

# Assessment of ICT Usage in Healthcare Service Systems: A Case Study of the Federal Medical Centre (FMC) Yenagoa in Bayelsa State, Nigeria

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## ABSTRACT

**Background and Objectives:** The use of information and communication technology (ICT) in health care service delivery is very crucial to the development of health care services of any country. The benefits of ICT are noticeable in many aspect of our social life in Nigeria. But the advancement and usage of ICT in health care facilities in the country is still poorly documented. As such this study assessed the usage of ICT in healthcare service systems in Nigeria.

**Material and Methods:** A descriptive survey research design was adopted for the study. The population of the study consisted of Doctors, Nurses, Pharmacist/Pharmacy Technician, Lab. Scientist, Health recorders and other health workers, who are staff of the Federal Medical Centre, Yenagoa. Data were collected from 238 respondents by means of structured questionnaires. The statistical tools used for the data analyses are tables, frequencies and simple percentages. Four research questions guided the study.

**Results:** The findings revealed that majority of the respondents have positive perception about the use of ICT in the healthcare facility. 85.3% of the respondents also agreed that ICT can improve patient-workers relationship. The study reveals that there are computers in most of the offices but the health workers rarely used these computers because most of these computers are not functional. The findings also reveal that usage of internet facility provided by the management has the poorest usage in the hospital, followed by computers. The telephone out-weighs all other ICT tools in usage. This is not because the hospital management provides phones to workers but because most of the workers used their personal phones to serve the purpose. The findings also revealed that lack of ICT facilities, lack of electricity supply, and lack of personnel access to ICT facilities, failure of equipment, lack of maintenance culture and negative cost benefit ratio are challenges confronting the use of ICT in the healthcare sector.

**Conclusion:** The study concluded that there is an urgent need for the hospital management to provide functional ICTs like telephone, computers and internet to all health workers and these should be made available and accessible.

**Key words:** Information and communication Technology, E-health, Healthcare services.

## I. INTRODUCTION

Information technology is a branch of engineering that deals with the use of computers and

telecommunications to retrieve, store and transmit information. Communication Technology is a method of meaningful exchange of information among people. The combination of these technologies gave

birth to a more effective technique called Information and Communication Technology (ICT). ICT is used to describe a range of technologies for gathering, storing retrieving, processing, analyzing and transmitting information. Studies show that ICT has powerful application in various sectors like, in education smart classes, distance learning and online tutorials come under the category of e-learning. Likewise we have e-health which improves healthcare procedures and suggests quick and better solutions to patients. <sup>(1)</sup>

Healthcare facilities involve action and activities that are linked together with the available technology to produce healthcare service delivery. The pan American Health Organization <sup>(2)</sup> reports that health reform processes have many facts. As such, there is no single model adopted by all countries. This implies that there are many ways of improving service delivery in health care facilities. How-be-it, ICT is a major way of doing this. It was explained that ICT have the potential of making a major contribution in improving access and quality of health care service delivery while containing cost <sup>(3)</sup>.

It is shown that the available information that affects the well-being of a patients is always critical and over the last decade, the advent of information and communication Technologies (ICT) have contributed immensely to the continuous learning sharing and dissemination of health information amongst professional<sup>(4)</sup>. The application of (ICT) tools or alternatively e-health tools to successful health care delivery had been widely demonstrated through various ICT health projects in developing and developed countries. E-health, an umbrella term that encompasses the use of ICT in healthcare includes telemedicine, where medical advice or consultation is provided over long distances via internet, radio, telephone and other communication devices. In another vein, e-health is the use of ICT tools for dissemination of health related information such as HIV/AIDS and vaccination hubs using radio, television, internet or short message service (SMS)<sup>(5)</sup>. Information from ICT social network is already used to support diagnosis, self-management and monitoring of treatment from individuals as well as the planning and provision of health care for a community. The United Nation, in a report reveals that ICT have the capacity of contributing to health

education, knowledge sharing health monitoring, health statistics gathering and achieving the millennium development goals, (now sustainable development goals)

Studies also show that the utilization of ICT or e-health tools such as health information systems, websites, electronic health records medical databases by health professionals will facilitate the following benefits as identified: improve the efficiency of health systems; enable remote consultation diagnosis and treatment through telemedicine; enhance collaboration and cooperation among health professionals by sharing of learning and training resources; support more effective health research and its dissemination and access to research findings; strengthen the ability to monitor incidence of public health threats and respond in a more timely and effective manners improve dissemination of public health information.

According to the WHO <sup>(6)</sup>, ICT has formed a backbone of healthcare services. It has helped in the prevention diagnoses and treatment of illnesses and diseases. ICT is the only one category of the vast array of technologies that may be of use in healthcare services. It further explains that given the right policies, organizations, resources and institutions, ICT can be a powerful tool in the hands of those working to improve health care services. ICT has played a major role in saving of lives and resources and direct improvements in people health. For instance, studies show that in Peru, Egypt and Uganda, effective use of ICT has prevented avoidable material deaths. In South Africa, the use of mobile phone has enabled Tuberculosis (TB) patients to receive timely reminders to take their medication. In Cambodia, Rwanda, South Africa and Nicaragua, Multimedia communication programmes are increasing to strengthen community responses to HIV/AIDS. In Bangladesh and India, global satellite technology is helping to track outbreaks of epidemics and ensure that effective prevention and treatment can reach people in time <sup>(3)</sup>. The case of Nigeria has remained unexplored.

The poor use of ICT tools in healthcare facilities has posed a lot of problems in healthcare delivery Nigeria. Prior studies showed that there is an improvement in the use of ICT in health care delivery

in developed countries of the world, but admitted that in the sub-Saharan Africa where Nigeria is located, this usage is still very poor<sup>(7)</sup>. The poor use of ICT in healthcare delivery delays healthcare services to patients. It frustrates the activities of healthcare providers and leads to poor relationship between patients and healthcare providers<sup>(8)</sup>. The use of ICT in healthcare services delivery in healthcare facilities has remained a paucity of study in the country. Therefore, it is pertinent to gather evidence via research by the assessment of ICT Usage in Healthcare Service Systems in Bayelsa State of Nigeria. In this study the following factors are considered; perception of health professionals on the use of ICT, the available ICT tools in the Health facilities and usage, the level of Government Commitment in providing these ICT devices and the challenges confronting the development of ICT in Nigeria.

## **II. MATERIALS AND METHOD**

The research design adopted was a descriptive survey design. The study was conducted at the Federal Medical Centre Yenagoa, Bayelsa state which is owned by the Federal Government of Nigeria and it provides medical services to the public. The study focused mainly on clinical health professional (Doctors/Nurses) and other health officers as the population of the study. A sample size of 238 health workers including doctors, nurses, health record officers, Pharmacist/Pharmacy technician, Laboratory Scientist, and other health workers, was chosen by using a stratified random sampling and convenience sampling techniques, which represents the entire medical team of the facility in this study. A questionnaire titled, “ Assessment of ICT Usage in healthcare service systems in Bayelsa State” was used for collecting data from the respondents on their socio-demographic characteristics, and on questions deduced from variables that are related to each of the study objectives and research questions. The first section of the questionnaire consisted of socio-demographic profile of respondents. The second section of it consisted of questions on perceptions of ICT in healthcare facilities, the usage of ICT in

healthcare delivery system, the level of commitment of hospital management team to providing ICT tools in healthcare facilities and the challenges confronting the development of ICT in the Federal Medical Centre Yenagoa. The instrument was administered by face to face administration to respondents and completed instruments were retrieved for statistical analysis. The study used tables, frequencies and percentages to analyze the data collected.

## **III. RESULTS**

### **Presentation of Demographic Information**

In this study, 60.5% of the respondents were female and 39.5% male, 21.9% of the respondents were Doctors, 42.0% Nurses, 8.40% Pharmacist, 9.24% Laboratory Technicians, 12.61% Health recorders and 5.88% other health workers (Dental health technicians, Radiographers etc.), this is shown in table 1.

It is observed that more than half of the respondents 56.7% possess HND/B.Sc. Degrees. This is followed by those who specifically identified themselves as MBBS Degree holders 21%. Only a few of the respondents had National Diploma and M.Sc/Ph.D Degrees. This implied that all respondents of the study are educated individuals, who have what it takes to give the required information needed for the study.

### **Respondent' s perceptions of ICT in Healthcare**

The study showed that majority of the respondents strongly agreed and agreed with 42.4% and 42.9% respectively, that computer is important to health workers in the hospital. Also a greater proportion of the respondents agree to the fact that internet and telephone are also important to health workers in the discharge of their services in the in the health facility.

Majority of the respondents strongly agreed and agreed that ICT can improve patient-health worker relationship with 41.2% and 44.5% respectively while a negligible proportion disagreed to this fact. These are shown in Table 2.

**SUMMARY OF TABLES**

**Table 1: Socio-Demographic Information**

CHARACTERISTICS	Sex		Age					CAT. H. W					QUALIFICATIO N				YRS OF EXPERIENCE							
	M	F	18-20	25-29	30-34	35-39	40 above	Doctors	Nurses	Pharmacist/technician	Lab. Technicians	Health records	Other health worker	ND	HND/B.Sc.	MBBS	M.Sc/Ph.D	5 & below	6-10	11-15	16-20	21-25	26-30	31 above
Freq. (No 238)	94	144	11	57	96	53	21	50	102	20	22	30	14	14	135	50	37	72	84	23	12	28	16	3
Percentage	39.5	60.5	46	23.9	90.3	22.3	88	21	42	8.40	9.24	12.61	5.88	5.9	56.7	21.5	15.6	30.3	35.5	9.7	5.0	11.8	6.7	1.3

**Table 2: Frequency Distribution of Respondents perceptions of ICT in the Healthcare Facility**

S/ N	Items	Responses (Frequencies /Percentage)				
		SA	A	UD	D	SD
	Computer is important to health workers	101 42.4%	102 42.9%	1 0.4%	21 8.8%	8 3.4%
	Internet is important to health workers	84 35.3%	123 51.7%	5 2.1%	26 10.9%	0 0.0%
	Telephone is important to health workers	145 60.9%	84 35.3%	9 3.8%	0 0.0%	0 0.0%
	ICT can make patients to have quick access to medical information	57 23.9%	169 71.0%	0 0.0%	12 5.0%	0 0.0%
	ICT can improve patient-health worker relationship	98 41.2%	106 44.5%	2 0.8%	23 9.7%	9 3.8%
	ICT can improve health professionals knowledge about recent health issues	125 52.5%	98 41.2%	0 0.0%	13 5.5%	2 0.8%
	ICT is better for health professionals to use in interaction with fellow workers	103 43.3%	108 45.4%	4 1.7%	0 0.0%	23 9.7%
	ICT is very important in health delivery services	167 70.2%	53 22.3%	2 0.8%	14 5.9%	2 0.8%

**Table 3: A table showing the Frequency Distribution of Respondents’ responses on the use of ICT in the Healthcare Facility**

S/N	Items	Responses (Freq. /Percent)		
		YES	NO	Undecided
1.	Used Computer (desktop/laptop) to offer health services to patients	113 47.5%	123 51.7%	2 0.8%
2.	Used internet to offer health services to patients	51 21.4%	174 73.1%	13 5.5%

3.	Used Telephone (fixed/mobile) to offer health services to patients	95 39.9%	141 59.2%	2 0.8%
4.	Used ICT to improve services to patients	114 47.9%	124 52.1%	0 0.0%
5.	Used ICT to schedule appointment with patients	53 22.3%	175 73.5%	10 4.2%
6.	Used ICT to render information to patients quickly.	98 41.2%	140 58.8%	0 0.0%
7.	Used ICT to improve knowledge of patients illness/problem	99 41.6%	139 58.4%	0 0.0%
8.	Used ICT to improve relationship with fellow practitioners	104 43.7%	133 55.9%	1 0.4%
9.	Used ICT to offer post-follow up with patients	36 15.1%	197 82.8%	5 2.1%
10.	Used ICT to obtain medical training	103 43.3%	135 56.7%	0 0.0%

Table 4: A table showing the Frequency Distribution of Respondents’ on ICT tools available in the Facility

S/N	Question Categories	Responses (Frequencies /Percentage)			
		Available & Functioning	Available but not Functioning	Not available	don’ t know
1.	Computer (desktop/laptop)	92 38.7%	112 47.1%	34 14.3%	0 0.0%
2.	Internet	54 22.7%	89 37.4%	93 39.1%	2 0.8%
3.	Telephone (fixed/mobile)	77 32.4%	103 43.3%	58 24.4%	0 0.0%

Table 5: A table showing the Frequency Distribution of Respondents’ Responses on challenges confronting the use of ICT Facility in the Hospital

S/N	Items	Responses (Frequencies /Percentage)			
		Very High Extent	High Extent	Low Extent	Very Low Extent
1.	Lack of ICT facilities	83 34.9%	126 52.9%	26 10.9%	3 1.3%
2.	Lack of electricity supply	130 54.6%	78 32.8%	21 8.8%	9 3.8%
3.	Lack of personal access to the ICT facilities	67 28.2%	156 65.6%	15 6.3%	0 0.0%
4.	Lack of maintenance culture	112 47.1%	96 40.3%	24 10.1%	6 2.5%
5.	Failure of equipment	95 39.9%	108 45.4%	21 8.8%	14 5.9%
6.	Cost-benefit ratio justify the non-use of ICT to attend to patient	12 5.0%	23 9.7%	115 48.3%	88 37.0%

### **The observed frequency of ICT usage by the respondents.**

It was observed that in Table 3, 47.5% used ICT to offer health services to patients. It is also observed that the respondents with greater percentage did not use ICT tools to: schedule appointment with patients, render information to patients quickly, obtain medical training and improve knowledge of patient illness/problem. But a lesser percentage agrees to the fact that they used ICT to all the mentioned variables.

### **The availability and functionality of ICT tools in the facility**

The Table 4 shows that nearly half of the respondents 47.1% have available but non-functional computer in their offices and 38.7% have functional computers and 14.3% opined that they do not have computers in their offices. About 39.1% of the respondents being the highest category of responses asserted that they do not have any internet facility in their offices. This was followed by these who have internet facilities but not functional with 37.4. 43.3% also asserted that they have telephone in their offices but added that the phones are not functional. Only 32.4% of the respondents have functional phones in their offices.

### **Challenges confronting the development of ICT implementation in the healthcare facility.**

The Table 5 shows that majority of the respondents opined that lack of ICT facilities and lack of electricity supply are challenges confronting the development of ICT with 34.9%,52.9% and 54.6%,32.8% of very high extent and high extent respectively. Lack of personal access to ICT facilities is rated at a very high extent and high extent with 28.2% and 65.6% respectively. But 39.9%, 45.4% and 47.1%, 40.3%, observed failure of equipment and lack of maintenance at a very high extent and high extent respectively.

## **IV. DISCUSSION**

The results show that majority of the respondent had positive perception about the use of information and communication technology (ICT) in the hospital. They opted for it usage to be encouraged. For example, the majority of the respondents agreed that

computer, internet and telephone are important ICT facilities that should be available and accessible in the hospital. This fact aligned with the assertion that application of information and communication technology tools (ICT) or alternatively e-health tools to successful healthcare delivery had been widely demonstrated through ICT health projects in developing and developed countries <sup>(4)</sup>. The study also showed that ICT can make patients to have quick access to medical information, it can improve patient-health workers relationship and that ICT is better for healthcare professional to use in interaction with fellow workers. The benefit of ICT in healthcare delivery is that it furnishes healthcare providers with the opportunity to improve patient-care by streaming clinical processes and creating a seamless flow of information. That universal access to information by health professionals is a prerequisite for meeting the sustainable Development Goals and achieving health for all. <sup>(8)</sup>

Again, by the results the usage of these ICT tools to render healthcare services is rated poorly in the facility. By implication the internet facility has the poorest usage in the hospital, followed by the computer and telephone. These findings is consistent with findings of other studies, that the accessibility and utilization of e-healthcare services in Nigeria is very low and thus there is a dearth need of ICT improvement in healthcare service delivery in Nigerian hospitals. Amongst the ICTs that were readily available in teaching hospitals, mobile phones were highly utilized by almost all the medical experts in the hospitals. The telephone out-weighs all other ICT tools in usage. This is not because the hospital management provides phones to workers but because most of the workers used their personal phones to serve the purpose. <sup>(10&11)</sup>

More so, a fair proportion of the respondents opined that they used ICT facilities to improve their services to patients. Majority of them asserted that they do not use ICT to schedule appointments with patients. However, more than half of the respondents opined that they have used ICT to improve self-knowledge about patients' illnesses. A greater percentage also agreed that they do not use ICT tools to improve their relationship with their fellow workers and to obtain medical training. This disagrees with the earlier findings that ICT have contributed immensely to the

continuous learning sharing and dissemination of health information amongst professionals. <sup>(4)</sup>

In response to the availability and functionality of ICT equipment, the results show that less than half of the respondents have functional computers in their offices. To others, it was found that either they do not have any computer or have a non-functional computer in their offices. Many of the staff do not have functional internet access and telephone in their offices. This conforms to the other findings that access and utilization of health care is low due to the cost of obtaining such ICT tools. <sup>(12)</sup>

The findings also revealed that lack of ICT facilities, lack of electricity supply, lack of personnel access to ICT facilities, failure of equipment, lack of maintenance culture and negative cost benefit ratio are challenges confronting the use of ICT in the healthcare sector. <sup>(11&12)</sup>

## V. CONCLUSION

This study affirms that the potentials of information and communication technological tools are yet to be fully utilized in hospitals in developing countries like Nigeria. It can be seen that so far, efforts have been made towards changing the status quo but the situation still remain elusive. More so, judging from the foregoing, it appears that the dream of ICT driven health sector will be realizable in Nigeria if the present and successive government can improve national infrastructures, especially in the areas of e-health technology and electricity. Moreover if other ICT components are given the same attention being given to telephone access, the quality of health care in Nigeria will be improved rapidly. However, this initiative should ensure that good management are also installed in the hospitals.

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### **AUTHORS CONTRIBUTIONS**

All authors contributed extensively to the work presented in this paper. Owaba, C O.E wrote the protocol, searched for literature, reviewed them and wrote the final draft. Arogo I.N and Ebuete, Y.I designed the study and directed the data collection, Azor, P.A performed all the statistical analysis. Dambo, I and Ayowie I.T interpreted the results and Ide, M A contributed to the literature content. All authors read and approved the final manuscript.