

Challenges of ICTs Utilization among Health Professionals: The Case of Public Hospitals in Addis Ababa, Ethiopia

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Keywords ICTs; Health professionals; ICTs utilization; Challenges; Public hospitals; Ethiopia

Abstract

Background: Information Communication Technologies (ICTs) play vital roles to enhance the effectiveness and efficiency of healthcare industries worldwide. However, its utilization in developing countries is very limited. This study was aimed to identify challenges of ICTs utilization among health professionals working in hospitals, Addis Ababa, Ethiopia.

Methods: A cross-sectional quantitative study was done among 320 health professionals in February 2015. Health professionals were selected systematically from the alphabetical lists/ registration book/of health professionals in each hospital. Trained data collectors used a pretested self-administered questionnaire to collect data on different variables. Epi Info version 3.5.4 and SPSS version 20 were used to edit and analyze data respectively. Descriptive statistics to describe study subjects and bi/multi variable regression analysis to identify ICTs utilization factors were used. Odds ratio at 95% Confidence Interval (CI) was used to describe the association between dependent and independent variables.

Result: A total of 312 (97.5%) health professionals responded to the questionnaire. More than half of health professionals (58.0%) aged between 25-30 years. Only 141 (45.0%) and 135 (43.0%) were computer literate and had computer access respectively. For those who had computer access, 115 (85.0%) used it in their daily activities. Of 123 (39.0%) respondents who have printer/photocopy services, 68 (55.0%) used printers to assist their work. Nearly two-third, 197 (63.0%) of health professionals accessed the internet using mobile/computer. Less than half, 148 (47.0%) of health professionals have awareness on the application of ICTs in the health system. Age, educational status, computer access, personal initiation, infrastructure, computer literacy, poor internet connection, budget shortage and management style were significant factors to health professionals' ICTs utilization in the study area.

Conclusion: Health professionals accessed and utilized ICTs inadequately to manage their patients. Personal (age, education level, computer skills, initiation/awareness), management style, infrastructure and resource shortage were factors for limited ICTs access and utilization. Improving ICTs access, computer literacy, internet connection, personal ICTs awareness and management are important to improve ICTs access and utilization among health professionals working in hospitals, Addis Ababa, Ethiopia.

Background

Information and Communication Technologies (ICTs) have been defined as “any product that will process, store, manipulate and communicate information electronically in a digital form” [1,2]. ICTs are crucial to solve data management, poor evidence based decision-making and clinical communication challenges [3-5]. Health information technologies are considered as critical to improve the efficiency and effectiveness of healthcare industries [6-8]. Customers' need, competition, educational needs, communication and innovation of different healthcare softwares contributed more in the adoption of ICTs in healthcare systems worldwide [9-13].

To have informed health professionals, who are the backbone of quality healthcare services, there must be appropriate health information sources [14,15]. Different scholars agreed as ICTs are valuable media to access, retrieve and circulate recent and relevant information among health professionals [12,16,17]. Nowadays, hospitals and health centers become more advantageous from the adoption of ICTs [18-21]. Medical record systems, telemedicine, video conferences, audio-video teaching materials, internet and e-learning are some of the applications of ICTs in healthcare businesses [22-25].

Even though ICTs are very important in healthcare systems, its adoption rate is very limited in the resource-limited countries [21,26-28]. Due to this fact and other contributing factors, healthcare facilities from developing countries have experiences of poor data management, weak evidence-based decision-making practices, encounter of various medical errors and poor planning [11,26,29-32]. Poor infrastructure, management problems, skill related issues, resource shortage, poor ICTs access were considered as factors for the presence of limited ICTs access and utilization in the health facilities in developing countries [33-36].

The aim of this study was to identify important ICTs utilization challenges among health professionals from the selected hospitals in Addis Ababa, Ethiopia. The findings of this study will serve as evidence to Federal ministry of health, Addis Ababa Health Bureau, hospital administrators and None Governmental Organizations (NGOs) to identify hindering factors to access and use ICTs and plan for appropriate interventions to solve the problem. It will also be important evidence for the coming researchers interested in the issue.

Methods

An institution based cross-sectional quantitative study was conducted in February 2015 to assess factors in accessing and utilizing ICTs among healthcare professionals working in public hospitals under the Addis Ababa Health Bureau/ AAHB. Addis Ababa is a capital city of Federal Democratic Republic of Ethiopia with a population of 2,738, 248 [35,37]. The city has 10 administrative sub cities and 99 Kebeles. There are 38 hospitals (10 public and 28 NGO and private). Often, public hospitals, five are owned by the AAHB [38]. During the study period, there were a total of 1200 healthcare professionals in different departments of five hospitals owned by AAHB.

Healthcare professionals who were working in those five hospitals during the study period were study population for this study. The sample size of the study was determined using Epi Info version 3.5.4 by taking total population N=1200, challenges of ICTs utilization of healthcare professionals (p) is 50% since there was no previous study there and precision error (d) = 0.05 at 95% CI and 10% contingency. Then, the actual sample size for the current study was $291+29=320$.

There were 279, 169, 156, 275 and 303 health professionals in Zewuditu memorial hospital, Ras-desta Damtew memorial hospital, Gandhi memorial hospital, Menellik II hospital and Yekatit 12 hospital respectively. Sample size for each hospital was determined proportionally based on the total number of health professionals in each hospital. Each sample from each hospital was selected systematically from the alphabetical databases of health professionals.

Data were collected using a pretested self-administered questionnaire. The questionnaire was developed by referring different related studies [38-41]. Socio-demographic characteristics, ICTs utilization practices and challenges on ICTs utilization were the basic contents of the questionnaire. The tool was prepared in English, translated into Amharic (local language) and then translated back to English to check its consistency. The tool was validated through pretesting at the Black lion hospital, which is similar in infrastructure to the studied hospitals. Three data collectors and two supervisors were participated in the data collection process.

Ethical clearance for this study was obtained from Addis Ababa Health Bureau Ethical Reviewing Committee. Informed verbal consent was taken from the head of each hospital. Written consent was also taken from each study participant after clear explanation of the purpose, data collection procedures and data confidentiality issues.

The author conducted a one day training on the objective of the study, data collection procedure, the contents of the questionnaire, data confidentiality, respondents' right and data quality issues to the data collectors and supervisors prior to the actual data collection date. Data collectors also informed health professionals about the objective

of the study, data collection procedures, data confidentiality and their rights during data collection. The author and supervisors conducted supportive supervision, daily on data collectors. Data collectors, supervisors and the author checked data quality daily.

After data collection, the author edited data manually and entered it to the computer using Epi Info version 3.5.4 for further editing. Edited data were then exported to the SPSS version 20 statistical software for analysis. Descriptive statistics were used to describe study population in relation to relevant variables. Binary logistic regression analysis was computed to see the effect of each study variable on the outcome variable. Variables having p value <0.2 on the bivariate analysis were entered into a multivariate logistic regression analysis to check confounding effect on the association from bivariate analysis. The strength of association was described using odds ratio at 95% CI.

Result

Socio-demographic characteristics of study participants

Three hundred twenty self-administered questionnaires were distributed among the health professionals working in hospitals under AAHB. The majority (97.5%) of them were completed and analyzed. Nearly two-third, 189 (61.0%) of health professionals were females. More than half of the health professionals (58.0%) were within 25-30 years. The mean, standard age of health professionals was 28 ± 4 years.

Table 1: Socio-demographic characteristics of health professionals from selected public hospitals in Addis Ababa, Ethiopia, 2015.

Study variables	Responses	Value (%)
Age in years:	20-24	56 (18.0%)
	25-30	181 (58.0%)
	31-36	45 (14.0%)
	37-42	30 (10.0%)
Sex:	Male	123 (39.0%)
	Female	189 (61.0%)
Educational level:	Diploma	82 (26.0%)
	Degree and above	230 (74.0%)
Professional category:	Nurse	181 (58.0%)
	Med. laboratory personnel	37 (12.0%)
	Medical doctor	28 (9.0%)
	Pharmacy personnel	30 (10.0%)
	Health officers	16 (5.0%)
	Other categories	19 (6.0%)
Working experience:	≤5 years	144 (46.0%)
	6-10 years	94 (30.0%)
	11-15 years	51 (17.0%)
Monthly salary in birr:	≥16 years	23 (7.0%)
	>1450.00	254 (81.0%)
	≤1450.00	58 (19.0%)
Computer literacy:	Yes	141 (45.0%)
	No	171 (55.0%)
Reasons for computer illiteracy:	Absence of computer centre	70 (41.0%)
	financial problem	58 (34.0%)
	time shortage	32 (19.0%)
	less attention to ICTs	11 (6.0%)
ICTs awareness:	Yes	148 (47.0%)
	No	164 (53.0%)
Job satisfaction:	Yes	104 (33.0%)
	No	175 (67.0%)
Reasons for job dissatisfaction:	Poor salary	65 (37.0%)
	Poor learning opportunity	52 (30.0%)
	Management problems	32 (18.0%)
	Facility related problems	26 (15.0%)

Three-fourth (74.0%) of health professionals were degree and above holders. More than half, 181 (58.0%) of the respondents were nurses followed by 37 (12.0%) medical laboratory personnel. More than half (54.0%) of health professionals have >5 years professional working experiences. About 4/5th (81.0%) of health professionals earned 1450.00 Ethiopian Birr/ETB/monthly (Table 1).

Of the total study participants, only 141 (45.0%) were computer literate (can perform at least office applications and internet services). Absence of computer center 70 (41.0%), financial problem 58 (34.0%), time shortage 32 (19.0%) and less attention to ICTs 11 (6.0%) were mentioned reasons to be computer illiterate. Less than half (47.0%) of health professionals knew ICTs and their applications in the health system. Only 104 (33.0%) of health professionals were satisfied with their current job. Poor salary 65 (37.0%), poor learning opportunity 52 (30.0%), management problems 32 (18.0%) and facility related problems 26 (15.0%) where some of the causes for job dissatisfaction (Table 1).

ICTs access and utilization among the healthcare professionals

One hundred thirty five (43%) health professionals had computer at office. Of those who had computer access, 115 (85.0%) used computers in their daily activities: Recording and storing documents 45 (39.1%), report writing 48 (41.8%) and 22 (19.1%) internet services were major activities using those computers (Table 2).

A large number of health professionals, 278 (89.0%) can access fax services. Very limited number of respondents, 123 (39.0%) have printer/photocopy services. Ink shortage 28 (51.0%), electric shortage 19 (35.0%) and management problems 8 (14.0%) were reasons for not using printers/photocopy. Only 62 (20.0%) and 54 (17.3%) of health professionals reported the presence of mini library services in Menelik II and Zewuditu memorial hospitals respectively. Similarly, 51 (16.0%) from Menelik II and 42 (13.0%) from Zewuditu memorial hospitals mentioned as there is an internet connection inside the hospitals (Table 2).

Of the total study participants, 197 (63.0%) had access to mobile/computer internet services (Google engine) inside and outside hospitals. Of these, 98 (50.0%) encountered problems while using the internet. Skill problems 48 (50.0%), poor internet connection 29 (29.0%) and internet cost 21 (21%) were challenged users faced (Table 2).

Challenges of ICTs utilization among the healthcare professionals

Health professionals raised several challenges to their poor ICTs utilization in daily activities. Major mentioned challenges were educational status, poor infrastructure, management problems, computer illiteracy, resource shortage, poor staffs' initiation, absence/poor internet connection, poor ICTs awareness, poor computer access, workload and absence of responsible body to ICTs (Table 3).

The majority (76.0%) of health professionals indicated the presence of poor infrastructure for ICTs utilization. More than half, 187 (60.0%) of the respondents reported the presence of management problem in relation to ICTs access and utilization. A Large number of health professionals (80.0%) mentioned resource shortage as a factor to ICTs utilization. More than half (61.0%) and 119 (38.0%)

Table 2: ICTs access and utilization among health professionals working in public hospitals in Addis Ababa, Ethiopia, 2015.

Variables	Responses	Value (%)
Computer access at office:	Yes	135 (43.0%)
	No	177 (57.0%)
Internet connection inside hospital:	Yes: Minilik : Zewuditu	51 (16.3%)
	No: (the rest 3 hospitals)	42 (13.5%)
		219 (70.2%)
Fax services at hospitals:	Yes	278 (89.0%)
	No	34 (11.0%)
Printers/photocopy availability:	Yes	123 (39.0%)
	No	189 (61.0%)
Computer utilization in daily activities:	Yes	115 (85.0%)
	No	20 (15.0%)
Purpose of computer use:	Storing documents	45 (39.1%)
	Report writing	48 (41.8%)
	Internet services	22 (19.1%)
	Skill related	32 (24.0%)
Problems encountered while computer use:	Electricity	37 (27.0%)
	No	66 (49.0%)
Using fax services:	Yes	231 (83.0%)
	No	47 (17.0%)
Using photocopy/printing services:	Yes	68 (55.0%)
	No	55 (45.05)
Reasons for not using photocopy services:	Ink shortage	28 (51.0%)
	Electric problem	19 (35.0%)
	Managerial problem	8 (14.0%)
Presence of library services:	Yes: Minilik : Zewuditu	62 (20.0%)
	No: (the rest 3 hospitals)	54 (17.2%)
		196 (62.8%)
Mobile/computer internet use (Google search engine):	Yes	197 (63.0%)
	No	115 (37.0%)
Problems encountered while using internet:	Skill related	48 (50.0%)
	Connection problem	29 (29.0%)
	Internet cost	21 (21.0%)

of health professionals indicated as there were poor staff initiation and time shortage respectively. Large number (70.0%) health professionals reported the absence of internet connection within their organizations. Only 121 (39.0%) health professionals showed their feeling to access and use computer and related technologies to assist their activities. More than half, 189 (61.0%) of health professionals indicated the absence of responsible body/office for ICTs in their working area (Table 3).

Based on the results from bivariate and multivariate logistic regression analysis, respondents' age, educational status, computer literacy, resource availability, management style, computer access, internet connection, staffs' initiation, ICTs awareness and infrastructure were statistically significant to ICTs utilization of health professionals. The odds of ICTs utilization among health professionals aged <=30 years to manage patients was OR=2.57, 95% CI [1.45, 4.56] compared with their counter parts. Degree and above holders were 3.17 [1.80, 5.59] times to use ICTs than diploma holders. Computer literates were 2.78 [2.01, 5.10] times in assisting their activities through ICTs compared with computer illiterates. Respondents who have computer access and ICTs awareness used 7.12 [5.32, 13.56] and 3.02 [2.15, 6.27] times ICTs in their activities than their counterparts respectively. Management problem and poor infrastructure can limit respondents' ICTs utilization by 51.0% and 73.0% (Table 3).

Table 3: Variables associated with the ICTs utilization of health professionals in public hospitals, Addis Ababa, Ethiopia, 2015.

Variables	ICT utilization		COR (95% CI)	AOR (95% CI)
	Yes (%)	No (%)		
Age in years:				
≤30	140 (45.0%)	97 (31.0%)	2.57 [1.45, 4.56]	1.91 [1.08, 3.12]
>30	27 (9.05)	48 (15.0%)	1	1
Sex:				
Male	73 (23.0%)	50 (16.0%)	1.48 [0.91, 2.40]	1.10 [0.68, 1.21]
Female	94 (30.0%)	95 (31.0%)	1	1
Educational status:				
Degree & above	140 (45.0%)	90 (29.0%)	3.17 [1.80, 5.59]	2.31 [1.42, 4.35]
Diploma	27 (8.0%)	55 (18.0%)	1	1
Working experience:				
≤5 years	70 (22.0%)	74 (24.0%)	0.69 [0.43, 1.11]	0.32 [0.24, 1.02]
>5 years	97 (31.0%)	71 (23.0%)	1	1
Monthly income in Birr:				
≤ 1450	26 (9.0%)	32 (10.0%)	0.65 [0.35, 1.20]	0.43 [0.21, 1.09]
>1450	141 (45.0%)	113 (36.0%)	1	1
Job satisfaction:				
Yes	57 (18.0%)	47 (15.0%)	1.08 [0.66, 1.78]	0.86 [0.32, 1.13]
No	110 (35.0%)	98 (32.0%)	1	1
Computer literacy:				
Yes	89 (29.0%)	52 (17.0%)	2.04 [1.26, 3.30]	2.78 [2.01, 5.10]
No	78 (25.0%)	93 (30.0%)	1	1
Computer access:				
Yes	115 (37.0%)	20 (6.0%)	13.82 [7.51, 25.66]	7.12 [5.32, 13.56]
No	52 (17.0%)	125 (40.0%)	1	1
Poor internet connection:				
Yes	106 (34.0%)	113 (36.0%)	0.49 [0.29, 0.84]	0.32 [0.24, 0.65]
No	61 (20.0%)	32 (10.0%)	1	1
Refreshment training:				
Yes	98 (31.0%)	50 (16.0%)	2.70 [1.66, 4.40]	3.02 [2.15, 6.27]
No	69 (22.0%)	95 (31.0%)	1	1
Poor staffs initiation:				
Yes	76 (24.0%)	114 (37.0%)	0.22 [0.13, 0.37]	0.45 [0.29, 0.71]
No	91 (29.0%)	30 (10.0%)	1	1
Management problem:				
Yes	87 (28.0%)	100 (32.0%)	0.49 [0.30, 0.80]	0.31 [0.22, 0.61]
No	80 (26.0%)	45 (14.0%)	1	1
Poor infrastructure:				
Yes	110 (35.0%)	127 (41.0%)	0.27 [0.15, 0.51]	0.43 [0.32, 0.81]
No	57 (18.0%)	18 (6.0%)	1	1
Resource shortage:				
Yes	117 (37.0%)	134 (43.0%)	0.19 [0.09, 0.40]	0.38 [0.21, 0.63]
No	50 (16.0%)	11 (4.0%)	1	1
Work load/time shortage:				
Yes	70 (22.0%)	49 (16.0%)	1.41 [0.87, 2.30]	1.91 [0.97, 4.08]
No	97 (31.0%)	96 (31.0%)	1	1

Discussion

Even though computer literacy is a backbone for ICTs utilization, more than half (55.0%) of health professionals in the study area were computer illiterates due to the absence of computer training center, monetary problem, time shortage and less attention to it. This finding was in line with the study findings from Ethiopia [41] and Nigeria [42] where 53.0% and 52.0% of health professionals were computer illiterates respectively. However, it is a very small figure compared with another study from Nigeria teaching hospital [43], where 93.0% of hospital doctors were computer literate. This may be due to the variation in infrastructure, computer access, resource and training centers access between the two countries. In addition, variations in the working environment situation/ being teaching hospital for Nigerian case/ and personal interests are potential reasons for this variation.

Only 135 (43.0%) health professionals had access to computers in the study area. It clearly showed that most of the respondents did not have computer in their offices. This is very low compared with the

study findings from the Black Lion Hospital, Addis Ababa [44], where 75.0% of physicians used computers in managing their patients. The variation could be resulted since Black Lion Hospital is a teaching hospital for medical students and it is also the only central hospital for any referral cases from different regions of Ethiopia. The Black Lion Hospital is also giving telemedicine services than the studied hospitals. As a result, this hospital may have relatively better facilities such as computer, internet connection, specialists, consultation services and management than those studied hospitals.

Computer access in Nigeria teaching hospital [43] is more than double (94%) compared to the current funding (43%). The most probable reasons for this great gap may be geographically, resource, management style, personal and governmental commitments, donors access, computer literacy, policy and infrastructure variations between these countries. In addition to these variations, the Nigerian hospital is a teaching hospital, which is expected to have a better working environment to access evidences and better skilled manpower, which could be another potential reason to the variation in computer access

compared to our situation. However, the 43% computer access in this study is relatively higher compared with study findings from South Africa [40] in which 31.0% of health professionals accessed computers to assist their daily activities. The potential reason for this variation may be study period variation of the two studies (2000 and 2015).

In the case of computer utilization for daily activities, only 37.0% out of the total respondents used computers to assist their daily tasks. It is very low compared to various studies on health professionals [39,40,43,44]. Poor computer access, managerial problems, computer illiteracy, resource shortage, less attention from staffs and poor infrastructure are the most accepted reasons for the presence of low computer utilization in the study area.

In the study area, only limited departments (TB clinics, ART clinics, TB-HIV, pharmacy and laboratory) owned those limited number of computers. This is supported by different studies [42,45]. The most valuable reasons could be the presence of sensitive public health cases and sensitive/confidential data in those departments. All these cases are also the cases in the world and needs attention from different directions. Therefore, a computer system is more preferable to process and handle such vital data. For this reason, there are relatively better interventions/supports (computer and relative devices, internet, installation of medical record systems, training and budget) from the government and various NGOs to those departments.

More than half (63.0%) of health professionals health professionals accessed Internet service using their mobiles and desktops (Google search engine). It is relatively the largest figure compared with study findings in Ethiopia [26,46], where internet access among health professionals during need assessment was 33.0% and 45% respectively. The most acceptable reasons for this variation could be study period variation (2002, 2005 and 2015), infrastructure, computer literacy, personal initiation and management concerns in 2002, 2005 and 2015. On the other hand, the magnitude of current internet access among health professionals is lower compared with results from different studies: Ethiopia [44] and Nigeria [39,43], where 88.0%, 98.0% and 96.0% of physicians used the internet services to access information for their daily activities. The logical reason for this discrepancy could be the nature of hospitals (the current studied hospitals are not primarily teaching hospitals, but Black Lion hospital [44] and Nigerian [43] are teaching hospitals) so may have relatively better setups/ infrastructure to access internet. It may also be due to the limited computer access and illiteracy, budget constraint, absence/limited internet connection and poor personal initiation in this study area compared with Nigeria Teaching hospital.

Of those who used internet services, 98 (50.0%) encountered problems while using the internet due to skill problems, poor internet connection and high internet costs. These hindering factors were also mentioned as determinant factors in various study findings from Ethiopia [26,41,44] and South Africa [40].

Age, educational status, computer illiteracy, computer access, poor internet connection, training on ICTs, poor staffs' initiation, management problems, infrastructure and resource shortage were significant variables (P -value <0.05) to ICTs utilization among health professionals in this study (Table 3). This finding is highly supported by various study findings from developed and resource limited countries [27,32,39,40,42,45]. It is obvious that personal awareness

and interest, computer skills, hospital setups, computer access, management concern and internet connection are interconnected or complimentary components to each other while talking about ICTs access and utilization in a certain service delivery organizations such as hospitals. Therefore, the above-mentioned determinant factors are vital to determine individuals' ICTs utilization status.

Conclusion

Even though ICTs play a central role to deliver timely and evidence based quality healthcare services, the majority of health professionals accessed and used ICTs inadequately to manage their patients in this study. More than half of the respondents were computer illiterates and poorly initiated to use ICTs. Socio demographic (Age, educational status), skill related problems (computer literacy, training), infrastructural (poor computer access, absence/poor internet connection, setups, resource constraint) and management style were important factors in limited ICTs utilization. Improving the infrastructures, management, computer access and literacy, internet connection and training/ICTs awareness is important to improve ICTs utilization among the health professionals in the study area.

Authors' Contributions

Mulusew Andualem Asemahagn/MAA/ did all activities starting from topic selection, proposal development, paper write-up, manuscript preparation and reviewing activities with the consultation of senior advisors and researchers.

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