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Attitudes towards and the confidence in acceptance of telemedicine among the people in Sabah, Malaysia

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***Abstract*---**The access to healthcare in rural areas is difficult and telemedicine could be a promising solution to this problem if it is accepted by the population. The aim of this study was to assess different attitudes towards telemedicine, the level of confidence and acceptance of telemedicine among rural populations in Sabah. A

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questionnaire based on the Technology Acceptance Model (TAM) framework and other validated studies were developed to achieve the data for this study. The questionnaire was distributed to the residents of Penampang and Putatan in Sabah. The questions were scored using a five-level Likert scale and the level of confidence was rated from 0 to 100%. A high mean score of attitudes towards use and a moderate score of confidence was observed in the findings, indicating positive attitude towards telemedicine and reasonable level of confidence in using telemedicine services for their healthcare needs. Findings in this study revealed a high level of acceptance among the respondents, which was found to be generally consistent with previous telemedicine studies.

***Keywords*---**telemedicine, telehealth, technology acceptance model, health inequity.

Introduction

The primary goal of the health care system in Malaysia is to provide quality health care services and ensure universal health coverage that meets the needs of all population groups. A major goal of the health care system in Malaysia is to prioritize improving the health of the more disadvantaged rural population groups. Although various measures such as extensive networks of primary healthcare clinics and mobile health services such as mobile doctors to the villages have been implemented, health inequity continues to exist between urban and rural populations and remains a challenge (Falcon, 2019).

One of the biggest barriers to health care services in rural areas is the distance of health care facilities. Studies in Malaysia have shown that health care facilities were on average 36 km away for rural residents, in comparison urban residents travelled 17km on average to get to a healthcare facility, with average travel times taken for rural and urban residents being 43 and 28 minutes respectively. This difference in the distance affects the accessibility to healthcare services in rural areas. Additionally, the disparity and inequitable distribution of healthcare personnel such as physicians and specialists remain a challenge (Quek, 2014). In rural areas, healthcare personnel are scarce with mostly nurses and doctors making weekly visits. As a result, rural populations receive lower quality healthcare services. Telemedicine has been presented as a solution to the problem of inequitable healthcare services and can prove to be invaluable to vulnerable groups living in rural areas with otherwise limited access to healthcare services (Ariff and Lieng, 2002). Technologies such as video calls and video conferencing allow for a greater sense of connectivity and can be used to connect patients with doctors remotely from a preferred location such as their home or workplace and it also helps them save travel-related time and money (McWilliams & Myers, 2018).

The rise of telemedicine

Telemedicine is a growing field that can provide professional help over the internet through an app, email, video conferencing, online chat or a phone call.

Telemedicine allows patients to consult with health care professionals who can then, diagnose and treat patients from a distance using telecommunications technology (Gogia et al., 2020). It is believed to be a mechanism to provide more effective and patient-centric healthcare services to patients who face physical and financial barriers to access quality healthcare support. Although the objective of telemedicine was to initially cut costs and reduce travel time spent by both patients and health providers, advancements in information and communication technology has widened the scope for telehealth technology. Telemedicine can be used for follow-up consultations, consultations with specialists, management of chronic diseases and the prescriptions of medications. Hence, telemedicine can be used to reduce health inequity and ensure more access to health care services in rural areas. (Hofstra, 2018).

Conceptual framework: technology acceptance model

Telehealth interventions may be an effective strategy for addressing access to healthcare services in remote areas. Assessing the acceptance is an essential and preliminary step in the successful implementation of any telehealth services into existing health systems. The Technology Acceptance Model (TAM) is a theoretical framework used for assessing the adoption and the application of a new technology. This theory determines an individual's intention to use the technology and their usage behaviour (Portz et al., 2019). According to studies TAM is the most widely used framework to assess the acceptance of telemedicine by measuring the intention to use the technology (Harst, Lantzsch & Scheibe, 2019).

According to the survey in 2016, video-based telehealth services have increased three-fold from 7% to 22% in over one year. As consumer technologies are becoming more popular with virtual and augmented reality becoming more common in healthcare settings. About 77% of respondents of a survey showed interest in sharing information and contacting their physician through telehealth interventions, indicating their acceptance in telehealth (Adams et al., 2016). Furthermore, it is important to assess the acceptance of telemedicine prior to its adoption and implementation into the health care system (Harst et al, 2019). Although TAM is a widely used theoretical framework, many studies using this model in Malaysia has only assessed the acceptance of telehealth technology among health care professionals such as physicians and nurses. Telehealth services is a technological process or system that needs to be adequately tested and assessed before it can be implemented and widely adopted in the primary health care system. As it is the public that is the end-user of telehealth interventions, it is necessary to evaluate their acceptance. This study aimed to investigate the attitudes towards and the confidence in acceptance of telemedicine among the people in Sabah, Malaysia.

Methodology

Sample population

A community-based cross-sectional analytical study was conducted. The study population were the rural communities in Penampang area and Putatan area in the state of Sabah. The required sample size is 380. The sample size was

determined using the technique by Krejcie and Morgan (1970). Penampang and Putatan areas of Sabah were selected due to logistic convenience. Convenience sampling method was used for the selection of respondents from each area. The questionnaires were distributed to the rural district offices in each location.

- The inclusion criteria were the respondents aged 18 years and above, able to speak and read English and able to provide informed consent. To recruit a representative demographic profile of participants, individuals of both genders and all races will be approached.
- Exclusion criteria was respondents with any mental disability.

Study instrument

Questionnaires were distributed to assess the attitude towards use and confidence in accepting the use of telemedicine in the chosen areas of Sabah. The questionnaire was developed from existing model questionnaires carried out in other countries (Gagnon et al., 2012; Poder et al., 2015).

Data collection process

The study was conducted following the IRB approval from the Perdana University. Convenience sampling method was used by approaching the rural district offices in Penampang and Putatan. The district officers then assisted in the distribution of the questionnaires to the rural residents in the respective areas. All participants had the option to not participate, and data was only collected from individuals who consented.

Independent variables

- Attitudes towards:
  The attitude towards telemedicine over traditional health was investigated. The Likert's scale was used to determine the degree of agreement in a respondent's perception about telemedicine and its use in fulfilling health care needs. According to TAM assessing the attitude towards use of telemedicine will determine the acceptance of adopting telemedicine into the local health care system.
- Confidence in telemedicine:
  The level of confidence of the participants in telemedicine over traditional health was determined. The variable confidence was measured based on 21-point percentage scale that ranged from "1= 0%" to "21= 100%" to determine the level of confidence in telemedicine.

Dependent variable

Acceptance of using telemedicine: The dependent variable of this study is the acceptance of telemedicine services in Sabah. In rural areas of Sabah there is a lack of accessibility to health care services. Various barriers such as a limited number of health professionals and distances to healthcare facilities prevent rural populations from accessing adequate health care. The implementation of telemedicine services could be a solution to this problem. Adopting telemedicine

services depend on various factors. This study intends to evaluate the attitudes towards use and the level of confidence in telemedicine in rural populations of Sabah. This will determine the acceptance of the population in adopting telemedicine in the health care system.

Data analysis

Statistical analysis of the results from this study will be carried out using IBM SPSS software. Frequency distribution was applied in organising and summarising the variables and detecting the outliers. Furthermore, cross-tabulation or contingency tables was used to present and group the variable of this study – attitude, confidence and acceptance. Lastly, correlation and regression analysis method were used to evaluate the relationships between the two independent variables and the dependent variable.

Results

According to the results, the mean score obtained for the variable attitude is 3.83 (76.6%). This finding indicates that the respondents of this study had a positive attitude towards telemedicine. On the other hand, the mean score of the variable confidence is 13.84, which indicates moderate, 65.9% level of confidence (Figure 1). The mean score of the dependent variable acceptance is 3.77 (75.4%), which indicates a high level of acceptance of telemedicine amongst the respondents. Furthermore, the result of the analysis Cronbach's Alpha for acceptance towards telemedicine is 0.699 (Figure 2). The generally accepted rule is that a Cronbach's Alpha score of 0.6 to 0.7 indicates an acceptable level of reliability and 0.8 or greater is a very good level (Hulin, Netemeyer, and Cudeck, 2001). This suggests that the reliability of acceptance towards telemedicine variables is acceptable.

Table 1
Frequency table of variables

	Attitude	Confidence	Acceptance
Mean Score	3.83	13.84	3.77
Percentage (%)	76.6	65.9	75.4

Table 2
Reliability testing

	Cronbach's Alpha
Acceptance Attitudes Confidence	0.699

Pearson's correlation coefficient (r) is a measure of the strength of the association between the variables investigated in a study. Correlation analysis shows that the independent variable of attitude towards telemedicine has a moderately strong positive correlation of 0.738 with the dependent variable of acceptance of telemedicine and are statistically significant ($P<0.01$). Similarly, the independent variable of level of confidence in the use of telemedicine has a moderately strong

positive correlation of 0.722 (Table 3) with dependent variable of acceptance of telemedicine.

Table 3
Correlation analysis

Variable	*Acceptance*	*Attitude*	*Confidence*
Acceptance	1		
Attitude (AT)	0.738**	1	
Confidence (CF)	0.722**	-0.818**	1

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

Multiple linear regression analysis was performed to analyse the difference among the dependent and the independent variables and in the degree to which the dependent variable is influenced by the independent variables. The coefficient for attitude is 0.961, which indicates a strong level of prediction (Table 4). This means that for every unit increase in the attitude, a 0.961 unit increase in the acceptance of telemedicine is predicted, holding all other variables constant. The variable attitudes (b=0.961, p=0.001) is significant and its coefficient is positive indicating that the greater the respondent's attitude, the greater acceptance to use telemedicine. This suggests that the null hypothesis that the respondent's attitude towards using telemedicine has no impact on his or her acceptance to use telemedicine is rejected. Furthermore, as shown in table 4, the linear regression analysis showed that R2 value was 0.544 for respondent's attitudes. This means that 54.4% of all the factors of acceptance of telemedicine is influenced by attitude towards telemedicine. The coefficient for confidence is 0.148, which indicates a weaker association with the acceptance of telemedicine. The variable confidence (b=0.148, p=0.001) is significant and its coefficient is positive indicating that the greater the respondent's level of confidence, the greater acceptance towards the use of telemedicine. The Linear regression analysis showed that R2 value was 0.521 for respondent's level of confidence. This means that 52.1% of all the factors of acceptance of telemedicine are influenced by the level of confidence in telemedicine.

Table 4
Multiple linear regression analysis

Variables	Standardized co-efficient		R2	F	Sig
	Beta	t			
Attitudes	0.961	19.21	0.544	368.97	0.001**
Confidence	0.148	18.32	0.521	335.610	0.001**

Discussion

Telemedicine is still a new concept in Malaysia, therefore, prior to implementing it into the local healthcare system it is important to establish a positive attitude towards telemedicine among the general population (Weng et al., 2018). Among

the items that measured the attitude towards telemedicine, 70.7% of the respondents agree that they would be comfortable with the use of information and communication technologies. This is an important factor to consider, as ICT literacy is one of the challenges to implementing telemedicine. Therefore, it is important that users feel comfortable with ICT devices. This finding is consistent with the findings from the Internet Users Survey in 2018, that states 87.4% internet usage in Malaysia (Malaysian Communications and Multimedia Commission, 2018). This explains the high level of comfort in using ICT devices. Furthermore, ICT teaching and learning in Malaysia starts in primary school. 34.4% of the respondents in this study have an educational background of primary to secondary level and 50.2% have Diploma or equivalent degree. Moreover, the results of the study show that majority of the respondents have a positive attitude towards the use of telemedicine to meet healthcare needs. 64.6% of the respondents agree, while 21.5% strongly agree that the use of telemedicine to meet healthcare needs is a good idea. The total mean score obtained for the variable attitude in this study is 3.83, which indicates that 76.6% of respondents exhibited positive attitudes towards telemedicine. These findings are consistent with other studies investigating the attitudes towards telemedicine (Biruk & Abetu, 2018; Chen et al., 2017; Ghaddar et al., 2020; Hossain et al., 2019).

Furthermore, findings from the study indicate that attitude is a good predictor for determining the acceptance of telemedicine. The variable attitude is significant ($p=0.001$) and its coefficient is positive indicating that the greater the respondent's attitude, the greater acceptance to use telemedicine. These findings are concordant with previous patient-based research studies on telemedicine and telehealth, validating attitudes as a significant predictor of acceptance (Ramírez-Correa et al., 2020; Tao et al., 2020). Similarly, in a study on acceptance of telemedicine among physicians in Malaysia, among the different variables utilised, attitude indicated the most significant effect on acceptance of telemedicine. The Linear regression analysis of the results obtained in this study showed that R2 value was 0.544 for respondent's attitudes. The studies carried out among healthcare professionals in Malaysia and Nigeria demonstrated 41.5% and 49.7% of acceptance of telemedicine, respectively (Zailani et al., 2014; Adenuga et al., 2017). The findings from this study suggest a positive relationship between attitudes and the acceptance of telemedicine, thus rejecting the null hypothesis. This confirms that a positive attitude towards the use of telemedicine has significant impact on the acceptance of telemedicine.

Only a limited number of studies have used population confidence as a measurement tool in telemedicine research. A study by Welch et al., found that 60% of patients using telemedicine felt it was important for healthcare professionals to have access to their health records (Welch et al., 2017). Similarly, 95 of the respondents in this study rated 70% confidence in sharing medical information with healthcare professionals. The mean score of the variable confidence is 13.84, which indicates moderate, 65.9% level of confidence. These findings are coherent with the results of the study by Poder et al. (2015) which studied population confidence in using telehealth services.

Furthermore, confidence in the use of telemedicine has a moderately strong positive correlation of 0.722 with the dependent variable of acceptance of

telemedicine. Although the linear regression coefficient is 0.148, which indicates weaker association, it is significant and positive, indicating that the greater the respondent's level of confidence, the greater acceptance towards the use of telemedicine. This could be suggestive that the variable confidence has less considerable influence on the independent variable acceptance in comparison to independent variable attitude. Additionally, the Linear regression analysis showed that R2 value for respondent's level of confidence is 0.521. This means that 52.1% of all the factors of acceptance of telemedicine are influenced by the level of confidence in telemedicine. Thus, the null hypothesis that respondent's level of confidence in using telemedicine has no impact on his or her acceptance to use telemedicine services is rejected.

Contribution to policy and practice

Malaysia was the first country to enact Telemedicine law in the year 1997. Although telemedicine has been around for a long time, the diffusion of telemedicine into the health care system has been limited in Malaysia. Telemedicine has been proven to be useful and vital during the COVID-19 pandemic. In efforts to control the transmission of COVID-19, the Malaysian government introduced the MySejahtera app to monitor the COVID-19 outbreaks within the country. The app also included features such as guidelines, information on the nearest health facilities and a COVID-19 hotspot tracker. Furthermore, the app allowed the identification of individuals who have been in close proximity to an infected person. Although, teleconsultations were not utilised, ICT tools were used to help patients retrieve results online to comply to physical distancing policy. However, telemedicine lacks the promotion and scale-up it requires. Furthermore, the implementation of teleconsultation in Malaysia is restricted by the regulations of the Telemedicine Act. According to the Malaysian Telemedicine Act, teleconsultation specifies provider-to-provider interactions only, therefore limiting the use of it among healthcare professionals. According to the Ministry of Health (MOH) Malaysia, an enabling framework must be created for telemedicine with appropriate changes to the regulations and policies to support telemedicine (Ministry of Health, 1997). According to the results obtained in this study, there is a high level (75.4%) of acceptance of telemedicine amongst the respondents. A practical implication of this study is to showcase the level of acceptance of telemedicine among rural populations to support the adoption of telemedicine.

Conclusion

Telemedicine has been utilised in various countries where it has proven to improve the accessibility to healthcare services. The use of telemedicine in Malaysia has the potential to enhance accessibility to healthcare services as well as reduce the health inequity among rural populations. This study helped in determining the respondent's acceptance of using telemedicine. The Technology Acceptance Model was used as the conceptual framework to collect data on respondent's attitudes towards use and level of confidence in using telemedicine. A high mean score of attitudes towards use and a moderate score of confidence was observed in the findings. This indicates that majority of the respondents demonstrated positive attitude towards telemedicine and reasonable level of

confidence in using telemedicine services for their healthcare needs. Findings in this study revealed a high level of acceptance among the respondents, which was found to be generally consistent with previous telemedicine studies conducted in other countries. Thus, confirming the hypothesis that respondent's attitude and confidence in using telemedicine has an impact on their acceptance to use telemedicine services. However, due to obstacles such as travelling restrictions and time constraint the target sample size was not achieved. Therefore, it is recommended that future studies should include a larger sample size, covering a wider geographical area and include additional variables to assess the acceptance of telemedicine in Malaysia.

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