Qualitative Data

4.3.1 Step 1: Familiarisation with data

In this initial phase, the collected data have been properly reviewed to get familiarised with the gathered information from the interview process. In this stage, the collected information from the interview transcripts has been properly reviewed to understand their potential to justify the targeted research area.

4.3.2 Step 2 and 3: Coding and Theme Generation

Objectives	Experts	Codes	Theme
<p>“To analyse perceptions of doctors about the effectiveness of Telemedicine consultations in managing chronic disease conditions in Kerala.”</p>	<p>Doctor 1: “...sustainability of care, enhanced follow-ups, and convenience....”</p> <p>Doctor 2: “...increased the accessibility of hypertensive patients....”</p> <p>Doctor 3: “Telemedicine has also made...regular consultations....., relieving travel pressure....”</p> <p>Doctor 4: “...better in follow-up and compliance...”</p> <p>Doctor 5: “.....reduces cost and time, which enhances compliance...”</p>	<p>Enhanced</p> <p>Follow-Up</p> <p>Convenience</p> <p>Increased the accessibility</p> <p>Regular Consultation</p> <p>Relieving Travel Pressure</p> <p>Better In Follow-Up</p> <p>Reduces Cost And Time</p> <p>Telemedicine</p> <p>Sustainability of Care</p> <p>Compliance</p> <p>Patients</p>	<p>Theme 1:</p> <p>Accessibility, follow-up, convenience, reduced time, and costs:</p> <p>Effectiveness of telemedicine to manage chronic conditions in Kerala</p>
<p>“To identify key impacts of telemedicine consultations on</p>	<p>Doctor 1: “....better adherence to the medication....number of</p>	<p>Adherence to the medication</p> <p>Number of admissions</p>	<p>Theme 2:</p> <p>Reduced admission, emergency visits,</p>

<p>patient outcomes as reported by doctors in Kerala.”</p>	<p>admissions to hospitals was reduced....”</p> <p><i>Doctor 2:</i> “...lowered the possibility of changes and emergency visits...”</p> <p><i>Doctor 3:</i> “...remote monitoring, lifestyle changes were supported....”</p> <p><i>Doctor 4:</i> “ ... emergency admissions decreased greatly, enhancing the stability....”</p> <p><i>Doctor 5:</i> “....improved control over diet. Healthier practices were supported....”</p>	<p>Emergency visits</p> <p>Remote monitoring, lifestyle changes</p> <p>Emergency admissions decreased</p> <p>Improved control</p> <p>Healthier practices</p> <p>Possibility of changes</p> <p>Supported</p> <p>Stability</p>	<p>remote monitoring, and improved control: Impacts of telemedicine on patient outcomes in Kerala</p>
<p>“To evaluate key challenges faced by doctors in using telemedicine for managing chronic diseases in the region.”</p>	<p><i>Doctor 1:</i> “....poor access to the internet..... low digital literacy...”</p> <p><i>Doctor 2:</i> “...incorrect patient-reported data,....absence of developed monitoring devices...”</p> <p><i>Doctor 3:</i> “...lack of laboratory integration,</p>	<p>Poor access to the internet</p> <p>Low digital literacy</p> <p>Absence of developed monitoring devices</p>	<p>Theme 3: Poor internet access, low digital literacy, unstable network and technology resistance: Issues faced by doctors in using telemedicine</p>

	<p>lack of complete information of a patient....”</p> <p><i>Doctor 4:</i> “.....unstable network connection, the inability to quantify physical patterns...”</p> <p><i>Doctor 5:</i> “Technology resistance, poor connectivity, inability to read non-verbal communication....an obstacle to accuracy and quality of diagnosis”</p>	<p>Lack of laboratory integration</p> <p>Lack of complete information</p> <p>Unstable network connection</p> <p>Technology resistance</p> <p>Inability to read non-verbal communication</p> <p>Incorrect patient-reported data</p> <p>Inability to quantify physical patterns</p> <p>Poor connectivity</p> <p>Obstacle</p> <p>Patient</p> <p>Diagnosis</p>	
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<p>“To recommend strategies for improving the application and use of telemedicine by doctors in managing chronic disease conditions in Kerala.”</p>	<p>Doctor 1: “...well-structured guidelines, telehealth training, education...”</p> <p>Doctor 2: “...promoting validated home-monitor devices, teaching caregivers,....”</p> <p>Doctor 3: “...provision of telemedicine orientation sessions, the connection of labs to virtual platforms...”</p> <p>Doctor 4: “...Educating the caregivers, inclusion of remote monitoring gadgets...”</p> <p>Doctor 5: “...conduct patient awareness programs, to support governmental initiatives...”</p>	<p>Telehealth training</p> <p>Promoting validated home-monitor devices</p> <p>Telemedicine orientation sessions</p> <p>Educating the caregivers</p> <p>Conduct patient awareness programs</p> <p>Teaching caregivers</p> <p>Connection of labs</p> <p>Virtual platforms</p> <p>Support governmental initiatives</p>	<p>Theme 4:</p> <p>Telehealth training, orientation sessions, and patient awareness programs:</p> <p>Strategies to improve the use of telemedicine in Kerala</p>
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Table 8: Code making and theme generation

4.3.3 Step 4 and 5: Reviewing, defining, and naming themes

The use of different codes that were gathered from analysing the responses gathered from the interview transcript helped in establishing accurate themes. The development of the

themes assisted in critically analysing the collected data to justify the targeted research goals.

4.3.4 Step 6: Thematic analysis

Theme 1: Accessibility, follow-up, convenience, reduced time, and costs: Effectiveness of telemedicine to manage chronic conditions in Kerala

In the current era of digitalisation, the credible progress and utilisation of telemedicine consultation play a vital role in supporting the progress of timely follow-up. According to this aspect, *Senior Specialist Doctor 1* said that “.... telemedicine services have been positive, as it offers sustainability of care, enhanced follow-ups, and convenience....” it indicates that this innovation enables the scope of getting regular care. The optimisation of telemedicine enables patients to get remote consultation from doctors helps patients to get quick guidance to control the threat of chronic disease. Similar to this aspect, *Senior Specialist Doctor 2* justified that “.... regular monitoring helps better compliance....”, which specified that the optimisation of constant checking helps patients to understand their health progress. This view has also been supported by *Senior Specialist Doctor 3*, who said, “Telemedicine has also made it possible to have regular consultations with chronic kidney patients....”.

Therefore, it has been understood that regular monitoring helps patients to determine the persistent control of chronic illness. On the other hand, *Senior Specialist Doctor 4* contrasted that “.... telemedicine becomes better in follow-up and compliance....”, revealed that this advancement helps in effectively monitoring the prevalence of the chronic disease. The use of telemedicine consultation helps doctors to remotely and strategically address the chronic health concerns of patients in Kerala. Furthermore, *Senior Specialist Doctor 5* specified that “.....the use of telemedicine reduces cost and time, which enhances compliance...”, thus, it can be stated that the use of this advanced consultation helps in improving the accessibility of the patients towards better healthcare practices. Thus, it has been understood that the utilisation of this innovation helps patients to get quick solutions to cure chronic diseases by improving the standard of the healthcare services in Kerala. The views collected from the doctors highlighted that the use of telemedicine helps in improving the convenience and accessibility of healthcare services or remote consultation to get relief from chronic illness.

Theme 2: Reduced admission, emergency visits, remote monitoring, and improved control: Impacts of telemedicine on patient outcomes in Kerala

The implementation of telemedicine has had quantifiable benefits in the medical care of patients, especially for chronic diseases like diabetes, hypertension, kidney diseases, and respiratory problems. According to the response of *Senior Specialist Doctor 1* mentioned that, “.....better adherence to the medication.... number of admissions to hospitals was reduced....”, this highlighted that the telemedicine helps in controlling the scope of emergencies for the patients in Kerala. The use of telemedicine consultation helps in providing frequent health guidance from experienced doctors, guides patients to take proper medication and monitors their health progress. Furthermore, *Senior Specialist Doctor 2* specified that “.....lowered the possibility of changes and emergency visits or hospitalisations...”, which indicates that the consideration of telephonic consultation helps in controlling the progression of chronic diseases. Similar to this aspect, *Senior Specialist Doctor 3*, added that “...remote monitoring, lifestyle changes were supported and complicated conditions....”. Thus, it has been understood that telemedicine consultation helps in getting remote healthcare services to treat chronic diseases in Kerala.

The optimisation of this innovative healthcare practice also helps patients to take guidance from the doctors regarding lifestyle changes to improve their health conditions. On the other hand, *Senior Specialist Doctor 4* contrasted that “.... Frequent follow-ups helped people follow the treatment with the inhaler, and the emergency admissions decreased greatly....”. Therefore, it can be stated that the telemedicine consultation improves flexibility that helps in controlling the patients from frequent hospital visits and helps them to improve their health condition. Similarly, *Senior Specialist Doctor 5*, stated that “.... improved control over diet. Healthier practices were supported....”, this indicates that the optimisation of this advanced consultation assisted in controlling the growth of health complications. The consistent follow-up of telemedicine consultation helps in enhancing the health condition of the patients from Kerala. Hence, it has been determined that the consideration of the telemedicine consultation helps in reducing the emergency situation, frequent hospital visits, and remote monitoring for the chronic patients from Kerala.

Theme 3: Poor internet access, low digital literacy, unstable network and technology resistance: Issues faced by doctors in using telemedicine

In recent times, poor digital literacy and a lack of internet connection have been the major drawbacks that have created difficulties for doctors to offer telemedicine consultations to patients from Kerala. According to the response collected from *Senior Specialist Doctor 1*, who said that “... poor access to the internet, evaluation of physical symptoms is hard, and the patient has low digital literacy,”, it indicates that the existence of this issue disrupts the offering of telemedicine consultation. The lack of awareness regarding the use of innovative healthcare facilities and providing guidance to improve the health condition of the chronic patients from Kerala. Additionally, *Senior Specialist Doctor 2* added that “.....incorrect patient-reported data, the absence of developed monitoring devices at home....”, indicates that the presence of this issue restricted access to better healthcare services for patients suffering from chronic diseases. On the other hand, *Senior Specialist Doctor 3*, contrasted that “.... lack of laboratory integration, lack of complete information of a patient, connectivity....”.

Furthermore, it has been understood that a lack of connectivity and insufficient information regarding the diseases disrupts the progress of in-depth communication between patients and doctors. Similarly, *Senior Specialist Doctor 4*, supported that “unstable network connection, the inability to quantify physical patterns of patients....”, this indicates the difficulties of telemedicine in the rural area of Kerala. This perspective also specified that poor internet connectivity reduces the presence of awareness among patients regarding the significance of telemedicine consultation. Apart from that, *Senior Specialist Doctor 5* said that “.....Technology resistance, poor connectivity, inability to read non-verbal communication and the lack of physical examinations.....”. This indicates that the insatiable communication creates gaps among the patients and doctors to offer better healthcare service. Based on the detailed analysis of these responses, it has been determined that the lack of resistance towards adopting innovation disrupts the growth of telemedicine consultation in Kerala. Hence, it has been understood that the existence of these challenges has restricted doctors from adopting telemedicine to treat chronic patients in Kerala.

Theme 4: Telehealth training, orientation sessions, and patient awareness programs: Strategies to improve the use of telemedicine in Kerala

The interview with a senior doctor underscored the success of Telemedicine in Kerala, which is heavily focused on the structure trending to the healthcare professional border awareness programme and patient orientation session. Although the infrastructure has improved, the lack of familiarity among users remains a major concern. The healthcare provider continuously emphasised that the majority of patients or even practitioners remain unfamiliar with the telemedicine platform. As per the opinion of *senior doctor 1*, “...*patient has low digital literacy, which causes a lack of communication and low efficiency of comprehensive chronic care...*”. These reflected that uncertainty among patients about the basic telehealth procedure undermined uptake and highlighted the significance of introductory guidance. Among patients lack of digital literature increases early score communications bias, which delays the treatment procedure and reflects a gap between actual utilisation and accessibility of the platform.

On the other hand, **senior doctor 2** highlighted that “...promoting validated home-monitor devices, teaching caregivers, and the electronic links with the electronic medical records...” This aspect highlighted the strategy for strengthening daily health adoptions, including caregiver education, valid home monitoring devices and integration with electronic medical records, as well as a user-friendly app for older chronic patients. These measures highlighted a patient-centred approach purposing to improve accessibility and continuity of care, along with a long-term engagement with the telemedicine services. Based on the other responses from **senior specialist doctors 4 and 3**, it has been understood that hybrid consultation is relevant to the daily medicine orientation support to connect labs to the virtual platforms and also empower caregivers to assist patients throughout the virtual consultation. Furthermore, educating the caregivers by adding a remote monitoring gadget support to interconnect Delhi medicine with physical inspection and address the obstacles in the chronic respiratory management. As per the perspectives of **senior specialist doctor 5**, it is very important to conduct patient awareness programs to support government initiatives in order to improve digital infrastructure and increase awareness about the use of telemedicine in the management of chronic conditions of patients.

4.4 Findings

Medical professionals emphasise that telemedicine practices require well-defined protocols for their implementation. The main factor to improve care quality is through structured guidelines. The medical staff emphasises that professional development requires specific training programs for clinicians. And training to peers seems to be the preferred training way (Fig 28, 29, 30). The ability to diagnose patients accurately through remote platforms stands as a fundamental requirement for healthcare providers (Fig 1, 2, 3, 4, 5). The availability of laboratory information integrated into the system is essential for making clinical decisions (Fig 6, 7, 8, 9, 10, 11, 12). The implementation of e-prescription features helps to simplify the process of delivering treatment (Fig 13, 14, 15, 16, 17, 18). The collected responses demonstrate a unified commitment to standardise procedures while enhancing medical staff abilities and integrating diagnostic tools to achieve optimal chronic disease management through telemedicine (Fig 19, 20, 21, 22, 23, 24). Furthermore, it has been found that better adherence to the medication and reduction of hospital admission at the major outcome of implication of telemedicine (Fig 25, 26, 27).

Based on the thematic analysis, it has been found that telemedicine in Kerala has become a successful approach for managing chronic illnesses by improving care continuity, accessibility, and convenience (Theme 1). Doctors and senior consultants frequently emphasised that periodic follow-ups and remote consultations increased patient compliance, decreased treatment delays, and decreased expenses (Theme 2). Positive effects on patient outcomes included fewer hospital stays and emergency visits as well as improved management of chronic conditions through lifestyle counselling and remote monitoring. Optimal use was hampered by issues such as inadequate internet access, erratic connectivity, insufficient digital literacy, and technology reluctance. These obstacles frequently caused inequities in healthcare access and delayed communication. Doctors strongly suggested systematic treatments to address these problems, such as patient orientation meetings, telemedicine training for healthcare practitioners, caregiver guidance, and the integration of medical data with home monitoring devices. Overall, the results show that despite the benefits of telemedicine in improving the delivery of chronic care, its effectiveness depends on digital inclusion and organized awareness campaigns.

4.5 Discussion

4.5.1 Evaluation of the perception of doctors about telemedicine consultations in managing chronic disease

In this digital era healthcare landscape has been transforming with adoption of advanced technological tools for diagnosis and consultation of patients. From the analysed findings it has been identified that chronic disease management has evolved with adoption of telemedicine approach of consultation. In Kerala doctors have been mostly provided effective telemedicine consultation by meeting higher accessibility for patients and improve convenience. The result of this study has highlighted the beneficial outcome of adoption of telemedicine in terms of reducing time and cost (Figure 10, 11, 13, 22 and 23). Both primary and quantitative data have similar outcome, reflected strong interest and proposition of doctors for providing telemedicine consultation to improve long term chronic disease management, particularly for hypertension and diabetes. The telemedicine approach of consultation has been valuable to sustain uninterrupted services with remote consultation and ensure continuous care especially for rural patients who have accessibility issues in healthcare services due to limited support. Therefore, it can be evaluated that positive perception of doctors about telemedicine to support continuous care consultation, higher accessibility, lower cost and time have perceived influence over developing adoption and implementation in healthcare services.

From the literature review, it has been identified that hypertension and diabetes are the most common chronic disease which have been significantly managed by telemedicine approach (Jana and Chattopadhyay, 2022). Particularly during COVID 19 pandemic it has been observed that adoption of telemedicine has been beneficial to continue patient care despite the limited accessibility (Corbett *et al.*,2020). Although telemedicine consultation has lack of physical examination opportunities which has been a hindering factor to sustain major concern for healthcare services and diagnosis interventions (Haleem *et al.*, 2021a). On the contrary, present study has been highlighted cost effectiveness outcome of telemedicine have been responsible for lowering healthcare expenditure and develop perceived acceptance among doctors to sustain chronic disease management (Figures 19, 22,23, Themes 1). The recent study by Kaeley *et al* (2021), revealed that Indian telemedicine has been catered opportunities to provide good quality health services majorly for villages and metropolitan cities. This finding is well aligned

with concept of technology acceptance model which explain perceived usefulness and ease of use have develop adoption of telemedicine services. Therefore, it can be stated that perceived positive attitudes and perception of doctors about cost effectiveness and convenience of using telemedicine approach have been valuable to support chronic disease management in Kerala.

4.5.2 Impact of telemedicine consultations on the patient results in Kerala as expressed by doctors

Doctors use telemedicine platforms to give advice to patients in Kerala and have experienced various impacts. According to a past literature by Kruse *et al.* (2017), telemedicine enhances medication adherence, health monitoring, and patient follow-up, all of which contribute to the stability of chronic conditions. This is similar to the obtained findings, which showcase that patient compliance is increased by periodic check-ups as a part of telemedicine consultations, as expressed by doctors of Kerala (Figure 17, 22, 23, Theme 2). Kumar *et al.* (2020), stated that telemedicine can significantly lessen the requirement for orthopaedic patients to physically visit outpatient departments for follow-up. In support of this, the TAM has explained the importance of acceptance of technologies like telemedicine platforms for improving patient recovery.

Based on the review of literature in Ma *et al.* (2022a), it is found that telemedicine consultation and telemonitoring improved glycaemic management in diabetic patients (reduction of HbA1c) and significantly decreased systolic blood pressure in hypertensive patients. In this context, the results reflected that telemedicine helps in improving medication administration in Kerala, which boosts patient trust. From the viewpoint of Stoltzfus *et al.* (2023), patient access to health care in rural areas is bolstered by telemedicine. This indicates that individuals living in rural places in Kerala can get advice on good medicines that cure their chronic diseases.

Nagaraja *et al.* (2024), expressed that live video consultations are facilitated through telemedicine. In contrast, the findings highlighted more benefits such as lifestyle counselling and remote monitoring, reduced hospital stays, and emergency visits, all of which were among the positive benefits on patient outcomes. Anawade *et al.* (2024), have confirmed that health disparities are reduced via telemedicine usage by health

professionals. Therefore, the impact of telemedicine on patient satisfaction is found to be positive.

4.5.3 Challenges faced by doctors in managing chronic diseases through telemedicine in Kerala

Telemedicine platforms have different benefits, however; there are certain drawbacks that hinder doctors from giving their specialised services to patients (Figure 25, Theme 3). From the literature review of Raju and Sistla (2022), it is understood that both customers and providers are now concerned about telemedicine facilities since they are not accredited. This contradicts the findings where it is observed that internet connection problems is a major issue for providing telemedicine consultants to the patients in Kerala. Adams *et al.* (2021), have highlighted that reliable internet coverage has been expressed by patients during their access to telemedicine platforms. From the theoretical foundation of TAM, it has been understood that in order to use technologies like digital platforms of telemedicine, acceptance by users is required, which motivates them to invest in having a good internet connection.

On the other hand, it has been found that the existence of poor digital literacy was considered as the major issue that disrupts the progress of telemedicine (Figure 25, Theme 3). In this context, Huda *et al.* (2025), stated that the low digital literacy created difficulties for the patients to access the internet to get telemedicine consultation. Thus, it has been understood that the use of TAM theory justified that the poor digital literacy created difficulties in accessing benefits from telemedicine by the chronic patients from Kerala. Furthermore, the existence of poor resistance to change also creates difficulties for the doctors to use telemedicine to treat chronic patients. In this aspect, past research by Khan *et al.* (2025), highlighted that the lack of proper training and legal ambiguities are the major issues that increase the issue of resistance to change. The existence of this issue creates difficulties establishing proper communication between the doctor and patients, which creates difficulties in treating chronic disease.

4.5.4 Identification of strategies to improve the use of telemedicine in chronic disease management in Kerala

Telemedicine has emerged as a transformative approach to healthcare delivery, particularly in regions with limited resources and high patient demand. Its

implementation, however, is influenced by the combination of technological readiness, patient awareness, and healthcare provider engagement. The findings of the study have indicated that in Kerala, the success of telemedicine in chronic disease management has depended on access to the digital platform as well as on a structured strategy like orientation sessions, professional training, and patient awareness programmes (Figures 28, 29, 30). The interview has revealed that patients often struggle with the familiarity, leading to hesitation (Theme 4, participants- senior doctor 2). Moreover, it has been understood that improvement of monitoring systems and digital literacy can increase the use of telemedicine in chronic disease management. (Fitzpatrick, 2023), highlighted that digital literacy is very important to improve equitable access to telemedicine in chronic disease management. On a similar note, the literature review of Haleem *et al.* (2021), found that awareness development about telemedicine supports to enhances a greater trust in remote healthcare services.

Apart from that, telemedicine services require doctors and nurses also receive proper training to handle virtual consultations, not just technically but also in communication. This aligned with the existing studies, Ma *et al.* (2022), who argued that interpersonal and technical training improved confidence along with service quality in telehealth delivery. The socio-technical system theory helps this finding emphasise that both technological and human systems must work together for successful adoptions. Bradford *et al.* (2015), stated that community awareness is very important because people living in a privileged area are not aware of the use of telemedicine services, thus, the arrangement of conduct awareness camps will ensure acceptance and efficiency. In that case, the aspects of TAM theory support to explain that the enhancement of awareness improves perceived usefulness, which drives adoption. Therefore, it can be stated that the conversation affirms that awareness, orientation, and training are critical tactics for long-term adoption of telemedicine in Kerala, which is consistent with both theoretical and literary viewpoints.

4.6 Conclusion

4.6.1 Research conclusions

Drawing from the overall discussion and analysis, it can be summarized that telemedicine dynamics providing cost effectiveness and convenience have been relevant to enhance

accessibility and follow ups for chronic disease management provided by doctors in Kerala which is significantly addressed key research questions.

4.6.2 Strategic conclusions

It has been identified that action needed based on this research is mainly required to prioritise technological innovation in healthcare and provide training for healthcare professional to enhance their awareness and understanding of the telemedicine approach. Improving digital literacy knowledge and awareness of relevance for improving implementation and acceptance of telemedicine.

4.6.3 Recommendations

A practical recommendation is suggested to standardise the training program for doctors to provide effective consultation services. Furthermore, it is also necessary to focus on developing accessibility and addressing compliance issues. Actionable insights are relevant for developing management in healthcare to improve chronic disease consultation services in Kerala, aligning with regulatory standards.

Chapter 5: Conclusion and Recommendations

5.1 Summarisation of study

The study has examined the perspectives of doctors on the effectiveness, challenges, impact, and improvement strategies for telemedicine to manage chronic disease in Kerala. The study has analysed perspectives of effectiveness to recognise the impact on patient outcome, proposing strategies and evaluating challenges for improving the use of telemedicine in chronic disease. A mixed-methods design has been applied along with purposive sampling to support finding senior specialists to complete the survey and interview. The quantitative data have been analysed pie chart analysis, and qualitative data were thematically analysed.

According to the results, most physicians believe that telemedicine is a useful tool for managing long-term illnesses. It was thought to be successful in improving continuity of care, decreasing needless hospital stays, and promoting patient compliance. The study also demonstrated how telemedicine promoted lifestyle changes, improved patient monitoring, and aided in treatment adherence, especially through the facilitation of routine follow-ups and remote consultations. However, the study also found a number of obstacles that prevent telemedicine from reaching its full potential. These included inconsistent internet access, especially in rural areas, patients' low digital literacy, their reluctance to embrace new technology, and challenges in incorporating validated home monitoring devices and diagnostic facilities into virtual care systems. These difficulties were thought to be obstacles to using telemedicine to manage chronic diseases in a thorough and easy manner.

The study has provided physicians with recommended organised training programs for healthcare professionals, patients and caregivers. Moreover, education and awareness campaigns, pharmacy integration with telehealth platforms, and easier access to validated home monitoring devices were also added in this study. In order to promote safe and efficient telemedicine practice, the findings of the study also emphasised the significance of policy support, the development of digital infrastructure, and well-defined protocols.

Overall, the dissertation showed how telemedicine has improved access, adherence, and continuity of care, making it a significant enabler of chronic disease management in

Kerala. However, removing organisational, literacy, and infrastructure-related obstacles is necessary for its long-term efficacy. According to the findings, doctors' opinions of usefulness and usability have a significant impact on adoption, which is consistent with the ideas of the Technology Acceptance Model.

5.2 Limitations of the study

This study has a number of limitations that highlight that the results cannot be applied to other healthcare professionals, like primary care physicians or nurses, or other parts of India with different healthcare infrastructures. The reason behind the limitation was the limited sample size, that restricted to senior doctors and specialists in Kerala. Second, because of the cross-sectional design, data were only gathered once, making it impossible to evaluate how attitudes and behaviours might change as telemedicine adoption develops. Third, the use of self-reported data may have resulted in bias because physicians may have given answers that were swayed by social desirability or favourable experiences in the past. Furthermore, the ability to triangulate results was limited by the exclusion of objective patient outcome data, such as clinical indicators or hospital admission rates. Lastly, the differences in telemedicine platform design and internet connectivity among various healthcare settings may have influenced experiences.

5.3 Practical and academic recommendations

The conclusion of the study was to provide significant directions for research and practice. Practically speaking, healthcare organisations ought to give top priority to creating precise and uniform guidelines for the application of telemedicine in the treatment of chronic illnesses. In order to guarantee safety and uniformity across care settings, these should specify eligibility, documentation, and escalation procedures. Physicians must participate in training programs to improve their proficiency with telemedicine platforms, medico-legal issues, and remote patient interaction. In order to close the digital literacy gap and foster trust in virtual care, patient and caregiver education should also be integrated into service delivery. The effectiveness of virtual care will be further enhanced by expanding rural connectivity and incorporating pharmacies, labs, and diagnostic services into telemedicine platforms. When combined with policy backing, infrastructure improvements can improve equitable access, especially for marginalised communities.

Future scholarly research will concentrate on combining objective patient outcome data, such as treatment adherence, emergency visits, and disease control indicators, with perceptions of clinicians. Greater insights into both quantifiable results and the lived experiences of physicians and patients will be obtained by incorporating mixed-method approaches. In order to investigate the relationship between perceived utility, usability, and behavioural intention, researchers can also modify and test theoretical models like the Technology Acceptance Model in the context of chronic diseases. These academic contributions will not only extend the evidence-based, but also inform policies as well as practices that make telemedicine more scalable, efficient and sustainable in the long run.

5.4 Suggestion for future research

The scope of this study will broaden in future research by incorporating larger and more varied samples that include primary care physician nurses and patients, in addition to senior specialists. It would be easier to identify regional differences in infrastructure adoption and patient outcomes if competitive studies were conducted across various states and healthcare systems of India. In order to monitor attitudes towards telemedicine change over time, particularly as digital literacy and new technologies are developed, longitudinal research is also required. Stronger evidence on the efficiency of telemedicine in chronic care will also come from incorporating objective outcome measures like clinical indicators, hospital readmission rates and long-term treatment adherence. Furthermore, understanding relational elements like trust, communication, and satisfaction may be enhanced by a mixed-method approach that integrates quantitative data with qualitative insights from physicians and patients.

5.5 Reflection on dissertation

This dissertation has been a worthwhile academic and personal learning experience. My comprehension of how telemedicine is influencing the management of chronic disease has improved as a result of the research process, which has also made it clear how crucial it is to match technology with the needs of patients and clinicians. I learned how to strike a balance between statistical rigour and thematic interpretation by using a mixed-method approach, which ensures that both numerical patterns and life experiences were recorded. At the time of the interview, I also improved my reflexivity, data analysis and critical

thinking abilities. Above all, this dissertation has helped me better understand how evidence-based research informs academic disclosure, healthcare practice and police.

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Appendices

Appendix A – Survey questionnaires

Demographic questions

1. What is your area of speciality?

- Cardiology
- General medicine
- endocrinology
- Rheumatology
- others

2. How many years of experience do you have in practice in telemedicine?

- 1 year
- 2 to 3 years
- 4 to 5 years
- More than 5 years

Objective-based questions

3. How effective do you find telemedicine consultation for managing chronic disease condition?

- Very effective
- Somewhat effective
- neutral
- Somewhat ineffective

- Very ineffective

4. As for your experience, which chronic disease is best managed by implication of telemedicine practice?

- Cardiac diseases
- Hypertension
- Asthma
- None of the above

5. How often do you rely on telemedicine follow-up consultation for chronic disease management?

- Always
- Often
- Occasionally
- Rarely
- Never

6. How often do telemedicine consultations provide improved medication adherence among chronic disease patients?

- Always
- Often
- Sometimes
- Rarely
- Never

7. Which is the most common outcome that has improved because of implication of telemedicine in chronic disease management?

- Timely follow-ups
- Higher accessibility to remote care
- Patient compliance
- Overall disease management
- None

8. In your opinion, what is the main benefit of telemedicine in chronic disease management and care?

- Reduce hospital visits
- Cost effective
- Time efficiency for doctors
- Better patient monitoring
- None of the above

9. According to your viewpoint, how significant is the lack of physical examination in Telemedicine consultation for managing chronic disease conditions?

- Very significant
- Somewhat significant
- Neutral
- Somewhat insignificant
- Not significant at all

10. What is the most common and primary challenge you have faced during conducting elements in practice and consultation?

- Inadequate technical and infrastructural support

- Lack of digital literacy among patients
- Ineffective and poor Internet connectivity
- Difficulties in clinical assessment

Lack of adherence to standard protocols

11. How often do you find difficulties in building doctor-patient rapport during telemedicine consultation?

- Always
- Often
- Occasionally
- Rarely
- Never

12. According to your experience and viewpoint, which aspect of telemedicine limits your capability to manage chronic disease conditions efficiently?

- Ineffective communication and gaps in interaction
- Lack of physical examination
- Poor tracking of follow-ups
- Inconsistency in patient records

13. What form of training would be relevant to improve your use of telemedicine for chronic disease management?

- Peer mentoring
- Government-supported modules
- Online workshops

- Training on communication
- Simulation-based training

14. Which would be the most effective for improving your experience with telemedicine for chronic disease management and care?

- Standardisation of guidelines
- Training of doctors
- Better telemedicine platforms
- Developing patient awareness and campaigns

15. Which of the following support services do you think should be incorporated within telemedicine platforms for better chronic disease management?

- Remote diagnostics
- Integrated lab reports
- E-prescription and delivery
- Data analytics for patient trends

Appendix B – Interview questions

1. How do you describe your overall experience in telemedicine consultation to manage chronic disease patients with diabetes or hypertension?
2. According to your opinion, what are the factors contributing to telemedicine effectiveness in your practice?
3. Can you explain a specific example of how telemedicine practice has impacted patient outcomes, like self-management or medication adherence in managing chronic diseases?
4. What are the most significant challenges you have faced while using telemedicine consultation for managing chronic disease conditions, and how do these challenges affect your ability to provide quality services and care?
5. What strategies have you found to be helpful in overcoming the challenges to sustain implication of telemedicine for managing chronic disease conditions?
6. How do you perceive the role of patient engagement and technological infrastructure in influencing the success of telemedicine for managing chronic disease in your practice?