SATISFACTION TOWARDS VIRTUAL CONSULTATION SERVICES AND ITS ASSOCIATED FACTORS AMONG HEALTH CARE PROVIDERS IN GOVERNMENT HEALTH CLINICS IN SELANGOR

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TABLE OF CONTENTS

ACKNOWLEDGEMENT ..... **iv**

TABLE OF CONTENTS ..... **v**

LIST OF TABLES ..... **viii**

LIST OF FIGURES ..... **ix**

LIST OF SYMBOLS ..... **x**

LIST OF ABBREVIATIONS ..... **xi**

LIST OF APPENDICES ..... **xii**

CHAPTER 1 INTRODUCTION **1**

1.1 Telemedicine 1

1.2 Telemedicine in Malaysia 1

1.3 The Technology Acceptance Model (TAM) 3

1.4 Problem statement & study rationale 4

1.5 Research questions 5

1.6 Research objectives 5

1.6.1 General objective 5

1.6.2 Specific objectives 6

1.7 Research hypotheses 6

CHAPTER 2 LITERATURE REVIEW **7**

2.1 Satisfaction towards telemedicine use 7

2.2 Satisfaction of health care providers in using the virtual consultation services in Malaysia 9

2.3 Questionnaires to measure satisfaction in telemedicine usage 10

2.4 Factors associated with satisfaction 14

2.5 Conceptual framework 14

CHAPTER 3 METHODOLOGY 16

3.1 Study design, study area and study period 16

3.2 Study population 16

3.2.1 Reference population 16

3.2.2 Target population 16

3.2.3 Source population 16

3.2.4 Sampling frame 16

3.3 Subject criteria 17

3.3.1 Inclusion criteria 17

3.3.2 Exclusion criterion 17

3.4 Sample size estimation 17

3.5 Sampling method and subject recruitment 19

3.6 Research tool 20

3.7 Operational definition 21

3.8 Data collection method 22

3.9 Data analysis 22

3.10 Ethical consideration 24

3.10.1 Subject vulnerability 24

3.10.2 Declaration of absence of conflict of interest

3.10.3 Privacy and confidentiality

3.10.4 Community sensitivities and benefits

3.10.5 Honorarium and incentives

3.10.6 Other ethical review board approval

3.11 Flowchart 26

CHAPTER 4 RESULTS 28

4.1 Demographic characteristics of study participants 28

4.2 Proportion of HCPs who are satisfied with the virtual consultation services 29

4.3 Associated factors of HCP's satisfaction with the virtual consultation services..... 30

4.3.1 Simple logistic regression analysis

4.3.2 Multiple logistic regression analysis

CHAPTER 5 DISCUSSION 34

5.1 Revisiting study background 34

5.2 Proportion of HCPs who are satisfied with the virtual consultation services 35

5.3 Associated factors of HCP's satisfaction with the virtual consultation services..... 36

5.3.1 Age and gender

5.3.2 Education level

5.3.3 Previous experience with virtual consultation services

5.3.4 Perceived usefulness and perceived ease of use

5.3.5 Behavioural intention and actual use

5.4 Strength and limitation 42

CHAPTER 6 CONCLUSION AND FUTURE RECOMMENDATIONS.....45

6.1 Conclusion 45

6.2 Recommendations for improvements 45

6.3 Recommendations for future studies..... 46

REFERENCES.....47

APPENDICES

LIST OF TABLES

Page

Table 3.1 Sample size calculation by single-proportion formula 18

Table 3.2 Sample size calculation by two-proportion formula 19

Table 3.3 Conversion of construct variables into categorical variables 21

Table 4.1 Demographic characteristics of health care providers 28

Table 4.2 Feedback on the PU, PEOU, BI, ATU and US towards VCS 29

Table 4.3 Simple Logistic Regression 30

Table 4.4 Multiple Logistic Regression 31

LIST OF FIGURES

Page

Figure 2.1 Conceptual framework of the study 16

Figure 3.1 Flowchart of the study 27

Figure 4.1 ROC Curve 32

LIST OF SYMBOLS

>	More than
<	Less than
≥	More than and equal to
≤	Less than and equal to
=	Equal to
α	Alpha
&	And
β	Beta
d	Precision
n	Sample size
N	Population size
p	Proportion
ρ	p-value
SD	Standard deviation
%	Percentage

LIST OF ABBREVIATIONS

AdjOR	Adjusted Odd Ratio
CI	Confidence Interval
COVID	Coronavirus disease
df	degree of freedom
HCP	Health care provider
MOH	Ministry of Health
OR	Odd Ratio
PS	Power and sample size calculation
Sig.	Significance
Std	Standard
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
VCS	Virtual consultation services
WHO	World Health Organization

LIST OF APPENDICES

Appendix A	Study Proforma
Appendix B	Extended TAM Questionnaire
Appendix C	Study Poster and QR Code
Appendix D	Jawatankuasa Etika Penyelidikan (Manusia) Universiti Sains Malaysia (JEPeM) Approval Letter
Appendix E	National Medical Research Registry (NMRR), Ministry of Health Malaysia Approval Letter
Appendix F	Selangor State Health Department Approval Letter

KEPUASAN TERHADAP PERKHIDMATAN KONSULTASI SECARA MAYA DAN FAKTOR-FAKTOR PENYUMBANG DI KALANGAN PETUGAS KESIHATAN DI KLINIK-KLINIK KESIHATAN DI SELANGOR

ABSTRAK

Latar Belakang: Perkhidmatan konsultasi maya telah dilaksanakan oleh Kementerian Kesihatan sejak 2019 bagi melengkapi penyampaian perkhidmatan penjagaan kesihatan yang ada di klinik kesihatan kerajaan di Malaysia. Walaupun perkhidmatan ini telah dibuktikan memberi manfaat kepada pesakit, tidak diketahui tentang kepuasan kakitangan kesihatan yang menjalankan perkhidmatan tersebut. Kajian ini menggunakan lanjutan Model Penerimaan Teknologi untuk menilai kepuasan kakitangan kesihatan dan mengenal pasti faktor-faktor yang berkaitan bagi meningkatkan perkhidmatan tersebut.

Objektif: Menentukan peratusan kakitangan kesihatan yang berpuas hati dengan perkhidmatan konsultasi maya dan mengenal pasti faktor-faktor yang berkaitan yang menyumbang kepada kepuasan HCP terhadap perkhidmatan konsultasi maya.

Metodologi: Sebuah kajian lintang rentas telah dijalankan di 42 klinik kesihatan kerajaan di negeri Selangor dengan menggunakan soal selidik dalam talian yang diambil dari lanjutan Model Penerimaan Teknologi. Sejumlah 137 kakitangan kesihatan dari pelbagai kategori telah menjawab kaji selidik atas talian tersebut. Data dianalisis menggunakan statistik deskriptif, regresi logistik mudah dan ganda.

Hasil: Majoriti kakitangan kesihatan (72.3%) berpuas hati dengan perkhidmatan konsultasi maya dengan skor purata 14.47 (3.391). Dari analisis regresi yang dilakukan, hanya dua faktor didapati mempunyai hubungan yang signifikan dengan kepuasan kakitangan kesihatan iaitu kegunaan yang dilihat (AdjOR 9.396, 95% CI: 3.196 hingga 27.625) dan niat tingkah laku (AdjOR 8.311, 95% CI: 2.494 hingga 27.694).

Kesimpulan: Kegunaan yang dilihat dan niat tingkah laku kakitangan kesihatan sangat penting dalam meramalkan kepuasan terhadap perkhidmatan konsultasi maya di klinik-klinik kesihatan kerajaan di Selangor. Oleh itu, usaha harus diarahkan ke arah meningkatkan tahap kepuasan kakitangan kesihatan dengan menangani faktor-faktor ini untuk memastikan kelestarian perkhidmatan ini di masa depan dan terus memberi manfaat kepada pesakit.

KATA KUNCI: Konsultasi maya, teleperubatan, telekesihatan, telekonsultasi, kepuasaan penggunaan

SATISFACTION TOWARDS VIRTUAL CONSULTATION SERVICES AND ITS ASSOCIATED FACTORS AMONG HEALTH CARE PROVIDERS IN GOVERNMENT HEALTH CLINICS IN SELANGOR

ABSTRACT

Background: Virtual consultation services have been implemented by the Ministry of Health since 2019 to complement current healthcare service delivery in government health clinics in Malaysia. While the services have been proven to benefit the patients, little is known about the satisfaction of healthcare providers who run the services. This study utilizes the extended Technology Acceptance Model to evaluate the satisfaction of health care providers and identify the associated factors to further improve the services.

Objectives: To determine the proportion of health care providers (HCP) who were satisfied with the virtual consultation services and identify the associated factors that contribute to HCP's satisfaction towards virtual consultation services.

Methodology: A cross sectional study was conducted in 42 government health in Selangor using a questionnaire adopted from the extended Technology Acceptance Model. A total of 137 health care providers from various categories responded to the online survey. Data were analysed using descriptive statistic, simple and multiple logistic regression.

Result: Majority of respondents (72.3%) were satisfied with the virtual consultation services with mean score of 14.47 (3.391). Two factors were found to have significant association with health care providers' satisfaction which were perceived usefulness (AdjOR 9.396, 95% CI: 3.196 to 27.625) and behavioural intention (AdjOR 8.311, 95% CI: 2.494 to 27.694).

Conclusion: Perceived usefulness and behavioural intention of health care providers strongly predict satisfaction towards virtual consultation services in government health

clinics in Selangor. Therefore efforts should be directed towards improving satisfaction level of health care providers by addressing these factors to ensure sustainability of the services in the future and to continue benefit the patients.

KEYWORDS: Virtual consultation, telemedicine, telehealth, teleconsultation, user satisfaction

CHAPTER 1

INTRODUCTION

1.1 Telemedicine

Telemedicine is part of the Information Communication Technology that uses digital communication between patients and HCP to limit personal interaction (Bokolo, 2021). It is the use of telecommunication technology to diagnose and treat patients from a distance (Catalyst, 2018). Although there are numerous similarities between the terms "telehealth" and "telemedicine," and researchers frequently use them interchangeably (Catalyst, 2018; WHO, 2021), "telehealth" is thought to be a more inclusive term that covers all digital healthcare services and activities. (Catalyst, 2018). Home patient monitoring, the use of live or real-time interactive online applications like videoconferencing, telesurgery, teleconsultation, or comparable platforms, and the use of non-interactive technology like store-and-forward applications are three categories of telemedicine, according to the American Telemedicine Association (Thong et al., 2021).

Since the WHO proclaimed the COVID pandemic in March 2020, the virtual health platform has quickly elevated to one of the most important facets of providing healthcare globally (Bokolo, 2021; Althumairi et al., 2022; Ng et al., 2022). The use of VCS as one of the most efficient and cost-effective strategies to provide health services to patients and to guarantee continuity of care has been facilitated by the execution of movement restriction orders, social distance, and quarantine to slow the rapid transmission of coronavirus (Bokolo, 2021).

1.2 Telemedicine in Malaysia

The introduction of telemedicine began in the late 1990s in developing countries including Malaysia. It is regarded as part of the healthcare facilities that enhance the

accessibility of patients in rural or distant areas with health care providers (HCPs) through multiple communication and information technology platforms (Maarop *et al*., 2011). In 2005 the World Health Assembly (WHA) through its resolution WHA58.28 recommended its members to develop long term strategies and policies on eHealth. This is followed by the release of a report by the World Health Organization (WHO) on Global Strategy on Digital Health 2020-2025 to promote the development and implementation of eHealth services across the globe (WHO, 2019).

The implementation of digital health such as telemedicine in Malaysia began in 1997, with the introduction of the first Malaysian Telemedicine Blueprint by the Ministry of Health, with the goal of leading healthcare in the information age (Chi *et al.,* 2022). A pilot project was carried out in several hospitals and health centres during 2000-2002 as an early commitment to help identify the potential in facilitating health service delivery across Malaysia (Maarop *et al.,* 2011; Chi *et al.,* 2022), but unfortunately these efforts were hampered by obstacles such as inadequate knowledge and awareness on the technology among users, and inconsistency in services demand and needs (Maarop *et al*., 2011; Zailani *et al.*, 2014).

Despite the implementation barriers, the idea of adopting a digital platform in health service delivery was re-established in March 2019 when the Family Health Development Division under the Ministry of Health initiated the Virtual Clinic Program as proof of concept in five selected government health clinics throughout the country (MOH, 2022). With the emergence of Covid-19 in late 2019, the use of telemedicine has rapidly gained attention across the country as the pandemic altered the healthcare system significantly (Gilbert *et al*., 2020; Ng *et al.*, 2022). The Virtual Clinic Program was expanded to 35 other government health clinics in 2020 as to further limit the exposure between healthcare staff and patients to curb the spread of Covid-19 while ensuring accessibility and

continuity of care for patients (Gilbert *et al*., 2020; MOH, 2022). The program was then rebranded to Virtual Consultation Services (VCS) to provide a larger scope of services to patients in line with the aim of the Ministry of Health (MOH) towards national health digitalization (MOH, 2022). To date, there are a total of 270 government health clinics involved with the VCS across the country with Selangor having the highest number of clinics (42 clinics). Among the scope of services provided under this initiative includes outpatient service for chronic patients with communicable and non-communicable diseases, maternal and child health, pharmaceutical, dietary, occupational therapy and physiotherapy and multi-disciplinary team (MDT) services (MOH, 2022).

Even though the number of participating health clinics is expected to increase each year, the lack of knowledge regarding the acceptance of the VCS among HCPs is concerning. The impact of VCS on patients' clinical outcomes largely depends on health care professionals' perceptions towards the usefulness and usability of the services which may eventually determine its long-term implementation. The objectives of this study are to describe the HCP's satisfaction in using VCS in Malaysia and identify its associated factors. The outcome of this study may serve as an important guide for the improvement of VCS in Malaysia especially in government health clinics to ensure high quality clinical service delivery to the patients and the sustainability of the service in the future.

1.3 The Technology Acceptance Model (TAM)

The current study applied the Technology Acceptance Model (TAM) in achieving the study objectives. The reason why this model is preferred is because of its robustness and it is currently the most widely employed model which had been empirically tested in vast areas and study settings (Husin *et al*.,2022).

The Theory of Reasoned Action by Ajzen and Fishbein in 1980 served as the basis for the model, which was first put forth by Fred D. Davis in 1986. Based on two key factors, perceived usefulness (PU) and perceived ease of use (PEOU), it is regarded as the most significant theory for understanding a person's acceptance of information technologies (Lee, 2003). The Technology Acceptance Model has been duplicated, expanded upon, and elaborated in several studies over the years to evaluate numerous technological applications across numerous disciplines (Lee, 2003; Viswanath Venkatesh, 2008). The extended Technology Acceptance Model kept the original constructs of perceived usefulness (PU), perceived ease of use (PEOU), behavioural intention (BI), and attitude and actual use (ATU), but added the reflective construct of user satisfaction (US) that was suggested by a few authors (Legris et al., 2003; Kissi et al., 2020; Akritidi et al., 2022).

Perceived usefulness (PU) is the HCP's perception that VCS will speed up care delivery, reduce costs, increase the quality of health outcomes, and improve documentation. How simple it is to understand and utilise the service is characterised as perceived ease of use (PEOU). The HCP's intention to accept or reject the services of the virtual consultation is known as behavioural intention (BI). Attitudes and actual usage (ATU) describe how the VCS is actually implemented and used, and user satisfaction (US) shows how satisfied the HCPs are with the use of the virtual consultation services in government health clinics.

1.4 Problem statement & study rationale

Since the implementation of virtual clinics in primary care before the COVID pandemic, the acceptance of HCPs involved in the VCS has not been adequately assessed,

and there have been lack of studies done to address this issue (Maarop *et al*., 2011; Nguyen et al., 2020). With the increasing use of online platforms during and post Covid pandemic, the assessment of this digital health technology is becoming more crucial due its rapid adoption by health care workers across Malaysia especially in Selangor to comply with standard operating procedures enforced during pandemic.

Virtual consultation services in primary care have been proven to improve healthcare delivery, and reduce burden, cost, and referrals especially during the COVID pandemic (Bashshur et al., 2016). Hence there is an urgent need to assess the satisfaction of HCP to ensure acceptance and delivery of high-quality clinical services.

Findings from this study will provide insights on the perceived usefulness (PU), perceived ease of use (PEOU), behavioural intention (BI) and actual usage (ATU) that will help to improve the service to ensure sustainability of its adoption in the future.

1.5 Research questions

i. What is the proportion of HCPs who are satisfied with the virtual consultation services?

ii. What are the factors associated with HCP's satisfaction towards virtual consultation services?

1.6 Research Objectives

1.6.1 General objective

To evaluate the satisfaction of HCPs in using the VCS in government health clinics and identify its associated factors.

1.6.2 Specific objectives

I. To determine the proportion of HCPs who are satisfied with the virtual consultation services.

II. To determine the associated factors of HCP's satisfaction with the virtual consultation services

1.7 Research hypotheses

I. There are no associations between demographics characteristics (age, gender, level of education and previous experience with virtual consultation services) with HCP's satisfaction towards virtual consultation services.

II. The perceived usefulness (PU), perceived ease of use (PEOU), behavioural intention (BI) and actual usage (ATU) are not associated with HCP's satisfaction (US) towards virtual consultation services.

CHAPTER 2

LITERATURE REVIEW

All the literature searches regarding satisfaction of health providers, telemedicine/telehealth/virtual consultation and the associated factors were extensively done by using search engines such as PubMed, Science Direct, Springer Link and Google Scholar. Various searching methods were utilized such as combination of terms with the use of Boolean operators (AND, OR, NOT). Key words used were telemedicine/telehealth/teleconsultation/virtual consultation, satisfaction, health care providers, primary care/health clinics and factors associated.

2.1 Satisfaction towards telemedicine use

A cutting-edge method of delivering healthcare, telemedicine makes use of technology to deliver clinical treatments remotely. It is critical to comprehend how healthcare professionals view this platform as it becomes more popular due to variables like decreased travel time and improved accessibility because their happiness has a big impact on service quality and effectiveness. While evaluating HCP perceptions towards telemedicine has become less common (Nguyen et al., 2020), it remains an important aspect of healthcare quality (Whitten and Love, 2005) and a strong predictor of whether virtual consultation will be used in the health care setting for a longer period of time (Nguyen et al., 2020; Neshnash et al., 2022). This is supported by the fact that the rapid emergence of telemedicine use may be temporarily influenced by the COVID outbreak, with movement restrictions imposed across the country, and the large amount of training given to health care staffs to use a virtual consultation platform during the pandemic (Husin et al., 2022).

Nonetheless, measuring an individual's satisfaction towards telemedicine could be complicated and challenging because it requires input from multiple perspectives (Whitten

and Love, 2005; Robert Garcia, 2017). For example, patient satisfaction might be related to time, convenience and affordability while HCP's satisfaction could depend on ease of use and clinical efficiency (Gondal *et al.*, 2022). Furthermore, the disadvantages of virtual consultation, such as a lack of physical contact, incompatibility in acute and emergency cases, and a language barrier, may reduce HCP's perceptions of this service (Neshnash et al., 2022). Hence this evaluation deserves strong attention since it is critical for both quality of treatment and health outcomes (Whitten and Love, 2005; Gondal *et al.*, 2022). Concerns about evolving care models and potential harm to patient-provider interactions were highlighted in a review by Greenhalgh et al. (2017). In addition, some health care providers have expressed that employing telemedicine may lead to increasing workloads and ethical and legal dilemmas (Scott Kruse et al., 2018).

The major emphasis of this study is on the satisfaction of HCP. Generally satisfaction can be defined as the sum of one's feelings or attitudes toward a variety of factors affecting the situation (Legris *et al*, 2003). It has been a major area of research on telemedicine use around the globe (Whitten and Love, 2005). A study by Khan *et al.* (2022) in Qatar focused on primary care physicians' perception of telemedicine use and have found that majority of the physicians were pleased with the use of telemedicine especially during the covid-19 pandemic. But few barriers were identified such as challenges to assess COVID-19 disease, inadequate training, and potential language barrier. Another study in United States evaluated HCPs' satisfaction with using telemedicine for obesity management in rural populations of older adults. They found that HCPs appreciated the potential for improved patient access to obesity management resources especially in rural area by using telemedicine, but highlighted that their satisfaction can be improved in many ways. This includes advocating for telemedicine in rural areas by regulatory authorities and allowing other healthcare providers to deliver telemedicine service to overcome shortage of primary care providers (Batsis *et al.*, 2017). Another study in India by Acharya and Rai (2016) reported that around 80% of doctors

expressed satisfaction with telemedicine due to its potential for enhancing patient care and its role in facilitating medical education. However, concerns were raised about technical issues, data security, and the quality of physical examinations conducted via telemedicine.

2.2 Satisfaction of health care providers in using the virtual consultation services in Malaysia

Even though there is rapid adoption of VCS in Malaysian health care facilities, not many studies done in Malaysia focus on the satisfaction level of HCPs using this virtual platform especially in health clinics. Government health clinics have been the primary focus for this study because of the extensive workload faced by the HCPs working in these facilities due to high number of daily patient visit. It is also based on the evidence that primary care has played an outstanding role in maintaining core health services and responding to public health emergencies such as the COVID-19 outbreak (Organization, 2021). Even though few studies conducted in Malaysia only focus on the usefulness of telemedicine in hospitals (Zailani *et al.*, 2014; Thong *et al.*, 2021; Chi *et al.,* 2022), a systematic review of studies conducted between 2005 and 2015 have shown that telemedicine played a major role in addressing limitations faced by primary health clinics (Bashshur *et al.*, 2016). However, many researchers concentrated on the evaluation of telemedicine from the patients' perspective rather than the physicians' perspective (Maarop *et al*., 2011; Nguyen *et al.*, 2020) . The evaluation is sometimes used to gauge the quality of care given by the physicians without really emphasizing on the clinical outcomes (Nguyen *et al.*, 2020). The acceptance of physicians towards the adoption of telemedicine also needs to be properly examined, as it might serve as an indicator to optimal treatment outcomes (Malouff *et al.*, 2021).

There have been several studies conducted in Malaysia to evaluate the satisfaction level of health care workers using VCS but in different contexts. Thong et al. (2021) discovered that 76.7% of doctors in private hospitals in Malaysia believe that virtual

consultation is beneficial and should be routine in clinical practice. The author suggested that few reasons have served as barriers for its use such as issues with medicolegal and consent, billing, charges and insurance payment for such services. This study however was done in private health care setting in which it might not reflect overall acceptance in Malaysia and most people can get the services for free from government health clinics. Similar findings had been noted by Ibrahim *et al.* (2010) in which 80% of doctors were interested in the idea of remote communication with their patients and many have good level of knowledge and experience on technology components related to telemedicine. However this study was conducted more than 10 years ago in which the advancement of information technology was not similar as nowadays and findings might not be comparable to the current virtual consultation services. Another study by Zailani *et al.*(2014) explored the factors associated with acceptance of virtual consultation and concluded that government policies, higher level support, perception of usefulness and computer self-efficiency positive impact on virtual consultation acceptance. The findings however were based on public hospital setting which might reflect different health care priorities and needs compared to primary care setting.

2.3 Questionnaires to measure satisfaction in telemedicine usage

There are various questionnaires available to measure satisfaction in telemedicine usage. A review by Hajesmaeel-Gohari & Bahaadinbeigy (2021) revealed that the commonly used questionnaires for evaluating users' satisfaction, usability, and acceptance of technology were Client Satisfaction Questionnaire (CSQ), Questionnaire for User Interaction Satisfaction (QUIS), System Usability Scale (SUS), Patient Satisfaction Questionnaire (PSQ), and Technology Acceptance Model (TAM). This current study used an unnamed questionnaire derived from the extended Technology Acceptance Model (TAM) by Kissi *et al.* (2020) to measure the satisfaction level among healthcare workers in Malaysia.

2.3.1 Client Satisfaction Questionnaire (CSQ)

The Client Satisfaction Questionnaire (CSQ) is a tool commonly used to assess satisfaction with services across a wide variety of fields, including mental health, social services, and healthcare. The questionnaire is usually brief, consisting of eight or more items rated on a 4-point scale. It measures overall satisfaction rather than satisfaction with specific aspects of the service (Attkisson and Zwick, 1982).

The CSQ was initially developed by Attkisson and Zwick in 1982. The questionnaire has been shown to have good reliability and validity in multiple studies. It has broad applicability, good psychometric properties and brief and easy to administer. However the CSQ measures overall satisfaction rather than satisfaction with specific aspects of the service. This could limit its usefulness in identifying specific areas for improvement (Attkisson and Zwick, 1982).

2.3.2 Questionnaire for User Interaction Satisfaction (QUIS)

The Questionnaire for User Interaction Satisfaction (QUIS) is a tool designed to assess users' subjective satisfaction with specific aspects of the human-computer interface. Developed by Chin, Diehl, and Norman in 1988 at the University of Maryland, QUIS is commonly used in usability studies to evaluate computer software, hardware, and websites (Chin *et al.*, 1988).

The QUIS is a Likert scale-based questionnaire where users rate various aspects of a product, such as overall reaction, screen factors, terminology and system feedback, learning factors, and system capabilities. The QUIS provides a detailed evaluation of user interaction, have versatile application and provides quantifiable metrics. However it depends on subjectivity and can be influenced by factors unrelated to the interface, such as the respondent's mood or prior experiences. Besides, the full version of the questionnaire is lengthy and could be time-consuming for users to complete (Chin *et al.*, 1988).

2.3.3 System Usability Scale (SUS)

The System Usability Scale (SUS) is a simple and effective tool for assessing the usability of a variety of products and services, including hardware, software, mobile devices, websites, and applications. It was developed by John Brooke in 1986 at Digital Equipment Corporation Ltd in the UK (Brooke, 1996).

The SUS consists of a 10-item questionnaire with five response options, ranging from "Strongly Disagree" to "Strongly Agree". The respondent's scores for each question are converted to a new number, added together, and then multiplied by 2.5 to convert the original scores of 0-40 to 0-100 (Brooke, 1996).

The SUS is versatile and technology-agnostic. It can be used to assess a wide range of interface types, simple and reliable. However it doesn't identify specific problems or provide detailed insight into different aspects of usability. Some questions in the SUS are negatively phrased and might be confusing to some respondents (Brooke, 1996).

2.3.4 Patient Satisfaction Questionnaire (PSQ)

The Patient Satisfaction Questionnaire (PSQ), developed by Ware and Snyder in the 1970s, is a widely used tool for measuring patient satisfaction with medical care. The PSQ contains 50 items across 7 dimensions: general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with the doctor, and accessibility and convenience (Ware and Snyder, 1975).

Respondents indicate their agreement with statements on a five-point scale, ranging from "Strongly Agree" to "Strongly Disagree". The PSQ can be used in various healthcare settings and provides insight into patients' perceptions of their care, which is crucial for improving quality and outcomes (Ware and Snyder, 1975).

The PSQ provides a thorough evaluation of patient satisfaction, covering multiple aspects of the patient's experience. It has proven reliability and validity and can help inform quality improvement efforts in healthcare settings. However the PSQ is relatively long, with 50 items, which may result in respondent fatigue and affect the quality of responses. Furthermore, the PSQ does not consider individual patient preferences, which could impact satisfaction (Ware and Snyder, 1975).

2.3.5 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), proposed by Davis in 1986, is a popular theoretical framework used to predict and explain user acceptance and usage of technology. The model suggests that perceived usefulness and perceived ease of use are two key determinants of whether an individual will accept and use a new technology (Davis 1985).

Perceived usefulness is defined as the degree to which a person believes that using a particular technology will enhance their job performance, while perceived ease of use refers to the degree to which a person believes that using a particular technology would be free of effort. TAM's strength lies in its simplicity, allowing it to be applied in a variety of contexts and with various technologies. TAM has been shown in many studies to have strong predictive power for technology acceptance and use. Over time, several variants of TAM have been developed to include additional factors such as social influence, facilitating conditions, and individual differences, enhancing the model's comprehensiveness (Davis 1985).

However, critics of TAM argue that it oversimplifies the acceptance process and ignores several important factors. TAM also focuses primarily on initial adoption rather than long-term use of technology. Therefore, it might be less useful in understanding continued usage and user loyalty (Davis 1985). Since TAM is relatively simple compared to other questionnaires, suitable for predictive study and VCS is still at early adoption phase, it has been chosen to be applied in this study.

2.4 Factors associated with satisfaction

Numerous researches have looked at the relationship between user acceptance and factors like age, gender, education level, and comfort with using digital platforms (Or and Karsh, 2009; Tubaishat, 2018). For instance, a study by Goldfarb et al. (2007) found that higher levels of education are associated with a greater inclination among younger users to accept and use Internet technology than among older users. Working experience is also related to the acceptance and use of telemedicine in the sense that it lessens tension and anxiety in healthcare workers who have been in their positions longer and are experienced with a variety of systems (Zailani et al., 2014). Age, gender, education level, and telemedicine familiarity will therefore be taken into account in this study as characteristics that govern the variation in satisfaction with virtual consultation services.

According to Kissi et al. (2020), PU and PEOU have a direct impact on behavioural intention, whereas actual use has a direct impact on behavioural intention, which in turn affects user satisfaction. This suggests that the sole factor directly influencing user happiness is the actual use. However, only a few studies (Zailani et al., 2014; Nguyen et al., 2020) suggested that PU and PEOU can directly affect user satisfaction. A few more studies (Chao, 2019; Lee et al., 2021) have revealed that user pleasure and behavioural intention are highly correlated. We therefore hypothesise that all PU, PEOU, BI, and ATU will favourably improve HCP's satisfaction with virtual consultation services based on these evidences.

2.5 Conceptual framework

Based on the above literature review, factors associated with HCP satisfaction can be divided into demographic factors and factors derived from Technology Acceptance Model. Demographic factors include age group, gender, level of education, and previous experience

with the service, whereas factors from TAM include PU, PEOU, ATU and BI. All of these factors are postulated to directly contribute to HCP satisfaction in using VCS.

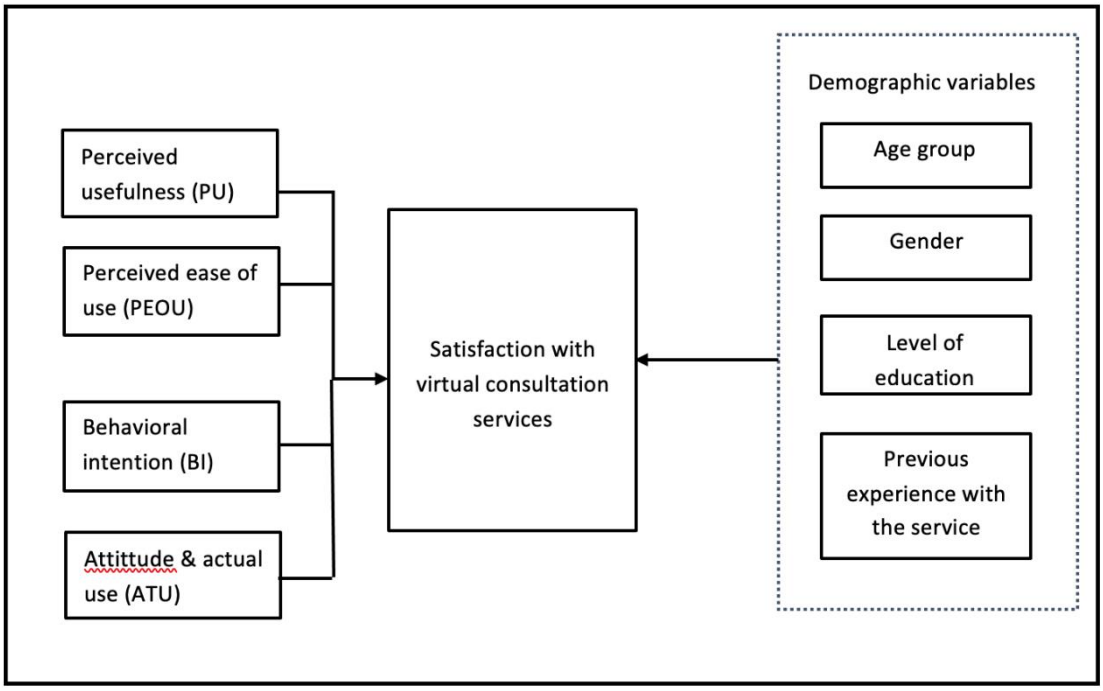

Figure 2.1: Conceptual framework of the study

CHAPTER 3

METHODOLOGY

3.1 Study design, study area and study period

A cross sectional study was conducted for nine months from October 2022 until June 2023. The study area was Selangor because it is the most populous state in Malaysia with the highest number of government health clinics that have adopted VCS. To date, there are 42 government health clinics under the supervision of the Selangor State Health Department (Appendix F).

3.2 Study population

3.2.1 Reference population

All healthcare providers in government health clinics or known as *Klinik Kesihatan* in Selangor

3.2.2 Target population

All health care providers who were involved with virtual consultation services in government health clinics in Selangor

3.2.3 Source population

All family medicine specialists (FMS), medical officers, pharmacists, dietitians, nutritionist, occupational therapists and physiotherapists who were involved with virtual consultation services in government health clinics in Selangor

3.2.4 Sampling frame

All family medicine specialists (FMS), medical officers, pharmacists, dietitians, nutritionist, occupational therapists and physiotherapists who were involved with virtual

consultation services in government health clinics in Selangor who fulfilled the study criteria during the study period.

3.3 Subject criteria

3.3.1 Inclusion criteria

i. Family health specialists, medical officers, pharmacists, dietitians, nutritionist, occupational therapists and physiotherapists who had at least one experience in using virtual consultation services in government health clinics in Selangor

ii. Able to understand the English language

3.3.2 Exclusion criterion

Visiting FMS, pharmacist, dietitians, nutritionist, occupational therapists and physiotherapists

3.4 Sample size estimation

The sample size for this study was calculated using the PS software. For the first specific objective, a single-proportion formula was used to derive the sample size. The variable used is US variable which refers to the proportion of HCPs who are satisfied with VCS.

Table 3.1: Sample size calculation for objective 1

Variable	**p**	**α**	***d***	**n**	**N + 20% anticipate dropout**	**Literature review**
User Satisfaction (US)	0.98	0.05	0.05	31	39	Qianqian Ma *et al.*, 2022

For the second study objective, the two-proportion formula was used to calculate the required sample size for each variable. Based on Table 3.2, the highest number of subjects required for this study is 135. The highest sample size was selected to minimize the margin of error and increase the precision of the results.

Table 3.2: Sample size calculation by two-proportion formula

Variables	**p0**	**p1**	**α**	**1-β**	**n**	**n*2**	**N + 20% anticipate dropout**	**Literature review**
Age group ≥ 40 years old	0.34	0.60	0.050	0.800	54	108	135	Neshnash, Metwally et al. 2022
Male gender	0.45	0.80	0.050	0.800	27	54	68	Thong et al., 2021
Level of education of bachelor degree	0.73	0.40	0.050	0.800	32	64	80	(Magadmi *et al.*, 2020)
No previous experience with telemedicine	0.84	0.60	0.050	0.800	52	104	130	(Hurley *et al.*, 2021)
Perceived as useful (PU)	0.82	0.50	0.050	0.800	31	62	78	Akritidi, Gallos et al. 2022
Perceived as easy to use (PEOU)	0.38	0.70	0.050	0.800	35	70	88	(Park et al., 2021)
High acceptance (BI)	0.84	0.60	0.050	0.800	52	104	130	Akritidi, Gallos et al. 2022

High usage (ATU)	0.85	0.60	0.050	0.800	47	94	118	(Hurley *et al.*, 2021)

p0 = Proportion of HCPs who were satisfied with VCS based on literature review

p1 = Estimated proportion of HCPs who were satisfied with VCS in government health clinics in Selangor

Power of study = 80%

α = 0.05

*20% addition to sample size due to possibility of data entry error, missing and outliers.

3.5 Sampling method and subject recruitment

Convenience sampling was applied for this study. It is acknowledged that this method of sampling results in the inability to infer the study findings to the population. However there were limited number of respondents who fulfilled the study criteria.

Study participants were recruited through the help of a co-researcher who provided the list of potential government health clinics. The liaison officer at each potential health clinic was contacted and provided with the link to the survey. The liason officers distributed the link to health care workers who were involved with VCS in their respective clinics via Whatsapp and emails. The researcher then filtered the respondents who completed the online survey according to the eligibility criteria. A poster with a QR code of the research questionnaire was posted on the notice boards at the health clinics involved with VCS to convey information about this study (Appendix C).

Researcher maintained voluntary participation by all potential respondents during the recruitment phase. HCPs who voluntarily chose to participate in the study were required to give informed consent prior to filling out the online questionnaire. There were options for subject to click on (whether 'I agree' or 'I disagree') before the respondents can proceed to the questionnaire page.

Study respondents were required to answer all the question in the questionnaire to complete the survey, however they may leave the session should they chose to end their participation in the study.

3.6 Research tool

This study used a validated (unnamed) extended TAM questionnaire from Kissi et al., 2020. It has five constructs: PU (4 items), PEOU (4 items), BI (4 items), ATU (4 items), and SE (4 items). The responses are graded on a 5-point Likert scale, with 1 being the strongest disagreement and 5 being the strongest agreement (Appendix 1). The various structures' Cronbach's alpha values were above the cut-off point of 0.70, ranging from 0.883 to 0.845. The average variance extracted (AVE) for all constructs was above the suggested range of 0.5, ranging from 0.668 to 0.603. The convergent validity was estimated. The discriminant validity analysis of the measurement models demonstrated the independence of the determinants from one another. According to Kissi et al. (2020), the standardised factor loadings for all components range from 0.603 to 0.947.

This questionnaire is in the English language. It is assumed that all HCPs had good proficiency in English to adequately understand and answer the questionnaire and produce reliable results. Altogether there were 20 questions. The scoring method is by adding all items' score under each construct to give the total score of every construct. If the total score of each construct is above average (more than 12), it reflects positive responses from the participants and if the scoring is below average (12 and below), it indicates unfavourable responses (except for PEOU construct which items are in negative direction hence the scoring is vice versa). All constructs were converted into categorical variables as presented in the table below based on the scoring.

Table 3.3: Conversion of construct variables into categorical variables

Constructs	Above average	Below average
Perceived usefulness (PU)	Useful	Non useful
Perceived ease of use (PEOU)	Difficult to use	Easy to use
Behavioural intention (BI)	High acceptance	Low acceptance
Actual use (ATU)	High usage	Low usage
User satisfaction (US)	Satisfied	Non-satisfied

Similar to the previous study by Kissi *et al.* (2020), this questionnaire was distributed to a similar population who are health care providers with experience in using virtual consultation services. Permission to use the questionnaire has been granted by the original author.

3.7 Operational definition

I. Virtual consultation services (VCS) : Live and synchronous session between HCPs and patients using Google Meet application via official MyGovuc2.0 email or using Skype for Business or BookDoc application

II. Perceived usefulness (PU): Physicians' belief that telemedicine will be beneficial and expedite care delivery, cost-saving, improve quality health outcomes and documentation

III. Perceived ease of use (PEOU): How simple to learn and use the telemedicine

IV. Behavioural intention (BI): Physicians' intention to either reject or accept the telemedicine services

V. Actual usage (ATU): The actual implementation and use of the telemedicine services in public health clinics

VI. User satisfaction (US): How satisfied are the physicians in using telemedicine services

3.8 Data collection method

This study used self-administered online questionnaire for data collection. A proforma and questionnaire were converted into Google form together with the Respondent Information Sheet. The link to the survey was distributed to email addresses and Whatsapp numbers of potential respondents by liaison officers at each clinic. QR code and a poster were also made available at clinics. Informed consent was obtained from each respondent prior to filling out the online questionnaire. The approximate time to fill up the Google form is five minutes. When poor response was observed, a reminder was given to the respective liaison officers to encourage more participation from HCPs.

3.9 Data analysis

The data derived from the Google form were converted into Excel sheet which were exported into SPSS version 27. For Specific Objective 1, descriptive statistics were used to summarise the socio-demographic characteristics of subjects. Categorical data were presented in frequency and percentage, while numerical data were presented in mean and standard deviation (SD). The scores derived from the TAM constructs on perceived usefulness (PU), behavioural intention (BI) and actual usage (ATU) were recoded and categorised; a total score of >12 was recoded as '1 – above average' and total score of ≤12 was recoded as '0 –

below average'. However, for perceived ease of use (PEOU) construct, a total score of ≤12 was recoded as '1 – above average' and a total score of >12 was recoded as '0 – below average'. The fifth TAM construct on user satisfaction (US) was recoded into '1 – Satisfied' if total score is >12 and into '0 – Not satisfied' if total score is ≤12.

For Specific Objective 2, simple logistic regression analysis was carried out to analyse each independent variable and presented in crude odds ratio (crude OR). The independent variables were age, gender, level of education, previous experience with VCS and the four TAM constructs namely PU, PEOU, BI and ATU. The fifth TAM construct, US was the binary dependent variable.

Variables from simple logistic regression with p-values of less than 0.25 or those identified as significant factors in the literature were included in the multiple logistic regression analysis. Then, using manual approach (entry), forward likelihood ratio selection, and backward likelihood ratio elimination, variables were chosen, and models were compared to create a preliminary main effect model. To verify for multicollinearity in the analysis, the variance inflation factor (VIF), standard error, and correlation matrix were utilised. To rule out any interaction, every conceivable two-way interaction between independent variables was examined. Then, the final preliminary model was produced. The receiver operating characteristic (ROC) curve, classification table, and Hosmer and Lemeshow goodness of fit test were used to assess the model's fitness. The Hosmer and Lemeshow goodness of fit test indicates that the model is fit if the p-value is greater than 0.05. A ROC curve with an area under the curve of 0.7 and above and a classification table with an overall properly categorised percentage of 80.0% and above both imply that the model is fit. With an adjusted OR, its 95% confidence interval (CI), and matching p-value, the results of the final model were reported. The strength of relationship between the dependent variable and the

independent variables was measured using the adjusted OR and 95% CI. A p-value of less than 0.05 was used to determine the degree of significance.

3.10 Ethical consideration

3.10.1 Subject vulnerability

Each respondent can participate freely and has the right to withdraw from this research at any time without giving any reason whatsoever. The co-researcher was involved in promoting and advocating this study; however care was taken to ensure respondents did not feel forced or obligated to join the study. Filling up the questionnaire only took five minutes and did not interfere with the busy schedule of the respondents. Respondents were reassured that the data collected will be confidential and will not be disclosed to the management authority to be used for any achievement assessment or work-related decision. Informed consent was obtained from each respondent via Google form prior to filling out the online questionnaire. Any inquiries or any additional information required by the respondents, the researcher can always be contacted via email and telephone number provided in the Google form.

3.10.2 Declaration of absence of conflict of interest

The researcher declared no conflict of interest in this study. The role of co-researcher was only in data collection and did not involve in keeping, organizing or analysing the data. No funding was channelled for this study. All information gathered were not be shared with or sold to third parties for commercial gain, and the results were used solely for academic purposes.