

## The Knowledge, Perception and Utilisation of E-Health among Health Workers in Benin City, Nigeria

\*Gani Olugbenga Owoeye<sup>1</sup>, Joy Chinyere Nwaogwugwu<sup>2</sup>, Ewere Scholastica Ehinze<sup>2</sup>

<sup>1</sup>Center for Disease Control, University of Benin, Benin City, Nigeria. <sup>2</sup>Department of Public Health and Community Medicine, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria.

### Abstract

**Background:** The aim of this study was to determine the perspective and utilization of e-Health services among healthcare workers in primary, secondary and tertiary health care centers in Benin city.

**Methodology:** This was a descriptive cross sectional study conducted among healthcare workers in Benin-City where the minimum sample size required for the study was calculated using the Cochrane formula ( $n = zp^2q/d^2$ ). Data was collected using an online semi structured questionnaire and data analysis was carried out using IBM SPSS version 22 software with  $p < 0.05$  considered statistically significant.

**Results:** A total of 340 respondents participated in this study where the mean age was  $31.5 \pm 7.1$  years and majority of the respondents 327 (96.2%) had good knowledge of eHealth whereabout two third 216 (63.5%) of the respondents had ever used eHealth services. Majority 308 (90.6%) of the healthcare workers highlighted non-availability of ICT facilities as a challenge to the implementation and utilization of eHealth services. Proposed solutions to the above challenges include government support/funding 206 (60.6%) and ICT education 186 (54.7%)

**Conclusion:** The lack of ICT facilities was stated as the main challenge to the implementation and utilization of eHealth services although majority of the respondents had good knowledge of eHealth. Proposed solutions to the challenge include government support/funding, free ICT education of health workers and Public Private Partnerships to support eHealth systems in health facilities.

**Keywords:** Electronic Health; ICT; Health Care Workers; Benin City.

### Introduction

Electronic Health (eHealth) is the use of Information and Communication Technologies (ICTs) in the support of health in order to improve the efficiency and effectiveness of healthcare management and delivery.<sup>1, 2</sup> eHealth has revolutionized the practice of medicine via three distinct functions; the use of eHealth technologies to observe and study health parameters, the use of eHealth to facilitate communication between all healthcare participants and, data utilization including referrals and medical data sources to inform medical decision-making and intervention development.<sup>3</sup> eHealth has become crucial for

modern healthcare systems worldwide and covers a wide variety of applications and services. These include electronic health records to ensure continuity of patient care across time, consumer health informatics to support individuals in health decision making, eLearning and health research by health workers, telemonitoring and telemedicine-related services. These telemedicine-related services refer to the virtual ICT-supported

**Corresponding Author:** \*Gani Olugbenga Owoeye  
Center for Disease Control, University of Benin,  
Benin City, Edo State, Nigeria.  
ganigbenga@gmail.com

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provision or support of health services by the collection of data on health conditions of patients. Tele-medicine related services include mobile health (mHealth) services, computerized physician order entry, ePrescribing, clinical decision support system, electronic medication overview and virtual health care teams.<sup>4,6</sup>

These online opportunities have been identified as a means to better enable health care providers with the expert management of patients without face-face contact. eHealth improves health surveillance, health system management, health decision making, standardised sharing of health information and promotes equity in healthcare delivery. It has potentials for online health education, expanding the scope of healthcare delivery, health compliance, follow-up and appointments. eHealth is an essential requirement for success in healthcare management and delivery worldwide as it enhances the access of healthcare professionals to health information in order to optimize health interventions outcomes.<sup>1</sup> Studies in the United States of America on the benefits of eHealth in public and private health care delivery organizations across rural and urban settings revealed that there were 50%-80% reduction in medication error rates; >15% reduction in laboratory and diagnostic imaging tests due to online access to results and 30% increase in use of formulary and generic drugs. Other findings from the study include significant reduction in time to refer patients using online scheduling and communication tools; 40% increase in patient screening and preventative health care procedures, and 40% increase in use of standard protocols by physicians.<sup>7</sup>

eHealth technology is not only relevant to high-resource settings as primary care in lower resource settings could also benefit from its use. In these settings, the patient-to-doctor ratio is often high and the average distance to the nearest primary healthcare facility is mostly long. However, with the increasing ownership of mobile phones even in resource challenged communities, there is ample opportunity to improve healthcare using eHealth.<sup>7</sup> Analysis of data from NCC shows a growth in mobile phone penetration in Nigeria from 80.85% in 2012 to 110.38% in 2016,<sup>8</sup> a current estimate of 40 million users with a forecast to grow to more than

140 million users by 2025. This represents a huge potential for healthcare delivery and development via eHealth in Nigeria.

Although e-health has the potential to improve the efficiency and effectiveness of healthcare management and delivery, it has been reported that acceptance of e-health among healthcare professionals is limited despite its critical roles in healthcare practices. Physician resistance to ehealth implementation is reported to be related to fear of, dissatisfaction with and uncertainty over new roles and responsibilities created by the introduction of ehealth systems.<sup>9, 10</sup> Also studies in developing countries have highlighted other drawbacks in implementing e-Health to include the lack of knowledge about ICT, lack of ICT equipment and unreliable ICT equipment. Other drawbacks include high cost of ICT equipment, low skill levels of potential users and limited access to ICT.<sup>1</sup> The effective utilization of eHealth tools may be possible if healthcare professionals have positive attitudes towards e-health and if they possess the skills to use information and communication technology tools in a conducive working environment.<sup>1,2,5</sup>

A systematic review on factors that influence the implementation of eHealth revealed that in selecting an appropriate e-health system; complexity, adaptability, cost and compatibility with existing systems and work practices needs to be taken into consideration.<sup>8,11</sup> The cost of implementing the eHealth system has been recorded as a major barrier. High set-up costs including purchasing and installation costs have been cited as barriers to the initial adoption of e-health systems<sup>8,9</sup>. Adaptability - another major factor influencing the implementation of eHealth- is the ability of the technology to be adapted to fit the local context. In order to overcome the barrier of adaptability, end user input should be considered in the design and development of eHealth technologies.<sup>11,12</sup>

Complexity factors have also be found to influence implementation of systems in healthcare settings. These factors include slow system performance, software and hardware that are difficult to use, the need for extensive software modifications, slow internet speed, connectivity issues and inability of health professionals to master the technologies.

Other factors which have been found to influence implementation and utilization of eHealth systems include healthcare workers attitudes and perceptions. Attitudes and beliefs act as both facilitators and barriers to implementation and acceptance of e-health systems across all e-health domains.<sup>13</sup> Positive staff attitudes can be described as beliefs that the new systems would benefit patients, interest in the technologies, perceived usefulness and motivation in working with the systems. Negative perceptions include beliefs that electronic systems would disrupt the delivery of healthcare; doubts that these systems can improve patient care, clinical outcomes or improve the quality of medical practices; and distrust in the systems.<sup>8-10,13</sup> Specifically, fears over a loss of autonomy, concerns over patient privacy and security being compromised and perceived threats to patient and health professional relationships have been repeatedly reported as barriers to use of eHealth systems.<sup>8, 13</sup> Healthcare professionals' computer skills, abilities and experiences can also influence implementation, acceptance and utilization of e-health systems.<sup>14, 15</sup> An absence or inadequacy of legislation and policies and liability concerns may also hamper the implementation of e-health systems at the organizational and health professional level. The creation of standards, policies and legislation may serve to reduce the concerns of health professionals over patient data safety and professional liability. It would also facilitate the exchange of electronic health information between systems and organizations while maintaining data integrity.<sup>16</sup>

It is therefore not known if health care professionals in Benin city possess good knowledge and have effective use of e-health care delivery. It is also not known if the factors highlighted above influences eHealth care delivery among health care professionals in Benin City. Therefore, it is essential to determine the perspective and utilization of e-Health services among healthcare workers in primary, secondary and tertiary health care centers in Benin City.

### Methodology

The study was conducted across primary, secondary and tertiary health care facilities in Benin-City, the capital of Edo State. There are three main LGAs in

Benin City namely Oredo, Egor and Ikpoba-Okha with a total of 360 registered health facilities.<sup>17</sup> Of these, 293 are designated as primary facilities, 61 as secondary and 6 as tertiary health facilities respectively. Two hundred and eighty (280) of the registered health facilities are privately owned while eighty are owned by the government.<sup>18</sup> The study utilized a descriptive cross sectional study design and was conducted among healthcare workers providing health care services in primary, secondary and tertiary health care centers in Benin City. Study population included doctors, dentists, nurses, physiotherapists, laboratory and record staff in direct contact with the eHealth system who gave consent to participate in the research. Administrative staffs who did not have clinic duties and other non-clinical staffs including cleaners and security personnel were excluded from the study.

The minimum sample size required for the study, was calculated using the formula<sup>19</sup> for single proportions ( $n = \frac{z^2 pq}{d^2}$ ) where n is minimum sample size, z is standard normal deviate set at 1.96 (at 95% confidence interval), p is prevalence value q is 1.0 – p and d is the degree of precision. For the purpose of this study, p was taken as 25.0% which represents the proportion of health care workers that utilized eHealth services in a previous study done in Uganda.<sup>20</sup> After adjusting for nonresponse rate of 10%, minimum sample size calculated was 320 and respondents were scientifically selected using a multistage sampling method. In stage one, each local government in Benin City was considered a cluster. Healthcare facilities were selected from a sampling frame obtained from the National Health Facility Registry where primary, secondary and tertiary health facilities were considered in clusters and thereafter study facilities were selected via proportionate allocation. In stage two, Healthcare workers (HCWs) were stratified according to professional designation, viz: doctors, nurses, physiotherapists, laboratory technicians/scientist etc. Proportionate allocation was used to determine the number of HCWs to be sampled at each level of health facility using a sampling fraction. In stage three, the final respondents at each health facility were selected using systematic random sampling applied to the corresponding staff list at facility level Data was collected using an online semi structured questionnaire adapted from studies carried out

among health care workers in Uganda<sup>20</sup> and Kuwait.<sup>21</sup> The questionnaire was pre-tested in health facilities in Ovia North East LGA before the actual data collection to check on the clarity, answerability, sequence and the appropriateness of the questions. Knowledge of eHealth among HCWs was assessed using a set of questions. Responses obtained to the questions were coded numerically. Positive responses were given a score of 1 while negative responses were given a score of 0. For questions with multiple responses, a score of 1 was given if the positive responses chosen were over 50% and a score of 0 if the responses chosen were less than 50%. A summative score was obtained and converted into percentages. Overall knowledge of eHealth was classified as good where respondents scored  $\geq 70.0\%$  and poor where scores of  $< 70.0\%$  were obtained. Quantitative assessment of HCWs perception of eHealth was based on their responses to a set of questions graded using a 3-point Likert scale (agree, indifferent and disagree). Responses which implied that HCWs were inclined towards use of eHealth services were considered as appropriate responses. Correspondingly, responses indicative of negative dispensation towards the use of eHealth services were considered as inappropriate. Responses to each question were coded as follows: least appropriate response was given a score of -2, 'indifferent' a score of 0 and the most appropriate response was given a score of +2. Thus, the maximum achievable score for each question was 2. Scores for each question were summed up and converted into percentages. HCWs who scored  $\geq 70.0\%$  were regarded as having positive perception towards eHealth while those who scored  $< 70.0\%$  were categorized as having negative perception.

Data was analyzed using IBM SPSS version 22 with the level of statistical significance set at  $p < 0.05$  at 95% confidence interval. Univariate analysis was carried out to describe the data. Continuous data like age was summarized using the mean and standard deviation. Categorical data were presented as frequencies and percentages in a table or represented using pie chart. Bivariate analysis was carried out using chi squared test of association and Fishers exact test.

Ethical clearance was obtained from the UBTH Research Ethics Committee and permission for this

work was also obtained from Ministry of Health, Edo State. Informed consent was obtained from each study participant after explaining the purpose of the study and the respondents were informed that their participation in the study was voluntary and they could opt out of the study at any time.

## Results

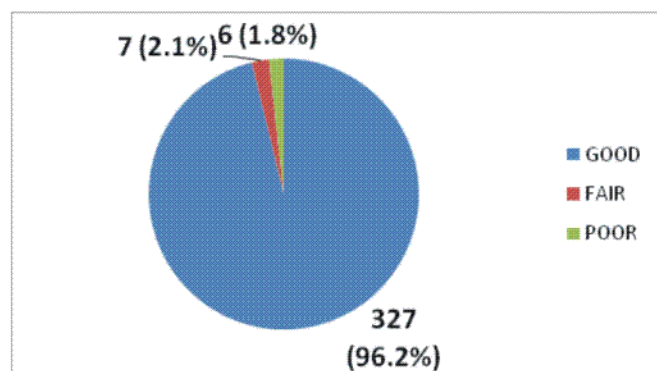
A total of 340 respondents participated in this study (Table 1) with a mean age of  $31.5 \pm 7.1$  years. There were more female respondents with a proportion of 52.4% and the predominant religion was Christianity 317 (93.2%) while about one third of the respondents were Benin. Majority 318 (93.5%) of the respondents had tertiary level of education.

Majority of the respondents 327 (96.2%) had good knowledge of eHealth (Figure 1). Table 2 revealed the sociodemographic characteristics and knowledge of eHealth among respondents. There was no statistically significant difference in the profession (Fisher's  $p = 0.957$ ), cadre of health facility (Fisher's  $p = 0.297$ ), work experience (Fisher's  $p = 0.276$ ) and level of education ( $\chi^2 = 1.516$ ;  $p = 0.380$ ) of the respondents. All the Pharmacists, Physiotherapists, Public Administrators and Health attendants had good knowledge of eHealth. There was an observable downward trend in the knowledge of eHealth with increasing cadre of health facility as more respondents in the Primary and Secondary health facilities had good knowledge of eHealth services. There was also an observable downward trend in knowledge of eHealth with increasing years of work experience as more respondents with  $< 5$  years work experience had good knowledge. With an increasing level of education, there was an increase in the proportion of respondents with good knowledge as majority of these respondents with tertiary level of education had good knowledge of eHealth.

**Table 1:** Socio-demographic characteristics of respondents

Variables	n=340	
	Freq	Percent
<b>Age group (years)</b>		
< 20	4	1.2
20 – 29	147	43.2
30 – 39	146	42.9
40 – 49	34	10.0
50 – 59	8	2.4

≥60	1	0.3
<b>Mean ± SD (years)</b>	<b>x = 31.5 ± 7.1</b>	
<b>Sex</b>		
Male	162	47.6
Female	178	52.4
<b>Religion</b>		
Christianity	317	93.2
Islam	17	5.0
ATR*	4	1.2
Agnostic	2	0.6
<b>Ethnicity</b>		
Benin	135	39.7
Esan	60	17.6
Igbo	49	14.4
Yoruba	29	8.5
Urhobo/Itsekiri/Ijaw/Isoko	29	8.5
Afemai	13	3.8
Ika/Kwale/Delta Ibo	6	1.8
Hausa	4	1.2
Efik/Ibibio	4	1.2
Idoma/Ebira	4	1.2
Others	7	2.1
<b>Level of Education</b>		
No formal	0	0.0
Primary	0	0.0
Secondary	22	6.5
Tertiary	318	93.5



**Figure 1:** Knowledge of eHealth among respondents

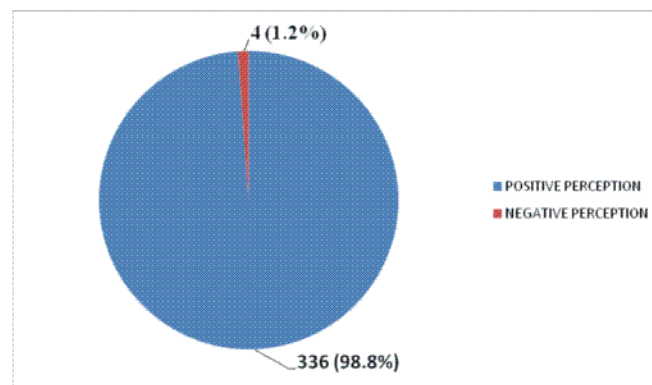
Majority of the respondents 336 (98.8%) had positive perception of eHealth (Figure 2). About two third 216 (63.5%) of the respondents had ever used eHealth services. Most of the respondents claim of eHealth usage was Browsing the internet for health research 172 (79.6%), Calling a patient using a telephone to give appointment 141(65.3%), Browsing internet for self-health education 140 (64.8%) and access to new disease management information 132 (61.1%). Majority 316 (93.0%) of the respondents had ICT gadgets available in their health facility. Computers 275 (87.0%), mobile devices 275 (87.0%), internet 224 (70.9%) and email 116 (36.7%) were the major gadgets available at the health facilities. Majority of the respondents

stated that eHealth services were available in their health facilities (Table 3). Majority 229 (67.4%) of the respondents preferred emailing a patient appointment/prescription schedules to other forms of eHealth services. Only about two fifth 128 (42.4%) of the respondents said they always had access to eHealth services in their health facilities. Majority 208 (68.9%) of the respondents perceived the quality of eHealth services in their health facility to be poor. The predominant types of Electronic Medical Records (EMRs) used by the respondents include Medscape 112 (51.9%), MedAccess 105 (48.6%), WebMD 93 (43.1%) and MedChart 87 (40.3%). Table 4.

**Table 2:** Work characteristics and Knowledge of eHealth among respondents

Variables	Knowledge			Test statistics	p-value
	Good F (%)	Fair F (%)	Poor F (%)		
<b>Profession</b>					
Doctor	133 (97.8)	1 (0.7)	2 (1.5)	Fisher's	0.957
Nurse	56 (96.6)	2 (3.4)	0 (0.0)		
Pharmacist	37 (100.0)	0 (0.0)	0 (0.0)		
MRO	25 (96.2)	0 (0.0)	1(3.8)		
CHEW	24 (96.0)	1 (4.0)	0 (0.0)		
Laboratory Scientist	21 (91.3)	0 (0.0)	2 (8.7)		
Physiotherapist	14 (100.0)	0 (0.0)	0 (0.0)		
Technician	6(75.0)	2 (25.0)	0 (0.0)		
Public Administrator	6 (100)	0 (0.0)	0 (0.0)		
Radiographer	2(50.0)	1(25.0)	1 (25.0)		
Health Attendant	3 (100)	0 (0.0)	0 (0.0)		
<b>Cadre of Health facility</b>					
Primary	79 (97.6)	1 (1.2)	1 (1.2)	Fisher's	0.297
Secondary	164 (97.6)	2 (1.2)	2 (1.2)		
Tertiary	84 (92.3)	4 (4.4)	3 (3.3)		
<b>Work experience</b>					
< 5 years	181 (97.3)	2 (1.1)	3 (1.6)	Fisher's	0.276
5 – 10 years	99 (96.1)	3 (2.9)	1 (1.0)		
>10 years	47 (92.2)	2 (3.9)	2 (3.9)		
<b>Level of education</b>					
Secondary	21 (95.5)	0 (0.0)	1 (4.5)	$\chi^2 = 1.516$	0.380
Tertiary	306 (96.2)	7 (2.2)	5 (1.6)		

$\chi^2 =$  Chi-square test



**Figure 2:** Perception of eHealth among respondents

Majority 308 (90.6%) of the healthcare workers highlighted non-availability of ICT facilities as a challenge to the implementation and utilization of eHealth services. Other major challenges highlighted include poor funding 304 (89.4%), poor internet connectivity 298 (87.7%) and unreliable electricity supply 256 (75.3%). Proposed solutions (Table 5) to the above challenges include government support/funding 206 (60.6%), ICT education 186 (54.7%) Public Private Partnerships 78 (22.9%) and free internet service within the health facility 8 (2.4%).

**Table 3:** Utilization of eHealth Services among respondents

Variables	Freq (%)
<b>Ever used Electronic Health Services (n=340)</b>	
Yes	216 (63.5)
No	124 (36.5)
<b>eHealth Service used by respondents** (n=216)</b>	
Browsing the internet for health research	172 (79.6)
Calling a patient using a telephone to give appointment	141(65.3)
Browsing internet for self-health education	140 (64.8)
Access to new disease management information	132 (61.1)
Monitoring patients drug compliance	77 (35.7)
Texting a patient	60 (27.8)
E-mailing a patient	60 (27.8)
Calling or sending a message/e-mail to diagnoses and manage diseases	60 (27.8)
Renew patients prescription of drugs	59 (27.3)
<b>Availability of ICT gadgets at health facility (n=340)</b>	
Yes	316 (93.0)
No	24 (7.0)
<b>Which gadgets are available?*** (n=316)</b>	
Computer	275 (87.0)
Mobile device	275 (87.0)
Internet	224 (70.9)
Email	116 (36.7)
Printer	82 (26.0)
eBooks/journals	72 (22.8)
Microsoft office	60 (19.0)
Telephone landline	56 (17.7)
Flash disks	54 (17.1)
CD-ROMs/DVDs	36 (11.4)
None	21 (6.7)
<b>Availability of Electronic Health Services in Health Facility (n=340)</b>	
Yes	302 (88.8)
No	38 (11.2)

\*\* Multiple response

**Table 4:** Respondents preferred eHealth service and Quality of service

Variable	freq (%)
<b>Preferred type of eHealth service** (n = 340)</b>	
E-mailing a patient appointment/prescription schedule	229 (67.4)
Real-time consultation with a patient via video-calling	182 (53.5)
Calling a patient using a telephone to give appointment	141 (41.5)
Browsing internet for self-health education	140 (41.2)
Browsing internet for research on health matters	134 (39.4)
Access to new disease management information	132 (38.8)
Monitoring patients drug compliance	77 (22.7)
Calling or sending a message/e-mail to diagnoses and manage diseases	60 (17.7)

Renew patients prescription of drugs	59 (17.4)
None	27 (7.9)
<b>Frequency of access to eHealth Services in Health Facility (n = 302)</b>	
Uncertain	21 (7.0)
Rarely	98 (32.5)
Sometimes	55 (18.1)
Always	128 (42.4)
<b>Perceived Quality of eHealth Services in Health Facility (n = 302)</b>	
Poor	208 (68.9)
Good	85 (28.2)
Excellent	9 (2.9)
<b>Types of eMRs used by respondents** (n = 216)</b>	
Medscape	112 (51.9)
MedAccess	105 (48.6)
WebMD	93 (43.1)
MedChart	87 (40.3)
MedTech	62 (28.7)
Banmi	3 (1.4)
Insta	16 (7.4)
Medstem	15 (6.9)
Nightingale	15 (6.9)
Quick book access	15 (6.9)
Can't recall the name	39 (18.1)
None	66 (30.6)

\*\* Multiple response

**Table 5:** Respondents' Perceived challenges in acquiring Information Communication Technology knowledge/ skills and proposed solutions

Variable	n = 340 Freq (%)
<b>Perceived Challenges**</b>	
ICT Facility not available / Equipment are obsolete	308 (90.6)
Poor Funding	304 (89.4)
Lack / Poor internet connection and service, Poor network	298 (87.7)
Poor / unreliable electricity supply	256 (75.3)
Poor Knowledge / Lack of training programs	94 (27.7)
Poor Political will / Administrative bottlenecks	62 (18.2)
Poor Cooperation between different healthcare personnel	12 (3.5)
Insecurity/Patient confidentiality	1 (0.3)
<b>Suggested Solutions by respondents**</b>	
Government support / Funding / NHJS	206 (60.6)
ICT education	186 (54.7)
Public private partnerships / NGOs	78 (22.9)
Free internet service within the health facility	65 (19.1)
Not Sure	8 (2.4)

\*\* Multiple response

## Discussion

The preponderance of respondents within the age group of 20 – 39 years as revealed by this study could be because respondents within this age group are more likely to be computer savvy and more abreast with current trends in digital technology as compared to older age groups. This was consistent with the findings in a study done in Zaria where 57.0% of respondents were within the age range of 20-29 years.<sup>22</sup> The female dominance among healthcare workers studied may reflect Nigeria's rising female literacy rates, which increased from 59.7% in 2008 to 61.4% in 2015.<sup>23</sup> Majority of the

respondents had tertiary level of education and this is not surprising as majority of the respondents were doctors, nurses and pharmacists.

Overall, respondents in this study displayed good knowledge of eHealth services. This may be due to the fact that majority of the respondents had tertiary level of education, possessed good ICT skills and had used eHealth services. The above finding is commendable as knowledge and understanding of eHealth systems have been reported as a facilitator to its implementation and utilization.<sup>24, 25</sup> This finding of the study is in consonance with a study done in Ebonyi where 85.6% of healthcare workers possessed a good level of knowledge of e-Health services.<sup>6</sup> However, the findings contradicted that done in North West Ethiopia where only 37.6% of respondents had good knowledge of eHealth services.<sup>26</sup>

Although there was no statistical association between profession, cadre of health facility, work experience, level of education of the respondents and their knowledge of eHealth, there was an observable downward trend in knowledge of eHealth with increasing cadre of health facility. More respondents in the Primary and Secondary health facilities had good knowledge of eHealth services. This may be due to the fact that majority of the respondents in this study were from Secondary health facilities. A downward trend in knowledge of eHealth was noticed with increasing years of work experience as more respondents with less than 5 years of work experience having good knowledge of eHealth. This could be attributed to the fact that younger respondents make up the population of workers with a shorter work experience. Young people are fast to learn and use newer technologies. They are also known to be more computer savvy and abreast with current trends in digital technology as compared to older respondents.<sup>27</sup> This study also revealed that majority of these respondents with tertiary level of education had good knowledge of eHealth. The reason for this is not farfetched as increased level of education can influence the ability to learn and use ICT facilities. A lack of knowledge and a limited understanding of benefits afforded by the eHealth system can act as a barrier to implementation and utilization of eHealth services. It is therefore of paramount importance to provide

access to appropriate, high-quality, well-funded, and easily available training especially among older age groups of health care workers.<sup>16,17</sup>

Majority of the respondents had positive perception of eHealth and this mirrors a study done in Kaduna where 96.9% of respondents had good perception of eHealth services.<sup>22</sup> This could be as a result of the respondents knowledge of eHealth services which has been known to influence perception. The overall positive perception corroborates the fact that eHealth services are easily accepted and utilized by the health workers. Attitudes and perception can act as both facilitators and barriers to implementation and acceptance of e-health systems across all e-health domains.<sup>13</sup> In order to foster and encourage continued positive perception among health care workers, there is need for increased communication and cooperation by involving them in the development and implementation of eHealth services. This would promote acceptance, perceived ease of use and increased awareness of the benefits of eHealth services.

Although majority of the respondents stated that there were ICT gadgets and eHealth services available in their health facility only a small proportion frequently utilized eHealth services in these facilities. This disparity could be due to poor quality of eHealth services in these facilities as perceived by the respondents. Although a high proportion of the respondents had basic computer education only a small percentage of them had ever had eHealth training. This may be attributed to poor quality of eHealth services in the health facilities as highlighted by the respondents. Majority of the respondents who utilized eHealth services highlighted browsing the internet for health research and calling a patient using a telephone to give appointment as the common forms of eHealth services used. This study also revealed that emailing a patient appointment/prescription schedules was the most preferred form of eHealth services among the respondents. This may be due to the fact that the above tasks of browsing the internet and emailing patients do not require overt ICT skills to perform. It could also be due to the availability of gadgets like computers, mobile devices, internet and email in these facilities which would encourage activities like browsing the internet and sending of emails to

patients. This is similar to a study done in Lagos where majority (50.8%) of the health workers surveyed highlighted mobile telemedicine for consultation and patient monitoring with healthcare colleagues as the common form of eHealth services used. Conversance with a particular type of eHealth service can improve its utilization therefore this should be a key factor in determining the type of eHealth services to be implemented in health facilities.<sup>28</sup>

Non-availability of ICT facilities, poor funding, poor internet connectivity and unreliable electricity supply were highlighted by the respondents in this study as major challenges to the implementation and utilization of eHealth services. This reflects a study done in South Africa which revealed that constraints to the implementation of eHealth in Africa and developing countries include low ICT budgets, poor infrastructure in maintenance of health services, unreliable electricity supply and insufficient human resource capacity.<sup>29</sup> Lack of ICT infrastructure is a significant eHealth system problem that stands as a barrier to its implementation as these gadgets are essential in the implementation and utilization of the eHealth system. Uninterrupted electricity power supply is a major challenge for most developing countries too. ICT equipment were manufactured to operate with other infrastructure such as electric power supply, under stable and constant controlled conditions making poor electricity supply a barrier to the implementation of eHealth services.<sup>30</sup> Strong internet connectivity offers access to all kinds of health related information by the usage of diverse websites and this is important for the effective utilization of eHealth services. In developing countries, there is still the problem of low internet penetration and low bandwidth leading to poor internet coverage and connectivity and this can hamper the implementation of eHealth. Poor funding is a valid challenge to the implementation of electronic health. Setting up eHealth systems is cost intensive especially in the initial phase and adequate funding of eHealth care system is critical for its maintenance and prevention of failures.<sup>31</sup>

### Conclusion

Majority of the respondents had good knowledge and positive perception of eHealth. About two third of the respondents had ever used eHealth services. A

good proportion of the healthcare workers highlighted non-availability of ICT facilities as a challenge to the implementation and utilization of eHealth services. Other major challenges highlighted include poor funding, poor internet connectivity and unreliable electricity supply. Proposed solutions to the above challenges include government support/funding, ICT education, Public Private Partnerships and free internet service within the health facility.

### Recommendations

There is need for government support/funding of eHealth systems in health facilities. There is also increased need for continued ICT education for health care workers as this will ensure continued ease of implementation and utilization of eHealth services in health facilities.

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