

Information and Communications Technology (ICT) and Health Workers Proficiency as a Determinant of Health Information Management: A case study of Health Facilities Ogun Southwestern Nigeria

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Abstract. The study investigated the application of ICT for health information management (HIM) in the health facilities and the proficiency of the health workers in the geopolitical east zone of Ogun State. The study adopted a non experimental survey method where self-structured questionnaires were administered to four hundred and fifty (450) health workers in the zone through a multi-stage sampling technique and frequency/percentage distributions were used to analyze the data obtained. Four hundred and twenty (420) (95.6%) health workers always use the ICT (e-mail, text messages, phones calls) for communication, followed by usage of ICT for research activities, where 345 (76.67%) use the ICT and 105 (23.33%) rarely use the ICT for research work, then the results revealed that 315 (70%) health workers always collaborate with the colleagues with the aid of ICT. The use ICT for HIM (data /records management and medical diagnosis) is relatively lower among the health workers-50 (11%) health workers use ICT for Data/Record Management while 30 (6%) use ICT for medical diagnosis. On the other hand, the average of results on the proficiency of the health workers indicated that only 35 (7.78%) of health workers are proficient, 98 (21.78%) not proficient and 321 (71.23%) were indifferent to computer system for HIM and not show interest with the computer system-the majority of the health workers are within the lower cadres where paper based systems are commonly used for health information sharing and management. The government should then equip/ implement ICT resources/ application in all the health facilities, making ICT training compulsory for the health workers and computerize the activities of the health facilities where information can be shared easily for efficient healthcare delivery system.

Keywords: Health Information Management, Information Technology, Communication, Health Workers, Proficiency, Ogun State.

1. INTRODUCTION

The country Nigeria despite her well endowments with both natural and human resources, unfortunately, her health indices are embarrassing. One of the reports of the World Health Organization (WHO) available also negate the past and present administration avowed commitment to the fundamental rights of Nigerians access to quality healthcare as enshrined in the 1999 constitution. For instance, the country's health system ranks 197th out of 200 member

nations of the World Health Organization (WHO) Enogholase (2010). The infant mortality is 103 per 1,000 live births, while maternal mortality is 800 per 100,000 live births (National Population Commission) cited in (punch, January 7, 2009). This is an indication of pertinent and burning issues affecting the healthcare systems of the country.

For instance, overall management weakness, technical incompetence, poor attitudes and behaviour of health staff and poor record keeping are some of the several indicators of the poor quality of health care delivery system in Nigeria (Chrisv, 2007). One of the key issues raised in the study by (Chrisv, 2007) is the hospital record system which is the focus of this study, critically looked at the manpower, workers efficiency and motivation, health information and record management with the application of Information and Communications Technology (ICT) in Nigeria Health Facilities.

Today, new technology has brought significant changes in health sector (Bates, 2005). In their studies, Harden (2002) and (Davis and Harden, 2001), believed that health services has also undergone profound changes due to recent technological advancements. Furthermore, health services providers particularly in the developed countries, has invested heavily in Information and Communication Technologies (ICT), not only to deliver health care, but to improve the quality of services that health professionals provided.

The availability and quality of ICT services are growing rapidly across Africa, with mobile network coverage rising from 16% in the late 1990s to over 90% of its population in 2011. Growth in this sector has led to increased investments, decreased costs and rapid growth in technology-enabled services (Shekar & Otto, 2012). The report further gave an insight about the application of ICT in health sector, that gains in ICT infrastructure have not as yet benefitted the health sector in a systematic way. Although there are many ongoing projects across Africa that attempt to improve the health sector through the use of ICTs, most remain pilots, few are evaluated and even fewer are designed or assessed for scalability (Shekar M & Otto, 2012).

Though, ICT has been introduced in many sectors in Nigeria. According to Hassan O. M et al (2011) ICT has been implemented in health care systems in Nigeria. However, research has shown that, scarcity of human resources in the health sector is a serious problem; it can be a particular beneficiary of ICT-mediation. Therefore, lack of qualified health professionals, poor distribution of facilities and poor access to the latest infrastructure are some of the issues to be addressed to improve the quality of services in our health facilities. Advanced technology can address at least some of these problems. In fact, international organizations such as the United Nations (UN) and the World Health Organization (WHO) have acknowledged ICT as a useful tool to address health care sector in developing countries (WHO, 2005; Drury, 2005).

Accordingly, United Nations Millennium Development Goals have articulated the significance of the use of ICT to address health issues (UN Millennium Development Goal, 2004). In terms of technology we are starting to see individuals using multiple devices in a variety of ways. The technology exists to allow safe and secure sharing of information at all level across an organization without the need to structure national sized data repositories. Goodenough (2009), opine that use of ICT in health services will help statistical data collection, but to do so, will need consistent semantics on a more global level. On the other hands, Grace (2009) focuses on the difficulty of integrating the disparate parts of the current health record into an electronic form.

The use of ICT in health service seems to create new and more effective service delivery which might likely increase the capacity and provide rapid, safe, effective and affordable health care services, but with sustainability, within health workforce and resource constraints For instance,

in traditional paper-based reporting systems, collecting and exchanging quality and timely health data remains a challenge, as the process can consume the time and attention of health workers who are meant to be providing services instead, and can result in inaccurate or incomplete data. Electronic Health Information Systems (HIS) can help minimize time spent recording data Shekar M and Otto, K (2012). The position of Skekar and Otto is supported by Ojo (2012) and also use of ICT like electronic health record given doctors, patients and other healthcare providers quick and easy access to patient medical records facilities (Ojo, 2012).

Apart from a unique feature of ICT - enabled data collection, the data can be viewed and analysed in real time so that care providers and policy makers can make lifesaving decisions based on evidence. Such tools can save health workers time and costs of paper-based data entry and transportation Shekar M and Otto, K (2012). The medical record is permanent documentation of the history and progress of a patient's medical care that can easily be accessible for planning purposes, regulatory bodies and medical research (Pickett, 2011).

Furthermore, the effect of ICT in healthcare will be substantial, due to most of its interaction with information. These effects will make impact upon the health information management role. This issue of Health Information Management shows in both theoretical and practical. The ability to use the ICT materials by health workers' is likely to be influenced by their proficiency. That is, health workers skills about their capacity to work effectively using the ICT gadgets will stand as a factor in determining their patterns of information usage. As a result of these influences, their efficacy skills are strong determinants or predictors of level of accomplishment that the health service professional finally attains.

Fonkych and Taylor (2005) pointed out that although the benefits of ICT will not be realized without considerable changes in work processes and structures. Generally, proficiency refers to thorough competence derived from training and practice. It also connotes knowledge as well as technical skills possessed by the health worker. Therefore health workers should view the role of ICT in their profession and try to engage in activities that will increase their proficiency level. Kinzie, Delcourt and Powers (1994) submitted that, the capabilities to successfully accomplish a particular task lie in an individual expression of what he is capable of doing. It is continually being actualized in an individual's mind, which Bandura (1997) called "mastery experience "or goal attainment. This view has also been supported by Albion (1999) whose findings belief in an individual capacity to work effectively with the computer is a significant factor in determining their patterns of computer use and a result-oriented accomplishment.

However, the hospital health information management (including both patient data and clinical knowledge) do exhibit its peculiarity difficulties, such that, they intimidate massive changes in healthcare. Increases in health information quality, quantity and access will bring both increased healthcare efficiency and quality. One of the key components of such a vision is the increasing use of ICT in the health arena, for example, an ubiquitous electronic health record (EHR) which has been in existence right from inception of ICT, but only now it's coming to fruition. (Australian Medical Association Review of health workforce: submission, 2005). Health systems globally are facing increasing demands for highly sophisticated services, yet they have limited resources and current and projected shortages of health professionals.

Apart from the issues mentioned above, , information computing usage for data record is still being faced with significant number of obstacles such as usability of the applications by health workers, confidentiality and privacy of patient data, and the management of health care workers amongst others. Therefore, it usability by health workers is summarized in its attributes to learn, competence and satisfaction. Also, Health care information that is supposed to be treated with confidentiality and utmost privacy lack professional skills. Thus, every user of the system must be proficient to gain access to the system's functionality.

Moreover, the level of ICT-Health based system's usability does not only influence the users' acceptance of the system, but may greatly influence the diagnosis and treatment processes in a health care centre. Other constraints to effectively make use of ICT is as a result of inadequate provision of infrastructure and insufficient Information and Communication Technologies (ICTs), its knowledge therefore limits the services of health workers, but the available once, how is it use with counterparts and other developed countries. Based on the aforementioned the researcher seeks to find out the implementation and application of ICT and the level of health workers proficiency in health information management (record management) across the health facilities in Ogun State Southwestern Nigeria as a case study.

1.2. Objective of the study

The objective of this study is to assess the extent of ICT usage and attitude of health workers towards health information management in health facilities in Ogun State Southwestern Nigeria.

1.2.1. The Specific objectives

- To assess the use of ICT resources by health workers for Health Information Management
- To assess the level of health information sharing with the use of ICT among the health care providers.
- To assess level of proficiency of health workers towards use of ICT in Health Information Management.

With the stated objectives, the study sought answers to the following research questions.

1. Do the health workers make use of ICT resources for the Health Information Management?
2. Do the health workers share health information with the use of ICT?
3. Do the health workers proficiencies affect the use of ICT resources in Health Information Management?

1.3. Brief description of the study area

The State has 20 Local Government Areas (LGAs) as enshrined in the Constitution. It is divided into Four Geo-Political Zones, Three Senatorial Districts, Nine Federal and 26 State Constituencies. The State Ministry of Health under the Health Sector Reform 2006 procured VSAT technology for the Ministry making information available at the fingertips of management and staff of the ministry. In providing enabling environment for the health workers in the state, a resource centre/library with internet facilities commissioned for workers in updating their knowledge on current trends (Ogun State Health Bulletin, 2006). Under the reform, most of the health facilities are supplied with ICT resources like computer systems with internet facilities for the running of the health facilities.

2.0. MATERIALS AND METHODS

This study adopted a non experimental survey type of research where the variables are not manipulated. So Inference was made from the observations only. The research instrument used for the study was self-structured questionnaires to find out about the available and use of ICT resources and the level of health workers proficiency in the use of ICT for health information management. The instrument consists of two parts-the first part of the instrument captured the demographic characteristics of the participants (health workers), and second consisting of the items to extract information on the variables under study. It is closed type designed in line with modified rating with weight allotted to enable respondents indicate their extent of agreement or disagreement with the statement supplied.

The study adopted a multi-stage sampling technique. The first stage was stratification of nine Local Government Areas (LGAS) in the state from Ogun East Senatorial District comprising of (1) Remo North, (2) Ikenne, (3) Sagamu, (4) Ijebu North, (5) Ijebu North East, (6) Odogbolu, (7) Ijebu-Ode, (8) Ijebu East and (9) Ogun Water Side Local Government Areas and public health facilities were randomly selected from each of the identified local government areas. The third stage was the purposive selection of public health facilities in the district that has implemented or partially implemented the use of the ICT in running of the facilities. The fourth and the last stage was the random selection of fifty (50) health workers from the Local Government Area. Therefore, the sample size for the study consisted of four hundred and fifty (450) health workers. The returned questionnaires were analyzed by the aid of descriptive statistics tool (charts) and Microsoft excel

3. RESULTS AND DISCUSSION

The distributions of the respondents were displayed in the table below indicated. The table shows the various health and medical professionals that formed the workforce in a typical health facility.

Table 1: showing the distribution of the departments (cadres) of the respondents

	No of Respondents	Respondents %
Doctors	35	7.78
Nurses/Midwives	150	33.33
Community Health Extension Workers (CHEW)	125	27.78
Health Information Managers (HIM)	45	10.00
Medical Laboratory professionals (MLP)	23	5.11
Pharmacy professionals (PP)	21	4.67
Others	51	11.33
Total	450	100

As shown in the table 1 above, there were 450 completed and returned questionnaires. 35 (7.78%) of respondents were doctors, 150 (33.33%) to the nurses/midwives cadre, 125 (27.78 %) were the Community Health Extension Workers (CHEW), Health Information Managers

(HIM) 45 (10.00%), Medical Laboratory professionals (MLP) 23 (5.11%), Pharmacy professionals (PP) 21 (4.66 %), while others were 51 (11.33 %) respondents that support one service or others in the health facilities- store keepers, radiologists, health educators etc. All the respondents were from the state three level of healthcare-(Teaching, State and General Hospitals, Health Centers and Health Posts).

Table 2: showing the distribution of the respondents highest academic qualification

Academic Qualification	Frequency	Percentages
PhD	3	0.67
Masters	10	2.22
Bachelor degree	85	18.89
Registered Nurses/Midwives	135	30.0
Registered Nurses	65	14.4
National Diploma	122	27.11
Others	30	6.67
Total	450	100

The table 2 presented the highest academic qualifications of the respondents. The responses showed that out of 450 respondents 30 indicated others as qualifications, the rest 420 are expected to be computer literates due to various computer courses and packages taken during their academic pursuits. At the undergraduate and Master programme levels the students must take computer courses and mostly use computer system and internet to do assignments and use projectors for seminar and project research work presentation. This is an evident that the respondents do have a considerable knowledge about ICT due to their various educational background and academic qualifications.

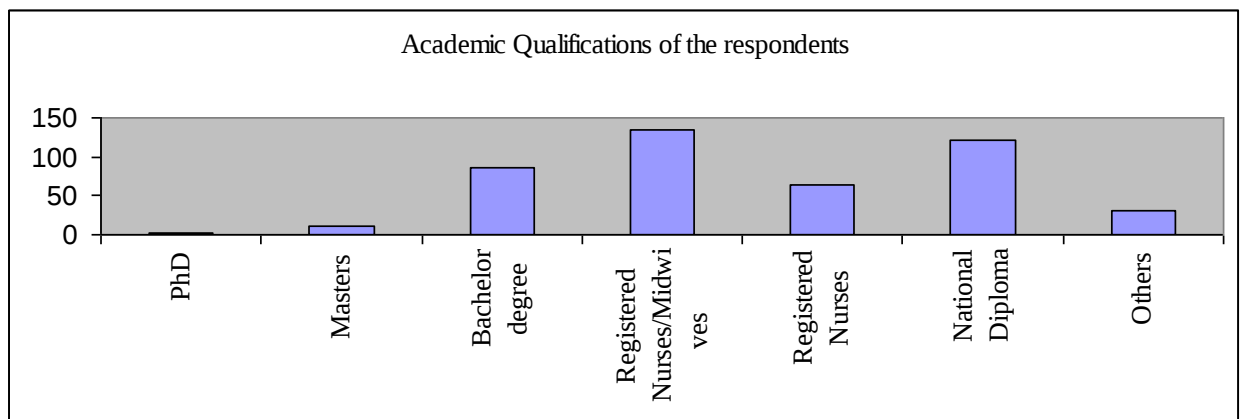


Figure 1: Bar Chart showing the highest qualifications of the respondents

The use of the ICT resources for health information management

Table 3: Showing the responses on the use of the ICT resources for health information management

	Positive Statements	Strongly Agree	Agree	Disagree	Strongly Disagree
A	The use of ICT gadgets is easy	35	56	234	104
B	The internet facilities is available and easy for searching for information	178	200	100	2
C	I find it easy to complete my tasks more quickly with the ICT resources	20	30	198	202
D	I find it easy to exchange information with the colleagues with aid of ICT	312	47	89	2
E	The available ICT in the hospital/clinics are well utilized	-	34	206	210
F	The ICT have been useful in the health recording system	-	34	206	210

The table 3 and figure 2 below showed the responses to the positive structured statements on the use of ICT resources such as computers, mobiles phones, and internet facilities etc.

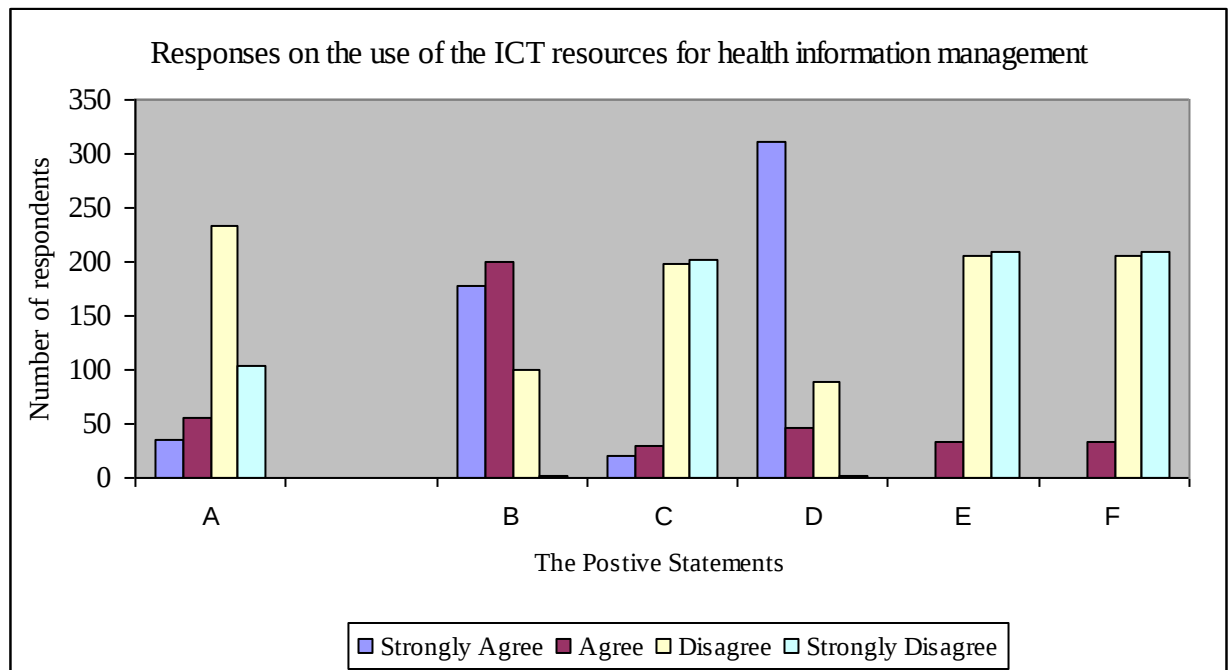


Figure 2: Showing the responses of the health workers on the use of ICT for Health Information management

The results revealed that the use of ICT gadgets (A) is easy for the respondents. It was only 35 that strongly agreed and agreed were 56 the easy handling of the ICT gadgets while 234 and

104 disagreed and strongly disagreed that the use of ICT gadgets not easy respectively. The response on the use of internet (B) among the health workers is different. 178 and 200 respondents find internet facilities easy and available for searching information. This is possible because of widespread use of mobile phones with internet facilities and some of them do have personal laptops and desktop connected to modem for internet facilities. The results of the third item on the table slightly correlate with that of item 1 (see table 3). The majority of the health workers still make use of other convention methods like sending of files, memos and documents and use paper for documentation. For the item D, in the opinion of the researcher, the workers might be referring to the use of mobile phones to make a call or sending of text messages to the colleagues, superior ones and the junior ones- that the more reason the majority of the respondents strongly agreed that the ICT make it easy to share information. However, unfortunately, the health workers believed that the ICT resources are not well utilized and they are not using them for health record management.

The sharing of health information with the use of ICT resources

Table 4: showing the responses on the sharing of information with the use of ICT resources

	Positive statements	Strongly Agree	Agree	Disagree	Strongly Disagree
A	It is easy to share information with use of ICT resources (e-mail, text messages, calls) resources among my colleagues	100	234	-	-
B	It is easy to consult with colleagues with ICT resources (e-mail, text messages, calls)	212	234	-	-
C	It is easy to interact with other departments or cadres with aid ICT resources (e-mail, text messages, calls)	213	235	-	-
D	The heath records can be collected with the ICT resources and share within departments	19	39	256	-
E	The ICT resources enhance the heath records management and quality of healthcare delivery	19	39	-	-

It is interesting to note that the degree of agreement to items A, B and C contrasted that of items D and E. The easy sharing of information (100 strongly agreed 234 agreed), consultations (212 strongly agreed and 234 agreed) and easy interactions (212 strongly agreed and 234 agreed) among colleagues and departments with use of ICT resources.

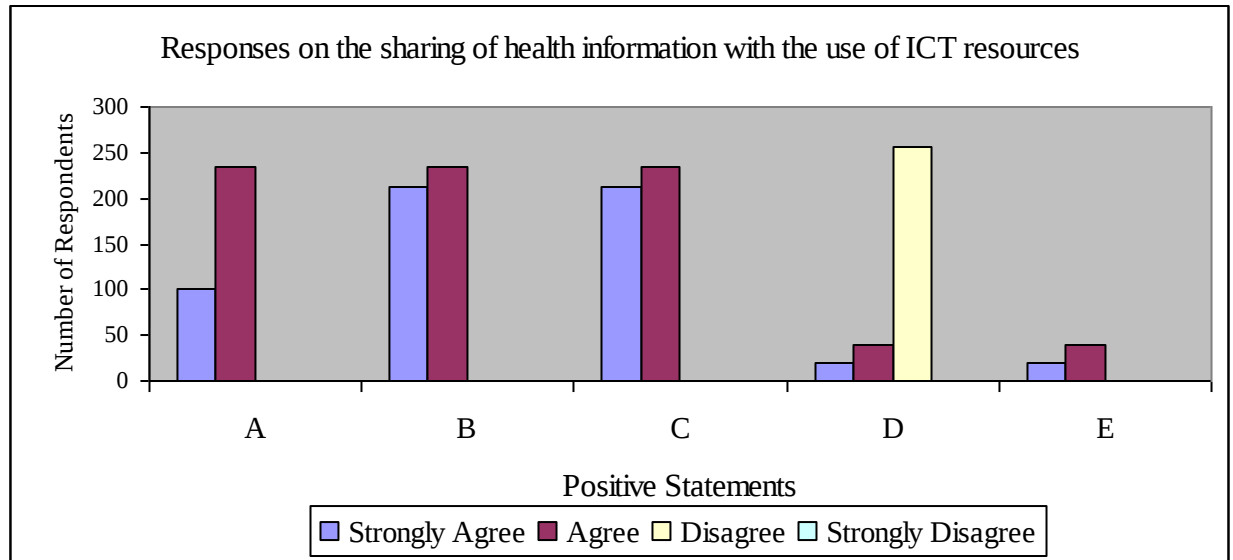


Figure 3: Showing responses on the sharing of health information with ICT resources

However, the use of ICT for health record management and the impact of the health record management on the enhancement of healthcare delivery were supported by only 58 respondents (19 strongly agreed and 39 agreed). See table 4 and figure 3 above

The level of proficiency of the respondents and activities in which ICT are used

This section D of the questionnaires was adapted from Olatokun & Adeboyejo (2009), where the respondents were asked to tick the list of the activities that ICT resources (computer) are used for. Then their personal proficiency about the computer and the uses for work were sought for.

Table 5: showing the responses on activities of the health workers with the use of ICT

	Activities	Always	Rarely	Never
1	Communication	420	30	-
2	Research	345	105	-
3	Networking /Linking with peer group	123	304	23
4	Skills acquisition	123	245	82
5	Collaboration with Colleagues	315	131	4
6	Data/Records Management	50	11	379
7	Medical Diagnosis	30	55	365

The results as displayed in the table 5 showed that, mainly the health workers use ICT for communication (A) 420 respondents out of 450 always use the ICT for communication, followed by usage of ICT for research activities (B), where 345 use the ICT and 105 rarely use the ICT for research work, then the results revealed that 315 out of 450 respondents, always collaborate with the colleagues with the aid of ICT (The results support the Hassan et al, 2011).

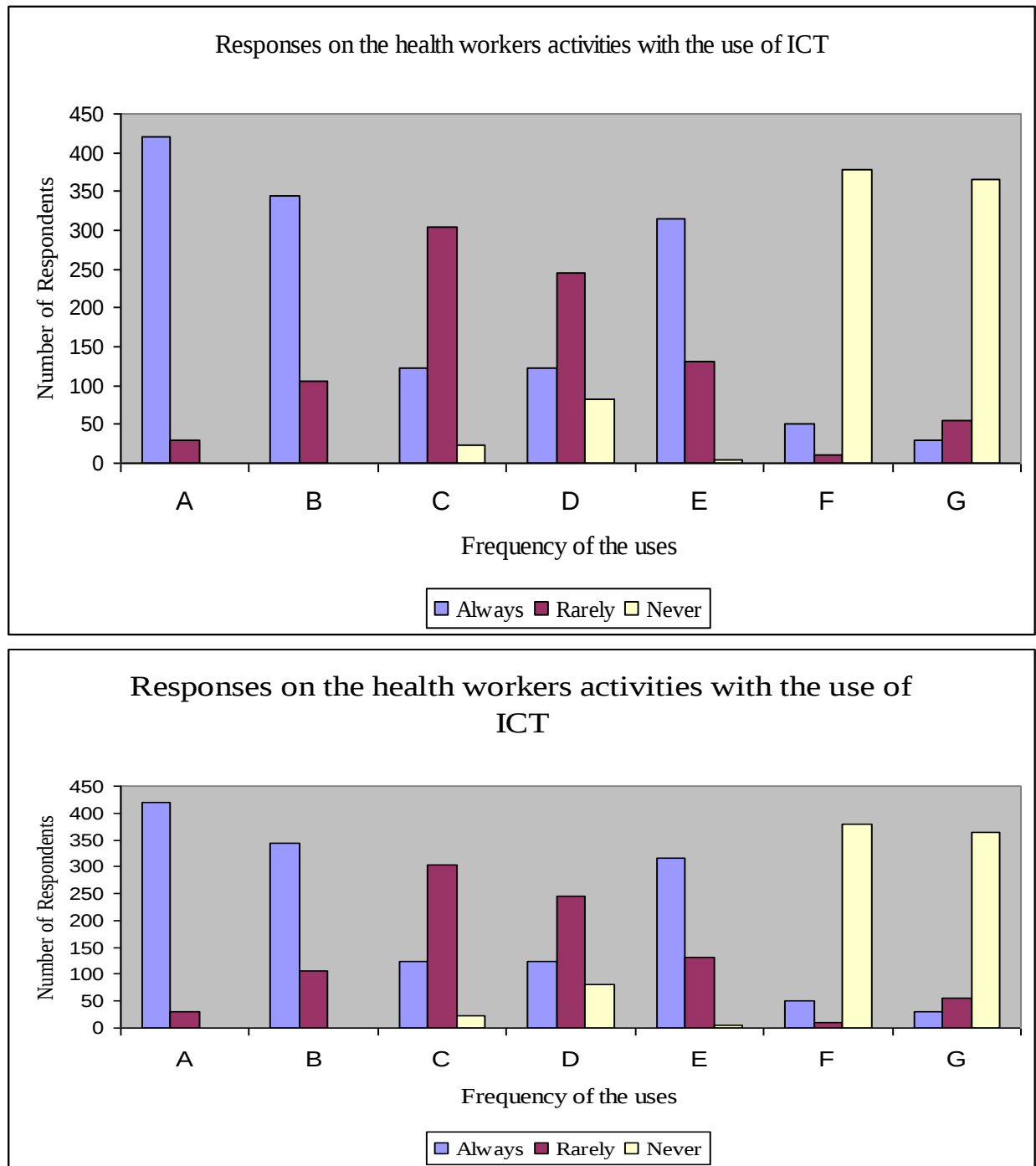


Figure 4: Responses of Health workers activities with the use of ICT

However, the responses on networking/linking (C) with peer group and skill acquisition (D) showed that 123 health workers use ICT for the two activities respectively. Unfortunately, the

use ICT for Health Information Management (data /records management (E) and medical diagnosis (F)) is relatively lower among the health workers-50 health workers use ICT for Data/Record Management while 30 use ICT for medical Diagnosis

Table 6: showing the responses on the proficiency on the use of ICT

	Proficiency	YES 1	NO 2	INDIFFERENCE 3
A	I enjoyed using specialized databases	11	74	375
B	The computer system provides an effective support for completing my task	123	237	100
C	When unexpected problems occur to the system, I do handle them well	3	7	440
D	I have good skill in the use of computer	3	75	372

The table 6 above and figure 5 below showed that 11 respondents pick YES believed they enjoy using specialized database, i.e they are highly proficient, while 74 is proficient and 375 fairly proficient using specialized databases. For computer system providing effective support for completing tasks by the workers, 123 respondents believed that computer has been very useful for completing their tasks, while 237 see computer to be useful and 100 were of the opinion that computer is not useful in assisting them in completing their tasks.

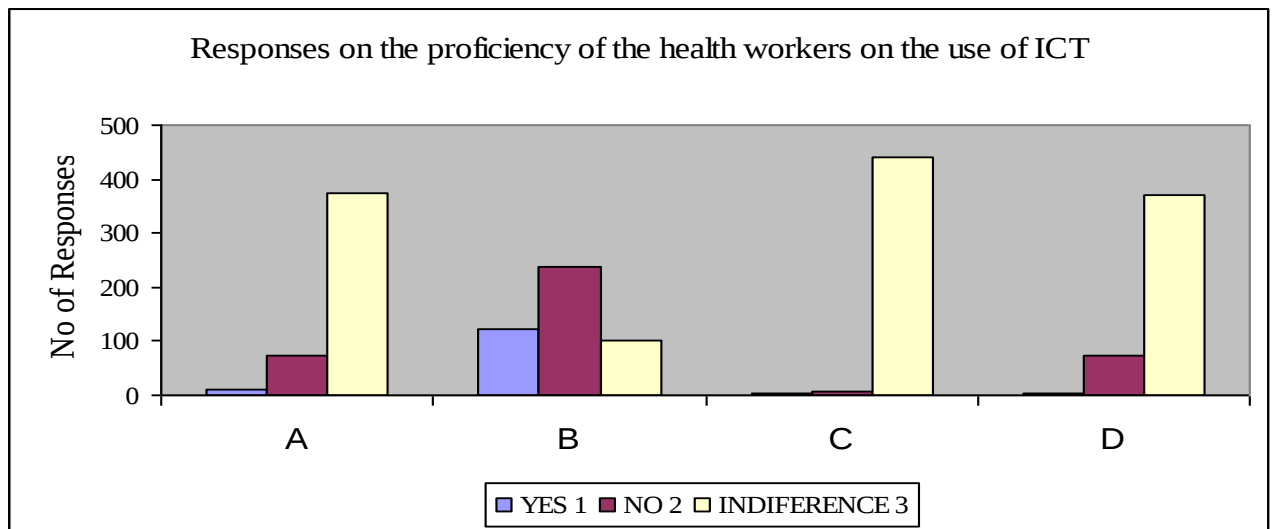


Figure 5: Showing the responses of the proficiency of health workers with ICT

However, 3 respondents can only handle computer very well, when they developed problems, 7 respondents believed they are not really good in diagnosing and handled computer problems

and majority of the respondents 440 do not have any knowledge in handling and maintenance of computer when they develop faults.

Table 7: showing the spatial variation of activities and ICT proficiency among the health workers for the purpose of their job

	Doctors			Nurses/Midwives			*CHEW			*HIM			*MLP			*PP			Others		
	A	R	N	A	R	N	A	R	N	A	R	N	A	R	N	A	R	N	A	R	N
Communication	30	5	-	100	50	-	11	35	79	32	13	-	-	12	11	-	9	11	12	30	9
Research	30	5	-	13	124	13	-	12	113	44	1	-	-	2	21	-	2	19	12	34	5
Networking	30	5	-	10	40	100	-	12	113	-	15	30	-	2	21	-	2	19	12	34	5
Skills	30	5	-	80	40	30	-	25	100	38	7	-	3	20	-	4	13	4	15	18	18
Collaboration	30	5	-	10	45	95	5	3	117	-	20	25	5	17	1	3	12	6	20	16	15
Data/Record	9	26	-	-	1	149	-	-	125	-	1	44	-	1	22	-	1	20	-	2	49
Diagnosis	6	29	-	-	4	146	-	-	125	-	-	45	-	3	20	-	1	20	2	2	47

A (always) R (rarely) and N (never)

1 (Yes), 2 (No) and 3 (Indifference)

	Doctors			Nurses/Midwives			*CHEW			*HIM			*MLP			*PP			Others		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
A*	5	13	9	3	108	36	2	96	20	1	20	13	-	7	15	3	14	2	1	35	12
B	10	12	19	8	3	115	1	7	105	1	4	36	8	1	10	14	-	6	-	2	27
C	3	25	4	2	115	29	2	83	30	3	23	15	2	15	4	6	8	5	1	30	3
D	3	24	4	2	115	29	2	80	27	2	24	10	2	15	4	6	7	3	1	30	2

*CHEW (*Community Health Extension Workers), HIM (*Health Information Managers), MLT (*Medical Laboratory professionals), PT (*Pharmaceutical Professionals)*

The table 7 showed the responses of the health workers on activities they used ICT for and their proficiency in using computer system for health information management. The results showed that most of the medical doctors (30) always and five (5) rarely use the ICT for the activities listed in the table 5 above as their responses shown in the table 6 above. Then, the nurse/midwives followed suit where considerable number always used the ICT but do not use them to keep record or diagnosed patients. Considering, generally other health workers that are lower in the hierarchy of the health facilities management the CHEW, HIM, MLT rarely or never use the ICT for job activities. Unfortunately, the HIM revealed that they have never use ICT to record or manage data of the patients. (See table 7 above) On the other way round, the proficiency of the health workers should be seen to correlate with their activities and uses of ICT. The average of the results displayed in table 6 showed that 35 respondents indicated YES that is very proficient in the use of ICT, 98 responded NO that is they are not proficient while 321 were indifferent.

However, the majority of health workers that responded indifferently are those in the lower cadre, indicating that they have no particular interest or sympathy; unconcerned for the use of ICT or might be aware of the relevance of the ICT to healthcare system. The findings of the study have answered the three research questions formulated- the health workers do make use of internet and phones to gather information, and the health workers find it easier to share information among the colleagues, interact with other departments with use of ICT resources (e-mail, text messages, calls), the health records can be managed with the ICT resources and for sharing of information within departments and the ICT resources when applied can enhance the health records management and quality of healthcare delivery. The third research question could be answered that the majority of the health workers at lower cadre are not proficient in using ICT resources like internet, specialized databases that consequently affect the health information management. However, the doctors and health information managers' cadres do have skills to operate computers, though majority of the respondents (440) cannot diagnose the computers when problems occur while 350 health workers believe that computer system provides an effective support in completing their task.

4. CONCLUSION

The healthcare system is still facing the challenges of non application of ICT for health information management in the state due to non provision of ICT gadgets and computerization of the health facilities. The situations of ICT provisions in the health facilities and influenced the proficiency of the health workers in handling of computers system and consequently the overall goals and objectives of healthcare delivery systems in the state are negatively affected.

Therefore, there is need for government and management of the health facilities provide all ICT infrastructures and enabling environments for the health workers to operate. All the health workers should attend training programmes and there should be policies formulated and implemented where all the health workers and departments interact and communicate. Thereby, the workers proficiency and the healthcare services will be improved.

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