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# Internet Accessibility and Use of Online Health Information Resources by Doctors in Training Healthcare Institutions in Nigeria

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## **Introduction**

The Internet is a global network of networks that enables computers of all kinds to directly and transparently communicate throughout the world. It is described as a global network and an 'Information Super-highway' (Computer Hope 2010). It is defined as a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard to geographical location (The Internet Society 2010). The internet is indeed a major technological breakthrough of our time.

The Internet is a popular source of health information for health care providers and consumers. It has been recognized by many as an important mechanism for transforming medical care. The internet affords healthcare practitioners unprecedented access to huge volume, high quality, current and relevant health care information. Among currently available technologies only the Internet has the potential to deliver universal access to up-to-date health care information (Godlee, Pakenham-Wash et al. 2004). Accurate and up-to-date information is vital to maintain quality of health care. During the past decade, many health information resources have been developed and available online for use by health care professionals.

The Internet has been used by healthcare professionals to obtain and share large amounts of medical information and to monitor diseases. The knowledge of the Internet as an important health information resource for physicians have greatly improved during the past decade as a result of patterns of use and medical impact measures (Bennett, Casebeer et al. 2004 ). The Internet has enabled health care practitioners to obtain and share health information and to track and monitor diseases (Centre for Disease Control 2003). In addition, it has made it easy and possible for physicians throughout the world to collaborate, communicate, and interact with each other (Manhas 2008). The Internet has brought about flexible communication between patients and doctors by empowering patients with information. It has also revolutionized the compilation, assessment and distribution of information relating to healthcare (Slattery 2008).

In the last two decades, there has been a tremendous increase in the volume of healthcare information published online. The amount of online health information available to users keep growing on daily basis than can ever be imagined ten years back. A great variety of information resources are now available and accessible online. These include among others search engines (Google, Yahoo, Alta Vista, Lycos, Mama, etc) databases (MEDLINE/PubMed, Scopus, Web of

Knowledge, EMBASE, African Index Medicus), portals, gateways, digital archives, libraries and institutional repositories. Recent, reliable, quality and up-to-date healthcare information are also available in websites of academic and health institutions, professional associations, governmental and non-governmental organizations. In addition, some governmental and not-for-profit organizations such as the National Institutes of Health (NIH) and Bioline International have digital archives for free full-text articles. Also available online are medical dictionaries, encyclopedias, abstracts and indexes, bibliographies, atlases, videos and drug information sources. Many of these information resources that provide accurate and reliable health care information for medical doctors are results of increase in the pace of healthcare research (Mckibbon, Fridsma et al. 2007)

Information is worthless if it is not used. Availability of information is one thing, access to and use of the available information is another (Oduola 2003). According to Dervin and Nilan, “information use” is a process whereby the user tries to make sense of discontinuous reality in a series of information use behavior (Dervin and Nilan 2003). Systems that are not utilized do not result in expected efficiency and effectiveness gains (Agarwal and Prasad 1999). Availability of e-resources has changed what users actually read and use; they tend to use what is easily accessible (Renwick 2005). The use of information varies among individuals, and professionals depending on their information needs and status. An important consideration in the process of health information gathering is accessibility and use of such information.

### **Literature Review**

The internet has become very popular and has penetrated into many countries across the world. It is estimated that there are over 300,000 networks, 196 million domain names attached to over 5 million computers located in over 100 countries connected to the Internet (Ukwe 2010). Internet Penetration Rate (IPR) is the percentage of the population of a given country or region that uses the internet while Internet Growth Rate (IGR) is determined by comparing the latest internet usage figures for each country or region with the baseline year 2000 for internet usage figures and the ratio expressed as a percentage. According to International Telecommunication Union (ITU), an internet user is someone aged two years or older who went online in the past 30 days (Internet Worldstats 2014). An internet user is someone who has access to internet connection with the basic knowledge of internet use and has actually used the internet in the last one to two weeks. In

SSA, it is not easy to determine the actual internet penetration because a subscription can be used by several people who in addition have access at work and home or in a cyber cafe.

The internet came into SSA from the early 1990s, Kenya (1993), Uganda and Nigeria (1995) and Togo in 1996 (Internet Worldstats 2014a). In 1996, only 11 African countries were connected to the internet however by the end of 2000 all 54 countries had achieved permanent connectivity (Gyapong 2002). Internet connectivity is however mainly confined to the capital cities, with very few towns being connected (Jensen 2002; Jensen 2007). Despite the fact that Africa's internet user growth rate ranks first in the world (3,606.7%); Internet penetration in the continent is the lowest (15.6%) when compared to other world regions (Internet Worldstats 2014a). Africa's poor internet status stems largely from poor telecommunication infrastructure and unreliable power supply in some countries, expense of equipment, and lack of technical skills that undermine the ability to provide cost-effective service (Royall, Schayk et al. 2005; Akpan-Obong 2007).

The number of Internet users around the world has been on the increase since the last decade. The total estimated population of the world as at June 30, 2014 was 7,182,406,565 billion while Internet users total 3,035,749,340 billion (Internet Worldstats 2014a). Noticeably, North America has a significantly higher Internet penetration rate (87.7%) than Oceania/Australia (72.9%) and Europe (70.5%). When compared to other world regions, Asia has the highest population (3,996,408,007 billion) as well as the highest population of Internet users (1,386,188,112) however; this region (Asia) has one of the lowest Internet penetration rates (34.7%). Despite the popularity of the Internet, the penetration rate is still very low worldwide, accounting for only 42.3% of the world's population. More than 20 years after the birth of the internet, two-thirds of the planets population still do not have regular internet access (UNESCO and ITU 2013).

In Nigeria, the Internet became available in 1996 and by 2000, over 150 Internet Service Providers (ISPs) had been licensed by the Nigerian Communication Commission (NCC) to operate in the country, indicating growth in access (eShekels Associates 2001). At its inception, limited e-mail services were offered by a few pioneering groups that collect emails from clients and send them in batches and also receive emails and deliver same through "snail" mail to recipients (clients). By mid-1998 there were a couple of Internet Service Providers (ISPs) operating slow links (Gelfand 2004). In year 2000, Internet penetration was (0.1%) but increased gradually to

(26.5%) in 2011 (Internet Worldstats 2014b). This growth was mainly due to the proliferation of 'cyber cafes' (popular commercial access points) used by those who have no other means of access to the Internet (Ajuwon 2003; OpenNet Initiative 2009; Omolase, Balarabe et al. 2010; Omolase, Ihemedu et al. 2010).

Of the over 140 million people living in Nigeria, less than 25 million currently have access to the internet due to high access costs. There were 45,039,711 internet users in 2011 and by 2014, the number rose to 70,300,000 million. Internet penetration rose from 29.0% in 2012 to 39.7% in 2014, an increase of about 10.7% (Internet Worldstats 2014b). This increase is a sharp contrast to what prevailed a few years ago when Nigeria lagged behind with respect to internet connectivity and usage compared to countries such as Morocco, Algeria and South Africa. However, the last four years has witnessed a tremendous increase in the number of internet users in Nigeria. At present, Nigeria is first in the list of African top internet countries followed by Egypt (Internet Worldstats 2014).

This recent growth rate is probably due to increase in the number of telecommunication companies that provide internet access and services in the country. The telecommunication companies provide Dial-up Internet connection via USB modem. The increase in penetration may also be due to use of cell phones by many Nigerians for accessing internet resources. An increasing minority now have access at home by subscribing to telecommunication companies such as Star Communications (Starcomm), Multilateral Telecommunication Network (MTN), Airtel (formerly known as Zain) and Global Communication Network (Glo). These companies provide dial-up Internet services (via USB modem) for those who can afford the subscription fees. Internet access is still expensive in Nigeria; each month, individual home users pay about USD 100 for access while corporate users pay as much as USD 1,500 for bandwidth costs (OpenNet Initiative 2009). In addition to the high cost of Internet access, users have to contend with substantial congestion at peak periods due to low bandwidth. Broadband Internet access is available in Nigeria but unpopular due to high cost. Despite the gradual growth rate of the Internet in the country, penetration is still low.

Librarians and information specialists assume that medical doctors have information needs associated with clinical work. Health care practitioners need information for efficient and effective management of their patients. They also need information to update their knowledge as well as for teaching and research. Ocheibi and Buba in their study of information needs and

information gathering behavior of medical doctors in Maiduguri reported that doctors need specific medical information to enhance their knowledge on a day-to-day basis, particularly with the information explosion such as e-mail and Internet facilities (Ocheibi and Buba 2003). According to Okoro and colleague, the primary reason why medical doctors need information is to obtain answers to clinical questions; they also need information to stay abreast of developments in clinical medicine (Okoro and Okoro 2009).

Internet has become an integral tool for the 21<sup>st</sup> Century physicians. Medical doctors who are not willing or ready to accept and use this technology will be missing valuable information relevant to their daily practice. A substantial amount of work has been done by information professionals and medical researchers addressing information needs, seeking and use among health care practitioners in a wide range of occupations and settings (Dee and Stanley 2005; Nwagwu 2008; Haines, Light et al. 2010). Previous researchers have investigated the use of electronic information resources by physicians (Bernard, Arnould et al. 2012), the preferred type of information sources (Kim, Bartlett et al. 2005; Wong and Veness 2005) and perceived barriers to accessing information for patient care (Mazloomdoost, Mehregan et al. 2008; Kirtz, Gschwandtner et al. 2013). However, there is limited information on the accessibility and utilization of online health information resources by medical doctors in training healthcare institutions in Nigerian.

## **Methods**

The descriptive survey design was used and total enumeration technique was adopted to cover a total of 1280 resident doctors in 13 training health care institutions in South-West Nigeria. The population of study are resident doctors undergoing professional training to qualify as specialists. A pre-tested self-administered questionnaire was used for data collection.

This paper is part of a large study on use of internet health information resources among resident doctors in tertiary healthcare institutions in South-West Nigeria. Ethical approval was granted by three of the healthcare institutions studied. Data for this study was collected between July and December 2011. Details of the methods used are available in two articles published earlier in *The Electronic Library* 2015, 43(1):102-119 and *African Journal of Medicine and Medical Sciences* [Supplement], 2014.

A questionnaire was used to gather data for the study. Data gathered and reported in this paper include Demographic details of the respondents, computer and internet accessibility,

frequency of accessibility of information resources at access points, purposes for use and constraints to use of health information resources. It also elicited information on the doctors' accessibility to Internet information resources such as Email, databases, search engines, EBM resources, Continuing Medical Education websites and full-text journals articles. Internet health information resources accessibility has twenty-four items in four points scale ranging from Very easily accessible = 4 to Not easily accessible =1. The highest point is four (4) and one (1) is the lowest. Internet health information resources accessibility has 24 items making a total of 96 when multiplied by 4, (the highest point). When the scores are high, Internet health information resources are Very Easily Accessible to the respondents but Not Easily Accessible when the scores are low. Constraints to use of internet health information resources contained twenty-four (22) questions on a 3 point scale ranging from Severe constraint =3, to not a Not a constraint=0. The total scores is 66, the higher the scores the more Severe the Constraints. When the score is low then, it is not a constraint to use of internet health information resources.

### **Methods of Data Analysis**

Data was analyzed using descriptive statistics including percentages, charts, means and standard deviation.

## **Results**

### **Demographic Profiles of the Respondents**

The demographic profiles of the respondents are presented in tables and charts.

### **Distribution of Respondents by Department**

Table 1 shows affiliation of the respondents by department. There were more doctors from departments in clinical medicine: Medicine 158 (17.5%), Family Medicine 128 (14.2%), Surgery 108 (12%) and Obstetrics /Gynaecology 99 (11%) than in Basic/Laboratory Medicine: Pathology 22 (2.4%), Hematology 21 (2.3%), Medical Microbiology/Parasitology 11(1.2) and chemical pathology 8 (0.9%).

**Table 1:** Distribution of Respondents by Department

	<b>Departments</b>	<b>Frequency (No)</b>	<b>Percentage (%)</b>
1	Medicine	158	17.5
2	Family Medicine	128	14.2
3	Surgery	108	12.0
4	Obstetrics and Gynecology	99	11.0
5	Paediatrics	84	9.3
6	Community Medicine/Community Health	75	8.3
7	Psychiatry/Mental Health	39	4.3
8	Ophthalmology	31	3.4
9	Radiology	31	3.4
10	Anesthesia/Intensive Care	28	3.1
11	Oral and Maxillofacial Surgery/ Dental Surgery	23	2.6
12	Pathology/Histopathology/Morbid Anatomy	23	2.6
13	Otorhinolargnology (ENT/)	21	2.3
14	Haematology	21	2.3
15	Medical Microbiology and Parasitology	11	1.2
16	Oncology/Radiotherapy	11	1.2
17	Chemical Pathology	8	0.9
18	Clinical Pharmacology	2	0.2
	<b>Total</b>	<b>901</b>	<b>100.0</b>

### Age, Sex and Educational Qualification of the Respondents

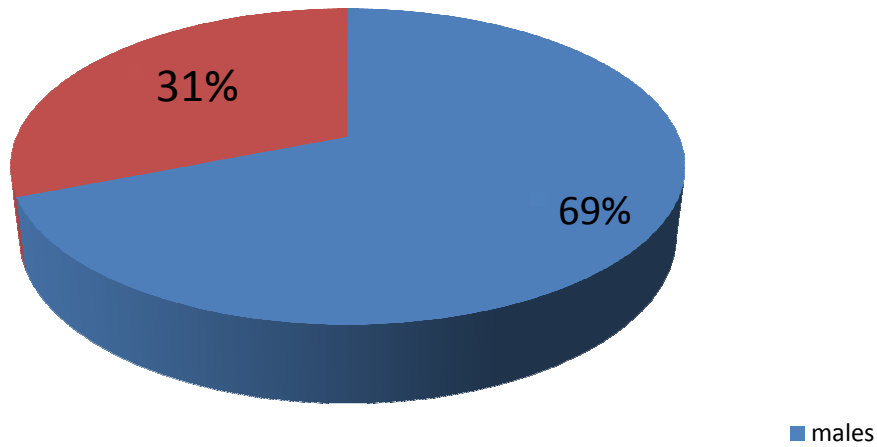
As shown in Table 2, majority (78.5%) of the respondents are within the 30-39 age brackets. The mean age of the respondents is  $34.0 \pm 4.46$  years. This result showed that the respondents are within their active academic and clinical service years. Figure 1 reveals the sex of the respondents. There are more males 69.0% than females (31.0%). The educational qualification of the respondents is shown in Figure 2. A great majority (93.5%) hold the Bachelor of Medicine and Surgery/ Bachelor of Dental Surgery (MBBS)/(BDS) degrees. While 2.5% have Post-graduate Diplomas, 1.7% respondents have MPH (equivalent of M.Phil) as their highest educational qualification.

**Table 2:** Age of the Respondents

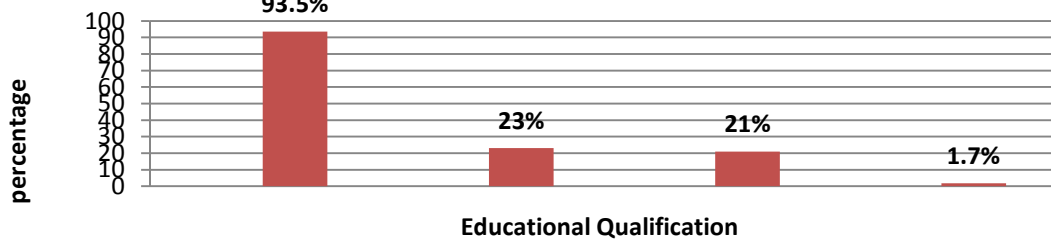
<b>Age Range</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Mean ( <math>\bar{X}</math> )</b>	<b>SD</b>	<b>Variance</b>
< 30	105	11.7	34.0	4.46	19.9
30-39	708	78.5			
40-49	81	9.0			
50 and above	7	0.8			
<b>Total</b>	<b>901</b>	<b>100.0</b>			



**Figure 1: Sex of the Respondents**



**Figure 2: Educational Qualification of the Respondents**



### **Respondents' Access to Computer and the Internet**

A total of 511(36.3%) respondents accessed the Internet from a computer at home and work with privately arranged Internet access subscription to telecommunication companies. Only 7.5% and 1.5% respondents accessed the Internet from the cyber café and the library respectively (Table 3).

**Table 3: Respondents Access to computer and the Internet**

<b>Internet Access Description</b>	<b>Frequency</b>	<b>Percentage</b>
Access to the Internet through private subscription from a computer at home and at work	511	436.3
Access via mobile telephone anytime anywhere	365	25.9
Access through private subscription from laptop at work	201	14.3
Access to the Internet through private subscription from a computer at home	159	11.3
Access at the cyber café	105	7.5
Access at work via a computer shared with up to 10 others	24	1.7
Access at work via a computer shared with up to 5 others	22	1.6
Access via a computer in the library	21	1.5
<b>Total</b>	<b>*1408</b>	<b>100.0</b>

\* Multiple responses are included

About half (49.2%) of the respondents accessed the Internet using Dial-up / USB modem while 42.0% used wireless connection. Less than half (47.0%) reported that the speed of their Internet connection was fair. Sixty-one percent respondent's paid Internet access fees from their pockets, 16.5% reported that it was paid for by their institution. While 7.4% have internet fees paid at subsidized rate at their institutions, 15.0% had no access at work.

### **Frequency of Internet Use in Access Points by Resident Doctors (N=901)**

Table 4 revealed the various access points where doctors used web-based health information. More than two-thirds (69.5%) accessed the internet daily at home and 56.8% used their mobile phones. While 19.6% accessed web-based health information resources weekly at the resident doctors' lounge, 19.4% did so in the clinic and 21.1% in hospital ward. Only 20.4% respondents accessed the internet monthly from cyber cafes and 18.3% did so weekly.

**Table 4:** Frequency of Internet use in different access points by the respondents (N=901)

Internet Access Points	Daily		Weekly		Monthly		Quarterly	
	No	%	No	%	No	%	No	%
Clinic	141	(23.7)	115	(19.4)	31	(5.2)	25	(4.2)
Ward	111	(21.1)	65	(12.3)	24	(4.6)	12	(2.3)
Home	535	(69.5)	141	(18.3)	33	(4.3)	7	(0.9)
Cyber café	21	(4.3)	90	(18.3)	100	(20.4)	95	(19.3)
Library	46	(10.3)	54	(12.1)	27	(6.1)	37	(8.3)
Friends/colleagues office	36	(9.1)	72	(18.1)	87	(21.9)	54	(13.6)
Computer Laboratory	22	(5.8)	4	(1.1)	10	(2.6)	17	(4.5)
ICT/IT Center	22	(5.5)	21	(5.4)	19	(4.9)	27	(6.2)
Resident's lounge	97	(19.4)	98	(19.6)	47	(9.4)	31	(6.2)
Mobile Phone	366	(56.8)	84	(13.0)	34	(5.3)	20	(3.1)

#### Accessibility of Internet Health Information Resources to by the respondents

Internet health information resources that are 'very easily' accessible to the respondents include Google ( $\bar{x}=3.65$ ,  $SD=0.67$ ) and Yahoo ( $\bar{x}=3.59$ ,  $SD=0.69$ ). E-mail ( $\bar{x}=3.44$ ,  $SD=0.70$ ), MEDLINE/PubMed ( $\bar{x}=2.77$ ,  $SD=0.91$ ), HINARI ( $\bar{x}=2.59$ ,  $SD=1.10$ ), reference material ( $\bar{x}=2.52$ ,  $SD=0.95$ ), online full-text articles ( $\bar{x}=2.49$ ,  $SD=0.99$ ) and e-books ( $\bar{x}=2.48$ ,  $SD=0.99$ ) were 'easily accessible' while Conference proceedings ( $\bar{x}=2.24$ ,  $SD=0.99$ ), Essential Health Links ( $\bar{x}=1.90$ ,  $SD=1.00$ ), Scopus, ( $\bar{x}=1.82$ ,  $SD=0.99$ ) and African Index Medicus ( $\bar{x}=1.79$ ,  $SD=0.94$ ) were occasionally accessible to the respondents.

**Table 5:** Accessibility of Internet Health Information Resources to doctors

<b>Internet Health information Resources</b>	<b>Mean ( <math>\bar{x}</math> )</b>	<b>SD</b>
Email	3.44	0.70
Email Discussion Forum	2.36	1.05
PubMed/MEDLINE	2.77	0.91
Scopus	1.82	0.99
African Index Medicus (AIM)	1.79	0.94
Web of Knowledge	2.24	1.14
Cochrane Library	2.12	1.05
Google	3.65	0.67
Yahoo	3.59	0.69
Google Scholar	2.94	1.10
HINARI	2.59	1.10
Essential Health Links	1.90	1.00
INASP PERI	1.73	0.94
African Journals Online (AJOL)	2.26	1.07
Bioline International (BI)	1.99	1.03
PubMed Central (PMC)	2.51	1.12
Directory of Open Access Journals (DOAJ)	1.82	1.00
Full-text journals from online journals	2.49	0.98
Electronic Books	2.48	0.99
Reference materials	2.52	0.95
Professional Association Websites	2.47	1.04
Journal websites	2.48	1.00
Conferences/meetings/ notices/proceedings	2.24	0.99
Continuing Medical Education (CME)	2.38	1.01

**Reasons for Use of Internet Health Information Resources by Doctors**

The reasons for use of internet health information resources by the respondents is shown in Table 6. The respondents use internet health information resources for preparation of Grand Round /Seminar presentation (98.8%), examination (94.5%), and research (93.1%). Other reasons for use of internet health information resources are communication (90.3%) and patient care (88.5%). More than half (53.3%) respondents do not use the internet for playing games.

**Table 6:** Uses of Internet Health Information Resources by Doctors

<b>Internet use items</b>	<b>Frequency</b>	<b>Percentage</b>
Research		
Yes	809	93.1
No	60	6.9
Communication		
Yes	781	90.3
No	84	9.7
Patient care		
Yes	762	88.5
No	99	11.5
Support teaching activities		
Yes	758	88.9
No	95	11.1
Preparation for presentation (review of patient cases/grand rounds and seminars)		
Yes	855	98.8
No	10	1.2
Preparation for certifying (Fellowship) examinations		
Yes	815	94.5
No	47	5.5
Continuing Medical Education (CME)		
Yes	651	76.9
No	196	23.1
Business		
Yes	420	50.5
No	412	49.5
Games		
Yes	338	46.7
No	442	53.3

### **Constraints to use of internet health information resources among doctors**

The constraints to use of Internet health information resources is shown in Table 7. A number of factors pose as constraints to use of internet health information resources by the respondents. Internet connection problems ( $\bar{x}=1.6$ ,  $SD=7.27$ ), Slow speed of Internet connection ( $\bar{x}=1.9$ ,  $SD=0.76$ ), login problems ( $\bar{x}=1.7$ ,  $SD=0.72$ ), low bandwidth ( $\bar{x}=1.8$ ,  $SD=0.85$ ), time constraint ( $\bar{x}=1.6$ ,  $SD=0.70$ ), high cost of access ( $\bar{x}=1.6$ ,  $SD=0.74$ ) and slow information download ( $\bar{x}=1.8$ ,  $SD=0.79$ ) were the constraints to use of Internet health information resources of doctors in tertiary health institutions in Southwestern Nigeria. The respondents did not consider level of privacy ( $\bar{x}= 1.2$ ,  $SD=0.56$ ), too much information on the Internet

( $\bar{x}$ =1.1, SD=0.54), language of content ( $\bar{x}$ =1.2, SD=0.54) and no access to computer ( $\bar{x}$ =1.2, SD=0.57) as constraints to use of Internet health information resources.

**Table 7:** Constraints to use of Internet Health Information Resources by Doctors

<b>Constraints to use of Internet information resources</b>	<b>Mean (<math>\bar{x}</math>)</b>	<b>SD</b>
Slow connection speed	1.9	0.76
Frequent power outages	1.9	0.77
Login problems	1.8	0.72
Low bandwidth	1.8	0.85
Slow information download	1.8	0.79
Time factor	1.6	0.70
High cost of access	1.6	0.74
Internet connection /connectivity problems	1.6	0.73
Accessibility of websites	1.5	0.65
No Internet access	1.4	0.67
Inadequate searching skills	1.4	0.65
Ease of use	1.3	0.60
Computer and Internet skills	1.3	0.60
Not able to find relevant information	1.3	0.63
Limited or no computers and Internet access at points of care	1.3	0.62
No training	1.3	0.64
Quality/accuracy of content	1.3	0.63
Privacy	1.2	0.56
Language of content	1.2	0.54
No access to computer	1.2	0.57
No Interest	1.1	0.51
Too much information	1.1	0.54

## Discussion

Access and use of the internet has become an integral part of our daily lives. Professionals from all works of life and disciplines now rely on the internet as a major source of information. This study was aimed at investigating accessibility and usage of internet health information resources by doctors in training healthcare institutions in Nigeria. The findings of the study showed that more than two-thirds (69.5%) accessed the internet daily from their homes. This figure is higher than that found among doctors in a teaching hospital in Ibadan, Nigeria where majority of the doctors accessed the internet from cyber cafes (Ajuwon 2006). It is however similar to a recent study among paediatricians in Pakistan (Bhatti 2014). A previous study (Ahmed and Yousif 2007) showed that more consultants accessed the internet more frequently at home for personal and professional purposes compared to junior doctors.

The possible reason why more doctors in this study used the internet at home than other access points may be due to availability of dialup internet connection via USB modem. This is a service provided at a fee by telecommunication companies namely Multilateral Telecommunication Network (MTN), Global Communications Limited (GLO), AirTell and Etisalat among others. One implication of this finding is that cyber cafes are no longer the major internet access points for majority of Nigerians as it were a few years back. This study confirmed the fact that many of the respondents accessed the internet from their home computers and mobile phones than cyber cafes. Another implication of this finding is that with internet access, the doctors are able to retrieve information resources relevant to their studies and for other purposes including preparation for examination, presentation and patient care. As internet service becomes readily available and affordable, the number of doctors who will be able to access internet health information resources in the comfort of their homes will increase. With internet access at home, respondents are also able to access information after work hours and don't have to jostle between work and information searching.

Use of mobile devices and smart phones has become widespread among different professionals including health care practitioners. In this study, more than half of the respondents used their mobile phones to access information resources on the internet. This finding is similar to that found in a previous study (ComScore 2012) but differs from an older study among doctors in Ile-Ife, Nigeria (Idowu, Ogunbodede et al. 2003) where mobile phones were used. Use of mobile phones for accessing online information has become prevalent in recent times due to technological advancement and ownership of mobile devices and smart phones that have internet facilities either through Wifi or other plans with service providers. Recent studies have shown that health professionals now use mobile devices and smart phones to access online health information for work related purposes (Ozdalga, Ozdalga et al. 2012; Ventola 2014 ).

A number of information resources are used on a daily basis and these include search engines and email for communication. Doctors and patients are increasingly using the internet to search for health related information. Google is the most popular and commonly used search engine on the World Wide Web (Tang and Ng 2006). In this study, Google and Yahoo are the major internet search engines "Very Easily Accessible" and used by the respondents. This is consistent with previous findings (Ajuwon 2006; Tang and Ng 2006; Dolan 2011). This implies that search engines are regarded as an easy means of searching online health information by the

respondents. This may be because search engines are easy to search and also load very fast. However, knowledge of different information sources by doctors will enable them to make efficient and effective use of the resources available on the internet in order to address their information needs. Also, Google and Yahoo are easily accessible to the respondent because they are free on the internet. Although, there are other free resources that were reported not to be easily accessible to the respondents probably due to lack of awareness.

Use of the internet for health and medical information by health care professional has greatly increased (Podichetty, Booher et al. 2006). This study showed that the participants used internet health information resources more for academic purposes including preparation for presentation, examination and teaching. This finding is similar to a previous study (Okoro and Okoro 2009) in which the most common reason why 90.0% of the males doctors consult medical literature was to prepare for examination, care development and updating of knowledge while their female counterparts' most seek information to update their knowledge followed by preparation for examination and career development. This finding is consistent with those of a previous survey among paediatricians in which web-based information resources were used for medical literature search (Bhatti 2014). Also, this study shows that 88.5% respondents used internet health information resources for patient care purposes (Ajuwon 2006; Prendiville, Saunders et al. 2009) This finding is similar to those of two older studies (Ajuwon 2006; Prendiville, Saunders et al. 2009) in which the respondents used internet resources for clinical information for patient care purposes. The implication of these findings is that doctors consider internet resources useful for both academic and clinical work purposes.

Another important finding of this study is that information sources such as Essential Health Links, African Index Medicus, Bioline International, PubMed Central and Directory of Open Access Journals though available free on the Internet, yet, respondents reported they are "Not Easily Accessible". This could mean that they are not aware of the existence of these sources of health information. As a result, respondents did not take advantage of these sources of health information. It could also mean that some of them are aware of the existence of these online resources but do not have "searching skills" hence, they claimed the resources are 'not easily accessible'.

In this study, a number of factors were reported by the respondents as constraints to use of internet health information resources. One of the major constraints that limit usage of online



health information resources among medical doctors in Nigeria is frequent power cut/outages. Frequent power outages is a major infrastructural problem in Nigeria and it affects every facet of the nation. This problem is not limited to health care institutions alone. Without power supply, it is difficult to connect to the internet and retrieve health information.

Time factor is one of the constraints faced by health care practitioners in using internet health information resources. Medical doctors have very busy clinical schedules and do not have time to access internet resources during work hours. The doctors spend more time in carrying out clinical duties and have limited time to access internet resources. This finding is consistent with previous research (Ahmed and Yousif 2007; Mazloomdoost, Mehregan et al. 2008; Bernard, Arnould et al. 2012; Kirtz, Gschwandtner et al. 2013) where time constraint was found to be a limiting factor to use of internet among medical practitioners.

Another constraint to use of internet resources is slow connection speed. In most of the healthcare institutions surveyed, the doctors reported that the speed of internet connection is slow therefore, it takes long to download relevant and needed documents from the internet. This could be as a result of low bandwidth which is another constraint to Internet use. The bandwidth in the various institutions are thin as a result, the connection speed is slow and make internet download time longer and frustrating to users. This problem is worse when downloading video clips and journal articles and books that runs into several pages. This finding is similar to that found by other researchers in Nigeria and other countries (Isah 2010; Idowu and Oduwole 2011; Bhatti 2014; Adeniji, Babalola et al. 2015). The challenged posed by slow speed of the internet can be addressed by increasing the bandwidth in the various institutions.

Another factor reported as constraint to use of internet health information resources by the respondents is cost of access. In Nigeria like many sub-Saharan African countries, cost of access is a major barrier to use of the internet. Internet access is still expensive in many countries in Africa. In this survey, respondents reported that cost is one of the constraints to their use of internet health information resources. This finding is consisting with previous studies (Ahmed and Yousif 2007; Mazloomdoost, Mehregan et al. 2008; Bernard, Arnould et al. 2012). Power outages is another constraint that affects use of internet health information resources by medical practitioners in training health institutions in Nigeria. Frequent power cut is a major infrastructural problem in Nigeria. It affects every facet of Nigeria including political, social, educational and economic development. Other studies have also found that power outages or frequent power cut is

one of the constraints to use of electronic resources. Kinengyere and colleagues in their study found that unreliable power supply was a barrier to use of electronic health information resources in universities in Uganda (Kinengyere, George et al. 2012). Findings of a recent study on awareness and use of electronic resources in Nigeria showed that power outage is one of the constraints (38.0%) to usage of electronic resources among librarians

## **Conclusion**

Internet use at home has increased with more people now accessing information online with their mobile phones. Accessibility to online clinical and health information is essential for good academic performance and better health outcomes. Usage of internet health information resources by doctors are limited due to the following constraints, slow speed of connection, frequent power outages, login problems, low bandwidth, slow downloading speed, lack of time, and high connection costs. Librarians in the 13 healthcare institutions should intensify effort in promoting information literacy skills to health care professionals, create awareness on available resources and teach doctors how to access and retrieve online health information. The management of the 13 healthcare institutions should make available internet facilities to encourage use of online information resources by medical professionals.

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