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Investigating the Receptiveness Attitude of the Patient With Diabetes Retinopathy Towards the Use of Teleophthalmology

Chiemelie Benneth Iloka, Enugu State University of Science and Technology, Nigeria
https://orcid.org/0000-0003-4892-116X

Idongesit Aniekan Ekpo, Cyprus International University, Cyprus

Husam Rjoub, Department of Accounting and Finance, College of Administrative Sciences and Informatics, Palestine Polytechnic University, Hebron City, West Bank, Palestine*
https://orcid.org/0000-0001-6536-8971

Kolawole Iyiola, The University of Mediterranean Karpasia, Cyprus

Jamiu Adetola Adetola Odugbesan, Cyprus West University, Cyprus

ABSTRACT

Research on the attitude of diabetes retinopathy's (DR) patients towards teleophthalmology as a branch of telemedicine has not been examined in developing countries. This article examines the receptiveness attitude of the patients with DR towards the use of teleophthalmology using 400 questionnaires to examine patients in Calabar DR screening center in Cross River State, Nigeria. The hypotheses were tested using multiple indicators multiple causes (MIMIC) as a special case of the structural equation modeling (SEM). The findings in this study indicated high cost and excess time negatively affects patient attitude, information, knowledge, and experience significantly and positively predict patients attitude towards teleophthalmology. Furthermore, the result of the paper shows that convenience and knowledge for 35.7 percent of the receptiveness of patients towards teleophthalmology. This study contributes by identifying that among other factors positive factors to enhance patient's receptive attitude to being diagnosis with diabetes retinopathy through telemedicine.

KEYWORDS

Calabar, Diabetes Mellitus, Diabetes Retinopathy, Nigeria, Patients, SEM

INTRODUCTION

The international diabetes federation has forecast that about 642 million persons worldwide will be battling "Diabetes mellitus" (DM) by 2040, considering that the last decades have shown an increase in the number of individuals with Diabetes mellitus peaking at over 400 million people around the globe. More than 50 percent of these cases will suffer complications, resulting in diabetes retinopathy

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*Corresponding Author

(DR). Therefore, most of the world's population are at risk of blindness in the next 20 years. The main category of the world population that will be affected most is composed of the global working class, thereby threatening the health state of the ablest and willing to work all around the world (Aguiree et al., 2013). According to the WHO, 15-17 percent of the cases of blindness worldwide are caused by diabetic retinopathy (World Health Organization, 2006). The prevalence and severity of DR are at 34.6 percent of any blindness; hence, it necessitates quick detection and evaluation for the patients to mitigate visual impairment risk (Shi et al, 2015).

In Africa, Diabetes mellitus (DM) is a common multifactorial health problem with contributing factors include hereditary, nutrition and lifestyle issues and often results in severe complications.

Diabetes mellitus (DM) becomes diabetes retinopathy (DR) when not quickly diagnosed and treated, which is a complicated stage of Diabetes mellitus which causes damage to the eye resulting in blindness as a result of the blockade in the blood vessels (Sabanayagam et al., 2019). In dealing with DR, telemedicine has been introduced in vision treatment which is regarded as teleophthalmology. Hence, technology has gradually taken a significant place in the health sector, just like business, finance, communication, and academics (Rathi et al., 2017). However, in Nigeria, the healthcare sector is yet to experience the same technological advancement level in other countries over time. Considering the rise in pressure on physical facilities in Nigerian health facilities, the need for remote vision healthcare provision through technology has been identified as a need in this sector. Some state and municipality governments have begun to provide technical facilities that can improve the healthcare sector. The Cross-River State government is one of the leading administrations that had engaged in providing such advanced healthcare (Edi et al, 2017). The government established this screening center to be able to provide early detection of DR in the community.

The attitude of patients who are to benefit from the teleophthalmology facilities will affect the government and doctors' ability to fight diabetic retinopathy (Das et al, 2015). However, the level of receptiveness of the patients to teleophthalmology in Nigeria needs investigation; otherwise, DR will remain prevalent in the country. Previous studies have shown that Nigerian doctors are not recommending teleophthalmology to their patients because of their limited knowledge about the technology. Apart from this perspective, the reason patient does not utilize teleophthalmology facilities in Nigeria is not included in the literature. (Obotu, 2019).

This study will focus on understanding the factors that affect the attitude of diabetic retinopathy patients by examining several prevalent factors identified in previous studies. A conceptual model is built upon the prevalent variable to examine DR patient's attitudes in the Cross-River State. This article will show the relationship between the patient's attitudes as outcomes and the variables that account for the attitude of DR patients (independent variables) in the Cross-rivers state in Nigeria.

VARIABLES ON PATIENT'S ATTITUDE TOWARDS TELEOPHTHALMOLOGY

Cost

Regarding factors that affect patients' attitudes, Avidor et. al., (2020) study presented that telemedicine has the potential of cost-effectiveness. This effect occurs mostly in developing countries with low-income populations and rural patients who do not have easy access to transportation. The developing countries included in their study are India, Brazil, and South Africa (Mohanan et al., 2017). These previous studies suggested that providing teleophthalmology in the context of primary health care office might reduce the cost implication but this does not necessarily reduce the high cost of the service, considering the main goal of primary healthcare is to make health services available to the local and grassroot. Further, Nigeria as a developing country was not including in these studies, despite its significance in Africa. Meanwhile, Momoh et. al. (2020) has reflected that physicians are unwilling to recommend telemedicine due to its financial implication on the poor patients and the availability of the service. The barrier of service availability contributed to the financial cost that

affects patients because the Nigerian healthcare system does not post physicians to remote locations to provide teleophthalmology services in remote areas. Instead, the patients are expected to travel to the teleophthalmology center. Thereby increasing the cost of getting the service on the side of the patients. The economies of scale on the side of healthcare managers by assembling all patients in one location is what takes place in Nigeria but results in high cost. Given the above, we hypothesize that:

H1: The cost of getting teleophthalmology positively and significantly impacts patients' receptiveness towards telemedicine/teleophthalmology.

Waiting Time

Momoh et al. (2020) research on time factor show that waiting time online before being attended to by ophthalmology is a barrier to telemedicine because of the state of the developing the technology in developing countries. This includes limited internet availability or slow Internet speed and a limited number of testing devices. Physicians have identified this as reasons why they are reluctant to recommend teleophthalmology to their patients in addition to the limited number of specialists. Therefore, it is argued that the physical traffic in eye hospitals has been moved online in telemedicine. Also, telemedicine needs decongestion not by rejecting the technology but by expanding the facility's space for more effectiveness. Hence, we hypothesize that:

H2: The duration it takes to get tested is positively and significantly related with patients' receptiveness towards telemedicine/teleophthalmology.

Convenience

According to some American studies, the eye examination takes the patients out of their remote community to a distant location of the dilated eye exam. This involves the patients traveling and using transportation means which also adds to time spent before getting to the eye clinic to use teleophthalmology services since doctors are not posted to remote areas in developing countries. (Ting, 2017). A factor that contributes to convenience is the ease of use of the technology, which is how quickly the doctor can navigate the teleophthalmology technology or how quick the patient can receive instructions and guides that support administering an eye test. This is connected to the knowledge available of teleophthalmology which aids early detection of diseases and visual symptoms by the technicians and ophthalmologist who sends pictures and photographs of the State of the eye (Newton, 2014).

Recommendation as a Result of Effectiveness and Accuracy of the Teleophthalmology

Another discussed factor is telemedicine technology's effectiveness, which is connected to the usage of equipment by the clinicians (Gupta, Sinha & Dagar, 2013). They vary according to accuracy and what they produce through the knowledge of the ophthalmologist. Some have argued that the variability is observable in varying levels of competence to capture digital photos of the retina. This variation in telemedicine produced for the vision also results in variation in attitude among patients. Also, this variation might occur among physicians who do not know how to maximize the use of the equipment to produce quality images. As a result, patients are reluctant to recommend teleophthalmology to each other (Shi et al, 2015). Therefore, we hypothesize that:

H3: The recommendation of teleophthalmology is positively and significantly related with receptiveness of patients towards telemedicine/teleophthalmology.

Information and Knowledge

Ramchandran et. al. (2020) presented that the information and knowledge about the effectiveness of telemedicine/teleophthalmology, especially in developing countries encourages patients to use the service which is one of the factors that defines the patients' attitude. Necessary information on this type of eye care and examination, i.e., teleophthalmology, would encourage, especially less-educated populations, to decide on the use of telemedicine to address Diabetes among patients. This will mitigate the clients' doubts about this technology (Ramchandran et. al., 2020). It is presented that patients expect the satisfaction and quality of services from telemedicine to be more than the use of conventional testing to switch to the use of teleophthalmology. Therefore, more information about the technology will reshape their expectation to suit achievable reality, building patient trust and a positive attitude toward telemedicine (Collon et. al., 2017). To fill in the knowledge gap, educating the patient on the value of teleophthalmology can occur when they visit the doctor for a face-to-face eye examination, especially among less educated or underserved regions. Therefore, we hypothesize the following:

H4: Information on access to teleophthalmology is positively and significantly related with receptiveness of patients towards telemedicine/teleophthalmology.

H5: Knowledge of telemedicine/teleophthalmology is positively and significantly related with receptiveness of patients towards telemedicine/teleophthalmology.

Experience Regarding the Service and Quality in Physical Facilities

Sun et al. (2020) research on availability, emphasized the burden that healthcare facilities experience due to overcrowding of visiting patients. In developing countries, facilities in public hospitals often exceed their limits due to huge population they serve. Subsequently, these healthcare facilities become overused, while the maintenance has been a difficult problem. From this standpoint, Tang et al. (2017) emphasized that telemedicine/teleophthalmology provides a solution to these difficulties, because eye deficiencies and blindness can be diagnosed and treated remotely. With teleophthalmology, scheduling is done through the data collection system which arranges patients' application while applying for the service. While the access to teleophthalmology is limited in developing in developing countries, it is reasonable to infer that patients' experience of such technology could increase its use. There it is hypothesize that:

H6: The experience of teleophthalmology is positively and significantly related with receptiveness of patients towards telemedicine/teleophthalmology.

Personal Relationship With the Ophthalmologist

Magyar-Ruseell et al (2008) argued that interaction with the ophthalmologist in face-to-face testing is higher than in the use of teleophthalmology. Telemedicine is providing the capturing of the retina while patience waits to receive treatment meanwhile face-to-face testing almost provides treatments or at least recommendations immediately. Besides, service outcomes is the main indicator of the quality of service which is also affected by the physician-patient relationship. Other authors have argued that this interaction produces the same quality result in conventional testing and teleophthalmology. Nevertheless, this study will examine the possible high and low levels of receptiveness among several telemedicine patients despite the quality of relationship and service that take place using both methods (Etim, 2018). Given this argument, it is hypothesized that:

H6: Personal Relationship with the ophthalmologist is positively and significantly related with receptiveness of patients towards telemedicine/teleophthalmology.

Confidentiality of the Patient's Health Details

The study of Wu et al (2010) examined confidentiality factor on the real-time examination of patients waiting at a center to be diagnosed through teleophthalmology. The center has set up several interacted channels by with the patient can be practically diagnosed. Nevertheless, the patients' expression shows their desire to receive their diagnosis confidentially in the sense that the patient's identity and other details are not expected to be disclosed to any third party (Dove et al., 2019). This is like other health record ethics where doctors do not inform the third party about the patient's health issues without the patient's consent. As a result of these demands, the center was prompted to set up a very secure communication network between the patient and the teleophthalmology and to ensure that the test devices are not interruptible by a third party. The case argued is that the patient's perception of the confidentiality and protection of their information by the technology, despite the provision and assurance by the service providers, has not changed over the years in developing communities. This proposition leads to:

H8: Confidentiality in the use of teleophthalmology is positively and significantly related with patient's receptiveness towards telemedicine/teleophthalmology.

RESEARCH METHODOLOGY

Cross River is in Nigeria, a developing country with a higher risk of diabetics that are disproportionate (Momoh & Agweye, 2017). Statistics have shown the prevalence of blindness, and visual impairment in Nigeria with a survey of Cross-river State having 2500 registered cases the State's screening center of Diabetes with only 25 percent has been tested for DR which is lower than the 80 percent of the local targets (Enang et al, 2014).

Permission and Consent

The study was carried out at the Cross River State's Diabetic Retinopathy Screening and Treatment Service (DRSTS) with the center's permission and the patients' consent with the assurance of the confidentiality of their information. This has been reflected in the questionnaire that was used in the data collection.

Data Collection

To collect data that are reliable to the study questions, the primary data collection method after the literature has been examined as a form of the secondary source that provides a foundation for this study. Primary data includes the use of a questionnaire sectioned into four sections that test receptiveness, variables affecting receptiveness, a special section focused on the teleophthalmology and tele-ophthalmologist interaction with the patient and the experience expectation. The questionnaire's source is the study of Valikodath et al (2017) on patient attitudes towards diabetic retinopathy in the United States, and their questionnaire was adopted because of the vastness. Each construct has been measured using at least 2 to 3 items to effective measurement. The cost was measured using 3 items, Convenience was measure with 3 items, Recommendation was measure with 3 items, information was measure with 3 items, Knowledge measure with 3, Experience was measure using 3, Time was measured using 3; Personal relationship was measure using 3 and Confidentiality was measured using 2. These questions have been set giving the patient the Likert scale from 1- 5 (1 strongly disagree, 2 disagree, 3 uncertain, 4 agree and 5 strongly disagree) pattern to select their answers.

The sample size in the study is therefore calculated using the automated formulae provided by Raosoft calculators; hence the recommended sample size is 384.

Subsequently, to ensure achieving the required sample size, four hundred and ten (410) questionnaires were administered to the patients in Calabar diabetes retinopathy screening center in

Cross River State throughout December 2020, using purposive sampling techniques. The descriptive statistics of the respondents are presented in Table 1. The demographic information of the respondents is illustrated in Table 1. Table 1 shows information such as age, gender, duration of Diabetes, and diabetic therapy of the respondents. Four hundred and three (403) respondents completed the survey. The result shows the majority of the respondent to be male (54.84%), while female respondents account for (45.16%). In addition, of the 403 respondents, only 190 (47.15%) had heard about telemedicine before the survey, while the majority 213 (52.85%) had not.

The result reveals that 366 (90.82%) of the 403 respondents have had prior eye examination, while 9.18% never had their eyes examined before. The majority of the respondents 266 (66.8%) had been using Cross River Diabetic Retinopathy Screening between one and two years, while 137 (33.2%) had been using the screening for at least three years and above.

ANALYSIS AND RESULTS

Statistical Process for Social Science (SPSS) software edition 26.0 and AMOS 24.0 were used for data analysis. SPSS 26.0 analyses the characteristics of the respondents, descriptive statistics, and correlation (relationship among constructs). AMOS 24.0 was used to test the construct validity and reliability of the observed variables, and structural equation modeling was used to test hypotheses.

Measurement Model

A confirmatory factor analysis (CFA) was performed to test the validity of the observed constructs. Six items with less than 0.6 factor loadings were removed from the scale, which is consistent with the assumption of (Kline, 2014). The items' factor loadings are illustrated in Table 2, all above the recommended threshold of 0.6.

Table 1. Demographic Information of the respondents (n=403)

Variables	Category	Frequency (n)	Percentage (%)
Age (years)	18-25	44	10.92
	26-30	77	19.11
	31-35	45	11.17
	36-40	152	37.72
	40 and above	85	21.08
Gender	Male	221	54.84
	Female	182	45.16
Duration of Diabetes	1-2	55	13.65
	3-4	80	19.85
	4-5	83	20.60
	6-7	114	28.29
	8 and above	71	17.61
Diabetic therapy	1-2	266	66
	3-4	100	24.81
	4-5	25	6.20
	6-7	10	2.48
	8 and above	2	0.50

Reliability refers to the consistency of the measurement items. In this study, Cronbach alpha was used to establish the internal consistency for each of each construct. Cronbach alpha was conducted to check the reliability of the measurement items. As illustrated in Table 2, Cronbach alpha values of all the observed constructs adopted in the current study ranged from 0.741 to 0.944. All were above the recommended threshold of 0.7, suggesting the measurement items had satisfactory internal consistency and reliability.

Validity is the extent to which the measurements adopted capture the variables they are measuring. A confirmatory factor analysis (CFA) was performed to test the validity of the observed constructs. Using CFA results, both average variances extracted (AVE) and composite reliability was estimated and used to calculate convergent validity. Nunnally (1978) and Fornell & Larcker (1981) suggested that AVE's convergent validity should be greater than 0.5 and CR should be larger than 0.7. As illustrated in Table 2, AVE ranged from 0.537 to 0.704, and CR ranged from 0.790 to 0.876. All observed constructs were greater than the recommended thresholds, indicating acceptable convergent validity.

Finally, discriminant validity was checked by comparing the square root of AVEs for each construct with the surrounding correlations. As shown in Table 3, all the square root of AVEs in diagonal parentheses was greater than the off-diagonal correlations, indicating acceptable discriminant validity (Fornell & Larcker, 1981).

The proposed hypotheses were tested using MIMIC (Multiple indicators multiple causes) SEM model in AMOS. The MIMIC model is a special case of SEM and involves adopting latent variables that are predicted by observed variables; it consists of two portions, 1) a measurement model which defines the association between the latent variable and its indicator, 2) a structural model which indicates the causal associations between latent variables and explains the causal effects (Joreskog & Sorbom, 1996). The MIMIC model was very useful in the current study because it takes into account additional variables (knowledge of technology and its convenience) which are assumed to impact the latent variable (Receptiveness of patient towards telemedicine/teleophthalmology). Consequently allows hypotheses testing on the direction of effects among different latent variables (i.e. knowledge of technology, personality relationship with ophthalmologist, recommendation, Information, experience, Information, experience, time, confidentiality, and receptiveness of patient towards telemedicine/ teleophthalmology). Thus, patients' attitudes towards telemedicine/teleophthalmology were measured by their perception of convenience and technology knowledge.

As illustrated in Table 4, the results revealed that cost H1(β=.105, S.E.=.084, $p < .05$) and time H2 (β=.131, S.E.=.059, $p < .05$) has positive and significantly predicted patient towards telemedicine/teleophthalmology respectively. Similarly, information H4 (β=.141, S.E.=.061, $p < .05$), and knowledge of teleophthalmology significantly and positively predicted receptiveness of patient towards telemedicine/teleophthalmology (β=.182, S.E.=.076, $p < .05$), thus validating H5. Experience H6 (β=.256, S.E.=.072, $p < .001$) and Personal relationship with ophthalmologist H7 (β=.119, S.E.=.056, $p < .05$), had a positive and significant relationship with patient towards telemedicine/teleophthalmology, they are accepted, hence supporting H1, H2, H4, H5, H6 and H7. The relationships between recommendation H3 (β=.0.05, S.E.=.030 $p > .05$) and confidentiality H8 (β=.105, S.E.=.084, $p > .05$) and receptiveness of patient towards telemedicine/teleophthalmology were rejected, as a result of the non-significance of their coefficients.

In addition, the square multiple correlation (R^2) result within the measurement portion is .357. This indicates that both predictors (convenience and knowledge of technology account for 35.7% of inpatient receptiveness toward telemedicine/teleophthalmology (Figure 1). Path analysis results of hypothesized relationships.

For the goodness of fit indices, it was recommended that CMIN/DF < 3, CFI and NFI > .90, AGFI, > .85, GFI > .90 and RMSEA <.08) are well above thresholds (Hu and Bentler, 1999), thus demonstrating a n excellent fit between MIMIC SEM model and data collected.

Table 2. Reliability and Validity Assessment

Constructs	Measurement items	Factor loadings (λ)	AVE	CR
Knowledge of teleophthalmology	($\propto$ =0.774)			
	KT1	.607	.586	.806
	KT2	.782		
	KT3	.882		
The personal relationship with an ophthalmologist	(μ=0.884)			
	PR1	.758	0.620	.864
	PR2	.860		
	PR3	.892		
	PR4	.608		
Cost of getting teleophthalmology	($\propto$ =0.944)			
	CT1	.782	.704	.876
	CT2	.803		
	CT3	.925		
Recommendation	($\propto$ =0.822)			
	REC1	.853	.653	.848
	REC2	.710		
	REC3	.852		
Information on access to teleophthalmology	($\propto$ =0.869)			
	IN1	.611	.621	.865
	IN2	.792		
	IN3	.831		
	IN4	.890		
Experience in using teleophthalmology	($\propto$ =0.794)			
	EX1	.774	.537	.822
	EX2	.802		
	EX3	.662		
	EX4	.684		
The time it takes to get tested.	($\propto$ =0.782)			
	TE1	.698	.560	.790
	TE2	.681		
	TE3	.853		

continued on following page

Table 2. Continued

Constructs	Measurement items	Factor loadings (λ)	AVE	CR
Confidentiality	($\propto$ =0.902)			
	CON1	.803	.602	.819
	CON2	.819		
	CON3	.701		
Knowledge of technology	($\propto$ =0.741)			
	KTH1	.607	.582	.843
	KTH2	.614		
	KTH3	.896		
	KTH4	.883		
Convenience	($\propto$ =0.916)			
	COV1	.850	.614	.826
	COV2	.779		
	COV3	.716		

Note: 1) KT=knowledge of teleophthalmology; PR= Personal relationship with ophthalmologist; CT= Cost; REC= Recommendation; IN=Information; EX= Experience TE= Time; CON= Confidentiality KTH; Knowledge of technology; COV=Convenience 2) μ=Cronbach alpha; AVE= Average variance extracted; CR= Composite Reliability

Table 3. Discriminant validity of constructs

Constructs	KT	PR	CT	REC	IN	EX	TE	CON	KTC	COV
KT	**(.765)**									
PR	.206	**(.787)**								
CT	.136	.121	**(.839)**							
REC	-.035	.089	-.024	**(.808)**						
IN	.077	.166	.084	-.03	**(.788)**					
EX	.154	.137	.019	.091	.073	**(.733)**				
TE	.048	.061	.060	.012	-.043	.418	**(.748)**			
CON	-.212	.052	.052	.013	.425	.367	.318	**(.776)**		
KTH	.029	.066	.066	.069	.314	.206	.127	.130	**(.724)**	
COV	.067	.091	.091	.017	.145	.209	.062	.069	.015	**(.763)**

Note: Boldface in bracket indicates that the square root of AVEs are greater than the off-diagonal correlations.

DISCUSSION

The increase in the number of people suffering from "Diabetes mellitus" (DM) calls for concern, especially in a developing country like Nigeria, requiring urgent measures to address the challenge. Telemedicine or teleophthalmology has been introduced as one of vision treatment measures, and it is already receiving considerable attention in the health sector. Therefore, sufficient knowledge in respect of the receptiveness of the people towards this treatment becomes imperative. Hence,

Table 4. Structural equation modeling of the hypothesized model

Hypothesized relationships	Path coefficient (β)	S.E.	p	Outcome
H1: CT ⟶ RPT	.105	.084	.021	Accepted
H2: TE ⟶ RPT	.131	.059	.028	Accepted
H3: REC ⟶ RPT	.005	.030	.863	Rejected
H4: IN ⟶ RPT	.141	.061	.020	Accepted
H5: KT ⟶ RPT	.182	.076	0.16	Accepted
H6: EX ⟶ RPT	.256	.072	.000	Accepted
H7: PR ⟶ RPT	.119	.056	.035	Accepted
H8: CON ⟶ RPT	-.015	.050	.762	Rejected

KT=Knowledge of technology; PR=Personality relationship with ophthalmologist; CT=Cost; REC= Recommendation; IN= Information; EX= Experience; TE= Time; CON= Confidentiality; RPT= Receptiveness of patient towards telemedicine/teleophthalmology; SE= Standard error

Figure 1. Path analysis results of hypothesized relationships

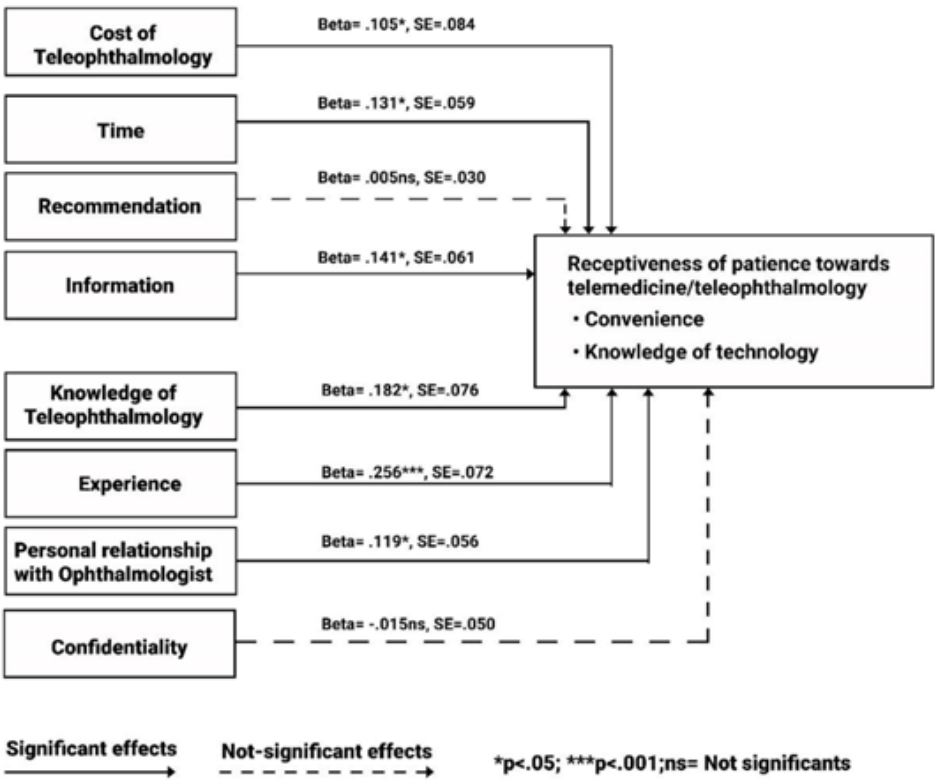

Table 5. Model fit indices of the research model

Modelfit indices	CMIN	DF	CMIN/DF	NFI	CFI	AGFI	GFI	RMSEA
Goodness of fit	19.915	13.097	1.532	.911	.968	.931	.970	.036

CFI = Comparative Fit, RMSEA = RootMean Square Error of Approximation; GFI= goodness of fit index; comparative fit index; NFI = Normed Fit Index; AGFI=adjusted goodness of fit index

the study aims to examine several factors that could influence teleophthalmology's receptiveness among the patient with "diabetes retinopathy" (DR). A structured questionnaire was used to collect information on these factors from selected patients at Calabar diabetes retinopathy center in Nigeria and employed AMOS (CB-SEM) for the hypotheses testing.

This study hypothesized that cost, waiting time, recommendation from an expert, information and patient knowledge on teleophthalmology, their experience, personal relationship with the ophthalmologist, and their confidentiality will positively influence the receptiveness of people towards teleophthalmology in Nigeria. Our findings indicate that only cost, waiting time, information and knowledge, experience, and personal relationship with ophthalmologists were positive and significantly influence people's receptiveness towards teleophthalmology. Meanwhile, the significant factors were found to have about 35.7% explanation variation in people's receptiveness towards teleophthalmology, which indicates that some other factors still account for the receptiveness towards teleophthalmology that requires further investigation.

The significance of cost as a factor influencing receptiveness towards teleophthalmology is congruent with some previous studies' position (Aviodor et al. 2020; Momoh et al. 2020; Torres, 2018). This implies that the cost implication of accessing telemedicine is being put into consideration by the patients. For instance, Aviodor et al. (2020) asserted that cost implication is a significant factor in telemedicine, especially in developing countries like Nigeria. A similar view was shared by Momoh et al. (2020), who posited that the cost implication of telemedicine could create a barrier for teleophthalmology. The findings on the significance of other factors are consistent with previous studies. For instance, waiting time is a significant factor in patient receptiveness towards teleophthalmology (Momoh et al. 2020); the significance of information and knowledge (Ramchandran et al. 2020); experience (Sun et al. 2020); and personal relationship with an ophthalmologist (Etim, 2018; Valikodath et al. 2017).

This study's implications are for the policymakers in Nigeria to formulate health policy that will focus more on the awareness of diabetic retinopathy disease in Nigeria and enlightenment campaign on teleophthalmology. Health professionals should devise an effective strategy for counseling patients with diabetes to reduce the number of people suffering from diabetes retinopathy. Moreover, the Nigerian government should improve the people's access to health care, especially those with limited access.

Though this study contributes significantly to the literature on factors influencing people's receptiveness towards teleophthalmology in Nigeria and developing countries as an extension, it is not devoid of limitations. The main limitations lie in the non-inclusion of people outside the health care facilities in Calabar and the use of convenient sampling techniques. These limitations limit the generalization of these findings; thus, future studies should enlarge the study's scope to cover more states in Nigeria and include people outside the health care facilities. Moreover, the investigation of the patients' demographic characteristics as moderating factors will be an interesting area to explore in future studies.

CONCLUSION

The statistics about the impending diabetes mellitus crisis as predicted by the international diabetes federation should trigger research and action according to mitigating diabetic retinopathy. Therefore,

policymakers should ensure that the designed teleophthalmology programs should focus more on the patient's affordability and accessibility, especially those at the lower economic strata who would be more receptive to teleophthalmology. Most African countries are within the low strata of the global economy, and the cost of teleophthalmology remains a challenge in those societies. Nigeria is one of the most developing countries where factors such as cost and accessibility to healthcare should be addressed. Although physicians' attitude has been investigated in previous studies, the development of telemedicine in Nigeria requires understanding the patients' attitude towards teleophthalmology, which would assist the government in developing, improving, and sustaining the teleophthalmology program in the country. However, the poor technological development of the healthcare sector necessitates the study on teleophthalmology. High cost and excess time spent in getting teleophthalmology are discouraging to patients. While policymakers attempt to provide accessibility, information, and knowledge about teleophthalmology should also be increased in Nigeria.

CONFLICT-OF-INTEREST STATEMENT

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Idongesit Aniekan Ekpo was born on the 15th of February, 1982 in Calabar, Cross River State, Nigeria to Aniekan Udo Ekpo (Mr) And Eno Aniekan Udo Ekpo(Mrs). One is deceased and one still alive. My mom died at the age of 58 due to diabetes complications. My childhood was a typical middle class environment circa the 1980's. I was born in a family with two other siblings, I had a happy, normal childhood as the last child of my parent. Mr. Idongesit Aniekan Ekpo is a Health Care provider and Humanitarian. He is an alumnus of several distinguished universities, holding a Bachelor of Medical Science in Medical Biochemistry from University of Calabar, and a Master degree in Health Care Organization Management from Cyprus International University. He is a distinguished member of Red Cross Society, Organization for Aging and Health Support and affiliated with numerous Humanitarian and Health Organization. He is happily married to Glory Agnes Ekpo.

Kolawole Iyiola is currently an independent researcher, has a PhD in business administration at the Cyprus International University, TRNC.

Jamiu Adetola Odugbesan hold a PhD in Business Administration from Cyprus International University. He is a researcher with several published articles in reputable indexed journals to its credit. He is interested in Development Economics, General Management, Health Economics, Energy and Environmental Economics, and Sustainable Development.