Examining Trust as a Key Determinant of eHealth Adoption in Malawi

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Abstract

Background There is value in having the general public take initiative in taking care of personal health. With the heavy burden of finances and shortage of healthcare personnel, patient-centered healthcare is increasingly becoming important especially through eHealth. The way technology is accepted and utilized may have significant hypothetical and concrete inferences. Thus, eHealth, like any other technology, has little value unless it is used. Nevertheless, there are many factors that potentially promote or hinder uptake and use of eHealth services. This study particularly focused on the role that trust plays in determining an individual's decision to use eHealth services.

Methods Using the Unified Theory of Acceptance and Use of Technology (UTAUT) model as the primary model of inference, two new constructs were introduced to determine whether trust is a significant contributor in consumers' decision to use eHealth. Through convenience sampling, participant responses were collected over a period of 6 weeks and evaluated using Structural Equation Modeling (SEM) technique.

Results A total of 400 responses were collected and outcomes of the analysis showed that Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC), had an affirmative effect on Behavioral Intentions to use eHealth. Performance Expectancy indirectly had a positive effect on Behavioral Intentions to use eHealth services via Trust in Internet (ToI) and Trust in Online Healthcare Providers (ToH). However, ToI had an insignificant effect while ToH had a positive effect.

Conclusion Trust is indeed an important element in a user's determination to use eHealth services. However, it depends on what exactly it is that users place trust in. Consumers are less trusting in the internet to facilitate accessing health related services but are more trusting in online healthcare service providers to ably assist with relevant services. The study also shows that it is essential for key stakeholders such as public policy actors and web designers to take into consideration specific target groups and user preferences which will enhance greater engagement of eHealth services.

1. Background

During the 1990s, as the internet penetrated the public sphere, a number of e-terms such as e-government, e-learning, e-mail, e-banking, and e-commerce began to appear offering new ways to conduct traditional tasks. The genesis of eHealth created an indispensable term and epitomized the potential for ICT to advance health and healthcare systems [1]. Today, Information and Communication Technology (ICT) is highly relevant to the healthcare sector through eHealth as it helps people have more insight into personal health through a personal digital healthcare environment [2]. Websites providing healthcare services present an important opportunity to achieve personal healthcare management. As the internet becomes increasingly accessible and available to consumers through phones or computers, patient-centered healthcare becomes a greater possibility [3].

However, user acceptance and use of eHealth is generally a challenge around the world [4, 5]. With eHealth technologies becoming increasingly ubiquitous, research into determinants of effective recognition, reception, and utilization is becoming more important [6, 7]. Generally, researchers have theorized technology acceptance as resulting from a psychological process that users experience in deciding to use a technology [8]. Furthermore, scholars affirm that consumer attitudes to technology, and particularly trust attitude, has an effect on how that technology is used [9, 10, 11]. Since health is a highly personal aspect of life, it is necessary to evaluate the technology comprehensively to enhance adoption and utilization. This evaluation relatively involves trust. Basically, research into trust in eHealth is actually an investigation into the association between individuals and technology [12].

In Malawi, use of the internet as a means of accessing healthcare remains in its infancy. Therefore, this research proposes to examine the relationship between determinants of eHealth use and consumers' intention to use eHealth via consumer trust. Scholars argue that there are two objectives to trust in technology; one objective is service provider offering services, the other objective is the device bridging the service provider and consumer which in this case is through the internet [13, 14]. While it is important to believe that an online service is trustworthy, it does not lead to automatic adoption of the service. After all, as demonstrated by the UTAUT model, other factors influence adoption as well [15, 4]. Findings indicate that in terms of variance (variance R^2), the strength of different models to explain intentions has resulted in a lowest score of 0.36 (Theory of Reasoned Action; Social Cognitive Theory) to the highest score of 0.69 (UTAUT). This therefore indicates the powerful explanatory ability of the UTAUT in relation to determinants of behavioral intentions [16]. This study therefore utilizes the Unified Theory of Acceptance and Use of Technology (UTAUT) as the primary model with slight alterations. Furthermore, two constructs of Trust in Internet (ToI) and Trust in Online Healthcare Providers (ToH) are incorporated.

3. Theoretical Model

The UTAUT is the primary model for this research with several alterations. Behavioral Intention to Use eHealth services (BI) is the dependent variable. PE, EE, SI, and FC are maintained as independent variables. However, three moderators including Gender, Age, Experience and Voluntariness of use are excluded from the model as moderators and are neither used as control variables. Two constructs of trust are added to the original UTAUT model including Trust in Internet (ToI) and Trust in Online Healthcare Providers (ToH). Specific details of the model and hypotheses are subsequently presented.

1. Behavioral intention to use (BI)

Researchers have proven that behavioral intention to use and actual technology usage are related. Thus, they propose that combining behavioral intention and use behavior to form "behavioral intention to use" makes sense [17]. Therefore, "behavioral intention to use" is used in this research as the dependent variable to demonstrate the concrete usage of eHealth services.

2. Performance Expectancy (PE)

Performance Expectancy is “the extent to which an individual believes that utilizing the technology will assist him or her to realize benefits in job performance” [18]. The value of an eHealth service is in the degree to which the facility affords a meaningful contribution to a patient’s health. After all, perceived usefulness is a major part of trust and in this case health related usefulness. Thus, it is expected that an effective eHealth service will provide a healthier balance between outcome and effort required [4]. Consumers’ positive attitude toward eHealth’s ability to attain intended healthcare objectives can stimulate adoption. Therefore, we posit that:

Hypothesis 1: Performance expectancy will positively affect behavioral intention to use e-health services

3. Effort Expectancy (EE)

Effort Expectancy is “the extent of ease related to the system use” [18]. High ease of use is fundamental to effort expectancy and relates to how easily users can navigate a technological platform. For instance, how easily one can navigate an eHealth website. Difficulties in finding information due to vaguely structured menus and web pages means a waste of time and is one of the major risk factors for eHealth. This suggests that a user-friendly and navigable structures should supersede improved visual appeal. Then again, if the visual appearance decreases significantly, this may also decrease trust in the service [4]. Thus, the assumption here is that the more user-friendly, expedient, and easy-to-use the technology is, the greater the likelihood that consumers will intend to use the service. Therefore, we posit the following:

Hypothesis 2: Effort expectancy will have a positively affect behavioral intentions to use eHealth services

4. Social Influence

Social influence is “the extent to which an individual perceives that important others believe he or she should use the new system”. It is dependent on an extensive range of provisional stimuli with three mechanisms affecting individual behavior namely; compliance, internalization, and identification. Changing an individual’s intention in reaction to societal forces is a function of compliance mechanism while the latter two mechanisms concern altering and amending an individual’s beliefs structure and/or initiating the individual’s reaction to possible situational benefits. Thus, adoption or resistance to change may be as a result of stimulus from associates. [18]. This study posits that:

Hypothesis 3: Social Influence will positively affect behavioral intentions to use e-health services

5. Facilitating Conditions

Facilitating Conditions is “the extent of belief an individual has in the existence of an organizational and technical infrastructure to facilitate system use”. It combines three key variables derived from preceding theories: firstly, perceived behavioral control which is individual insight into the existence or lack of necessary means and prospects; facilitating conditions defined as impartial environmental features that participants approve enable easy accomplishment of an act; and compatibility defined as the extent to which a novelty is observed to be well-suited to prospective users’ prevailing standards, desires, and previous involvements” [18]. The study therefore examines how facilitating conditions affect intention to use. The following is therefore hypothesized:

Hypothesis 4: Facilitating conditions will positively affect behavioral intentions to use eHealth services

6. Trust in internet (Tol)

With reference to trust in internet, the expectation is that there should be minimal or no technical errors [4]. Reliability of technical artifacts is often deemed to be a preferable feature [19]. Thus in this case, technical reliability relates to whether the service will experience a systems fault or other failures. Researchers have identified technical failures as a significant risk for Dutch eHealth adoption, as they may lead to higher time consumption and higher costs [20]. Thus, in this study, we propose that the degree to which an individual has confidence in the benefits which using the technical artifact will provide positively affects their belief in the reliability of the technical artifact. Therefore, we posit the following:

Hypothesis 5: Performance expectancy positively affects Trust of internet

With reference to e-Government, scholars theorize that trusting beliefs in the internet will positively affect behavioral intentions [21]. This paper explores this relationship with reference to eHealth. Thus, we posit the following:

Hypothesis 6: Trust of internet positively affects behavioral intentions to use eHealth services

7. Trust in online healthcare providers (ToH)

Benevolence is defined as the degree to which the object warranting an attitude of trust, which is the trustee, is thought to have good intentions towards the trustor. It concerns the trustors assessment of the trustee's good intentions [22]. Illustrations of this will frequently relate to privacy issues such as providers' intentions when handling patient data for purposes the patient is inadequately aware of. In this case, the trustee is not the eHealth system itself because technology cannot have its own intentions. Therefore, this domain applies to the providers of the eHealth services such as technology developers and the healthcare institution [4]. In this study it is theorized that consumers' positive attitude toward eHealth's ability to attain intended healthcare objectives will positively affect trust in online healthcare service providers. The following is therefore posited:

Hypothesis 7: Performance expectancy will positively affect Trust of online e-health service providers

It is hypothesized that trust in government will positively affect behavioral intentions. However, results of the analysis of this relationship found that this relationship was not significant and therefore not supported. This paper explores this relationship in the context of eHealth and hypothesizes the following:

Hypothesis 8: Trust of online e-health service providers will positively affect intentions to use e-health services

Figure 1: Proposed research model

Table 1: Hypotheses

Number	Hypothesis
H1	Performance expectancy will positively affect behavioral intention to use e-health services
H2	Effort expectancy will positively affect behavioral intentions to use e-health services
H3	Social Influence will positively affect behavioral intentions to use e-health services
H4	Facilitating conditions will positively affect behavioral intentions to use e-health services
H5	performance expectancy will positively affect Trust of internet
H6	Trust of internet will positively affect behavioral intentions to use e-health services
H7	Performance expectancy will positively affect Trust of online e-health service providers
H8	Trust of online e-health service providers will positively affect behavioral intentions to use e-health services

4. Methodology

1.1. Study design

The study employed a quantitative approach and engaged in hypotheses testing. It was a correlational study since it endeavored to understand if a link exists amongst the examined variables thus validating the relationship. To attain the research objectives, a model was formulated after a comprehensive literature review. UTAUT is the selected base model with several adaptations to suit the research context.

1.2. Instrument development

The research questionnaire contained items primarily adopted from previous studies [21, 23], while integrating the necessary authentication and phraseology in order to adapt it to the research context. All questions were rated on a five-point Likert-type scale spanning from "Strongly Agree" to "Strongly Disagree." Questions were clear and simple, intended to find out respondents' general attitude towards eHealth. The questions further sought to capture respondents' prospects of using eHealth services in the near future. Respondents' gender, age, occupation and education information was also collected. The questionnaire was presented to two PhD students who have knowledge in the area. Thereafter, a pretest was carried out with 20 respondents to ensure content validity. The data was then examined for completeness of responses, reviewed and modified in accordance with recommendations. To ascertain questionnaire reliability Cronbach Alpha analysis was conducted.

1.3. Sampling

A sample of Malawian citizens who use the internet was identified for this study. Sampling is a method of choosing an adequate proportion of components out of the population. If the right sample is selected It is promising to apply features of the components to the population elements [24]. Convenience sampling was used because it is quick, inexpensive, and appropriate since researchers simply use participants who are available at that particular moment [25]. According to preliminary results of the Malawi National Statistical Office (NSO) census conducted by the in 2018, the current population of Malawi is 17,563,749. Estimates indicate that only 9.61% of Malawians have access to internet. This translates to 1,687, 876 internet users [26]. Thus, the appropriate size of a sample at a confidence level of 95% and a margin of error of 5%, is approximately 350 complete responses [27]. The survey focused on individuals aged over 18 years as they are likely to have means of accessing the internet, have the interest to access internet, and have better familiarity with internet-

based services [288]. Consequently, the probability that the young adult and older age groups in the population will use eHealth services is higher compared to those below 18 years.

1.4. Data Collection

The study adopted a cross-sectional approach to data collection in which data was collected at once for 6 weeks. Online survey was the chosen method of data collection because it is a cost and time efficient method. A questionnaire was developed on www.wjx.com. A questionnaire link was then sent through e-mail and social media groups on Facebook, LinkedIn, Twitter, WhatsApp, and WeChat. A total of 400 responses were collected from 198 males and 202 females. No incentives were provided to respondents due to avoid bias in responses.

5. Analysis And Results

5.1. Statistical analysis

Firstly, using SPSS 21.0, demographic data was analyzed. Subsequent analysis involved a reliability test to

determine whether measurements were consistent. Using Lisrel 8.7 statistical software, Structural Equation Modeling (SEM) was performed. SEM comprises several set multivariate processes such as regression analysis, discriminant analysis, canonical correlation, and factor analysis. SEM therefore provides a broad and appropriate context for analysis executed statistically. Secondly, SEM is suitable for analyzing hypothetical concepts that are characterized by latent factors [29] as is the case with this study. Convergent and discriminant validity to determine construct validity, model testing, and hypothesis testing was done. The subsequent sections provide details of the analysis and results.

5.2. Reliability test

A Cronbach Alpha test suggests four cut-off points that represent results ranging from excellent to low [21]. Results of the Cronbach analysis (Table 2) indicate that 6 constructs have excellent reliability represented by scores above 0.90 while 1 construct has high reliability represented by a score above 0.70 indicating that items representing the same construct are internally reliable.

5.3. Construct validity analysis

Confirmatory Factor Analysis (CFA) is done firstly to realize approximations of the model framework, that is, the factor variances and co-variances, the residual error variances of the observed variables, and the factor loadings. Secondly, it is done to see if the model is a good fit to the data [29]. This process requires firstly, a convergent validity test which was applied by means of Composite Reliability (CR) Average Variance Extracted (AVE). Results show all CR scores above 0.7 indicating sufficient representation of proposed constructs with respect to primary constructs [21, 30]. Outcomes of AVE indicated scores higher than the recommended 0.5 score [28]. This means the questionnaire had good convergent validity [30]. Results are presented Table 2. Secondly, discriminant validity test was applied by using AVE and it is confirmed when there is low correlation between a measure and another measure which it ought to be different [30]. Thus, Table 3 shows the scores of square roots of AVE in **bold diagonal cells** higher than correlations between constructs thus indicating a good discriminant validity [28, 30].

Table 2: Result of Confirmatory Factor Analysis (CFA), Composite Reliability (CR), and Average Variance Extracted (AVE).

Constructs	Factor loading	Cronbach's alpha	CR	AVE
Performance Expectancy		.912	.911	.774
PEI1	.842			
PEI2	.989			
PEI3	.796			
Effort Expectancy		.950	.950	.826
EE1	.967			
EE2	.823			
EE3	.993			
EE4	.840			
Social influence		.929	.926	.862
SI1	.923			
SI2	.933			
Facilitating Conditions		.886	.895	.811
FC1	.987			
FC2	.804			
Trust in Online Health providers		.919	.914	.779
TH1	.894			
TH2	.863			
TH3	.890			
Trust in internet		.957	.955	.754
TI1	.768			
TI2	.991			
TI3	.805			
TI4	.986			
TI5	.782			
TI6	.805			
TI7	.908			
Behavioral intentions		.902	.898	.747
BI1	.810			
BI2	.904			
BI3	.876			

Extraction Method: Maximum Likelihood, Rotation Method; Promax with Kaiser Normalization

Table 3. Descriptive Statistics, Correlation Matrix, Reliability, and Square Root of AVE.

Sr.	Construct	M	(SD)	1	2	3	4	5	6	7
1.	Performance Expectancy	1.91	(0.81)	0.880						
2.	Effort Expectancy	1.88	(0.77)	0.430	0.909					
3.	Social Influence	2.33	(1.07)	0.369	0.441	0.928				
4.	Facilitating Conditions	1.84	(0.77)	0.247	0.318	0.289	0.901			
5.	Trust in Health Providers	2.07	(0.89)	0.322	0.411	0.496	0.253	0.983		
6.	Trust in Internet	1.90	(0.83)	0.499	0.444	0.482	0.282	0.496	0.868	
7.	Behavioral Intentions	1.85	(0.78)	0.445	0.477	0.408	0.346	0.379	0.427	0.864

M – Mean; SD – Standard deviation. Note. N= 400. All correlations are significant at $p < 0.001$. **Bold values** on the diagonal represent **square root of Average Variance Extracted (AVE)**.

5.4. Descriptive statistics

Table 4 indicates relatively fair response from both males and females with 50.5% of respondents being female. Over 70% are aged below 35 years supporting observations by other scholars stating that 93% of people between 18 and 29 years are the largest internet and social network users [30]. Results also show that the majority of respondents hold either a Bachelors or Master's degree. 54% of respondents are employed either on a full time or part-time basis while 24.8% indicated belonging to the "Other" category. This could possibly capture students which was a category excluded as an occupation. Nevertheless, this provides useful insights into those who are using the internet the most. Interestingly, over 74.8% of respondents showed over 5 years of internet use and 82.3% use it on a daily basis. This shows that the majority have experience using internet.

Table 4: Descriptive statistics

Demographics	Frequency	Percentage
Gender		
Male	198	49.5%
Female	202	50.5%
Age		
18-25	110	27.5%
26-35	174	43.5%
36-45	65	16.3%
46-59	36	9.0%
60+	15	3.8%
Level of education		
Secondary Certificate	36	9.0%
Professional Diploma	64	16.0%
Bachelor's degree	151	37.8%
Master's degree	114	28.5%
Doctorate	30	7.5%
Other	5	1.3%
Occupation		
Unemployed	62	15.5%
Intern	23	5.8%
Part-time worker	46	11.5%
Full-time worker	170	42.5%
Other	99	24.8%
Internet experience		
0-6 months	1	0.3%
7-12 months	11	2.8%
1-4 years	89	22.3%
5+ years	299	74.8%
Internet use frequency		
once a month	3	0.8%
once a week	7	1.8%
a few times a week	61	15.3%
every day	329	82.3%

5.5. Model fit testing

Model fit testing was carried out for both the Measurement Model and the Structural Model. Researchers assert that all goodness-of-fit measures are some function of the degrees of freedom (df) and the chi-square (χ^2) [29]. The chi-square values were 427.45 and 613.01 while the degrees of freedom were 231 and 238 respectively. However, scholars argue that adjusted χ^2 ($\chi^2/\text{degrees of freedom}$) is an appropriate metric as χ^2 alone is not strong for sample size [21]. Analysis of fitness indices such as Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Incremental Fit Index (IFI), and Normed Fit Index (NFI) were applied. These indices are reported in line with previous research [14, 21, 30]. Recommended values and outcomes of the overall Measurement Model fit and Structural Model fit tests are presented in Table 5 and Table 6 respectively.

Table 5: Goodness of Fit statistics for Measurement Model

Model	χ^2	df	χ^2/df	GFI	AGFI	RMSEA	CFI	IFI	NFI
Range	-	-	<3.00	>0.8	>0.80	< 0.08	>0.9	>0.9	>0.9
Base	427.45	231	1.850	0.92	0.89	0.046	0.99	0.99	0.98

Table 6: Goodness of Fit statistics for Structural Model

Model	χ^2	df	χ^2/df	GFI	AGFI	RMSEA	CFI	IFI	NFI
Range	-	-	<3.00	>0.8	>0.80	< 0.08	>0.9	>0.9	>0.9
Base	613.01	238	2.576	0.89	0.86	0.063	0.98	0.98	0.97

5.6. Hypothesis testing

Subsequent to model fit testing, hypothesis testing was conducted. The results indicate that all but one of the constructs (H6) are significant predictors of consumer choice to adopt and use eHealth services. The research model also endeavored to explore the link between PE and Tol (H5) as well as PE and ToH (H7). H5 indicates greatest significance ($\beta = 0.55$, $p < 0.001$); that means, consumers have a higher expectation of the internet to perform well in order to also be able to trust that eHealth services will accomplish its purpose. Furthermore, H7 indicates a high correlation ($\beta = 0.39$, $p < 0.001$) meaning that consumers' expectations for Online Healthcare Providers to offer reliable and safe healthcare services is significant and this influences their level of trust in using eHealth services.

Figure 2: Results of hypothesis testing

6. Discussion

Founded on the UTAUT model, the model used in this study examined determinants of consumer use of eHealth with an extension of Trust in Internet (Tol) and Trust in Online Healthcare Providers (ToH) added to the model. Considering the breadth of eHealth to include services such as; mobile health (mHealth), electronic health records (EHR), health knowledge management, health informatics, tele-healthcare, virtual healthcare, and health research services [31], this study focused particularly on internet use for delivery of healthcare services as a form of eHealth. Since 1969 the internet has existed. But with the revolutionary discovery of the World Wide Web in 1991, accessibility of the internet became more widespread. Today, the internet is a global platform and a universal feature in the home, schools, and in the workplace reaching a worldwide user population of over 400 million [32, 33]. This study therefore provided valuable insights into underlying determinants of consumer decision to adopt eHealth services in Malawi particularly through the internet.

All four of the factors in the UTAUT model including: effort expectancy (EE), performance expectancy (PE), facilitating conditions (FC), and social influence (SI) positively affect behavioral intention. New hypotheses are introduced into the model (H5-H8) and findings indicate that H5, H7, and H8 are supported while H6 is not. For the latter hypothesis, this suggests that trust in internet is not influential to behavior intentions to use eHealth. Results indicate that Performance Expectancy (PE) has a significant effect ($\beta = 0.22$, $p < 0.01$) on behavioral intention to use. This suggests that consumers will use eHealth services if they believe it will increase their productivity or afford them some form of gain. In other words, the results mean that consumers have a high expectation of eHealth to satisfy their requirements. An important research objective was to examine the link between PE and Trust in relation to behavioral intentions. Performance expectancy positively affects both trust of internet (Tol) ($\beta = 0.55$, $p < 0.001$) and trust of online healthcare providers (ToH) ($\beta = 0.39$, $p < 0.001$). Therefore, it can be said that PE affects behavioral intentions both directly and indirectly through Tol and ToH (which is the most significant determinant of the behavioral intention to use). This emphasizes the significance of trust as a factor affecting consumers' decision to use eHealth.

Generally, among all the determinants, PE was a significant predictor of behavioral intentions through consumers' Tol ($\beta = 0.55$, $p < 0.001$) and ToH ($\beta = 0.39$, $p < 0.001$) respectively. If the internet as a means through which one is to access eHealth services is slow, unreliable, and expensive it will be difficult to encourage eHealth use. Likewise, if service providers are dishonest, insensitive and unscrupulous, engaging customers or maintaining those that exist is a difficult task (Bansal, 2016). This implies that PE indirectly influences behavioral intention since it affects ToH positively ($\beta = 0.10$, $p < 0.05$). Effort Expectancy (EE) indicates statistical significance in relation to behavioral intention ($\beta = 0.22$, $p < 0.001$). This implies that citizens will use eHealth services if they believe it to be easy to navigate and explore [21]. This supports sentiments made by other scholars that difficulties in finding information due to vaguely structured menus and web pages means a waste of time and this is not what consumers want [4]. Therefore, user-friendly and navigable structures should be prioritized along with visual appeal [4].

Social influence (SI) was a significant factor determining behavioral intentions ($\beta = 0.11$, $p < 0.05$). It can be deduced that consumers hold other peoples' opinions as an important factor influencing their decision to use eHealth services. People that are either important or influential to an individual such as colleagues, friends, parents, or other relatives play a key role in one's decision to use eHealth services. Facilitating Conditions (FC) which is the existence of

other conditions that consumers believe help them use eHealth services indicated a significant impact on behavioral intentions ($\beta = 0.17, p < 0.001$). This implies that consumers acknowledge the significance of environmental factors that will facilitate use of eHealth services. Those with resources are more likely to use eHealth services. Furthermore, those that have adequate knowledge are also inclined to use eHealth services in comparison with those lacking adequate knowledge. Tol showed an insignificant effect on behavioral intentions ($\beta = 0.09, p < 0.05$). This implies that the level of trust individuals hold in the internet does not affect their decision to use eHealth services. The significance of ToH ($\beta = 0.10, p < 0.05$) is limited meaning that compared to Tol, consumers place importance on the role of online healthcare service providers in delivering relevant services. This in turn influences their decision to use eHealth services but is not a priority consideration.

7. Conclusion

The purpose of this study was to explore factors that influence eHealth adoption in Malawi. This was done using a variant of the UTAUT as the primary model incorporating ToH and Tol as new constructs. In this study, EE, PE, FC, SI are influencing factors of consumer decision to use eHealth services. Similar studies have been conducted with few studies focusing on consumer adoption of eHealth services [34, 35]. Other studies in e-Government have proven that trust of internet and trust of government have an indirect positive effect on behavioral intentions through performance expectancy [14, 36, 21]. However, this study explored the indirect effect of PE on behavioral intentions through Tol and ToH. Results may have profound importance to national policy-makers and other relevant stakeholders. Firstly, PE was highly significant meaning that in order to increase traffic to health websites, there is need to show the usefulness of the systems. Moreover, consumers expect to have a user-friendly system which will facilitate easy use of the eHealth system. This provides an opportunity for government to build reliable platforms for interaction with consumers with reference to health services and promote awareness about these facilities.

Furthermore, ToH has a positive effect on behavioral intentions. It is therefore essential for online healthcare service providers to make sure their platforms are user-friendly and relevant to the needs of consumers. In addition, Tol is not a significant factor for using eHealth services. Results further show that FC such as resources and knowledge are important factors for increasing use of eHealth. Thus, policy-makers ought to focus on providing necessary facilities to enable consumers to increase use and uptake of eHealth services. Lastly, social influences are important to consumer decision to use eHealth services. This in turn means that if one person decides to use eHealth services, many more in his/her social circle will be inclined to use eHealth. Paying close attention to findings of this study can facilitate greater adoption of eHealth in Malawi.

7.1. Limitations and future direction

Firstly, participant characteristics such as education level, occupation, and internet experience may vary from the whole population. Although it would be a daunting task, it would be worthwhile to conduct further studies with better representation of the whole population. For instance, the majority of those using the internet are employed. However, another relatively large group belongs to the “other” group of people which is only assumed to be students. Future research could focus on particular groups of those employed or focus on University students to further comprehend adoption behavior. Secondly, the study employed purely quantitative measures to collect data. For instance, by borrowing other scholars’ ideas [37], in-depth studies through a combination of qualitative and quantitative measures to investigate what health information consumers are particularly interested in on the internet will provide useful insights into adoption behavior.

Thirdly, considering the economic status of the country and consequent economic characteristics of the population, a further look into facilitating conditions through a resource-based view may add valuable information on determinants of adoption. Finally, the research data was collected from a developing country in which limitations and challenges relating to availability of and access to information on the use and applicability of technology in relation to health is limited as compared to the developed world. A similar study using data from developed countries would provide comparative insights into the generalizability of the results using these constructs.

Appendix

Table A1: Survey questions

Category	Qstn #	Question
Demographic information	1	Gender
	2	Age
	3	Level of education
	4	Occupation
Internet experience	5	How long have you been using the internet?
	6	How often do you use the internet?
Trust in internet ^a	7	I trust eHealth services through the internet
	8	I use the internet to search for health information
	9	I look at social media sites or professional sites for health-related information
	10	I think that the eHealth services' technical and legal infrastructure protects enough personal information and data
	11	In general, internet is a trusted tool I can use to interact with eHealth services
	12	I trust internet security and protection protocols, which increase my willingness to use eHealth services
Trust in online healthcare institutions ^a	13	In general, I don't trust e-health and its services through the internet
	14	I trust online healthcare institutions and departments
	15	I trust online healthcare institutions and departments' abilities to provide e-health services effectively and securely
	16	I trust that citizens and their benefits have the highest priorities at online healthcare institutions and departments
Performance expectancy ^b	17	Using the internet for health-related matters enables me to accomplish tasks more quickly
	18	Using the internet improves my success about the subject of the health
	19	If I use internet for health-related matters, I will increase my productivity
Effort expectancy ^b	20	My interaction with the internet for health matters would be clear and understandable
	21	It would be easy for me to become skillful at using the internet for health related matters
	22	I would find the internet for health related matters easy to use
	23	I will recommend others to use health-related websites
Social influence ^b	24	People who influence my behavior think that I should use eHealth services
	25	People who are important to me think that I should use eHealth services
Facilitating conditions ^b	26	I have the resources necessary to use the internet to access eHealth services
	27	I have the knowledge necessary to access eHealth services
Behavioral intention to use eHealth services ^a	28	I plan to use the eHealth services in a short time
	29	I intend to use eHealth services in the future
	30	I would use health-related websites

^aAdapted from [21]

^bAdapted from [233] Venkatesh V, et al. (2003)

Abbreviations

UTAUT: Unified Theory of Acceptance and Use of Technology; PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Conditions; Tol: Trust in Internet; ToH: Trust in Online Healthcare Providers

Declarations

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AG & VEA were responsible for conceptualization and writing the manuscript. KS was responsible for data analysis and interpretation of results. MMU & SL were responsible for reviewing and structuring the article. All authors have read and approved the final version of the manuscript.

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This research investigated trust as a key determinant of eHealth adoption. Consent to participate in the study was sought from individual participants and further ethical approval was not required. No identifying personal or medical information was obtained or recorded for the purposes of research or any other use.

Consent for publication

Participants involved in this study provided consent for publication.

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Proposed research model

Figure 2

Results of hypothesis testing

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