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Factors Influencing User Acceptance Towards E-Health In The Public Healthcare Sector: A Case Of Kenyatta National Hospital, Kenya

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Abstract: ***User acceptance is the verifiable willingness of a group of users to employ IT tools to support the tasks for which they were designed. Research related to eHealth often focuses on IT architecture and implementation, but less attention has been paid to end users' responsiveness to HIS and how this may affect health outcomes. User acceptance is a key predicament since digital health investments cannot achieve their optimum potential until IT tools are properly utilized.***

The main purpose of this study is to investigate factors influencing user acceptance towards eHealth in the public healthcare sector. The Specific objectives are: (i) To examine the influence of user attitude on user acceptance towards eHealth in Kenyatta National Hospital, (ii) To assess the influence of perceived system effectiveness on user acceptance towards eHealth in Kenyatta National Hospital (iii) To determine the influence of facilitating conditions on user acceptance towards eHealth in Kenyatta National Hospital, and (iv) To assess the moderating influence of age, gender, and experience on the relationship between user attitude and user acceptance towards eHealth in KNH.

The study reviews the Technology Acceptance Model, the Updated DeLone and McLean IS Success Model and, the Unified Theory of Acceptance and Use of Technology to examine the influence of user attitude, perceived system effectiveness, and facilitating conditions on user acceptance towards eHealth in the public healthcare sector.

The study employed a mixed methods cross-sectional survey design with a target population of 2403 staff stratified as healthcare and non- healthcare workers in Kenyatta National Hospital. A simple random sampling method was employed to select 331 out of 2403 healthcare workers from various directorates. Web based Questionnaires were used as the primary data collection instrument while secondary data was collected through reviews of both theoretical and empirical literatures. Validity and reliability of data collection tool was evaluated and recommended by IT usability experts. The study found out that user attitude had the highest influence on user acceptance towards eHealth in KNH at 34.9% followed by perceived system effectiveness at 24.7% and finally facilitating conditions at 15.3%. Further, age and user experience had a moderating influence on the relationship between user attitude and user acceptance. The study concluded to improve the level of user acceptance towards eHealth, user attitude and system effectiveness should be enhanced through IT training, user support and installing secure and reliable technology infrastructure to improve their skills and confidence in using technology for communication and information transmission.

Keywords: Digital Health, Healthcare, Project, Service Delivery, User Acceptance, User Attitude

I. INTRODUCTION

The medical sector is an important part of any country's economy. A country with ineffective healthcare systems and policies is bound to experience slow economic growth as the productivity of its citizens might be greatly affected when they fall sick and die from curable diseases. Recent healthcare reform efforts have placed emphasis on the need for Information Systems to provide a secure, cost-effective, efficient processing, and transmission of health information in a healthcare facility. Hence, the concept of Hospital Management Information Systems emerged and gained

momentum worldwide (Xiao, Sharman & Rao, 2014). The main goal of eHealth is to apply high speed telecommunication and information systems to capture, store, and share information amongst healthcare providers in a hospital to support the delivery of healthcare services to patients.

Hospitals in developed countries continue to implement and use electronic medical records to improve the quality of care at a lower cost. A global survey by WHO member countries in Southeast Asia, the Americas, Europe, and the Western Pacific indicated that mHealth applications have been explored globally with the aim of harnessing the potential of this solution to improve healthcare and reduce the global disease burden. In the United States of America, for instance, a $1.2 billion grant was announced to facilitate adoption of electronic health records in all hospitals by 2014 (Stacy & Ulku, 2012). In Sweden, the Netherlands, and Australia, Nzuki & Mugo (2014) found that although diffusion of technology is high and their economies are stable, the rate of eHealth adoption among physicians in those countries is significantly lower.

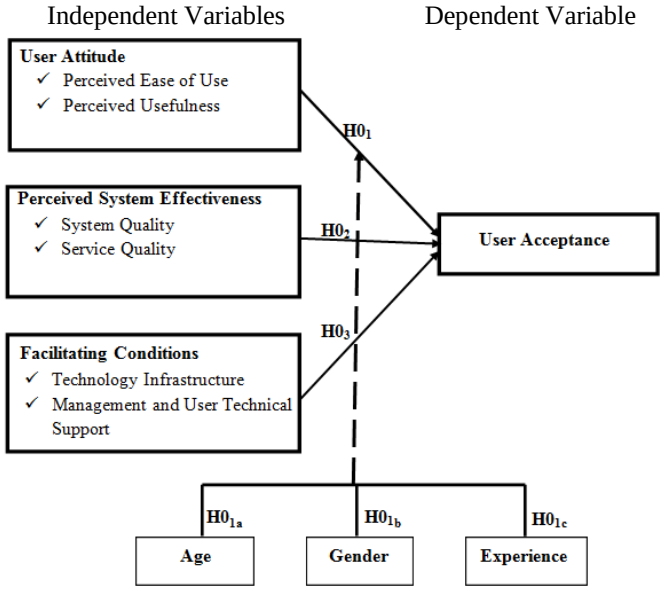
In the digital world, governments globally are increasingly adopting eHealth to bridge the gap in access to health services as well as to improve the efficiency and governance of the healthcare system to achieve better health outcomes. For instance, the Government of Tanzania developed a Hospital Management Information System (GoTHoMIS) to collect and report facility level clinical information and support hospitals in service delivery as part of their eHealth strategy. Also, the adoption of eHealth in Ghana has become a vital component of the country's healthcare delivery system. Reliance on eHealth seems poised to grow in the years to come due to the numerous benefits derived from the capture, storage, retrieval, and analysis of large volumes of protected health data from multiple sources, spread over an extended period. However, the challenge with this implementation is that concerns have been raised on its potential to undermine the sanity of the patient-physician interaction because of social cue and privacy concerns (Norman, Alkins & Binka, 2011).

Likewise, Kenya's healthcare system has recently been devolved, with funding now managed primarily by the 47 counties that make up the country (Williamson & Mulaki, 2015). The Government of Kenya, through the Ministry of Health, is providing support to the counties in the area of digital health and has established an eHealth unit to guide overall policy, set standards and support national-level systems such as the Kenya Health Master Facilities List and the District Health Information Software (DHIS2) for collating national statistics on health indicators (Kang'a *et al*., 2017). Given the limitations of Kenya's health care system in terms of funding and accessibility, the government and private sector have been exploring ways to use mobile technology to improve access to health care services given the strong mobile phone penetration in the market.

II. REVIEW OF LITERATURE

TAM is particularly applicable in the field of Health IT because it indicates that an individual's behavioural intention to use technology is determined by the person's attitude toward the use of technology. TAM 2 incorporated cognitive and social influences to predict technology acceptance. The cognitive aspects included perceived ease of use (PEOU), job relevance, quality of output, and result demonstrability. While social influence was primarily concerned with subjective norms and voluntariness (Venkatesh, 2000). The updated DeLone and McLean Information Systems Success Model consists of six interrelated dimensions of IS success: information, system, and service quality, (intention to) use, user satisfaction, and net benefits and signifies that user acceptance towards eHealth can be influenced by system and service quality, which is described in this study by perceived system effectiveness factors.

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model formulated by Venkatesh *et al.* (2003) to justify user acceptance of information technology. The UTAUT model explains user intentions to use an information system and subsequent usage behaviour. The theory contains four key constructs, namely: performance expectancy, effort expectancy, social influence, and facilitating conditions, Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behaviour (Venkatesh *et al*., 2003). This informed the use of gender, age, and experience to moderate the influence of user attitude toward eHealth because these are underlying issues that influence their decision to accept and use eHealth. The figure 2.4 below illustrates the relationship between user attitude, perceived system effectiveness, and facilitating conditions, and user acceptance towards eHealth.



(Source: compiled by the author)

Figure 2.1: Conceptual framework of factors influencing user acceptance towards eHealth

A. USER ATTITUDE AND USER ACCEPTANCE TOWARDS EHEALTH

A user attitude is an emotional entity that is concerned with the social behaviour of individuals towards new technologies and the extent to which public hospitals regard eHealth as being of importance to them. Users' perceptions of technology can affect how a new technology is conceptualized and if it will be accepted and further used.

According to Mishra (2007), training staff on how to use technology is necessary to promote positive attitudes about electronic patient data management, which leads to greater acceptance and implementation of eHealth. This is because training raises awareness and confidence levels as users can overcome technophobia while relating usage to expected benefits (Kimaro & Nhampossa, 2007).

In Zimbabwe, Furusa & Coleman (2018) observed that older doctors lacked enthusiasm to work in an environment embedded in technology and that there was a greater skill level of technology among young doctors than their older counterparts. Similarly, women are likely to have limited technical literacy and confidence when it comes to using technologies, hence they represent less in the development and implementation of eHealth interventions (Zurovac *et al*., 2013).

According to Venkatesh & Davis (2000), job relevance is the individual's perception regarding the extent to which the usage of a particular system is applicable to his or her job. Technology artefacts whose functional features are relevant and appropriately mapped to their tasks are likely to generate a positive attitude and a greater level of satisfaction from users, hence resulting in higher levels of utilization and productivity (Chan & Kaufman, 2010).

$H_0$1: User attitude has no significant influence on user acceptance towards e-health in Kenyatta National Hospital.

B. PERCEIVED SYSTEM EFFECTIVENESS AND USER ACCEPTANCE TOWARDS EHEALTH

Perceived system effectiveness is the extent to which a system can be expected to achieve its objectives within its specific environment. The effectiveness of the system depends on its output quality, visibility, timeliness, and reliability (Kayser *et al*., 2015).

Service time delivery is the ability of the health system to provide healthcare quickly after a need is identified, which is dependent on the system's quality. The quality of a system is determined by attributes such as ease of use, ease of learning, response time, usefulness, availability, reliability, completeness, flexibility, and security (Yusof *et al*., 2008).

Service quality is defined as the user's judgment of the excellence of a service based on the level of technical support, they receive from the IT department. For example: responsiveness, accuracy, dependability, technical competence, and empathy of the personnel staff. As a result, hospitals should have ICT structures in place and IT officers should be conversant with the technology used in healthcare facilities.

According to WHO, clinical care providers from low-resource settings in developing nations face multiple barriers to the delivery of high-quality and efficient health services such as limited access to timely and relevant health information and a shortage of trained healthcare workers, particularly in rural and remote areas (WHO, 2014).

In recent years mobile devices have been used in task-shifting applications to provide training content, enable communication between different cadres of health workers, implement clinical decision support systems, and provide work-planning and scheduling tools (Campanella *et al*. 2015) Such digital health strategies can help improve access to quality healthcare delivery, which can, in turn, improve overall health outcomes in underserved populations (IRD, 2012).

$H_0$2: Perceived system effectiveness does not significantly influence user acceptance towards e-health in Kenyatta National Hospital.

C. FACILITATING CONDITIONS AND USER ACCEPTANCE TOWARDS EHEALTH

As an organizational factor, facilitating conditions is the degree to which organizational resources and internal technical infrastructure exists to facilitate the system usage. To be more specific, the availability of organizational resources such as time, money, effort, and technological resources such as computer devices and broadband communication equipment's are required to facilitate the performance of a particular behaviour in their operating environment (Venkatesh, 2003).

Management support influences the environment where the technology is used, the governance of the technology, the resources (manpower and financing) available to support use of the technology and the system's growth strategy (Aizstrautaa *et al*., 2014 & Yusof *et al*., 2008).

A well-defined technology infrastructure is an essential ingredient for any country wishing to implement a successful eHealth framework. The ICT infrastructure typically incorporates broadcast communications, access to computer devices, intranet access, adequate data transmission capacity, and broadband access (Qureshi *et al*., 2013). Indeed, high bandwidth is required to provide good multimedia content and a rich eHealth experience, and thus networks are a critical component for healthcare institutions to share and exchange health information (Anwar, 2012). Omary *et al.* (2009) point out that poor ICT infrastructure, a low rate of internet penetration, and low bandwidth are among the challenges to eHealth adoption in Tanzania.

User technical support enables users to respond to potential problems in service accessibility to solve user concerns. This assistance can take the form of a user guide, the existence of help pages on the website, and the presentation of the frequently asked questions with their answers within the web application and handling back-up and recovery of data and applications (Perez, Mbugua & Kilwake, 2016).

From their findings, Idoga, Toycan, Nadiri & Çelebi (2019) revealed that performance expectancy, cloud-based health knowledge, IT infrastructure and social influence have a significant effect on the intentions of healthcare

professionals to accept and use the cloud-based system. Therefore, we conclude with the following hypothesis:

$H_0$3: Facilitating Conditions do not have a significant influence on user acceptance towards eHealth in Kenyatta National Hospital.

D. USER ACCEPTANCE

In this study, user acceptance towards eHealth is the dependent variable. It is the extent to which users believe the information system at their disposal meets their information requirements (Ilias *et al*. 2009). User acceptance is driven by a person's intentions to use a technology based on their positive or negative feelings after deciding rationally on an activity (Ajzen & Fishbein, 1991). This decision could be influenced by an individual's social network, who believe that he or she should use or not use a new information system in performing his activities (Dadayan & Ferro, 2005).

Hoque, Albar & Alam (2016) found that performance expectancy, effort expectancy, social influence, and personal innovativeness had a significant impact on the behavioural intention to use eHealth, whereas facilitating conditions had no significant effect.

Mwangi (2016) concluded that the perceived usefulness of ICT positively influences its use by medical practitioners to a large extent, and it improves the effectiveness of health service delivery. The study established that users with limited digital skills and knowledge tend to rely heavily on other people's opinions about ICT.

In their findings, Khobi, Mtebe & Mbelwa (2020) revealed that top management support, perceived benefits, security and privacy, and compatibility were significant predictors of DHIS2 usage in Sierra Leone. However, poor Internet connectivity, lack of security policies and guidelines, and shortage of qualified personnel were identified as barriers to effective DHIS2 use.

III. METHODOLOGY

A. RESEARCH DESIGN

A research design provides a framework for the collection and analysis of data in a manner that is suited to the research question (Bryman & Bell, 2011). In the present study, a combination of quantitative and qualitative approaches was used. The quantitative approach involved the application of a survey method. The qualitative approach was used to gain an understanding of the natural settings of individuals that were involved in using information systems to understand the underlying reasons, opinions, and motivations for them to use or not to use hospital information systems. A cross sectional descriptive survey design was adopted with questions being asked once in the entire period of the research as described by Saunders *et al*. (2007).

B. TARGET POPULATION

The target population included healthcare and non-healthcare workers in Kenyatta National Hospital.

C. SAMPLE SIZE

A sample size refers to the number of items to be selected from the universe (population) to constitute a sample (Kothari, 2009). Sample size of study was obtained using Krejcie & Morgan, 1970 formula for finite population which is calculated as under:

$$S = \frac{X^2NP(1-P)}{d^2(N-1)+X^2P(1-P)}$$

Where*:*

S = Sample size required

X = Z value (e.g., 1.96 for a 95% confidence level)

N = Population Size

P = Population proportion (in decimal form) (assumed to be 0.5(50%))

d = Degree of accuracy (5%), expressed as a proportion (0.05); It is the margin of error

$$S=\frac{1.96^2*2403*0.5*(1-0.5)}{0.05^2*(2403-1)+1.96^2*0.5(1-0.5)}$$

$$S=\frac{2307.8412}{6.9654}$$

Therefore, the sample size was 331.

D. SAMPLE FRAME

The sample frame is a list of all population units from which the sample will be selected (Cooper & Schindler, 2003). For this study, the sample frame was healthcare and non-healthcare workers in Kenyatta National Hospital.

E. SAMPLE PROCEDURE

This study applied simple random sampling, where it gave respondents an equal chance of being selected. Cooper and Schindler (2003) defined the simple random sampling technique as a procedure of systematically acquiring and recording information about members of a given population. Under this method, data were collected for each unit proportionally.

F. SAMPLE AND SAMPLING TECHNIQUE

A sample is a subset of a population that has been selected for investigation (Bryman & Bell, 2011). This research intended to investigate the level of user acceptance towards eHealth in the public healthcare sector, and therefore the sample size was purposively and conveniently distributed among the sample frame because they are responsible for healthcare operations and are directly involved in using HIS.

G. DATA COLLECTION INSTRUMENTS

Structured web-based questionnaires were used in this study to collect the primary data to save time and money as well as to facilitate an easier analysis as they are immediately usable, while unstructured questions are used because they encourage respondents to give an in-depth and felt response without feeling held back in revealing any information.

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H. DATA COLLECTION PROCEDURE

An online questionnaire was designed and administered via e-mail. Each respondent was asked to anonymously complete the questionnaire and submit their response. The respondents were informed about the purpose of the study to minimize any biases in data collection procedures. To the enhance response rate, respondents were called on the phone and sent e-mail reminders.

I. PILOT STUDY

A pilot study was conducted to pre-test the research instrument to refine the questions, the instrument, or procedures (Cooper & Schindler, 2003).

a. VALIDITY OF THE RESEARCH INSTRUMENT

Validation ensures that the questionnaire is valid by confirming that it measures what it is supposed to measure and that it accurately represents the content. Validation checks whether the questionnaire is appropriate for the sample/population and whether it is comprehensive enough to collect the information needed to address the objectives of the study.

Content validity was assessed in the present study to find out the extent to which the questionnaire captured the variables that needed to be measured from the objectives of the study. Before the questionnaire was used to collect data, three information systems usability experts evaluated it in terms of the percentage of questions they considered relevant to them and the universal average score from the three experts was calculated. The first expert gave it 95%, the second expert gave 90% and the third expert gave 85%. This yielded an average score content validity index percentage of 90% which is greater than the lower limit of 85% hence the content validity of the questionnaires was confirmed.

According to Hair *et al*. (2019), Construct validity is the degree to which the study variables represent the theoretical construct which is being measured. Fornell & Larcker (1998) noted that construct validity of confirmatory factor analysis includes two main tests, namely, convergent validity test and discriminant validity test.

Convergent validity refers to the degree to which constructs are measured with different variables (Hill & Hughes, 2007; Kenny & Kashy, 1992). In convergent validity, the variables should be highly correlated with the construct to ensure that they belong to the construct to be measured (Wang, French & Clay, 2015). The amount of factor loading is a fundamental consideration in determining convergent validity (Hair *et al*., 2019). Igbaria, Zinatelli, Cragg, and Cavaye (1997) suggested that a latent variable showing a factor loading of ≥0.50 is good. Meaning that the construct contributes to 50% and above of the variance in the indicator.

In statistics, discriminant validity measures the extent to which a construct is distinguished from other constructs in a model (Hair *et al*., 2019). Hair *et al*. (2019) state that discriminant validity could be established by correlating one construct to another. If the correlation value of both constructs is lower than 0.85, it means that the discriminant validity exists. The assumptions of discriminant analysis include homogeneous within group variances, multivariate normality within groups, linearity among all pairs of variables, no multi-collinearity, and prior probabilities.

b. RELIABILITY OF THE RESEARCH INSTRUMENT

Reliability, which is, testing the extent to which the measure is free of bias or results are consistent over time, is determined by reliability coefficient. The construct reliability of the questionnaire was measured statistically by measuring the internal consistency of the variables that represent latent construct to be measured. Internal consistency is calculated using Cronbach's Alpha. According to Gefen, Straub and Boudreau (2000), a construct reliability coefficient higher than 0.70 is acceptable.

c. NORMALITY TEST

Tests of normality was used to check whether the data are well modelled and normally distributed to know which type of data analysis tests to carry out (parametric or non-parametric test) (Gujarati, 2002).

d. CORRELATION ANALYSIS

The spearman's rank- order correlation was used to determine the strength and direction of the monotonic relationship between the independent variable and the dependent variable. The Spearman correlation coefficient, r_s, can take values from +1 to -1. A r_s of +1 indicates a perfect association of ranks, a r_s of zero indicates no association between ranks and a r_s of -1 indicates a perfect negative association of ranks. The closer r_s is to zero, the weaker the association between the ranks.

e. PRINCIPAL COMPONENT ANALYSIS

Principal component analysis was performed to gauge the importance of a variable to the factor, and it is used to identify and remove hidden constructs or variable items that do not meet the objectives of the study and are not obvious from direct analysis (Ledesma & Valero-Mora, 2007; David *et al*., 2010). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), which ranges between 0 and 1 should be greater than an index of 0.5 for a satisfactory factor analysis to proceed.

f. MULTICOLLINEARITY TEST

Multicollinearity occurs in statistics when two or more predictor variables in a multiple linear regression model are highly correlated (Bickel, 2010). A Variance Inflation Factor (VIF) was used to assess multicollinearity in multiple linear regression models. A VIF of 5 or more is suggested as the rule of thumb for concluding the VIF to be too large, thus unsuitable.

g. REGRESSION ANALYSIS

In this study regression analysis was performed to establish whether independent variables predict the dependent variable. The following multiple linear regression equation is used:

$Y = f(X_1, X_2, X_3)$

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_0$

Where.

β_0 = the intercept point (constant) on the Y axis for X_1, X_2, X_3 whose influence on the model is insignificant.

Y = User Acceptance (Dependent Variable)

X_1 = User Attitude

X_2 = Perceived System Effectiveness

X_3 = Facilitating Conditions

β_1, β_2, β_3 = the slope of the regression line for each independent variable that has a significant influence on the model (multiple regression coefficients).

e_0 = Error term.

To draw conclusions on the moderating effect of age, gender, and experience on the relationship between user attitude and user acceptance towards eHealth, a hierarchical multiple regression model was developed and tested for significance. The model included interaction variables of the moderating variables and the independent variables. The hierarchical multiple regression equation was given by:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_M Z_1 + \beta_M Z_2 + \beta_M Z_3 + \beta_{1M} X_1 * Z_1 + \beta_{2M} X_1 * Z_2 + \beta_{3M} X_1 * Z_3 + e_0$

Where,

β_0 = the intercept point (constant) on the Y axis for X_1, X_2, X_3 whose influence on the model is insignificant.

Y = User Acceptance (Dependent Variable)

X_1 = User Attitude

X_2 = Perceived System Effectiveness

X_3 = Facilitating Conditions

Z_1 = Age

Z_2 = Gender

Z_3 = Experience

$X_1 * Z_1$ interaction variable between user attitude and age

$X_1 * Z_2$ interaction variable between user attitude and gender

$X_1 * Z_3$ interaction variable between user attitude and experience

β_1, β_2, β_3 = the slope of the regression line for each independent variable that have a significant influence on the model (multiple regression coefficients).

β_M = the slope of the regression line for each moderating variable that has a significant influence on the model (moderating multiple regression coefficients).

βi_M = the slope of the regression line for each interaction variable that has a significant influence on the model (hierarchical multiple regression coefficients).

e_0 = Error term.

h. TESTING OF RESEARCH HYPOTHESES

The following null hypotheses were tested using linear regression test of significance to establish whether a relationship exists between the variables. The chosen alpha level for the analysis was 0.05 ($\alpha = 0.5$). The decision rule was that if the exact probability is less than the critical alpha level ($p < \alpha$), the finding is significant, and the null hypothesis was to be rejected. If the exact probability is greater than the critical alpha level ($p > \alpha$), the finding is not significant, and the study would fail to reject the null hypothesis.

H_{01}: User attitude has no significant influence on user acceptance towards eHealth in Kenyatta National Hospital.

H_{02}: Perceived system effectiveness does not significantly influence user acceptance towards eHealth in Kenyatta National Hospital.

H_{03}: Facilitating Conditions do not have a significant influence on user acceptance towards eHealth in Kenyatta National Hospital.

H_{04}: Age, Gender and Experience of healthcare workers do not constrain the relationship between user attitude and user acceptance towards eHealth in Kenyatta National Hospital.

IV. FINDINGS AND DISCUSSION

A. RESPONSE RATE

In this study, a total of 310 respondents answered the questionnaires against an estimated sample size of 331 respondents. This resulted in a response rate of 93.6 percent. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting, a rate of 60% is generally good while a response rate of above 70% is excellent.

B. RELIABILITY ANALYSIS

Reliability of the questionnaire that was used for data collection in this study was evaluated using the Cronbach's Alpha which measures the internal consistency of the instrument and is based on the average correlation among the items on a scale (Pallant, 2007). A computed Cronbach's Alpha of 0.70 is considered sufficient for research hence the questionnaire that was used in this study was higher than 0.70 thereby confirming its reliability. The reliability statistic for each of the variables is presented in Table 4.2.

Variable	Number of items	Cronbach's alpha	Conclusion (reliable/unreliable)
User Attitude	6	0.960	Reliable
Perceived System Effectiveness	6	0.933	Reliable
Facilitating Conditions	6	0.896	Reliable
User Acceptance	6	0.950	Reliable

Table 4. 1: Reliability Test results

a. CORRELATION ANALYSIS

A Spearman's rank order correlations were run to examine the relationships between user attitude, perceived system effectiveness, facilitating conditions, and user acceptance. There were positive and significant correlations between user acceptance and user attitude indicated by r_s=0.501 n=310, p<0.001, user acceptance and perceived

system effectiveness r_s=0.423 n=310, p<0.001, user acceptance and facilitating conditions r_s=0.369 n=310, p<0.001. In addition, a positive and significant correlation was observed between user attitude and perceived system effectiveness r_s=0.413 n=310, p<0.001, user attitude and facilitating conditions as given by r_s=0.449 n=310, p<0.001 and a positive and significant correlation between facilitating conditions and perceived system effectiveness indicated by r_s=0.434 n=310, p<0.001.

			User Acceptance	User Attitude	Perceived System Effectiveness	Facilitating Conditions
Spearman's rho	User Acceptance	Correlation Coefficient	1.000	.501**	.423**	.369**
		Sig. (2-tailed)	.	.000	.000	.000
		N	310	310	310	310
	User Attitude	Correlation Coefficient	.501**	1.000	.413**	.449**
		Sig. (2-tailed)	.000	.	.000	.000
		N	310	310	310	310
	Perceived System Effectiveness	Correlation Coefficient	.423**	.413**	1.000	.434**
		Sig. (2-tailed)	.000	.000	.	.000
		N	310	310	310	310
	Facilitating Conditions	Correlation Coefficient	.369**	.449**	.434**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	310	310	310	310

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

Table 4. 2: Spearman's Rank Order Correlations

b. *PRINCIPAL COMPONENT ANALYSIS*

Principal component analysis is a factor extraction technique performed to summarize the data set and regroup variables into a limited set of factors based on shared variance in order to interpret the relationships and patterns (Yong & Pearce, 2013). PCA was conducted on the three constructs of user acceptance namely user attitude, perceived system effectiveness and facilitating conditions. It involved 18 items, but after preliminary analysis, it was found that there were only 13 valid items. The factors influencing user acceptance towards eHealth and their significant component loading can be summarized as shown in Table 4.17 below.

FACTOR	SIGNIFICANT VARIABLE (VALID ITEMS)	FACTOR LOADING
User Attitude	Your computer system interface is user friendly	0.572
	Your Computer System is easy to use	0.709
	You are skilled in operating the computer system	0.574
	Your computer system provides information about which inputs are permitted	0.510
Perceived System Effectiveness	Your computer system has minimum inconvenient downtimes	0.760
	Your computer system is able to respond to your requests on time	0.528
	Your computer system provides accurate and correct information	0.547
	Your computer system provides up to date information	0.728
Facilitating Conditions	You are able to connect to the intranet quickly	0.612
	You are guided in using the computer system in your hospital	0.676
	You are able to get technical support from your ICT support officers	
	Your computer system gives concrete hints for troubleshooting	
	Your computer system provides easy to understand error messages	

Table 4. 3: Summary of user acceptance towards eHealth component loading

SCREE PLOT

The Scree plot is a graph of the Eigen values against all the usability factors. In the scree plot it can be observed that after the fifth component the line becomes more horizontal indicating that components after this point do not contribute much to the explanation of the variance, therefore 5 factors have been retained.

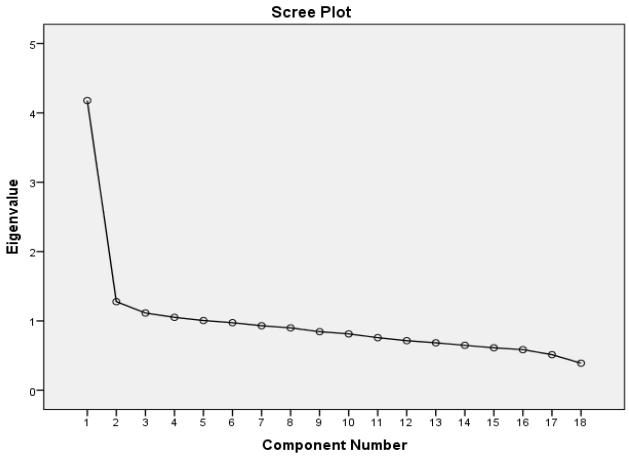

Figure 2.2: Scree Plot for User acceptance towards eHealth

c. *MULTICOLLINEARITY TEST*

Multicollinearity occurs when there is a high degree of association between independent variables (Mugenda & Mugenda, 2012). A good regression model requires that a strong correlation exists between the independent variables and the dependent variable, but the independent variables should have minimal if any correlation with each other. In this study, collinearity statistics (Table 4.17) indicate that multicollinearity was not found to be a problem in the model.

It is evident from Table 4.17 that the tolerances were above 0.20 thereby falling above the lower limit of 0.10. A tolerance value which falls above 0.10 shows there is no multicollinearity (Pallant, 2007; Tabachnick & Fidell, 2007). The variance inflation factors (VIF) were below 10 further indicating that multicollinearity was not a problem. Multicollinearity is associated with VIF above 10 and tolerance values below 0.10. The variables in this study

therefore did not suffer from the problem of multicollinearity and were fit for regression analysis.

Variable	Collinearity Statistics	
	Tolerance	Variance Inflation Factors (VIF)
(Constant)		
User Attitude	0.645	1.551
Perceived System Effectiveness	0.658	1.519
Facilitating Conditions	0.649	1.540

a. Dependent Variable: User Acceptance

Table 4. 4: Multicollinearity Statistics

MODEL SUMMARY

The three independent variables (user attitude, perceived system effectiveness and facilitating conditions) that were studied, explain only 38.2% of the effects of the independent variables on user acceptance as represented by the R^2 which means that other factors not studied in this research contribute 61.8% of the effects of the independent variables on user acceptance. Therefore, further research should be conducted to investigate the other factors influencing user acceptance (61.8%).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.623[a]	.388	.382	.63812	.388	64.599	3	306	.000	2.037

a. Predictors: (Constant), Facilitating Conditions, Perceived System Effectiveness, User Attitude

b. Dependent Variable: User Acceptance

Table 4. 5: Model Summary

ANOVA MODEL

Study findings in ANOVA table 4.19 indicated that the above discussed coefficient of determination was significant as evidence of F ratio of 64.599 with p value 0.000 <0.05 (level of significance). Thus, the model was fit to user acceptance using user attitude, perceived system effectiveness and facilitating conditions.

Model	Sum of Squares	df	Mean Square	F	Sig.
1Regression	78.913	3	26.304	64.599	.000[b]
Residual	124.603	306	.407		
Total	203.517	309			

a. Dependent Variable: User Acceptance

b. Predictors: (Constant), Facilitating Conditions, Perceived System Effectiveness, User Attitude

Table 4. 6: ANOVA

d. TESTING OF RESEARCH HYPOTHESIS

The study of factors influencing user acceptance towards eHealth is based on a conceptual framework in Figure 2.4 having three independent variables (user attitude, perceived system effectiveness, facilitating conditions) and three moderating variables (age, gender, and experience). To test these factors, a set of four hypotheses were formulated and analysed using linear regression and the results shown in Table 4.20 and Table 4.22 below.

The first hypothesis of the study stated that there is a no significant relationship between user attitude and user acceptance towards eHealth in KNH. Findings in table 4.28 show that user attitude had coefficients of estimate which was significant basing on $\beta_1 = 0.349$ (p-value = 0.000 which is less than $\alpha = 0.05$) thus we reject the hypothesis and conclude that there is a significant relationship between user attitude and user acceptance towards eHealth. This suggests that there is up to 0.349 unit increase in user acceptance for each unit increase in user attitude. Also, the effect of user attitude is less than the effect attributed to the error, this is indicated by the t-test value = 6.259.

The second hypothesis stated that there is no significant relationship between perceived system effectiveness and user acceptance towards eHealth. Nonetheless, the study findings show that perceived system effectiveness has a significant effect on user acceptance basing on $\beta_2 = 0.247$ (p-value = 0.000 which is less than $\alpha = 0.05$) thus we reject the hypothesis.

This suggests that there is up to 0.247 unit increase in user acceptance for each unit increase in perceived system effectiveness. Furthermore, the effect of perceived system effectiveness was stated by the t-test value = 4.473 which implies that the standard error associated with the parameter is less than the effect of the parameter.

The third hypothesis of the study stated that there is no significant relationship between facilitating conditions and user acceptance towards eHealth. As opposed to the findings, the study observed that facilitating conditions has a significant effect on user acceptance basing on $\beta_3 = 0.153$ (p-value = 0.006 which is less than $\alpha = 0.05$). Furthermore, the effect of facilitating conditions was stated by the t-test value = 2.755 which implies that the standard error associated with the parameter is less than the effect of the parameter.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.796	.182		4.376	.000	.438	1.154		
User Attitude	.338	.054	.349	6.259	.000	.232	.444	.645	1.551
Perceived System Effectiveness	.261	.058	.247	4.473	.000	.146	.375	.658	1.519
Facilitating Conditions	.154	.056	.153	2.755	.006	.044	.265	.649	1.540

a. Dependent Variable: User Acceptance

Table 4. 7: Linear Regression Coefficients

The dependent variable of the model is user acceptance. From the analysis, we could write the regression model as:

$Y = 0.796 + 0.338X_1 + 0.261X_2 + 0.154X_3$

Whereby, Y is user acceptance, X_1 is user attitude, X_2 is perceived system effectiveness and X_3 is facilitating conditions.

MODERATING VARIABLES OF USER ATTITUDE ON USER ACCEPTANCE TOWARDS EHEALTH

To test the fourth hypothesis that there is no moderating effect of age, gender, and experience of healthcare workers on the relationship between user attitude and user acceptance towards eHealth, a statistical model was developed, and the three moderating variables were included. The results of the regression analysis are shown in the coefficients tables below.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.672	.161		10.384	.000	1.355	1.989		
User Attitude	.463	.049	.478	9.462	.000	.367	.560	.838	1.194
Z score: Age	.670	.174	.825	3.852	.000	.328	1.012	.047	21.481
Int_Variable	-.221	.053	-.906	-4.144	.000	-.326	-.116	.045	22.347

a. Dependent Variable: User Acceptance

Table 4. 8: Moderating effect of age on user acceptance towards eHealth

From the findings in table 4.22 above, age had a negative and significant moderating effect on the relationship between user attitude user acceptance based on β_4=-0.906 (p-value = 0.000 which is less than $\alpha = 0.05$, t=-4.144).

Table 4. 9 Moderating effect of experience on user acceptance towards eHealth

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.655	.160		10.318	.000	1.339	1.971		
User Attitude	.480	.048	.495	9.975	.000	.386	.575	.872	1.147
Z score: Experience	-.330	.167	-.406	-1.980	.049	-.657	-.002	.051	19.583
Int_Variable	.134	.049	.563	2.716	.007	.037	.231	.050	20.012

a. Dependent Variable: User Acceptance

Table 4.10: Moderating effect of age on user acceptance towards eHealth

From table 4.23 above, experience had a positive and significant effect on the relationship between user attitude and user acceptance towards eHealth based on β_6= 0.563 (p-value = 0.007 which is less than $\alpha = 0.05$, t = 2.716) and therefore we reject the hypothesis in regard to experience.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.491	.154		9.687	.000	1.188	1.794		
User Attitude	.534	.046	.550	11.689	.000	.444	.624	.998	1.002
Z score: Gender	.274	.154	.337	1.780	.076	-.029	.577	.062	16.242
Int_Variable	-.100	.046	-.416	-2.193	.290	-.190	-.010	.062	16.241

a. Dependent Variable: User Acceptance

Table 4. 11: Moderating effect of gender on user acceptance towards eHealth

However, as shown in table 4.24 above, the moderating effect of gender on the relationship between user attitude and user acceptance was not significant basing on β_5= - 0.416 (p-value = 0.290 which is more than $\alpha = 0.05$, t=-2.193).

The second model involved including the moderating and interaction variables that have a significant influence on user acceptance towards eHealth into the multiple regression model. The final multiple regression model equation was given by:

$Y = 0.796 + 0.338X_1 + 0.261X_2 + 0.154X_3 + 0.670Z_1 – 0.330Z_3 – Z_1 (0.221X_1) + Z_3 (0.134X_1)$

Whereby.

Y is user acceptance, X_1 is user attitude, X_2 is perceived system effectiveness, X_3 is facilitating conditions, Z_1 is age, and Z_3 is experience and the interaction variables.

a. 4.7 Discussion of the Findings

The results of the analysis have revealed that user attitude had a positive and significant effect on user acceptance towards eHealth in the public healthcare sector. This result is consistent with the study findings made by Chen & Hsiao (2012) that perceived usefulness and perceived ease of use significantly affect HIS acceptance from the physician's perspective. In addition, Zayyad & Toycan (2018) found that the perceived usefulness, belief, willingness, and attitude of healthcare professionals have a significant influence on their intention to adopt and use eHealth applications.

As evidenced in chapter four, perceived system effectiveness has a significant effect on user acceptance. In line with the study findings, Zarei *et al*. (2015) found that perceived service quality, cost of services, quality of the process and quality of interaction are the most important predictors of user satisfaction but not the physical environment.

Again, there was a significant relationship between facilitating conditions and user acceptance towards eHealth. Congregate to the findings, Sharifian *et al*. (2014) established that nurses' acceptance towards HISs was influenced by performance expectancy, effort expectancy and social influence with facilitating conditions and performance expectancy having the strongest influence on user intention. Also, Phichitchaisopa & Naenna (2013) also found that performance expectancy, effort expectancy, and facilitating conditions have a significant effect on adoption of HIS.

Finally, the results show that age significantly moderates the relationship between user attitude and user acceptance towards eHealth. In line with the study findings in the extant literature, Furusa & Coleman (2018) indicated that older doctors lacked enthusiasm to work in an environment embedded in technology and that there was a greater skill level of technology among young doctors than their older counterparts.

Also, the study findings show that user experience significantly moderates the relationship between user attitude and user acceptance towards eHealth. However, the findings show that gender does not significantly moderate the relationship between user attitude and user acceptance, contrary to the findings by Zurovac *et al*. (2013) who echoed that women are likely to have limited technical literacy and confidence when it comes to using technologies, hence

represented less in the development and implementation of eHealth interventions.

V. CONCLUSION

As per the findings of the study it can be concluded that user attitude, perceived system effectiveness and facilitating conditions (independent variables) influences user acceptance towards eHealth (dependent variable). The relationship was confirmed through correlation and regression analysis which revealed that there was a positive significant linear relationship between user attitude and user acceptance towards eHealth. Regression and correlation analysis also confirmed that there is a positive significant linear relationship between perceived system effectiveness and user acceptance towards eHealth. Also, the regression analysis proofed that there is a significant relationship between facilitating conditions and user acceptance. Therefore, the study concluded that user attitude, perceived system effectiveness and facilitating conditions influences user acceptance towards eHealth.

VI. RECOMMENDATIONS

The survey on user attitude revealed that they have a positive attitude towards eHealth, with the following three attitude factors considered the most important: an easy-to-use system, a user-friendly computer system interface and being skilled in operating the computer system. This kind of response suggests that healthcare workers at KNH are likely to be confident in using Hospital Information Systems when they have been adequately trained in IT skills should there be no other hindrances.

The study found out that perceived system effectiveness positively influences user acceptance towards eHealth. These findings suggest the need for an effective information system. In addition to having an excellent system and service quality, the outcome further suggests that top management and other relevant stakeholders should be involved through legislation and other incentivizing policies to reinforce service level agreement concerning system security and performance to enable healthcare workers at KNH to accept and use technology in undertaking their tasks.

The study also revealed that facilitating conditions has a significant effect on user acceptance. The results are cognisant with the findings of prior authors, Sharifian *et al*. (2014) and Idoga *et al*. (2019) who found a significant link between facilitating conditions and user acceptance. The implication of these results is that technology infrastructure is an essential component of eHealth at KNH that would enable effective communication and information transmission among different cadres of healthcare workers.

Finally, the study recommends automating the research model for evaluating user acceptance towards eHealth using a suitable software development language to enable the model to be available, easy to update, manage and implement in other public hospitals in Kenya.

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