

Original Article

Accessibility and Acceptability of Digital Healthcare Services among People Living in Southwestern Nigeria

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Abstract

Background: The advent of digital healthcare services has become paramount in the world we live in today. Digital healthcare involves the use of information and communication technologies in addressing the medical problems and health-related challenges faced by people seeking medical treatment. This study assesses the impact of digital healthcare among technologically literate people in Southwestern Nigeria (SWN) and seeks to understand its accessibility and acceptability among them. **Methods:** The study was a cross-sectional study. Our study data was obtained through an online questionnaire survey of 427 individuals (aged ≥ 15 years) living in SWN. The data were analyzed using the SPSS version 25 software. **Results:** The study found that roughly half of the respondents (52.0%) have heard about digital healthcare while only 44.0% have accessed it. Over seven-tenth (76.3%) of the respondents considered digital healthcare to be an acceptable form of receiving healthcare while 64.4% were willing to pay for it. Age ($X^2=7.702$, p-value = 0.021), occupation ($X^2=20.685$, p-value = 0.004) and awareness about digital healthcare ($X^2=55.507$, p-value = 0.001) were significantly associated with accessibility of digital healthcare. **Conclusion:** The findings obtained from this study showed that awareness of digital healthcare was high among people in SWN; however, its accessibility was low. Also, digital healthcare was highly acceptable amongst them and they were willing to pay for such service.

Keywords Digital health, healthcare, acceptability, access, utilization, Nigeria

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Background

Digital healthcare involves the combination and application of digital technologies to enhance the efficiency of healthcare service delivery [1]. It entails the use of information and communication technologies to help address the health problems and challenges faced by people seeking medical treatment [2]. These technologies include both hardware and software solutions and services, including digital healthcare services, web-based analysis, email, mobile phone and applications, text messages, wearable devices, and clinic or remote monitoring sensors [2,3]. In fact, some people describe digital healthcare as the application of new technology in a healthcare setting.

Digitization is possibly the most comfortable change that most doctors and patients are experiencing. The proliferation of the internet, penetration of the global market and rising use of mobiles is expected to fuel this trend further [4]. Education and information around the use of digital health can bring the number of people under the umbrella of technology benefits [4]. Digital health has the potential to revolutionize how populations interact with national health services and also strengthen health systems [4,5].

Nigeria as a country, with an approximate population of 206 million as at the year 2020, has poor healthcare indices and currently has many of its health workforce concentrated in the urban healthcare centers in the nation [6]. In most Nigeria states, extending existing healthcare services to cover the entire population is therefore a major goal and technology has a strong role to play in this through digital healthcare service deliveries [7]. Information technology (IT) has been identified as a vehicle with the potential to improve the quality and efficiency of healthcare system in Nigeria [7].

Nigeria is also witnessing a rise in internet users with a record of over 91.6 million users in the country [8]. According to the Global System for Mobile Communications, the mobile industry in West Africa is forecast to contribute more than \$50 billion annually to the region's economy by 2022, with countries such as Nigeria being one of the top contributors [8]. In recent times, Nigeria has witnessed a rise in tech hubs giving support to digital startups; hence creating even more breeding space for digital health startups [6,8]. This has been ongoing for the past 10 years.

The rise in digital health startups in Nigeria can be owed to a large digital market size of over 200 million people with an increasing population of young adults. The increase in the population of young adults has led to an exponential rise in the demand for healthcare services. Nigeria is now embarking on projects which are intended to bridge the gap between those that have access to quality healthcare and those that do not have such access, using digital health tools [5]. The Nigerian healthcare system is poorly developed and has suffered a lot of several backdrops [9, 10]. There is no adequate and functional surveillance systems as well as functioning digital healthcare platform developed and hence, no tracking system to monitor the outbreak of communicable diseases, bioterrorism, chemical poisoning and disease

progression in the management of patients [10,11]; this poorly developed digital healthcare service in the country has reduced the rate of availability and accessibility of health care services.

This study assesses the impact of digital healthcare among people in Southwestern Nigeria (SWN) and seeks to understand its accessibility and acceptability among them.

Methods

Study Area

The area selected for this study is the SWN. Nigeria is a country situated in West Africa, bordering Niger in the north, Chad in the northeast, Cameroon in the east, and Benin in the west. Its southern coast is on the Gulf of Guinea in the Atlantic Ocean [12]. The SWN is one of the six (6) geo-political zones of country. This zone consists of six (6) states namely: Ekiti, Lagos, Ogun, Ondo, Osun and Oyo. The main language spoken is Yoruba although there are different dialects even within the same state [12].

Study Design

This study was a cross-sectional descriptive study which determined the accessibility and acceptability of digital healthcare among people in SWN.

Study Population

The study population is people in SWN, of the age of ≥ 15 years, who were technologically literate.

Sample Size

The study sample for this research was calculated using Leslie Kish formula:

$$n = \frac{Z^2 pq}{e^2}$$

Where: n = minimum sample size required; Z = confidence limit of survey at 95% (1.96); p = the proportion of the target population estimated to have a particular phenomenon of interest in the study (the significant value for p was assumed to be 50%); and e = absolute deviation from true value (degree of accuracy) = 5%.

Based on the above-stated formula, a sample of 384 people was determined to be the minimum sample size for the study.

Sampling Technique

A convenience sampling technique was used for this study.

Study Instrument

The questionnaire used consisted of four (4) sections, namely: socio-demographic details; awareness of digital healthcare; accessibility of digital healthcare; and

acceptability of digital healthcare. The questionnaire was piloted amongst medical health professionals in SWN.

Data Collection

Information was obtained from 427 eligible participants with the use of a questionnaire via an online Google survey form.

Data Management and Analysis

The data collected was pre-coded and cleaned. Statistical Package for the Social Sciences (SPSS) version 25 software was used to run the analysis. Summary statistics was generated using bar charts, pie charts, frequencies and percentages while Chi-square test was used to test for associations between variables at 5% significant level.

Ethical Considerations

All participants were informed about the purpose and scope of the study. Also, they were assured that their participation is strictly confidential and anonymous. Participation in the study was strictly voluntary. All participants had the opportunity to discontinue or stop filling the questionnaire if the questions became uncomfortable. The study caused no harm to the participants.

Results

Socio-Demographic Characteristics of the Respondents

Even though a sample size of 382 persons was determined as the minimum sample size for this study, but due to high response, 427 persons were eventually surveyed.

The mean ($\pm$ SD) age of the respondents was 27.31 ($\pm$ 4.83) years. The minimum age was 15 years while the maximum was 45 years. Majority (286; 67.0%) of them fell within the age group of 25 – 34 years. More than nine-tenth (407; 95.3%) had tertiary education. Almost half 184 (43.1%) were working in Lagos State. The average ($\pm$ SD) duration, in years, which our respondents have been using a smart phone was 8.88 ($\pm$ 3.27) years. More than half (264; 61.8%) had been using smart phones for 6 to 10 years. Majority of the respondents 378 (378; 88.5%) lived or worked in urban areas. Almost all the respondents (411; 96.3%) were using mobile data as source of their internet connection, only 50 (11.7%) were using portable modems while 156 (36.5%) were using Wi-Fi. This shows that some of those using mobile data were still using portable modems and Wi-Fi (Table 1).

More than half 221 (51.8%) of the respondents were professionals (Figure 1).

Awareness of Digital Healthcare

Out of the 427 respondents, 52.0% have heard about digital healthcare before, 29.7% have not heard of this form of healthcare while 18.3% were not sure. Of those (n=222) that have heard about it before, 64.4% heard about it on social media (Table 2).

Table 1. Socio-demographic distribution of respondents (n=427)

Social Demographic	Frequency	Percentage (%)
Age Group (Mean [$\pm$SD] = 27.31 [$\pm$4.83] years) (Range = 16 – 45 years)		
15 - 24 years	108	25.3
25 - 34 years	286	67.0
35 – 45 years	33	7.7
Gender distribution		
Male	156	36.5
Female	271	63.5
Highest level of education		
Secondary	18	4.2
Tertiary	407	95.3
Others	2	0.5
Which state do you work or school in?		
Ekiti	4	0.9
Ondo	10	2.3
Lagos	184	43.1
Osun	20	4.7
Ogun	21	4.9
Oyo	152	35.6
Others	36	8.4
Duration of smart phone usage (Mean [$\pm$SD] = 8.88 [$\pm$3.27] years) (Range = 1 – 20 years)		
<=5 years	66	15.5
6 -10 years	264	61.8
11 – 15 years	81	19.0
16 – 20 years	16	3.7
Locality		
Rural	49	11.5
Urban	378	88.5
Mobile data		
Yes	411	96.3
No	16	3.7
Portable modems		
Yes	50	11.7
No	377	88.3
Wi-Fi		
Yes	156	36.5
No	271	63.5

Accessibility to Digital Healthcare

Less than half (145; 44.0%) of our respondents have had access to digital healthcare services. Of those 145 persons that had accesses it, 60 (41.4%) accessed it via telemedicine applications, 64 (44.1%) via chat forum on health-related website, 15

(3.5%) via video conferences with a medical professional, and 6 (1.4%) accessed it through others means (Table 3).

Table 2. Awareness of digital healthcare domains among respondents

Awareness of Digital Healthcare Domains	Frequency	Percentage (%)
Have you heard about digital healthcare before? (n=427)		
Yes	222	52.0
No	127	29.7
Not Sure	78	18.3
Social media (n=222)		
Yes	143	64.4
No	79	35.6
Friends or colleagues (n=222)		
Yes	64	28.8
No	158	71.2
Healthcare professionals (n=222)		
Yes	97	43.7
No	125	56.3
Advertisement such as bill boards and fliers (n=222)		
Yes	31	14.0
No	191	86.0
Others (n=222)		
Yes	16	7.2
No	206	92.8

More than three-quarters 338 (78.2%) reported that they will like to use digital healthcare while only 7 (1.6%) said that they would not like to (Figure 2). In assessing the comfortable channels for receiving digital healthcare, 280 respondents preferred "mobile applications" as a comfortable channel, 157 preferred phone calls, and 139 preferred e-mails (Figure 3).

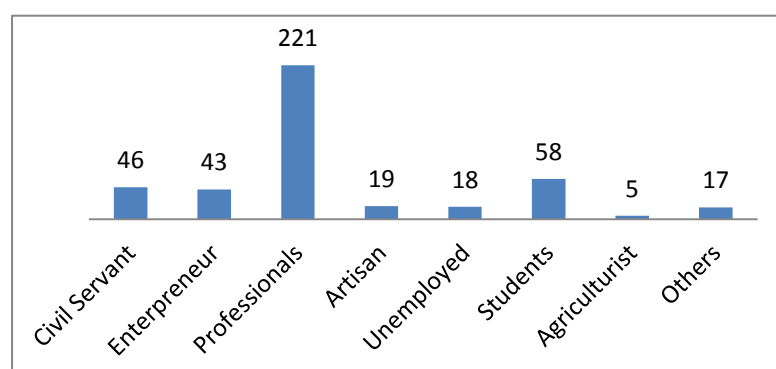


Figure 1. Occupation distribution of respondents

Acceptability of Digital Healthcare Services

Considering the acceptability of digital healthcare services, 326 (76.3%) people considered it an acceptable form of receiving healthcare. Regarding the advantages of digital healthcare, 357 (83.6%) respondents said it is easy to access, 277 (64.9%) reported that it will increase health seeking behavior, 349 (81.7%) agreed that it will remove

Table 3. Distribution of digital healthcare accessibility (n=427)

Accessibility of Digital Healthcare Domains	Frequency	Percentage (%)
Have you had the opportunity to access health services via Digital Healthcare such as: (Please choose as many that apply)		
Through telemedicine applications	60	14.1
Through chat forum on health-related websites	64	15.0
Through video conference with a medical professional	15	3.5
I have not accessed this kind of care before	282	66.0
Others	6	1.4

Table 4. Digital Healthcare Acceptability Distribution

Acceptability of Digital Healthcare Domains	Frequency	Percentage (%)
Do you consider this an acceptable form of receiving health care? (n=427)		
Yes	326	76.3
No	26	6.1
Not Sure	75	17.6
Advantages of rendering health services through Digital Healthcare (n=427)		
It is easy to access	357	83.6
It can increase health seeking-behavior	277	64.9
It removes the barrier of travelling long distances to seek medical attention	349	81.7
There is an increased access to credible health information and advice	271	63.5
It reduces hospital waiting time	351	82.2
Others	6	1.4
Disadvantages of Digital Healthcare (n=427)		
It is expensive	122	28.6
It cannot attend to emergency situations	298	69.8
It removes the face-to-face contact with the doctor, which is important	232	54.3
It cannot be used without a smart phone or internet connection	284	66.5
It cannot be accessed by individuals who are not technology literate	327	76.6
Health information provided through this means cannot be trusted	115	26.9
Others	10	2.3

Note: Multiple responses were allowed

the risk and barriers of travelling a long distance to seek medical attention, 271 (63.5%) said that it will increase access to credible health information and advice, and 351 (82.2%) reported that it will reduce hospital waiting time. Regarding the disadvantages, 327 (76.6%) respondents said that digital healthcare services cannot be accessed by someone who is not technologically literate, 298 (69.8%) reported

Table 5. Socio-Demographic Details versus Digital Healthcare Accessibility using Chi-Square

Socio-Demographic	Accessibility of Digital Healthcare		χ^2	p-value
	No (282)	Yes (145)		
Age Group			7.702	0.021*
15 - 24 years	78 (27.7)	30 (20.7)		
25 - 34 years	177 (62.8)	109 (75.2)		
35 - 45 years	27 (9.6)	6 (4.1)		
Gender			0.711	0.458
Male	107 (37.9)	49 (33.8)		
Female	175 (62.1)	96 (66.2)		
Highest level of education			3.586	0.166
Secondary	15 (5.3)	3 (2.1)		
Tertiary	265 (94.0)	142 (97.9)		
Others	2 (0.7)	0 (0.0)		
Occupation			20.685	0.004*
Civil Servant	35 (12.4)	11 (7.6)		
Entrepreneur	34 (12.1)	9 (6.2)		
Professionals	124 (44.0)	97 (66.9)		
Artisan	14 (5.0)	5 (3.4)		
Unemployed	14 (5.0)	4 (2.8)		
Students	45 (16.0)	13 (9.0)		
Agriculturist	4 (1.4)	1 (0.7)		
Others	12 (4.3)	5 (3.4)		
Rural-Urban			3.269	0.079
Rural	38 (13.5)	11 (7.6)		
Urban	244 (86.5)	134 (92.4)		
Duration of using smart phone			2.538	0.468
≤5 years	45 (16.0)	21 (14.5)		
6 - 10 years	178 (63.1)	86 (59.3)		
11 - 15 years	51 (18.1)	30 (20.7)		
16 - 20 years	8 (2.8)	8 (5.5)		
Mobile Data			0.054	1.000
Yes	271 (96.1)	140 (96.6)		
No	11 (3.9)	5 (3.4)		
Portable Modems			3.662	0.079
Yes	27 (9.6)	23 (15.9)		
No	255 (90.4)	122 (84.1)		
Wi-Fi			0.412	0.526
Yes	100 (35.5)	56 (38.6)		
No	182 (64.5)	89 (61.4)		
Awareness			55.507	0.001*
Yes	114 (40.4)	108 (74.5)		
No	115 (40.8)	12 (8.3)		
Not Sure	53 (18.8)	25 (17.2)		

that it cannot attend to emergency situations, and 284 (66.5%) reported that it cannot be used without a smart phone and internet connection (Table 4).

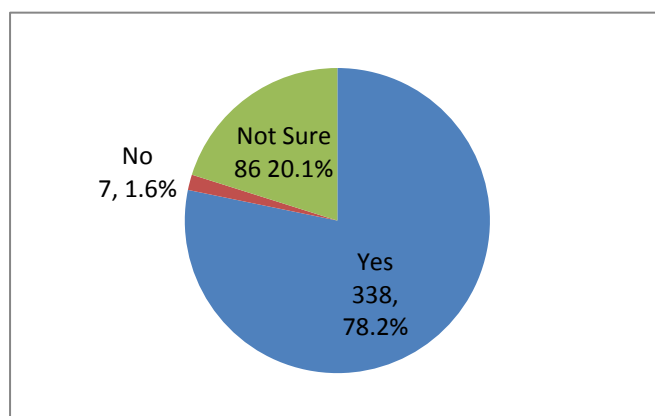
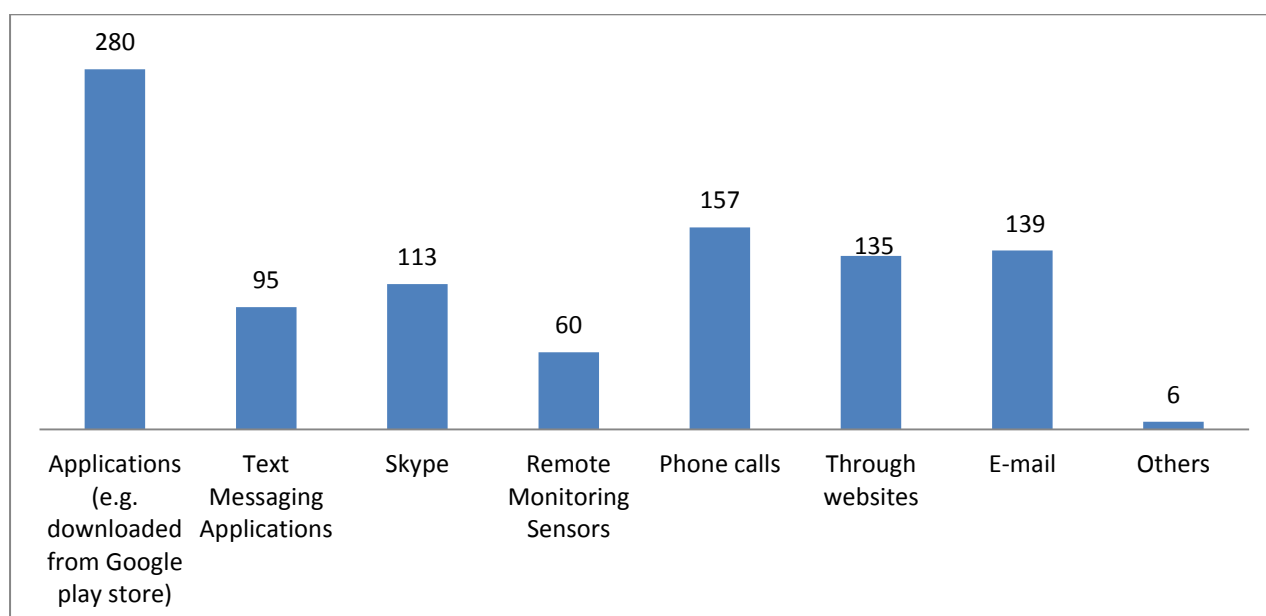


Figure 2. Chart depicting likeness to use digital healthcare services

Regarding the willingness to pay for digital healthcare services, 275 (64.4%) were willing to pay for it (Figure 4). Among the individuals willing to pay, 59 (21.5%) were willing to pay less than one thousand Naira (<N1,000) for it, 103 (37.5%) were willing to pay between

N2,000 and <N3,000, 27 (9.8%) were willing to pay between N3,000 and <N4,000, 33 (12.0%) were willing to pay between N4,000 and <N5,000, and 53 (19.2%) were willing to pay N5,000 and above.



Note: Multiple responses were allowed

Figure 3. Comfortable channels of digital healthcare accessible to the respondents

Associations between Respondents' Characteristics and Accessibility to Digital Healthcare Services

It was observed that there were significant association between accessibility of digital healthcare services and age ($X^2=7.702$, p-value = 0.021), occupation ($X^2=20.685$, p-value = 0.004) and awareness ($X^2= 55.507$, p-value = 0.001)) while gender, educational level, duration of using smart phone, locality and source of data connection were not significantly associated with accessibility of digital healthcare (Table 5).

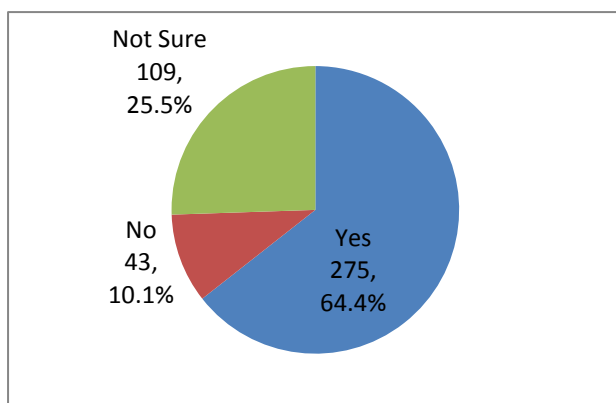


Figure 4. Chart depicting willingness among respondents to pay for digital healthcare services

Discussion

The rationale for conducting this study was to assess the impact of digital healthcare among people living in SWN and to understand its accessibility and acceptability among them. The findings obtained from this study were

noteworthy. Most (95%) of the respondents in this study had tertiary level of education; this finding is similar to that reported in other Nigerian studies [13,14]. It was also observed that most of the respondents were professionals, living in urban areas. This finding corroborates existing report that the population of internet users in Nigeria is predominantly domiciled in the cities [15].

The majority of the respondents have been using smart phone for 6 to 10 years, and mobile data was the most common source of internet connection among them. Some of them also used a combination of Wi-Fi and portable modems in addition to mobile data; this demonstrates the fact that most of the respondents had access to smart phones and internet facilities; as a result, they can easily access digital healthcare services.

The majority of our respondents had heard of digital healthcare services before, which is in contrast to a similar study done in 2016 in South-East Nigeria which reflected that most of its respondents had not heard about this form of health service [7]. However, a high awareness rate, similar to that reported in our study, had been reported in some other Nigerian studies [13,14].

Information about digital healthcare was sought by our respondents from multiple sources. Social media, healthcare professionals, and friends/colleagues were their top sources of information regarding digital healthcare. Of all these sources, social media has been reported to be the most utilized source. This finding supports other reports that the social media is a very rich source of information on health-related matters among Nigerians [16-18].

Despite the high rate of awareness of digital healthcare among our respondents, only the minority of them have had the opportunity to access digital healthcare services, of which they accessed these services via chat forums on health-related website, telemedicine applications, and video conferences with a medical professional. However, many of our respondents-at-large were willing to use digital healthcare services. Furthermore, the preferred comfortable channels for receiving digital healthcare services amongst our respondents were through applications, phone calls and e-mails.

There were significant relationships between the respondents' characteristics and accessibility to digital healthcare. We found that those who: were aware of digital healthcare; had access to internet facility; were using smart phones for >5years; were within the age range of 25 to 34years; were female; had tertiary school education; were professionals; and living in urban areas had higher rate of access to digital healthcare services. This finding is not surprising, as majority of people with those afore-listed characteristics are known to be high users of digitalized services [15].

Digital healthcare has many benefits [13,14]. Its utilization can help: increase health seeking behavior, remove the risk and barriers of travelling a long distance to seek medical attention; increase access to credible health information and advice; and also reduce hospital waiting time. However, it has some limitations which are: it may be inaccessible to someone who is not technologically literate; it cannot attend to emergency situations; and it cannot be used without a smart phone and internet connection. Despite the peculiar limitations of digital healthcare, the majority of our respondents considered digital health care as an acceptable form of receiving healthcare. This finding is highly consistent with that reported among health professionals and trainees in Nigeria and other developing countries [13,14].

With respect to the amount to be paid for digital healthcare services, the majority of the respondents were willing to pay for digital healthcare services. However, most of them were opting for an amount below five thousand naira; this amount is roughly below ten US Dollars. Unfortunately, majority of Nigerians cannot afford this service at this rate, as several millions of Nigerians live below 1 USD per day [19]. Nigeria, as a third world country with poor health indices [20-23], can benefit a lot from digital healthcare, especially for the inhabitants in rural areas who are not easy to reach and lack sufficient healthcare services [24,25]. Hence, this call for the recommendation that the Nigerian government at all levels should invest massively into the field of digital healthcare services, and as well provide subsidies for the users of such form of care so that more Nigerians can have access to it.

This study has its limitations. This study was an online survey; it did not adopt the use of a paper questionnaire. Hence, people who are non-users of smart phones, computers, and other sophisticated telecommunication gadgets were not surveyed for their opinions. Secondly, this study was delimited to SWN only; people living in other geopolitical zones in Nigeria (i.e. North-east Nigeria, North-west Nigeria, North-central Nigeria, South-east Nigeria, and South-south Nigeria) did not have the opportunity to participate in the study.

However, notwithstanding these limitations, this study is one of the few available studies on the area of acceptability and utilization of digital healthcare services in Nigeria. Also, the findings obtained from this study can be used to guide policy makers in the planning and implementation of policies relevant to digital healthcare services in Nigeria.

Author contributions: EBO and FH conceptualized the study; study protocol was developed by EBO and FH; data collection and analysis was done by EBO; manuscript drafting was done by EBO; review of drafts was done by FH, BI and MO; all authors agreed to the final draft of the manuscript.

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