

Influence of Beliefs on Attitudes and Intention of Adopting e-Health System among the Public Hospitals of Thailand

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For the context of a developing country like Thailand, it is not possible for all citizens of the country to afford private clinics or medical services. Millions of people die every year from various diseases such as malaria, yellow fever, plague in the continent, due to lack of implementation of e-health care systems. Much research shows that health information technology (HIT) and, in particular, electronic medical records (EHR) provide efficient and effective care. This study aims to examine the relationship of health care practitioners' intentions to adopt e-health care systems, with selected constructs such as beliefs, attitudes and intentions of adopting e-health care systems among hospitals in Thailand. This study used a quantitative approach to investigate influences of belief on intention through the mediating role of attitude. This study finds that there is a mediating influence of attitude between belief and intention towards adopting e-health systems. The level of significance shows belief has a higher variance level on intention. The findings of this study will be able to give a clear and constructive picture of adopting e-health that would provide top-level management of health care centres with effective implications for adopting e-health systems in Thailand.

Key words: *E-health System, Intention, Attitude, Beliefs.*

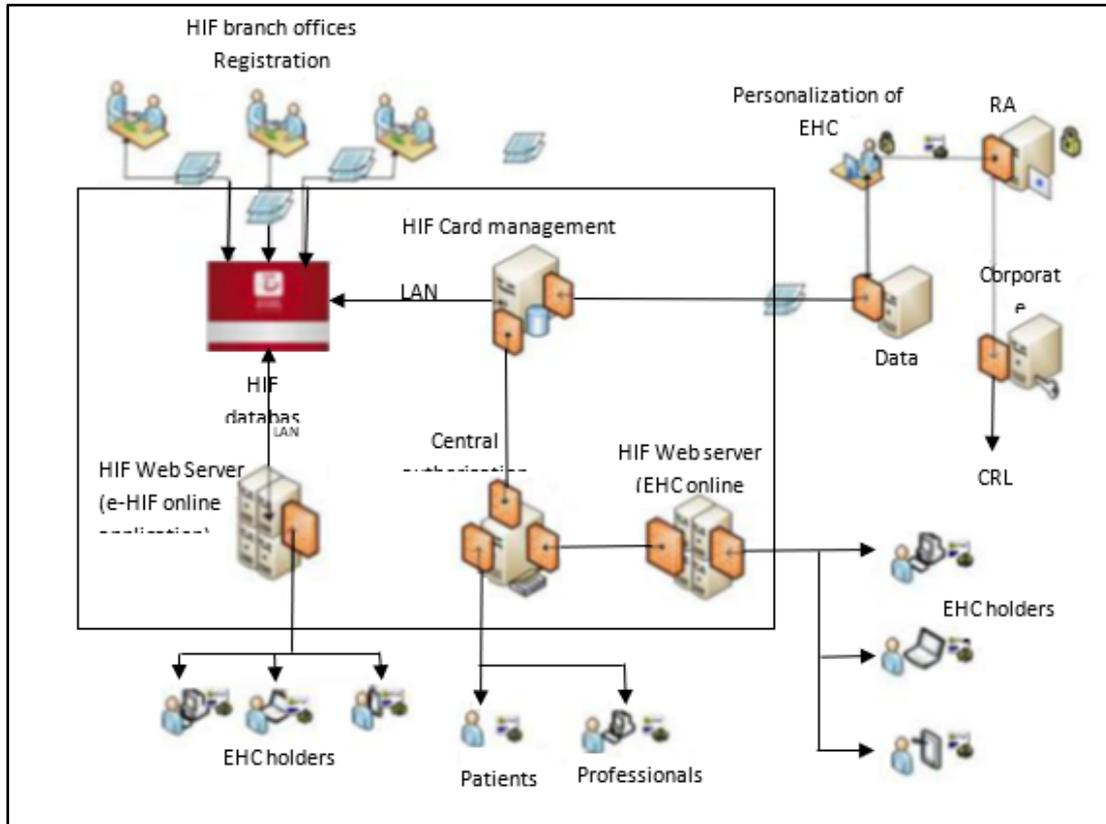


Background of the Study

A study shows that health information technology (HIT) and, in particular, electronic health records (EHR) provide effective and efficient care. Interoperability is the ability of a technology to exchange patient information electronically among various information systems (e.g. EHR), and use patient information based on various information systems, keeping in mind their true meaning and intentions. To change the healthcare system, government incentives prompted hospitals and outpatient care service providers to accept EHRs (ASIAGO, 2017). Moreover, it is now accessible, and facilities can be shared by patients. Information from various organisations can improve patient safety and coordination of care, and also costs can be reduced. Although the healthcare system has made significant progress in using information for e-patients, organising, collecting, and even nursing facilities by some providers, are lagging behind this curve (Zakaria & Yusof, 2016); (Handayani, Hidayanto, & Budi, 2018).

EHR is an electronic health care system which is used as a tool in the medical sector. There are two parts of this system (MARTHA, 2016); (R. Hoque & Sorwar, 2017) which involves: a management and a public key infrastructure (PKI), management and approval system (a card management system with a central government system). Encryption and digital signature technology together are used for protected electric communications, which is known as electronic medical records, which will be used as the minimum amount of data installed on the network, and as a measure of verification and storage of relevant data. An e-health card is a complex, electronic health system that will serve as a means of transferring data to the state health insurance system. In the near future, the e-health card will allow entry of all the online e-health facilities available. Figure 1. shows the main components of electronic health cards system.

Figure 1. Electronic Health Card System



Source: Narattharaksa, Speece, Newton, and Bulyalert (2016)

Current follow-up surveys, examining EHRs with 80% and 87%, respectively, have revealed that EHRs are being received by the leading private health care providers and hospitals, a previous study proved that ten out of every six are adopting EHR for nurses (Shahzad, Jianqiu, Zia, Shaheen, & Sardar, 2018). They are well skilled and provide the best facilities to their patients. It is imperative that medical facilities providing emergency and long-term care be excluded from central EHR incentive programs created by the Health and Economic and Clinical Information Technology (HITECH) Act. As a result, nursing care facilities do not have access to public funding to offset the adoption costs of EHR, unless hospitals and primary care providers are eligible for federal incentive programs. Lack of funding is important because costs are becoming a serious obstacle to implementing EHRs in nursing facilities, such as training-related resources and other infrastructure.

Table 1: Number of Hospital Beds per 10,000 population, 2013

Country	Number Of Hospital Beds
Brunei	28
Global Median	26
Thailand	21
Vietnam	20
Singapore	20
Malaysia	19
Laos	15
Indonesia	9
Cambodia	7
Myanmar	6
Philippines	5

Source: Ministry of Public Health, Thailand

Table 1, shows the number of hospital beds per 10,000 people in 2013. Here, it can be observed that Thailand (21) has good numbers of beds in their hospitals but still Brunei (28) and Global Median (26) have more beds per population. Besides that, Vietnam (20), Singapore (20), Malaysia (19), Laos (15), Indonesia (9), Cambodia (7), Myanmar (6) and Philippines (5) also have adequate amounts of hospital beds.

Thailand has time constraints and it is imperative to develop a plan to leap frog Thailand from an industrial society to an advanced industrial society, bypassing the stage of a developed society. In this regard, the Thai government envisions ICT as an enabler that can transform Thailand from a fast paced, advanced, knowledge-based industrial society to an information based industrial society (Kohpaiboon, 2019). Hence, authorities need to take the lead to devise plans and formulate strategies to ensure a successful transformation for the nation.

Thailand relies on itself to produce a high-quality healthcare workforce. Workplace density in health care per 1000 population is slightly higher than the WHO benchmark of medical professionals. To ensure an adequate health service professional in rural areas, sustained efforts have been implemented for multiple involvements, such as employing students from rural backgrounds, pondering curricula on rural health problems, mandatory rural services and financial and non-financial incentives by all medical graduates since 1972. All medical professional staff such as doctors and nurses are required to attend a National Licensing Examination. Since 2001, the need for nursing education credits has been ensured by the Professional Councils and they review the relicensing for professional nurses every five years.

In addition, the ordinary people in the country are not satisfied with services provided by public hospitals. As cited by Arvanitis and Loukis (2016), the Thai National Health Services (TNHS) is having an extremely tough time in terms of competing in most areas of growing medical tourism in the region. Despite the clear enhancements in Thai health related issues generally for past generation, it is anticipated that future enhancements might not happen because of the country's socio-economic situations or because of other unspecified reasons. However, concurrent efforts are being taken in order to maintain our present capability for caring for our people whenever we look for innovative techniques, at the same time, having clear authority while making any changes or modifications. Information and Communication Technology (ICT) is considered to have the capability of reducing these effects which used to result from the isolated geography, and can access data in remote areas. ICT would also be able to deliver the platforms to share the support and information related to the medical aspects (Park & Han, 2017).

Thus, this study aims:

- i) To develop a general framework of adopting e-health care systems that would provide a top-level management of health care centres, with implications for better implementing e-health care systems among public hospitals in Thailand.
- ii) To examine the mediating role of attitude in between beliefs and intentions of adopting e-health care systems among public hospitals in Thailand.

Literature Review

Adoption of e-health has been reviewed by several of researchers in different field of study such as information system and health care management systems. This study is focused on adoption of e-health records in Thailand. The technology acceptance model, TAM is adopted in order to provide explanations towards the beliefs and attitudes on adopting e-health care systems in Thailand.

e-Health System

In the 21st century, “electronic health” appeared in connection with the use of electrical information and communication technologies in healthcare. Initially, managers are used in combination with other “electronic” words (for example, e-business, and e-commerce) and are aware of the new opportunities that the Internet has opened up for the health sector (Usak, Kubiato, Shabbir, Dudnik, Jermittiparsert, & Rajabion, 2019). Over the past decade, e-health has been able to attract researchers and healthcare practitioners.

E-health has been defined as the intersection of information, health and medical informatics (Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016). Nonetheless, the author viewed



the usefulness of e-health as not merely for technological development, but also as an innovative approach to thinking or global attitudes that, through the use of information and communication technologies and networks, can enhance the treatment of health care systems in any given country. E-health has also been defined M. R. Hoque, Bao, and Sorwar (2017) and Suebnukarn, Marcelo, and Kijisanayotin (2015), as “E-health is the use of Internet technology and electronic communications to support the provision and management of medical management services.”

The main purpose of e-health is for improving the quality of medical care, increasing the effectiveness of medical care, increasing commitment to evidence-based medicine and developing a new relationship between patients and health care providers (Pronsawatchai, Auefuea, Nartthanarung, & Soontornpipit, 2018). The authors described the administrative implications of e-health and concluded that e-health programs are good tools to increase efficiency and reduce costs in healthcare facilities. They also focused on policy implications and concluded that e-health could reduce costs while improving public health. E-health is able to provide effective and affordable health services to citizens of all ages (Pronsawatchai et al., 2018).

Technology is used for monitoring the health of patients by use of health information systems and computer science health care delivery services. The system has developed for different tasks to monitor different patient health issues such as those involving the brain, kidney and others (2018). There are system variations that have been utilised for monitoring the health of patients both inside and outside hospitals, also for the doctor to monitor the condition of the patient. Harfoushi, Akhorshaideh, Aqqad, Al Janini, and Obiedat (2016) created a system to monitor the brain injuries of patients when they go back to their houses. Dey, Vijayaraman, and Choi (2016) designed a system that can monitor the level of sugar from diabetes patients in order to check when the sugar is raised and lowered. Another study by Gagnon, Ngangue, Payne-Gagnon, and Desmartis (2015) designed a system called Home Nurse, which facilitates communication between the nurse and patient from the clinic. This system will tell the nurse the condition of the patient, and they will know what treatment they need to give the patient.

However, digital segmentation in health care is twice as problematic as the cost of technology-supported healthcare systems and training is considered vital for competitiveness in a global society (Popova & Asrafi, 2015). In addition, embracing healthcare technology in developing countries does not always lead to a direct proportional increase in the learning outcomes of scholars, so it is important to understand the reasons for success in adapting the results (Popova & Asrafi, 2015) ; (Davies & Harty, 2013). Consequently, ICT in health programs should be designed to increase the productivity of the national economy in order to support the spread of technology among the general public.

EHRs play a key role in providing high-quality patient care at nursing facilities. Patients at these facilities often experience differences in care, such as visits to the emergency room and hospitalisation. Mutual advanced information exchange is associated with more complete documentation, which can support more efficient and secure care to address the information sharing failures involved during the transfer of care. In addition, patients suffer from complex conditions in nursing facilities and they require poly-pharmacy intervention. Built-in EHRs data guidelines allows for a rule-based decision support to encourage compliance and identify interactions with allergies. Furthermore, EHR may support early reminders, and their adaptation is associated with an increase in vaccination rate in nursing settings. Overall, results from systematic examinations, surveys, and qualitative studies indicate that EHRs in nursing care have a positive impact on improving errors and documentation accessibility (Ingun, Narkpaichit, & Boonger, 2015); (Alam, Masum, Beh, & Hong, 2016); (Rojanapanus et al., 2019).

Intention of Adopting e-Health System

The acceptance or adoption of the e-health system is the advantage for the patient and the clinic to utilise the benefit of the system. However, the use of e-health is to reduce the time spent visiting the doctor in hospital and also cost reduction to pay bills in the hospital (Napatupulu, 2017). This system is enhancing the safety of the patient by alert or reminding the patient when to take drugs and what type of drugs they need to take. This leads to examining the factors and the benefits of adoption of e-health systems by hospitals to monitor the health of the system (Sukkird & Shirahada, 2018). Numerous studies have come out with different factors that affect the adoption of e-health and the usage of the system. A study was carried out to find out how much faster and easier adoption of e-health services would work to improve the health of the patient.

Some researchers have identified barriers to the adoption of technologies that are unique to the physician population, such as funding costs and implementation times, as well as organisational issues such as physician cost recovery structures and new physician technologies. Simon et al. (2007) investigated the level of success of the Electronic Health Record (HER) system. The authors made the conclusion that, many studies have focused on EHR adoption, users' capabilities on handling technology systems in health care, but studies related to actual usage of e-health systems are very limited.

“Electronic health records have great potential to improve quality and safety in healthcare, but this improvement will occur only if clinicians have access to key functions in EHR systems and use them regularly.” (Simon et al., 2007).

At the point when users see a specific system as a convenience which helps them to finish their tasks and activities, they feel utilising a framework is easy and advantageous to them, then they will have the longing to utilise that system in a like manner. Nowadays, patients and health experts frequently utilize cell phones in their day to day routines, and this reflects their goals towards the use of e-Health services (Kaewkitipong, 2016); (Kim, Lee, Hwang, & Yoo, 2015).

Some studies show that there is a relationship between e-health and user adoption (Nilashi, Ahmadi, Ahani, Ibrahim, & Almaee, 2015); (Ghani & Jaber, 2015). Srivastava (2016) examined user acceptance of utilising health information systems. Qureshi, Kundi, Qureshi, Akhtar, and Hussain (2015) investigated the use of e-health services by older people to determine the barriers on intention to use health care systems. The author uses ease of use, usefulness and intention to establish acceptance of the e-health services. The results show all the variables are significantly correlated to the e-health services.

Attitude

The adoption and implementation of e-health measures is highly dependent on healthcare professionals. I wonder how interesting is the role of a “mediator” in access to health workers? The question is how digital services are accepted by professionals and how electronic medical services are used at work. Their systematic review also shows that experience increases confidence in the use of technology. However, many healthcare professionals are negative about technology education, which affects their lack of motivation and willingness (Handayani et al., 2018) to use e-health. The level of preparedness, access and perceived ease of medical workers in the electronic health care system is notable until the successful implementation of the new system. Health workers are responsible for providing the best possible care to patients with knowledge in accordance with certain guidelines, and digitisation will gradually change the responsibilities and professional relationships between patients.

A few studies, Ahmadi, Ibrahim, and Nilashi (2015); and Munyua, Rotich, and Kimwele (2015) recommended that seen helpfulness as one of the essential variables that predicts the utilisation of innovation technology. The perceived usefulness initially characterised by Khemthong and Roberts (2006), as how much a person accepts that utilising a specific system would upgrade his or her occupation performance." From the point of view of healthcare systems, the seen convenience is characterised by how much a person considers that utilising versatility gadgets for the administration of medicinal services will be of benefit to him/her. According to Alloghani, Hussain, Al-Jumeily, and Abuelma'atti (2015), when the patients and specialists realise that e-Health administrations are valuable and will move the

health services forward, this will promote the efficiency of hospital staff, thus this convenience will encourage goals of utilisation.

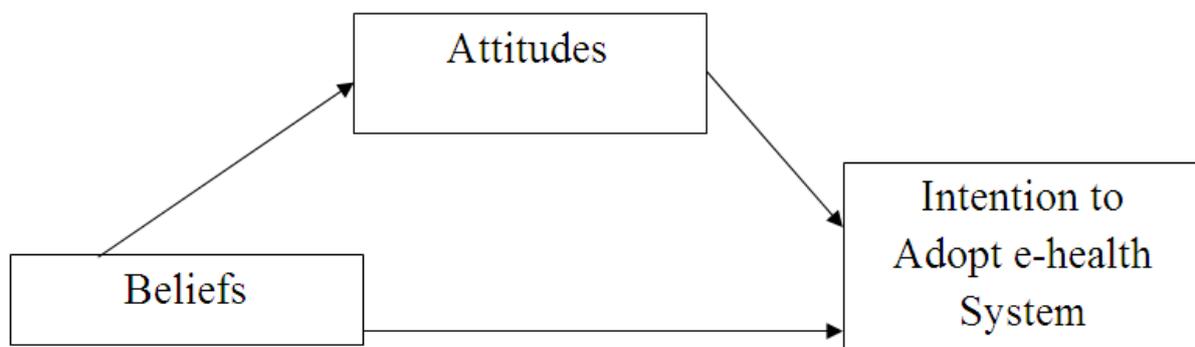
Beliefs

Attitude assessment is a belief that reflects expected results or beliefs about the consequences of completing a given task. The social impact described by UTAUT was not considered to be significant enough to stem from other significant human beliefs, but respondents were more affected by the influence of their patients and colleagues about how eHealth had changed attitudes. It was considered normal or their point of view.

In addition, the lack of an immediate environment for social work can lead to the creation of a positive environment for digital negativity, as well as to the fact that negative users have a strong negative attitude towards disbelief and attitude. However, some answers reflected that the professionals themselves were going to use their knowledge of digital medical services to influence their family members and other medical professionals. Thus, the aspect of social influence can be reduced and how it can be classified so that it remains a complicating factor, as indicated in previous studies, however, this study suggests that social impact may be an important factor in creating technology acceptance (Dennis, Venkatesh, & Ramesh, 2003).

A study by Winley, Arjpru, and Wongwuttivat (2007), proposed that previous issues have the critical impact on the present level of users' trust. In expansion, another study by Ahmadi, Nilashi, Shahmoradi, and Ibrahim (2017) demonstrated that trust is a social component that has significant impact on the user of e-health innovation. Sombat, Chaiyasoonthorn, and Chaveesuk (2018), Alloghani et al. (2015) established that, building trust and belief among citizens are considered as noteworthy factors, which is influencing the hospital authority's intention to adopt e-health care systems in public hospitals of Thailand. Authors also added that health services given by public hospitals in developing countries do not receive adequate trust by the patients.

Figure 2: Research Framework



Source: (Fishbein & Ajzen, 1977)

Research Methodology

This study used quantitative research design to investigate the influence of belief on intention through the mediating role of attitude. This study has been conducted as cross-sectional. Purposive sampling technique has been used in this research. The target population of this study was health care professionals. The sample size of the research is 300 and all the responses were collected from Bangkok, Thailand. The seven-point Likert-type scale has been used to measure responses. This research used SPSS 24 software for data analysis.

Data Analysis and Findings

Gender of the respondents is slightly distanced in the percentage. Male respondents are 66.3% and female are 33.7%. The age of the respondents consisted of the highest percentage at “18 to 28 years” with 40.4 percent, “29 to 39 years” 21.3 percent, “40 to 50 years” 11.7 percent, “51 to 60 years” 18.6 percent, “62 and above” 8 percent.

Education levels of the respondents are identified by a few indicators, such as foundation, diploma/higher diploma, undergraduates, postgraduate and professional degree. Based on the survey, the highest percentage of respondents are undergraduates 121 (40.3 percent), diploma/higher diploma 88 (29.4 percent), foundation 38 (12.7 percent), post graduate 31 (10.3 percent) professional degree 8 (7.3 percent).

The work experience of the respondents are “less than 5 years” 46 percent, “6 to 10 years” 22.7 percent, “11 to 15 years” 10.3 percent, “16 to 20 years” 16.7 percent and 21 years and above is 4.3 percent.

Table 2: Demographic factors of the respondents (n=300)

Factors	Frequency	Percentage
Gender		
Male	199	66.3
Female	101	33.7
Total	300	100
Age		
18 to 28 years	121	40.4
29 to 39 years	64	21.3
40 to 50 years	35	11.7
51 to 61 years	56	18.6
62 and above	24	8

Total	300	100
Education Level		
Foundation Degree	38	12.7
Diploma/Higher Diploma	88	29.4
Undergraduates	121	40.3
Postgraduates	31	10.3
Professional Degree	22	7.3
Total	300	100
Work Experience		
Less than 5 years	138	46
6 to 10 years	68	22.7
11 to 15 years	31	10.3
16 to 20 years	50	16.7
21 years and above	13	4.3
Total	300	100

Regression Analysis for Direct Effect (Beliefs on Attitude)

Table 3 demonstrates the influence of belief on attitude of adopting e-health systems, which is an additional support for future tourism development. There is a significant relationship between independent and dependent variables as shown by the F-statistic ($F=24.336$, $p<0.05$). The $R^2 = 0.141$ value indicates that the Belief has 14.1 percent of the variance on attitude of adopting e-health systems.

Table 3: The Influence of Belief on Attitude of Adopting e-health System

Variable	Coefficients	Standard Error	t-value	p value
Belief	0.430	0.087	4.933	0.000
$R^2= 0.141$; $F= 24.336$				
Sig. = 0.000				

*Dependent variable: Attitude

Regression Analysis for Direct Effect (Beliefs on Intention)

Table 4 shows the significance of belief on intention of adopting e-health systems. There is a significant relationship between independent and dependent variables as shown by the F-

statistic ($F=40.389$, $p<0.05$). The $R^2 = 0.214$ value indicates that the belief has 21.4 percent of the variance on intention of adopting an e-health system.

Table 4: The Influence of Belief on Intention of Adopting e-health System

Variable	Coefficients	Standard Error	t-value	p value
Belief	0.566	0.035	6.355	0.000
$R^2= 0.214$; $F= 40.389$				
Sig. = 0.000				

*Dependent variable: Intention

Regression Analysis for Direct Effect (Attitude on Intention)

Table 5 demonstrates the influence of attitude on intention of adopting an e-health system, which is additional support for future tourism development. There is a significant relationship between independent and dependent variables as shown by the F-statistic ($F=30.223$, $p<0.05$). The $R^2 = 0.170$ value indicates that the attitude has 17.0 percent of the variance on intention of adopting an e-health system.

Table 5: The Influence of Attitude on Intention of Adopting e-health System($n=300$).

Variable	Coefficients	Standard Error	t-value	p value
Attitude	0.348	0.063	5.498	0.000
$R^2= 0.170$; $F= 30.233$				
Sig. = 0.000				

*Dependent variable: Intention

As shown in Table 6, there is a significant relationship between belief and attitude as evidenced by a significant level ($p=0.00$; $*p<0.05$). It is indicating that there is a positive relationship with independent variables and mediating effect. The level of significance shows belief has 15.44 percent ($R^2 =0.1544$) variance on attitude. Similarly, belief and attitude has a significant relationship to intention ($p=0.000$; $*p<0.05$). It proves that there is a mediating influence of attitude between belief and intention towards adopting an e-health system. The level of significance shows belief has a 24.76 percent ($R^2 =0.2476$) variance on intention, when the moderator's role interacts.

Table 6: Regression Analysis through Process Macro for Mediating Effect

Model: 4
Y : MEAN_INTENTION
X : MEAN_BLIEF
M : MEAN_ATTITUDE
Sample
Size: 300

OUTCOME VARIABLE:
MEAN_ATT
Model Summary
R R-sq MSE F df1 df2 p
.3929 .1544 .2648 27.0225 1.0000 148.0000 .0000
Model
coeff se t p LLCI ULCI
constant 2.5962 .2651 9.7942 .0000 2.0723 3.1200
MEAN_BLF .3751 .0722 5.1983 .0000 .2325 .5177

OUTCOME VARIABLE:
MEAN_INT
Model Summary
R R-sq MSE F df1 df2 p
.4976 .2476 .3402 24.1896 2.0000 147.0000 .0000
Model
coeff se t p LLCI ULCI
constant .9589 .3857 2.4860 .0140 .1966 1.7212
MEAN_BLF .2703 .0890 3.0386 .0028 .0945 .4461
MEAN_ATT .4248 .0932 4.5595 .0000 .2407 .6089
***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****
Direct effect of X on Y
Effect se t p LLCI ULCI
.2703 .0890 3.0386 .0028 .0945 .4461



Indirect effect(s) of X on Y:				
Effect BootSE BootLLCI BootULCI				
MEAN_ATT .0494 .0478 .0748 .2615				
*****	ANALYSIS	NOTES	AND	ERRORS

Discussion and Conclusion

The present study has argued the advantage and benefit of using technology in order to monitor the health of the patient. Attitude and beliefs were adopted to examine the intention of adopting e-health systems. As demonstrated by previous studies, e-health has a positive relationship with the users' attitudes and beliefs for adopting e-health systems. The importance of e-health systems in Thai hospitals was widely discussed throughout the study. This study proves that there is a mediating influence of attitude between belief and intention towards adopting e-health systems.

The level of significance shows belief has higher variance levels on intention, when a moderator's role interacts. For the context of a developing country like Thailand, it is not possible for all citizens of the country to afford private clinics or medical services abroad. It might lead to deteriorating circumstances, when public clinics are not able to provide the services by using the latest technology. As a consequence, the occurrences and happenings of non-communicable conditions have been raised with a high acceleration growth for a 20 year period. There are several diseases, such as cardiovascular problems, hypertension, diabetes and cancer which have been contributing tremendously towards the aspects of morbidity which have been able to highlight strains on the expenditure of health-related activities.

The explicit considerations of the study will be the influence of attitudes and belief towards adopting e-health systems in Thailand. This research will be able make contributions to the existing knowledge of the research area by empirically evaluating the variables and factors. The results of the study will be able to give a clear and constructive picture of adopting e-health that would provide a top-level management of health care centre with implications for better implementing e-health systems in Thailand. Further study ought to investigate more on the service quality of Thai public hospitals in order to identify the gaps and adopt e-health systems for the betterment of service and treatment levels.

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