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Assessment of Digital Health Literacy Skills among Medical Doctors for Healthcare Delivery in General Hospitals of Katsina State-Nigeria

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Abstract
Innovations such as telemedicine, mhealth, e-health, telehealth are some of the technologies used by health professionals to provide effective healthcare service delivery. Digital health literacy skills allow health professionals to explore and harness the potentials of these innovations. This study seeks to assess the level of digital health literacy skills among health professionals in Specialist Hospitals in Kaduna State-Nigeria and consequently the level of utilization of these novel technologies. Related literature from various sources are reviewed under the following sub-headings: Concept and significance of digital health literacy, types of digital health literacy possessed by health professionals in Nigeria, types of ICT facilities available in specialist hospitals, use of health literacy skills by health professionals, and challenges associated with the use of ICT facilities by health professionals. Cross-sectional survey design was employed for the study, and the results presented as descriptive and inferential statistics using SPSS (Version 16.0). The results show that majority 55 (42%) of the respondents rate their digital health literacy as moderate, 48 (37%) rate their digital health literacy skills as high, 17 (13%) rate their digital health literacy skills as very low, while only 10 (8%) rate their digital health literacy skills as very high. The study recommends that there should be more staff trainings in order to enhance the capacity of the medical doctors and that adequate and up-to-date ICT facilities are needed in the hospitals.

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Keywords: Telemedicine, Health Care Delivery, Digital Literacy and e-health.

1. Introduction

The world is in the digital era, where billions of information recourse are internet. Advances in Information and Communication Technology (ICT) for healthcare systems such as artificial intelligence (AI), e-health, m-health, internet-of-things, are innovations that change how health professionals discharge their clinical duties. Digital health literacy skills refer to the health professionals' ability to find, evaluate, search, and communicate information through the internet. The ability of health professionals to do these could shorten the time taken for medical decision-making. Thus, digital health literacy skills will result in faster diagnoses and treatments, and would consequently help save lives and money. This is important to establish efficient and sustainable healthcare delivery systems.

Digital health literacy skills (also known as Digital education, e-learning, or digital learning) is defined as the act of adopting ICT in the search of medical information for effective healthcare delivery. Digital health literacy skills has the potential to improve the competencies and satisfaction of health professionals. According to Rowlands (2020), digital health is the convergence of the digital revolution and genetics revolutions within healthcare empowering health professionals to better track, manage, and improve healthcare; and reduce inefficiencies in healthcare delivery, improve access, reduce costs, increase quality, and make medicine more accessible. While health literacy is the personal characteristics and social resources needed for individuals and communities to access, understand, appraise, and use information and services to make decisions about health status.

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The objectives of this Study are to (1) identify the types of digital health literacy possessed by the medical doctors under study; (2) identify the ICT facilities available to them for healthcare delivery; and (3) investigate how the medical doctors use of these facilities for healthcare in Katsina state.

2. Literature Review

Health professionals need to acquire pre-requisite digital skills in order to harness the potentials of the emerging health innovations for effective healthcare delivery. According to Dwyer et al (2021), digital devices such as mobile phones, tablets, and portable computers have become an essential part of our daily lives. We access news, read email, check Facebook, text our families, and even communicate with our health care providers digitally. Digital technologies are providing many opportunities for communication and collaboration.

According to WHO (2017), digital health literacy is a set of skills, knowledge, and attitudes that a person needs in order to develop functionally in the Information Society. Digital health literacy (or eHealth literacy) is the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.

The Health Professionals European Health Parliament (2016), recommended that health professionals including physicians, nurses, dentists, pharmacists and midwives should possess skills and aptitude for communication, data analysis, computer literacy, medical devices compatibility, data protection programs, mobile applications, cloud storage, surfing internet, and the ability to read, understand and forward information using smart devices. This would require these professionals to acquire skills in areas like information security, interoperability, data analyses, design and implementation of tools to measure data, and software development. IT professionals working in the healthcare environment should possess skills in data privacy, information security, ethics, software engineering and database development.

Digital health literacy is an essential element for the successful transformation of healthcare systems. Better digital health literacy can lead to enhanced prevention models, better observance of healthier behaviours and improved wellbeing. According to Rowlands (2020), digital health literacy is the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to preventing, addressing or solving a health problem. The diagram in Figure 1 shows the branches of digital health literacy skills and its components: Figure 1

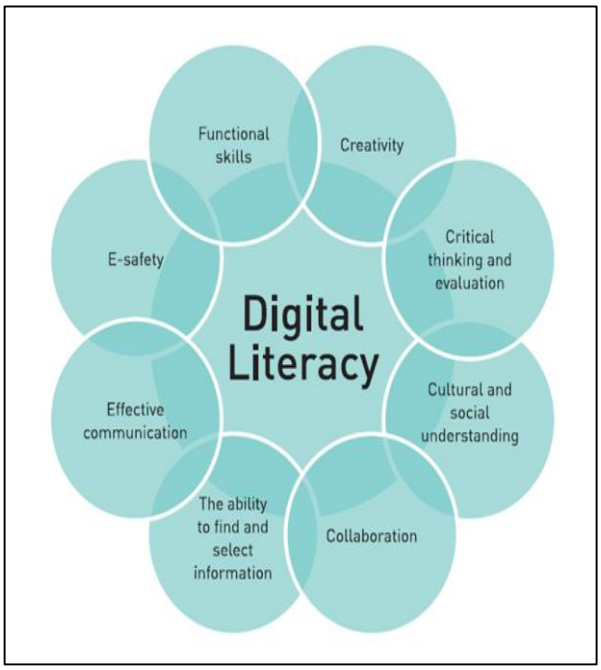


Figure 1: Digital Literacy Components (Kate Shively Kate 25th January, 2021).

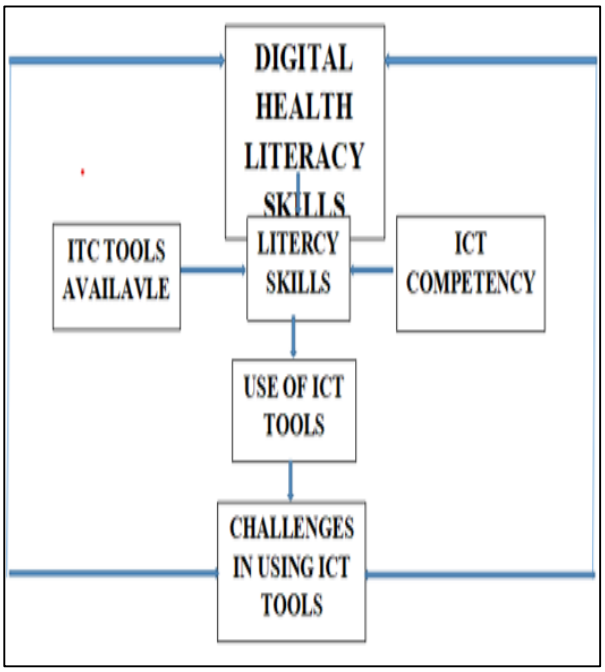


Figure 2: Proposed Model for Digital Health Literacy Skills for Health professionals

According to Matthews (2021), introducing digital skills for working within a healthcare environment is essential in ensuring that the future workforce is prepared for the expected exponential digitalisation of UK's National Health Services (NHS). As such, digital literacies are becoming a key element of curricula for students in health care, as well as a core requirement for academics (Kennedy & Yaldren, 2017). Documents-sharing applications such as Google Docs, Wikispaces or Office 360 allow multiple users to edit the same document at the same time. The conceptual model of this study is shown in the Figure 2

3. Methodology

A survey research design, adopted using cross- sectional design, was employed for this study. The study population comprised of medical doctors that are presently working in five Healthcare facilities at Katsina, as listed in Table 1.

Table 1: Study Population and Description

S/N	GENERAL HOSPITALS	ADDRESS	NO OF DOCTORS
1	General Hospital Katsina	M Dikko Rd, Katsina	38
2	Kurfi General Hospital.	Katsina	28
3	General Hospital Malumfashi	Yashe Road, Malumfashi, Katsina	33
4	General Hospital	Mani, Katsina State	31
5	Ministry of Health Katsina State	Katsina State Ministry of Health, Katsina	11
	TOTAL		**141**

The data for this study was analyzed using both descriptive and inferential statistics. Descriptive statistics was used to summarize the data collected and to present it using simple percentages. While inferential statistics (Cronbach alpha (α)) was used to test the hypothesis in order to determine the existence of relationship between variables and the responses which was extracted, collated, coded, and presented using SPSS (Version 16.0).

4.0. Results

4.1. Response Rate

Table 2 shows that 141 of questionnaire were administered to the medical doctors, out of which 130 (92%) were returned and found useful for analysis. While 11 (8%) were not returned. The high rate of returned copies of the questionnaire was attributed to the fact that most of the respondents are within the reach of the researchers, and where they were not, several follow ups were made

Table 2: Response Rate

QUESTIONNAIRE	FREQUENCY	PERCENTAGE (%)
Number of questionnaire administered	141	100%
Number of questionnaire returned	130	92%
Number of questionnaire not returned	11	8%

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Table 3: Demographic Information

GENDER	FREQUENCY	PERCENTAGE (%)
Male	75	57%
Female	55	43%
Total	**130**	**100%**
EDUCATIONAL LEVEL	**FREQUENCY**	**PERCENTAGE (%)**
MBBS	75	57%
MSc	49	38%
MPHL/PhD	6	5%
TOTAL	**130**	**100%**
YEARS OF EXPERIENCE	**FREQUENCY**	**PERCENTAGE (%)**

01-10 years	70	54%
11-20 years	22	17%
21-30 years	16	12%
31-40 years	22	17%
TOTAL	**130**	**100%**

Table 3 shows that more than half 75 (57%) of the respondents are male while 55 (43%) are female. However, the table shows that 75 (57%) of the respondents have MBBS as their highest qualification, 49 (38%) of the respondents have MSc and only 6 (6%) have MPHL/PhD. The table also indicates that more than half 70 (54%) of the respondents have more than 10 years working experience, 22 (17%) of the respondents worked for 11-20 years in the hospital, 16 (12%) of the respondents worked for 21-30 years and 22 (17%) of the respondents worked for 31-40 years in their respective hospitals.

4.2. Types of Digital Health Literacy

Table 4 reveals that majority 83 (63%) of the respondents have computer related certificates while only 47 (37%) of the respondents do not acquired any computer certificates. This means that most of the medical doctors have requisite digital skills. Table 5 shows that majority 55 (42%) of the respondents rate their digital health literacy as moderate, 48 (37%) rate their digital health literacy skills as high, 17 (13%) rate their digital health literacy skills as very low, while only 10 (8%) rate their digital health literacy skills as very high. This implies that majority of the medial doctors in hospitals in Kaduna State have basic digital health literacy skills for healthcare delivery. Table 6 reveals that 45 (35%) of the respondents have skills to use word processing and graphics in their hospitals for healthcare delivery, 47 (21%) of the respondents have skills to use social networking, 36 (17%) of the respondents have skills access medical databases, only 10 (7%) have skills to download health information on the internet and 12 (9%) have skills of web design.

Table 4. Computer related Certificates

COMPUTER RELATED CERTIFICATE	FREQUENCY	PERCENTAGE
Yes	83	63%
Not	47	37%
TOTAL	**130**	**100%**

Table 5: Level of Digital Health Literacy Skills

LEVEL OF DIGITAL LITERACY SKILLS	FREQUENCY	PERCENTAGE
Very high	10	8%
High	48	37%
Moderate	55	42%
Very low	17	13%
TOTAL	**130**	**100%**

Table 6: Types of Digital Health Literacy

DIGITAL SKILLS	FREQUENCY	PERCENTAGE
Word processing and graphics	45	35%
Web designing	12	9%
Downloading health information	10	7%
Social networking	27	21%
Accessing medical databases	36	28%
TOTAL	**130**	**100%**

4.3. Types of Health Facilities Available

Table 7 shows that 37 (28%) of the respondents reported that computers, internet and microsoft office are available in the hospitals, followed by 7 (6%) of the respondents who reported that there is printer and scanner in the hospitals, while only 5 (4%) said that there is digital camera available to use in the hospitals. Only 10 (5%) of the respondents

reported there is printer and scanner available respectively, while 5 (2%) of the respondents said there is digital camera available to use in the hospitals for healthcare delivery

Table 7: Types of ICT Facilities available

ICT FACILITIES AVAILABLE	FREQUENCY	PERCENTAGE
Computer	37	28%
Internet	37	28%
Printer	7	6%
Scanner	7	6%
Microsoft Office	37	28%
Digital Camera	5	4%
TOTAL	**130**	**100%**

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4.4. Use of Health Literacy Skills by Health Professionals

Table indicates that majority 80 (62%) of the respondents said that they use the available ICT facilities for healthcare delivery in the hospitals, while only 50 (38%) reported they do not use available ICT facilities.

Table 8: Utilization of ICT facilities

UTILIZATION OF ICT FACILITIES	FREQUENCY	PERCENTAGE
Yes	80	62%
No	50	38%
TOTAL	**130**	**100%**

Table 9: Types of ICT Facilities used

ICT FACILITIES AVAILABLE	FREQUENCY	PERCENTAGE
Computer	38	30%
Internet	34	26%
Pinter	8	6%
Scanner	8	6%
Microsoft office	34	26%
Digital camera	8	6%
TOTAL	**130**	**100%**

Table 9 reveals that 38 (30%) of the respondents used computer, 34 (26%) of the respondents used internet and Microsoft office in the hospitals, only 8 (6%) of the respondents used printer, scanner and digital camera in the hospitals for healthcare delivery.

4.5. Challenges Associated with the Use of ICT

Table 10 reveals the challenges associated with the use of ICT facilities by medical doctors for healthcare delivery in the hospitals in Katsina State, the result is shown as 30 (23%) of the respondents reported there is lack of ICT facilities lack of constant electricity supply and Lack of personal computer lack of wireless technology, 26 (20%) report that lack of technological know-how, only 4 (3%) of the respondents reported that there is lack of personal access to ICT facilities, lack of stable Internet connectivity and lack of personal computer, and only 2 (2%) of the respondents reported that there is lack of financial access to computers and internet in the hospitals.

Table 10. Challenges associated with the use of ICT

CHALLENGES	FREQUENCY	PERCENTAGE
Lack of ICT facilities in the hospital	30	23%
Lack of constant electricity supply	30	23%
Lack of personal access to ICT facilities	4	3%
Lack of stable Internet connectivity	4	3%
Lack of technological know-how	26	20%
Lack of wireless technology	30	23%

Lack of personal computer	4	3%
Lack of financial access to computers and internet	2	2%
TOTAL	**130**	**100%**

4.6. Inferential Statistics

The discussion below explains the findings of the inferential analysis using Chi-Square (α) test to test the null hypothesis employed in the study. Chi-Square (α) was used in testing the hypothesis using SPSS version 20.0. In the conduct of the test, 0.05 was used as the level of significance. All the assumptions of the Chi-Square were met before the analysis was done.

4.6.1 The relationship between the digital health literacy skills and the healthcare services provided by the health professionals.

The chi-square test (Table 11) shows that there is a relationship between the digital health literacy skills and the healthcare services provided by the health professionals for healthcare delivery, X^2= 5.735E1, Df = 478, N=189, P =.000. This shows that, null hypothesis is rejected and alternate hypothesis is accepted. Therefore, a significant relationship exists between awareness and healthcare delivery in the hospitals.

4.6.2 The relationship between the ICT facilities available in the hospitals and the Digital Health Literacy Skills possessed by the medical doctors

Table 12 reveals that chi-square test shows that there is a significant relationship between the ICT facilities available in the hospitals and the digital health literacy skills possessed by the medical doctors, X^2= 5.735E1, Df = 478, N=189, P =.000. This shows that, null hypothesis is rejected and alternate hypothesis is accepted. Therefore, a significant relationship exists between awareness and healthcare delivery in the hospitals

Table 11: Relationship between the digital health literacy skills and the healthcare services provided by the health professionals

	Value	Df	Asymp. Sig.(2sided)
Pearson Chi-Square	5.735E1	478	.000
Likelihood Ratio	5.735E1	478	1000
Linear-by-Linear Association	404.363	478	.009
No of Valid Cases	189		

Table 12: Relationship between the ICT facilities available in the hospitals and the Digital Health Literacy Skills possessed by the medical doctors

	Value	Df	Asymp. Sig.(2sided)
Pearson Chi-Square	5.735E1	478	.000
Likelihood Ratio	5.735E1	478	1000
Linear-by-Linear Association	404.363	478	.009
N of Valid Cases	189		

4.7. Discussion of Findings

The study investigates digital health literacy among medical doctors in general hospitals for Healthcare Delivery in Katsina State, Nigeria. The discussions were based on the four (4) research objectives raised by the researcher. A total of two hundred and fourteen (141) copies of the questionnaire were administered to the respondents. However, the study found that there are more male medical doctors than the female doctors in the hospitals. Their highest qualifications are mostly MBBS and they have spent about ten years practicing medical profession.

The study found that most of the medical doctors have computer related certificates and their digital literacy skills rated as moderate, is in the areas of word processing and graphics, social networking and accessing medical databases for healthcare delivery. The study found that most of the medical doctors used the available ICT facilities in the hospitals, these being: computers, internet, printers, scanners and Microsoft office. The study also found that most of the medical doctor working in the hospitals encountered various challenges in using ICT facilities such as

lack of ICT facilities in the hospital, lack of constant electricity supply, lack of technological know-how and lack of wireless technology.

5.0. Conclusion

The study found that there are more male medical doctors than females in the three hospitals selected for the study. It was also found that most of the medical doctors spent more than ten years working in the hospitals and their highest qualification is MBBS certificates. The study concluded that most of the medical doctors obtained computer related certificates in addition to their medical certificates. The study concluded that the medical doctors have limited digital health literacy skills in word processing, social networking, and accessing medical databases. This implies that the medical doctors in the study do not have digital skills in more advanced technologies such as web designing, computer programming and software application development.

6.0. Recommendation

Based on the findings and conclusions drawn from the study, the following recommendations were made:

1. There should be more staff training in order to enhance the capacity-building of the medical doctors.
2. Adequate and up-to-date ICT facilities should be provided in the hospitals
3. There should be constant power supply and internet connectivity in the hospitals for the medical doctors to access health information resources.
3. The Hospital management should encourage the use of ICT facilities and health innovative technologies for healthcare delivery.

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