Journal of Health Informatics in Developing Countries

http://www.jhidc.org/
Vol. 12 No. 2, 2018

Submitted: July 27th, 2017 Accepted: July 9th, 2018

Factors influencing the use of electronic health records among nurses in a teaching hospital in Nigeria.

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Abstract

Background: Effective use of Electronic Health Records (EHR) by healthcare professionals has great potentials of optimizing the process of healthcare service delivery, especially in clinical sites. Despite high potentials for transformation of healthcare services through implementation of EHR as the core driver of prompt access, timely interventions, evidence-based decision making, cost-effective care, efficient management of scarce resources and client satisfaction; some EHR projects had fallen short of fulfilling these critical objectives. In recent past, factors ranging from human to socio-technical issues have been reported as determinants of use and non-use of EHR among target professionals. Therefore, this study investigated knowledge of EHR, access to electronic recording devices, awareness of an EHR named Made-In-Nigeria Primary Healthcare and Hospital Information System (MINPHIS), utilization of MINPHIS, and perceived factors responsible for use or non-use of MINPHIS among nurses in a teaching hospital in Nigeria. The nurse-user, institutional and societal related factors influencing utilization of MINPHIS in the pioneering teaching hospital was determined.

Methods: A cross-sectional design was used to collect quantitative data using a structured questionnaire among nurses working in the teaching hospital of reference. Systematic random sampling was used to select 230 nurses, out of which 206 consented. Data analysis was done using SPSS version 17. Hypotheses were tested at p value < 0.05 using Chi square and correlation coefficient.

Results: Majority of nurses (80.1%) had never used MINPHIS despite a significant percentage (79.6%) willing to use electronic health records. Only 37.4% claimed they were provided with MINPHIS computer system in their workplace, while 86.9% had never been trained. 26 of the 27 nurses that were trained claimed it lasted for few days while 25 affirmed it had no impact on use of MINPHIS. Consequently, 93.7% emphasized that paper documentation remained dominant. Statistically, there was significant relationship between use of the EHR (MINPHIS) and age (p = 0.045), years of working experience (p = 0.007), availability of computer system (p = 0.000), and training of users (p = 0.000).

Conclusion: Nurses are willing to use Electronic Health Record system but the required practical on-the-job training, necessary equipment and enabling environment are not supportive of the reported interest. All factors, user-related, institutional and societal factors, need to be appropriately examined and supported for successful use of EHR for improved healthcare delivery in Nigeria and similar developing countries.

Implication: Future researches should adopt a multi-level approach (i.e. individual, institutional and societal) in evaluating factors that may influence successful implementation of EHR projects among target users.

Keywords: Nurses; ICT; Electronic Health Record System; MINPHIS.

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1. INTRODUCTION

There is a growing interest of implementing a system of electronic health records among organizations which is considered as a quality improvement initiative [1]. An electronic health record is a digital store of patient data made accessible to multiple authorized users for continuity and efficiency in an integrated healthcare delivery system [2]. Nurses, being the single largest healthcare providers all over the world, are important to the adoption of Information Communication Technologies (ICT) in healthcare. This made nurses significant target-users for effective use and successful implementation of e-Health systems, especially in Africa [3]. Moreover, nurses bring a unique dimension to the implementation of Electronic Health Records (EHR), and their early involvement as a stakeholder in the implementation could influence their attitude, adoption and optimal use of EHR. Therefore, a clear understanding of the context within which nurses' use EHR systems is vital to successful implementation of EHR projects [4].

Nurse clinicians, educators, researchers and administrators handle large amounts of data and information during their discharge of daily duties. Traditionally, client data are handwritten in an unstructured paper format, in multiple versions. This process makes location, abstraction, and comparison of information very slow and difficult, thereby limiting the process of knowledge creation, sharing and development [5]. Moreover, prompt access to quality information by all stakeholders in the health care delivery system requires a structured and secured documentation mechanism for provision of quality patient care, which can be achieved with Electronic Health Records [6]. In the 21st Century, use of EHR has become the global best practice in the management of patient records, with developed countries taking the lead. Gradually, concerted efforts are being focused on phasing out of manual paper records in developing countries, which had consumed huge space in antique health record libraries for centuries and notably delayed access to efficient medical care [7].

Several factors had been documented in research literatures to have influenced the use of EHR among nurses. Some nurses were reported to have been resistant to using Information Technology (IT), while others lacked the required preparedness for effective application of health IT in nursing practice and documentation [8]. Likewise, some authors concluded that nurses lack time and skills to access and review electronic evidence-based information [8,9]. Meanwhile, poor implementation process, negative perception and lack of awareness of the immediate benefits were other reasons for sub-optimal or non- use of EHR [8,10]. Moreover, lack of informatics training, computer training, and technical support increases resistance to use [8,11,12].

Moreover, required documentation changes, system maintenance requirements and poor access to computer system are additional barriers [8,9,13]. According to Levy [14], non-availability of ICT equipment has hindered health workers from showing serious interest, leading to a widespread apathy towards ICT because of lack of facilities and their use. Another important challenge is the willingness of healthcare professionals to use IT-applications which is essential for successful eHealth implementation. Therefore, analysis of users' willingness and competence in eHealth applications often helps project managers alongside the institutional agencies or authorities to find out the required eHealth gadgets and organizational resources to acquire in advance [15].

Pre-implementation analysis confirms users' willingness to adopt and use IT-applications in healthcare organizations, thereby helping decision makers to handle implementation tasks effectively. It also helps to determine whether planned eHealth projects or applications will solve current problems, meet user demands and actualize specific goals or targets of the organization. This requires thorough and systematic analysis of the available human, financial and physical resources available for successful implementation of the selected eHealth systems within the socio-technical environment [15].

Nurses gain knowledge of information technology through education and training. However, Hebert [16] and Heeks [17] reported limited access of different categories of nurses to training and training systems. However, several authors affirmed that nurses' knowledge, skills and competencies in informatics significantly improved after well-planned sessions of focused training. The newly acquired knowledge, improved competency and proficiency with the use of computerized patient information systems (CPIS or EHR) and technology, rapidly enhanced evidence-based practice among nurses and overall patient safety [8,18,19].

Historically, a Finnish/Nigerian research team collaborated to further expand their rudimentary hospital information system in the late 1990s. The main aim of the partnership was to develop and pioneer the implementation of a comprehensive Electronic Health Records System that will be suitable for use within the context of developing countries. The teaching hospitals and medical centers in Nigeria were the priority focus for implementation. The target was to have established by year 2001, functional Health Informatics units in all the teaching hospitals in Nigeria for effective coordination of the standardized software between a University-based development laboratory and clinical site implementation of the MINPHIS system [20]. Although, the development of the commercial MINPHIS software was completed over two decades ago, only five teaching hospitals and medical centres could purchase and implement the system three years after the completion due to high cost of

procurement [20]. Therefore, by the target year 2001, despite some hospitals having computers or IT units, they were primarily focused on word processing or serving as technical support to typing pools and administrative offices [20]. Afterwards, the emergence of a Norwegian and South African partnership team, led to another successful development and deployment of a district-level health information management system (DHIS) in Africa. This eventually actualized the main objective of the Finnish/Nigerian research team to launch a primary healthcare and hospital information system for use in developing countries [20,21].

The MINPHIS architecture is a robust, two-tier architecture intended to improve usability by supporting a form-based, user-friendly interface. It also improves scalability by accommodating up to 100 users, and promotes flexibility by allowing data to be shared, usually within a homogeneous work environment [22]. According to Afolabi [23], the first system evaluation report in the 1990s noted the usefulness of MINPHIS and the fact that it could be expanded to give more clinical benefits. Subsequent system evaluation reports revealed the capabilities of the software were not optimally utilized by target users, which makes MINPHIS a partial success. Nonetheless, the MINPHIS system is still being used to generate useful summary reports by trained Health Records Officers for disease surveillance, health management reviews, research purposes and patient outcomes evaluation by healthcare professionals and hospital managers. Therefore, the MINPHIS package is still commercially available for procurement, with at least four tertiary hospitals in Nigeria using it for various purposes [23].

Considering the MINPHIS scenario, Gambo et al. [22] deduced that "eHealth projects can be derailed by the conflicting interests of different stakeholders. A starting point for such projects should begin with in-depth understanding of the individual interest of stakeholders with sincere focus on integrating all interests into the roadmap for actualizing the ultimate health-related objectives of the e-Health application. They further noted that although individual and application interests may not always be fully aligned, the major partners can find a common ground between project objectives and personal interests – sometimes money-making or achieving recognition - which can all be achieved by first developing and successfully implementing the system through active project management and sincere collaboration mechanisms [22]. In summary, Afolabi [23] emphasized that there is need for project managers to invest maximally on the social or soft side of an e-Health project by building trust among all stakeholders, facilitating open and honest interactions, as well as other effective mechanisms of negotiation and compromise [23]. When all these are in place, it will engender the effective use of EHR by nurses and other healthcare professionals.

The critical lesson from the MINPHIS case is that successful implementation of EHR requires software system integration with health care service delivery through active collaboration and social engagement of all partners and professionals as critical stakeholders. Although, the implementation of an EHR is a daunting effort, an organization-wide strategic effort governed by defined structure, oversight, and project leadership is needed. This was demonstrated at Allina Hospitals and Clinics [24] where active stakeholders' engagement throughout the EHR planning and implementation cycles, was the outstanding strategy for winning the HIMSS Davies Organizational Award [24].

More importantly, Saba and McCormick [25] reiterated that nurses need to participate in design review and provide local resources to ensure successful EHR implementation for optimal delivery of quality care to the patients. Therefore, a deliberate, careful and proactive change that involves the clinicians is vital to successful implementation of EHR. They finally warned that it is imperative to note that change is inevitable during EHR implementation, hence, the numerous benefits and positive effect of the change should be emphasised by all stakeholders (medical, nursing, and administrative leadership) [25].

2. METHODS

2.1 Research Design

A cross-sectional research study was conducted using self-structured questionnaire for collection of quantitative data among the target population.

2.2 Research Setting

The research was done in a tertiary healthcare institution with facilities for training, research and quality service delivery. The institution was established by the Western Region Government of Nigeria in 1975 covering a wide catchment area including the whole of Osun, Ekiti, Ondo, some parts of Oyo, Kwara, Kogi, Edo and Lagos states in South-West Nigeria.

The target population was the entire nursing staff working at the headquarters of a tertiary healthcare with five multi-unit healthcare facilities in distant locations. The personnel data was collected from the Nurses Audit Unit at the Office of the Director of Nursing Services. As at the time of study, a total of 537 nurses were employed and working in wards and clinics in different sections of the three-part tertiary healthcare facility. Specifically, 183 nurses work in the first part, 181 nurses in the second part and 173 nurses in the third part of the whole institution. For adequate representation, we aimed at getting 269 (50%) of the study population from the three parts but only 230 nurses (43%) consented.

2.3 Sampling Technique

A systematic random sampling technique was employed in selecting 230 Nurses that consented to participate from the three parts or segments (Phases I, II and IV) within the tertiary healthcare institution as highlighted Table 1. Appropriate measures were employed to ensure that sampling included all cadres of nurses.

Segment	Number of Nurses	Respondents
Phase I	183	80
Phase II	181	77
Phase IV	173	73
TOTAL	537	230

2.4 Instrument for Data Collection

Data was collected using self-structured questionnaire designed to collect relevant information from the sample population. The instrument was structured into five sections to actualize the research objectives highlighted as thus: Section A: Demographic Data; Section B: Level of Utilization of Computer and Software Applications; Section C: Usability of Existing Electronic Health Records System (MINPHIS) and Section E: Challenges and Suggestions for Use of MINPHIS System.

2.5 Validity and Reliability of the Instrument

Validity of the structured questionnaire was established through face and content validity techniques. The structured questionnaire was critically reviewed for appropriate structuring and suitability of the test item to answer the research questions. Pilot study was done by administering the questionnaire to 50 randomly selected respondents at another distant facility owned by the healthcare institution where MINPHIS was also being implemented. Their responses were evaluated to ascertain the internal consistency of data generated by the instrument or questionnaire. Ambiguous questions were reframed for clarity and relevance to the stated research objectives for the study.

Reliability test was done using test-retest method. The Cronbach's Alpha was calculated using 18 selected test cases, of which the result was 0.80. Hence, the research instrument was found to have an acceptable level of reliability with good internal consistency.

2.6 Procedure for Data Collection

The nursing personnel roster on the wards and clinics was used in selecting a representative sample of nurses across cadres. Thereafter, the research questionnaire was administered directly to each enlisted nurse for the study after gaining their verbal consent. Written Informed Consent was also obtained after detailed explanation of their level of participation and signing of a pre-drafted subject information sheet attached to the front page of the questionnaire by respondents. The ethical guidelines of the institution were followed strictly throughout the study.

High level of anonymity was guaranteed by informing respondents not to write their names on the questionnaire. Confidentiality of data and liberty of respondents to decline their participation in the study at any time were emphasized. Consequently, 206 out of 230 nurses gave their consent and fully completed the questionnaire for the research study. Avoidance of double respondents was ensured through coding of the research questionnaire. Data collection was conducted for a period of six (6) weeks by paying scheduled visits to wards and clinics during and after duty hours of the randomly selected and enlisted nurses.

2.7 Method of Data Analysis

Data collected were analyzed using the Statistical Package for Social Sciences (SPSS) software version 17.0. Descriptive statistics, using frequency tables, percentages, graphical representations and inferential statistics using Chi square and correlation coefficient were made. The alpha level of significance was set at p value < 0.05 for accepting or rejecting the research hypotheses.

3. RESULTS

3.1 Demographic Characteristics of respondents

Table 1 shows the summary of demographic characteristics of the respondents.

Table 1: Gender and Age Range Distribution among Respondents

Variables	Frequency N=206 (%)
Gender	
Male	38 (18.4)
Female	168 (81.6)
Age Categories (Mean =34±7.5)	
Below 30yrs	84 (40.8)
31 - 40yrs	83 (40.3)
41 - 50yrs	30 (14.6)
51 - 60yrs	9 (4.4)

Educational Level	
Professional Certificates [RN, RM and other licensed specialties]	152 (73.8)
University Degree [RN plus BSc/BNSc., MSc. Or PhD.]	54 (26.2)
Professional Status	
Nursing Workforce Cadre [Nursing Officer 2 to Principal Nursing Officer]	179 (86.9)
Nurse Manager Cadre [Assistant Chief Nursing Officer to Assistant Director]	27 (13.1)
Workplace	
Ward	159 (77.2)
Clinic	14 (6.8)
Theatre	29 (14.1)
Work Experience	
Less than 1 year	35 (17.0)
1 – 5yrs	77 (37.4)
6 – 10yrs	47 (22.8)
11 – 15yrs	26 (12.6)
16 – 20yrs	11 (5.3)
21yrs and above	10 (4.9)

3.2 Information Communication Gadgets Owned by Respondents

Figure 1 showed that only 4.4% of the respondents did not have any form of electronic information communication gadget.

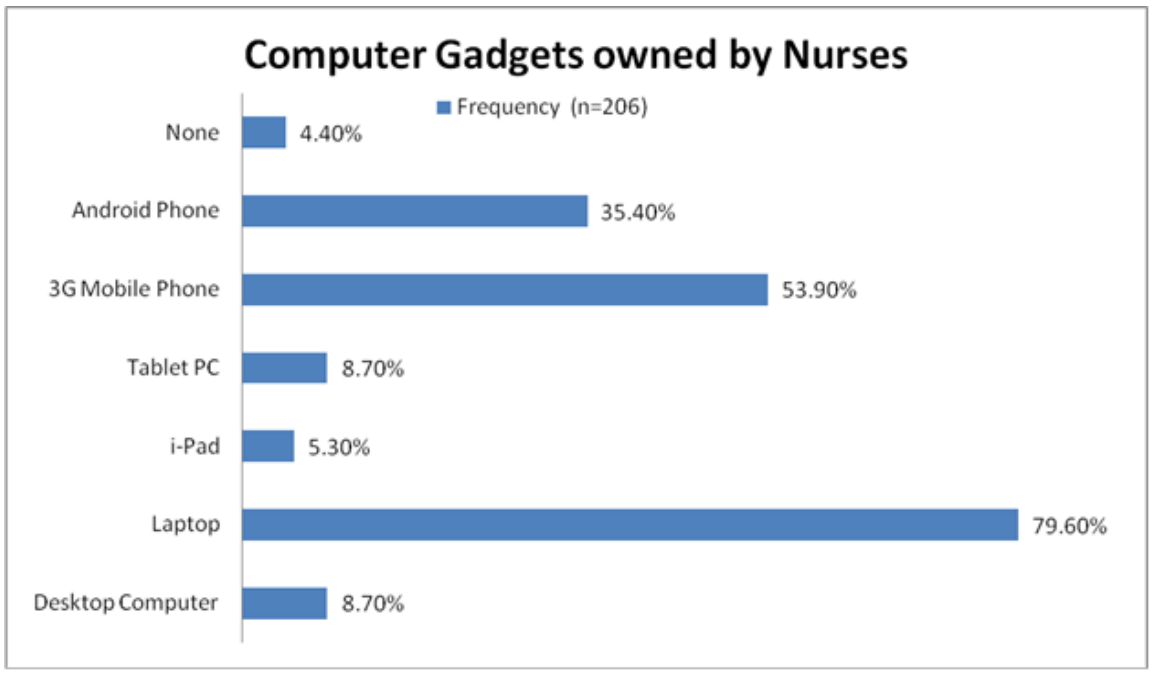

Figure 1: Bar Chart showing Computer Gadgets owned by Respondents

3.3 Definition of Electronic Health Records by respondents

Majority of nurses (74.8%) chose the correct definition of Electronic Health Records as shown in the Table 4.

Table 4: Definition of Electronic Health Records

Definition	Frequency (n=206)	Percentage (%)
An Electronic System for recording patient care information only.	9	4.4
A Computer System for documentation of nursing care.	2	1.0
A modern way of using ICT in the hospital for quality service delivery.	41	19.9
A Network of Computerized System for data entry, processing, storage and retrieval of healthcare information.	154	74.8

3.4 Current and Preferred Method of Documentation among Nurses in the Hospital

Table 5 showed that an overwhelming majority of nurses (93.7%) claimed that Pen and Paper was the dominant method being used for patient care documentation in the hospital as at the time of study. However, 79.6% preferred to use Electronic records while Laptop was chosen by the highest percentage of respondents (51.9%) for Electronic documentation.

Table 5: Current and Preferred Documentation Method in the Hospital

Variable	Frequency N=206 (%)
Current Method of Documentation	
Pen and Paper	193 (93.7
Both (Paper and Electronic Recording)	13 (6.3)
Proportion of Paper and Electronic Documentation	
100% Paper documentation	191 (92.7)
25 - 50% Electronic documentation	2 (1.0)
Below 25% Electronic documentation	13 (6.3)
Preferred Method of Documentation	
Paper-based Records	28 (13.6)
Electronic Records	164 (79.6)
Undecided	14 (6.8)
Preferred Device for Electronic Documentation	
Desktop Computer	59 (28.6)
Laptop	107 (51.9)
I-Pad	28 (13.6)
Tablet PC	28 (13.26)
Android Phone	31 (15.0)

3.5 Awareness and Use of Electronic Health Record System (MINPHIS)

As shown in Table 6, (57.8%) of nurses sampled were not aware of MINPHIS System in the hospital and only 1.9% of respondents wrote the full meaning of MINPHIS correctly. Majority of respondents (62.6%) were not provided with MINPHIS System for documentation on their ward or clinic. Hence, 80.1% of the respondents claimed they had never used MINPHIS. Only 2.9% cited few tasks that they had used MINPHIS for in the past.

Some of the tasks quoted by respondents were; admission and discharge of patients, retrieval of laboratory results, documentation of patient care including nursing process and care plan.

Table 6: Distribution of respondents by awareness and use of Electronic Health Record (MINPHIS) in the Hospital

Variable	Frequency - N=206 (%)
Awareness of MINPHIS among respondents	87 (42.2)
Correct definition of MINPHIS among respondents	4 (1.9)
Provision/Availability of MINPHIS System at the workplace	77 (37.4)
Frequency of MINPHIS use by respondents	
Occasionally	5 (2.4)
Rarely	36 (17.5)
Never	165 (80.1)
Tasks currently performed using MINPHIS System	
Don't use MINPHIS at all	191 (92.7)
No Response	9 (4.4)

3.6 Training on Use of Electronic Health Record System (MINPHIS) in the Hospital

As shown in Table 7, 86.9% claimed they have never been trained on the use of MINPHIS while only 13.1% were trained. Nevertheless, most of the respondents that were trained claimed it lasted for few days while a high percentage of them (92.6%) affirmed that the training had no impact on use of MINPHIS.

Table 7: Distribution of respondents by nature and perceived impact of training on Use of Existing Electronic Health Records (MINPHIS) in the Hospital

Variable	Frequency (N=206) (%)
Training of respondents on use of MINPHIS System	
3 - 4 years ago	4 (1.9)
5 years and above	23 (11.2)
Never trained	179 (86.9)
Duration of Training on use of MINPHIS System	
Few days	26 (12.6)
1 week	1 (0.5)
Never trained	179 (86.9)
Training Method on use of MINPHIS System	
Lecture	13 (6.3)
Workshop	14 (6.8)
Never trained	179 (86.9)
Perceived Impact of Training on use of MINPHIS System	
Good Impact on Use	2.9 (1.0)
No Impact on Use	25 (12.1)
Never trained	179 (86.9)

3.7 Challenges affecting Effective Use of Existing EHR (MINPHIS) in the Hospital.

As shown in Figure 2, respondents emphasised that lack of training (88.8%) and epileptic power supply (85.0%) were the greatest challenges among others, limiting effective use of MINPHIS in the hospital.

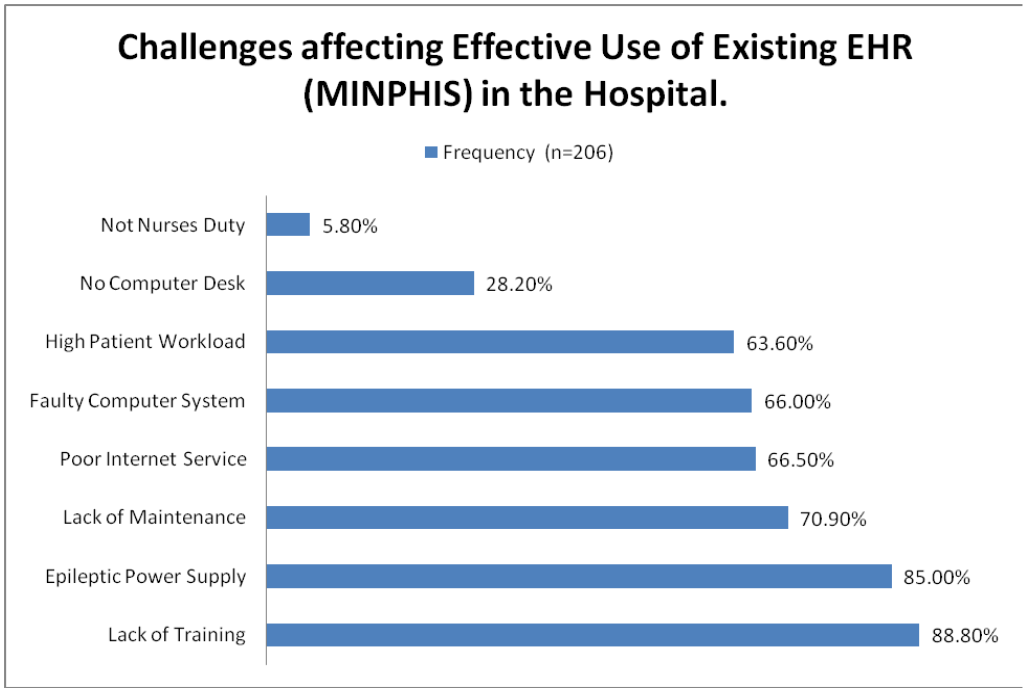

Figure 2: Bar Chart showing Challenges limiting Effective Use of MINPHIS.

3.8 Suggestions for Effective Use of Electronic Health Record in the Hospital.

Table 8 showed that majority of respondents suggested comprehensive training through in-service workshops and provision of adequate, functional computer systems for effective use of EHR.

Table 8: Summary of Suggestions for Effective Use of EHR by Respondents.

S/N	Highlights	Frequency N=206 (%)
1.	Comprehensive training of nurses and other healthcare workers on Electronic Health Records through in-service workshops.	143 (69.4)
2.	Provision of adequate, functional computer systems at the bedside in all the wards and clinics with necessary software.	103 (50)
3.	Constant, un-interrupted power supply with back-up.	58 (28.2)
4.	Reliable and accessible internet service connection	35 (17.0)
5.	Regular and proper maintenance of all equipment and e-facilities	36 (17.5)
6.	Employment of more nursing staff to cover the excess workload	32 (15.5)

3.9 Result of Hypotheses Testing

The p values shown in Table 9 confirmed the level of significance ($p<0.05$) of some key factors or socio-demographic variables. Therefore, the null hypotheses were rejected, and the alternate hypothesis stated accordingly.

Alternate Hypothesis 1: "There is significant relationship between Age and Actual Use of existing Electronic Health Records (MINPHIS) among nurses in the hospital".

Null Hypothesis 2: "There is no significant relationship between level of academic qualification of Users and Actual Use of existing Electronic Health Records (MINPHIS) among nurses in the hospital".

Alternate Hypothesis 3: "There is significant relationship between Year of Working Experience and Actual Use of existing Electronic Health Records (MINPHIS) among nurses in the hospital".

Alternate Hypothesis 4: "There is significant relationship between Availability of MINPHIS System and Actual Use among nurses in the hospital".

Alternate Hypothesis 5: "There is significant relationship between training of Users and Actual Use of existing Electronic Health Records (MINPHIS) among nurses in the hospital".

In summary, Table 9 confirmed that age, years of working experience, provision of MINPHIS Computer system at the workplace and training on MINPHIS had significant influence on frequency of use of the MINPHIS system among target users in the facility. These highlight the key user-related factors that must be considered as critical to the success of EHR projects. Meanwhile, level of academic qualification did not influence use of the system.

Table 9: Chi Square and Correlation Tests

Null Hypothesis	Crosstabs (p value ≤ 0.05)	Chi Square	Interpretation
(i) There is no significant relationship between Age of Users and Actual Use of MINPHIS in the hospital.	Age range of respondents * Frequency of MINPHIS Use at Workplace.	0.045	Significant
(ii)There is no significant relationship between level of Academic Qualification and Actual Use of MINPHIS in the hospital.	Level of Academic Qualification * Frequency of MINPHIS Use at Workplace.	0.132	Not Significant
(iii) There is no significant relationship between year of Working experience and Actual Use of MINPHIS in the hospital.	Working Experience in Years * Frequency of MINPHIS Use at Workplace.	0.007	Significant
(iv) There is no significant relationship between Availability of MINPHIS system and Actual Use in the hospital.	Provision of MINPHIS System at Workplace * Frequency of MINPHIS Use at Workplace.	0.000	Significant

(v) There is no significant relationship between Training of Users and Actual Use of MINPHIS in the hospital.	Last Training on MINPHIS System * Frequency of MINPHIS Use at Workplace.	0.000	Significant

4. Discussion

For clarity and emphasis, the factors that influenced use of Electronic Health Records in this study were classified into three major categories. These are; (i) user-related factors (ii) institutional factors and (iii) societal factors. The three perspectives were discussed as highlighted below.

4.1 User-Related Factors Influencing Use of Electronic Health Records

Age has been proven to be a critical factor in the attainment of effective use of electronic systems among target users. Since majority of the nurses (81.1%) in this study were younger adults aged below 40years old which showed a statistically significant relationship ($p = 0.045$) with actual use of HER. This study further substantiates the fact that age has an inverse relationship with use of electronic systems within the facility. This clearly supported the findings of Yehualashet, Andualem and Tilahum [26] in a Referral Hospital in Northern Ethiopia. Considering a dominant percentage (81.6%) of the nurses in this study being females; a typical scenario in nursing profession globally, majority (79.6%) preferred to use electronic method of documentation in their practice. Therefore, contrary to common bias, gender was not a notable factor as a determinant of actual use of EHR in this study.

Furthermore, academic qualification (University degree) was affirmed not to have significant relationship with actual use of EHR in the hospital. This further supported the recent findings of Yehualashet, Andualem and Tilahum [26] in Ethiopia. Majority of nurses (73.8%) in this study were licensed professional nurses trained in the Basic Schools of Nursing and Midwifery. This finding revealed the importance of the observation made by Ajibade, Oladeji and Okunlade [27] that computer literacy had been incorporated into the curricula by the Nursing and Midwifery Council of Nigeria since the year 2000 [27], which is in line with modern trends of incorporating relevant competency training into nursing programme. However, the findings of this study provide a basis for challenging the submission of Reese [8] that a considerable percentage of nurses are resistant to using IT since they lack preparation for the incorporation of health IT into nursing practice and documentation. The issue may not be that of resistance by the target users (especially nurses) but ineffective training on use of EHR which is more of an institutional factor because of poor implementation strategies. This fact was corroborated by the findings of Irinoye,

Ayandiran, Fakunle and Mtshali [28] in a study involving nurses in a teaching hospital in Nigeria.

Moreover, figure 1 showed that majority (95.6%) of nurses in this study owned at least one or multiple computer gadgets with the highest percentage (79.6%) having a Laptop except 4.4% that had none. This demonstrated a high level of individual preparedness among the target users evidenced by ownership of a computer system as a positive attitude and cognitive precursor to learning and using Electronic Health Records for improved work practices in the hospital facility. This form of readiness was emphasized by Emuoyibofarhe [29] and in Harvard University Guide for IT implementation in developing countries [30].

4.2 Institutional Factors Influencing Use of Electronic Health Records

Despite the fact that majority of the nurses in this study were young adults below 40 years (81.1%), in the active workforce cadre (86.9%) and preferred to use electronic records for documentation (79.6%) which were of similar findings with a study by Yehualashet, Andualem and Tilahum [26] in a Referral Hospital in Northern Ethiopia; Table 6 showed that less than half of the nurses (42.2%) were aware of the existing EHR as compared with higher level of awareness (72.2%) among healthcare professionals in Ethiopia [26]. As at the time of study, majority (80.1%) had never used the MINPHIS Electronic Health Records System, 92.7% of the nurses claimed they do not use MINPHIS for any patient-related task, while 62.5% emphasized that they were not provided with MINPHIS computer system at their place of work. Hence, there were obvious institutional factors that must have clearly accounted for this unexpected reality.

As enumerated by nurses in Figure 2, lack of training (88.8%) was identified as the greatest barrier that hindered effective use of MINPHIS in the tertiary healthcare institution. This was also identified as the topmost barrier to effective use of EHR by nurses in India as reported by Singh and Muthuswamy [31]. Furthermore, it was confirmed in this study that there was significant relationship between actual use of MINPHIS and availability of MINPHIS System (p value = 0.000) as well as training of Users (p value = 0.000). These findings were in support of several authors across the globe and in African countries as highlighted by Yehualashet, Andualem and Tilahum [26]. Other institutional factors highlighted in this study were; lack of maintenance (70.9%), faulty computer system (66%) and high patient workload (63.6%).

Comprehensive needs assessment and pre-implementation analysis before embarking on EHR project in any institution are critical to successful outcomes as recommended by

Brender [15] as these provides basis for capacity building for effective deployment. Moreover, the findings in this study also reiterated the submission of Afolabi [23] who noted that MINPHIS was being under-utilized in most tertiary healthcare institutions where it had been deployed and has almost become a 'status symbol' due to conflicting interests of different stakeholders. Hence, the MINPHIS project had suffered mostly from lack of effective collaboration methodologies as advocated by Korpela et al. [32]. This was contrary to the successful organization-wide strategy implemented by Allina Hospitals and Clinics [24], thereby leading to poor user participation and feedback as emphasized by Saba and McCormick [25]. Therefore, the major barrier towards effective use of MINPHIS is that of the macro-level systemic factors which overrides the micro-level individual factors as emphasized by Gagnon et al. [33].

4.3 Societal Factors Influencing Use of Electronic Health Records

Epileptic power supply (85%) and poor internet service (66.5%) can be classified as key social factors influencing effective use of EHR as highlighted by nurses. While these were rarely mentioned in studies conducted in most developed countries, these vital socio-economic infrastructures have remained a crucial challenge to the attainment of meaningful use of electronic systems in both rural and urban areas of developing countries, especially in sub-Sahara Africa. As noted by Adedoyin, Imam and Oladapo [14], Yehualashet, Andualem and Tilahum [26], Irinoye et al. [28] and several other authors [34-37]; these challenges had been recurrent especially within the context of developing countries, thereby becoming obstacles to successful implementation of EHR projects in Africa.

Moreover, there is lack of a nationwide eHealth strategic framework for effective provision of valuable information, strategic coordination and management of budgetary allocations or special trust funds, as well as guidelines and incentives for public and private healthcare institutions aspiring to implement Electronic Health Records for quality healthcare delivery in Nigeria. Therefore, the need for political goodwill and commitment of government towards achieving meaningful use of EHR cannot be overemphasized in most developing countries as demonstrated by advanced countries e.g. Sweden, Finland, Denmark and USA, where EHR implementation had gained significant momentum.

5. Conclusion

The MINPHIS experience has provided a unique scenario for evaluating the key factors influencing use of EHR among nurses in a public and federal government-controlled

health care institution in Nigeria. This study affirmed that multiple user-related, institutional and societal factors were the critical determinants of successful EHR implementation. Also, these factors have significant impact on the level of meaningful use that can be achieved by target users within the context of a socio-technical environment, especially in the developing countries. Hence, IT managers and EHR Implementation Experts must pay key attention to these factors and constantly review their actual or potential impact on the usability of the electronic system before, during and after project implementation within the context of the target healthcare facility and the society at large.

Therefore, health informatics experts, EHR project managers and researchers need to adopt a multi-level approach (i.e. individual, institutional and societal) in evaluating factors that may influence successful implementation of EHR projects among target users. These factors should be critically assessed at the pre-implementation phase and consistently tracked during and after implementation as progress indicators throughout the project lifecycle.

6. Acknowledgements

The authors sincerely appreciate all those who have helped in the entire process of conducting this study, most especially Nurses who consented and participated.

7. Conflict of Interest

The authors declare that there are no conflicts of interest.

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