The level of Internet access and ICT training for health information professionals in sub-Saharan Africa

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Abstract

Background: Information and Communication Technologies (ICTs) are important tools for development. Despite its significant growth on a global scale, Internet access is limited in sub-Saharan Africa (SSA). Few studies have explored Internet access, use of electronic resources and ICT training among health information professionals in Africa.

Objective: The study assessed Internet access, use of electronic resources and ICT training among health information professionals in SSA.

Methods: A 26-item self-administered questionnaire in English and French was used for data collection. The questionnaire was completed by health information professionals from five Listservs and delegates at the 10th biannual Congress of the Association of Health Information and Libraries in Africa (AHILA).

Results: A total of 121 respondents participated in the study and, of those, 68% lived in their countries' capital. The majority (85.1%) had Internet access at work and 40.8% used cybercafes as alternative access points. Slightly less than two-thirds (61.2%) first learned to use ICT through self-teaching, whilst 70.2% had not received any formal training in the previous year. Eighty-eight per cent of respondents required further ICT training.

Conclusions and recommendations: In SSA, freely available digital information resources are underutilized by health information professionals. ICT training is recommended to optimize use of digital resources. To harness these resources, intergovernmental and non-governmental organizations must play a key role.

Background

Information and Communication Technologies (ICTs) were viewed as one of the principal tools to bridge the 'north to south' health information gap, initially, via CD-ROMs and currently through the Internet. Systematically harnessed ICTs have been shown to improve the health of populations in many developed countries through the empowerment of those who access and use information.[1] Unfortunately, ICTs have not been thus harnessed in developing countries, including those in sub-Saharan Africa.[2]

Sub-Saharan Africa (SSA) is comprised of 53 different African countries including 47 countries on the mainland and the six surrounding island nations. The continent is commonly divided along the lines of the Sahara, the world's largest desert, which covers a huge area across the northern half of the continent. The region south of the desert is known as sub-Saharan Africa.[3] SSA consists of four regions namely: East, West, Central and Southern Africa.

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ICT is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning.[4] ICTs are often spoken of in a particular context, such as ICTs in education, health care or libraries. 'New' ICTs tend to focus on the electronic or digital end of the spectrum such as e-mail, the Internet, mobile phones and digital (video) camera.[5]

The use of ICT for health—or 'eHealth'—represents one of the key instruments for health care delivery and public health.[6] ICTs are fundamental for health systems to meet obligations, to deliver care, pursue research, educate students, treat patients and monitor public health. ICTs in their many forms are essential for co-ordinating complex activities, ensuring quality, fostering collaboration and sharing the body of knowledge in health.[6] This advancement is changing how health care is delivered and how health systems are run. ICTs offer unique opportunities for developing countries to narrow the development gap with industrialized countries. They have the potential to assist developing countries 'leapfrog' entire stages of development.[7] The Internet component of ICTs is an enhanced means of acquiring and sharing useful information and of multilateral communication.[8]

Equitable and universal access to health care information is an important part of the worldwide strategies to reduce global disparities in health and to achieve the health-related Millennium Development Goals (MDGs).[9] To achieve health-related MDGs by 2015, health information professionals in SSA countries have a critical role to play in optimizing access to ICT. Key variables necessary for the successful application of these tools are free access to Internet-based health information resources, reliable and cost-effective access to the Internet and the required skills to identify and appraise relevant information. With viable access to the Internet, a significant body of health-related information would be available to users in developing and transitional countries.[10–12] These are countries in which access to information and communication resources is limited, particularly in SSA and Asia[13] regions with the lowest access to ICT.[14]

According to information from AllAfrica Global Media, Internet connectivity in Africa is growing at a faster pace than any other region worldwide. In July 2007, there are 33.5 million Internet users in Africa, or 3.6% population penetration. This contrasts with a 69.5% penetration in North America and 17.8% worldwide. This shows a 641% increase in SSA Internet access since 2000.[15] In 2006, the largest African populations of Internet users exist in South Africa (3.6 million users);[16] Egypt (5 million users); Morocco (3.5 million users) and Kenya (1.5 million users).[17] The number of regular Internet users may be larger than reported because of access through cybercafes and other multiperson access points.

Capacity building is essential in order to bridge a 'knowledge divide' and facilitate a more equal partnership and resultant information sharing between the industrialized and developing countries.[18] As noted, having access to the materials and legal rights to utilize the information are two key components. However, without proper training and education, including in-service training/ courses, the available resources will be underutilized. Health information professionals need to develop expertise in information management, searching, downloading and evaluation of Internet-based health information resources. In addition, they need to acquire communication and information repackaging skills, proficiencies for the critical appraisal of the medical literature, writing and editing for peer review expertise, plus organizational building competencies.[10,19,20]

Previous studies have focused on knowledge and utilization of ICT among students, academics and health care professionals.[21–26] There has been little research in exploring Internet access and ICT competencies among health information professionals in SSA. The main objective of this study was to assess Internet access and ICT training among health information professionals in SSA.

Methodology

The Association of Health Information and Libraries in Africa (AHILA) 10th biannual Congress and the e-mail discussion forums (AHILA-NET, HIF-NET, AFRO-NET, FAME and NLA Online-Forum) served as the platform or channel through which study participants were recruited.

Study population

This descriptive cross-sectional survey was carried out between August and October 2006. The study population consisted of health information professionals who were either members of AHILA and or subscribers to any of the five e-mail discussion forums/Listservs (AHILA-NET, AFRO-NET, HIF-NET, FAME and NLA-Online Forum). AHILA is a professional association for medical librarians in Africa. Founded in Kenya in 1984, AHILA has 41 member countries and holds its Congress biannually. The main aim of the association is to promote closer association between health information professions and also high standards for health information services, education and research in Africa. AHILA-NET is the Listserv for AHILA members, while AFRO-NET and HIF-NET are e-mail discussion forums for health workers, health information professionals and others interested in health-related issues within Africa. FAME is an e-mail discussion forum for African Medical Editors and NLA-Online Forum is the Listserv for members of the Nigerian Library Association.

Instrument for data collection

A standardized 26-item questionnaire was used for data collection. The questionnaire, which was designed to be self-administered, elicited information on respondent's background, Internet access, ICT training received and ICT instructional needs. It also contained two sets of useful training topics—ICT-related skills and information accessing skills. A 5-point scale (where 5 stands for 'expert', 4 'somewhat expert', 3 'average', 2 'beginner' and 1 'no skills') was used. The questionnaire was originally designed in English and later translated into French to encourage participation by French-speaking members.

Method of data collection

The questionnaire was administered in two ways. Firstly, the researchers posted on the Internet the questionnaire with a covering letter to AHILA-NET, AFRO-NET and HIF-NET between August and September 2006. As a result of cross-posting,

members of two additional Listservs—the Forum for African Medical Editors (FAME) and the Nigerian Library Association Online Forum (NLA-online Forum)—received and completed the questionnaire. To encourage full participation, the authors sent three reminders to the potential respondents through the Listservs. By the end of September 2006, the researchers had received 56 completed questionnaires.

Secondly, in order to encourage broader participation, the authors printed and distributed the questionnaire, in both English and French to delegates at the 10th AHILA Congress held in Mombasa, Kenya, 23–27 October 2006. It was ensured that delegates who had completed the questionnaire online did not complete the printed version. Conference participants, who had been unable to complete the questionnaire online, had another opportunity to do so. The authors both attended the meeting and received 65 completed (print) questionnaires. Altogether, a total of 121 respondents completed the questionnaire, either online or the printed version.

Data management and analysis

The completed questionnaires were collated, keyed into the computer and frequencies were generated using Microsoft Excel. The analysis was carried out using the EPI-Info software developed by the US Centers for Disease Prevention and Control (CDC).

Results

Demographic profile/background of respondents

Table 1 summarizes the demographic profile of the respondents. The majority (74.4%) were health information professionals, 40.5% of whom had been employed in their current positions for more than 10 years while 19.8% had been working for 1–4 years. More than two-thirds (68%) of the participants resided in their country's capital cities, 24.3% were in satellite cities or large towns and 7.6% lived in rural areas. Figure 1 shows respondents' country of residence: Kenyans constituted 33.1% of the respondents, while 16.5% were from other East African countries; other

Table 1 Demographic profile/background of respondents (*n* = 121)

Variables	*n*	%
Status		
Health information professionals	90	74.4
Health workers (doctors, nurses and others)	31	25.6
Employment in current position		
< 1 year	12	9.9
1–4 years	24	19.8
5–9 years	23	19.1
≥ 10 years	49	40.5
No response	13	10.7
Source of questionnaire		
E-mail discussion forums/Listservs	55	45.4
AHILA 10th Conference, Kenya	64	52.9
No response	2	1.7

regions of Africa represented were Central Africa (6.6%), West Africa (13.2%) and Southern Africa (22.3%).

Internet access

Table 2 shows participants' Internet access. A total of 85.1% respondents claimed they had access to the Internet at work, 14.9% did not. Less than half (44.7%) had a dedicated link within their organization to an Internet service provider (ISP) and 21.3% had Internet access within the organization to a server with satellite. When asked to describe the reliability of their Internet connection at work, 41.7% reported that it was 'good' while 27.2% claimed theirs was 'very good'; however, 6.8% stated that theirs was 'poor/very poor'. With regard to Internet speed at work, 35.9% respondents claimed that it was 'good' and 33% described theirs as 'average'. Forty-one per cent of the respondents used cybercafes as an alternate outlet for Internet access. Researchers (65.2%) were the primary audience for the information obtained from the Internet, followed by clinicians (53.7%) and administrative staff (52.9%). Figure 2 presents respondent's reasons for using the Internet. While 88% respondents searched full-text documents for work-related purposes, 40% did so for personal use and 80% claimed they used e-mail for work-related purposes. A large majority (74.4%) were aware of the African Index Medicus (AIM); 25.6% were not. Of those aware, 54.4% used it 'sometimes' and 21.1% 'never' used it.

Table 3 summarizes health information professionals' use of Internet resources. Less than half (45.4%) of the respondents claimed they 'often' searched MEDLINE/PubMed. Google was the most popular search engine, used by 71% respondents; 50.5% searched the World Health Organization (WHO) website 'sometimes'. Health Internetwork Access to Research Initiative (HINARI), International Network for the Availability of Scientific
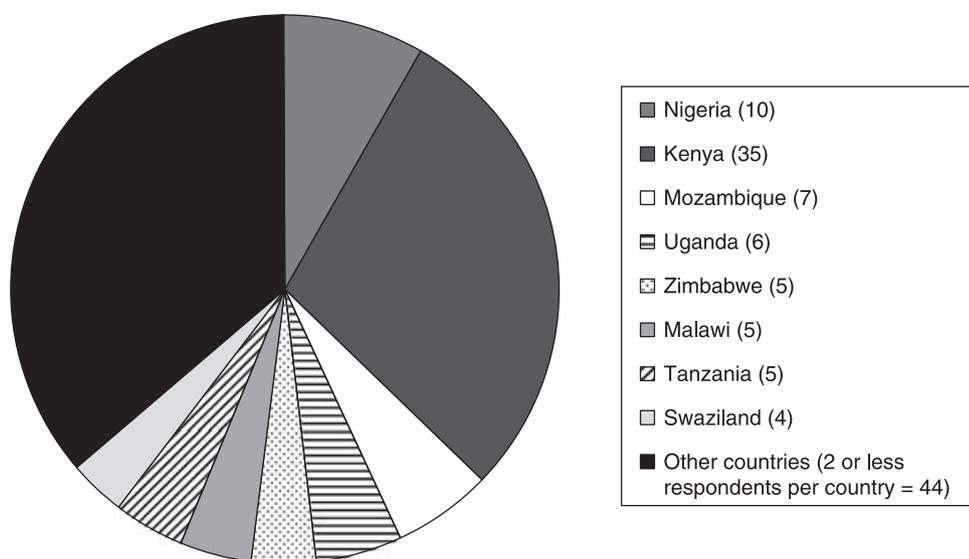

Figure 1 Number of survey respondents' country of residence

Legend:
- Nigeria (10)
- Kenya (35)
- Mozambique (7)
- Uganda (6)
- Zimbabwe (5)
- Malawi (5)
- Tanzania (5)
- Swaziland (4)
- Other countries (2 or less respondents per country = 44)

Table 2 Internet access, awareness and use of the African Index Medicus (AIM) database by African health information professionals (*n* = 121)

Variable	*n*	%
Do you have Internet access at work?		
Yes	103	85.1
No	18	14.9
What type of Internet link do you have at work?		
Phone line/modem	17	16.5
Dedicated link within an organization to an Internet service provider	46	44.7
Internet link within an organization to a server with satellite	22	21.3
Direct link to a server with satellite access	17	16.5
Network link via a consortia	1	1.0
Reliability of Internet access at work		
Very good	28	27.2
Good	43	41.7
Average	25	24.3
Poor/very poor	7	6.8
Description of Internet speed in the institution		
Very good	18	17.5
Good	37	35.9
Average	34	33.0
Poor/very poor	14	13.6
Other Internet access points		
Internet cafe (cybercafe)	42	40.8
At home	15	14.6
At a friend's house	4	3.8
None	42	40.8
Are you aware of the existence of African Index Medicus (AIM)		
Yes	90	74.4
No	31	25.6
How frequently do you use African Index Medicus?		
Never	19	21.1
Sometimes	49	54.4
Often	21	24.5
Users of information obtained (*n* = 121)*		
Self	47	38.8
Clinicians	65	53.7
Researchers	79	65.2
Administrative staff	64	52.9
Government ministry officials	42	35.5
Non-governmental organizations staff	37	30.6
Students	19	15.7
Consumers	38	31.4

*Multiple responses.

Publications (INASP) Health Links, other health information gateways and websites of other health organizations were 'never' accessed by 39.6, 57, 70.3 and 41.3% of respondents, respectively. Figure 3 summarizes the type of health information accessed by the respondents. The most 'often' accessed categories were research materials (71%), public health information (65%) and clinical information (50%).

Training

As shown in Table 4, the majority (70.2%) did not receive any formal training on use of ICT during
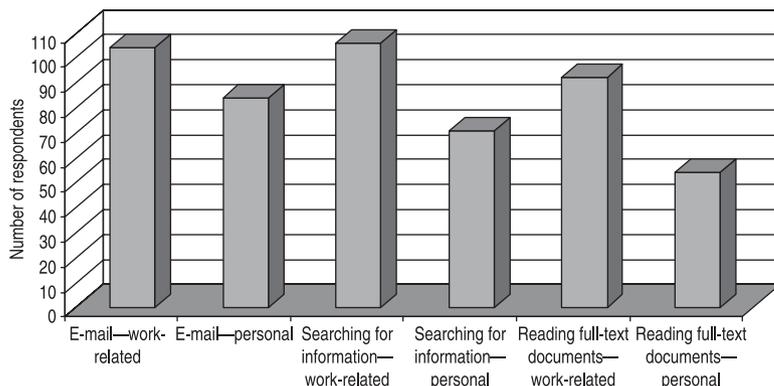
Figure 2 Respondents' reasons for using the Internet; *n* = 121 (with multiple checks)
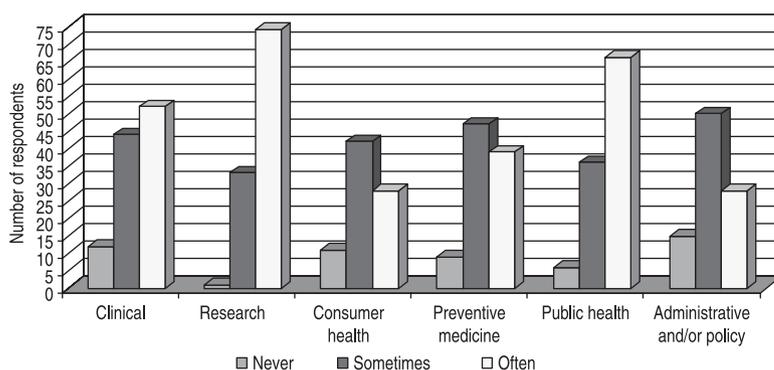

Figure 3 Type of health-related information accessed; *n* = 121 (with multiple checks)

Internet resources used	Never %	Sometimes %	Often %
MEDLINE/PubMed	19.0	35.6	45.4
Google search	9.2	19.8	71.0
Other search engines	38.8	29.8	31.4
HINARI	39.6	26.5	33.9
Other full-text journal sources	46.3	27.3	26.4
INASP Health Links (gateways)	57.0	29.8	13.2
Other gateways for health information	70.3	15.7	14.0
WHO website	23.2	50.4	26.4
Websites of other health organizations	41.3	33.9	24.8
AHILA-Net, HIF-Net and AFRO-Net	54.5	19.0	26.5
Other e-mail discussion groups	57.9	18.1	24.0

Table 3 Internet resources and type of information accessed by African health information professionals

AFRO-Net, African Networks for Health Research and Development; AFRO, African Region; AHILA, Association for Health Information and Libraries in Africa Electronic Discussion Group; HIF, health information professional; HIF-Net, Health Information Forum Discussion List; HINARI, Health Internetwork Access to Research Initiative; INASP, International Network for the Availability of Scientific Publications; WHO, World Health Organization.

Table 4 Health information professionals in sub-Saharan Africa (SSA) and Information and Communication Technologies (ICT) training (*n* = 121)

Variable	*n*	%
How did you first learn to use ICT/E-resources?		
Self-taught	74	61.2
Family, friend, colleague	10	8.3
Short course (paid)	9	7.4
Library training	18	14.8
In-house training at work	10	8.3
Did you receive formal training in ICT in the previous 1 year?		
Yes	36	29.8
No	85	70.2
Have you ever received ICT training in previous years?		
Yes	52	43.0
No	69	57.0
What skills did you acquire from previous ICT training? (*n* = 121*)		
Microsoft Word	67	55.3
E-mail/Internet	70	57.8
Search online databases (PubMed)	62	51.2
Download full-text articles from HINARI	45	37.2
Search engines	61	50.4
Database design	41	33.9
Digitization processes	25	20.7
Copyright/data protection	16	13.2
Online discussion lists	36	29.8
HTML	32	26.4
Java/Java Script	32	26.4
What factors affect attendance at ICT training courses? (*n* = 121*)		
Lack of budget	63	52.0
Pressure of current workload	43	35.5
No courses at location	24	19.8
Personal/family commitments	15	12.4
Do you require further ICT training?		
Yes	106	87.6
No	15	12.4
What training format do you prefer? (*n* = 121*)		
Online training via e-mail	38	31.4
Face to face with an instructor	72	59.5
PowerPoint presentations	39	32.2
Practical training involving hands on	83	68.5

*Multiple responses.
HINARI, Health Internetwork Access to Research Initiative.

the year preceding the research. When asked how they first learned to use ICT, 61.2% of the respondents noted self-training. When asked what skills they had acquired from previous ICT training, 57.8% of respondents had received e-mail instruction, 55.3% had been given training in Microsoft Word and Office software and 51.1% on database searching. Major impediments to attendance in ICT-related training were lack of budget (52.0%) and heavy workload (35.5%). The majority (87.6%) required ICT training; preferred training formats are hands-on instruction (68.5%) and face-to-face interaction with an instructor (59.5%).

The training needs of health information professionals on ICT are shown on Table 5. A total of 48.8% of respondents ranked using computers and finding information on the Internet as 'essential' topics. Also ranked 'essential' were online database searching (51.2%) and using online journals (59.5%). For all categories, the responses ranged from 80.2% (evaluating information on the Internet) to 61.2% (using evidence-based medicine services). Figure 4 shows ICT training topics that respondents perceived to

Areas of information skills training (topics)	Essential %	Useful %	Not useful %
Using computers	48.8	28.9	22.3
Searching databases on CD-ROM	34.7	35.5	29.7
Finding information on the Internet	48.8	32.2	19.0
Evaluating information on the Internet	43.8	36.4	19.8
Searching online databases	51.2	29.7	19.0
Using online journals	59.5	33.9	6.6
Using evidence-based medicine (EBM) services	43.0	18.2	38.8

Table 5 Usefulness of 'information skills training' among health information professionals in sub-Saharan Africa (SSA; *n* = 121)
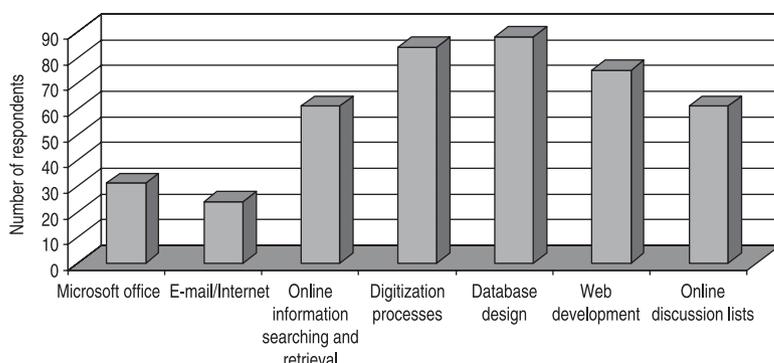

Figure 4 ICT-related skills—usefulness of training topics; *n* = 121 (with multiple checks)

Table 6 Competence ranking (1–5) of Information and Communications Technology (ICT) among health information professionals in sub-Saharan Africa (SSA; *n* = 121**)**

Resources	Expert (5) %	Somewhat expert (4) %	Average (3) %	Beginner (2) %	No skill (1) %
Searching databases on CD-ROM	14.9	29.8	15.7	14.0	8.3
Internet/web browsing	27.3	24.8	24.8	6.6	1.7
E-mail	35.5	33.1	11.6	2.5	1.7
E-mail discussion lists/Listservs	19.0	21.5	21.5	13.2	9.9
Search engines	19.0	28.9	24.8	10.7	5.8
Searching online databases (PubMed/MEDLINE)	20.7	39.6	16.5	10.7	5.0
Searching online journals (HINARI) and other digital archives	19.8	25.6	19.8	13.2	12.4

be useful. The majority (80%) of the respondent's ranked database design as 'useful'; the ranking of other topics are digitization process (80%), web development (70%), online discussion lists (50.4%) and online information searching and retrieval (50.4%).

Table 6 summarizes participants' perceived ICT competencies. They claimed to be 'somewhat expert' in searching online database/PubMed (40%) and accessing online journals (HINARI)/other

digital archives (26%). In the use of e-mail and Internet/web browsing, 35.5% and 27.3% respondents', respectively, claimed to be 'experts' while 25% claimed 'average skills' in using search engines.

Discussion

Internet penetration in SSA over the past few years has been largely confined to the major cities,

where only a minority of the total population lives.[12,14,16] In this study, 92.4% of the respondents who had Internet access lived in the capital, satellite cities or large towns, while only 7.6% resided in rural communities. The explanation for this is that Internet connectivity requires infrastructure, including electricity, which is available mainly in urban areas in many parts of Africa. The majority (85.1%) of the respondents claimed they had access to the Internet at work because they cannot afford to have Internet access at home. In many African countries, individuals cannot pay the huge cost of personal Internet connection, because ISPs in the region have to pay the full cost of leased lines to Internet backbones which are outside the continent, resulting in high connection charges.[14,16]

The cybercafe was the most prominent alternative outlet for Internet access. Similar findings have been reported in Nigeria and Uganda.[21–24] Cybercafes are popular because they offer affordable pay-as-you use services. However, there are several problems associated with the use of cybercafes, including lack of privacy and the fact that these cafes typically are rowdy.[23]

Although 74% of the respondents were aware of AIM, a regional database being co-ordinated by the WHO in collaboration with AHILA to store regionally generated biomedical information, only 24.5% used it 'often' while 25% 'never' used it at all. Yet, AIM was created to reduce the lack of access to health information produced in Africa or by African researchers. It was intended to improve access to information resources relating to health in African countries and to give greater visibility to health and biomedical research carried out in the region.[27] AIM is underutilized, probably because of its inherent limitations, including the fact that it contains only abstracts, whereas many users would prefer having the full text of an article.

The goal of HINARI, INASP Health Links and many other web resources is to bridge the digital health information divide between the north and the south. Unfortunately, the majority of our study participants underutilized these resources. Another underutilized resource is MEDLINE, which was 'often' used by only 45% of the respondents. Our findings differ from a study in the USA where

40% of the practitioners 'never' or 'almost never' performed literature searches from online sources such as MEDLINE.[28] There are two possible explanations for the underutilization of these resources, namely limited Internet access and poor infrastructure, especially electricity. We suggest two interventions to address this problem: infrastructural development would improve access to the Internet and electricity supply; training is required to increase awareness and improve the skills that professionals need to take full advantage of these valuable resources.

Google was the most popular search engine, used 'frequently' by 71% of the respondents. This figure is comparable with findings from to a previous study[22] in which 78% of the respondents used Google, but higher than that found in another study carried out in Nigeria[23] where 58% respondents used this search engine. Google is popular for several reasons, including the fact that it loads easily and it requires no specialized searching skills.

Approximately 30% of the study participants had received formal training in the use of ICT; this figure is lower than findings from a study carried out in Ile-Ife, Nigeria, where 54% respondents had received some form of ICT training.[25] More than one quarter of the respondents (32.2%) were self-taught in the use of ICT, a finding that agrees with those of Salmons,[29] Renwick[30] and Samuel *et al.*[26] The fact that 43% claimed that lack of budget was responsible for their inability to attend ICT training/courses in their workplace is a reflection of the poor funding status of many institutions in SSA. It is, however, encouraging that a large proportion (88%) of the participants perceived the usefulness of training to improve their capacity to use ICT. Similar findings have been reported by others.[26,31,32]

Limitations of the study

The data from this study must be interpreted with caution because participation was limited to membership of only Listservs and attendance at the 10th AHILA Congress. Therefore, these findings cannot be generalized to all health information professionals in SSA. In addition, we could not determine how representative our sample was because some members of Listservs did not

indicate their current status when joining the list. Consequently, it was difficult to separate members who were health information professionals from other categories of health workers. Finally, some list members did not indicate whether they were practicing in Africa or elsewhere. It was therefore difficult to determine the total number of list members who were residing and practicing in SSA and thus give an accurate response rate for this study.

Conclusions and recommendations

This study reiterates that Internet penetration and access in SSA remains low. While access is available in the capital cities, frontline health workers in remote villages do not have this information option. A follow-up study should assess the information needs of health information professionals in non-urban settings (primary and district levels) and develop strategies for meeting these requirements.

The study restates the need for continued training in the use of ICT for health information professionals. What is required is an increase and co-ordinated effort to improve ICT and information management skills of health information professionals in SSA. There is need for organizations such as the AHILA and WHO, African Region (AFRO) to initiate the forming of consortia to facilitate the use of Internet-based information and training issues. Such training should focus on reaching all levels of potential users from urban and rural regions so that they are able to acquire the necessary knowledge and skills.

Regarding specific information needs, more attention should be directed toward ensuring free access to resources such as medical references, drug formularies and medical handbooks. These resources are of critical value to the vast majority of health information professionals in SSA and predominantly to health workers in primary and district care facilities. Internet-based health information should be repackaged in various formats, in different languages and then made available to those underserved in the rural areas, particularly the frontline health workers.

From governmental, inter-governmental and non-governmental organizations, there needs to be an increase in health information funding. African governments in particular should do much more to ensure expansion of Internet access beyond the capital cities. Improvements in connectivity will require a major ICT initiative, which will in turn require substantial and sustained funding.

Such sustained efforts by all the principal stakeholders will foster the environment that is necessary for the harnessing of the potential of ICT for the delivery of health information in developing and transitional countries. Without proper attention and financial support, the required package of components (free or cost-effective access to information, a viable level of hardware and bandwidth, reliable supply of electricity and training for multiple levels of health professionals in various settings) and the access 'for all' to health information component of the Millennium Development Goals will not be reached by 2015.

Key Messages

Implications for Policy

- Health Information Professionals (HIP) play a critical role in optimizing access to ICT in Africa.
- With limited access to ICT (Internet) in sub-Saharan Africa, there is an urgent need for appropriate intervention including infra-structural development and improved funding.

Implications for Practice

- African HIP underutilize freely available digital health information resources, thereby undermining their efficient job performance.
- ICT skills of HIP will improve with increased and coordinated training.

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