ARTICLE

FACTORS THAT INFLUENCE MEDICAL DOCTORS' BEHAVIOURAL INTENTION TO USE CLINICAL INFORMATICS

Owolabi K. Abyaomi
University of Zululand, South Africa
yomiowolabi2000@yahoo.com

Neil D. Evans
University of Zululand, South Africa
evansn@unizulu.ac.za

Denins N. Ocholla
University of Zululand, South Africa
Ochollad@unizulu.ac.za

ABSTRACT

A better understanding of the factors that influence the integration of clinical informatics would promote the effective utilisation of its tools, particularly among medical doctors. The overall aim of this research was to use the unified theory of acceptance and use of technology (UTAUT) model to examine factors that influence medical doctors' behavioural intention to use clinical informatics. The study assessed the influence of UTAUT constructs on the acceptance and use of clinical informatics resources among medical doctors in selected teaching hospitals in Nigeria and South Africa. Quantitative research was employed through a survey. The target population consisted of medical doctors at the King Edward VIII Hospital in Durban, South Africa, and the University College Hospital in Ibadan, Nigeria. The study established that all four of the UTAUT constructs (effort expectancy, performance expectancy, facilitating conditions, and social influence) influenced the use of clinical informatics among medical doctors in the selected teaching hospitals. Based on the findings of the study, it is recommended that an enabling environment be created that will promote the use of clinical informatics and adequate training, which is necessary for the effective use of the tools and which will bring about positive behavioural intentions in medical doctors to accept and use clinical informatics for effective healthcare delivery.

Keywords: clinical informatics; hospitals; Nigeria; social informatics; South Africa; teaching; UTAUT

UNISA university of south africa PRESS

Mousaion
Volume 35 | Issue 1 | 2017 | pp. 130–154
https://upjournals.co.za/index.php/LIS

https://doi.org/10.25159/0027-2639/2321
ISSN 0027-2639 (Print)

INTRODUCTION

In this paper, we argue that enormous potential lies in the provision of access to and the use of clinical informatics resources in teaching hospitals in Nigeria and South Africa, but the behavioural aspects of their use by clinical doctors are not readily known. The World Health Organization (2007) notes that service delivery in healthcare is concerned with how services are organised and managed to ensure access, quality, safety and continuity of care across health conditions, across the globe.

Health informatics is the application of information and communication technology (ICT) in the collection, storage, and evaluation of health data, and its advent has greatly transformed the health sector (Idowu, Cornford, and Bastin 2008). Its uses enhance healthcare delivery and lead to improvement in evidence-based medicine that assists medical doctors with decision-making (Staggers and Thompson 2002). The University of Southampton (2014) describes health informatics as the knowledge, skills and tools that enable health information to be collected, managed, used and shared to support the delivery of healthcare and to promote the development of the healthcare system. It is concerned with the assessment of methods and systems for the acquisition, processing and interpretation of patients' data with the help of knowledge from scientific research (Imhoff, Webb, and Goldschmidt 2001). Bardan and Thouin (2013) categorise health informatics into seven groups, namely: clinical informatics, nursing informatics, veterinary informatics, dental informatics, bioinformatics, imagery informatics, and public health informatics. The focus of the current study is limited to the access to and use of clinical informatics among medical doctors in selected teaching hospitals in Nigeria and South Africa.

Clinical informatics is the application of ICT in all facets of medicine and the healthcare system (Polašek and Kern 2012). Clinical informatics is the integration of clinical science, computer science and information science to manage and communicate data, information and knowledge in clinical practice. Clinical informatics facilitates the integration of data, information, knowledge, and wisdom to support patients, medical doctors and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes and information technology (American Association of Medical Informatics 2015). This indicates that clinical informatics is the use of data and information communication technology to promote and to deliver effective healthcare services.

Staggers and Thompson (2002) note that clinical informatics provides adequate methods for the effective collection, storing and analysing of healthcare information. It goes further to say that clinical informatics supports clinical decision-making and at the same time encourages evidence-based medicine.

Okiy (2010) notes that ICTs encompass all forms of technology that are used to create, store and exchange information in various formats, such as voice, still images, animation and multimedia. Polašek and Kern (2012) explain that clinical informatics resources assist medical doctors with their clinical practice. According to Ortiz, Meyer

and Burstin (2002), clinical information can be categorised as follows: electronic medical records, computerised physician order entries, computerised decision support systems, and diagnosis imagery archives. The objective of clinical informatics, as observed by Staggers and Thompson (2002), is to improve the health condition of the people through the use of ICT resources in the direct diagnosis, treatment and evidence-based medical care of patients. The contributions of clinical informatics to the medical professional include promotion of knowledge sharing, adequate health monitoring, statistics gathering and analysis, and the delivery of effective healthcare services (Olatokun and Adeboyejo 2009). Daniel and Oyetunde (2013) identify the following purposes for which medical doctors use clinical informatics resources: to consult with professional colleagues through instant transmission or email messages, to access electronic file systems and power search utilities to locate information, to effectively communicate through the use of the Internet, and to diagnose patients.

The WHO (2005) acknowledges that a well-functioning healthcare system is one that adopts the use of clinical informatics for reliable and timely access to health information by medical doctors for decision-making. Thus, clinical informatics essentially provides medical doctors and other healthcare workers with the opportunity to improve accuracy and overcome distance and time.

The goals in the application of clinical informatics by medical doctors in developed and developing countries are quite similar and yet slightly different. In developed countries, the main objective of clinical informatics is to reduce healthcare costs, and to provide effective healthcare delivery to people irrespective of their background (Luna et al. 2014). On the other hand, in developing countries the focus of using clinical informatics is to improve access to medical care (Haluza and Jungwirth 2014). The provision of effective healthcare services seems to be shared in the two studies.

According to Nuq (2012), there is a shortage of 4.3 million doctors and other health workers around the world. The author states that third-world countries are the worst hit, particularly African countries which have 24 per cent of the global burden of diseases, with only three per cent of the world's medical doctors and less than one per cent of the world's health expenditure. Wootton et al. (2009) identify various reasons for the need to instil clinical informatics in developing countries, which include the high costs of traditional healthcare services, the shortage of medical doctors and other qualified personnel in the countries' healthcare sectors, and ICT innovation. Clinical informatics also provides a window of opportunity for the health sector, particularly in developing countries, to use ICT resources to combat epidemics and severe diseases (Dawson 2011). This could have been extremely helpful with the recent Ebola outbreak in West Africa and the Zika outbreak in Brazil.

Davis, Bagozzi and Warshaw (1989) note that user acceptance is an important determinant of the success or failure of any new ICT project that is introduced into a system. From the foregoing, user acceptance can be described as the ability and willingness of user groups to employ a technology for the tasks that it is designed to

perform or support. The UTAUT theory identifies four key constructs that directly determine user acceptance and usage of technology, namely performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), and four control variables, namely gender, age, experience, and voluntariness of use (Liu 2013, 30).

Venkatesh et al. (2003, 447) describe performance expectancy as the degree to which an individual believes that using ICT would assist him/her with achieving better results. Performance expectancy is about the benefits that the user will enjoy with the new technology compared to the old system in relation to job performance. The authors reveal that performance expectancy is the strongest determinant of behavioural intention. Tamblyn et al. (2006) posit that clinical informatics has the potential to improve medical doctors' productivity and job performance, and also to improve the quality of the diagnosis and treatment of patients.

The effect of performance expectancy can be seen as the most salient factor in medical doctors' acceptance of clinical informatics. Mourad (2012) opines that "job fitness" or "job relevance" has an effect on medical doctors' use of clinical informatics. Putzer and Park (2010) established that job relevance is a factor that is significantly associated with the use of clinical informatics among medical doctors in community hospitals in the USA. Medical doctors are likely to appreciate how clinical informatics can meet their job requirements and improve efficiency and effectiveness at work. Whittaker, Van Zyl and Soicher (2011) note that clinical informatics is a decision-making support tool for medical doctors. The ability of a tool to provide evidence-based clinical assistance to medical doctors is perceived as an essential factor that may encourage use (Alsos, Dabelow, and Faxvaag 2012).

Almulhem (2015) likewise notes that medical doctors' impression of clinical informatics is one of the factors that determine its use. The author further argues that attitude and ease of use of clinical informatics would also determine its use. Schaper and Pervan (2007) found that effort expectancy was a key factor in behavioural adoption among medical doctors in Australia. However, it was found to have no effect on behavioural intention among medical doctors in Hong Kong (Chau and Hu 2002).

A study by Cilliers and Flowerday (2013) conducted a study on the use of telemedicine among health workers, where the majority of the respondents stated that the system was user-friendly. A total of 71 per cent claimed that they could use the technology with ease, and 69 per cent stated that the system was very easy to learn. These results may be due to previously gained computer knowledge and the training that the staff had undergone.

Studies have shown that an individual's intention to use a new technology can be influenced by the views, opinions and perceptions of the people around him/her, particularly in his/her immediate environment (Venkatesh and Davis 2000). According to Venkatesh et al. (2003, 452), "individuals are more likely to comply with others' expectations when those referent others have the ability to reward behaviour or punish

non-behaviour". Chau and Hu (2002) conducted a study on medical doctors' decision-making processes regarding the use of clinical informatics in Hong Kong. The research was conducted in a hospital environment, and they found that social influence may differ from one country to another.

Vogd (2004) examined the hierarchical structure among medical doctors in German hospitals and the influence of supervisors on the use of clinical informatics. The study agrees that social influence has a significant impact on behaviour. The disagreement between the doctors and their supervisors on whether a technology should be adopted may explain the young doctors' reluctance to use clinical informatics. Kim and Kankanhalli (2009) confirm that professional colleagues' opinions are a salient social influence in the use of clinical informatics in hospital environments. Kim and Kankanhalli (2009) claim that the negative attitude of senior medical doctors to the use of clinical informatics may affect the attitude of young medical doctors to the use of the tools. This implies that if senior medical doctors do not use clinical informatics, they may negatively influence others' decisions to use it.

Facilitating conditions refer to the degree to which users believe that organisational and technical infrastructure will support the use of ICT (Venkatesh et al. 2003). Facilitating conditions are related to the technology acceptance model (TAM), perceived ease of use (PEOU), Model of Personal Computer Utilisation (MPCU), and compatibility Diffusion of Innovation (DOI) model. Unlike other constructs such as social influence, facilitating conditions and effort expectancy are not found to influence users' intentions significantly (Nwagwu and Akeem 2013). Nuq and Aubert (2013) determined that there is a significant relationship between organisational and facilitating conditions and the actual degree of usage.

Holden and Karsh (2010) note that facilitating conditions are very important in the acceptance of technology in healthcare. They observe that the availability of resources, which include technical knowledge and adequate knowledge of computers, is one of the facilitating conditions that promote the use of clinical informatics. Kijsanayotin, Pannarunothai, and Speedie (2009, 406) likewise note that facilitating conditions are very important in medical doctors' acceptance of clinical informatics because they are a factor that significantly explains the use of technology.

Cilliers and Flowerday (2013) highlight the various resources that promote facilitating conditions in hospitals to include technical services, knowledge of the system, and compatibility with other systems already in place. Extant literature has affirmed that when medical doctors have the right attitude to ICT, their intention to use the technology in their hospitals tends to be positive (Melas et al. 2011).

CONTEXTUALIZATION

Nigeria and South Africa are economic powerhouses on the continent of Africa. Nigeria, the "Giant of Africa", has a population of 170 million (National Agency for Control of Aids 2014) and is divided into 36 states that are spread across six geopolitical

regions: the North East, North Central, North West, South West, South East and South South. There are 26 teaching hospitals and 25 federal medical centres in the country (Federal Ministry of Health 2004). However, there are no available data about the total number of general hospitals which are being handled by various state governments in Nigeria. South Africa is divided into nine provinces, namely the Eastern Cape, Free State, Gauteng, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape and KwaZulu-Natal. The estimated population of South Africa in 2013 was 52.98 million (Statistics South Africa, 2013). There were 4 200 public health facilities in South Africa, eight of which are teaching hospitals, and a total of 165 371 qualified medical doctors in the country (South Africa Infor, 2012). Nigeria has three tiers of medical care: primary, secondary and tertiary healthcare (Federal Ministry of Health 2010). South Africa's healthcare system consists of five structures, which are primary healthcare (clinics), district hospitals, regional hospitals, tertiary hospitals and central hospitals (academic). The two countries face the same health challenges, which include high levels of HIV/AIDS, tuberculosis, and a low expectancy rate (Chikotie 2013; Onu and Agbo 2013).

The governments of the two countries have made various attempts in the past to promote clinical informatics in their countries. The Nigerian government embarked on the promotion of clinical informatics in the country in 1980 through a research project championed by the Computer Centre of Obafemi Awolowo University Teaching Hospital in Ile-Ife, and the University of Kuopio in Finland (Idowu, Cornford, and Bastin 2008). It also introduced a software package called the State Hospital Network (SHONET) which is used to share hospital resources over computer networks (Idowu, Cornford, and Bastin 2008). The Ministry of Health in South Africa, for its part, inaugurated a committee to look at effective ways of promoting clinical informatics in public hospitals across the country with the aim of developing clinical informatics practices (Department of Health 2012).

Two teaching hospitals, namely the University College Hospital in Ibadan, Nigeria, and the King Edward VIII Hospital in Durban, South Africa, were selected for this study. The University College Hospital in Ibadan was founded in 1952 and is affiliated to the University of Ibadan as its teaching hospital. The hospital was established in response to the need for the training of medical personnel and other healthcare professionals for both the country and the West African sub-region (UCH 2011). The hospital runs courses at undergraduate level and provides postgraduate residency training programmes in all specialities ranging from internal medicine to surgery, obstetrics and gynaecology (UCH 2011).

The King Edward VIII Hospital in Durban was founded in the year 1950 (Ahamed 2013). The hospital is the second largest hospital in the southern hemisphere, and provides regional health services to the provinces of KwaZulu-Natal and the Eastern Cape (Department of Health 2014). It is also the teaching hospital of the Nelson Mandela School of Medicine which is affiliated to the University of KwaZulu-Natal. It

offers courses in various fields of medicine such as obstetrics and gynaecology, general medicine, general surgery and paediatrics (Department of Health 2014).

The selection of teaching hospitals in Nigeria and South Africa was based on Ani's (2013) assertion that Nigeria and South Africa are two of the leading African countries in research productivity. Despite this, the countries have been ranked poorly in terms of healthcare delivery. For example, South Africa was 175th and Nigeria was ranked 187th by the World Health Organization (WHO 2000). Smart, Peace and Tonukari (2004) also decry the poor state of ICT infrastructure in many countries, which include Nigeria and South Africa. According to the authors, the status of ICT development in many teaching hospitals on the continent does not support an effective and efficient healthcare delivery system.

The two teaching hospitals were selected for several reasons. The first is that they belong to the first generation of teaching hospitals in Nigeria and South Africa and are therefore well established in terms of funding towards infrastructural and human development in their respective countries. The King Edward VIII is also the only teaching hospital in the province of KwaZulu-Natal, South Africa, and the University College Hospital is the only federal teaching hospital in Oyo State, Nigeria.

The selection of hospitals affiliated with the two universities allowed for the comprehensive study of the accessibility and utilisation of clinical informatics among medical doctors in two teaching hospitals from different countries.

Furthermore, the affiliated universities of the hospitals were highly ranked in 2014 by the Ranking Web of Universities (2014) among the universities in Africa. The King Edward VIII hospital was selected because the University of KwaZulu-Natal in South Africa was ranked sixth and the University College Hospital was selected because the University of Ibadan Nigeria was ranked 19th out of 1 417 universities that were listed in the assessment in Africa.

THE STUDY PROBLEM AND RATIONALE

The previous section provided a conceptual and contextual background for informing the problem and rationale of this paper. In the medical field, a number of studies (Nwagwu and Akeem 2013; Ruxwana, Herselman, and Conradie 2010) have revealed that ICT is underutilised in many healthcare facilities, resulting in instigation and economic haemorrhaging in healthcare development. The National Centre for Chronic Disease Prevention and Health Promotion (2009) states that the United States of America spent huge amounts of funds on ICT in healthcare delivery without any considerable results. The cited study noted that failure of medical doctors to use clinical informatics resources placed a very heavy burden on the hospital managements, patients, and other healthcare workers. This study therefore sought to explore the factors that influence medical doctors' behavioural intention to use clinical informatics in selected teaching

hospitals in Nigeria and South Africa. In this paper, we provide answers to the following research question:

- Which of the factors are the most influential in the acceptance and use of clinical informatics among medical doctors in the selected teaching hospitals?

RESEARCH METHODOLOGY

The study adopted the largely positivist paradigm to deal with the research problem. The study employed the quantitative method through a survey design. The sample for the study was drawn from medical doctors in two selected teaching hospitals, the King Edward VIII Hospital in Durban, South Africa, and the University College Hospital in Ibadan, Nigeria. Purposive sampling was used to select the two teaching hospitals. The random sampling technique was used to select the respondents for the study. The questionnaire was administered to 413 medical doctors in the two teaching hospitals, 258 (63%) of whom returned the questionnaire (Table 1). The sampling frames for the study were the departmental lists of medical doctors from all the medical departments used in the survey.

Table 1: Distribution of respondents by medical department

Medical Department	UCH Frequency (176) %		KEH V111 Frequency (82) %		TOTAL *(258) Frequency %	
Anaesthesia	16	9.1	11	13	27	10
ENT	11	6.3	02	04	13	05.
Medicine	30	17	18	22	48	19
Surgery	22	12.5	12	14	34	13
Orthopaedics and Trauma	15	8.5	07	08	22	09
Paediatrics	19	10.8	10	12	29	11
Psychiatry	15	8.5	04	05	19	07
Radiology	15	8.5	05	06	20	08
O and G	25	14	10	12	35	14
Haematology	08	4.5	03	04	11	04
Total	176	100	82	100	258	100

*Note: N = 258 is the total number of respondents that completed the questionnaires from the two surveyed teaching hospitals out of the 413 copies of questionnaires that were administered. Both descriptive and inferential statistics were used to analyse the factors that influence the use of clinical informatics resources among medical doctors in the selected hospitals.

INSTRUMENT ADMINISTRATION

The 25 questionnaire items were adapted from the UTAUT study of Venkatesh et al. (2003). These items represent independent and dependent variables used in the current study. The questionnaire items were designed to measure the behavioural intention of medical doctors to use clinical informatics. In addition, the words were modified to fit the specific technology under investigation and changes were also made to the user acceptance scale. All items were measured on a four-point Likert scale, where 1 = strongly agree, 2 = agree, 3 = strongly disagree, and 4 = disagree.

A pre-test of the questionnaire was conducted before the start of the formal survey. A pre-test was conducted to validate the instrument. In addition, it assisted concerning the setting of the questionnaire, and question ambiguity was obtained. This allowed for changes to be made to the questionnaires. Cronbachs' alpha was calculated to determine the reliability of the items. The results indicated that the reliability numbers are greater than 0.6 which are considered acceptable in technology acceptance (see Figures 1 to 6) (Zhang, Li, and Sun 2006). Table 2 shows the test for the sampling adequacy.

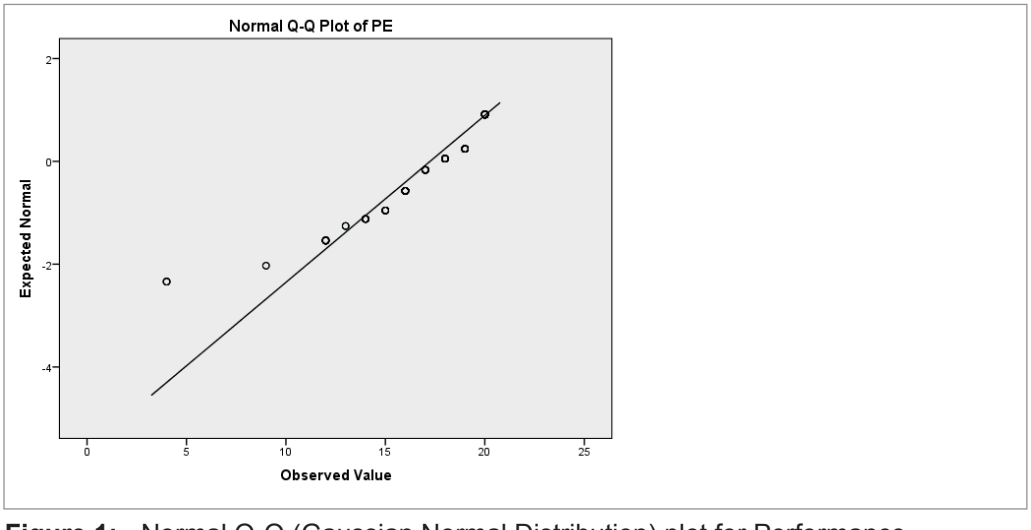

Figure 1: Normal Q-Q (Gaussian Normal Distribution) plot for Performance Expectancy (PE)

From the normal Q-Q plot of PE it can be seen that it is approximately normally distributed with two outliers.

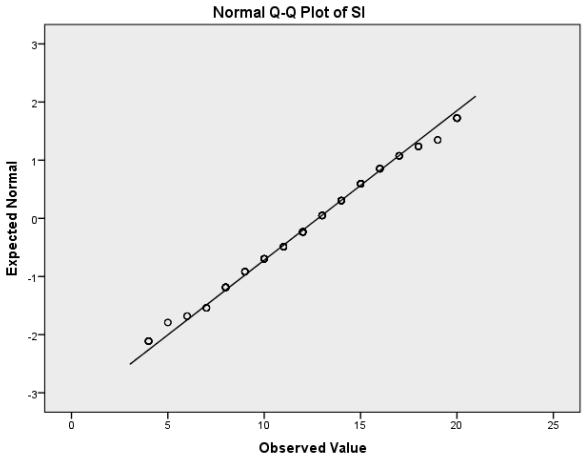

Figure 2: Normal Q-Q (Gaussian Normal Distribution) plot for Social Influence (SI)

From the normal Q-Q plot of SI it can be seen that it is approximately normally distributed.

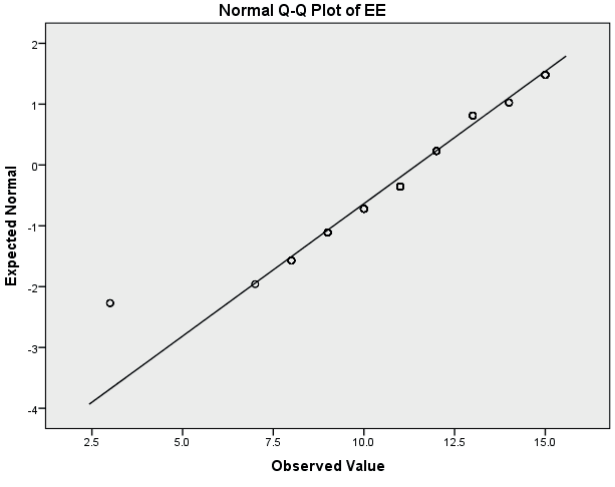

Figure 3: Normal Q-Q (Gaussian Normal Distribution) plot for Effort Expectancy (EE)

From the normal Q-Q plot of EE, it can be seen that it is approximately normally distributed with one outlier.

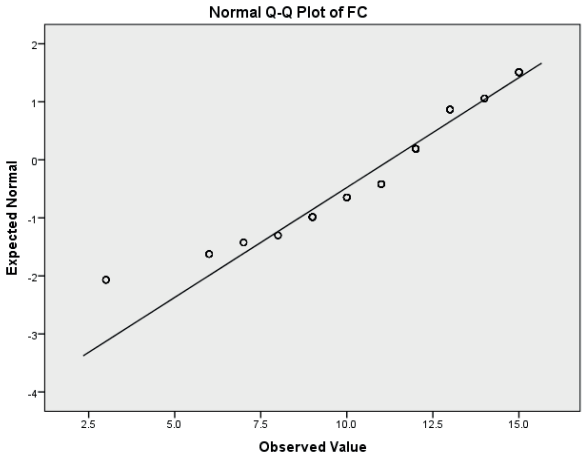

Figure 4: Normal Q-Q (Gaussian Normal Distribution) plot for Facilitating Conditions (FC)

From the normal Q-Q plot of FC, it can be seen that it is approximately normally distributed with outliers.

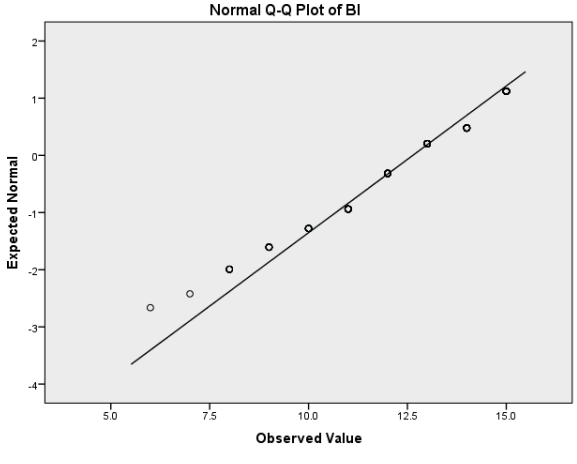

Figure 5: Normal Q-Q (Gaussian Normal Distribution) plot for behavioural intention

From the normal Q-Q plot of behavioural intention it can be seen that it is approximately normally distributed with outliers.

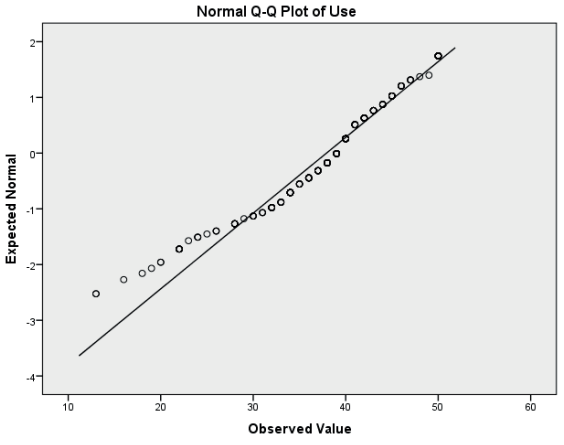

Figure 6: Normal Q-Q (Gaussian Normal Distribution) plot for behavioural intention to use

From the normal Q-Q plot of behavioural intention to use it can be seen that it is approximately normally distributed with outliers.

Table 2: Kaiser-Meyer-Olkin (KMO) test for sampling adequacy

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		.834
Bartlett's test of sphericity	Approx. Chi-square	446.275
	Df	15
	Sig.	.000

Cerny and Kaize (1977)

Since the result of the KMO test is greater than 0.834, it can be said that the sample is very adequate.

Table 3: Reliability of the instruments

Items in the questionnaire	**Number of items**	**Cronbach's alpha**
Performance expectancy	04	0.707
Social influence	04	0.802
Effort expectancy	03	0.708
Facilitating conditions	03	0.907

RESEARCH FINDINGS

This section presents the study's findings on the issues surrounding the acceptance of clinical informatics resources by medical doctors at the selected hospitals. The UTAUT constructs will be used to examine the factors that influence medical doctors' behavioural intention to use clinical informatics. This includes the performance expectancy, effort expectancy, facilitating conditions and social influence.

Factors that Influence Medical Doctors' Behavioural Intention to Use Clinical Informatics Resources

The Relative Importance Index (RII) was used to rank the recognised factors that influence the behavioural intention to use clinical informatics resources among the medical doctors in the selected hospitals. The RII supported the findings from descriptive statistics (see Table 3) which revealed that performance expectancy and effort expectancy are two of the constructs that influenced the behavioural intention. Performance expectancy was ranked first with an RII of 0.862, closely followed by effort expectancy with 0.764.

Correlation Analysis between Independent and Dependent Variables

The study examined the correlative significance between the independent variables (performance expectancy (PE), social influence (SI), effort expectancy (EE) and facilitating conditions (FC)) and the dependent variable (behavioural intention (BI)). The results in Table 4 show that there was a significant relationship between the independent variables and dependent variables.

Pearson's Product-Moment Intercorrelation between the Dependent Variable (BI) and Independent Variables (PE, SI, EE and FC)

An assessment of the intercorrelation matrix between the dependent and independent variables revealed that performance expectancy had the highest correlation with behavioural intention, that is, performance expectancy positively influenced behavioural intention with a correlation degree of ($r = 0.49$). For effort expectancy this indicates that effort expectancy positively influences the behavioural intention with a correlation degree ($r = 0.45$) and facilitating conditions ($r = 0.37$), while social influence has a low positive influence on the behavioural intention with a correlation degree ($r = 0.24$).The results revealed that each of the independent variables (performance expectancy, social influence, effort expectancy and facilitating conditions) was significantly correlated with the medical doctors' behavioural intention to use clinical informatics resources (see Table 5).

Influence of the Behavioural Intention on the Use of Clinical Informatics Resources

The influence of the behavioural intention on the use of clinical informatics resources was examined through the use of the multiple correlation coefficient R, which is a measure of the influence of the response variable, behavioural intention on the use of clinical informatics. Table 6 shows a value of 0.528, which is an indication of a good level of influence. The coefficient of determination ($R^2 = 0.271$) is the percentage of variance in the behavioural intention that was explained by the independent variables.

The Influence of Independent Variables on the Behavioural Intention

The influence of the independent variables on the behavioural intention revealed that performance expectancy, social influence, and effort expectancy significantly influenced the behavioural intention to use clinical informatics resources ($F (3, 254) = 32.790$, $P < 0.05$). These results show that the model is a good fit. (See Table 7.)

Unstandardised Coefficients

An assessment of unstandardised coefficients is an indication of how much behavioural intention varies with an independent variable when all the other independent variables are held constant. The results indicated that performance expectancy and effort expectancy had a statistically significant influence on the behavioural intention to use clinical informatics resources ($P < 0.05$), while social influence was not significantly related to behavioural intention ($P > 0.05$). (See Table 8.)

Relationship between Use Behaviour and Behavioural Intention to Use

An assessment of the relationship between use behaviour and the behavioural intention to use clinical informatics resources revealed that there was a statically significant relationship between use behaviour and the behavioural intention to use clinical informatics resources at the selected hospitals, at a 95 per cent level of confidence. (See Table 9.)

Influence of Facilitating Conditions on the Use of Clinical Informatics Resources

The influence of facilitating conditions on the use of clinical informatics resources indicated that facilitating conditions had a significant influence, at a 95 per cent level of confidence.

Regression Analysis on the Independent Factors to the Prediction of the Behavioural Intention

Table 10 presents the results of the regression of medical doctors' behavioural intention to use clinical informatics resources based on the four related variables. The regression results show an adjusted R-square value of 0.29 (Table 11), and an F-ratio of 25.22 (Table 12), the latter of which is significant at 0.05 (0.000 < 0.05). These results indicate that the four independent variables (performance expectancy, social influence, effort expectancy and facilitating conditions), jointly (as indicated by the R-square value) explained 29 per cent of the variations in the medical doctors' intention to use clinical informatics resources. The prediction is also significant, as indicated by the F-ratio.

Table 12 indicates, firstly, that each of the factors made a significant contribution to the prediction (as indicated by the significance of the t-values, which were higher than 0.05 as shown in the "t" column of the table). Secondly, the standardised coefficients (beta values) which indicate the relative strength of each factor in the prediction of medical doctors' behavioural intention to use clinical informatics, indicated that performance expectancy contributed the most to the prediction of medical doctors attitudes to clinical informatics usage (beta value = .320), followed in declining order of strength by effort expectancy (beta = .197), facilitating conditions (beta = .096), and social influence (beta = 027). These results imply that all four of the factors significantly contributed to the explanation and prediction of medical doctors' behavioural intention to use clinical informatics tools. (See Table 13.)

Table 4: Correlation analysis between independent and dependent variables

	PE	**SI**	**EE**	**FC**	**BI**	**Use**
PE	1	.322	.572	.473	.486	.438
SI	.322	1	.399	.309	.238	.331
EE	.572	.399	1	.569	.445	.377
FC	.473	.309	.569	1	.368	.401
BI	.486	.238	.445	.368	1	.456
Use	.438	.331	.377	.401	.458	1

Table 5: Pearson's Product-Moment Intercorrelation between dependent (BI) and independent variables (PE, SI, EE and FC)

	BI	PE	SI	EE	FC
BI	1.000	.486	.238	.445	.368
PE	.486	1.000	.322	.572	.473
SI	.238	.322	1.000	.399	.309
EE	.445	.572	.399	1.000	.569
FC	.368	.473	.309	.569	1.000

Table 6: Influence of behavioural intention on the use of clinical informatics

Model	R	R square	Adjusted R square
1	.528a	.279	.271

Table 7: The influence of independent variables on behavioural intention

ANOVA						
Model		**Sum of squares**	**Df**	**Mean square**	**F**	**Sig.**
1	Regression	272.397	3	90.799	32.790	.000b
	Residual	703.355	254	2.769		
	Total	975.752	257			

Table 8: Unstandardised coefficients indicating how behavioural intention varies with independent variables

Model	B	Std error	T	Sig.
(Constant)	6.402	.641	9.990	.000
PE	.215	.041	5.191	.000
SI	.017	.029	.575	.566
EE	.202	.057	3.519	.001

Table 9: Relationship between use behaviour and behavioural intention to use

Model	**B**	**Std error**	**T**	**Sig.**
(Constant)	8.036	.569	14.134	.000
Use	.121	.015	8.241	.000

Table 10: Influence of facilitating conditions on the use of clinical informatics resources

Model	**B**	**Std error**	**T**	**Sig.**
(Constant)	5.803	.794	7.309	.000
Use	.144	.021	7.001	.000

Table 11: Regression of medical doctors' behavioural intention to use clinical informatics tools

Model	**R**	**R square**	**Adjusted R square**	**Std error of the estimate**
	.534a	.285	.274	1.66049

Table 12: ANOVA of medical doctors' behavioural intention to use clinical informatics tools

Model		Sum of squares	Df	Mean square	F	Sig.
	Regression	278.173	4	69.543	25.222	.000b
	Residual	697.579	253	2.757		
	Total	975.752	257			

Table 13: Collinear assessment

Model	Unstandardised coefficients		Standardised coefficients	T	Sig.	95.0% Confidence interval for B	
	B	Std error	Beta			Lower bound	Upper bound
(Constant)	6.260	.647		9.677	.000	4.986	7.534
PE	.202	.042	.320	4.787	.000	.119	.285
SI	.013	.029	.027	.453	.651	−.045	.071
EE	.167	.062	.197	2.704	.007	.045	.289
FC	.071	.049	.096	1.447	.149	−.026	.168

DISCUSSION OF THE FINDINGS

The study established that performance expectancy and effort expectancy are two of the UTAUT constructs that positively and significantly influenced medical doctors' behavioural intention to use clinical informatics in the two hospitals, with P-values of 0.05 that seem to be consistent with related studies (Carlsson et al. 2006; Deng 2010; Knutsen, Constantiou, and Damsgaard 2005; Oye, Iahad, and Ab Rahim 2012; Wong and Dioko 2013). Further, performance expectancy and effort expectancy have a significant positive influence on the behavioural intention to use ICT (Jairak, Praneetpolgrang, and Mekhabunchakij 2009; Venkatesh et al. 2003).

Performance expectancy's influence on the behavioural intention to use clinical informatics is reported in a number of studies (Chismar and Wiley-Patton 2003; Cohen, Bancilhon, and Jones 2013; Kijsanayotin, Pannarunothai, and Speedie 2009; Kim and Kankanhalli 2009; Maillet, Mathieu, and Sicotte 2015; Wang et al. 2009). This implies that medical doctors who believe that using clinical informatics tools will be beneficial to them will accept the technologies a lot more than medical doctors with lower performance expectancies.

It is further revealed that the effort expectancy had the strongest influence on medical doctors' behavioural intention to use clinical informatics tools which concur with some related studies (Kijsanayotin, Pannarunothai, and Speedie 2009; Nanji et al. 2011; Wright and Marvel 2012). Thus, medical doctors who assume that a clinical informatics tool will be easy to use and not require a lot of effort tend to embrace the use of the system. It is advisable that clinical informatics designers need to take note of this and make their technologies easy to operate and use (Wang et al. 2009).

Many studies have used the acceptance model to analyse medical doctors' behavioural intention to use clinical informatics in the healthcare sector. However,

there are discrepancies in the results. For example, Esmaeilzadeh et al. (2015) used a modified UTAUT model to examine the behavioural intention of medical doctors to use the Computerised Decision Support System in Malaysia, surveying 335 doctors and 12 hospitals. The results revealed that performance expectancy, self-efficiency, and social networks were the factors that influenced the use of the facility. The findings of Maillet, Mathieu and Sicotte (2015) also differ from the findings of this research. The authors found out that the performance expectancy and facilitating conditions are the major factors that influence medical doctors' behavioural intention to use clinical informatics tools.

When Dünnebeil et al. (2012) used the UTAUT model and the TAM to confirm the degree of acceptance of clinical informatics facilities among medical doctors in Germany, it was found that perceived usefulness and PEOU greatly influenced medical doctors' behavioural intention to use clinical informatics tools. Likewise, Kijsanayotin, Pannarunothai, and Speedie (2009) used the UTAUT model to investigate the use of ICTs among community health workers in Taiwan and found that the performance expectancy, effort expectancy, social influence, and attitude were the factors that influenced the behavioural intention of healthcare workers to use the technologies. The differences in the findings can be attributed to the submission of Venkatesh et al. (2003) that the theory explains 70 per cent of the variation in usage intentions, which is higher than each of the eight previous models and their extensions.

CONCLUSION

The extent of the acceptance of clinical informatics among medical doctors depends on the positive relationships that influence their behavioural intentions to use and usage behaviour of clinical informatics. The theory indicated predictive, accuracies and predictive relevance toward their behavioural intentions to clinical informatics among medical doctors in Nigeria and South Africa. Performance expectancy is positively correlated with dependent variables suggesting that performance expectancy can be attributed to the perceived belief that using clinical informatics will make a medical doctor's work easier and improve their performance at work. In addition, effort expectancy is moderately positively correlated. Similarly, facilitating condition and social influences have weak positive correlations. The extent of acceptance of clinical informatics by medical doctors will depend on nurturing the strong relationships that will enhance their behavioural motives to use clinical informatics.

Furthermore, it is well recognised in user acceptance studies that users' intention to use a new technology is determined primarily by the perception that such a technology would be advantageous and increase job performance. The study suggests that clinical informatics designers improve the tools functions to make the user interfaces easier to operate.

The limitation of the study lies in the fact that the study focused on the factors that influence behavioural intention of medical doctors to use clinical informatics in selected teaching hospitals in Nigeria and South Africa, therefore the result may not be generalised to other teaching hospitals that are not used in the study. Based on this the study suggest a further study that will validate the model and findings in other teaching hospitals in other countries. Secondly, this study was carried out in one teaching hospital in Nigeria and South Africa respectively, and as a result the study represents a starting point for investigating crucial factors influencing medical doctors' adoption of clinical informatics and actual behaviour of using clinical informatics.

Despite these limitations, the results provide important insights to why medical doctors use clinical informatics. The empirical analysis of the study contributed to knowledge in the area of clinical informatics acceptance research. The findings of the study are very important to medical doctors, hospital managements and patients. It provides a comprehensive analysis of the factors that influence medical doctors' behavioural intention to use clinical informatics. Based on this, the study expands knowledge in the area of clinic informatics adoption in selected teaching hospitals in Nigeria and South Africa. The findings of the study produced a practical support document which could provide more opportunities to medical doctors to adopt the use of clinical informatics. Lastly, the results of the study contribute to the UTAUT theoretical validity.

REFERENCES

Ahamed, N. 2013. "Medical Surgeries and Safari in South Africa". *Medical Students Journal of Austria* 2(3): 1–12.

Almulhem, J. A. 2015. "Importance of Medical Informatics in Medical Students' Curricula in Saudi Arabia." Master's thesis, University of Wisconsin-Milwaukee.

Alsos, O. A., B. Dabelow, and A. Faxvaag. 2012. "Doctors' Concern of PDAs in Ward Round Situation." *Methods of Information in Medicine* 50 (2): 190–200. https://doi.org/10.3414/ME09-01-0017.

America Association of Medical Informatics. 2015. "Informatics Areas of Clinical Informatics." *America Journal of Informatics* 2 (1): 1–4.

Ani, O. E. 2013. "Accessibility and Utilization of Electronic Information Resources for Research and Its Effect on Productivity of Academic Staff in Selected Nigerian Universities between 2005–2012." PhD thesis, University of South Africa.

Bardhan, I. M., and C. Thouin. 2013. "Health Information Technology and Its Impact on the Quality and Cost." *Healthcare Delivery Decision Support Systems* 55 (2): 438–449. https://doi.org/10.1016/j.dss.2012.10.003.

Carlsson, C., J. Carlsson, K. Hyvonen, J. Puhakainen, and P. Walden. 2006. "Adoption of Mobile Devices/Services: Searching for Answers with the UTAUT." Proceedings of the 39th Annual Hawaii

International Conference on System Sciences (HICSS '06), 4–7 January. https://doi.org/10.1109/HICSS.2006.38

Cerny, C. A., H. F. Kaiser. 1977. "A study of a Measure of Sampling Adequacy for Factor-analytic Correlation Matrices." *Multivariate Behavioral Research* 12 (1): 43–47. http://dx.doi.org/10.1207/s15327906mbr1201_3

Chau, P., and P. Hu, 2002."Investigating Healthcare Professionals' Decisions to Accept Telemedicine Technology: An Empirical Test of Competing Theories." *Information and Management* 39 (4): 297–311. https://doi.org/10.1016/S0378-7206(01)00098-2.

Chikotie, T. T. 2013. "ICTs and Public Healthcare Service Delivery in a Developing Country Context: Critical Factors towards Addressing the Health Divide." *Journal of Health Informatics in Africa* 1 (1): 133–440.

Chismar, W. G., and S. Wiley-Patton. 2003. "Does the Extended Technology Acceptance Model Apply to Physicians?" Proceedings of the 36th Hawaii International Conference on System Sciences, 6–9 January. https://doi.org/10.1109/HICSS.2003.1174354.

Cilliers, L., and S. V. Flowerday.2013. "Health Information Systems to Improve Health Care: A Telemedicine Case Study." *South African Journal of Information Management* 15 (1): 1–12. https://doi.org/10.4102/sajim.v15i1.541.

Cohen, J., J. M. Bancilhon, and M. Jones. 2013. "South African Physicians' Acceptance of E-Prescribing Technology: An Empirical Test of a Modified UTAUT Model." *South African Computer Journal* 50: 43–54. https://doi.org/10.18489/sacj.v50i1.175.

Daniel, G. O., and M. O. Oyetunde. 2013. "Nursing Informatics: A Key to Improving Nursing Practice in Nigeria." *International Journal of Nursing and Midwifery* 5 (5): 90–98. https://doi.org/10.5897/IJNM2013.0101.

Davis, F. D., R. P. Bagozzi, and P. R. Warshaw. 1989. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models." *Management Science* 35 (8): 982–1003. https://doi.org/10.1287/mnsc.35.8.982.

Dawson, J. A.2011."Comparative Study on System Requirements and Success Factors of Telemedicine Solutions in Resource-poor Settings." Master's thesis, University of Tromsø.

Deng, H. 2010. "Emerging Patterns and Trends in Utilizing Electronic Resources in a Higher Education Environment: An Empirical Analysis." *New Library World* 111 (3/4): 87–103. https://doi.org/10.1108/03074801011027600.

Department of Health. 2012. "National Report of Health Annual Report 2012/2013." Accessed June 5, 2014. http://africacheck.org/wp-content/upload/2014/02/13016dohreport.

Department of Health. 2014. Province of KwaZulu-Natal; King Edward V111. Accessed October 8, 2014. http://www.kznhealth.gov.za/kingedwardhospital.htm.

Dünnebeil, S., A. Sunyaev, I. Blohm, J. M. Leimeister, and H. Krcmar. 2012. "Determinants of Physicians' Technology Acceptance for E-Health in Ambulatory Care." *International Journal Medical Informatics* 81 (11): 746–760. https://doi.org/10.1016/j.ijmedinf.2012.02.002.

Esmaeilzadeh, P., M. Sambasivan, N. Kumar, and H. Nezakati. 2015. "Adoption of Clinical Decision Support Systems in a Developing Country: Antecedents and Outcomes of Physician's Threat to Perceived Professional Autonomy." *International Journal of Medical Informatics* 84 (8): 548–560. https://doi.org/10.1016/j.ijmedinf.2015.03.007.

Federal Ministry of Health. 2004. "Health Sector Reform Programme: Strategic Thrusts with a Logical Framework and a Plan of Action, 2004–2007." Abuja: Federal Ministry of Health. https://eurekamag.com/research/013/040/013040021.php.

Haluza, D., and D. Jungwirth. 2014. "ICT and the Future of Health Care: Aspects of Health Promotion." *International Journal of Medical Informatics* 84 (1): 48–57. https://doi.org/10.1016/j.ijmedinf.2014.09.005

Holden, R. J., and B.T. Karsh. 2010." The Technology Acceptance Model: Its Past and Its Future in Health Care." *Journal of Biomedical Informatics* 43 (1): 159–172. https://doi.org/10.1016/j.jbi.2009.07.002.

Idowu, D. C., D. Cornford, and L. Bastin. 2008. "Health Informatics Development in Nigeria." *Journal of Health Informatics in Developing Countries* 2 (1): 15–33. https://jhidc.org/index.php/jhidc/article/viewFile/11/44.

Imhoff, M., A. Webb, and A. Goldschmidt. 2001. "Health Informatics." *Intensive Care Medicine* 27 (1): 176–186. https://doi.org/10.1007/PL00020869.

Jairak, K., P. Praneetpolgrang, and K. Mekhabunchakij. 2009."An Acceptance of Mobile Learning for Higher Education Students in Thailand." *Special Issue of the International Journal of the Computer, the Internet and Management* 17 (3): 361–368.

Kijsanayotin, B., S. Pannarunothai, and S. M. Speedie. 2009. "Factors Influencing Health Information Technology Adoption in Thailand's Community Health Centers: Applying the UTAUT Model." *International Journal of Medical Informatics* 78 (6): 404–416. https://doi.org/10.1016/j.ijmedinf.2008.12.005.

Kim, H. W., and R. Kankanhalli.2009. "Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective." *Management Information Systems Quarterly* 33 (3): 567–582.

Knutsen, L., I. D. Constantiou, and J. Damsgaard. 2005. "Acceptance and Perceptions of Advanced Mobile Services: Alterations during a Field Study." In Proceedings of International Conference on Mobile Business. Sydney, Australia, 11–13 July. https://doi.org/10.1109/ICMB.2005.13.

Liu, J. 2013. "E-Learning in English Classroom: Investigating Factors Impacting on ESL (English as Second Language) College Students' Acceptance and Use of the Modular Object-Oriented Dynamic Learning Environment (Moodle)."Master's thesis, Iowa State University.

Luna, D., A. Almerares, J. C. Mayan, F. G. B. de Quirós, and C. Otero. 2014. "Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review of the Current Challenges." *Healthcare Informatics Research* 20 (1): 3–10. http://doi.org/10.4258/hir.2014.20.1.3.

Maillet, É., L. Mathieu, and C. Sicotte. 2015. "Modeling Factors Explaining the Acceptance, Actual Use and Satisfaction of Nurses Using an Electronic Patient Record in Acute Care Settings: An Extension

of the UTAUT." *International Journal of Medical Informatics*84 (1): 36–47. https://doi.org/10.1016/j.ijmedinf.2014.09.004.

Melas, C. D., L. A. Zampetakis, A. Dimopoulu, and V. Moustakis. 2011. "Modelling the Acceptance of Clinical Information Systems among Hospital Medical Staff: An Extended TAM Model." *Journal of Biomedical Informatics* 44 (4): 553–564. https://doi.org/10.1016/j.jbi.2011.01.009.

Mourad, N. 2012."Perceived Factors Influencing Acceptance and Adoption of Mobile Technology by Clinicians in Practice." Master's thesis, University of Minnesota.

Nanji, K., J. M. Rothschild, C. Salzberg, C. A. Keohane, K. Zigmont, J. Devita, T. K. Gandhi, A. K. Dalal, D. W. Bates, and E. G. Poon. 2011. "Errors Associated with Outpatient Computerized Prescribing Systems." *Journal of the American Medical Informatics Association* 18 (6): 767–773. https://doi.org/10.1136/amiajnl-2011-000205.

National Agency for Control of Aids. 2014. "Global Aids Response Country Progress Report Nigeria." Abuja: Federal Ministry of Health.

National Centre for Chronic Disease Prevention and Health Promotion. 2009. "The Power of Prevention: Chronic Disease ... The Public Health Challenge of the 21st Century." https://www.cdc.gov/chronicdisease/pdf/2009-Power-of-Prevention.pdf

National Strategic Health Development Plans 2010–2013. 2010. Abuja: Federal Ministry of Health. http://www.health.gov.ng/doc/.

Nuq, P. A. 2012. "Towards a Better Understanding of the Intention to Use ehealth Services by Medical Professionals; The Case of Developing Countries." PhD thesis, University of Newcastle.

Nuq, P. A., and B. Aubert. 2013. "Towards a Better Understanding of the Intention to Use ehealth Services by Medical Professionals: The Case of Developing Countries." *International Journal of Healthcare Management* 6 (4) 217–236. https://doi.org/10.1179/2047971913Y.0000000033.

Nwagwu, W., and A. Akeem. 2013. "Contexts of Utilization of ICT by Medical Practitioners in Private Hospitals in Osun State, Nigeria." *World Journal of Science, Technology and Sustainable Development* 10 (3): 229–246. https://doi.org/10.1108/WJSTSD-01-2013-0004.

Okiy, R. B. 2010. "Globalization and ICT in Academic Libraries in Nigeria: The Way Forward." *Library Philosophy and Practice* (e-journal). Paper 501. https://digitalcommons.unl.edu/libphilprac/501/.

Olatokun, W. M., and O. C. Adeboyejo. 2009. "Information and Communication Technology Use by Reproductive Health Workers in Nigeria: State of the Art, Issues, and Challenges." *An Interdisciplinary Journal on Humans in ICT Environments* 5 (2): 181–207. https://doi.org/10.17011/ht/urn.200911234470.

Onu, F. U., and I. S. Agbo. 2013. "Factors that Affect the Use of ICT in Nursing Profession in Ebonyi State Nigeria." *Journal of Information Engineering and Applications*3 (11): 61–67. https://www.iiste.org/Journals/index.php/JIEA/article/view/8489.

Ortiz, E., G. Meyer, and M. Burstin. 2002. "Clinical Informatics and Patient Safety at the Agency for Health Care Research and Quality." *Journal of American Medical Informatics Association* 9 (6): 2–7. https://doi.org/10.1197/jamia.M1216.

Oye, N. D., A. Iahad, and N. Ab Rahim. 2012. "A Comparative Study of Acceptance and Use of ICT among University Academic Staff of ADSU and LASU: Nigeria." *International Journal of Engineering and Technology* 2 (1): 103–115.

Polašek, O., and I. Kern. 2012. "Medical Informatics across Europe: Analysis of Medical Informatics Scientific Output in 33 Europeans Countries." *Informatics for Health and Social* Care 37 (1): 12–22. https://doi.org/10.3109/17538157.2011.590256.

Putzer, G. J., and Y. Park. 2010. "The Effects of Innovations Factors on Smartphone Adoption among Nurses in Community Hospitals." *Perspectives in Health Information Management* 7 (1).

Ranking Web of Universities. 2014. Accessed August 13, 2014. http://www.webometrics.info/en/Ranking_africa.

Ruxwana, N. L., M. E. Herselman, and D. P. Conradie. 2010 "ICT Application as e-health Solutions in Rural Healthcare in the Eastern Cape Province of South Africa." Health Information Management Journal 39 (1): 1–12. https://doi.org/10.1177/183335831003900104.

Schaper, L. K., and G. P. Pervan. 2007. "ICT and OTs: A Model of Information and Communication Technology Acceptance and Utilisation by Occupational Therapists." *International Journal of Medical Informatics* 76 (1): 212–221. https://doi.org/10.1016/j.ijmedinf.2006.05.028.

Smart, P., C. Pearce, and N. J. Tonukari. 2004. "E-publishing in Developing Economies." *Canadian Journal of Communication* 29 (3).

South Africa Infor. 2012. "Healthcare in South Africa." https://www.brandsouthafrica.com/south-africa-fast-facts/health-facts/health-care-in-south-africa.

Staggers, N., and C. B. Thompson. 2002. "The Evolution of Definitions for Nursing Informatics: A Critical Analysis and Revised Definition." *Journal of American Medical Informatics Association* 9 (3): 255–261. https://doi.org/10.1197/jamia.M0946.

Statistics South Africa. 2013. "Statistical Release: Mid-year Population Estimates." https://www.statssa.gov.za/publications/P0302/P03022013.pdf.

Tamblyn, R., A. Huang, Y. Kawasumi, G. Bartlett, R. Grad, A. Jacques, M. Dawes, M. Abrahamowicz, R. Perreault, L. Taylor, N. Winslade, L. Poissant, and A. Pinsonneault. 2006. "The Development and Evaluation of an Integrated Electronic Prescribing and Drug Management System for Primary Care." *Journal of the American Medical Informatics Association* 13 (2): 148–159. https://doi.org/10.1197/jamia.M1887.

UCH (University College Hospital). 2011. "Rebirth of Excellence." Accessed July 5, 2014. http://uch-ibadan.org.ng/sites/default/files/Rebirth_of_Excellence.pdf.

University of Southampton. 2014. "HLTH6 Health Care Informatics. https://www.southampton.ac.uk/cruk/ciru/index.page.

Venkatesh, V., and F. David. 2000. "A Theoretical extension of the Technology Acceptance Model: Four Longitudinal Field Students." *Management Science* 46 (2): 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926.

Venkatesh, V., M. G. Morris, G. B. Davis, and F. D. Davis. 2003. "User Acceptance of Information Technology: Toward a Unified View." *MIS Quarterly*27 (3): 425–478.

Vogd, W. 2004. "Ärztliche Entscheidungsprozesse des Krankenhauses im Spannungsfeld von System- und Zweckrationalität: Eine qualitativ rekonstruktive Studie unter dem besonderen Blickwinkel von Rahmen ("frames") und Rahmungsprozessen." VWF. https://www.vwf.de/autoren/3-89700-404-6.php3.

Wang, C. J., M. H. Patel, A. J. Schueth, M. Bradley, S. Wu, J. C. Crosson, P. A. Glassman, and D. S. Bell. 2009. "Perceptions of Standards-based Electronic Prescribing Systems as Implemented in Outpatient Primary Care: A Physician Survey." *Journal of American Medical Informatics Association* 16 (4): 493–502. https://doi.org/10.1197/jamia.M2998.

Whittaker, L., J. van Zyl, and A. S. Soicher. 2011. "What is the Point-of-Care? A Case Study of User Resistance to an E-Health System." *Telemedicine Journal and e-Health* 17 (1): 55–61. https://doi.org/10.1089/tmj.2010.0008.

Wong, I. A., and L. D. A. Dioko. 2013. "Understanding the Mediated Moderating Role of Customer Expectations in the Customer Satisfaction Model: The Case of Casinos." *Tourism Management* 36: 188–199. https://doi.org/10.1016/j.tourman.2012.10.010.

Wootton, R., N. G. Patil, R. E. Scott, and K. Ho. 2009. *Telehealth in the Developing World*. London: Royal Society of Medicine Press.

WHO (World Health Organization). 2000. "Health Systems: Improving Performance." Accessed July 4, 2015. http://www.who.int/whr/2000/en/

WHO (World Health Organization). 2005. "Connecting for Health: Global Vision, Local Insight: Report for the World Summit on the Information Society." Geneva: WHO. http://www.who.int/ehealth/resources/wsis_report/en/.

WHO (World Health Organization). 2007. "The World Health Report 2007 – A Safer Future: Global Public Health Security in the 21st Century." Geneva: WHO. http://www.who.int/whr/2007/en/.

Wright, E., and J. Marvel. 2012. "Electronic Health Records: Postadoption Physician Satisfaction and Continued Use." *The Health Care Manager* 31 (3): 259–267. https://doi.org/10.1097/HCM.0b013e3182619e90.