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Availability, Utilization, and Support Systems of Ehealth Resources in Nursing Practice among Nurses in Cape Coast, Ghana

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Abstract

Information and communication technology (ICT) is transforming healthcare delivery at a fast rate. Nurses who form most of the health workforce are strategically positioned to champion the transition to digital health care. Ghana is fast adopting eHealth. However, there is little evidence on how well nurses are using these technologies. A descriptive cross-sectional study using a quantitative approach was conducted to examine the availability, utilization, and support systems of eHealth resources in the nursing profession. A multi-stage sampling technique was employed. Data collated from 206 registered nurses in Cape Coast revealed that respondents were predominantly female (61.7%), and 38.3% were males. The result suggests that good resources for eHealth service delivery were available with association wards and resources availability (χ^2=19.691, P= .012). Comparatively, the A&E ward had the most resources compared to the medical ward (p=.018), OPD (p=.012), Surgical ward (p=.013), Theatre (p=.003), Children ward (p=.000), Obs/Gynae ward (p=.002), ICU (p=.042) and NICU (p=.011). Also, most nurses have received adequate training, technical support, and internet connectivity towards eHealth resources usage. The study further revealed that most facilities did not have access to eLibraries. Monitoring and evaluation were either erratic or non-existent. Though the study results showed some promise in the digitization of healthcare in Ghana, there is more to be done to bridge the gap between the health needs of the population and the technologies required to meet them.

Keywords*: Attitude, eHealth, Information and Communication Technology (ICT), Knowledge, Practice, Resources.*

Introduction

Information and Communication Technology (ICT) is transforming the healthcare industry and is now an integral part of healthcare [1]. Today, health systems are more efficient and responsive to clients' needs due to the incorporation of ICT. This is evident in the reduced healthcare costs, improved delivery and effectiveness of healthcare services, and increased patient safety and decision support for clinicians [2-4]. When ICT is used in health and health care, it is termed eHealth [5, 6].

Nurses form the greatest percentage of health care professionals worldwide and hence play a crucial role in championing health care reforms such as adopting eHealth [7]. In high-income countries, nurses interact most with eHealth systems due to the demands of their work. They are indispensable when it comes to helping patients set up their health records or explaining how they can use a patient portal. It is worthy to

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note that eHealth is a meaningful resource in the daily routine of the nurse [8, 9]. To obtain the greatest benefit from ICT, nurses must necessarily play a leading role in its adoption. However, various studies have proven that nurses are dissatisfied with electronic health solutions for them due to a lack of consultation. Other reasons are that the computer systems were laborious to use, illogical, slow, complex, and undependable [10-12].

Several countries in Africa are implementing eHealth projects. These technologies can improve efficiency in time and resource utilization and facilitate complex decision-making. Diagnosis and treatment of patients can also be enhanced using these systems. However, these projects in the region continued to be on a small scale and fragmented [13, 14]. Despite its relevance, [15] reported a decline in the integration of computers into nursing in many low-income countries.

The Ghanaian health sector appears to have joined the ICT revolution. This is evident through the incorporation and use of computers in health service delivery, management, and administration. However, the Ministry of Health in Ghana intimates that the modest response has not been well structured [16]. The government of Ghana developed a policy document on ICT for accelerated development in 2003, an eHealth policy in 2005, and the national eHealth strategy document in 2010 [17-19], all in the bid to improve the ICT infrastructure in the health sector and facilitate the adoption of eHealth solutions.

Despite the remarkable growth in incorporating ICTs in healthcare delivery, the projects do not usually survive beyond the pilot phase [20]. Nurses, who are major stakeholders in health care delivery, claim they are ill-informed about information technology health initiatives and are not consulted when implementing eHealth initiatives [21]. This phenomenon is not limited to Ghana or Africa. [22] affirm that, although electronic health records are used in many hospitals globally, and clinicians have reported numerous benefits from their effective and efficient use, its evaluation by nurses has received minimal attention. Again, little evidence exists regarding the nursing contribution to telehealth, significantly beyond data input and output analysis for other members of the health team [23, 24].

Since nurses form the largest segment of the health workforce, learning from their experiences and perspectives on eHealth would be highly relevant for Ghana as we migrate from mechanical to digital health care. However, various studies have revealed that nurses are the last set of health care workers to adopt the eHealth revolution for reasons of lack of consultation before implementation [10, 12]. This might have been the reason why the use of eHealth was found to be lower among nurses and general practitioners in Poland [25, 26]. However, these studies do not capture the Ghanaian nursing context. In Ghana, there is a paucity of literature capturing factors and attitudes of nurses towards ICT use in health [27]. Studies so far reviewed in Ghana do not isolate the nursing experience and hence do not examine the availability, utilization, and support systems of eHealth resources in the nursing profession. This study, therefore, sought to assess the use of eHealth in nursing practice among nurses in Cape Coast**,** Ghana.

Materials and Methods

Study Design and Setting

A cross-sectional study was conducted to assess the availability, utilization, and support systems eHealth resources of nursing professionals among hospitals in the Cape Coast Metropolis of the Central Region of Ghana. The Metropolis is endowed with a teaching hospital, a metropolitan hospital, a university hospital, a polyclinic, and various clinics and health centers that provide health care to the population.

The population of the study included all registered nurses who have had at least a year's working experience in Cape Coast. This enabled the researcher to reach the nurses who have

worked in the metropolis and understand the systems. The estimated number of registered nurses within the metropolis, excluding midwives, is about 550, according to data available at the regional health directorate, Cape Coast Teaching Hospital, and the University of Cape Coast Hospital. Of this number, about 100 did not meet the criteria of working for at least one year.

Sampling Procedure and Sample Size

The multi-stage sampling technique was used to select participants for the study. Hospitals in the Cape Coast metropolis were first placed in primary, secondary, and tertiary clusters using cluster sampling. After placing the hospitals in clusters, one hospital was randomly selected from each cluster using simple random sampling. The hospitals in each cluster were listed and assigned numbers. At the end of the exercise, the three hospitals selected were the Cape Coast Teaching Hospital, which had 396 registered nurses, the University of Cape Coast Hospital, with 47 registered nurses; and the Ewim Polyclinic with 21 registered nurses. Once the hospitals had been selected, registered nurses who had worked for a year or more were randomly sampled. Eligible registered nurses with one or more years of working experience in the selected facilities, estimated at about 464, were sampled randomly and served with questionnaires. At each ward, nurses meeting the criteria were isolated and allowed to pick pre-wrapped papers bearing the numbers 1 and 2. Any registered nurse meeting the criteria who chose the number 2 was administered a questionnaire. A total of 184 questionnaires were administered at the Cape Coast Teaching Hospital, 21 at the University of Cape Coast, and 10 at the Ewim Polyclinic.

For this study, the formula adopted for the calculation of sample size is recommended by [28] for quantitative cross-sectional studies.

The formula; Sample size = $n = \frac{N}{1+N(e)^2}$ (1)

Where n is the sample size, N is the population size which is estimated to be about 464 according to data available at the regional health directorate, and e is the level of precision for which a 5% error margin was chosen. For this study, the sample size, a 95% confidence level, and P=0.5 are assumed. Hence the sample size for the study was:

$n = \frac{396}{1+ 396(0.05)^2}$ = 199 for Cape Coast teaching hospital.

n= $\frac{47}{1+ 47(0.05)^2}$ = 42 for the University of Cape Coast hospital.

$n = \frac{21}{1+ 21(0.05)^2}$ = 20 for Ewim Polyclinic

This figure which was 261, was selected randomly.

Data Collection and Instrument and Procedures

A structured questionnaire was used to solicit responses from participants. This questionnaire was in two parts. The first part was related to socio-demographic information; the second part had questions about the use of eHealth in the care and management of patients by nurses. The second part had questions on a four-point Likert scale. There was an intentional omission of the midpoint. This is to enhance the accuracy of the responses and avoid the misinterpretation of the midpoints. Each item on the point Likert type scale was scored as 1 - strongly agree, 2- agree, 3- disagree and 4 - strongly disagree. At each ward, nurses meeting the criteria were isolated and allowed to pick pre-wrapped papers bearing the numbers 1 and 2. Any registered nurse meeting the criteria who chose the number 2 was administered a questionnaire. Prior to administration, the research was briefly explained to them, and they were told they had the right to opt out of the research. Nurses were made to sign consent forms prior to data collection. The average number of questionnaires collated per day was 20. The process continued until the total number required at each facility was obtained.

Pretesting was done at Swedru Municipal Hospital. The hospital was chosen for pre-testing because it shares similar characteristics with the study area. All the necessary adjustments were effected before the commencement of actual data collection. No questions were deleted after the pre-test; however, a rearrangement of two questions was done to improve the cohesiveness among items. The Cronbach's alpha coefficient determined after being applied to the tool was 0.942.

Questionnaires collated were checked for completeness, and data collated from the structured questionnaire was entered into and analyzed using statistical package for social sciences (SPSS) version 22.0 data analysis software. Responses of respondents were transformed into percentages and presented in the form of frequency distribution tables and graphs. A Kruskal-Wallis H test as well as a post hoc analysis using Dunn's test were the statistical analysis used to test for significant relationships between demographic characteristics and availability, utilization, and support system for eHealth resources. A rating scale was developed to categorize the results from the analysis ranging from zero (0) to four (4). A score between zero (0) to one (1) was rated as poor, a score between 1.1 and 2.0 was rated as fair, a score between 2.1 and 3.0 was rated as good, and a score between 3.1 and 4.0 was rated as excellent.

Results

Socio-Demographic Characteristics of Respondents

The registered nurses who participated in this study numbered up to 206. The majority of the respondents (61.7%) were female, and 38.3% were males. Almost half of these respondents (49.5%) were married, 48.1% were single, and about 2.4% were divorced. Most of the respondents (62.6%) were between the ages of 21 and 30 years, 26.7% were between 31 and 35years, and 5.3% were between 36 and 40 years. Respondents above age 40 were also 5.3%. Concerning religious associations, the study showed that the majority of respondents (92.2%) were Christians, 6.8% were Muslims and 1% was a traditionalist. Many of the respondents (63.6%) had a diploma as their highest level of education, 20.4% had a bachelor's degree, 9.7% had an advanced diploma, 1.9% had a post-graduate diploma, and 4.4% held a master's degree (Table 1).

Table 1. Socio-Demographic Characteristics of Respondents

Socio-Demographics	Frequency	Percentage (%)
Sex		
Male	79	38.3
Female	127	61.7
Total	**206**	**100.0**
Age (years)		
a21-25years	62	30.1
26-30years	67	32.5
31-35years	55	26.7
36-40years	11	5.3
more than 40years	11	5.3
Total	**206**	**100.0**
Marital Status		
Married	102	49.5
Single	99	48.1
Divorced	5	2.4

Total	**206**	100.0
Religion		
Christian	190	92.2
Muslim	14	6.8
Traditionalist	2	1
Total	**206**	**100.0**
Education		
Diploma	131	63.6
Advanced diploma	20	9.7
Bachelor's degree	42	20.4
Post graduate diploma	4	1.9
Master's degree	9	4.4
Total	**206**	**100**

Professional Characteristics of Respondents

Regarding specialization and distribution on the wards, 78.6% were in general nursing practice, 6.3% were ophthalmic nurses, 5.8% were registered mental nurses, and 2.4% were registered community health nurses. ENT nurses made up 1.9%, whiles 1.5% were theatre nurses. Pediatric nurses were 1.5%, and critical care nurses were also 1.5%. Only 0.5% of respondents were public health nurses. The majority of the nurses (24.8%) were on the medical wards, and 23.8% were on the surgical wards. The children's ward also had 12.6% of respondents, and 13.6% were at the outpatient department. Respondents from the theatre constituted 6.8%, whiles the accident and emergency wards had a 9.7% response rate. Obstetrics and gynecology wards, ICU, and NICU accounted for 4.4%, 3.4%, and 1.0% of respondents, respectively. Only 2.4% of respondents had more than 20years of experience. The majority of respondents (51.9%) had worked between 1 and 5 years, and 33.5% had worked between 6 and 10 years. About 9.2% and 2.9% had worked 11 to 15 years and 16 to 20years, respectively (Table 2).

Table 2. Professional Characteristics of Respondents

Socio-Demographics	Frequency	Percentage (%)
Rank		
SN	82	**39.9**
SSN	42	**20.4**
NO	41	**20.0**
SNO	30	**14.6**
PNO	10	**4.9**
Ward		
Surgical	49	**23.8**
Medical	51	**24.8**
Children	26	**12.6**
NICU	2	**1.0**
Obs/Gynae	9	**4.4**
ICU	7	**3.4**

Theatre	14	**6.8**
A&E	20	**9.7**
OPD	28	**13.6**
Specialty		
General nursing	162	**78.6**
Ophthalmic Nurse	13	**6.3**
Critical care nurse	3	**1.5**
Paediatric nurse	3	**1.5**
ENT nurse	4	**1.9**
Theatre nurse	3	**1.5**
Registered mental nurse	12	**5.8**
Registered CHN	5	**2.4**
Public health nurse	1	**0.5**
Years of Work		
1-5years	107	**51.9**
6-10years	69	**33.5**
11-15years	19	**9.2**
16-20years	6	**2.9**
More than 20years	5	**2.4**

Availability of eHealth Resources to Nurses

Most nurses in Cape Coast (54.9%) were found to have good resources on eHealth available to them. Approximately 21.8% agreed to have fair resources, whereas 11.2% said they had poor resources. Only 12.1%, however, had excellent resources.

Association between Ward and eHealth Resources Available to Nurses

The ward where one works seems to determine the type of resources on eHealth available to nurses. A Kruskal-Wallis H test showed that there was a strong statistical association between ward and resources (χ^2 =19.691, p=.012), with mean ranks of 83.35 for the surgical ward, 97.84 for the medical ward, 127.50 for children's ward, 159.50 for Neonatal Intensive Care Unit, 139.22 for the obstetrics and gynaecological wards, 122.14 for the Intensive Care Unit, 108.86 Theatre, 107.05 for Accident and Emergency wards and 101.43 for the Outpatient Department (Table 3).

Comparatively, the post hoc analysis using a Dunn's test showed statistically significant relationships among the following pairs; A&E – Medical (p=.018), A&E – Surgical (p= .013), A&E – OPD (p=.012), A&E – ICU (P=.042), A&E – Theatre (p=.003), A&E – Children (p=.000), A&E – Obs/Gynae (p=.002) and A&E – NICU (p=.011). A&E had the most resources compared to the medical ward, OPD, Surgical ward, Theatre, Children's Ward, Obs/Gynae ward, and NICU (Table 4).

Table 3. Association between Ward and eHealth Resources Available to Nurses

Independent variable	**Dependent variable**	**N**	**Mean Rank**	χ^2	**p-value**
Ward	**Resources on ehealth**				
Surgical	-	49	83.35	19.691	.012
Medical	-	51	97.84	-	-
Children	-	26	127.50	-	-

NICU	-	2	159.50	-	-
Obs/Gynae	-	9	139.22	-	-
ICU	-	7	122.14	-	-
Theatre	-	14	108.86	-	-
A&E	-	20	107.05	-	-
OPD	-	28	101.43	-	-
Total	-	206	-	-	-

Table 4. Post Hoc Analysis for Wards and Resources

Sample 1-Sample 2	χ^2	**Std. Error**	**Std. Test statistic**	**P**
A&E-Medical	35.085	14.805	2.370	.018
A&E-Surgical	36.870	14.890	2.476	.013
A&E-OPD	-41.082	16.429	-2.501	.012
A&E-ICU	50.207	24.644	2.037	.042
A&E-Theatre	57.279	19.555	2.929	.003
A&E-Children	60.081	16.690	3.600	.000
A&E-Obs/Gynae	71.017	22.524	3.153	.002
A&E-NICU	105.600	41.617	2.537	.011
Medical-Surgical	1.785	11.226	.159	.874
Medical-OPD	-5.997	13.199	-.454	.650
Medical-ICU	-15.122	22.619	-.669	.504
Medical-Theatre	-22.193	16.932	-1.311	.190
Medical-Children	-24.995	13.523	-1.848	065
Medical-Obs/Gynae	-35.931	20.289	-1.771	077
Medical-NICU	-70.515	40.451	-1.743	081
Surgical-OPD	-4.212	13.924	-.317	751
Surgical-ICU	-13.337	22.674	-.588	556
Surgical-Theatre	-20.408	17.006	-1.200	230
Surgical-Children	-23.210	13.616	-1.705	.088
Surgical-Obs/Gynae	-34.146	20.351	-1.678	093
Surgical-NICU	-68.730	40.482	-1.698	090
OPD-ICU	9.125	23.714	.385	.700
OPD-Theatre	16.196	18.368	.882	.378
OPD-Children	18.999	15.283	1.243	.214
OPD-Obs/Gynae	29.935	21.503	1.392	.164
OPD-NICU	64.518	41.073	1.571	.116
ICU-Theatre	-7.071	25.977	-.272	.785
ICU-Children	9.874	23.895	.413	.679
ICU-Obs/Gynae	20.810	28.280	.736	.462
ICU-NICU	55.393	44.993	1.231	.218
Theatre-Children	2.802	18.602	.151	.880
Theatre-Obs/Gynae	13.738	23.976	.573	.567
Theatre-NICU	48.321	42.420	1.139	.255
Children-Obs/Gynae	-10.936	21.703	-.504	.614
Children-NICU	-45.519	41.178	-1.105	.269

Obs/Gynae-NICU	34.583	43.868	.788	.430

Training and Support

Regarding facility training, 57.3% agreed they had been trained in the use of eHealth. About 42.7%, however, have not received any training. The majority (60.6%) said that technical support was available to them, whereas 39.4% of respondents did not have access to this support. Even though most nurses had received training on eHealth, the majority (57.8) claimed there were no regular workshops on eHealth, and 42.2% have had regular workshops (Table 5).

Table 5. Training and Support

Had Facility Training	**Frequency**	**Percentage (%)**
Disagree	88	42.7
Agree	118	57.3
Total	206	100
Technical staff support		
Disagree	81	39.4
Agree	125	60.6
Total	206	100
Regular workshops on eHealth		
Disagree	119	57.8
Agree	87	42.2
Total	206	100

Internet Access

In relation to access to the internet in the facility, 48.1% claimed they had 24hour internet connectivity, while 51.9% did not. Yet individually, 58.7% had 24hour internet connectivity, and 41.3% reportedly had no access to the internet. Most of the respondents (71.8%) reported that they did not get internet bundles from the facility, but 28.2% said they did. This indicates that the high number of respondents with 24hour internet connectivity was large due to personal effort (Table 6).

Table 6. Internet Access

24-hour facility internet	**Frequency**	**Percentage (%)**
Disagree	107	51.9
Agree	99	48.1
Total	206	100
24-hour personal internet		
Disagree	85	41.3
Agree	121	58.7
Total	206	100
Given internet bundles		
Disagree	148	71.8
Agree	58	28.2
Total	206	100

The use of Electronic Platforms for eHealth Service Delivery

Intra and interdisciplinary cooperation seem to be very good. A greater portion of respondents (64.1%) confirmed that they had a common platform with their colleagues where they shared health information. However, 35.9% claimed they had no such platforms. Again, most nurses (54.4%) were on platforms that connected them to other healthcare team members, with 45.6% not involved in such activities. The majority (64.1%) of respondents had no access to eLibraries in their facility, whiles the minority (35.9) of the respondents reported the existence in their facilities. When asked about an electronic link with other facilities for the purposes of information sharing, 63.2% denied knowledge of any such link, but 36.8% said they did (Table 7).

Table 7. Electronic Platforms and Libraries

Nurses' common ePlatform	**Frequency**	**Percentage (%)**
Disagree	74	35.9
Agree	132	64.1
Total	206	100
Nurses' eplatform with other health professional		
Disagree	94	45.6
Agree	112	54.4
Total	206	100
Facility eLibrary		
Disagree	132	64.1
Agree	74	35.9
Total	206	100
eLink with other facilities		
Disagree	130	63.2
Agree	76	36.8
Total	206	100

Monitoring and Evaluation

In the areas of monitoring and evaluation, 59.2% of respondents revealed that the practice was either erratic or non-existent. However, 40.8% agreed that it was well structured in their facilities. This gives the impression of poor supervision of eHealth in the various facilities. Furthermore, 56.3% did not have a complaint section for eHealth, and 43.7% said there was a clear channel in place for addressing eHealth challenges. A greater number, 57.8%, of respondents acceded that they had no complaint section for eHealth, with 42.2% also agreeing to a clear channel of addressing eHealth challenges. It seems that once in place, the eHealth systems are left to run on their own with minimal supervision (Table 8).

Table 8. Monitoring and Supervision

Regular monitoring and evaluation by management	**Frequency**	**Percentage (%)**
Disagree	122	59.2
Agree	84	40.8
Total	206	100
Complaints section for eHealth		

Disagree	116	56.3
Agree	90	43.7
Total	206	100
Channel of addressing challenges		
Disagree	119	57.8
Agree	87	42.2
Total	206	100

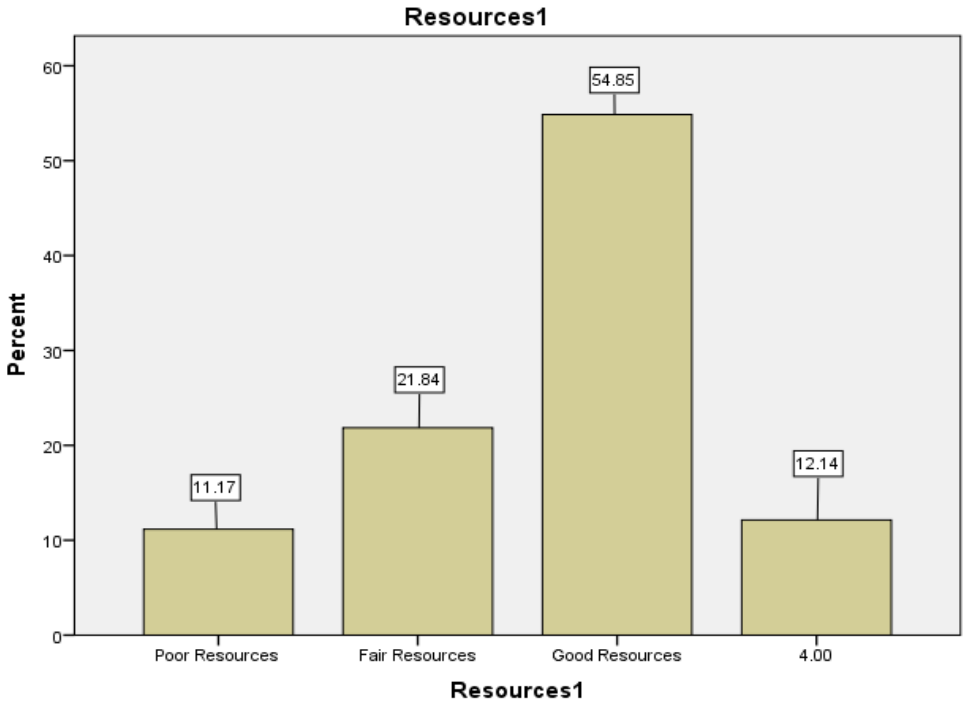

Figure 1. Availability of eHealth Resources Nurses

Discussion

The purpose of this study was to assess eHealth resources availability, utilization, and support systems for professional registered nurses in Cape Coast, the central regional capital of Ghana. The result suggests that most nurses in Cape Coast (54.9%) indicate that their facilities had good resources for eHealth service delivery available to them. About 21.8% agreed to have fair resources, whereas 11.2% said they had poor resources in their facilities. A few respondents (12.1%), however, had excellent resources. Although this study seems to point to the fact that basic infrastructure for eHealth service delivery was in place, many other studies have identified lack of infrastructure as a major setback to eHealth service delivery [29-33]. In resource-challenged countries such as Ghana, that recently attained a low middle-income status, this is an important finding. [34], observes that in Africa, access to a stable supply of electricity in many countries is very poor, especially in rural settings. Although network connectivity is improving, access to especially broadband is minimal. Fifty-seven percent (57%) of the population in Sub-Saharan Africa are in locations without mobile broadband access. This is likely to threaten the adoption of eHealth in the sub-region. However, according to the alliance for affordable internet 2017 report, Ghana has about 60.68% broadband access compared to 17.5% in 2012 and 37.75% infrastructure coverage. This attests to the fact that Ghana has improved in broadband provision, which is likely to positively impact the provision of eHealth services. The likely

explanation to the finding of good resources and infrastructural development from the study may be the recent efforts by the Ministry of Health to equip hospitals in the Central Region with eHealth infrastructure.

A Kruskal-Wallis H test performed to find the association between the wards of work and resources revealed that the ward where one works seems to determine the type of resources on eHealth available to nurses (χ^2=19.691, P= .012). Comparatively, the post Hoc Dunn's test discovered that the A&E had the most resources compared to the medical ward (p=.018), OPD (p=.012), Surgical ward (p=.013), Theatre (p=.003), Children ward (p=.000), Obs/Gynae ward (p=.002), ICU (p=.042) and NICU (p=.011). In relation to the ratings, the Accident and Emergency ward seems to be the most resourced ward in terms of eHealth care delivery.

Regarding facility training, although 57.3% agreed they had been trained in the use of eHealth, 42.7% had not received any training. Again, many respondents (60.6%) said that technical support was readily accessible to them, whereas 39.4% of respondents did not have such support. Despite the high numbers who had initial facility training, most of the respondents (57.8%) claimed there were no regular workshops on eHealth, whiles 42.2% had had regular workshops. These findings could be the reason why the knowledge and practice of eHealth were reportedly good. Lack of technical support and training has been a significant barrier to eHealth usage, according to data. This underscores the need for constant training and technical support as these directly impact the use of eHealth. For example, nurses in Saudi Arabia currently could not fully employ computer technology in their daily practices and were limited to only certain functions in their computerized systems [12]. Most electronic health record functionalities related to nursing were poorly utilized according to some studies in Turkey [22, 23, 35] observed low adoption of eHealth in low-income countries is partly due to a lack of computer skills among the clinicians. This means that countries that have clinicians with the requisite ICT training demonstrate a high acceptance of eHealth. [36] also confirmed that training had a direct influence on the use of eHealth. This underscores the need for structured training for staff, as 44.8% had not been trained. But then, this finding leaves room for questioning as to why knowledge and practice of eHealth seem to be good, but 44.8% claimed to have no training. [21,29,37] reported that there were those who had not received training or had it informally yet been comfortable using these resources. Even though some nurses have been trained, regular workshops and in-service training seemed to be lacking, and this omission may lead to a decline in the modest gains made.

Results from this study indicated that most respondents had personal 24hour internet connectivity and were largely due to their own efforts. Access to 24hour internet in the facilities was average as 51.9% claimed they had no access while 48.1% had. Yet individually, 58.7% had 24hour internet connectivity, with only 41.3% denying the fact. Most of the respondents (71.8%) reported that they did not get internet bundles from the facility, but 28.2% said they did. Reliable 24hour internet connectivity as a backbone for eHealth systems is crucial. Its absence is likely to cripple eHealth service delivery. It is disturbing that only 50% of respondents had 24hour internet connectivity in the facility. Internet penetration is one of the key determinants in the success of eHealth [38]. Though a worrying situation, it is not surprising because 57% of the population in Sub-Saharan Africa are in locations without mobile broadband access [34]. Also, the erratic power situation in Ghana, which has given rise to the new word "Dumsor" (Frequent electrical power outages), could be the reason for the inability to provide 24hour internet access. Although network connectivity is improving, access to especially broadband is minimal [34].

In trying to explore the utilization of electronic platforms for professional development and information sharing, a greater proportion of respondents had a common platform with their colleagues where they shared health information. Most nurses were on platforms that connected them to other members of the healthcare team. This meant electronic platforms are a major source of health information for nurses. A minority (35.9%) of respondents had access to eLibraries in their facility. The majority (64.1) of the respondents reported the non-existence of these facilities. These findings are consistent with those of [36], who found that the use of electronic libraries was greatly reduced. [39]. The absence of these facilities, therefore, places nurses at a disadvantage in getting access to the latest information that can impact their practice. If nursing in Ghana is to join in the digital revolution, all facilities need to be equipped with eLibraries and access to electronic databases. It is worth noting that nurses had varying opinions when asked about an electronic link with other facilities for information sharing; 63.2% denied knowledge of any such link, but 36.8% said they did. Many nurses have used electronic platforms to increase their knowledge. Nurses working in remote districts have increased opportunities to consult and compare practice with those in higher facilities when adopting eHealth, thereby reducing professional isolation [38]. Nurses in Cape Coast and Ghana as a whole can take advantage of these platforms via social networks or closed user groups to enhance eHealth service delivery.

These platforms can be used as a fulcrum to transform and improve practice since most nurses already use them [40] adds that there is better communication and coordination between healthcare providers with the use of these platforms. A study in Taiwan involving 1026 registered nurses revealed that nurses increasingly used social networks for knowledge sharing and knowledge [41]. In high-income countries, virtual health promotion sessions are one way of saving time and increasing efficiency. Here, one nurse can work with a group of people simultaneously. Nurses can go on virtual visits using the internet and have consultations with other health professionals instantaneously to facilitate better patient care and planning [24]. In addressing nursing efficiency, ICT provides great opportunities to provide health care services to distant clients who would otherwise have challenges accessing healthcare [40]. eHealth will also help nurses consult with a specialist over difficult cases, thus providing better care to the communities. There is better communication and coordination among healthcare providers [40]. This represents an area that can be explored for improved health care delivery and help to bridge the nurse-to-patient ratio gap. It is important that smaller facilities have electronic links with bigger facilities for information sharing and consultation.

In the areas of monitoring and evaluation, 59.2% of respondents revealed that the practice was either erratic or non-existent. However, 40.8% agreed that it was well structured in their facilities. This gives the impression of a less than average supervision of eHealth in the various facilities. To ensure effectiveness and efficiency, it is important that consistent monitoring and evaluation be done. Furthermore, 56.3% did not have a complaint section for eHealth, and 57.8% said there were no clear channels in place for addressing eHealth challenges. Only 43.7% of respondents acceded that they had a complaint section for eHealth, with 42.2% also agreeing to a clear channel of addressing eHealth challenges. It seemed that once in place, the eHealth systems were left to run on their own with minimal supervision. Effective supervision allows managers to identify and correct mistakes and ensure that standards are maintained. Problems such as the lack of a complaints section or channels for addressing eHealth challenges could be easily identified and corrected if there was effective monitoring and supervision.

Conclusions

Though the study results showed some promise in the digitization of healthcare in Ghana, there is more to be done to bridge the gap between the health needs of the population and the technologies required to meet them. After instituting the eHealth systems, most facilities leave them to run on their own without adequate supervision. This is a dangerous trend that will ruin the gains made towards the digitization of healthcare if allowed. eHealth has come to stay, therefore, every effort needs to be put in to enable Ghana, and for that matter, Africa to make maximum use of its potential.

References

[1] Canadian Nurses Association. 2006a, E-Nursing Strategy for Canada. Position statement. Ottawa.

[2] Remlex D., 2007, Information and Communication Technology in Chronic Disease care. *Medical Care Research and Review*, 64(2), 123-147.

[3] O'Carroll, P. W., Yasnoff, W. A., Ward, M. E., Ripp, L. H., & Martin, E. L., 2007, Public Health Informatics and Information Systems. Springer.

[4] Acheampong, E. K., 2012, The State of Information and Communication Technology and Health Informatics in Ghana. *Online Journal of Public Health Informatics*, 4(2), 21-25. ojphi.v4i2.4191. doi: 10.5210/ojphi.v4i2.4191.

[5] The Royal College of Nursing., 2022, Clinical-topics/eHealth. London: e Royal College of Nursing, 20 Cavendish Square, London, W1G 0RN ©. Retrieved from www.rcn.org.uk

[6] World Health Organization., 2019a, Delivered by women, led by men: A gender and equity analysis of the global health and social workforce. Human Resources for Health Observer - Issue No. 24. WHO, Geneva. Available at: https://www.who.int/hrh/resources/health-observer24/en/ (accessed 19 November 2020).

[7] World Health Organization, 2020, State of the World's Nursing 2020: Investing in Education, Jobs, and Leadership. WHO, Geneva. Available at: https://www.who.int/publications/i/item/9789240003279 (accessed 19 November 2020)

Data Availability

All data generated or analyzed during this study will be made available upon request to the author.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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[8] Öberg, U., Orre, C. J., Isaksson, U., Schimmer, R., Larsson, H., & Hörnsten, Å., 2017, Swedish primary healthcare nurses' perceptions of using digital eHealth services in support of patient self-management. Scandinavian Journal of Caring Sciences, 32(2), 961–970. doi:10.1111/scs.12534.

[9] Onu, F. U., & Agbo, I. S., 2013, Factors That Affect the Use of Ict in Nursing Profession in Ebonyi State Nigeria. Journal of Information Engineering and Applications, 3(11), 63–70.

[10] Topaz, M., Ronquillo, C., Peltonen, L., Pruinelli, L., Sarmiento, R. F., Badger, M. K., Ali, S., Lewis, A., Georgsson, M., Jeon, E., Tayaben, J. L., Kuo, C., Islam, T., Sommer, J., Jung, H., Eler, G. J., Alhuwail, D., & Lee, Y., 2016, Nurse Informaticians Report Low Satisfaction and Multi-level Concerns with Electronic Health Records: Results from an International Survey. AMIA Annu Symp Proc. 2016; 2016: 2016–2025. Published online 2017 Feb 10.

[11] While, A., & Dewsbury, G., 2011, Nursing and information and communication technology (ICT): A discussion of trends and future directions, International Journal of Nursing Studies. 48(10), 1302-1310.
https://doi.org/10.1016/j.ijnurstu.2011.02.020.

[12] Azza, E. M., 2015, Adoption and Barriers to Adoption of Electronic Health Records by Nurses in Three Governmental Hospitals in Eastern Province, Saudi Arabia. Perspectives in Health Information Management. 12, 1f. 1-16. PMCID: PMC4632875.

[13] Asamoah-Odei, E., Kebede, D., Zielinski, C., Soumbey-Alley, E.-W., Peixoto, M., & Moeti, M., 2012, Leveraging eHealth to Improve National Health Systems in the Africa Region. African Health Monitor, (14), 46-52.

[14] World Health Organization., 2013, eHealth Strategy factsheet.

[15] Sarfo, J. O., & Asiedu, M., 2013, EHealth Efficacy in Ghanaian Nursing : A pilot Thematic Analysis on Benefits and Challenges. *European Scientific Journal*, 9(23), 209–221.

[16] Ministry of Health., 2005, Ministry of Health Policy.

[17] Government of Ghana., 2003, Ghana ICT for Accelerated Development Policy.

[18] Ministry of Health, 2005, Ministry of Health ICT Policy.

[19] Ministry of Health., 2010, Ghana E-health Strategy.

[20] Adjorlolo, S., & Ellingsen, G., 2013, Readiness assessment for implementation of the electronic patient. *Journal of Health Informatics in Developing Countries*, 64(2). 128-140.

[21] Hegney, D., Eley, R., Buikstra, E., Fallon, T., Soar, J., & Gilmore, V., 2006, Australian nurses access and attitudes to information technology: A national survey. Studies in Health Technology and Informatics, 122: 688–692. PMID:17102351

[22] Top, M., & Gider, O., 2013, Nurses ' Views on Electronic Medical Records (EMR) in Turkey: An Analysis According to Use, Quality and User Satisfaction, *Journal of Medical Systems*. 36(3) 55-62. DOI:10.1007/s10916-011-9657-6

[23] Chike-Harris, K. E., Durham, C., Logan, A., Smith, G., & DuBose-Morris, R., 2020, Integration of telehealth education into the health care provider curriculum: a review [published online ahead of print April 3, 2020]. *Telemed J E Health*. 10.1089/tmj.2019.0261.

[24] Koivunen, M., & Saranto, K., 2017, Nursing professionals' experiences of the facilitators and barriers to the use of telehealth applications: a systematic review of qualitative studies. *Scandinavian Journal of Caring Sciences*, 32(1), 24–44. doi:10.1111/scs.12445.

[25] Duplaga, M., 2016, Searching for a Role of Nursing Personnel in Developing Landscape of Ehealth: Factors Determining Attitudes toward Key Patient Empowering Applications. *Plos One*, 11(4), e0153173. doi: 10.1371/journal.pone.0153173

[26] While, A., & Dewsbury, G., 2011, Nursing and information and communication technology (ICT): A discussion of trends and future directions, *International Journal of Nursing Studies.* 48(10), 1302-1310.
https://doi.org/10.1016/j.ijnurstu.2011.02.020.

[27] Afarikumah, E., 2014, Electronic Health in Ghana: Current Status and Future. *Online Journal of Public Health Informatics*,5(3) 230-238. https://doi.org/10.5210/ojphi.v5i3.4943.

[28] Yamane, T., 1967, Statistics: An Introductory Analysis (2nd ed.). New York: Harper and Row.

[29] Chitungo, I., Mhango, M., Mbunge, E., Dzobo, M., Musuka, G., & Dzinamarira, T., 2021, Utility of telemedicine in sub-Saharan Africa during the COVID-19 pandemic. A rapid review. Human Behavior and Emerging Technologies, 3(5), 843–853. https://doi.org/10.1002/hbe2.297.

[30] Furusa, S. S., & Coleman, A., 2018, Factors influencing e-health implementation by medical doctors in public hospitals in Zimbabwe. *SA Journal of Information Management*, 20(1). doi:10.4102/sajim.v20i1.928.

[31] Car, J., Black, A., Anandan, C., Cresswell, K., Pagliari, C., Bokun, T., McKinstry, B., Procter, R., Majeed, A., & Sheikh, A., 2008, The Impact of eHealth on the Quality & Safety of Healthcare. *Public Library of Science Medicine* 8(1),71-87. https://doi.org/10.1371/journal. pmed.1000387.

[32] Darbyshire, P., 2004, "Rage against the machine?": nurses 'and midwives ' experiences of using Computerized Patient Information Systems for clinical information. Journal of Clinical Nursing, 13, 17–25. Doi:10.1111/j.1365-2702.2006.01180.x.

[33] Peters, D. H., Kohli, M., Mascarenhas, M., & Rao, K., 2006, Can computers improve patient care by primary health care workers in India? *International Journal of Quality Health Care*, 18(6), 437–445. https://doi.org/10.1093/intqhc/mzl053.

[34] Asah, F., 2013, Computer usage among nurses in rural health-care facilities in South Africa: Obstacles

and challenges. *Journal of Nursing Management*, 21(3), 499–510. https://doi.org/10.1111/j.1365-2834.2011.01315.

[35] United States Agency for International Development., 2016, Trends in Digital Health in Africa. Retrieved from https://www.usaid.gov/what-we-do/global-health/global-health-newsletter/digital-health.

[36] Khan, S. Z., Shahid, Z., Hedstrom, K., & Anderson, A., 2012, Hopes and fears in implementation of electronic health records in Bangladesh. *Electronic Journal of Information Systems in Developing Countries*, 54(8), 1–8. https://doi.org/10.1002/j.1681-4835.2012.tb00387.x.

[37] Ridgway, L., Mitchell, C., & Sheean, F., 2011, Information and communication technology (ICT) use in child and family nursing: What do we know and where to now? *Contemporary Nurse*, 40(1), 118-129. https://doi.org/10.5172/conu.2011.40.1.118.

[38] Dee, C., & Stanley, E. E., 2005, Information-seeking behavior of nursing students and clinical nurses: implications for health sciences librarians. *Journal of Medical Library Association*, 93(1), 213–222. PMC1082938.

[39] Mugo, D. M., 2014, Determinants of Electronic Health in Developing Countries. *International Journal of Arts and Commerce*, 3(3), 49–60.

[40] Dowding, D., 2013, Are nurses expected to have information technology skills? Nursing Management, 20(5), 31–37. DOI: 10.7748/nm2013.09.20.5.31. e1112.

[41] Gulzar, S., Khoja, S., & Sajwani, A., 2013, Experience of nurses with using eHealth in Gilgit-Baltistan, Pakistan: a qualitative study in primary and secondary healthcare. *BioMed Central Nursing.* 12(6) 1-6. https://doi.org/10.1186/1472-6955-12-6.

[42] [42] Khanum, S., Souza, M., Naz, N., Sasso, G., Brüggemann, O., & Heideman, I., 2016, The Use of Networking in Nursing Practice —*An Integrative Review. Societies*, 6(3), 22-35. https://doi.org/10.3390/soc60300.