A STUDY ON THE EFFECTIVENESS OF TELEMEDICINE ON HEALTH OUTCOME AMONG MALAYSIANS

BY

BOO SHI QI

CHAI YEE LING

JOAN HENG KA YEE

LAI YAN XIN

TAN SUE RYNN

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is 18,889 words.

Name of Student:	Student ID:	Signature:
1. BOO SHI QI	21ABB07076	
2. CHAI YEE LING	21ABB07121	
3. JOAN HENG KA YEE	22ABB00292	
4. LAI YAN XIN	20ABB06048	
5. TAN SUE RYNN	20ABB04622	

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List of Abbreviations

AIDS	Human Immunodeficiency Syndrome
COPD	Chronic Obstructive Pulmonary Disease
HBM	Health Belief Model
ICU	Intensive Care Unit
N	Sample Size
p-Value	Probability Value
RPM	Remote Patient Monitoring
SCT	Social Cognitive Theory
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TM	Telemedicine

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Preface

The study "A Study on The Effectiveness of Telemedicine on Health Outcome Among Malaysians" originated from our recognition of telemedicine's pivotal role in modern healthcare. As deeply engaged scholars and practitioners in healthcare delivery, we observed Malaysia's persistent healthcare barriers, particularly in providing equitable services across diverse urban and rural areas.

Driven by a fervent desire to address these challenges, we embarked on a journey into telemedicine research, aiming to contribute to Malaysia's healthcare advancement. Telemedicine, with its ability to bridge geographical gaps and improve patient care, became our primary focus due to its transformative potential.

Our decision to study telemedicine's effectiveness among Malaysians was guided by an understanding of the country's unique healthcare landscape, marked by urban-rural disparities and diverse ethnicities. We recognized the need to explore telemedicine's impact within this complex context. Our research approach was underpinned by a commitment to scientific inquiry and evidence-based practice. Employing a multidisciplinary approach, drawing from healthcare, technology, and social sciences, we aimed to uncover the intricate dynamics of telemedicine adoption in Malaysia.

Motivated by our belief in telemedicine's ability to revolutionize healthcare delivery, we sought to shed light on its effectiveness and inform policy decisions and clinical practices. We aimed to identify key success factors and drive positive change within Malaysia's healthcare system.

We are grateful for the support and collaboration of colleagues, mentors, and stakeholders throughout this endeavor. We hope this research study will spark further dialogue, innovation, and progress in telemedicine and healthcare delivery, not only in Malaysia but also globally.

Abstract:

The provision of telemedicine services through telecommunications technology has become a transformative solution in the field of healthcare delivery. In the case of Malaysia, where disparities in access to healthcare persist, telemedicine is expected to improve health outcomes in both urban and rural settings. However, understanding its effectiveness requires examining a variety of factors, including patient satisfaction, accessibility to patient outcomes, and barriers faced by telemedicine users. This study aimed to investigate the effectiveness of telemedicine on health outcomes for Malaysians, focusing on patient satisfaction, auxiliary functions, and barriers to adopting telemedicine. With a hybrid approach, quantitative data on patient health outcomes into the patient experience is collected. Preliminary findings suggest a positive correlation between patient satisfaction and telemedicine effectiveness, underscoring the importance of user experience in healthcare delivery. In addition, assistive features such as remote patient monitoring and real-time interactive services play a vital role in improving patient outcomes and care coordination. However, barriers to the adoption of telemedicine, including technical limitations and privacy concerns, have prevented its widespread implementation. By addressing these barriers and leveraging the benefits of telemedicine, Malaysia can improve the accessibility and quality of healthcare services, especially for underserved populations. This research adds to a growing body of knowledge on the role of telemedicine in healthcare transformation, providing insights for policymakers, healthcare providers, and technology developers.

Keywords: Telemedicine, Health Outcome, Patient Satisfaction, Auxiliary Functions, Barriers, Malaysia.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

In our research, we aim to investigate the effectiveness of telemedicine on health outcome among Malaysian. Chapter 1 will encompass the research background, research problem, research objectives, research questions, hypotheses, and significance of the study.

1.1 Research Background

Health is a vital component of living life to the fullest. Maintaining good health is essential for experiencing life to its maximum potential. The healthcare sector, recognized as one of the most expansive industries globally, holds immense significance for everyone (Medical News Today, n.d.). This sector encompasses enterprises involved in delivering clinical care, producing pharmaceuticals and medical devices, and furnishing auxiliary services such as medical insurance. Furthermore, the field of health also holds substantial importance as a major source of employment.

Telemedicine pertains to the provision of healthcare services through the utilization of telecommunications technology, enabling distant delivery of medical treatment. The utilization of audio, video, and various communication tools is used to enhance the processes of diagnosing, treating, consulting, and monitoring patients. Telemedicine improves the quality of healthcare services at the local level and increases patient contentment by enabling patients to consult with expert doctors within their own communities. This eliminates the need for them to invest time and financial resources in traveling to major urban areas. Starting from the mid-1990s, there has been a swift reduction in the cost of technology, leading to increased affordability of videoconferencing for a broader range of healthcare recipients.

In 1996, the Office of Rural Health Policy carried out a survey on rural hospitals to evaluate their adoption of telemedicine. Out of the 2,472 hospitals that were

included in the survey, 499 had implemented telemedicine in some form. Among these, around one-third had utilized videoconferencing to provide different types of medical services. Notably, services such as cardiology, dermatology, and psychiatry were utilized by over 30% of these hospitals at least once (Nesbitt et al., 2000).

Due to the ongoing advancements and progress in contemporary network information technology, coupled with the increasing expectations for healthcare services, leading to the emergence of a novel telemedicine healthcare paradigm. Social distancing, a crucial measure for preventing COVID-19, forms the fundamental basis of telemedicine. At the outset, telemedicine primarily served as a means for general practitioners to consult with specialized colleagues located in distant areas like medical centers or campuses, especially in regions that were remote or difficult to access. However, this scenario has shifted considerably with the widespread availability of the Internet. The development of communication gadgets capable of delivering excellent audio and video connections has opened up significant possibilities for offering remote patient support, whether it's within one's residence, workplace, or even nursing facilities (Shaver, 2022) .

Among the different categories of telemedicine, three primary types stand out: store and forward telemedicine, remote monitoring, and real-time interactive services. The **store-and-forward telemedicine** approach enhances the accessibility of patient records and medical data over significant distances (“Types of Telemedicine Serve,” 2022). This method operates in a manner similar to email, where patients transmit medical data like lab results, x-rays, and other health-related information to healthcare professionals. Subsequently, these crucial details are shared with specialized consultants, such as radiologists or physicians situated in different locations. The main advantage of this telemedicine variant is that it doesn't necessitate immediate involvement from both the sender and receiver (MedleyMed, n.d.).

Another crucial and widely employed telemedicine category is **remote monitoring**, enabling patients to autonomously track their health using diverse technological devices designed to measure and document vital signs (MedleyMed,

n.d.). RPM (Remote Patient Monitoring) has the potential to greatly reduce the duration a patient spends in the hospital, offering them the opportunity to recuperate under observation within the comfort of their home. Although technology enabling patients to self-monitor for such conditions has existed for some time, contemporary advancements now facilitate the remote sharing of crucial health information with medical practitioners and healthcare experts. Advanced equipment can seamlessly transmit essential medical data to doctors automatically, enhancing their ability to deliver superior care and promptly identify early indications of potential issues (Types of Telemedicine Serve, 2022).

Real-time interactive telemedicine involves secure videoconferencing, messaging applications, or other online communication platforms to deliver immediate medical care. This form of telemedicine can even be conducted through phone calls. Primary care physicians and psychiatrists extensively employ this form of telemedicine. It offers prompt healthcare, particularly in urgent situations. Real-time interactive telemedicine proves highly effective for follow-up appointments and supervising medication regimens (Writer, 2022).

Telemedicine Platform in Malaysia

In line with the global trend of rising demand for telehealth services and infrastructure, Malaysia has introduced several innovative telemedicine platforms. For instance, the first multidisciplinary digital healthcare platform in Malaysia has been launched in 2021, namely "**Carepool Asia**", it is subscription-based model starting at RM170 per month for two users, offering unlimited teleconsultations with access to doctors, dietitians, and mental health experts (Gunasegaran, 2021). Furthermore, one of Malaysia's leading telemedicine platforms, "**Teleme**" has linked patients with healthcare professionals, pharmacists, and medical laboratories online. Their offerings encompass online consultations, electronic prescriptions, medication delivery or pickup, and health assessments. Additionally, they feature a reminder system and maintain a personal health record, tailoring patients' healthcare experience while eliminating constraints related to time and location for medical services. Other telemedicines which allow for online consultations are "**Doctor2U**" and "**Doc2us**", while telemedicine platforms that

provide online appointment booking services are "**BookDoc**" and "**GetDoc**". In 2020 "**GetDocPlus**" was also launched in Malaysia, which enables users to access a network of over 400 Panel Clinics in Singapore and Malaysia, offering various medical services at exclusive rates. (Jireh Group, 2020). Another telemedicine application example is "**Health Metrics**", it is designed for users to monitor and keep tabs on different facets of their health and overall well-being. These applications commonly offer functions like monitoring daily physical activity, tracking heart rate, documenting dietary choices and exercise routines.

Choosing Malaysia as the focus of research on telemedicine's effectiveness in improving health outcomes presents several reasons. One key factor is Malaysia's urban-rural divide, characterized by varying levels of healthcare infrastructure and service accessibility. Urban areas generally boast better healthcare facilities and services, while rural areas often contend with limited infrastructure and healthcare professional shortages (Mohd Noh et al., 2022). Understanding telemedicine's effectiveness in both settings can help healthcare systems allocate resources more efficiently to cater to diverse urban and rural needs.

Lastly, the implementation of telemedicine in Malaysia is still in its early stages, with various barriers hindering its widespread adoption. For instance, research by Ang and her colleagues (n.d.) indicates a scarcity of telemedicine use among healthcare professionals in Malaysia, with earlier data showing that only a minority were receptive to the idea of reducing physical interactions through telemedicine. This resistance may stem from technological limitations, Internet connectivity issues, lack of trust and other factors. Thus, studying the effectiveness of telemedicine can provide insights into its successful integration into the Malaysian healthcare system and its positive impacts on patients.

1.2 Research Problem

Telemedicine has experienced swift expansion and widespread adoption in recent times. In an overarching assessment of nations belonging to the Organization for Economic Co-operation and Development, 83% of evaluations concluded that

telemedicine was equally efficient as in-person care, whereas 39% determined that utilizing telemedicine was financially prudent (Eze et al., n.d.).

Telemedicine presents convenience and a range of advantages for both patients and clinicians in contrast to traditional service delivery approaches. Through a study conducted by Snoswell and his colleagues, shows where the telehealth interventions resulted in either similar or increasingly positive clinical outcomes for patients when compared to usual care (Snoswell et al., 2021). Ekeland (2010) and colleagues also undertook a similar analysis in 2010, aggregating available evidence concerning the general efficacy of telehealth. Their findings indicated a positive trend, yet they emphasized the necessity for more robust evidence and controlled trials to establish the comprehensive effectiveness of telehealth (Ekeland et al., 2010).

Despite the available evidence, the widespread global adoption of telemedicine has only gained momentum in recent times. In England, for example, data for elderly patients reveal that the rate of remote consultations more than doubled between February and May 2020, following a legislated transition to total triage in the English National Health Service. In the Netherlands, the transition from primarily face-to-face to virtual consultations occurred within a week as part of the pandemic response strategy (Valdes et al., 2022). Notable examples of high-income countries with established telemedicine programs include the United States, and several European nations. On the other hand, the adoption of such services in low- and middle-income countries has primarily been hindered by limitations stemming from financial resources and inadequate technology infrastructure.

Malaysia stands out as one of the rapidly developing nations in Southeast Asia and holds an upper-middle income status. Its per-capita income is approximately RM 46,524 (equivalent to US $11,512). Nevertheless, there are arguments suggesting a lack of commitment and concerns within the Malaysian healthcare sector regarding telemedicine. A survey conducted by Medical Protection (2021) revealed that a significant majority of doctors, around 96%, express concerns about the potential exclusion of vulnerable patient groups if medical consultations

shift primarily to online platforms. A study in the International Journal of Environmental Research and Public Health (2020) highlighted the potential of telemedicine to enhance healthcare access in Malaysia.

Malaysia's historical mortality burden has been an important source of be concerned, particularly given the high incidence of non-communicable diseases (NCDs) as the leading cause of death (Khaw et al., 2023). According to a study published in Medical Journal Malaysia (2024), the benefits of teleconsultation for NCD monitoring revolve around two primary themes: better care delivery efficiency and benefits to health care providers. Participants in their survey frequently discuss two main benefits of the teleconsultation service: avoiding long clinic waits and saving money on transportation. This not only enhances convenience but also significantly reduces costs for both patients and healthcare providers, particularly important during economic downturns. Additionally, teleconsultations enhance patient safety by minimizing exposure to COVID-19 in crowded clinics. Moreover, participants note that patients feel more empowered to manage their health due to improved disease monitoring through regular follow-up sessions (Medical Journal Malaysia, 2024). Telemedicine has a profound impact on non-communicable diseases (NCDs) by providing convenient access to healthcare services, allowing for timely diagnosis, monitoring, and management.

On the other hand, in the context of Malaysia, an obstacle to achieving UHC will be ensuring that public sector service quality improves and capacity expands to meet rising demand (Hoang et.al, 2014). Malaysia confronts challenges in providing healthcare to rural regions due to disparities in population density, accessibility, and available services between East and Peninsular Malaysia (Dominick, 2019). Telemedicine contributes significantly to Malaysia's Universal Health Coverage (UHC) by boosting access to healthcare services, particularly in remote or underserved areas. Telemedicine enables people to consult with healthcare specialists remotely, removing geographical boundaries and reducing travel time and costs associated with accessing healthcare facilities.

Hence, it’s crucial to determine the effectiveness of telemedicine on health outcome among Malaysians. This study proposed to investigate the patient

satisfaction on telemedicine. Cole (2021) and his colleagues' research shows that their patients were easy to talk with the telemedicine doctor over the screen and shows highly satisfaction result on telemedicine. However, other researchers found different results. Park (2021) research shows that there is low level of satisfaction on telemedicine. In the context of health outcome, Bhaskar (2020) argued that telemedicine has a poor result on the health outcome. Besides, Ly (2017) studies also shows significant relationship between barriers and effectiveness of telemedicine.

With all these studies on telemedicine providing mixed result with significant, no significant, positive, or negative relationship, a clear picture on the relationship between telemedicine and health outcome cannot be established. Thus, a study on effectiveness of telemedicine on health outcome is crucial. However, studies related to these among Malaysian have received less attention in the past. Therefore, addressing this gap is the primary objective of the present study.

1.3 Research Objectives

1.3.1 General Objective

I. To determine the effectiveness of telemedicine on health outcome among Malaysian.

1.3.2 Specific Objective

I. To determine how the patient satisfaction impacts the effectiveness of telemedicine among Malaysians.

II. To determine the auxiliary function on patient outcome resulting from telemedicine among Malaysians.

III. To determine the barriers while using telemedicine among Malaysians.

1.4 Research Question

I. Is there a significant relationship between patient satisfaction and the effectiveness of telemedicine?

II. Is there a significant relationship between the auxiliary function on patient outcome and the effectiveness of telemedicine?

III. Is there a significant relationship between the barriers and the effectiveness of telemedicine?

1.5 Hypothesis of study

I. There is a significant relationship between patient satisfaction and the effectiveness of telemedicine.

II. There is a significant relationship between the auxiliary function on patient outcome and the effectiveness of telemedicine.

III. There is a significant relationship between the barriers and the effectiveness of telemedicine.

1.6 Significance of Study

The research topic "Effectiveness of Telemedicine on Health Outcomes" carries substantial significance within the realm of contemporary healthcare and technological progress. Telemedicine involves the remote provision of medical services using digital technologies and telecommunications. (Askarov, 2021) This approach holds the potential to surmount geographical obstacles, offering healthcare access to individuals in distant or underserved areas. The study's focus could be on elucidating how telemedicine enhances patients' access to medical consultations, diagnoses, and treatment, all without necessitating in-person visits.

Consequently, this could lead to an overall improvement in healthcare accessibility.

Moreover, the study could delve into how telemedicine widens the scope of healthcare services for demographics facing limited mobility, such as the elderly or disabled. By scrutinizing its effects across various population groups, the research might underscore how telemedicine contributes to impartial healthcare delivery. Another aspect to consider is the potential cost reduction facilitated by telemedicine, which stems from a decreased requirement for frequent in-person appointments, travel expenses, and hospital stays. Assessing the economic advantages of telemedicine could offer valuable insights into its role in optimizing the allocation of healthcare resources. (Enbibel, 2021)

The study's central focus could be on evaluating how telemedicine proves effective in the management of chronic ailments. The research can analyze whether outcomes are improved for individuals with chronic illnesses through remote monitoring, virtual appointments, and customized care strategies. Additionally, an exploration into patient perspectives and contentment levels regarding telemedicine services can illuminate the human dimension of healthcare provision (Nelson et al., 2023). This comprehension of how patients perceive interactions and consultations with healthcare providers through telemedicine has the potential to guide enhancements in service quality for the future.

1.7 Chapter Layout

Chapter 1: Introduction

Effectiveness of telemedicine and three independent variables are discussed in connection to one another in this chapter (patient satisfaction, health outcome, barriers).

Chapter 2: Literature Review

For Chapter 2, this research highlights the underlying theories, the discussion of the variables (**dependent**: effectiveness of telemedicine; **independent**: patient satisfaction, auxiliary function on patient outcome, barriers). Besides, a conceptual framework will be generated for further understanding of the relationship between variables. Hypotheses will be formulated to assess the validity of the relationship between the variables.

Chapter 3: Research Methodology

The third chapter outlines information collecting procedures based on the relevant study design and data collection technique, which identify the source of the data. Furthermore, the sampling design can be categorized into five main components: defining the target population, establishing the sampling frame and location, identifying sampling elements, selecting appropriate sampling methods, and determining the sample size. This chapter also delves into the selection of research tools, constructing measurements, processing data, and conducting data analysis.

Chapter 4: Data Analysis

Chapter 4 will focus on discussing the data collected from questionnaires. This involves conducting a descriptive study where respondents' feedback is categorized based on demographics, aiming to identify significant trends in their perceptions. Subsequent steps include evaluating scales and conducting inferential analysis.

Chapter 5: Discussion and Conclusion

The key discoveries are covered in Chapter 5. Additionally, it includes the study's implications, limitations, conclusions, and suggestions for future studies.

1.8 Chapter Summary

As a summary, this first chapter has provided information about the study's significance and hypotheses, research background, research objectives, and research questions.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this topic, the assertion made in the literature review will be supported in this investigation by articles from scholarly journals and other sources. We will talk about the literature review, suggested conceptual framework, and hypothesis creation as they pertain to the underlying ideas under discussion.

2.1 Underlying Theories

2.1.1 Technology Acceptance Model (TAM)

Despite the accepted advantages, telemedicine is unlikely to be an invaluable healthcare service until people begin making use of it. (Kayserili & Colkesen, 2023) As a result, a key factor will be how end-users tend to feel about adopting telemedicine services. It is crucial to first understand the aspects affecting peoples' perceptions in order to encourage the use of telemedicine services. Thus, the fundamental theoretical foundation for this study's research model development is the Technology Acceptance Model (TAM). The TAM concentrates on how people's intentions to adopt a technology are influenced by their perceptions of that technology's usability and ease of use. (Nelson Kakulla, 2020)

The refereed journal article has created a number of models over the last few decades to comprehend the characteristics of user adoption of technology. For numerous information technology-based applications, these models undergo repeated verification. However, according to Rho et al. (2014), the most solid and well-established basis for technology acceptance is represented by the TAM developed by Davis. This research strategy assists our research focuses on using a questionnaire survey to examine the main drivers of telemedicine services from the perspective of Malaysian. Technology acceptance is the voluntary decision made by an individual to use new technology. Users' willingness to use

technology is a critical component for the telemedicine's effective adoption and utilization. (Smirnova et al., 2021)

TAM, which has a basis in sociology and psychology, is the model that is most frequently used in a variety of research investigations. TAM's main objective is to foresee how consumers will embrace new technology and to draw attention to information system design flaws before widespread adoption (Jin & Chen, 2015).

However, a number of studies have raised questions about using TAM's original principles to describe consumers' intentions towards health information technologies. The usage intentions of respondents for telemedicine services cannot be well described by a small number of variables. People use telemedicine services differently depending on a variety of social and behavioural aspects that are not taken into account by the TAM model (Hsieh, 2016). According to several studies, the interaction of a number of social elements, such as social influence and enabling environments, may significantly impact how users behave when it comes to accepting new technology.

The TAM is crucial in revealing the telemedicine-related elements that influence the decisions of Malaysian to adopt and use telemedicine platforms. (Rosário & Rosário, 2024) Their view of how simple it is to use these platforms—from registration to consultation—plays a critical role in determining how likely people are to use them. Their attitude towards its adoption is also influenced by how they view the advantages of telemedicine, such as quick access to medical knowledge and less travel time. (Nouira & Souayeh, 2023) Researchers can identify the precise features of telemedicine that affect how effective it is at improving health outcomes by better understanding these perspectives.

2.1.2 Health Belief Model

The Health Belief Model (HBM) is based on the idea that an individual's beliefs about health risks, the gravity of those risks, the advantages of taking preventive measures, and the obstacles to doing so have a big impact on their behaviours. (Moodi et al., 2021) This paradigm is one of the instructional approaches that emphasises the modification of one's own beliefs. HBM emphasises that perceptions influence people's motivation and influence them to change their behaviour. (O'Hara, 2018)

In order to promote health, telemedicine exchanges medical and health information via a variety of communication methods. Telemedicine is a tactic to lower costs and provide equitable access to high-quality medical care. (O′Shea et al., 2015) The implementation of HBM in conjunction with telemedicine is an alternative for countries that are impoverished given their insufficient resources. These nations' inadequate resources result in the incorrect and unfair delivery of services. Given its capacity to deliver remote education, counselling, surveys, and service improvement, telemedicine has drawn particular attention as a workable alternative (Cho et al., 2018). Increased access to health care services, cost-effective education, increased access to education, increased social support, better treatment outcomes, and improved service quality are some advantages of telemedicine (Pathipati et al., 2016).

This model is essential to comprehending how Malaysian view and interact with telemedicine as a way to improve their health outcomes. Their willingness to use telemedicine solutions is influenced by their perception of their sensitivity to health problems, such as the incidence of particular diseases in their area (Belachew et al., 2023). The perceived seriousness of these health issues also affects people's decisions to use telemedicine platforms to get help. Additionally, the degree of adoption and ensuing efficacy of such services are significantly

influenced by the perceived advantages of using telemedicine, such as convenience and accessibility to medical counsel. Equally significant are the perceived obstacles, which include worries about privacy, technology literacy, and healthcare quality. (Chandrakar, 2021) These issues can either make it difficult or easier for people to incorporate telemedicine into their routines for seeking medical treatment.

2.1.3 Social Cognitive Theory

According to the Social Cognitive Theory (SCT), social connections, observational learning, and self-efficacy are crucial elements in influencing how people act in social situations. (Sehl et al., 2022) Self-efficacy relates to people's assessments of their capacity to plan and carry out the steps necessary to complete a task. This aspect influences the actions people perform, the amount of effort they are willing to put out, and the duration of their persistence in overcoming difficulties (Huang, 2013). Additionally, self-efficacy has been proven to have a variety of psychological and behavioural implications in many domains of human psychosocial functioning, making it a key factor in determining how well someone does a task.

Williams et al. (2014) defined computer self-efficacy as "people's judgements about their abilities to use a computer system successfully" after adapting the broader concept of self-efficacy. This ground-breaking solution ought to be a unique application of computer systems in the area of telehealth. Tsai (2014) defined the self-efficacy of a telehealth system as the assessment of an individual's usability. Although the majority of the study's participants showed high levels of usage intention, they also showed low levels of confidence in their ability to use the system. So, Tsai stated that in order to create an expanded model for patients' acceptance of telehealth, system self-efficacy should be taken into account and incorporated into the TAM.

This thesis clarifies how Malaysian's behaviours are influenced by their observation of others' experiences with telemedicine platforms in the context of telemedicine. People frequently copy the behaviours they see others rewarding or reinforcing. (Hargie, 2021) Therefore, seeing success stories from telemedicine can encourage locals to take advantage of these services more freely. Additionally, their belief in their ability to use telemedicine effectively (self-efficacy) is influenced by their view of the advantages, such as getting accurate diagnoses and professional guidance. Their readiness to accept telemedicine as a method of enhancing their health outcomes is consequently influenced by their level of confidence. (Otto et al., 2023)

2.2 Review of Literature

2.2.1 Dependent Variable: The effectiveness of the use of telemedicine

According to the Office of the National Coordinator for Health Information Technology, telemedicine (TM) is the use of electronic information and telecommunications technologies to facilitate and advance remote clinical healthcare, education about health-related topics for both patients and professionals, as well as activities related to public health and healthcare administration. In order to deliver and provide access to high-quality healthcare services and outcomes. Telemedicine is being accepted and put into practice as it has the ability to **lower the cost of health** by reducing issues like pharmaceutical abuse, unnecessary emergency department visits, and extended hospital stays (Gajarawala & Pelkowski, 2021). In addition to acting as a **useful medium for communications** between healthcare experts and patients, telemedicine also promotes improved connection among those professions. Hence, telemedicine has greatly strengthened the bonds between patients, healthcare professionals, and other stakeholders given the growing need for a collaborative approach to patient care and greater collaborations between patients and providers (Hyder & Razzak, 2020).

Furthermore, a review that was published by Eze, Mateus and Hashiguchi in 2020, had assessed the current evidence regarding the efficiency, cost effectiveness, patient perspectives, and strategies for implementing telehealth. The review discovered that telehealth frequently demonstrates effectiveness, can offer cost-efficient solutions, receives positive feedback from patients, and can be implemented successfully.

Telemedicine as a tool for emergencies during COVID-19

The utilization of telemedicine has grown significantly in the last decade, and its adoption has accelerated even more swiftly due to the emergence of COVID-19 pandemic. According to Ramaswamy et al. (2020), the extremely widespread use of telemedicine in response to the COVID-19 pandemic may have a significant and long-lasting effect on the delivery of healthcare. By alleviating pressure on overburdened healthcare systems, telemedicine emerged as a vital tool, ensuring that medical requirements could be fulfilled within the confines of one's residence (Vizitiu, 2018).

This assertion is in accordance with a 2020 study conducted by Monaghesh & Hajizadeh, in which they highlighted that telemedicine lessens the demand on healthcare resources, enhances healthcare accessibility, and mitigates the risk of direct transmission of infectious agents. As a result, telemedicine has evolved into an essential requirement for the general population, healthcare practitioners, and individuals afflicted with COVID-19, particularly when individuals are under quarantine. This enables patients to engage with healthcare providers in real-time, seeking guidance for their health concerns. The global issue of Emergency Department overcrowding underscores the need for effective solutions and one of the most cost-effective and widely adopted strategies to combat COVID-19 has been the reduction of face-to-face interactions (Busti et al., 2024). Evidence points to telemedicine's ability to expedite triage processes and to bring about positive impacts on patient care while driving down costs within healthcare systems. (Witkowska-Zimny & Nieradko-Iwanicka, 2022).

Telemedicine For Patients at Home

According to Hyder & Razzak (2020), the advantages of at-home telehealth monitoring, particularly for chronic disease patients, extend beyond individual benefits to hospitals. In this context, at-home telehealth monitoring has emerged as a powerful tool for reducing hospital readmissions. Patient data, encompassing crucial metrics like blood pressure, weight, heart rate, and pulse, were collected daily and uploaded to a monitoring system equipped with decision support software. This system promptly alerted patients and nurses to individuals needing attention, ensuring timely intervention. By this, patients can use wearable devices, smart scales, blood pressure monitors, and other sensors to gather and transmit their health data to healthcare professionals (Jiang, 2021).

Besides, patients can communicate with healthcare providers in real-time without physically visiting a medical institution by integrating tools like video conferencing, secure messaging, and remote monitoring equipment. (Ahmid et al., 2022) Patients can now engage with healthcare providers irrespective of geographical barriers. They can schedule virtual appointments, discuss their symptoms, receive medical advice, and even undergo initial evaluations through video consultations. This not only reduces the need for time-consuming travel and waiting room visits but also enhances overall patient engagement. (Lerut, 2019)

In short, telemedicine may become a viable form of healthcare delivery in the near future, especially for patients who face obstacles to receiving care. Though telemedicine is not currently applicable for all medical requirements and cannot entirely substitute an in-person physical examination, it can be used to supplement it (Jin et al., 2020)

2.2.2 Independent variable 1: Patient Satisfaction

Patient satisfaction is a sign of how well healthcare technology has been adopted and applied. According to Alananzi & Hader (2022), a satisfied patient is more likely to comply with medical advice than one who is dissatisfied, which leads to improved clinical outcomes, a quicker recovery, and a shorter hospital stay. In

particular, given the current view of healthcare as a patient-centered and consumer-driven system, measuring patient satisfaction has grown in importance as a gauge of the quality and performance of healthcare services. Hamasaki (2022) had discovered that patient satisfaction was linked to specific aspects of telemedicine, including **patient outcomes, user-friendliness, communication, and time saved on travel.** This relationship is in agreement with a study conducted by Nguyen(2020) and her colleagues, they proposed that patients consistently express a satisfaction rate of 95% - 100% with telemedicine in comparison to face-to-face appointments. They often attribute their satisfaction with telemedicine to the convenience of reduced travel expenses. Bassi et al. (2022) also stated that patients are satisfied with telemedicine as they were able to express their medical issues and feel comfortable speaking with healthcare professionals during televisits. This is because telemedicine consultations are typically scheduled appointments, allowing healthcare providers to allocate dedicated time to each patient, and this focused interaction gives patients the impression that their concerns are being heard and addressed without distraction. Telemedicine is also able to satisfy patients in terms of their health outcomes as it has enhanced patient results by enabling advanced monitoring, cognitive support capabilities, clinical decision aid, and application of critical care protocols based on established evidence (Armaignac et al., 2018).

Furthermore, a recent study conducted by Mason (2022) has adapted the SERVQUAL model to analyze telemedicine patient satisfaction. SERVQUAL model refers to the methodology that frequently employed in service marketing and consumer satisfaction research. In the study, Mason confirmed the credibility and validity of the SERVQUAL model in measuring patient satisfaction and pinpointed four underlying dimensions of it. These dimensions encompassed **how patients viewed the health benefits, patient-centered care, financial costs, and non-financial costs** linked to the services they received. To delve deeper, the research revealed that satisfaction regarding telemedicine's health benefits depended on how patients perceived the treatment outcomes. Patient-centered satisfaction hinged on patients' interpretations of the provider's empathy and

interpersonal interactions(Venetis, 2018). Satisfaction with monetary costs was tied to patients' perceptions of the financial savings facilitated by telemedicine, this could include factors like reduced travel expenses, time saved, and potentially lower consultation fees, while contentment with non-monetary costs stemmed from the perceived decrease in non-financial burdens associated with the telemedicine service.

Apart from the four performance dimensions that were identified, SERVQUAL models have other five dimensions which are used to evaluate service quality and patient satisfaction. First, **tangibility**. This dimensions directly encompass the physical and visual aspects of the service. For instance, the design and user-friendliness of the telemedicine platform, the professionalism and appearance of healthcare providers during video consultations. (Althumairi et al., 2022) Adequate information sharing through digital means, such as clear medical instructions, readable documents, and accessible links to additional resources, contributes to the tangible aspect of patient satisfaction. Next, **reliability**. This dimension refers to the consistency and dependability of service delivery. For instance, patients feel confident that their health concerns are being adequately addressed and follow-up actions are executed as promised. Thirdly, **responsiveness** refers to the willingness of healthcare providers to provide prompt service to them. In telemedicine, it involves timely responsiveness to patient inquiries, and the assurance that patients' questions are acknowledged and addressed in a timely manner (Razali & Jamil, 2020). Next dimension is **assurance,** and this refers to the competence, courtesy and confidence given by the healthcare providers. Last dimension is **empathy** where it refers to the ability of a healthcare provider to demonstrate sincere and personalized attention to patients through listening, validating patients' concerns (Tamara & Dadang & Hadyana, 2020).

The above study can also align to the 3 dimensions of overall satisfaction that are probably impacted by telemedicine which include the **perceived effectiveness of**

the technology, how user-friendly it is, and its reliability, as outlined by Nguyen(2020) and her colleagues. In terms of technology's perceived usefulness, patient contentment with telemedicine is rooted in their perception of the technology's capability to effectively address their healthcare needs. If patients perceive that the technology is achieving positive health outcomes, their overall satisfaction is likely to increase. Additionally, ease of use plays a pivotal role in patient satisfaction, as their experience is shaped by how effortlessly they can navigate the telemedicine technology, ensuring a smooth and user-friendly encounter (Wijaya & Darma, 2022).

2.2.3 Independent Variable 2: Auxiliary Function on Patient Outcomes

In telemedicine, auxiliary functions refer to the supplementary services, interventions, or support systems that accompany telemedical consultations in order to improve the patient experience and ultimately, patient outcomes (Grover et al., 2023). In the context of telemedicine use within Malaysian. This study seeks to determine the impact of auxiliary services on patient outcomes.

Remote monitoring is an important auxiliary function in the practise of telemedicine since it allows for continuous monitoring of patient vital signs and essential health indicators. Dinesen (2016) and his colleagues conducted a study presents compelling evidence of remote monitoring's revolutionary impact in healthcare, particularly among people suffering from chronic obstructive pulmonary disease (COPD). The use of remote monitoring interventions resulted in a significant reduction in hospital admissions, indicating a trend towards more proactive and preventative healthcare practises. Furthermore, it demonstrated how remote monitoring aided in overall improved health outcomes for COPD patients. This study emphasises the critical function of remote monitoring in telemedicine, emphasising its potential to improve patient outcomes while also reducing the load on healthcare systems by reducing hospitalisations and encouraging patient-centered care.

Care coordination, another important auxiliary function in healthcare, has experienced tremendous modification as a result of telemedicine integration. A study conducted by Vimalananda (2017) and his colleagues focuses light on the significant effect of telemedicine, particularly electronic consultations, on the improvement of care coordination among healthcare professionals. The findings show that telemedicine can help bridge communication and collaboration barriers across the healthcare continuum. Patients receive more comprehensive and timely care when healthcare practitioners can easily communicate information and insights via telemedicine (Mer, 2021). This can result in better patient outcomes by making sure that medical decisions are well-informed, therapies are optimised, and possible consequences are detected and dealt with early. The study emphasises how care coordination procedures themselves, as well as patient care and results, are transformed as a result of telemedicine, which is not solely a technology-driven innovation.

With its innovative ability to enhance patient outcomes, particularly in situations like stroke rehabilitation, tele-rehabilitation stands out as a significant area within telemedicine. Laver et al.(2013) study discusses the critical relevance of auxiliary services in tele-rehabilitation, especially remote monitoring and guidance. These roles work together to produce a complete and patient-centered rehabilitation approach. Remote monitoring allows healthcare personnel to closely monitor a patient's development, vital signs, and adherence to therapeutic regimens, providing prompt and personalised interventions. At the same time, remote guidance enables expert advice and support from a distance, ensuring that patients receive suitable workouts and rehabilitation approaches. (Van Der Hulst et al., 2023) As a result, this collaborative and technology-driven strategy improves functional outcomes for stroke patients dramatically. Tele-rehabilitation not only promotes better patient engagement but also streamlines the rehabilitation process, ultimately leading to improved patient recovery and functional restoration, highlighting the transformative power of telemedicine in the realm of rehabilitation.

Auxiliary functions are critical components of telemedicine that have a substantial impact on patient outcomes in Malaysia and beyond. (McAdams, 2018) These auxiliary functions are critical in improving patient awareness, providing timely care, and resolving healthcare inequities. Telemedicine, as a novel technique, exhibits the potential to enhance the general healthcare experience for Malaysian, potentially resulting in better health outcomes.

2.2.4 Independent Variable 3: Barriers

Telemedicine implementation and adoption have resulted in significant improvements in healthcare delivery, but they have also created a series of barriers that must be carefully considered. (Chen, 2021) This study of telemedicine barriers seeks to determine and analyze obstacles to the seamless integration of telemedicine services into healthcare systems.

Tan et al. (2018) studied the adoption of telemedicine in Malaysia and discovered a wide range of barriers that patients face, with a special focus on culturally rooted challenges. One notable challenge that arose was the language barrier, which primarily impacted elderly adults with low proficiency in English which is the language most commonly applied across multiple telemedicine platforms. This linguistic issue hindered their capacity to engage with and use telemedicine services successfully. Furthermore, the study raised another important concern which is concerns about the security and privacy of sensitive health data. These worries are widely shared and have been identified as a major barrier to the acceptance of telemedicine solutions and causes the potential consumers were hesitant to use the service due to the high vulnerability of exchanging personal medical information across digital networks. This study's findings point out the importance of culturally sensitive and multilingual telemedicine approaches and they also emphasize the crucial significance of addressing security and privacy concerns in order to facilitate the wider integration of telemedicine services within Malaysia's healthcare landscape. (Jimenez & Jahankhani, 2019)

In a study conducted by Mair et al. (2018), the focus turned to older patients and their experiences with telemedicine, indicating a variety of challenges that hinder their participation with these digital healthcare platforms. Notably, the study emphasized the importance of privacy and data security issues which were prominent among older people. The possible exposure of personal health information in a digital forum raised concerns, leading to a hesitation to fully embrace telemedicine services (Assaye et al., 2022) Another significant barrier that was identified was the thought to be difficult in accessing telemedicine systems. Elderly patients raised their concerns regarding their ability to use and benefit from these digital tools, given that they may be less proficient in technology. As a result, this study highlighted the critical importance of overcoming these diverse barriers in order to ensure that telemedicine services are accessible and beneficial to all patient demographics. Healthcare providers can bridge the gap and facilitate equitable use of telemedicine, particularly among the elderly by implementing strong privacy protections, improving data security processes, and building user-friendly interfaces. (Shafik, 2024)

Scott Kruse et al. (2016) conducted a comprehensive study that discovered telemedicine adoption among healthcare professionals through a systematic evaluation of existing literature. This study focuses into the varied set of barriers that healthcare professionals face in thinking about implementing telemedicine into their practices. Among the challenges highlighted was the perceived reliability of the technology itself. Professionals were concerned about technical malfunctions and system breakdowns, which could compromise patient care and erode trust. Furthermore, the complexity of telemedicine systems was identified as a significant barrier. Due to the complexity of these systems, there will be the potential resistance to change. (Lawlor et al., 2023) Furthermore, the study recognised the conflict between telemedicine's innovative nature and the established norms of traditional healthcare practices. Professionals were concerned about the possibility of disrupting existing patient-doctor relationships and treatment systems. This study's conclusions emphasised the importance of overcoming these complex barriers. Developing more strong and dependable

technology, streamlining telemedicine system usability, and providing extensive training to healthcare professionals could all help ease these concerns. These initiatives play an essential role in creating an optimal environment for the successful integration of telemedicine into mainstream healthcare also will enhance patient outcomes and the overall healthcare landscape. (Omachonu, 2018)

In conclusion, the analysis of barriers and difficulties shows the varied variables that affect the successful implementation and use of telemedicine services. Addressing these barriers, which can range from technology issues to patient preferences and legal hurdles, is critical to achieving the full potential of telemedicine in increasing healthcare accessibility and quality.

2.3 Proposed Conceptual Framework

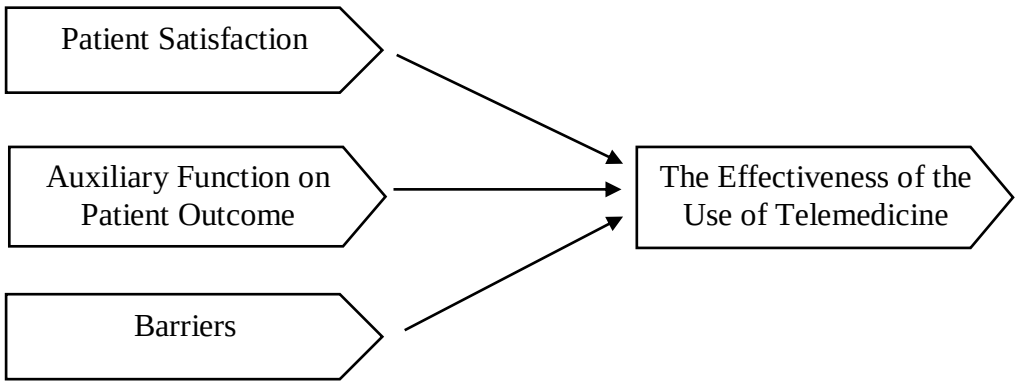


Figure 2.3. Proposed Conceptual Framework

2.3.1 Relationship between Technology Acceptance Model and Patient Satisfaction towards the effectiveness of telemedicine

Regarding telemedicine, both the Technology Acceptance Model (TAM) and patient satisfaction are essential concepts. Patient satisfaction measures how satisfied patients are with their healthcare experiences, including their interactions with telemedicine providers, and TAM is a widely accepted theoretical framework

used to explain and forecast how people embrace and adopt new technologies (Park & Park, 2022). Patients' perceptions of the technology's value in enhancing access to healthcare services, controlling their health, and minimizing difficulties connected to conventional in-person visits have a big impact on how accepting they are of telemedicine. Patients are more likely to use telemedicine and, as a result, express better levels of satisfaction with their healthcare experiences when they believe it to be a beneficial tool for their requirements (Amin et al., 2022). Furthermore, in the context of telemedicine, elements like patient fulfilment, technology acceptability, effective communication, and quality of care all play a significant part in developing the telemedicine landscape (McConnochie, 2019). Thus, the TAM framework explains why there is a positive correlation between patients who accept telemedicine and their overall satisfaction with this cutting-edge method of healthcare delivery.

2.3.2 Relationship between Health Belief Model and the Auxiliary Function on Patient Outcome towards the effectiveness of the telemedicine

According to the Health Belief Model (HBM), factors that affect people's health-related behaviors include their perceived susceptibility to health problems, the severity of those problems, the advantages of addressing them, and the perceived difficulties in doing so. People who believe they are prone to health issues or have a particular medical condition may be more likely to employ telemedicine services if they believe it to be an efficient and practical way to meet their healthcare demands. (KURŞUN, 2023) People may be more inclined to use telemedicine if they perceive benefits like quicker access to medical professionals and shorter travel distances, which may enhance health outcomes.

The HBM takes into account cues to action, which may come from within (such as symptoms) or beyond (such as advice from healthcare professionals). When it comes to telemedicine, outside factors like recommendations from reliable medical professionals can be quite important in swaying people's decisions to use telemedicine services. A patient is more likely to use telemedicine if a doctor

suggests it as a treatment option for their disease. (Menage, 2020) This could result in prompt diagnosis and treatment, which can improve their health outcomes. Healthcare professionals and policymakers can better design telemedicine interventions and communication methods to improve patient health outcomes by taking these elements into account.

2.3.3 Relationship between Social Cognitive Theory and barriers of the effectiveness of telemedicine

Social cognitive theory explains how social and cognitive elements interact to influence people's attitudes and behaviors in the setting of telemedicine adoption. (Wu et al., 2021) The theory's main tenet is observational learning. People are more inclined to think of telemedicine as a good alternative for their healthcare requirements if they observe others in their social networks effectively adopting it. On the other hand, if people experience bad things or learn about difficulties others have encountered, they can have doubts about telemedicine and be reluctant to use it.

Self-efficacy beliefs, a key idea in social cognitive theory, are especially pertinent to the uptake of telemedicine. Self-efficacy is the notion that someone believes they can carry out a particular task successfully. People who have a high level of self-efficacy when using technology and corresponding with medical professionals online are more likely to overcome obstacles and adopt telemedicine. On the other hand, people with poor self-efficacy could be reluctant to use telemedicine out of concern for technical difficulties or miscommunications during virtual consultations. (Teo, 2022)

2.4 Hypothesis Development

2.4.1 Significant Positive Relationship Between Patient Satisfaction and The Effectiveness of Telemedicine

In the context of modern healthcare delivery, the implementation of telemedicine has transformed the way patients access medical care (Chen, 2021). With the

increasing popularity of telemedicine, driven in part by the convenience it provides patients in terms of distant consultations and reduced travel hours, it is critical to understand how this technological progress affects patient satisfaction.

According to Karolina (2022), telemedicine has shown beneficial in substituting unnecessary in-person appointments, lowering the risk of infectious infections such as COVID-19. In reviewed research, patient satisfaction with telemedicine has been consistently high, with new patients often reporting higher satisfaction than follow-up patients. Virtual visits were more helpful for certain patients when they already had a relationship with their healthcare professional. Furthermore, many respondents indicated that virtual consultations might sufficiently replace in-person visits, resulting in fewer missed appointments and significant cost and time savings, especially for consultations performed from the convenience of one's own home or workplace. Overall, telemedicine has emerged as a crucial tool for maintaining healthcare continuity during the pandemic and beyond, delivering multiple benefits to both patients and healthcare institutions. (Shahid, 2020)

According to a study by Front Public Health (2022) that examined patient and carer satisfaction with telemedicine for the treatment of Type 1 diabetes in children and young adults. The data demonstrated that both patients and their parents or carers were quite satisfied. Participants reported feeling at comfortable sharing their medical issues and feeling that they received appropriate attention and assistance throughout the COVID-19 epidemic. As a result, this study found a considerably positive association between patient satisfaction and telemedicine use.

However, the relationship between patient satisfaction and telemedicine use is complicated. According to the findings of a study conducted by JAAOS (2021), there is no significant relationship between patient satisfaction and the method of visit (in-person or telemedicine). The study's findings are likewise consistent with earlier studies, implying that telemedicine can be an acceptable type of patient consultation. However, several factors influenced patient satisfaction. Patients preferred visiting a surgeon over midlevel clinicians for some types of visits. This choice could be related to increasing trust in physician professionals. Nevertheless,

we still to believe that telemedicine will have a significantly positive impact on patient satisfaction in Malaysian. Therefore, we propose a strong positive relationship between patient satisfaction and the effectiveness of telemedicine in this context.

In conclusion, telemedicine has indisputable benefits including convenience, accessibility, and cost savings, but its influence on patient satisfaction seems to be a complex interaction of many aspects. Across various research, patient satisfaction with telemedicine encounters has been generally positive. Although the relationship between patient satisfaction and the use of telemedicine is complex, we still believe that the use of telemedicine will have a significant positive impact on patient satisfaction among Malaysian.

2.4.2 Significant Positive Relationship Between the Auxiliary Function on Patient Outcome and The Effectiveness of Telemedicine

Telemedicine has evolved in recent years as a disruptive way to healthcare delivery, with the potential to reshape the landscape of patient health outcomes. (Aiman, 2023) This study aims to explore the hypothesis that there exists a significant positive relationship between health outcomes and the utilization of telemedicine services.

According to Federico (2021), telemedicine can successfully reduce unexpected hospitalisations, lower healthcare expenses, relieve financial constraints on families, and improve carer satisfaction. However, further study is needed to establish telemedicine's effectiveness in improving a variety of patient outcomes associated with complicated medical conditions, such as mental health, hospital readmissions, carer capabilities, and self-care.

According to William et al. (2001), despite the fact that telemedicine has become widely used in healthcare, there is limited evidence that telemedicine interventions provide clinical results that are equivalent to or better than in-person care. In their

study, they noted that evidence exists for home-based telemedicine, which shows modest benefits for patients with chronic diseases such as AIDS and Alzheimer's, while there is strong evidence supporting its effectiveness in emergency room settings as well as benefits in surgical and neonatal ICU settings.

Although there is no significant evidence shows that the strong correlation between health outcome and the use of telemedicine, but the studies have proven that benefits of use of telemedicine can indirectly affect the health outcome. Considering this, we present a hypothesis that there is a significant positive relationship between health outcome and the use of telemedicine among Malaysian.

Telemedicine has evolved in recent years as a disruptive way to healthcare delivery, with the potential to reshape the landscape of patient health outcomes (Kaisanesh, 2023). When a telemedicine program satisfies the four requirements of being sound, efficient, cost-effective, and practical, it is considered successful. By enhancing patient convenience, lowering healthcare costs, and raising patient happiness, telemedicine has the potential to greatly enhance supplemental health outcomes. Patients have easier access to healthcare services, which improves their overall quality of life and well-being. Norway's health officials maintain that it is the duty of the government to ensure that everyone has access to the required health and care services, regardless of where they live (Buvik et.al, 2016).

In orthopedic research, real-time videoconferencing was shown to be an effective way to deliver orthopedic care to remote locations, according to a study by Lambrecht (1998) and his coworker. However, more research, including a cost-benefit analysis, was advised. Additionally, telemedicine using live video conferences to treat orthopedic problems between an Antarctic station and Japan was said to be successful (Ohno et.al, 2012). A separate document camera was used in some of the previous experiments to highlight the significance of sending X-ray images of sufficient quality as a factor to enhance telemedicine for remote orthopedic consultation (Aarnio,1999).

An effective technology enables the determination of process outcome measures, clinical outcome measurements, and patient satisfaction, according to study done by David (2009). The adoption of process results, such as prompt foot screenings, retinal evaluations, vaccination administrations, and measurement of laboratory tests, can be evaluated to determine the success of automated telemedicine systems. All diabetic patients must undergo tests for A1C, glucose, and lipids, and some patients with hemoglobinopathies must also undergo tests for certain laboratory analytes, such as serum creatinine levels in metformin users, liver tests in statin users, serum potassium in hypertensive patients taking specific blood pressure medications, and serum fructosamine. (Li & Li, 2022)

Although there is no significant evidence showing the strong correlation between auxiliary function of health outcome and the use of telemedicine, the studies have proven that benefits of use of telemedicine can indirectly affect the health auxiliary outcome. Considering this, we present a hypothesis that there is a significant positive relationship between health auxiliary outcome and the use of telemedicine among Malaysian.

2.4.3 Significant Positive Relationship Between the Barriers and The Effectiveness of Telemedicine

Telemedicine is an effective communication technology used between healthcare providers and patients that reduces the risk of infection. Nonetheless, despite its growing popularity and potential benefits, its effective implementation faces a number of barriers. (Bravi et al., 2019) These barriers are frequently seen as impediments to widespread acceptance of telemedicine. However, this hypothesis tries to investigate the intriguing possibility that there may be a positive relationship between the presence of these barriers and the actual use of telemedicine.

Based on a research from Racha et al. (2022), a variety of barriers in the field of telemedicine are identified. They include technical issues like slow internet connectivity, privacy worries, problems with data confidentiality and payment, restrictions on physical exams and diagnostics, difficulties serving special populations, inadequate training for both patients and healthcare professionals, issues with the doctor-patient relationship, and general acceptability of telemedicine. These challenges highlight the necessity for specialised solutions and have consequences for the efficient application of telemedicine. Therefore, removing these barriers is crucial for enhancing the use of telemedicine in health crises and this indicate a significantly positive relationship between barriers and the effectiveness of telemedicine. (Schmidt, 2024)

According to the findings of a study conducted by Surya (2018), developing country governments face enormous pressure to offer accessible, inexpensive, and high-quality healthcare to their citizens. A viable way to close this healthcare gap is provided by cutting-edge techniques like telemedicine. The widespread adoption of telemedicine in underdeveloped nations has been hindered by the barriers, which include a number of challenges. On the other hand, Mohammad Einolghozati (2018) discovered that the most frequent barrier was money problems, followed by cultural difficulties. Without identifying and addressing the barriers to telemedicine adoption among practitioners, attaining successful and sustainable telehealth implementation becomes practically impossible.

According to research by Niloufar et al. (2021), there are a number of challenges that need to be overcome for TeleRehabilitation (Telemedicine) to be successfully used in the healthcare industry. Despite telemedicine's advancements, limitations of technology limit its efficacy and detract from its attraction to both consumers and healthcare professionals. Infrastructure and access, operational conflicts and systems, logistical problems, legal obstacles, and difficulties with communication are just a few of the barriers of telemedicine that have been emphasised in this research. These concerns all contribute to the problems.

Therefore, based on the few studies, it is shown that barriers are related to the use of telemedicine. As the more the barriers, the harder the implementation of the use

of telemedicine. So, we propose a hypothesis that there is a significant positive relationship between barriers and the effectiveness of telemedicine among Malaysian.

2.5 Chapter Summary

To finalize, chapter two has offered the fundamental underlying theories, a review of the literature, a proposed conceptual framework, and the development of hypotheses. In chapter three, we will proceed with the research methodology.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The third chapter focuses on the research methodology. The broad framework of the study, as well as its methods for data collection, sampling strategy, instrument, variables, and measurements, processing, and analysis, are all explained in this chapter.

We chose to analyse the responses submitted to a questionnaire that had closed-ended questions and multiple-choice answers using a quantitative research design. However, because our questionnaire must involve the entire Malaysia area, the respondent will be required to fill up their residential area. We applied questionnaires as part of our data collection strategy to obtain both primary and secondary data. We used Google Forms to administer a series of standardised questions to participants. This chapter has also covered the measurement scale and reasoning. The questionnaire's questions are also created and linked with academic papers. In this study, data processing methods including data checking, editing, coding, and transcription are utilized.

3.1 Research Design

The goal of the research design is to give our investigation an adequate framework. The choice of research approach is a key step in the research design process, according to Abutabenjeh & Jaradat (2018), as it defines how pertinent data for a study will be gathered. However, there are numerous relevant decisions made during the research design process.

The entire method that researchers choose to carry out their study is referred to as the research design. Researchers can respond to their study questions or hypotheses according to this design. The three primary categories of research designs are exploratory research, descriptive research, and causal research.

Additionally, there are two subcategories of research designs: qualitative research design and quantitative research design.

The research design employed in our study is known as explanatory or causal research, which seeks to investigate the cause-and-effect relationship between two variables. Experimental designs are frequently used in causal research, where the researcher manipulates the independent variable to see how it affects the dependent variable. It is assumed that when the independent variables change, the dependent variables will follow suit. Following exploratory and descriptive research, the researchers are typically experts in their field.

According to Namazi (2016), since we need to establish the causal relationship between the independent variable and dependent variable, the study's design was based on casual research. The effectiveness of adopting telemedicine and health outcomes in the Malaysia region are the focus of our group's research. In order to ascertain a causal relationship between the two variables, our study will manipulate the independent variable and then observe the resulting impact on the dependent variable.

3.2 Sampling Design

3.2.1 Target Population

Based on McClintock (2018), the target population is the group that the intervention is meant to research and draw findings from. When performing cost-effectiveness research, the characteristics of the target population and any subgroups should be specified in depth. Our research focuses primarily on Malaysia.

The effectiveness of adopting telemedicine in relation to health outcomes must be examined in this study. The utilisation of telemedicine is one of the independent factors. The dependent variables are patient satisfaction, health outcomes, population and barriers in Malaysia.

3.2.2 Sampling Frame and Sampling Location

Aline with Elangovan A (2016), the sample frame is a list of each individual of the relevant community. Since no appropriate source could be found that gives a statistical list of the population using telemedicine within the Malaysia area, we would apply non-probability sampling in this study. After including the Malaysia population (31.53 million people) in our sampling calculation, the questionnaire is targeted to receive at least 385 respondent who fulfill our targeted requirement.

3.2.3 Sampling Elements

An analysis or case within the population being researched is referred to as a sampling element. When adopting element sampling, also known as direct element sampling, every unit, such as a person, organisation, group, or firm, has an equal chance of being picked to be included in the study sample. (Mweshi & Sakyi, 2020) The respondents may be distinguished from the target population of our study based on factors like gender, age, ethnicity, level of education, and salary range who reside in Malaysia region. Both men and women can serve as our respondents in this study when it involves gender.

We will classify the respondents based on their ethnicity and educational attainment in order to acquire more precise statistics. More than that, we'll gather data on income ranges with the aim of better understanding the wage payment relative to the motive for using telemedicine. This is because someone making a good living is motivated to use technology.

3.2.4 Sampling Techniques

The non-probability sampling methodology is being used in this study to collect data from the respondents since it is a quick, easy, and affordable way to do so. According to Naderifar et al. (2017), a recruitment technique known as "snowball sampling" is used to enlist the assistance of participants in a research study in order to increase the number of subjects. As a result, snowball sampling is utilised

in this study to choose samples because the population may be difficult to reach. We decide to distribute questionnaires to a limited subset of students because it is difficult to recruit a big sample telemedicine user in Malaysia. Because it is easier to contact surrounding relative directly than respondents from other places, the small subset of nearby respondents who are students in Malaysia are reachable.

3.3 Data Collection Methods

Data collection tools in a research refer to the systematic processes andtechniques used to gather relevant information, facts, or data for the purpose of conducting research, addressing research questions and testing hypotheses. This endeavor holds paramount importance in acquiring dependable and accurate data to substantiate the research objectives. (Anane, 2024) Data collection methods can be categorized into two main groups, namely primary and secondary data. In this particular study, both primary and secondary data are utilized to enhance the accuracy of research findings.

3.3.1 Primary Data

Primary data (first-hand information) constitutes data collected directly from original sources, specifically for a particular research project. This data is unique, aligning precisely with the research goals, and has not previously been distributed or subjected to external analysis. Researchers have complete control over the data gathering process when employing primary data collection techniques like surveys, interviews, experiments, observations, and questionnaires, therefore primary data is said to have greater validity than secondary data as it remains unaltered by human interventions (Kabir, 2016). Although primary data is highly valued for its freshness and alignment with the research inquiry, it can present challenges due to its potential for being both time-consuming and expensive to obtain. Nevertheless, it offers researchers the opportunity to uncover innovative insights and validate hypotheses.

In this study, we will utilize questionnaires as our primary data collection method, administered through Google Forms. A series of questions related to the use of telemedicine are asked in the questionnaire and the questionnaire is standardized where all respondents receive the same set of questions in the same format to enhance its validity. We have chosen to utilize the questionnaire due to its cost-effectiveness and efficiency in gathering data from a large number of respondents within a relatively short period of time.

3.3.2 Secondary Data

Secondary data, comprising information gathered and shared by sources other than the researcher, provides an alternative to collecting data first-hand. It is sourced from various outlets like government publications, academic journals, market research reports, and preexisting datasets. Often, this data originates from diverse research goals, and on occasion, researchers or organizations share it with the public to enhance its usefulness. When primary data collection was not feasible, secondary data serves as a cost-effective and time-efficient solution. However, we will carefully evaluate the relevance and quality of the content of journals to ensure it aligns with our research goals.

3.4 Construction Measurement

3.4.1 Origin of Construction Measurement

Table 3.1: Origin of Construction Measurement

Variables	**References**	**Questions**	**Scale of Measurement**
Effectiveness of Telemedicine	Parmanto et al. (2016) Bakken et.al (2006)	Q1 Q2	Interval Scale

		Q3	
		Q4	
Patient Satisfaction	Parmanto et al. (2016) Bakken et.al (2006) Huang (2013)	Q1	Interval Scale
		Q2	
		Q3	
		Q4	
		Q5	
		Q6	
		Q7	
Auxiliary Function on Patient Outcome	Bakken et.al (2006) Park et.al (2021) Huang, J.C (2013) Sincavage, E (2023)	Q1	Nominal Scale
		Q2	
		Q3	Interval Scale
		Q4	
		Q5	

		Q6	
		Q7	
		Q8	
		Q9	
Barriers	Bakken et.al (2006)	Q1	Interval Scale
		Q2	
		Q3	
		Q4	
		Q5	

3.4.2 Scale of Measurement

In statistics, the concept of measurement is more comprehensively referred to as "scales of measurement" or "levels of measurement." The scale of measurement is a fundamental aspect in research and statistics, indicating how variables or data are characterized, quantified, and assessed. The characteristics specific to each measurement scale determine which statistical analyses are appropriate for use. Psychologist Stanley Smith Stevens introduced four levels of measurement: nominal, ordinal, interval, and ratio. In our study, we utilize nominal and ordinal scales for the measurement of qualitative data, while for assessing quantitative data, we employ interval scales. These scale choices are instrumental in

determining the most appropriate analytical methods based on the nature of the data at hand and our research objectives.

3.4.2.1 Nominal Scale

Nominal scale, in another term categorical variable scale, is the most basic measurement that can be used to label variables. According to Marateb et al (2014), nominal data can be assessed only when individual items fall into specific distinct categories, and it is not feasible to assign any numerical value or rank these categories. Nominal data have some key characteristics: 1) the different categories have no ordering, 2) the inability to measure the distance between values, 3) the freedom to list any categories in sequence without altering their relationship. Some examples of nominal scales include marital status, eye colour, and city of birth. In this research, gender has been represented using a nominal scale as follows.

Example of nominal scale:

Gender:

□ Male □ Female

3.4.2.2 Ordinal Scale

According to Anjana (2021), an ordinal scale is a type of ranking system where numerical values are assigned to variables to indicate their position or rank within the dataset. Instead of merely naming the variables, they are organized in a particular sequence, enabling them to be both named and ranked within specific groups. In ordinary scale, they have a natural order. For instance, “very satisfied” is superior to “satisfied”, which is better than “neutral”. However, it's not possible to precisely assess the disparity between these values. In other words, we can't assert that the difference between "very satisfied" and "satisfied" is equal to the difference between “satisfied” and “neutral.”

Example of ordinal scale:

Highest Education Level

☐ Primary School

☐ Secondary School

☐ Diploma

☐ Bachelor’s Degree

☐ Master’s Degree

☐ PhD

3.4.2.3 Interval Scale

An interval scale, commonly utilized in statistical analysis and research, not only organizes data systematically but also maintains a uniform interval between values. This uniformity ensures that the numerical distinction between any two successive points on the scale remains consistent and meaningful across its entire range. However, it's important to recognize that an interval scale lacks an absolute zero point, rendering the value "zero" as an arbitrary reference point rather than indicating a complete absence of the measured attribute. A classic example is temperature measurement in degrees Celsius or Fahrenheit, where the difference between 2°C and 3°C is the same as the difference between 4°C and 5°C. This illustrates the difference between interval scales and ordinal scales, where, unlike temperature, we cannot ascertain whether the distance between 'strongly agree' and 'agree' equals that between ‘agree’ and ‘neutral.’ (Larroulet, 2021).

Example of Interval Scale:

Table 3.2: Questionnaire Design with Interval Scale

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Telemedicine provides for my healthcare needs.	1	2	3	4	5
2.	Whenever a mistake is made in the system, it can be rectified easily and quickly.	1	2	3	4	5
3.	I believe the treatment process could become productive and efficient using telemedicine system.	1	2	3	4	5
4.	The telemedicine system helps to monitor my health condition.	1	2	3	4	5

3.5 Data Analysis

Data analysis is the methodical application of logical and/or statistical tools to describe and demonstrate, summarise and assess, and assess data. (*Data Analysis*, n.d.) We will utilise Statistical Package for the Social Sciences, or SPSS, software to analyse the data we have gathered from our respondents for our research.

3.5.1 Descriptive Analysis

Descriptive analysis is a technique that involves instructing panellists in how to measure particular visual, flavour, texture, and aftertaste sensory characteristics. (O'Sullivan, 2011) We can more easily provide quantitative descriptions from

enormous amounts of data by using descriptive analysis. This descriptive approach, which focuses on the qualitative side of the data, does have some limits, though. The specifics of how the data is created are not displayed. Therefore, we will compare the data from Section A, or the demographic data from our questionnaire, using descriptive analysis. We shall inquire about the respondents' gender, age, education level, ethnicity, residence area, and salary range for our Section A. We will use SPSS software to analyse this data after which we will provide it in a more straightforward format.

3.5.2 Scale Measurement

3.5.2.1 Reliability Test

Researching the properties of the measuring range and the scales' constituent parts is made possible by the reliability test. We shall conduct a reliability test in order to evaluate the questionnaire data. The reliability of the variable is evaluated using Cronbach Alpha. The closer a value is to 1, the more trustworthy it is. The dependability level of measurement table is shown below.

Table 3.3: Coefficient Alpha

Cronbach's Alpha ranges(α)	**Reliability Level**
< 0.5	Unacceptable
0.50 – 0.59	Poor
0.60 – 0.69	Questionable
0.70 – 0.79	Acceptable
0.80 – 0.89	Good
> 0.90	Excellent

Source from Mohd, Z., Ismail, S., & Abd Latif Saleh. (2018, July 9). Contractor's Performance Appraisal System in the Malaysian Construction Industry: Current Practice, Perception and Understanding.

3.5.3 Inferential Analysis

The reliability of inferences about a population that are based on data acquired from a sample of the population is assessed using inferential analysis. (Calvello, n.d.) It allows us to draw conclusions from the data we have gathered.

3.5.3.1 Multiple Regression Analysis

A single dependent variable and several independent variables can be analysed using the statistical technique known as multiple regression. (Ganesh, 2010) As below is the multiple regression formula we use and adapted for our research. (The Multiple Linear Regression Equation, 2016)

Table 3.4: Multiple Regression Equation

Multiple Regression Equation	**Multiple Regression Equation used for this research**
$y = b_1x_1 + b_2x_2 + \ldots + b_nx_n + c$	$y = b_1x_1 + b_2x_2 + b_nx_n + c$
y = Dependent Variable	y = Effectiveness of Telemedicine
b_1 = Value of Y when all X1 to Xp equals to zero	b_1= Value of Y when all X1 to X4 equals to zero
Bp = Estimated regression coefficients	b1 -bn = Estimated regression coefficients
xp = Independent Variables	x_1 = Patient Satisfaction
	x_2 = Auxiliary Function on Patient Outcome
	x3 = Barriers

3.6 Chapter Summary

We decided on the overall design of the study, methods for gathering data, sampling strategy, instrument, create measuring tools, data processing software,

and analysis procedures in the third chapter. There are three main forms of data analysis: descriptive, quantitative, and inferential.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter focuses on the examination of the data, which includes the presented data, and discusses how it relates to research questions and hypotheses. The data collected from the survey will be analyzed by SPSS and the results will be presented in tabular and graphical formats. This chapter also encompasses descriptive analysis methods, scale measurement techniques, and inference analysis.

4.1 Descriptive Analysis

Descriptive statistics are used to interpret the collected numerical information. There are 7 questions in this section with answer information.

4.1.1 Respondent Demographic Profile

Researchers can gain a deeper understanding of respondents by obtaining their demographic data. The demographic data of the respondents comprises their gender, age, educational attainment, ethnicity, income range, and residential area.

4.1.1.1 Gender

Table 4.1 and Figure 4.1 is the statistics of respondents' gender.

Table 4.1: Statistics of Respondents' Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	220	54.7	54.7	54.7
	Male	182	45.3	45.3	100.0
	Total	402	100.0	100.0	

Figure 4.1: Statistics of Respondents' Gender

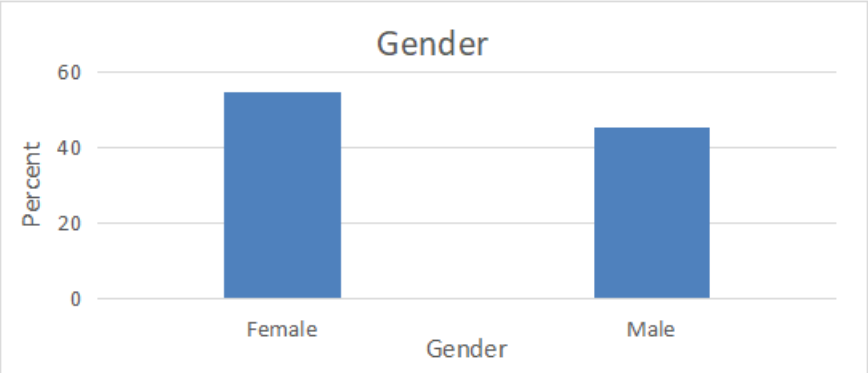


Table 4.1 and Figure 4.1 present the proportions of respondents' gender who took part in the survey. We have two categories of a gender groups. The female comprises 220 respondents (54.7%), while the male comprises 182 respondents (45.3%).

4.1.1.2 Age Group

Table 4.2 and Figure 4.2 show the statistics of respondents' age group.

Table 4.2 : Statistics of Respondents' Age Group

Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 years old and below	21	5.2	5.2	5.2
	21 to 30 years old	240	59.7	59.7	64.9
	31 to 40 years old	40	10.0	10.0	74.9
	41 to 50 years old	36	9.0	9.0	83.8
	51 to 60 years old	41	10.2	10.2	94.0
	61 years old and above	24	6.0	6.0	100.0
	Total	402	100.0	100.0	

Figure 4.2 : Statistics of Respondents' Age

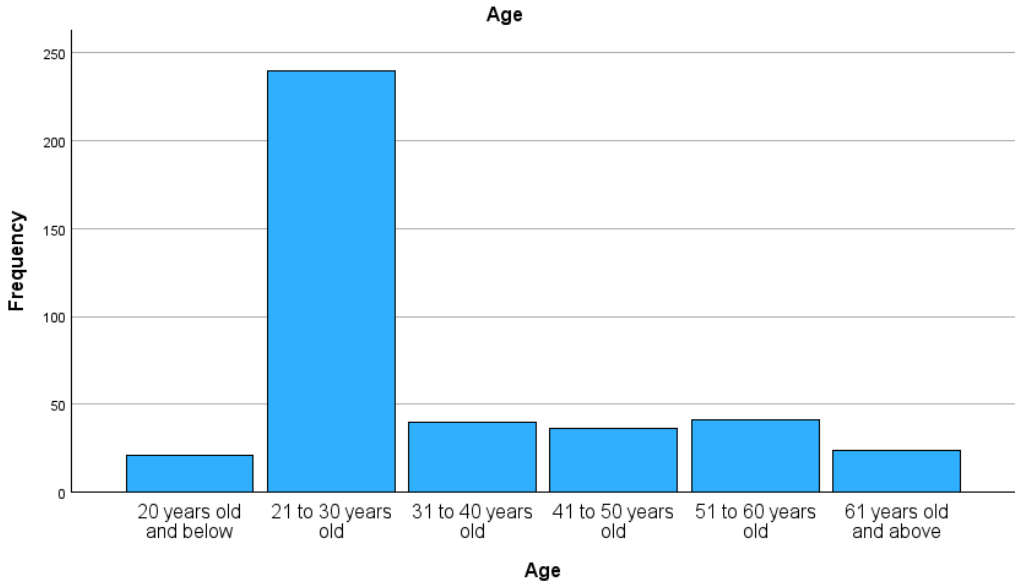


Table 4.2 and Figure 4.2 present the breakdown of respondents into various age groups. Six distinct age categories are available for respondents to choose from. A mere 5.2% (21 respondents) of the sample belongs to the age bracket of 20 years old and younger. Furthermore, 59.7% (240 respondents) of the sample were young adults (defined as being between the ages of 21 and 30). Next, 10% of respondents (40 respondents) are between the ages of 31 and 40. Also, 9% (36 respondents) of the total respondent are between ages of 41 until 50. In addition, 10.2% (41 respondents) are from 51 until 60 years old. Finally, 6% (24 responders) were the baby boomers (age of 61 and above).

4.1.1.3 Highest Education Level

Table 4.3 and Figure 4.3 show the statistics of respondents' highest education level.

Table 4.3 : Statistics of Respondents' Education Level

Highest Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's Degree	260	64.7	64.7	64.7

	Diploma	50	12.4	12.4	77.1
	Master's Degree	15	3.7	3.7	80.8
	Others	3	.7	.7	81.6
	PhD	2	.5	.5	82.1
	Primary School	15	3.7	3.7	85.8
	Secondary School	57	14.2	14.2	100.0
	Total	402	100.0	100.0	

Figure 4.3 : Statistics of Respondents' Highest Education Level

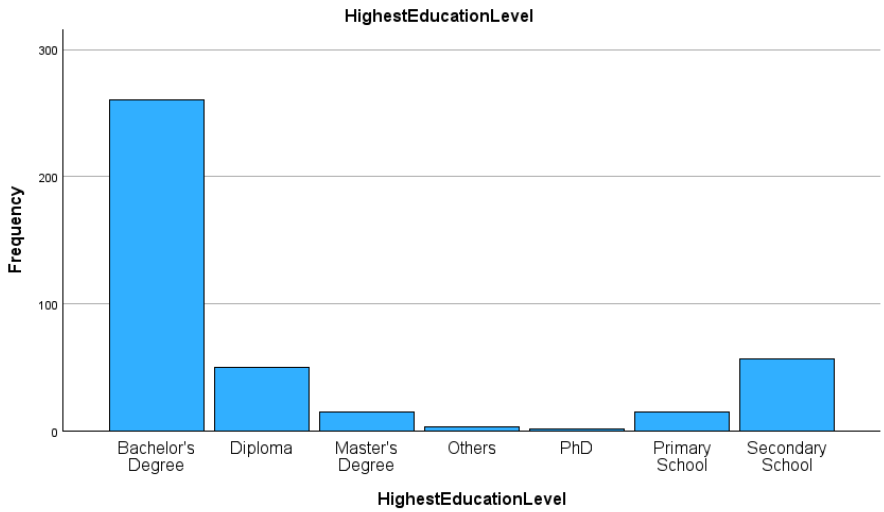


Table 4.3 and Figure 4.3 show that seven levels of education (Bachelor's Degree, Diploma, Master's Degree, PhD, Primary School, Secondary School and others) be distinguished. Most respondents are bachelor's degree holders, which is 64.7% (260 respondents). After that, the secondary school holder comprised 14.2% (57 respondents), followed by the diploma holder consisting of 12.4% (50 respondents). Furthermore, the master's degree holders and primary school holder covered the same respond which containing 3.7% (15 respondents) responds. Followed by the PhD holders, which contain 0.5% (2 respondents). Lastly, 0.7% (3 respondent) filled others highest education level (Pre-University, STPM).

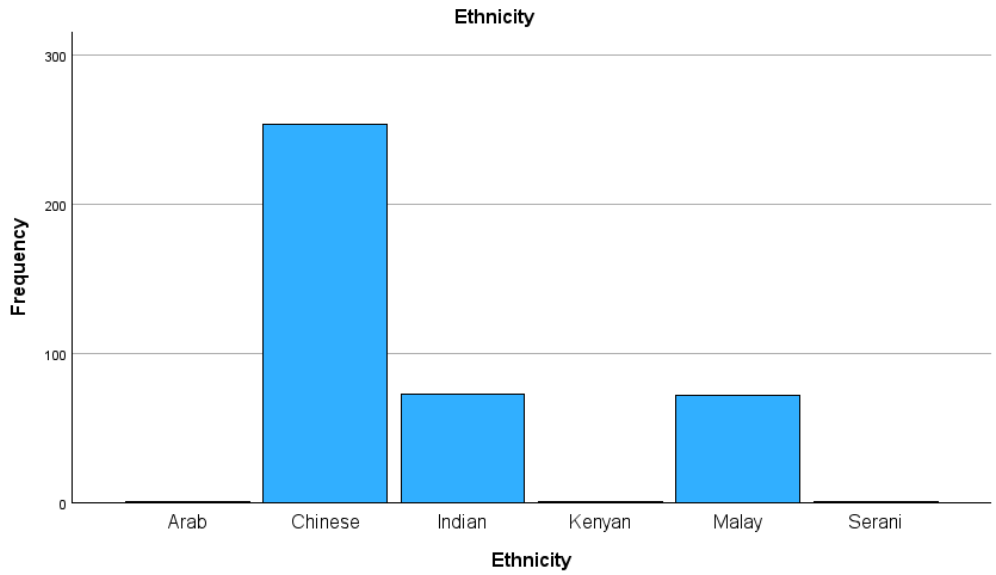
4.1.1.4 Ethnicity

Table 4.4 : Statistics of Respondents' Ethnic Group

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arab	1	.2	.2	.2
	Chinese	254	63.2	63.2	63.4
	Indian	73	18.2	18.2	81.6
	Kenyan	1	.2	.2	81.8
	Malay	72	17.9	17.9	99.8
	Serani	1	.2	.2	100.0
	Total	402	100.0	100.0	

Figure 4.4 : Statistics of Respondents' Ethnicity



Both Table 4.4 and Figure 4.4 illustrate the ethnicity divide into Chinese, Indian, Malay and others subgroups. The vast majority of respondents (63.2%, or 254 people) are Chinese. The next largest group is Indian, with 18.2% (73 respondents), then Malay, with 17.9% (72 respondents). Finally, there are 0.7% (3 respondents) from the other subgroup including Arab, Kenya and Serani.

4.1.1.5 Income Range

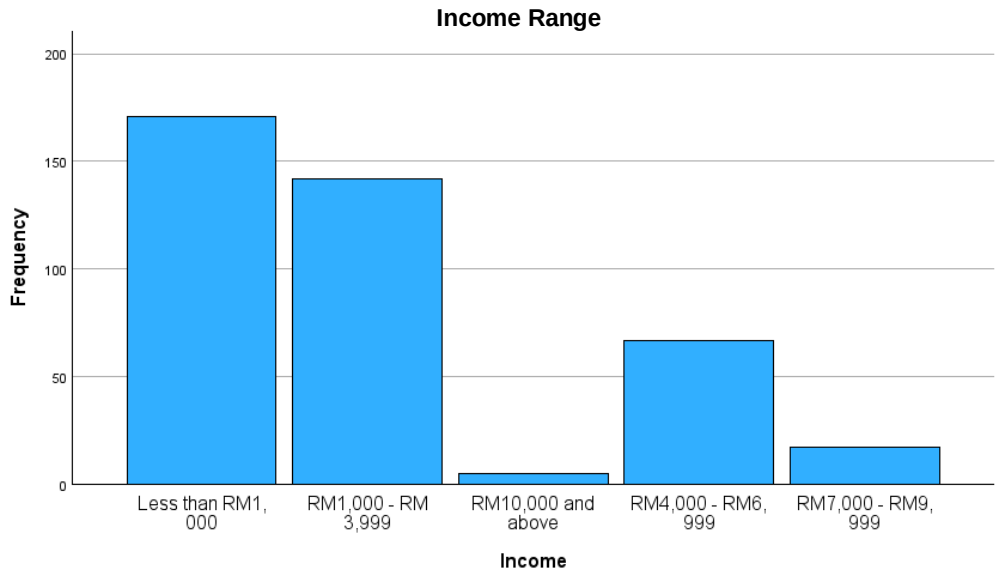
Table 4.5 and Figure 4.5 show the statistics of respondents' income range.

Table 4.5 : Statistics of Respondents' Income Range

Income Range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM1,000	171	42.5	42.5	42.5
	RM1,000 - RM 3,999	142	35.3	35.3	77.9
	RM10,000 and above	5	1.2	1.2	79.1
	RM4,000 - RM6,999	67	16.7	16.7	95.8
	RM7,000 - RM9,999	17	4.2	4.2	100.0
	Total	402	100.0	100.0	

Figure 4.5 : Statistics of Respondents' Income Range



Based on Table 4.5 and Figure 4.5, there have five classifications of respondents' income ranges. The highest income range is less than RM1,000, which consists of 42.5% (171 respondents), while the lowest of the respondent's salary range level is RM10,000 and above, which consists of 1.2% (5 respondents). Next, the salary

range of RM 1,000 to RM3,999 consists of 35.3% (142 respondents), next the income range of RM 4,000 to RM6,999, which consists of 16.7% (67 respondents). Last is RM7,000 to RM9,999 income range, comprising 4.2% (17 respondents).

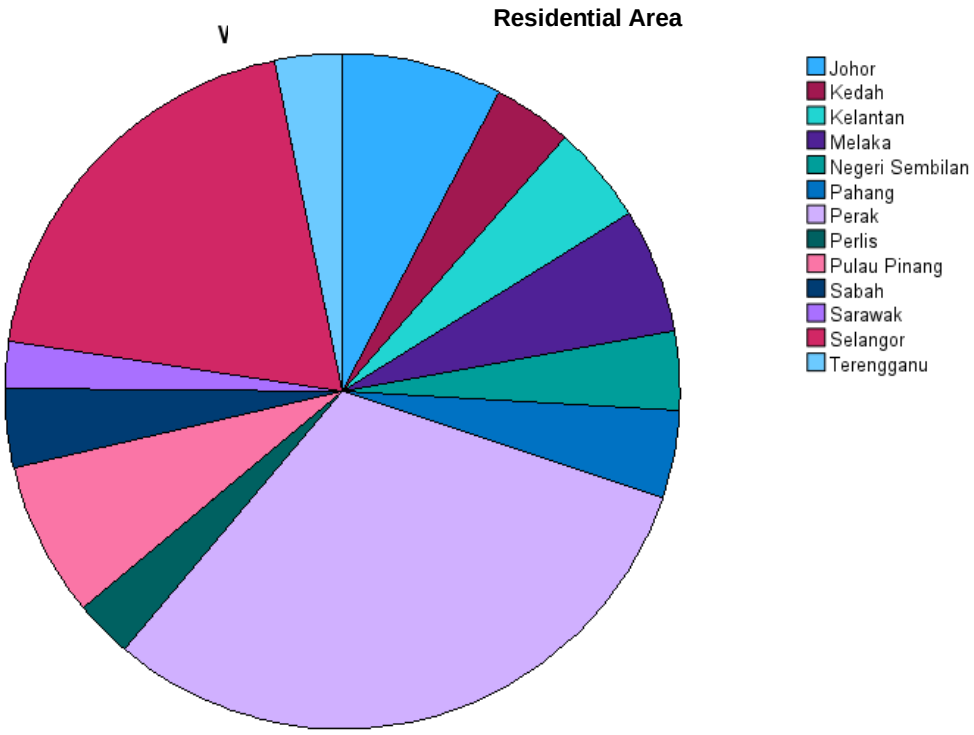
4.1.1.6 Respondents' Residential Area

Table 4.6 : Statistics of Respondents' Residential Area

Residential Area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Johor	31	7.7	7.7	7.7
	Kedah	15	3.7	3.7	11.4
	Kelantan	19	4.7	4.7	16.2
	Melaka	24	6.0	6.0	22.1
	Negeri Sembilan	15	3.7	3.7	25.9
	Pahang	17	4.2	4.2	30.1
	Perak	125	31.1	31.1	61.2
	Perlis	11	2.7	2.7	63.9
	Pulau Pinang	30	7.5	7.5	71.4
	Sabah	15	3.7	3.7	75.1
	Sarawak	9	2.2	2.2	77.4
	Selangor	78	19.4	19.4	96.8
	Terengganu	13	3.2	3.2	100.0
	Total	402	100.0	100.0	

Figure 4.6 : Statistics of Respondents' Residential Area



According to Table 4.6 and Figure 4.6, there are thirteen classifications of respondents' residential areas. The highest rate of the respondent's residential area is Perak, which consists of 31.1% (125 respondents), while the lowest of the respondent's residential area is Sarawak, which consists of 2.2% (9 respondents). Next, the second highest respondents' residential area is Selangor consists of 19.4% (78 respondents), followed by Johor, which consists of 7.7% (31 respondents). Furthermore, Pulau Penang consists 7.5% (30 respondents), followed by Melaka consists of 6% (24 respondents). Lastly, the remaining residential area consist below than 20 respondents: Kelantan 4.7% (19 respondents), Pahang 4.2% (17 respondents). Kedah, Negeri Sembilan and Sabah consist the same rate, which have 3.7% (15 respondents). Terangganu consist 3.2% (13 respondents) and lastly Perlis involve 2.7% (11 respondents).

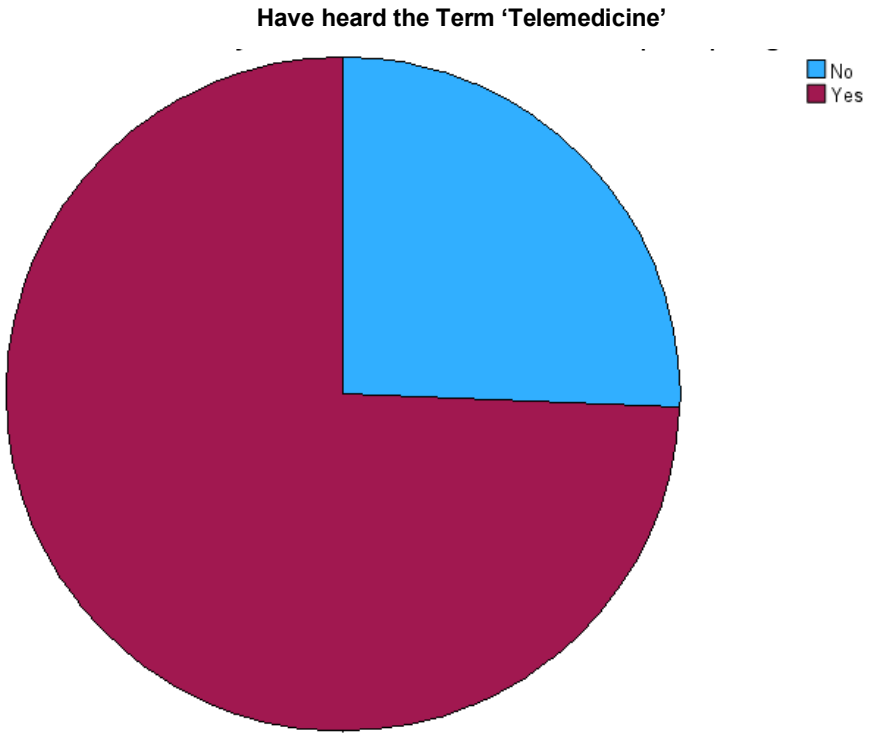
4.1.1.7 Have heard the Term‘Telemedicine’

Table 4.7 : Have heard the Term ‘Telemedicine’

Have heard the Term ‘Telemedicine’

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	103	25.6	25.6	25.6
	Yes	299	74.4	74.4	100.0
	Total	402	100.0	100.0	

Figure 4.7: Have heard the Term ‘Telemedicine’



Based on Table 4.7 and Figure 4.7, there have two classifications regarding are the respondents herd the term ‘telemedicine’ before fill in our survey. Based on our research, 74.4% (299 respondents) of the respondents did herd the term ‘telemedicine’ before. However, there are 25.6% (103 respondents) have not herd the term ‘telemedicine’ before.

4.1.2 Central Tendencies Measurement of Constructs

A central tendency is defined as data that specifies a single representative value at the centre of a collection. (Gupta et al., 2019) In this section, we will utilize SPSS software to compute the mean and standard deviation of both the dependent and independent variables.

4.1.2.1 The Effectiveness of Telemedicine

Table 4.8: The Effectiveness of Telemedicine

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
1. Telemedicine provides for my healthcare needs.	402	4.09	3	.805	2
2. Whenever a mistake is made in system, it can be rectified easily.	402	4.01	4	.863	1
3. I believe the treatment process could become productive and effective.	402	4.22	1	.802	3
4. The telemedicine system helps to monitor my health condition.	402	4.21	2	.799	4
Valid N (listwise)	402				

Mean and standard deviation rankings for the effectiveness of telemedicine are presented in table 4.8. Based on the table, the statement with the lowest meaning is the second question in this section, "Whenever a mistake is made in system, it can be rectified easily" at 4.01, and standard deviation at 0.863. Moreover, the statement "Telemedicine provides for my healthcare needs", "The telemedicine system helps to monitor my health condition" and "I believe the treatment process could become productive and effective", each have the mean of 4.09, 4.21 and 4.22; each of the standard deviations consists of 4.09, 4.21 and 4.22 respectively.

4.1.2.2 Patient Satisfaction

Table 4.9: Patient Satisfaction

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
1. I could easily communicate with doctors using the telemedicine system.	402	4.08	3	.903	3
2. I feel comfortable communicating with the doctors using the telemedicine system.	402	4.09	2	.899	4
3. The telemedicine system is simple and easy to understand.	402	4.12	1	.865	6
4. The way I interact with this system is pleasant.	402	4.07	4	.821	7

5. Using the telemedicine system, I could see the doctor just as well as in person.	402	3.95	6	1.007	2
6. I can always trust the telemedicine systems.	402	3.85	7	1.026	1
7. Healthcare providers encourage and support me to use the telemedicine system.	402	4.07	4	.889	5
Valid N (listwise)	402				

Table 4.9 presents the mean and standard deviation (SD) ranking regarding patient satisfaction. According to the table, the statement "I can always trust the telemedicine systems." has the lowest mean, standing at 3.85, with a standard deviation of 1.026. The statement 'Using the telemedicine system, I could see the doctor just as well as in person.' has its mean at 3.95 with containing 1.007 standard deviation. Moreover, the statement 'The way I interact with this system is pleasant.' and "Healthcare providers encourage and support me to use the telemedicine system.", have the same mean at 4.07. However, both of the statement has different standard deviation value at 0.821 and 0.889 accordingly. Furthermore, 'I could easily communicate with doctors using the telemedicine system.' and 'I feel comfortable communicating with the doctors using the telemedicine system.' having similar mean value at 4.08 and 4.09. Both statements cover its standard deviation at 0.903 and 0.899. Lastly, 'The telemedicine system is simple and easy to understand.' partaking the highest mean at 4.21 and standard deviation at 0.865.

4.1.2.3 Auxiliary Function on Patient Outcome

Table 4.10: Most Used Telemedicine Platform

Most Used Telemedicine Platform

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AIA+	1	.2	.2	.2
	BookDoc	32	8.0	8.0	8.2
	Doc2us	24	6.0	6.0	14.2
	Doctor2U	46	11.4	11.4	25.6
	GetDoc	23	5.7	5.7	31.3
	GetDocPlus	14	3.5	3.5	34.8
	Health Metrics	17	4.2	4.2	39.1
	MySejahtera	228	56.7	56.7	95.8
	Teleme	17	4.2	4.2	100.0
	Total	402	100.0	100.0	

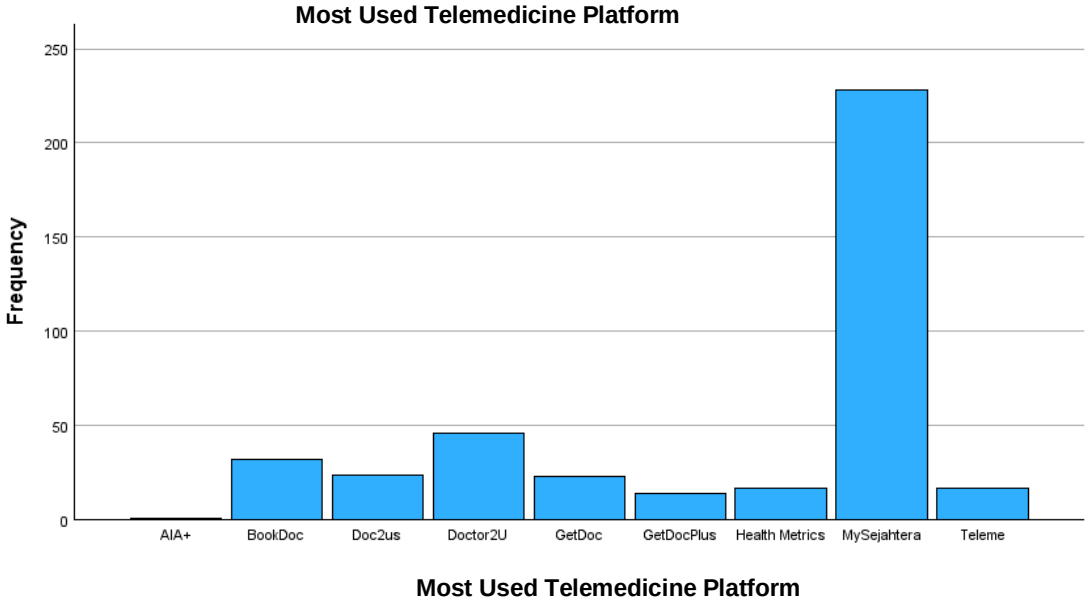


Figure 4.10: Most Used Telemedicine Platform

Table 4.10 shows the statistics of most used telemedicine platform from respondents. The statement with the lowest mean is AIA+ at 0.2% (1 respondent). The telemedicine platform 'GetDocPlus.' which has its percentage at 5.7% (23 respondents). Moreover, Health Metricts and Teleme has the same percentage at 4.2% (17 respoondents). Furthermore, Get Doc and Doc2us having similar percentage at 5.7% and 6.0%. Both telemedicine platfeom cover its frequency at

23 and 24 respondents accordingly. Also, BookDoc and Doctor2u has its percentage at 8% (32 respondents) and 11.4% (46 respondents). Lastly, MySejahtera partaking the highest percentage at 56.7% which containing 228 respondents.

Table 4.11: Most Used Auxiliary Function

Most Used Auxiliary Function

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electronic Prescriptions given by Healthcare Professionals	43	10.7	10.7	10.7
	Health Assessments	67	16.7	16.7	27.4
	Medication Delivery or Pickup	32	8.0	8.0	35.3
	No experience	4	1.0	1.0	36.3
	Online Appointment Booking Services	172	42.8	42.8	79.1
	Online Consultation	84	20.9	20.9	100.0
	Total	402	100.0	100.0	

Figure 4.11: Most Used Auxiliary Function

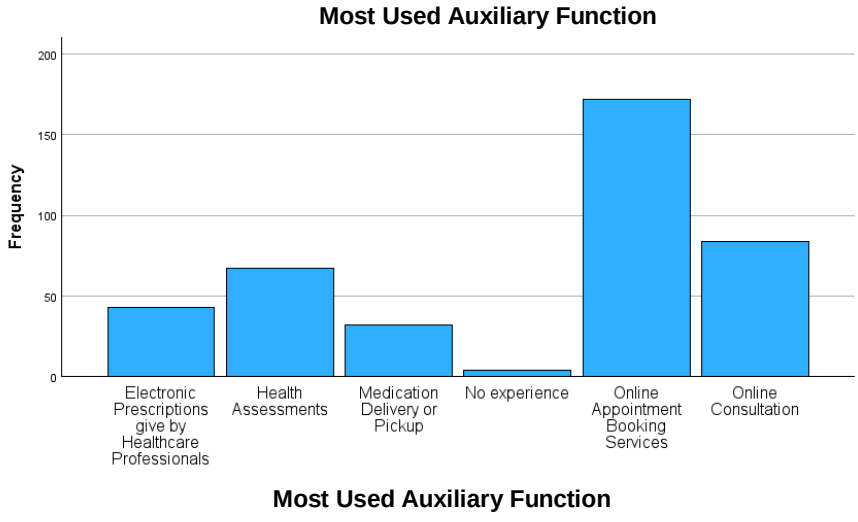


Table 4.11 shows the frequency and percentage of the most used auxiliary function collect from respondents. Based on the table, the selection with the lowest frequency and percentage is “no experience” at 4 respondents (1%).

Moreover, the auxiliary function “Medication Delivery or Pickup”, “Electronic Prescriptions given by Healthcare Professionals”, “Health Assessments”, and “Online Consultation.” each have the frequency of 32, 43, 67, 84 respondent result and percentage of 8%, 10.7%, 16.7%, 20.9% respectively. Lastly, the auxiliary function “Online Appointment Booking Services” has the highest frequency and percentage at 172 respondents (42.8%).

Auxiliary Function on Patient Outcome

Table 4.12: Auxiliary Function on Patient Outcome

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std Deviation Raking
1. Telemedicine systems save the treatment time.	402	4.18	2	.820	5
2. Doctors are able to deals with my problems using telemedicine system.	402	4.00	6	.885	4
3. Doctors are able to explain my medical conditions well enough as in person visits.	402	4.02	5	.939	3
4. Telemedicine is convenient to use compared with the in-person visits.	402	4.07	4	.948	2

5. Telemedicine can partially replace in person visits.	402	3.89	7	1.083	1
6. Telemedicine systems are helpful in monitoring health and reduce mortality rate.	402	4.12	3	.802	7
7. I will recommend the telemedicine system to my family and friends.	402	4.19	1	.805	6
Valid N (listwise)	402				

Table 4.12 shows the mean and standard deviation ranking of auxiliary function on patient outcome. According to the table, the statement "Telemedicine can partially replace in-person visits." has the lowest mean, recorded at 3.89, with the highest standard deviation at 1.083. The statement 'Doctors are able to deals with my problems using telemedicine system.' has its mean at 4.00 with containing 0.885 standard deviation. Moreover, the statement 'Doctors are able to explain my medical conditions well enough as in person visits.", having its mean at 4.02 and its standard deviation us 0.939. Furthermore, 'Telemedicine is convenient to use compared with the in-person visits.', 'Telemedicine systems are helpful in monitoring health and reduce mortality rate.' and 'Telemedicine systems save the treatment time.' having their mean value at 4.07, 4.12 and 4.18. Their standard deviation at 0.948, 0.802 and 0.820 accordingly. Finally, the statement "I will recommend the telemedicine system to my family and friends." has the highest mean, standing at 4.19, with a standard deviation of 0.805.

4.1.2.4 Barriers

Table 4.13: Barriers

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
1. Telemedicine system can protect patient's privacy well.	402	4.01	3	.881	3
2. The use of telemedicine technology seems difficult to me. (Reversed)	402	4.478	1	.501	5
3. The lack of physical contact during telemedicine is not a problem.	402	3.68	5	1.067	1
4. Doctor can get a good understanding of patient medical problem through telemedicine system.	402	3.93	4	1.012	2
5. Telemedicine systems keeps patient's information confidential.	402	4.06	2	.814	4
Valid N (listwise)	402				

Table 4.13 shows the mean and standard deviation ranking of barriers. Based on the table, the statement with the lowest mean is "The lack of physical contact

during telemedicine is not a problem.' at 3.68, with highest standard deviation at 1.067. The statement 'Doctor can get a good understanding of patient medical problem through telemedicine system.' and 'Telemedicine system can protect patient's privacy well.' has similar mean at 3.93 and 4.01. Both statements contain standard deviation value at 1.012 and 0.881 accordingly. Besides, statement 'Telemedicine systems keeps patient's information confidential.' has its mean at 4.06 and standard deviation at 0.814. Lastly, 'Telemedicine systems keeps patient's information confidential.' contribute the highest mean at 4.478 and standard deviation at 0.501.

4.2 Scale Measurement

Scale measurement involves the process of data collection and testing (Mishra et al., 2018). We utilized SPSS software to conduct reliability tests on both the dependent and independent variables, analyzing the data from the 402 respondents we collected.

4.2.1 Reliability Test of Pilot Test

Table 4.14: Cronbach's Alpha Reliability Test – Pilot Test

No	Variable	Number of Items	Cronbach's Alpha Value	Result of Reliability
1.	The Effectiveness of Telemedicine	4	0.746	Acceptable Reliability
2.	Patient Satisfaction	7	0.845	Good Reliability
3.	Auxiliary Function of Patient Outcome	7	0.854	Good Reliability
4.	Barriers	5	0.722	Acceptable Reliability

4.2.1.1 Reliability Test

Table 4.15: Cronbach's Alpha Reliability Test

No	Variable	Number of Items	Cronbach's Alpha Value	Result of Reliability
1.	The Effectiveness of Telemedicine	4	0.809	Good Reliability
2.	Patient Satisfaction	7	0.887	Good Reliability
3.	Auxiliary Function of Patient Outcome	7	0.888	Good Reliability
4.	Barriers	5	0.743	Acceptable Reliability

Table 4.16: Cronbach's Alpha Reliability

Reliability	**Coefficient Alpha(α)Range**
Unacceptable	Below 0.5
Poor	0.5 - 0.6
Questionable	0.6 – 0.7
Acceptable	0.7 – 0.8
Good	0.8 – 0.9
Excellent	Above 0.9

A pilot test with 30 responds is conducted before collecting actual survey for our study. As indicated in tables 4.14, 4.15, and 4.16, all of the independent variables and the dependent variable demonstrate good reliability and are considered acceptable. While compared the both pilot test and actual reliability test, our dependent variable (The Effectiveness of Telemedicine) obtained a good reliability which improved from 0.746 to 0.809 at the Cronbach's Alpha Value.

The two independent variables which have also obtained good reliability are Patient Satisfaction and Auxiliary Function of Patient Outcome each at the Cronbach's Alpha Value improvement from 0.845 to 0.887 and 0.854 to 0.888 respectively. Meanwhile the left independent variables, Barriers has obtained acceptable reliability, which is between 0.7 until 0.8. This independent variable has the Cronbach's Alpha Value of 0.722 improved to 0.743 compared to pilot test.

While compared the both pilot test and actual reliability test, the result of reliability for 'The Effectiveness of Telemedicine' was improved from 0.746 to 0.809 based on the pilot test.

4.3 Inferential Analysis

When comparing the variations amongst the treatment groups, inferential statistics are frequently employed. Measurements from the experiment's sample of participants are used by inferential statistics to compare the treatment groups and draw conclusions about the wider subject population (Kuhar, 2010). From the data we have gathered, we can draw conclusions from it. We will look at how these factors impact the dependent variable using multiple regression analysis.

4.3.1 Pearson Correlation Coefficient Analysis

The statistical relationship between two continuous variables is measured by the Pearson's correlation coefficient test statistic. Due to its foundation in the covariance approach, it is regarded as the most effective way to measure the relationship between variables of interest (Statistics Solutions, 2021).

Table 4.17: The scale of Pearson's Correlation Coefficient

Range	Relationship
±0.5 to ±1.0	Strong
±0.3 to ± 0.49	Moderate

±0.1 to ± 0.29	Weak

4.3.1.1 The Effectiveness Of Telemedicine And Patient Satisfaction

Table 4.18: Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine And The Patient Satisfaction

Correlations

		The Effectiveness of Telemedicine	Patient Satisfaction
The Effectiveness of Telemedicine	Pearson Correlation	1	.759**
	Sig. (2-tailed)		<.001
	N	402	402
Patient Satisfaction	Pearson Correlation	.759**	1
	Sig. (2-tailed)	<.001	
	N	402	402

**. Correlation is significant at the 0.01 level (2-tailed).

The result above shows the correlation coefficient resulted value of 0.759. This reveal that The effectiveness of telemedicine is positively correlated to patient satisfaction. Therefore, it can be concluded that patient satisfaction tends to increase as the effectiveness of telemedicine increases, and vice versa. Furthermore, the correlation coefficient value of 0.759 between the effectiveness of telemedicine and patient satisfaction indicates a strong association, as it falls within the range of ± 0.5 to ± 1. Moreover, the correlation between the effectiveness of telemedicine and patient satisfaction is statistically significant, as evidenced by the p-value of 0.000, which is lower than the alpha value of 0.05.

4.3.1.2 The Effectiveness of Telemedicine and Auxiliary Function on Patient Outcome

Table 4.19: Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine and Auxiliary Function on Patient Outcome

Correlations

		The Effectiveness of Telemedicine	Auxiliary Function on Patient Outcome
The Effectiveness of Telemedicine	Pearson Correlation	1	.754**
	Sig. (2-tailed)		<.001
	N	402	402
Auxiliary Function on Patient Outcome	Pearson Correlation	.754**	1
	Sig. (2-tailed)	<.001	
	N	402	402

**. Correlation is significant at the 0.01 level (2-tailed).

The result above shows the correlation coefficient resulted value of 0.754. This reveal that The Effectiveness of Telemedicine is positively correlated to Auxiliary Function on Patient Outcome. Therefore, it can be inferred that the auxiliary function on patient outcome tends to improve as the effectiveness of telemedicine increases, and vice versa. Additionally, the association between the Effectiveness of Telemedicine and Auxiliary Function on patient outcome is considered strong, as indicated by the correlation coefficient value of 0.754 falling within the range of ± 0.5 to ± 1. Furthermore, the correlation between the effectiveness of telemedicine and the auxiliary function on patient outcome is statistically significant, as demonstrated by the p-value of 0.000, which is lower than the alpha value of 0.05.

4.3.1.3 The Effectiveness of Telemedicine and Barriers

Table 4.20: Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine and Barriers

		The Effectiveness of Telemedicine	Barriers
The Effectiveness of Telemedicine	Pearson Correlation	1	.638**
	Sig. (2-tailed)		<.001
	N	402	402
Barriers	Pearson Correlation	.638**	1
	Sig. (2-tailed)	<.001	
	N	402	402

Correlations

**. Correlation is significant at the 0.01 level (2-tailed).

The result above shows the correlation coefficient resulted value of 0.638. This reveal that the effectiveness of telemedicine is negatively correlated to barriers. Therefore, it can be concluded that the effectiveness of telemedicine tends to improve as barriers decrease, and vice versa. Next, the correlation coefficient value of 0.638 between the effectiveness of telemedicine and barriers suggests a strong association, as it falls within the range of ± 0.5 to ± 1. Moreover, the correlation between the effectiveness of telemedicine and barriers is statistically significant, as evidenced by the p-value of 0.000, which is lower than the alpha value of 0.05.

4.3.2 Multiple Linear Regression (MLR) Analysis

Table 4.21: Multiple Linear Regression Coefficient Summary

Dependent Variable: The Effectiveness of Telemedicine

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.917	.126		7.279	<.001	.670	1.165
	Patient Satisfaction	.388	.048	.421	8.114	<.001	.294	.482
	Auxiliary Function on Patient Outcome	.371	.050	.396	7.424	<.001	.273	.469
	Barriers	.035	.046	.037	.763	.446	-.055	.125

Table 4.20 illustrates a significant correlation between the independent variables (Patient Satisfaction, Auxiliary Function on Patient Outcome, and Barriers) and the effectiveness of telemedicine, as evidenced by all p-values for these factors being less than 0.05. However, the p-value of 0.446 is bigger than the alpha value of 0.05, hence the correlation between barriers and the effectiveness of telemedicine is not statistically significant.

4.3.2.1 Patient Satisfaction and the Effectiveness of Telemedicine

H1: There is a significant positive relationship between patient satisfaction and the effectiveness of telemedicine in Malaysia.

SPSS data shows a strong correlation between patient satisfaction and the effectiveness of telemedicine in Malaysia. The hypothesis is accepted since the p-value is less than 0.001, which is less than the alpha = 0.05.

4.3.2.2 Auxiliary Function on Patient Outcome and the effectiveness of Telemedicine

H2: There is a significant positive relationship between auxiliary function on patient outcome and the effectiveness of telemedicine in Malaysia.

Results from SPSS showed that the p-value for the correlation between auxiliary function on patient outcome and the effectiveness of telemedicine in Malaysia was less than 0.001, indicating statistical significance. The hypothesis is thus accepted.

4.3.2.3 Barriers and the Effectiveness of Telemedicine

H3: There is a significant positive relationship between barriers and the effectiveness of telemedicine in Malaysia.

The analysis conducted using SPSS indicated that there was no statistically significant association between barriers and the effectiveness of telemedicine in Malaysia. This is supported by the p-value (0.446), which exceeds the significance level (0.05), thus leading to the rejection of the hypothesis.

4.3.3 Multiple Regression

As below is the multiple regression formula we use for our research and insert our dependent variable and independent variables.

Whereby:

$Y = b_0+b_1X_1+b_2X_2+b_3X_3$

Y= the Effectiveness of Telemedicine
b_0= Value of Y when all X_1 to X_3 equals to zero
$b_1 – b_3$= Estimated regression coefficients
X_1 = 1st Independent Variable (Patient Satisfaction)
X_2 = 2nd Independent Variable (Auxiliary Function on Patient Outcome)
X_3 = 3rd Independent Variable (Barriers)

The Effectiveness of Telemedicine= 0.917 + 0.388 (Patient Satisfaction) + 0.371 (Auxiliary Function on Patient Outcome) + 0.035 (Barriers)

Through the formula described above, we are able to explain which of the predictors best explains the variance in the effectiveness of telemedicine in Malaysia. To conclude, patient satisfaction has the greatest standardized coefficient beta value (0.388) in influencing the variance of the dependent variable. When it comes to explaining variation in the dependent variable, auxiliary function on patient outcome ranks second, with a beta value of 0.371 on the standardized coefficient. With a standardized coefficient beta value of 0.035, barriers come in the third place as a factor in explaining the variance of the dependent variable.

Table 4.22: Multiple Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801a	.641	.639	.39178

Table 4.21 indicates a R value of 0.801 for our investigation. This indicates that the three independent factors are significantly related to the dependent variable. This result yields a R squared score of 0.641, indicating that the four independent variables may be accounted for in the output. The independent variables account for 63.9% of the observed variance in the dependent variable.

4.4 Chapter Summary

In Chapter 4, summaries that were descriptive, quantitative, and inferential were provided. Using SPSS, we evaluated the survey data to find correlations between the dependent component (The Effectiveness of Telemedicine) and the independent factors (Patient Satisfaction, Auxiliary Function on Patient Outcome, and Barriers). The study's implications, synopsis, and discussion will be covered in the upcoming chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICAIONS

5.0 Introduction

In this chapter, major findings and their theoretical and practical implications will be discussed. The limitations followed by the future study will also be explained. In addition, this section will draw a conclusion based on the purpose, research questions, and results of the study.

5.1 Discussions of Major Findings

MySejahtera: Vital for Post-COVID Healthcare in Malaysia.

According to the survey, 228 out of 402 respondents selected 'MySejahtera' as their most frequently used telemedicine platform, indicating its continued popularity in Malaysia even after the Covid pandemic. MySejahtera, the mobile app widely used by adults during the pandemic, has remained relevant despite many users abandoning it after the mandatory check-in requirement was lifted in May 2022 (Povera & Harun, 2022). The government has been working to transform the app into a national health app as Malaysia transitions into digital health in the post-pandemic era. MySejahtera's supervisor, the Health Ministry's Crisis Preparedness and Response Centre (CPRC), head of data Dr. Mahesh Appannan predicted that the app would play a significant role in Malaysians' lives for many years to come (Zainal & Lee, 2022).

Since then, the latest health version of MySejahtera has been updated with new features such as health screening appointments, seeking medical treatment and advice, and a blood and organ donor platform (Suhaidi & Naharul, 2022). In addition to tracking Covid-19 cases, the app's infectious illness tracker has been expanded to include additional communicable diseases like dengue, rabies, measles, and hand, foot, and mouth disease. Health Minister Khairy Jamaluddin said on July 16 that the most recent version of MySejahtera may now retain user

health information and childhood immunisation data for kids born from July 1, 2022. According to Datuk Dr. Muhammad Radzi Abu Hassan, online dental appointments at the Health Ministry's medical facilities would also be accessible on MySejahtera as of May 15, 2023. The public can use this feature to arrange for a dental examination and to make appointments at a time that works best for them. In order to remind the public about the appointment date and time, the ministry will also implement an automated reminder system ("Online dental appointments at Health Ministry facilities", 2023).

In October 2023, the Health Ministry (MOH) has also introduced a new feature on the MySejahtera app called MyMinda, which allows users to assess their mental health status independently. MyMinda consists of three sub-modules that help individuals with mental health assessment, self-care, and access to mental health professionals (Kho, 2023). According to the Dewan Rakyat, as of November 15, a total of 17,300 mental health screenings have been recorded, with 23% or 3,983 of those screened showing risks of depression, and 15% or 2,592 found to have a risk for anxiety ("Mental Health Screening in MySejahtera", 2023). MySejahtera has enabled instantaneous reporting of diseases and up-to-date information, empowered communities and assisting them in protecting themselves. In December 2023, Health Minister Khairy Jamaluddin was also urged to consider re-imposing the use of the MySejahtera app to monitor Covid-19 patients following a surge in cases, with 12,757 cases reported for the week ending December 9, 2023, representing an 88% increase from the 6,796 cases reported the previous week ("Consider using MySejahtera again", 2023).

In short, MySejahtera is more than just an application for managing COVID-19 outbreaks. It also functions as a public health app, digitalizing healthcare services and creating opportunities to enhance healthcare accuracy and efficiency.

5.1.1 Patient Satisfaction and Effectiveness of Telemedicine

H1: There is a significant relationship between patient satisfaction and the effectiveness of telemedicine.

According to the research findings, there is a positive association between patient satisfaction and the effectiveness of telemedicine, indicating that higher perceived effectiveness of telemedicine leads to greater patient satisfaction. This is substantiated by the correlation coefficient value of 0.759, indicating a high to strong correlation between the two variables. Furthermore, a p-value of 0.0000, below the alpha level of 0.05, signifies a statistically significant relationship between the two variables.

Patient satisfaction is a crucial metric for assessing how successfully the telemedicine modality fulfilled patient expectations and shown adoption of this emerging medical service model (Cole et al., 2021). The voice of the patients must be heard constantly so that telehealth developers may be agile in their development process while the healthcare organisation continues to produce more technology-based care that matches the demands of patients and providers. (Kruse et al., 2017). According to Armaignac et al. (2018), patients feel satisfied with telemedicine when it provides them with positive outcomes in healthcare delivery through advanced monitoring, clinical decision-support capabilities, life-saving performance, and evidence-based critical care protocols. Therefore, to encourage the implementation of telemedicine, it's critical to evaluate its overall clinical effectiveness and make sure that any modifications to the care model would improve patient outcomes and enhance their satisfaction (Snoswell et al., 2021).

5.1.2 Auxiliary function on Patient Outcome and Effectiveness of Telemedicine

H2: There is a significant relationship between auxiliary function on patient outcome and the effectiveness of telemedicine.

The findings of the study suggest that there is a positive correlation between auxiliary function on patient outcome and the effectiveness of telemedicine, as demonstrated by a correlation coefficient value of 0.759, indicating a high to strong correlation between the two variables. Moreover, the p-value of 0.000, which is less than the alpha value of 0.05, signifies that the connection between

auxiliary function on patient outcome and the effectiveness of telemedicine is statistically significant.

This research result supports the notion that the effectiveness of telemedicine can be enhanced by well-functioning auxiliary functions. Telemedicine relies on various auxiliary functions, such as efficient appointment scheduling, timely access to medical records, and effective technical support can directly impact patient outcomes. For example, patients can have a video consultation with doctor in the smallest period of time. Additionally, a personalized meeting enables doctors to gather important information ahead of time and give patients individualized care, which improves health outcomes (Haleem et al., 2021). Moreover, another example of support services and processes that complement the primary telemedicine services include administrative task. For instance, if administrative processes are streamlined, healthcare providers can focus more on delivering care, leading to better outcomes for patients using telemedicine services. Auxiliary function of telemedicine has indeed provided patient with positive outcomes in healthcare delivery, such as resolving patients' concerns, facilitating contact with healthcare professionals, better accessibility, convenience, and cost efficiency (Aashima et al., 2021). Thus, optimizing auxiliary functions can improve patient outcomes and enhance the overall effectiveness of telemedicine services.

5.1.3 Barriers and Effectiveness of Telemedicine

H3: There is a significant relationship between barriers and the effectiveness of telemedicine.

The previous chapter's results have established a negative correlation between barriers and effectiveness of telemedicine. This indicates a statistically significant association between the two variables, as shown by a correlation coefficient value of 0.638 and a p-value of 0.000, which is below the alpha value of 0.05.

Barriers can directly impact the effectiveness of telemedicine. For example, technological difficulties that make it difficult for patients or healthcare professionals to use telemedicine technology can cause frustration and lower utilisation rates, which in turn can lower the quality of treatment that is provided through telemedicine. According to Ftouni e al. (2022), the adoption of telemedicine was sluggish primarily due to technological prerequisites. Barriers such as lack of universal access to technology, poor internet connectivity, and limited expansion of rapid internet networks impeded communication and interaction during video consultations. Besides, another example indicates that barriers could affect the effectiveness of telemedicine are pointed by Alarabyat et al. (2023), they found that due to patients' latent inertia and experience with traditional mode of treatment, which they believe to be more comprehensive, safe, or convenient, they will strongly oppose telemedicine. This resistance may stem from a fear of adopting new technology.

Such challenges could result in limited data available for assessing the effectiveness of telemedicine and hinders efforts to improve telemedicine service and its effectiveness. In short, addressing these barriers is crucial for maximizing the utilization of telemedicine among patients and healthcare providers. This may allow developers to maintain agility in their development processes, while healthcare organizations continue to provide technology-based care, ensuring the delivery of high-quality care to patients (Ansarian & Baharlouei, 2023).

5.2 Implications of the Study

5.2.1 Practical Implications

As there are minimal research regarding to the effective use of the telemedicine on health outcome among Malaysian, this research will help those who want to increase the effectiveness of the use of telemedicine thus filling in the research gap. Through the factors we have discussed such as patient satisfaction, auxiliary functions on patient outcomes and barriers in which are reliable based on our research. By identifying and addressing these factors, healthcare provides and

policymakers can enhance the delivery of telemedicine services, thereby improving overall health outcomes in Malaysia.

With healthcare system plays an important role in Malaysia healthcare industry, especially telemedicine, this research will definitely help in improving the integration of telemedicine into Malaysia's healthcare system. With effectiveness of the use of telemedicine, it can increase the quality of services in healthcare sector then led to more productivity thus increasing the effectiveness and efficiency of delivery of healthcare services leading to improved adherence to treatment plans and better health outcomes. By embracing telemedicine as a viable alternative to traditional healthcare delivery models, healthcare organizations can adapt to changing patient needs, improve access to care, and enhance overall health outcomes in the country.

As the Covid-19 pandemic has alerted the Malaysian that telemedicine is an alternative to traditional healthcare models during pandemic to provide prompt healthcare services and most of them had knew the benefits of the use of telemedicine. Now since the Covid-19 pandemic becoming less of an issue in Malaysia nowadays, the use of telemedicine initiatives should be continue in this recovery phase of country which helps to motivate the Malaysian to integrate to new healthcare systems era. By identifying and addressing factors such as patient satisfaction, auxiliary functions on patient outcomes, and barriers while using telemedicine, we contribute valuable insights to healthcare providers and policymakers. Through the integration of telemedicine into Malaysia's healthcare system, we anticipate improvements in service quality, productivity, and overall health outcomes.

5.2.2 Theoretical Implications

Based on the study, we have found that three theories we have applied are applicable. From the outcome of the research, these theories are advantages to patient satisfaction, auxiliary functions on patient outcomes and barriers while using telemedicine in the effectiveness of the use of telemedicine.

Firstly, the Technology Acceptance Model (TAM) believes that an individual's desire to accept a technology is impacted by their perceptions of its usability and convenience of use. Patients' perceptions of the convenience, accessibility, and use of a telemedicine platform play an important role in determining how satisfied they are with the service. We are able to better comprehend how perceptions of accessibility and ease of use affect telemedicine's effectiveness in improving Malaysians' health by evaluating patient attitudes concerning its adoption using TAM.

Second, the Health Belief Model (HBM) highlights how personal beliefs about health risks, the benefits of prevention, and barriers influence health-related behaviours. Applying HBM to telemedicine, it indicates that patients' perceived barriers to the severity of their health issues, the advantages of telemedicine use, and the convenience with which they can receive telemedicine care affect their willingness to embrace telemedicine and take part in telemedicine consultations. We may discover methods to overcome perceived obstacles and improve telemedicine's efficacy in enhancing health outcomes for Malaysians by investigating how patients' health beliefs influence their acceptance of the practice.

Last but not least, social cognition theory (SCT) highlights the significance of interpersonal relationships, observational learning, and self-efficacy in influencing personal behaviour. SCT indicates that patients' willingness to use telemedicine services is influenced by their perceptions of other people's experiences with telemedicine platforms and their own level of self-efficacy, or confidence in their ability to use telemedicine effectively. We can develop interventions to encourage the adoption of telemedicine and eliminate barriers to its usage, thus increasing its effectiveness in improving health outcomes for Malaysians, by examining how social influences and self-efficacy affect patients' acceptance of the practice.

5.3 Limitation of the Study

We encountered a few difficulties when doing the study. The fundamental drawback of this research is that only a limited number of respondents participated. Some respondents may choose to ignore the questions or refuse to reply to them

since this study gathering data from respondents by having them fill out a Google form, in which case they will not respond to our messages. In seeking solutions to these issues, we have sent around 402 questionnaires to a wide range of respondents through email and message, which has taken the research a lot of time.

Additionally, as our study is focused on the effectiveness of the use of telemedicine in Malaysia, it may not be applicable to reach out to larger populations such as healthcare professionals or certain age groups such as teenagers and senior citizens. There may be cultural stigma factors that influence the effectiveness of telemedicine which limit their use of telemedicine. It's also possible that factors like health literacy and financial consideration, which may influence the effectiveness of the use of telemedicine but were left out of our study's methodology, play a role in it.

Furthermore, the data collection method was another drawback in our research. For this study, we used a non-probability sampling procedure known as "snowball sampling," in which participants are recruited by online. This is due to the fact that our target population is quite big, making it difficult for us to reach a substantial proportion of respondents for the purpose of collecting questionnaire responses. As a consequence of this, we send our questionnaire to the initial respondents through email, and after that, we ask these people to share our questionnaire link to any other individuals they know who would be interested in taking part in the study. Afterward, more people are invited to participate in the study from the newly recruited participants. Since the majority of the individuals who participated in our study are between the ages of 21 and 30, accounting for 59.7% of all respondents, this indicates that we are unable to acquire information from all of the different groups in an equivalent manner. The snowball sampling approach may be an effective and cost-efficient way to target a certain group. Nevertheless, it can also be subject to bias due to the fact that respondents who are referred may have similar characteristics or perspectives. As a result, it may affect the results' capacity to be generalized.

The last limitation of our study is the possibility of participants reluctant to participate in questionnaires, which refers to an instance in which respondents

couldn’t provide responses to our questionnaires which they are not familiar or not understand with the term “telemedicine” and this caused they are not intended to fill out our questionnaires after they get to view our Google form.

5.4 Recommendation for future research

To overcome the challenge of limited respondent participation in research, there are several strategies that can be considered. Firstly, expanding the target audience by promoting the survey across various platforms such as face to face, online forums can help reach a wider range of participants. Secondly, improving the survey design to make it more user-friendly and engaging could be beneficial. This might involve reducing the length of the survey, refining the clarity of questions, or incorporating visual aids for better comprehension. Enhancing the layout of the survey can also encourage respondents to complete it without skipping questions. Furthermore, following up with non-respondents through reminders via email or text messages can encourage them to participate. Ensuring privacy and confidentiality of participant data is also essential to build trust and encourage participation. By implementing these strategies, researchers can overcome the challenge of limited respondent participation and achieve a more robust and diverse participant pool.

Next, to overcome the second challenge in our study, which is reaching out to larger populations, in research requires targeted and strategic approaches. When targeting age-specific groups like teenagers, utilizing social media platforms popular among these demographics can be effective. For example, teenagers can access telemedicine services more conveniently through community health centers or schools, with virtual health clinics and counselors readily available for instant assistance. When come to the middle age group, marketing initiatives emphasising the convenience, accessibility, and benefits of telemedicine for working middle-aged adults can assist promote awareness and encourage adoption. Elderly can be taught how to utilise telemedicine platforms effectively by holding workshops or one-on-one sessions at local clinics, senior centres, or community centres. Giving

them written or video instructions on how to access and utilise telemedicine services will help them get even more familiar to the technology.

To address the limitations associated with snowball sampling in our research, it's advisable to integrate various sampling methods for a more inclusive sample. While snowball sampling effectively targets specific groups, it's crucial to supplement it with probability sampling techniques like stratified or cluster sampling. For example, to ensure diversity and mitigate biases in our future research, we can first employ stratified sampling to randomly select an initial subset of participants from different academic departments across the university. This initial sample provides a foundation for representation across various academic disciplines. Subsequently, within each departmental stratum, we implement snowball sampling by asking the initial participants to share the survey link with their peers and classmates who meet the study criteria. As the survey spreads through social networks, we continuously recruit additional participants from each department. This combined approach allows us to achieve a balance between random selection and network expansion, ensuring that we capture a wide range of perspectives and experiences among college students.

To tackle the issue of participants hesitating to engage in our study due to unfamiliarity with the term "telemedicine," we can adopt several strategies. Initially, it's crucial to offer straightforward and succinct explanations of "telemedicine" at the survey's outset, ensuring participants grasp its significance. This can involve providing concise definitions or illustrating the concept with simple language and examples. Additionally, including supplementary materials or directing participants to additional resources about telemedicine can aid in their understanding prior to completing the questionnaire.

To improve telemedicine issues in rural and urban areas can be achieved through targeted efforts to improve accessibility and infrastructure are needed to deal with telemedicine issues in rural as well as urban areas. One strategy to facilitate the provision of seamless telemedicine services nationwide involves partnering with the Malaysian Communications and Multimedia Commission (MCMC) to ensure internet and 5G access in underdeveloped areas. This can be accomplished by

providing incentives to commercial telecommunications providers for their investments in network infrastructure in rural areas. Telemedicine can benefit both urban and rural individuals by tackling these important issues.

5.5 Conclusions

To sum up, this study aimed to investigate the effectiveness of telemedicine on health outcome among Malaysian. Through a comprehensive review of literature and analysis of survey data, several factors were identified, including patient satisfaction, auxiliary function on patient outcome, and barriers.

The findings of this study highlight the importance of addressing these factors in order to improve the effectiveness of telemedicine in healthcare industry. Specifically, enhance patient satisfaction and auxiliary function on patient outcome, as well as overcoming the barriers able to enhance the effectiveness of telemedicine.

This study also contributes to the understanding of telemedicine effectiveness in Malaysia's healthcare industry and provides practical recommendations for improving the effectiveness of telemedicine. This study may serve as a springboard for more research into the effects of these variables on effectiveness of telemedicine.

In conclusion, this study emphasized the critical role of telemedicine in healthcare industry and underscores the need for healthcare organizations to utilize telemedicine as a means to of enhance patient care, improve access to healthcare services, and overcome geographical barriers.

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Appendices

Appendix 1: Google Form Questionnaire Sample

A Study on the Effectiveness of Telemedicine Use on Health Outcome among Malaysians

Dear respondents,

We are final-year undergraduate students pursuing Bachelor of Business Administration (Honours) in Healthcare Management at Universiti Tunku Abdul Rahman (UTAR) Kampar Campus. Currently, we are conducting our Final Year Project (FYP) titled

" A Study on the Effectiveness of Telemedicine Use on Health Outcomes among Malaysians. "

Please note that "**telemedicine**" refers to the remote provision of healthcare services using telecommunications technology. It involves electronic communication tools such as video calls, phone calls, text messages, and other digital platforms to connect patients with healthcare providers.

1. Purpose of this study
-To determine the effectiveness of telemedicine use on health outcomes among Malaysians.
-To enhance the accessibility and acceptance, as well as promote the use of telemedicine among Malaysians.
-To solve the issue of lack of accessibility for telemedicine among Malaysians.

2. This questionnaire consists of *five* sections.
Section A - Demographic Questions
Section B - Effectiveness of Telemedicine
Section C - Patient Satisfaction
Section D - Auxiliary Function on Patient Outcome
Section E - Challenges and Barriers

3. Please answer ALL questions accurately in this survey. All information and data collected will be used solely for academic research and will be kept confidential.

4. For any further inquiries, please contact us at suerynn1102@1utar.my.

Your participation in this research project would be greatly appreciated.

PERSONAL DATA PROTECTION STATEMENT

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, University Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

Notice:

1. The purposes for which your personal data may be used are inclusive but not limited to:

- For assessment of any application to UTAR
- For processing any benefits and services
- For communication purposes
- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For the purpose of our corporate governance
- For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

1. By submitting this form you hereby authorise and consent to us processing (including disclosing) your personal data and any updates of your information, for the purposes and/or for any other purposes related to the purpose.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update your personal data by writing to us at suerynn1102@1utar.my

Acknowledgement of Notice *

- ◯ I have been notified and that I hereby understood, consented and agreed per UTAR above notice.
- ◯ I disagree, my personal data will not be processed.

Section A - Demographic Profile

Below are a few questions that seek information about yourself. Please mark the appropriate column/space provided that applies to you. Choose only **ONE** answer for **EACH** question.

Gender *

- ◯ Male
- ◯ Female

Age *

- ◯ 20 years old and below
- ◯ 21 to 30 years old
- ◯ 31 to 40 years old
- ◯ 41 to 50 years old
- ◯ 51 to 60 years old
- ◯ 61 years old and above

Highest Education Level *

- ◯ Primary School
- ◯ Secondary School
- ◯ Diploma
- ◯ Bachelor's Degree
- ◯ Master's Degree
- ◯ PhD
- ◯ Other...

Ethnicity *

- Chinese
- Malay
- Indian
- Other...

Income *

- Less than RM1,000
- RM1,000 - RM 3,999
- RM4,000 - RM6,999
- RM7,000 - RM9,999
- RM10,000 and above

What is your residential area ? (Example: Tapah, Kampar) *

Short answer text

Have you heard the term "telemedicine" before participating in this survey?

- Yes
- No

Section B- Dependent Variable (The Effectiveness of Telemedicine)

Please indicate the extent to which you agree or disagree on the following question by using 5 point Likert scale:

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Telemedicine provides for my healthcare needs. *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Whenever a mistake is made in system, it can be rectified easily and quickly. *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

I believe the treatment process could become productive and efficient using telemedicine system. *

	1	2	3	4	5	
Strongly Diagree	◯	◯	◯	◯	◯	Strongly Agree

The telemedicine system helps to monitor my health condition. *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Section C- Independent Variable (Patient Satisfaction)

Please indicate the extent to which you agree or disagree on the following question by using 5-point Likert scale:

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

I could easily communicate with doctors using the telemedicine system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I feel comfortable communicating with the doctors using the telemedicine system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The telemedicine system is simple and easy to understand. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The way I interact with this system is pleasant. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Using the telemedicine system, I could see the doctor just as well as in person. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can always trust the telemedicine systems. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Healthcare providers encourage and support me to use the telemedicine system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Section D - Independent Variable (Auxiliary Function on Patient Outcome)

Please indicate the extent to which you agree or disagree on the following question by using 5-point Likert scale:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Which telemedicine platform do you use the most? *

- MySejahtera
- Teleme
- Doctor2U
- Doc2us
- BookDoc
- GetDoc
- GetDocPlus
- Health Metrics
- Other...

What varieties of telemedicine auxiliary function do you use the most?

- Online Appointment Booking Services
- Online Consultation
- Electronic Prescriptions give by Healthcare Professionals
- Medication Delivery or Pickup
- Health Assessments
- Other...

Telemedicine systems save the treatment time. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strong Agree

Doctors are able to deals with my problems using telemedicine system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Doctors are able to explain my medical conditions well enough as in-person visits. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Telemedicine is convenient to use compared with the in-person visits. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Telemedicine can partially replace in-person visits. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Telemedicine systems are helpful in monitoring health and reduce mortality rate. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I will recommend the telemedicine system to my family and friends. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly agree

Section E - Independent Variable (Challenges and Barriers)

Please indicate the extent to which you agree or disagree on the following question by using 5-point Likert scale:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Telemedicine system can protects patient's privacy well. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The use of telemedicine technology seems difficult to me. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The lack of physical contact during telemedicine is not a problem. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Doctor can get a good understanding of patient medical problem through telemedicine system. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Telemedicine systems keeps patient's information confidential. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Appendix 2: Ethical Approval Letter

Re: U/SERC/245/2023

26 September 2023

Dr Siti Fazilah Binti Abdul Shukor
Head, Department of Business and Public Administration
Faculty of Business and Finance
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Siti,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Business Administration (Honours) Healthcare Management programme enrolled in course UBHZ3016. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No.	Research Title	Student's Name	Supervisor's Name	Approval Validity
1.	Unveiling Influences: Exploring Societal Factors on Weight Loss Supplement Consumption Among Adolescents in Malaysia	1. Goh Kai Boon 2. Tong Khay Lok 3. H'ng Xuan Ying 4. Wong Ru Jun 5. Chau Willis	Dr Hemaniswarri Dewi a/p Dewadas	26 September 2023 – 25 September 2024
2.	A Study on Knowledge, Influence, Perception and Readiness in Acceptance of the Ayurveda Approach to Stress Management Among Education Professionals	1. Abhilashini a/p Prabagaran 2. Kavithaashri a/p Selvaraja 3. Sneha Ramesh		
3.	A Study on the Effectiveness of the Use of Telemedicine on Health Outcome Among Perak Communities	1. Boo Shi Qi 2. Chai Yee Ling 3. Joan Heng Ka Yee 4. Lai Yan Xin 5. Tan Sue Rynn	Ms Jamie Anne a/p James Michael	

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

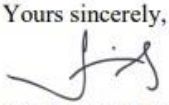
(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Should the students collect personal data of participants in their studies, please have the participants sign the attached Personal Data Protection Statement for records.

Thank you.

Yours sincerely,



Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Business and Finance
Director, Institute of Postgraduate Studies and Research

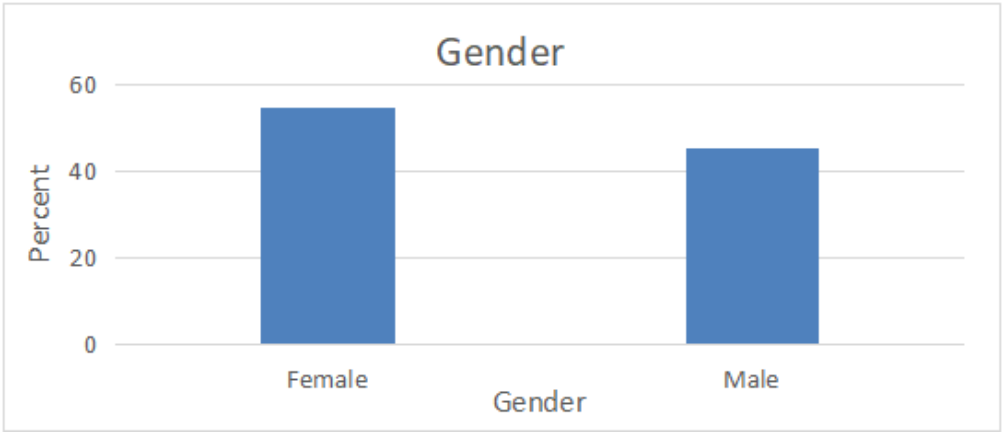
Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 Fax: (603) 9019 8868
Website: www.utar.edu.my

Appendix 3: Respondent Demographic Profile

Demographic Profile: Gender

Gender

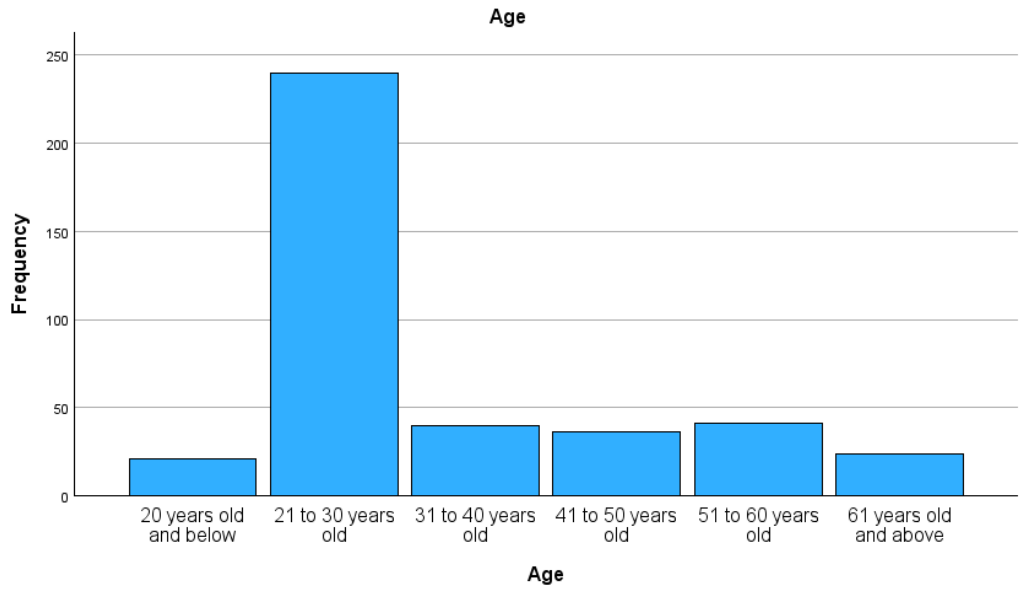
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	220	54.7	54.7	54.7
	Male	182	45.3	45.3	100.0
	Total	402	100.0	100.0	



Demographic Profile: Age Group

Age Group

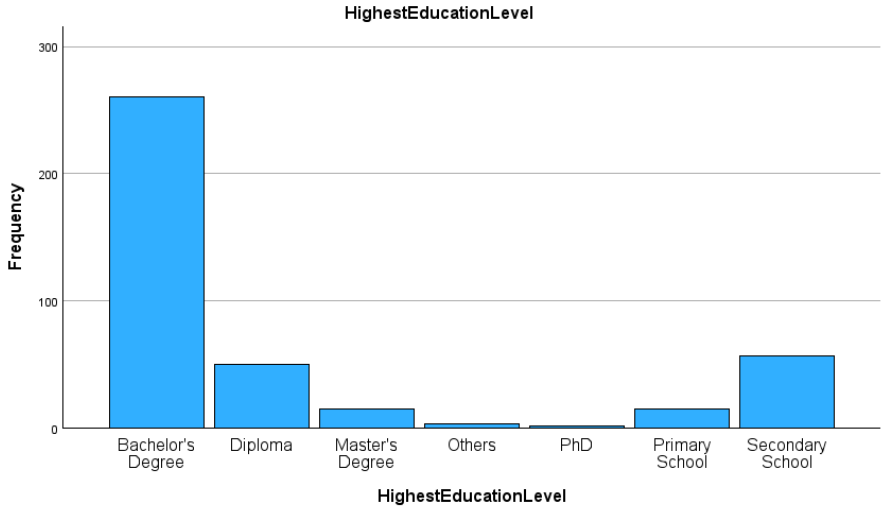
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 years old and below	21	5.2	5.2	5.2
	21 to 30 years old	240	59.7	59.7	64.9
	31 to 40 years old	40	10.0	10.0	74.9
	41 to 50 years old	36	9.0	9.0	83.8
	51 to 60 years old	41	10.2	10.2	94.0
	61 years old and above	24	6.0	6.0	100.0
	Total	402	100.0	100.0	



Demographic Profile: Highest Education Level

Highest Education Level

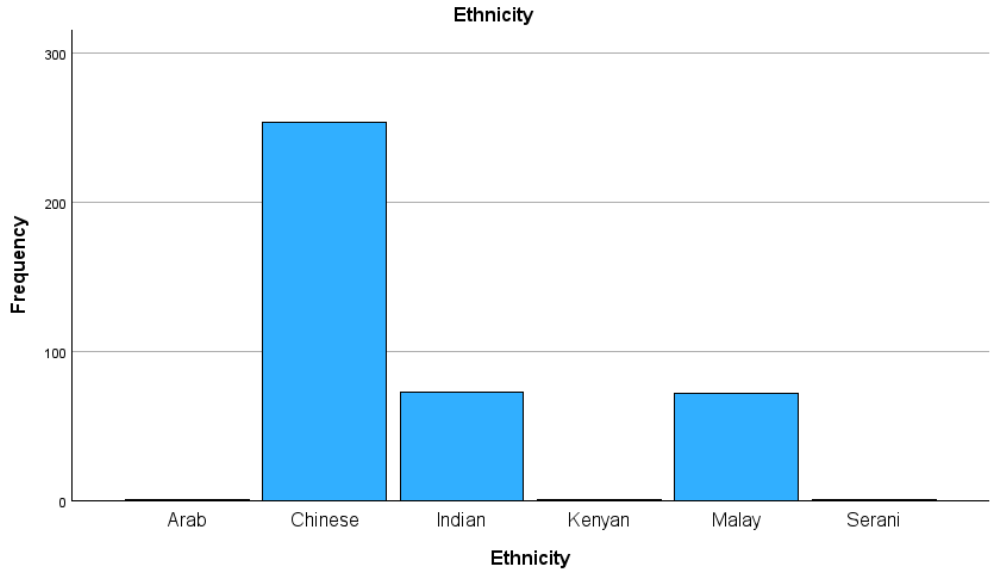
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's Degree	260	64.7	64.7	64.7
	Diploma	50	12.4	12.4	77.1
	Master's Degree	15	3.7	3.7	80.8
	Others	3	.7	.7	81.6
	PhD	2	.5	.5	82.1
	Primary School	15	3.7	3.7	85.8
	Secondary School	57	14.2	14.2	100.0
	Total	402	100.0	100.0	



Demographic Profile: Ethnicity

Ethnicity

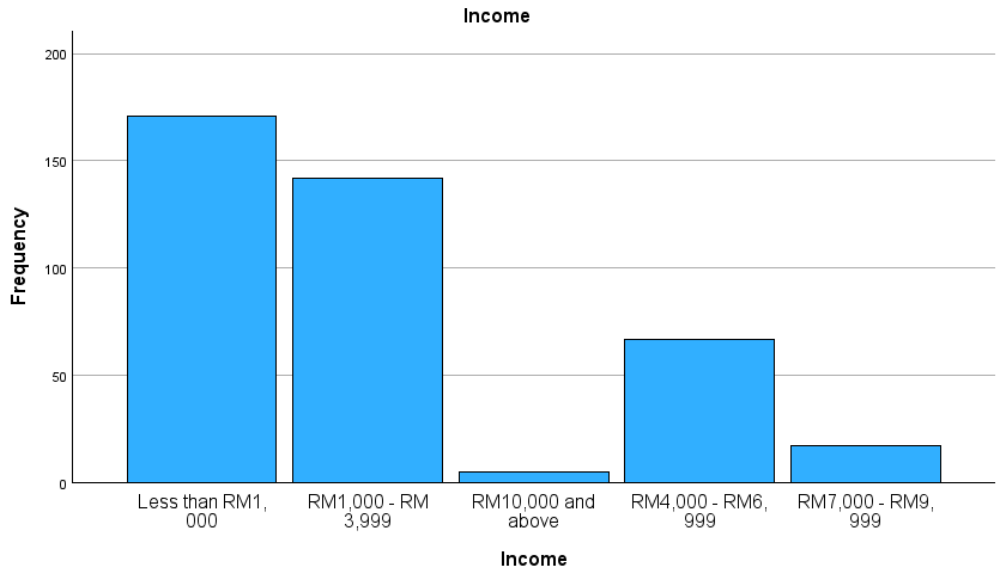
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arab	1	.2	.2	.2
	Chinese	254	63.2	63.2	63.4
	Indian	73	18.2	18.2	81.6
	Kenyan	1	.2	.2	81.8
	Malay	72	17.9	17.9	99.8
	Serani	1	.2	.2	100.0
	Total	402	100.0	100.0	



Demographic Profile: Income Range

Income Range

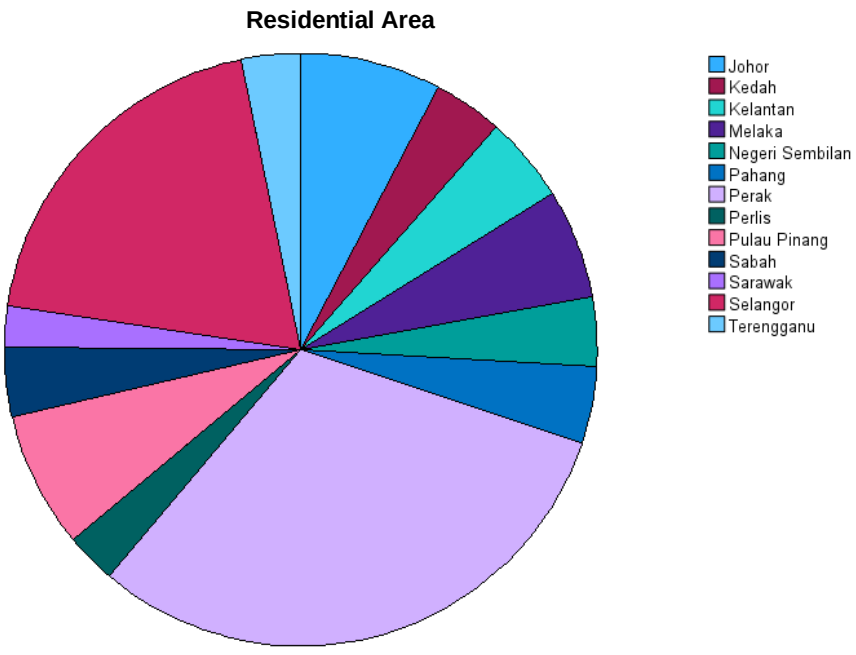
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM1,000	171	42.5	42.5	42.5
	RM1,000 - RM 3,999	142	35.3	35.3	77.9
	RM10,000 and above	5	1.2	1.2	79.1
	RM4,000 - RM6,999	67	16.7	16.7	95.8
	RM7,000 - RM9,999	17	4.2	4.2	100.0
	Total	402	100.0	100.0	



Demographic Profile: Respondents' Residential Area

Residential Area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Johor	31	7.7	7.7	7.7
	Kedah	15	3.7	3.7	11.4
	Kelantan	19	4.7	4.7	16.2
	Melaka	24	6.0	6.0	22.1
	Negeri Sembilan	15	3.7	3.7	25.9
	Pahang	17	4.2	4.2	30.1
	Perak	125	31.1	31.1	61.2
	Perlis	11	2.7	2.7	63.9
	Pulau Pinang	30	7.5	7.5	71.4
	Sabah	15	3.7	3.7	75.1
	Sarawak	9	2.2	2.2	77.4
	Selangor	78	19.4	19.4	96.8
	Terengganu	13	3.2	3.2	100.0
	Total	402	100.0	100.0	



Demographic Profile: Have heard the Term ‘Telemedicine’

Have heard the Term ‘Telemedicine’

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	103	25.6	25.6	25.6
	Yes	299	74.4	74.4	100.0
	Total	402	100.0	100.0	

Appendix 4: Central Tendencies Measurement

Central Tendencies Measurement for the Effectiveness of Telemedicine

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
5. Telemedicine provides for my healthcare needs.	402	4.09	3	.805	2
6. Whenever a mistake is made in system, it can be rectified easily.	402	4.01	4	.863	1
7. I believe the treatment process could become productive and effective.	402	4.22	1	.802	3
8. The telemedicine system helps to monitor my health condition.	402	4.21	2	.799	4
Valid N (listwise)	402				

Central Tendencies Measurement for Patient Satisfaction

Descriptive Statistics

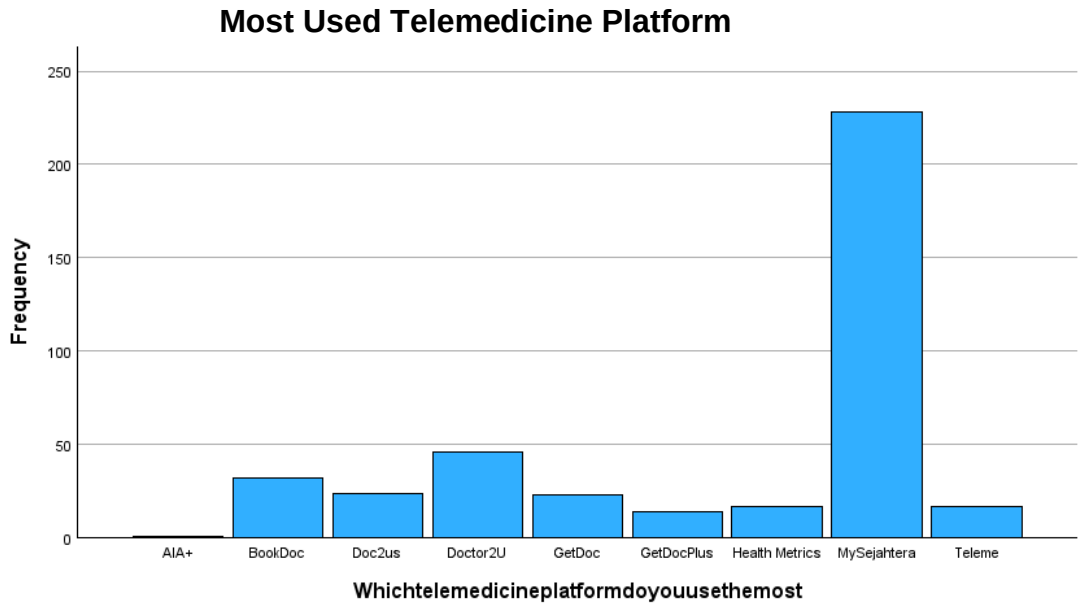
	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
8. I could easily communicate with doctors using the telemedicine system.	402	4.08	3	.903	3
9. I feel comfortable communicating with the doctors using the telemedicine system.	402	4.09	2	.899	4
10. The telemedicine system is simple and easy to understand.	402	4.12	1	.865	6
11. The way I interact with this system is pleasant.	402	4.07	4	.821	7
12. Using the telemedicine system, I could see the doctor just as well as in person.	402	3.95	6	1.007	2
13. I can always trust the telemedicine systems.	402	3.85	7	1.026	1

14. Healthcare providers encourage and support me to use the telemedicine system.	402	4.07	4	.889	5
Valid N (listwise)	402				

Central Tendencies Measurement for Most Used Telemedicine Platform

Most Used Telemedicine Platform

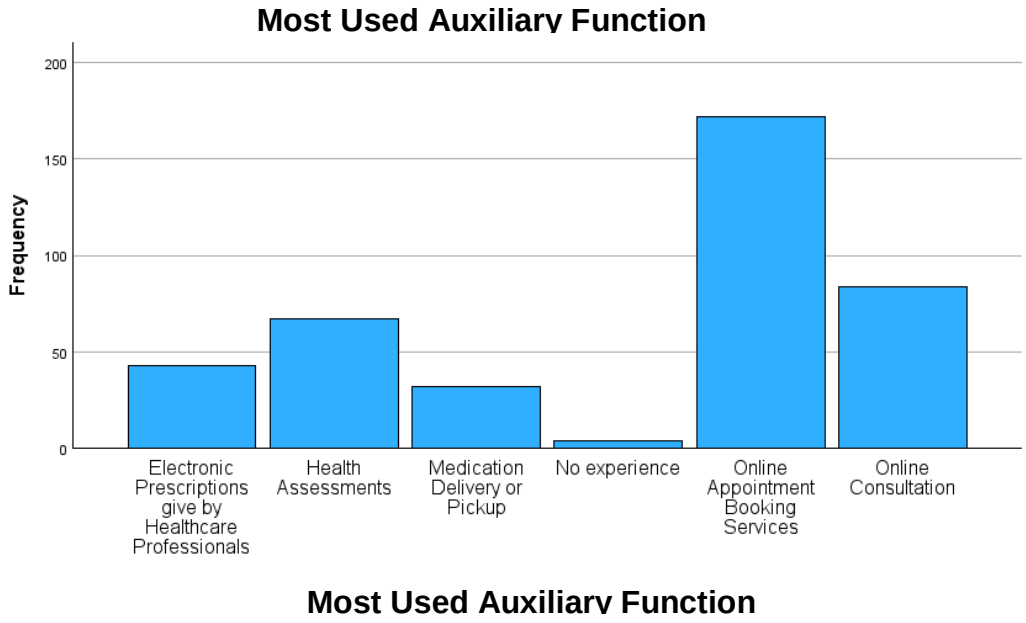
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AIA+	1	.2	.2	.2
	BookDoc	32	8.0	8.0	8.2
	Doc2us	24	6.0	6.0	14.2
	Doctor2U	46	11.4	11.4	25.6
	GetDoc	23	5.7	5.7	31.3
	GetDocPlus	14	3.5	3.5	34.8
	Health Metrics	17	4.2	4.2	39.1
	MySejahtera	228	56.7	56.7	95.8
	Teleme	17	4.2	4.2	100.0
	Total	402	100.0	100.0	



Central Tendencies Measurement for Most Used Auxiliary Function

Most Used Auxiliary Function

	Frequency	Percent	Valid Percent	Cumulative Percent
Electronic Prescriptions given by Healthcare Professionals	43	10.7	10.7	10.7
Health Assessments	67	16.7	16.7	27.4
Medication Delivery or Pickup	32	8.0	8.0	35.3
No experience	4	1.0	1.0	36.3
Online Appointment Booking Services	172	42.8	42.8	79.1
Online Consultation	84	20.9	20.9	100.0
Total	402	100.0	100.0	



Central Tendencies Measurement for Auxiliary Function on Patient Outcome

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std Deviation Raking
8. Telemedicine systems save the treatment time.	402	4.18	2	.820	5
9. Doctors are able to deals with my problems using telemedicine system.	402	4.00	6	.885	4
10. Doctors are able to explain my medical conditions well enough as in person visits.	402	4.02	5	.939	3
11. Telemedicine is convenient to use compared with the in-person visits.	402	4.07	4	.948	2
12. Telemedicine can partially replace in person visits.	402	3.89	7	1.083	1
13. Telemedicine systems are helpful in monitoring health and reduce mortality rate.	402	4.12	3	.802	7
14. I will recommend the telemedicine system to my family and friends.	402	4.19	1	.805	6
Valid N (listwise)	402				

Central Tendencies Measurement for Barriers

Descriptive Statistics

	N	Mean	Mean Ranking	Std. Deviation	Std. Deviation Ranking
6. Telemedicine system can protect patient's privacy well.	402	4.01	3	.881	3
7. The use of telemedicine technology seems difficult to me. (Reversed)	Ori: 232 SQ change to 402 dunno can or not leh	4.478	1	.501	5
8. The lack of physical contact during telemedicine is not a problem.	402	3.68	5	1.067	1
9. Doctor can get a good understanding of patient medical problem through telemedicine system.	402	3.93	4	1.012	2
10. Telemedicine systems keeps patient's information confidential.	402	4.06	2	.814	4
Valid N (listwise)	402				

Appendix 5: Reliability Test

The effectiveness of telemedicine

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.809	4

Patient Satisfaction

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.885	.887	7

Auxiliary Function of Patient Outcome

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.886	.888	7

Barriers

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.743	.743	5

Appendix 6: Pearson Correlation Coefficient Analysis

Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine and The Patient Satisfaction

		The Effectiveness of Telemedicine	Patient Satisfaction
The Effectiveness of Telemedicine	Pearson Correlation	1	.759**
	Sig. (2-tailed)		<.001
	N	402	402
Patient Satisfaction	Pearson Correlation	.759**	1
	Sig. (2-tailed)	<.001	
	N	402	402

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine and Auxiliary Function on Patient Outcome

		The Effectiveness of Telemedicine	Patient Satisfaction
The Effectiveness of Telemedicine	Pearson Correlation	1	.754**
	Sig. (2-tailed)		<.001
	N	402	402
Auxiliary Function on Patient Outcome	Pearson Correlation	.754**	1
	Sig. (2-tailed)	<.001	
	N	402	402

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation Coefficient Analysis for The Effectiveness of Telemedicine and Challenges and Barriers

		The Effectiveness of Telemedicine	Patient Satisfaction
The Effectiveness of Telemedicine	Pearson Correlation	1	.638**
	Sig. (2-tailed)		<.001
	N	402	402
Barriers	Pearson Correlation	.638**	1
	Sig. (2-tailed)	<.001	
	N	402	402

Appendix 7: Multiple Linear Regression (MLR) Analysis

Multiple Linear Regression Coefficient Summary

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	.917	.126		7.279	<.001	.670	1.165
Patient Satisfaction	.388	.048	.421	8.114	<.001	.294	.482
Auxiliary Function on Patient Outcome	.371	.050	.396	7.424	<.001	.273	.469
Barriers	.035	.046	.037	.763	.446	-.055	.125

Multiple Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801a	.641	.639	.39178