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## Modern Technology in Nursing, its Impact and Role in Improving Maternal and Child Health among Nurses in Irrua Specialist Teaching Hospital, Esan Southeast, Edo State, Nigeria

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**ABSTRACT:** This study looked into the impact and role of current nursing technologies in enhancing maternal and child health among nurses at Irrua Specialist Teaching Hospital in Esan Southeast, Edo State, Nigeria. The study was conducted using a descriptive cross-sectional approach. The study's population consisted of 497 nurses, with a sample size of 136 respondents calculated using Taro Yamen's formula. The basic random sampling technique was used to pick respondents for the study from the public. Data were collected using a validated 15-item questionnaire. Experts assessed the instrument's face and content validity. The instruments' reliability estimates of 0.82 were determined using the test-retest approach. Data were analyzed using frequency counts, percentages, mean values, and standard deviations. The data analysis results showed that current technology in nursing has a significant impact on enhancing mother and child health among nurses in the research area. The study concludes that the predictor variables (perception of and adherence to anaemia prevention strategies) have a substantial impact on pregnant women attending antenatal clinics in selected hospitals in Benin City, Edo State, Nigeria. Based on the study's findings, it was advised that health policymakers, hospital administrators, and nurse leaders guarantee that nursing technology is used in healthcare delivery.

**Keywords:** Modern technology, Nursing, Maternal and child health, Nurses

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### INTRODUCTION

Maternal and child health (MCH) is a global health concern, especially impacting low- and middle-income countries (LMIC) where Nigeria belongs. Modern health technologies are creating opportunities to address the social determinants of MCH by facilitating access to information and providing other forms of support throughout the maternity journey. Technology has increased rapidly over the past four decades and has become an integral part of healthcare (Fergus and Igwe, 2019). It has been noted that paper based routine health information system often requires repetitive data entry, but information technology (IT) is changing the way

people and organizations work, access to relevant health information tends to improve with the use of electronic health information systems, in the West Bank, the primary health care system for maternal and child health was entirely paper-based, with care providers spending considerable amounts of time maintaining multiple files and client registers (Agwu, 2018). Information technology (IT) is becoming increasingly important as a source of information to guide practice and manage patient care. Nurses and midwives therefore need to be proficient in its use as pregnancy is a unique condition in the life of a woman which needs to be taken very seriously (Chib et

al., 2008). Nigeria is witnessing continual advocacy and an increased number of individuals yearning for the computerization of health information and healthcare processes. On the other hand, the government is evolving policies and strategies for the adoption and implementation of health information (Adeleke, 2019). This is evident in the development of a draft by the federal ministry of health and the ministry of communication technology which was termed the National Health Information Communication Technology (ICT) strategies framework. Utilization of modern technology in maternal and child health is important in improving the well-being of mothers, infants, and children. It has enabled developed and developing countries to save lives of women and their babies in the most vulnerable groups thereby reducing morbidity and mortality rate (Bhati, 2019).

The continuum of care for the child has three distinct phases; foetus, infant and early childhood. Consequently, the range of services available for mothers and children in all these phases is one of the most diverse within the health care system. To meet these expectations of providing safe and effective care in the healthcare environment, informatics competencies are critical and essential for nursing and midwifery practice (Greer, 2022). For effectiveness and consistent utilization of health information technology in maternal and child health care services, the committee in charge of research and ethics Irrua Specialist Teaching Hospital, Esan Southeast should develop and implement an e-governance project which will provide micro-level details of maternal and child health care indicators on monthly basis which ensures better health for women and children thus minimizing maternal and neonatal morbidity and mortality.

Health care providers within the implementation areas were trained on Information Communication and Technology (ICT) and given smartphones and other ICT equipment to assist in collecting clients' information. Despite significant investments in various interventions by governments and other organizations across the Local Government Area to improve MCH service utilization, complains about maternal and child health keeps persisting. It is based on this problem that this study investigated modern technology in nursing, its impact and role in improving maternal and child health among nurses in Irrua Specialist Teaching Hospital, Esan Southeast, Edo State, Nigeria.

Access to communication is widely recognized as an important factor in increasing the use and quality of maternal health care (Noordam, 2021). Across the globe, ICTs disrupt industries by drastically altering the means by which people engage with their wellbeing. The advancement of ICT may be leveraged as a game-changing communication tool to solve health issues. ICTs, particularly mobile devices, provide a platform for accessing health information and services, which can

help to bring about change in locations where health infrastructure and resources are typically scarce (Obo-Nai, 2019). Health information technology has the potential to become an effective instrument when used as part of a well-coordinated national health policy. It has the potential to empower policymakers, health frontline workers, and patients in all nations to enhance the quality of mother and child healthcare (International Telecommunication Union. (2013). The prospects for mobile phones to act synergistically with existing health systems in developing countries are numerous. By empowering individuals and providing decision makers with timely information about crucial health concerns, ICTs play a critical role in addressing health-related challenges (Nkrumah, Guerriero, & Purohit, 2019). Because it is compact, portable, frequently utilized, and relatively affordable, the mobile phone has high potential, and expanding network coverage makes it easier to communicate with people in rural and remote locations (Noordam, 2021).

Mobile platforms can allow health personnel to more proficiently monitor pregnancies, identify danger signs, and guarantee that women have access to emergency obstetric care in the event of problems (Obo-Nai, 2019). Pregnant women can also receive mass health messages via their cell phones. Maternal care, chronic illness management, and disease epidemics can all benefit from mobile devices and mobile health (mHealth) services. These services increase the health system's efficiency and effectiveness by tracking and reporting on patients, and they expand health care to disadvantaged populations (West, 2023). People can use health management applications to check their health, keep track of their medications, and allow healthcare practitioners to review and share their medical information remotely.

The capacity of information and communication technology (ICT) to be integrated into present health institutions has been widely acknowledged in the literature (Majeed and Khan, 2019). There are numerous ways in which ICT can assist in improving maternal health. The potential of ICTs to generate, store, retrieve, and convey information among users can ameliorate and sustain the provision of healthcare solutions (Odendaal et al., 2020). ICT, especially mobile phones, may be a proper channel for remedying the challenges of health literacy and for reaching women from inadequately serviced societies. Mobile applications can provide patients with tools to enable their engagement in the treatment and welfare. They can support the training of health personnel by providing access to correct and up-to-date information concerning health conditions and treatment as well as the most recent thoughts on treating certain health problems. Mobile technology permits patients to receive personal reminders via e-mail, automated phone calls, or text messages. Text messaging, for instance, exhibits significant potential as a means

for health care improvement for a number of reasons; it is accessible on nearly every model of mobile phone, the cost is reasonably low, its use is extensive, it does not need substantial technological knowledge, and it is generally appropriate to a variety of health behaviours and circumstances (Cole-Lewis, and Kershaw, 2020). There are cases where SMSs have proven to be effective in facilitating and improving health care activities. For example, in South Africa, Dis-Chem's (a private health facility) decision to send SMS reminders dramatically reduced the no-show rate for patients who had registered for COVID vaccines. Dis-Chem used the SMS system to send reminders to people who had already been assigned an appointment (Khan, 2021). Mobile health improves doctor-patient engagement by permitting computer generated consultation in real time using methods from text messaging to video calls. It also allows the patient to participate daily in their healthcare. Mobile technologies have been seen to be useful in improving maternal care. Mobile systems enable health care providers to track pregnancies more effectively, recognize danger indicators more quickly, and guarantee that pregnant women have easy access to emergency obstetric treatment if complications occur. Oluwaseun (2021) found that using ICT to care for pregnant women during and after delivery boosted demand for health services and reduced maternal-infant fatalities. Appointment reminders, health tip communication, and emergency referrals all benefit from ICT technologies (mobile phones, the internet, television/digital video disk (DVD), and radio). Déglise et al. (2022) reviewed case studies from low-income countries to examine SMS-supported interventions for prevention, observation, administration and treatment compliance of communicable and non-communicable diseases. Their study showed that mobile phones seemed to be an effective instrument for disease control interventions in low-income countries. The study concluded that mobile phones function as a low-cost technique to address certain needs of health structures and can offer new opportunities to improve health care in low-income countries.

## **MATERIALS AND METHODS**

### **Experimental setting**

### **Research design**

A descriptive cross sectional design was adopted for the Study. The study was carried out in Irrua Specialist Teaching Hospital, Esan Southeast, Edo State, Nigeria. Irrua Specialist Teaching Hospital is a federal government of Nigeria teaching hospital located in Irrua, Edo State, Nigeria. The purpose of Irrua specialist Teaching Hospital (ISTH) is to become a Centre of Excellence in Teaching, Research and Service to various

health problems facing the rural and suburban/small urban town communities.

### **Participants/Sample**

The population for the study comprised of 497 nurses. The sampling technique used in this study is the simple random sampling technique. A sample of one hundred and thirty six (136) registered nurses/midwives (RN, RM) was selected from the accessible population of 497. This sampling technique was used to select registered nurses/midwives (RN, RM) that were presented at the time of the study. The sample size was determined using Taro Yamane formula for sample size determination.

### **Instrumentation**

The instrument used for data collection was a self-developed, validated well-structured questionnaire which was tested for content validity. The reliability was done using the test-retest method. There after the information was analyzed for a co-efficient value which yielded coefficient index of 0.82. Data for this study were collected through face-to-face administration of questionnaires to the respondents who met the criteria for the study. Descriptive analysis of the personal data was analyzed using descriptive statistics, charts, frequencies tables and percentages.

### **Ethical consideration**

Participants in this study were allowed to decide whether to participate or not in the study after explaining the purpose of the study verbally. Respondents were also informed that information provided was treated with confidentiality and free to withdraw from participation of the study at any time.

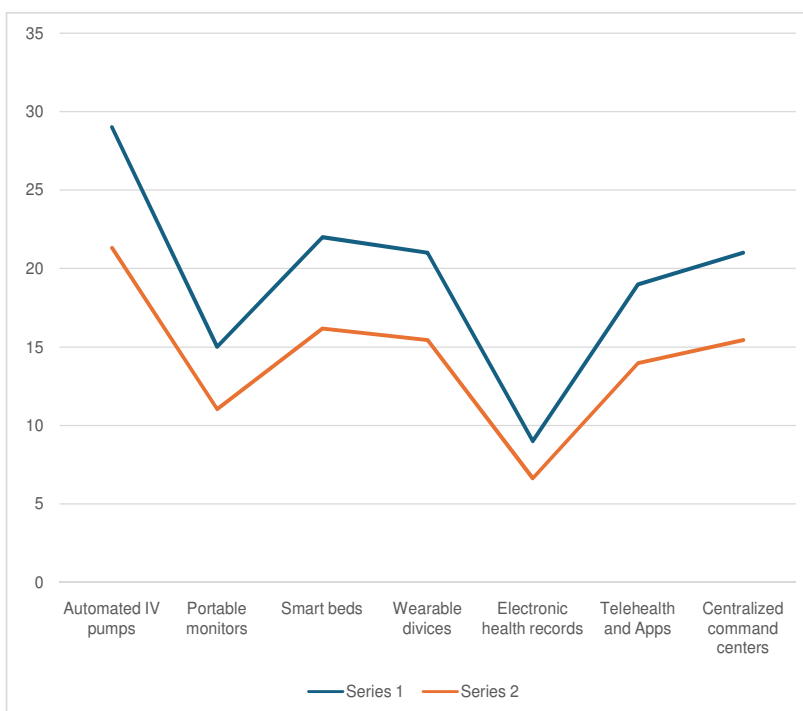
## **RESULTS**

The result of the study shows that out of 136 respondents used in the research, 61 respondents (44.85%) were males while 75 (55.15%) were females (Table 1). The result of the study further shows that out of 136 respondents used in the research, 26 respondents (19.12%) were 30 years old or younger, 54(39.71%) were between 31-40 years, while 56 respondents (41.18%) were 41 years of age or older. Going forward, the results of respondents' on marital status showed that out of the 136 respondents used in the research, 38 (27.94%) are single, 89(65.44%) are married, , 5(3.68) are divorced while 4(2.94%) are widows/widowers. In terms of the academic qualification, the results showed that out of the 136 respondents used in the study, 45 (33.09%) Registered midwives/Registered nurses, 62(45.59%) have Bachelor degrees in Nursing, 29(21.32%) have Master degrees in nursing. In terms of years of working

**Table 1:** Demographic variables of respondents

Variable	Demographic	Frequency	Percentage
Sex	Male	61	44.85
	Female	75	55.15
	<b>Total</b>	136	100
Age	≤30 years	26	19.12
	31-40 years	54	39.71
	≥41 years	56	41.18
	<b>Total</b>	136	100
Marital status	Single	38	27.94
	Married	89	65.44
	Divorced	5	3.68
	Widow/widower	4	2.94
	<b>Total</b>	136	100
Academic qualification	RM/RN	45	33.09
	B.NSc	62	45.59
	M.Sc	29	21.32
	<b>Total</b>	136	100
Years of experience as a nurse	10 years below	32	23.53
	11-30	61	44.85
	31 years and above	43	31.62
	<b>Total</b>	136	100

Source: Field work (2023)

**Figure 1:** Knowledge of types of modern technologies used in nursing

experience, 32 respondents (23.53%) have worked for 10 years and below, 61 respondents (44.85%) have worked for about 11-30 years while 43 respondents (31.62%) have worked for about 31 years and above (Table 1). Based on the types of modern technologies used in nursing, the result of the study showed that out of 136 respondents used in the research, 29 respondents (21.32%) have knowledge of automated IV pumps, while

15 (11.03%) are aware of portable monitors (Figure 1). The result of the study in Figure 1 further shows that out of 136 respondents used in the research, 22 respondents (16.18%) are aware of smart beds, while 21 (15.44%) are aware of wearable devices, 09 respondents (6.62%) are aware of electronic health records. Going forward, the results of respondents also revealed that out of the 136 respondents used in the research, 19 (13.97%) are aware

**Table 2:** Factors facilitating the utilization of modern technology among nurses.

To what extent do the following factors facilitate the utilization of modern technology?	N	SD	X
1 Proper training of nurses on how to operate ICT tool.	136	3.12	1.11
2 Implementation of hospital policy on utilization of modern technology.	136	2.30	0.98
3 Adequate knowledge of modern technology.	136	2.51	0.91
4 Availability of computers in the hospitals.	136	3.11	1.00
5 Hospital management support and provision of institutional guideline.	136	2.49	1.32

Grand Mean= 2.71

N= Number of respondents, SD= Standard Deviation,  $\bar{X}$  = mean

Key: Very High Extent (VHE) = 4 , High Extent(HE) =3, Low Extent (LE) =2, Very Low Extent(VLE)= 1

**Table 3:** Factors inhibiting the utilization of modern technology among nurses.

To what extent do the following factors inhibit the utilization of modern technology in nursing?	N	SD	X
1 Lack of comprehensive training of Nurses on modern technology	136	2.91	0.99
2 Unavailability of electronic health information technology tools.	136	2.51	0.92
3 Lack of constant power supply	136	2.42	1.01
4 The absence of reliable and accessible internet service connection.	136	2.31	1.23
5 Inadequate knowledge of modern technology in nursing	136	2.51	0.89

Grand Mean: 2.53

N= Number of respondents, SD= Standard Deviation,  $\bar{X}$  = mean

Key: Very High Extent (VHE) = 4 , High Extent(HE) =3, Low Extent (LE) =2, Very Low Extent(VLE)= 1

aware of centralized command center, while 21(15.44%) know tele health and App. The result in (Table 2) showed the rating on the extent of factors facilitating the utilization of modern technology. Items 1, 2, 3, 4 and 5 had a mean rating of 3.12, 2.30, 2.51, 3.11, and 2.49 respectively which are greater than the benchmark of 2.50. The grand mean of 2.71 indicates that there is a very high extent of the factors facilitates the utilization of modern technology.

The result in (Table 3) showed the rating on the extent of factors inhibiting the utilization of modern technology in nursing. Items 1, 2, 3, 4 and 5 had a mean rating of 2.91, 2.51, 2.42, 2.31, and 2.51 respectively which are greater than the benchmark of 2.50. The grand mean of 2.53 indicates that factors inhibiting the utilization of modern technology in nursing are to a very high extent.

## DISCUSSION

The finding of the study showed that there is a high extent of the impact of modern technology in nursing in improving maternal and child health among nurses in the study area. The result of the study is worthwhile as it highlights the significance of modern technology to the nursing profession. The finding correspond with a previous study by Rania, Soheir, Nagat and Samerra (2014), whose assessment of knowledge of nursing informatics in Cairo, Egypt revealed that most healthcare facilities in developing countries still rely on paper-based health information records rather than adopting electronic health information technology. Similarly, the findings agree with a study by Ademuyiwa, Faleke and Otetubi (2020) in University Teaching Hospital in Lagos, Nigeria, which revealed that the type of nursing technology mostly in used is routine paper based health information records

with only few units in the facility using electronic health information systems. Also, finding revealed that the extent of utilization of electronic health information technology among nurses in delivery of maternal and child healthcare at UCTH, Calabar is very low, while utilization of paper based health information technology is high. Majority of the nurses have never utilized electronic health information technology to access patients' health information, record and chart changes in vital signs or provide inter disciplinary communication. The result is consistent with the study by Ibebuikwe et al., (2019), in Imo state Teaching hospital in Orlu in Nigeria whose finding showed that the extent of utilization of health information technology to provide nursing care is low due to unavailability of ICT tools, and low knowledge health information technology to provide healthcare services.

## Conclusion

The study findings revealed a significant impact of modern technology in nursing on the improvement of maternal and child health among nurses in the study area. This conclusion underscores the crucial role that technology plays in enhancing the delivery of healthcare services, particularly in the context of maternal and child health. The integration of modern technology has evidently empowered nurses to provide more efficient and effective care, ultimately leading to positive outcomes for both mothers and children. As such, it is imperative for healthcare institutions to continue investing in and leveraging modern technological advancements to further enhance the quality of nursing care and ultimately contribute to the overall improvement of maternal and child health outcomes. This conclusion not only highlights

the current impact of technology in nursing but also emphasizes the potential for even greater advancements in the future, underscoring the importance of ongoing research and innovation in this critical area of healthcare.

## Recommendations

Based on the finding of the study, it was recommended that;

The challenges that nurses face when using modern nursing technology must be addressed. The fact that there are challenges means that millions of people are deprived of better maternal and child health and medical care. Health policy makers, hospital managements and nurse leaders should ensure that nursing technology is utilized in delivering healthcare service.

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