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Determinants Of E-Health Utilization And Delivery Of Health Care Services Among Primary Health Care Workers In Rivers West Senatorial District

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ABSTRACT
This study investigated the determinants of utilization of E-healthcare service delivery among primary health workers in Rivers west senatorial district. The research design of the study was a descriptive cross survey design. The population of the study are all health workers in the selected primary health care facilities amounting to 815 for the study with the sample of 440 determined using Yaro Yamene formula The instrument used to elicit data was a self-structured questionnaire titled "Utilization of E-health Application in Health Care Delivery Questionnaire (UE-HCDQ). Reliability index of the validated instrument of 0.70 was obtained using the Pearson Product Moment Correlation (PPMC). Data analysis were done using the Statistical Product and Service Solutions (IBM SPSS Version. 25). The result of this study illustrated that the grand mean of 1.88±0.79 is greater than the criterion mean of 1.50, indicating that the level of E-health care service delivery was good. The result also showed that those who had training are 24 times (OR=24.183, 95% CI:14.014-41.728) more likely to utilize E-health in delivery of health care service among primary health care workers compared to those who are not trained. The result also indicated that those who had ICT availability were more (OR=26.766) more likely to utilize E-health in delivery of health care service. It was concluded that level of utilization of E-health system for effective health care delivery was good. The high level of utilization E-health system was significantly determined by some factors such as training and availability of ICT among others. It was recommended among others that government should organize quarterly training for electronic health record for health care workers so that it can be used for charting the patient during booking, diagnosis, treatment, management and counselling service.
Keywords: E-health, Information and Communication Technology (ICT), Primary Health Care,

INTRODUCTION

E-health is the use of information and communication technology to reinforce health and health care. The application of information communication technology (ICT) in health care delivery is not merely about technology but a means to solve the critical data management and clinical communication challenges in health care organizations. According to World Health Organisation (2020) E-health can be defined as the cost effectiveness and secure use of information and communications technologies in support of health and health related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research. It refers to forms of prevention and education, diagnostics, therapy and care delivered through digital technology, independently of time and place. E-health is the leveraging of information and communication technology (ICT) to connect providers, patients, and governments; to

educate and inform health care professionals, managers and consumers; to stimulate innovation in health care delivery and health system management (WHO, 2013). E-health serves as a medical record used to capture, store, and share information among healthcare providers, it also helps in delivering of healthcare services to patients.These new forms of delivery produce new contents of care such as 'blended' care where conventional mental health care is combined with online interventions (Bagyendera, 2016).

According to WHO (2020), primary health care addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social wellbeing. It provides whole-person care for health needs throughout the lifespan, not just for a set of specific diseases. Primary health care ensures people receive quality comprehensive care - ranging from promotion and prevention to treatment, rehabilitation and palliative care - as close as feasible to people's everyday environment. Health Care is the most inclusive, equitable, cost-effective and efficient approach to enhance people's physical and mental health, as well as social well-being. E-health also denotes the IT-supported secondary process of care, such as quality systems and E-administration; finance, procurement, logistics, medical records, case management, appointments etc (Ossebaard & Gemert-Pijnen, 2016). Societal and scientific expectations of eHealth's potential are flying high. eHealth allegedly strengthens the opportunities for self-care, self-management and patient participation. This Online strategies including adaptations of more traditional communication methods such as the delivery of tailored information and the creation of support networks, such as the implementation of Smartphone applications for disease prevention and management has yielded much benefits in health care delivery (Cobb, et al 2011; Hebden, et al 2013). The utilization of ehealth care service might be affected by several factors such as training, work experience, availability, and health worker's efficiency among others.

Training is another form of education to provide the individual with the renewal of knowledge about a condition, concept, and ideas such as helping health care workers use ehealth service. It is pertinent to note that health care workers who recently received training on health technologies may be aware of ehealth application and utlization. Studies of Cwiklcki, et al (2020) revealed that adequate training is significant with effective use of ehealth application among health care workers. Studies of Ossebaard and Gemert-Pijnen (2016) revealed that health caare workers who are educated about ICT and computer gadgets were statistically significant with the utilization of ehealth application ($p<0.05$). It could be clear that most health workers do not know how to operate computer devices because it is new innovation in health care service hence they require training to enlightened them on the use of ehealth device to deliver effective health care to the population. Eason et al (2013) in their study buttressed that workers require training because the programme evolved around different systems to be delivered both local and national health care system.

Availability of ICT could be a major factor that influence the utilization of electronic health care delivery in primary health service. This involve the use of electronic devices, computer materials and laboratory to enable health workers to process, register/booking for antenatal service, referral of cases and documents needed in medical service/proceedings. Stang et al (2010) put up that health care facility need to be equipped with electronic health applications devices, equipment and materials to ensure effective and efficient health care delivery. Burn, et al (2020) affirmed that it is feasibility for exploiting data for admissions, record of cases and transfer of folders from one facility to another. Zheng et al., (2020) provide decentralized computational architectures and data management technology, so that actions on data (such as transactions) take place in a decentralized manner. Kirub et al (2021) indicated that self-efficacy, effort expectancy, performance expectancy, facilitating conditions and social influence have a significant direct effect on user's attitude toward using telemedicine. Simoes (2019) opined in his findings that the fields of health management and health information technology (HIT), health informatics inclusive, are intertwined; one cannot distinguish where one field begins and the other ends.Nguyen et al(2014) confirmed that the potential of this technology to aid patient care and clinical documentation; for example, in improved documentation quality, increased administration efficiency, as well as better quality, safety and coordination of care. Common negative impacts include changes to workflow and work disruption.

It could be crystal clear that most health facilities in Rivers East senatorial district do not have ICT unit to carry out health care service in the work post and not governmental effort have beeing put in place to institute such viable component of health service. Poor or low level utilization of health service were due to inadequate lack of training and unavailabilty of ICT in the health facility located in the rural areas in the study settings. It was observed that most communities in the area of the study the Primar Health Care workers have no training and ICT devices were not Available which affects means of likehood but quality health care delivery was thwarted. Although there is a lack of mobile phone ownership, low level awareness of mobile phone use in healthcare and low familiarization about available E-health services in Rivers East senatorial district. It is against this backdrop that the study identify the determinants of utilization of E-health care service delivery among primary health workers in Rivers West senatorial district, Nigeria.

Statement to the Problem

The use of E-health application is a new development in the delivery of health care service that health care workers are not aware. Despite that the area of E-health has enabled health and medical practitioners to communicate with patient and the population, health care workers are stuck to the adaptation of traditional communication to the delivery of healthcare services. Poor knowledge about E-health application; unreliable information communication technology equipment; lack of availability of information communication technology equipment, high cost of information communication technology; low level of skills of potential healthcare workers; technology compatibility; and limited access to ICT as challenges hindering E-health use. Given the high burden of disease prevalence in Nigeria including emerging and re-emerging infectious diseases and the high rate of infections among health care professionals, the emerging trends in the nation's healthcare systems and spared by low number of skilled personnel. E-health is believed and has been identified to improve health care by strengthening the health system, supporting delivery of health care, and improving communication without necessarily face-to-face contact among health care providers with patient. It is pertinents to note that health care workers operating in Rivers West senatorial district lack the requisite skills and are reluctant in the use of E-health device in healthcare service delivery. It was observed that poor proficiency and inefficiency of staff or PHC workers were challenges in the use of E-health in health care service delivery. It was noticed that there was a bridged in communication even during COVID-19 pandemic which can be mended with the adhering to E-health information. Hence, the study would unravel the determinants of E-health utilization in health care service delivery among primary health care workers in Rivers West senatorial district, Rivers State, Nigeria.

Research Questions

The following research questions guided the study

1. What is the level of health care service delivery among primary health care workers in Rivers west senatorial district?
2. To what extent does training constitute a determinant of utilization of E-health in health care service delivery among primary health care workers in Rivers west senatorial district?
3. To what extent does availability of ICT constitute a determinant of utilization of E-health care service among primary health care workers in Rivers west Senatorial district?

METHODOLOGY

Descriptive survey research design was employed in the present study. The area of study was Rivers West Senatorial District. The population of the study are all health care workers in the selected primary health care facilities in Rivers West Senatorial District. Ahoada East (165), Ahoada West (146), Abua-Odual (322), Asari-toru (182) Local Government Areas of Rivers State amounting to 815 for the study (Primary HealthCare Mangement Board, 2020 The instrument used to elicit data was a structured questionnaire titled "Utilization of E-health Utilization in Health Care Delivery Questionnaire (UEHCDQ) was designed and adopted for data collection. The questionnaire consisted of two sections A and B. Section A revealed information about E-health application while section B showed information about utilization of E-health in health care delivery. A 4-points Likert scale was used ranging from 1 - strongly disagree, 2 –

disagree, 3 - agree and 4 - strongly agree as response items. The reliabilibilty of the instrument was obtained through test re-test method and were subjected to statistical analysis, and reliability index of 0.70 was obtained using the Pearson Product Moment Correlation (PPMC). Hence, it was reliable and applicable for the study. Means, frequency distributions, and percentages were used in answering the research questions.

RESULTS

Research Question 1: *What is the level of utilization of E-health care service delivery among primary health care workers in Rivers East senatorial district?*

Table 2: E-health care service Utilization

Criterion mean = 1.50

SN	**Items**	χ	SD
1.	E-health system enables effective communication of clinical information to patient.	1.28	0.72
2.	E-health system does not necessarily enable effective communication of clinical information among colleagues.	1.58	0.64
3.	E-health system facilitates clinical decision making	1.78	1.03
4.	E-health system facilitates clinical information sharing across unit/wards and colleagues	1.80	0.92
5.	E-health care service facilitates storage of patient's folder.	1.95	0.89
6.	E-health care service facilitates documentation of workers' files	2.10	0.62
7.	E-health care service facilitates diagnostic and laboratory procedure.	1.81	0.66
8.	E-health care service permits easy access to previous medical reports	2.41	0.74
9.	E-health system enables computation of treatment/diagnostic proceedings	1.92	0.84
10.	E-health system enables summary of previous medical proceedings	2.10	0.88
11.	E-health system enhances booking or issuing appointment to patient.	1.98	0.82
	Grand Total	1.88	0.79

Table 4.1 showed the level of E-health care service delivery among primary health care workers in Rivers West senatorial district. The result showed that, the grand mean of l.88±0.79 *is* greater than the criterion means of 1.50, indicating that the level of E-health care service delivery among primary health care workers in Rivers West senatorial district was high.

Research question 2: *To what extent does training constitute a determinant of utilization of E-health in health care service delivery among primary health care workers in Rivers West senatorial district?*

Table 2: Training and Utilization of E-health care service Delivery among primary health workers.

SN	Items	Training			
		Regular		Not regular	
		$\bar{X}$	SD	$\bar{X}$	SD
1	E-health system as a new innovation is not difficult to operate.	1.89	0.78	1.93	0.86
2	E-health systems are not socially and culturally accepted by workers.	1.73	0.88	1.76	0.86
3	E-health system utilization of health care delivery is determined by the accessibility	2.10	0.87	2.13	0.97
4.	Better assessment of E-health system encourages the delivery and use of health care service.	1.88	0.87	1.93	0.87
5	Shorter duration is not required to operate E-health system for utilization of health care service.	1.91	0.61	1.92	0.69
6	Cost of E-health system is a driving force for increase health care service delivery.	1.59	0.89	1.56	0.89
7	Availability of E-health system enables effective delivery of health care service.	2.01	0.53	2.08	0.58
8	The cost of E-health system may not be necessary for the use of health care service	1.87	0.77	1.83	0.79
9	Longer duration of utilization of E-health system does not affect delivery of health care service.	2.01	0.59	2.01	0.62
10	The experience of workers may not necessary for the use of E-health system for effective health care service delivery.	2.02	0.84	1.93	0.85
	Grand total	**1.90**	**0.76**	**1.91**	**0.79**

Criterion mean = 1.50

Table 2 showed the training constitute a determinant of utilization of E-health application in health care service delivery among primary health care workers in Rivers west Senatorial District. The result showed that both category of training constitute a determinant the utilization of E-health application in health care service delivery among primary health care workers. However, those who were not regularly trained had more factors affecting them (X = 1.91 ±0.97) compared to those who were trained regularly (X = 1.90±0.76).

Research Question 3: *To what does availability of ICT constitute a determinant of utilization of E-health care service among primary health care workers in Rivers west Senatorial district?*

Table 3: ICT availability and Utilization of E-health care service Delivery among primary health care workers.

SN	Items	Working experience			
		Yes		No	
		$\bar{X}$	SD	$\bar{X}$	SD
1	E-health system as a new innovation is not difficult to operate.	2.22	0.88	1.81	0.79
2	E-health systems are not socially and culturally accepted by workers.	2.25	0.87	1.60	0.80
3	E-health system utilization of health care delivery is determined by the accessibility	2.34	0.99	2.04	0.89
4.	Better assessment of E-health system encourages the delivery and use of health care service.	2.25	0.83	1.79	0.85
5	Shorter duration is not required to operate E-health system for utilization of health care service.	2.33	0.60	1.77	0.62
6	Cost of E-health system is a driving force for increase health care service delivery.	1.82	1.10	1.49	0.79
7	Availability of E-health system enables effective delivery of health care service.	2.41	0.56	1.93	0.50
8	The cost of E-health system may not be necessary for the use of health care service	2.41	0.56	1.66	0.76
9	Longer duration of utilization of E-health system does not affect delivery of health care service.	2.14	0.68	1.96	0.57
10	The experience of workers may not be necessary for the use of E-health system for effective health care service delivery.	2.25	0.83	1.87	0.83
	Grand total	**2.24**	**0.79**	**1.79**	**10.74**

Criterion mean = 1.50

Table 3 showed the factors affecting the utilization of E-health application in health care service delivery among primary health care workers based on ICT availability in Rivers Wast Senatorial District. The result showed that both category of ICT availability had factors affecting the utilization of E-health application in health care service delivery among primary of health care workers based on work experience. However, those who had 1CT were more affected (X = 2.24±0.79) compared to those who had no ICT (X = 1.79±0.74).

DISCUSSION

Utilization of E-health care Service

The result of this study showed that the grand mean of 1.88±0.79 is greater than the criterion means of 1.50, indicating that the level of E-health care service delivery among primary health care workers in Rivers East senatorial district was good. The result of this study is expected because electronic technologies and devices are advancing every day and over the recent times it was introduced in the health care system to promote quality delivery of service. However, since the introduction of primary health care system in Rivers State, computer device and ICT were made available for health workers to

utilize to advance the system. The result of this study is in line with McCrorie, et al (2015) and Nguyen et al (2014) that health care workers are likely to use computer electronic devices in the health service if it was made available for the workers and had a significant effect on the delivery of health care services Hayat, et al (2017) and Norman Skinner (2006) and whose studies stated that utilization of electronic health system helps to improve the literacy and competency of workers in all occupation thereby enhance quality service delivery especially in health care services. Previously, Gunter et al, (2005) added that devices such as electronic health record are mostly utilized by health care workers to collectively receive information and data of the particular population. Chris et al (2014) agreed that health care workers who use electronic health record to chat for patient and gather information significantly deliver quality health care service. As of the time of this study, there were possible no contrary findings that were against the outcome of this study, hence health care workers are more likely to utilize E-health device. It is plausible that utilization of electronic health system is significant to provide disseminating health information pertaining to health messages and tips on how to know about your health. There is need to ensure that electronic health devices should be available for health workers to utilize in order to advance the health system. This would enable dissemination of information and data procession/storage to improve quality outcomes.

Training and Utilization of E-health in Delivery of Healthcare Service

The result of this study showed a statistical significant relationship between training and utilization of E-health in the delivery of health care service among primary health care workers (p=0.000). However, the result also showed that those who had training were 24 times (OR=24.183, 95% CI:14.014-41.728) likely to utilize E-health in delivery of health care service among primary health care workers compared to those who are not trained. The result of this study is expected because regular training usually provide health care workers with information and new techniques that may advance the utilization of health care system. Health workers who received training at interval may efficiently utilize the electronic health device in enhancing quality health service delivery. The result of this study is in line with Cwiklcki, et al (2020) that adequate training is significant with effective use of e- health application among health care workers (p<0.0«l). Simoes (2019) affirmed that health workers in the health system who are not well trained in the use of computer application and or software may not be able to function effectively in the health care service. Wheatley (2013) added that in-service training for health care workers provide them with new information on the need to adopt the use of computer-based method of healthcare delivery. Ossebard and Gemert-Pijncn (2016) affirmed that health care workers who are educated about ICT and computer gadgets and other devices were statistically significant with the utilizationof electronic health application (p<0.05) for effective delivery of health care service. Wheatley (2013) and Cobb, et al (2011) whose studies states that online training on the strategies including adaptations of more traditional communication methods such as the delivery of tailored information and the creation of support networks, such as the implementation of smartphone applications for disease prevention and management has yielded much benefits in health care delivery. Eason et al (2013) added that healthcare workers require training because the health service programme evolved around different systems to be delivered both local and national health care system which require the use of innovative technologies such as computer devices. It could be clear that most health care workers do not know how to operate computer devices because it is new innovation in health care service hence they require training to enlighten them on the use of E-health device to deliver effective health care to the population. It is pertinent to note that health care workers who have recently received training on health technologies may be aware of E-health application and utilization. As of the time of this study, there were no findings within my reach that contradict with outcome of this current study. Hence, training is a determinant of utilization of electronic health system in quality healthcare service delivery.

ICT Availability and Utilization of E-health in Delivery of Healthcare Service

The result showed a statistical significance relationship between ICT availability and utilization of E-health in delivery of health care service among primary health care workers (p=0.000). However, the result also showed that those who had ICT availability were (OR=26.766, 95% CI:14.014-41.728) and more likely to utilize E-health in delivery of health care service among primary health care workers

compared to those who are not have ICT availability. The result of this study is expected because if the ICT are available for the health care workers they would likely utilize it to deliver quality health care service. The result of this study is in keepings with Zhang et al.. (2020) whose studies revealed that lack of available ICT and data processing technology affect the level of accessibility and utilization of electronic health system in order to deliver quality healthcare service to the populace. Smith et al (2020) added that availability of telE-health devices provide dissemination of information for effective healthcare service such as online booking and registering for antenatal service, diagnosis, computed technology for diagnosis, online visit to health personnel among others. Renee et al (2020) buttressed that if ICT are available for workers in the health facility it may be possible for them to solve basic problem associated with their job such as sorting for patient folder, storage of information, sending of memo, printing of diagnostic results for patients among others. Olok, et al (2015) that more than average percentage of workers (57.4%) who have access to computer device may likely deliver heath care service through electronic health system as compared with those without computer knowledge and accessibility. It is plausible that if electronic health devices are available of competent health care workers, health care service would be easily delivered to the people. There was no contrary findings that were observed against the current study as of the time of this study.

Summary

This study investigated factors that affect E-health utilization and delivery of healthcare service in primary health centers in Rivers West senatorial district. The research design of the study was a descriptive survey research design. The population of the study are all health workers in the selected primary health care facilities identified above. Ahoada East (165), Ahoada West (146), Abua-Odual (322), Asari-toru (182) Local Government Areas of Rivers State amounting to 815 for the study. The sample size for the study consisted of 400 health care workers. This sample size was determined using Yaro Yamene formula for a finite population. A multi stage sampling procedure was adopted to select the sample of the study which were in three stages. The instrument used to elicit data was self-structured questionnaire titled "Utilization of E-health Utilization in Health Care Delivery Questionnaire (UE-HCDQ) was designed and adopted for data collection. The self-structured instrument was validated from the lecturers of Human Kinetics, Health and Safety Studies for face construct and content validity to the experts for moderation, criticism and correction. Results from the pre-test test were subjected to statistical analysis, and reliability index of 0.70 was obtained using the Pearson Product Moment Correlation (PPMC). Hence, it was reliable and applicable for the study. Data analysis was done using the Statistical Product and Service Solutions (IBM SPSS Version. 25). The result showed that, the grand mean of 1,88 ±0.79 is greater than the criterion means of 1.50, indicating that the level of E-health care service delivery among primary health care workers in Rivers East senatorial district was good. However, those who had worked for 1-5years were more affected (X = 1.97±0.63) followed by 11-15years (X = 1.95±0.63) and 6-10years **(**X= 1.81±0.59). The result for this study those who had ICT were more affected (X = 2.24±0.79) compared to those who had no ICT (X = 1.79±0.74). The result also showed that those who had training are 24 times (OR=24.183, 95% CI:14.014-41.728) more likely to utilize E-health in delivery of health care service among primary health care workers compared to those who are not trained. The result also showed that those who had ICT availability were (OR=26.766, 95% CI:14.014-41.728) likely to utilize E-health in delivery of health care service among primary health care workers compared to those who do not have ICT availability.

CONCLUSION

With regards to the findings of this study, it was concluded that level of utilization of e- health system for effective health care delivery was high. The high level of utilization E-health system was significantly determined by some factors such as training and availability of ICT, hence, the need to enhance technological innovation into health care delivery to improve quality service.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Government should include digital and electronic health in tertiary education curriculum in order to ensure national approach to developing quality and specific digital health competencies, to support allied health graduates being prepared to work in the digital health age.
2. Government should organize quarterly training for electronic health records for health care workers so that it can be used for charting the patient during booking, diagnosis, treatment management and counseling service. This may promote effective and efficient quality health care delivery.
3. Managers of health service should implement and adopt as preferred modality of telemedicine and this may open an opportunity to integrate telemedicine systems in the health system during and post pandemic health services.
4. Health care managers should implement E-health record to reduce concerns for quality and safety of patient care and improve the chance of successful implementation such as easy reaching out to clients from distant locations.
5. Health care workers should comply with the use of electronic devices in healthcare system as a new innovation to advance quality and effective service delivery such as the ability to use compute gadget in processing data from patient for booking and registration for health service.
6. Government should ensure ICT and devices are supplied and available for the disposition of health care workers to effectively utilize it for sending tele-health information and messages.

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