

# Knowledge and use of Information and Communications Technology in healthcare delivery among healthcare providers in Ketu South municipality

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## Research Article

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# Abstract

**Background:** According to research, Information Communication Technology (ICT) adoption is linked to increased productivity and economic growth. The benefits of using Information Technology (IT) in the health field are well-known and can help in the promotion of; patient-centered care, care quality, and education of health workers and patients. Despite this, IT implementation is complicated and requires changes at multiple levels, including patients, healthcare practitioners, and healthcare organizations. Hence, this study seeks to examine the level of knowledge and use of ICT among healthcare practitioners' in delivering healthcare.

**Materials and Methods:** A descriptive cross-sectional study design was used with a structured questionnaire administered to 198 participants. Data was entered into Epi-data version 4.0, cleaned before being exported to Stata version 17 for analysis. Frequency tables were used to display the background characteristics. Cross tabulation was also done to determine the association between Knowledge, socio-demographic, utilization of information and barriers to use of ICT in healthcare delivery.

**Findings:** Overall, 126 (63.6%) were women. Majority of the respondents (56.1%) had good knowledge about ICT, a great portion of the respondents (69.7%) had utilized ICT and the top four usage of internet by the respondents were, for research, for social media, access to news and for mailing in the proportions of 33.1%, 25.3%, 21.8% and 19.8 respectively.

**Conclusion:** Even though a great portion of healthcare providers in Ketu South Municipality preferred using ICT tools in working we discovered knowledge and usage gaps. Therefore, we recommend health workers be frequently trained on how to effectively use computers in healthcare delivery in order to successfully integrate ICT into our healthcare system.

## Background

The rise and evolution of technology has prompted a reconsideration of how technology may be employed in healthcare delivery. Its constant growth and widespread usage has had a tremendous impact on all sectors of society, making it impossible to provide services or even function without them. The use of ICT in healthcare has grown increasingly important in decentralized healthcare to the point where in developed countries, the use of ICT for healthcare delivery has been studied extensively with the majority of them making significant progress (1) having successfully integrated IT improvements into their healthcare systems, resulting in improved care (2). With its countless successes in improving healthcare delivery, the application of IT innovations in healthcare has gained significant recognition over the last 20 years.

Even though ICT implementation is difficult and necessitates changes at all levels of the healthcare system (3), it has become increasingly important in the health industry for improving healthcare delivery and promoting health education. With its immense benefits to the health industry, ICT has become a topic of interest to governments, organizations, and individuals. Proper integration of ICT in healthcare delivery

brings about services such as electronic health records, e-prescribing, patient records, clinical guidelines, computerized chronic condition monitoring, and pharmaceutical and biology item barcode readers reduce medical errors and health-care costs (4) as well as bridge geographical gaps and increase patient access to healthcare.

The application of ICT in rural regions has the ability to improve people's lives. The Kenyan integrated mobile Maternal and New-born Child Health Information Platform (KimMNCHip), for example, is considerably improving the health of pregnant women and mothers with children under the age of five in Kenya (6). According to (7) study on the level of ICT integration in the Hohoe Municipal Hospital (HMH), both patients and physicians recognize that the benefits of ICT are higher in quantity, and they are prepared to buy into the idea if it becomes a reality.

Despite all the benefits ICT has to offer, its implementation remains a challenge that requires changes at numerous levels. The current ICT infrastructure in Ghana has not been properly integrated and networked to sustain the healthcare delivery system (8). In order to fully benefit from the use of ICTs in the healthcare industry, the Ministry of Health (MoH) and the Ghana Health Service (GHS) developed an eHealth strategy which aims to use ICT's advantages and benefits to improve Ghana's health system. This study therefore seeks to evaluate healthcare professionals' knowledge, use of ICT in healthcare delivery, and impediments to use of ICT in health care in the Ketu South municipality.

## **Materials And Methods**

### **Study design and study setting**

A descriptive cross-sectional study was conducted among 198 health care providers in the Ketu South Municipality in the Volta Region. The largest town in the municipality is Aflao which is situated at its most eastern tip and also serves as the main gateway to Lome, the capital of the Republic of Togo. Aflao registered a populace of 37,350 during the 2010 population Census out of an overall population of 160,756 in the Municipality. In Aflao, there are almost 9000 established houses with petty traders and fishermen making up the majority of the population in the area.

### **Study population**

The study population consisted of professional healthcare providers which included doctors, nurses, physician assistants etc. who worked in various health facilities in Ketu South Municipal.

### **Inclusion and Exclusion criteria**

This study included all Healthcare providers in Ketu South Municipal and excluded those who declined to give their consent and those who were absent from work during the period of data collection.

# Variables

The study used a multivariable technique which took into account a quantitative approach based on a series of reviews conducted both in Ghana and abroad. Knowledge of participants, utilization of ICT were the dependent variables while the independent variable included the socio-demographic characteristics of the participants.

## Sampling and sample size determination

Morgan's formula was used to determine the study's sample size which was 198 healthcare providers in the municipality. The health personnel were chosen from the various health facilities using a simple random sampling (lottery method) procedure. Each health worker in the sampling frame was allocated a number. The given numbers were written on paper, folded neatly into a bowl, and thoroughly mixed. A health worker was allowed to pick a piece of paper from the folded pieces of papers, which was remixed after each pick until the number of healthcare providers required for the study were reached.

## Data collection and quality management

Data was collected using a well-structured questionnaire which consisted of four parts, namely; Demographic characteristics, Knowledge on ICT/computer use, Utilization of ICT/computers and Barriers to utilization of ICT. The reliability and validity of the questionnaire was determined via pre-testing among healthcare providers in Akatsi North District, Ave-Dakpa. Data entry was done using Kobo collect, downloaded as a Microsoft Excel File and exported to Stata 17.0 for analysis. Data cleaning was done at every stage to ensure there was quality data.

## Data analysis

Data gathered was screened for completeness and consistency after which was entered using Kobo collect. It was then exported to Stata version 17 for further cleaning and analysis. Descriptive statistics was used for frequencies and percentages of categorical variables. Furthermore, composite variables were created using the mean scores with values below the mean score coded as '0' and those above the mean score as '1'. Inferential statistics was used for chi-square, T-test, and logistic regression. Chi-square test was used to determine relationship between the explanatory and outcome variables while binary and multiple linear regression were used to test for the strength of association between Knowledge, socio-demographic, utilization of information and barriers to ICT use in Ketu South Municipality's healthcare delivery. T-test also was used for mean comparison among groups. A probability value of 0.05 and below was used to judge the statistical significance.

# Ethical approval and consent to participate

Ethical approval for this study was sought from the University of Health and Allied Sciences Research Ethics Committee (UHAS-REC A.10[114] 21-22), an approval from the Municipal Director of Health and an introductory letter from the university (UHAS) was also obtained. Moreover, participants were allowed to give consent by word of mouth. After an informed consent form was read to participants clearly explaining the purpose of the study before the questionnaires were administered.

## Results

### Socio-demographic characteristics

A sum of 198 people was recruited with a 92% response rate. Overall, 126 (63.6%) more women than men responded to the survey. A large proportion of the respondents were single 119(60.1%) as compared to those married 79(39.9%). The largest population of respondents were Christians-177(89.4%), followed by the Muslims-18(9.1%) and the Traditionalists-3(1.5%). The number of respondents who were Ewe's were 106, Akan's were 73 and other ethnicities were 19 whose ratios were 53.5%, 36.9% and 9.6% respectively. In addition, when it comes to the respondents' total number of years of employment, 159 (80.3%) respondents indicated that they have been working less than and up to ten years now, 26 (13.1%) indicated working 11 to 19 years now and the remaining 13 (6.6%) have worked 20 years and above.

### Knowledge on Information and Communication Technology

The study showed that 168(84.8%) agreed that computers can help communication in health while the rest 30(15.2%) disagreed with the statement. 175(88.4%) believed that ICT facilitates collaboration and cooperation among health workers. Again, many respondents summing up to 114(57.6%) agreed that ICT supports health research, its dissemination and access to its findings. Also, two-thirds of the respondents 132(66.7%) agreed that companies with email may no longer need to use the postal system. Thirty-five (17.7%) disagreed that ICT can monitor the incidence of public health threats and 163(82.3%) agreed that ICT can monitor the incidence of public health threats. 167(84.3%) of the respondents said messages can be sent by email to every PC network instantly. There was also a good knowledge score of 56%.

### Healthcare professionals' level of ICT usage

Majority of the respondents (193) had an email address. One hundred and thirty-two (132) respondents said they use online medical journal/organization subscription in their field of study. Majority of the respondents 155(78.3%) accessed the internet 4 times and/or more in a week, 37(18.7%) respondents accessed the internet about 2 to 3 times per week and the remaining 6(3.0%) respondents accessed the internet only once a week. Also, 108 (54.6%) of the respondents used PowerPoint presentations twice or more in a week, 50 (25.2%) respondents used it once a week and 40(20.2%) respondents did not use it at all in a week. Of the uses of the internet stated by respondents, research was the main use followed by social media, news and mailing. In all, the overall ICT utilization was good (69.7%).

# Barriers To Utilization of Information and Communication Technology

From the data obtained, 105 respondents (53%) agreed that using ICT or computers put them at risk. The majority, 158 (79.8%), disagreed that the electronic system wastes time. Again, 143 respondents (72.2%) agreed that poor internet accessibility is a problem that compromises the efficient use of ICT. Furthermore, 100 (50.5%) respondents confirmed that the inability to use computers is a barrier to the use of ICT in healthcare delivery. In sharing their views, the respondents also identified that “the use of computer and internet brings laziness”, 142 (71.7%) disagreed while the remaining 56 (28.3%) agreed with the above statement.

## **Association between Knowledge, socio-demographic, utilization of information and barriers to ICT use in Ketu South Municipality's healthcare delivery.**

To determine whether there was an association between socio-demographic knowledge, utilization of information and barriers to use of ICT, chi-square test and logistic regression analysis was conducted. Of the variables presented, poor internet accessibility and inability to use computers were significantly associated with the use of ICT in healthcare delivery. The study used the 5% significance level. However, the remaining variables after the analysis was conducted revealed that they were not significant to the use of ICT (Table 1).

Table 1

Association between socio-demographic, knowledge, utilization of information and barriers to use of ICT in healthcare delivery

Variables	Knowledge on information technology		Chi-Square	P-Value	COR (95% CI), p-value	AOR (95% CI), p-value
	Poor Knowledge (87) n (%)	Good knowledge (111) n (%)				
Age						
≤ 30	40(49.4)	48(43.2)	0.76	0.6884		
31 to 49	41(47.1)	59(53.2)				
50+	3(3.5)	4(3.6)				
Sex						
Female	57(65.5)	69(62.2)	0.24	0.626		
Male	30(34.5)	42(37.8)				
Marital status						
Married	36(41.4)	43(38.7)	0.14	0.706		
Single	51(58.6)	68(61.3)				
Religion						
Christianity	77(88.5)	100(90.1)	3.35	0.187		
Islam	10(11.5)	8(7.2)				
Traditional	0(0.0)	3(2.7)				
Ethnicity						
Akan	31(35.6)	42(37.8)	0.17	0.919		
Ewe	48(55.2)	58(52.3)				
Others	8(9.2)	11(9.9)				
Type of certificate						
Certificate	13(14.9)	18(16.2)	2.55	0.636		
Degree	31(35.6)	50(45.1)				
Diploma	37(42.5)	36(32.4)				
Master’s degree	3(3.5)	3(2.7)				

Variables	Knowledge on information technology		Chi-Square	P-Value	COR (95% CI), p-value	AOR (95% CI), p-value
	Poor Knowledge (87) n (%)	Good knowledge (111) n (%)				
PhD	3(3.5)	4(3.6)				
<b>How long working as health worker</b>						
≤ 10	69(79.3)	90(81.1)				
11 to 19	15(17.2)	11(9.9)				
20+	3(3.5)	10(9.0)				
<b>Job title</b>						
Nurse	56(64.4)	67(60.4)	0.53	0.912		
Public health officer	3(3.5)	3(2.7)				
Medical doctor	13(14.9)	19(17.1)				
Technical officer	15(17.2)	22(19.8)				
<b>Utilization of technology</b>						
No	44(50.6)	46(41.4)	1.64	0.200		
Yes	43(49.4)	65(58.6)				
<b>IT or computer poses dangerous physical threats</b>						
Disagree	46(52.9)	47(42.3)	2.17	0.141		
Agree	41(41.1)	64(57.7)				
<b>The electronic system is time-wasting</b>						
Disagree	68(78.2)	90(81.1)	0.26	0.612		
Agree	19(21.8)	21(18.9)				
<b>Use of computer and internet brings laziness</b>						
Disagree	59(67.8)	83(74.8)	1.16	0.281		



Variables	Knowledge on information technology		Chi-Square	P-Value	COR (95% CI),	AOR (95% CI),
	Poor Knowledge (87) n (%)	Good knowledge (111) n (%)			p-value	p-value
Agree	28(32.2)	28(25.2)				
<b>Poor internet accessibility</b>						
Disagree	34(39.1)	21(18.9)	9.88	0.002	Ref.	Ref.
Agree	53(60.9)	90(81.1)			2.75(1.45–5.22), 0.002	2.46(1.26–4.81), 0.008
<b>Inability to use computers</b>						
Disagree	50(57.5)	48(43.2)	3.95	0.047	Ref.	Ref.
Agree	37(42.5)	63(56.8)			1.77(1.01–3.13), 0.048	1.40(0.77–2.55), 0.276

## Discussion

### Knowledge on Information and Communication Technology.

This study showed that 53% had good knowledge on Information and Communication Technology. The findings from this study were higher than observations made from a study conducted among health science students at the University of Gondar, North Western Ethiopia that 51% of the respondents had knowledge of ICT (9) and however, another study conducted among health sciences students of the University of Ghana to determine their knowledge and use of ICT which observed that students have a nearly 99% literacy rate in computers (10). Findings from another study conducted in Tafo Government Hospital indicated that the personnel had a good understanding of how to use ICT to deliver healthcare (11). The majority of respondents (40%), claimed in the questionnaire that they had previously participated in an occasion on ICT development through professional education (11).

Nonetheless, the findings from this study revealed that more than half of the respondents had good knowledge. This is comparable to two studies, one conducted in rural African health facilities among rural health workers in Africa which revealed low levels of computer knowledge (12) and the other among health workers in rural post-war conflict in Northern Uganda which also revealed that respondents generally exhibited low knowledge (13). Majority of respondents 168 (84.8%) agreed that ICT can enhance communication among health workers with regards to health which is higher than a study

conducted in Nigeria which revealed among healthcare providers that ICT will improve their health communication p (0.001) (14).

However, the findings from this study revealed that majority of the respondent's 88.4% were in agreement with the statement that IT facilitates collaboration and cooperation among health workers which is higher than the findings from a study conducted in Ghana on 56% of those surveyed to the study titled "The Effects of Information and Communication Technology on Health Service Delivery at Tafo Government Hospital" unanimously agreed that Programs speed up medical diagnosis and ease of access. This might be inferred from research showing that ICT enhances coordination and clinical management assistance to facilitate the incorporation of clinical workflow among physicians and other healthcare providers (11).

Moreover, findings from two studies which revealed that majority of the respondents (97.2%) out of the total respondents agreed or strongly agreed to the statement that e-messaging was a useful tool for communication with GPs conducted in Norway (15), and majority of the respondents 226 (99.1%) who admitted that HIT will improve communication among healthcare providers, also a study conducted in Nigeria by (16) which are both higher than the findings from this study which revealed that only 132(66.7%) of the respondents agreed that Companies with email may no longer need to use the postal system. The findings from this study finally revealed that most respondents 163(82.3%) were in support of the statement that IT can monitor the incidence of public health threats which is lower than the agreement of the statement that HIT will facilitate prompt retrieval of patients' health records from 223(98.2%) respondents from study conducted in Nigeria (16).

## **Healthcare professionals' level of ICT use**

Majority of the respondents (97.5%) of this study had an email address which is higher than two other studies conducted with the proportion of respondents, 73% who possessed email address (16) and 78.4% respondents who possessed an email address (14) all conducted in Nigeria. However, it is noteworthy in another study conducted by (17) that the majority (123, 57.7%) of respondents in that study regularly used e-mail (17) while in a different study which had a lower proportion of respondents(51.8%) were proficient users of e-mails (18)

The findings from this study revealed four major areas where internet is used by the respondents which showed that, the internet was highly used for research purposes which helped with their field work and to broaden and acquire new knowledge on studies relating to their field of study, the internet was again utilized more by the respondents for social media, the internet was used to get access to news and also, the internet was not used much for mailing. Surprisingly, this survey's findings align with those of another study, which revealed that the majority of participants utilized computers to support the academic work (93%), email messages (70%), social media (60%), and leisure (66%) (10).

Again, the findings from the study revealed that majority of the respondents used internet mostly for research purposes (33%), which conforms with a study conducted in Mumbai, India on Awareness and Use of Information Technology among Healthcare Practitioners in Tertiary Healthcare Hospital in

Metropolitan City which found that most of the doctors also used ICT for research work (56%) and data analysis (48%) (19). From this study, two-thirds of the respondents 132(66.7%) had used medical journal/organization subscription online in their field of study which is more than the findings of the respondents 129 (54.0%) who took part in a nationwide study conducted on Information technology skills and training needs of health information management professionals in Nigeria who had access to health-related archives through the Internet (14).

According to the study's findings, every respondent used the internet at least once per week, with the majority doing so four or more times. In contrast, a study similar to this one conducted in Ghana found that most respondents there used the internet at least three days on average weekly (70%), along with networking sites (60%), and for recreation (66% %) (10).

## **Barriers to utilization of ICT**

The findings from the studies revealed that the majority of the respondents did not agree with the statement that, the electronic system is a waste of time as many of the health professionals thought that the use of ICT would rather help properly manage time in sharing of information among them and also improve the quality of healthcare services provided to clients. It can be deduced from this study that half of the respondents stated that inability to use computers hindered them to effectively and efficiently use ICT to deliver quality care at health facilities. Another study, The Effects of Information and Communication Technology on Health Service Delivery at Tafo Government Hospital, by (11) in Ghana found that the majority of respondents, or 72%, agreed to the fact that inadequate knowledge of ICT applications could hamper the effects of Technology in ensuring the provision of high-quality services by clinicians in the services.

## **Limitations**

The study was limited to health workers in the Ketu South municipality. The studies' main focus was on "barriers to ICT use". Questionnaires used had its limitations such that the reliability of the data from the questionnaire depended on the extent to which the respondents could remember facts and there was no way to know how truthful their responses were. There was also a small sample size due to financial constraints.

## **Conclusion**

This study revealed that the overall level of knowledge and use of ICT were good. Despite this, there were many barriers identified to its use and implementation in the healthcare delivery system. In order for a successful integration of ICT into our healthcare system, health workers should be educated and trained on how to effectively use the computers in healthcare delivery as well as make provisions for an available network.

# Abbreviations

ICT

Information Communication Technology

IT

Information Technology

HMH

Hohoe Municipal Hospital

MoH

Ministry of Health

GHS

Ghana Health Service

HIT

Health Information Technology

# Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the University of Health and Allied Sciences Research Ethics Committee with study ID: UHAS-REC A.10[114] 21-22. Permission was also obtained from the Municipal Director of Health (Ketu South Municipal). Verbal Informed consent was obtained from all participants after the purpose of the study was clearly explained to them. Confidentiality of the information obtained from the sampled population was strictly maintained. All methods were performed in accordance with the relevant guidelines and regulations. Verbal informed consent was approved by the University of Health and Allied Sciences Research Ethics Committee.

Consent for publication

Not applicable

Availability of data and materials

All data analyzed in this study have been included in this published article.

Competing interests

The authors declare they have no competing interests.

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Authors' contributions

EJK and LA both conceived and designed the study, performed the analysis and drafted the manuscript. LA critically revised the first draft for intellectual content. Both authors read and approved the final manuscript.

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