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Original Research Article

Knowledge, Attitude and Perception on the Use of Telemedicine in Obstetric Practice among Health Workers at the Federal Medical Centre, Makurdi

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ABSTRACT

Background: Telemedicine can address manpower shortages and enhance obstetric practice in low- and middle-income countries (LMICs). This study evaluates the knowledge, attitude, and perception of telemedicine in obstetrics among health workers at the Federal Medical Centre (FMC), Makurdi. **Methods:** A convergent parallel mixed-method design was employed, comprising a cross-sectional study of 210 health workers and a focused group discussion with 10 obstetricians at FMC Makurdi. Data were collected using a self-administered online questionnaire (google form) and an interviewer guide. Analysis was conducted using IBM SPSS Statistics Version 25 and NVivo version 12, with results presented in tables, charts, and textual forms. **Results:** Among the 210 participants, 44.3% were aged 32-41 years, 66.7% were female, 83.8% had tertiary education, and 63.8% were nurses. High levels of knowledge (73.3%) and utilization (88.1%) of telemedicine were observed. Over 80% of participants agreed that telemedicine could improve obstetric practice in LMICs through e-learning, health education, prenatal care, referrals, research, increased access to obstetric care, and enhanced collaboration among specialists. Barriers to telemedicine use included ICT illiteracy, lack of awareness, high setup costs, and maintenance challenges. **Conclusions:** The participants' good knowledge of telemedicine can be leveraged to improve obstetric practice, potentially reducing maternal and perinatal morbidity and mortality in LMICs.

Keywords: Knowledge, Attitude, Perception, Telemedicine, Obstetric Practice

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INTRODUCTION

Telemedicine involves the use of various telecommunication platforms on the internet and electronic media to render quality health services remotely [1,2]. It is defined as a collection of means or methods for enhancing the health care, public health, and health education delivery and support using telecommunication technologies [3]. This have been enhanced by the availability and increase use of mobile phone app, wearable devices, short messages or text messaging, multimedia messaging services and live audiovisual communication [3–6].

With the increasing obstetric population and the non-proportionate increase in the obstetric care specialist especially in the rural areas, telemedicine could be the solution to bridge the gap between the inadequate man power and rendering quality obstetrics care in the low and middle income countries (LMICs) like Nigeria[1]. Previous studies have shown the effectiveness of telemedicine in obstetrics especially in technologically advanced countries in the reduction of health care cost, unscheduled face to face visits, low neonatal weights and admissions to Neonatal Intensive Care Unit (NICU) [7]. Telemedicine has also been shown to reduce prolonged pregnancies, enhance maternal satisfaction, improve health behaviors, aid in weight management, address

mental health issues, alleviate postpartum depression, and improve pregnancy outcomes in high-risk pregnancies [7,8].

Available literature shows high prevalence of maternal and perinatal morbidity and mortality in developing countries like Nigeria [9]. With the availability of internet services globally and across Nigeria, telemedicine can be used to improve obstetric practice in several ways, such as exchange of information in the patient's management, prompt diagnosis of cases, treatment and follow up, develop a referral system, training and research as well as less visit to the obstetricians and mid wives.

Although the use of telemedicine is underdeveloped in Nigeria, the adoption of this method of health care delivery in obstetrics may significantly reduce maternal and perinatal morbidity and mortality especially in rural areas with no specialized manpower. Therefore, the purpose of this study is to determine the knowledge, attitude and perception of the use of telemedicine in obstetrics practice among health workers at the Federal Medical Centre (FMC), Makurdi.

METHODOLOGY

Study Site and Duration

This study was conducted at the Federal Medical Centre (FMC) Makurdi between 4th of April to 9th of May, 2023. The estimated number of health workers at the time of this study was 559 (Doctors, pharmacists and nurses).

Study Design

This was a convergent parallel mixed method study approach, consisting of a cross sectional descriptive study and a focus group discussion (FDG).

Study Population

This consist of 210 health workers (doctors, pharmacist and nurses/midwives) and 10 obstetricians for the FDG.

Inclusion and Exclusion Criteria

Health workers who were doctors, pharmacists and nurses/midwives were included in the study while other health workers and those who declined to consent to the study were excluded.

Sample Size Calculation

The sample size was determined using the sample size formula for prevalence study[10].

$n = Z^2P(1-P)/d^2$

Where,

n= Minimum sample size,
Z= Standard normal variate (at 5% type I error, P< 0.05) = 1.96
P= The proportion of medical practitioners who practice telemedicine was 67.3% from previous study in Enugu, Nigeria [1].
1-P= 1-0.673=0.327
d= Precision =0.05

Therefore, $n = 1.96^2 \times 0.673 \times 0.327 / (0.05)^2 = 338$
Using N (final)= n/1+n/N) for a study with a sample population of < 10,000

Where N= estimated total of the population. The total number of doctors, pharmacist and nurses working at Federal Medical Centre Makurdi from the hospital records at the time of this study was estimated to be 559.
N (final)= 338/1+338/559 =210

Sampling Method

A purposive sampling technique was used during this study. A self-administered online questionnaire was sent to the various WhatsApp platforms of doctors, nurses and pharmacist for their responses. The participants (Obstetricians) in the FDG were purposively selected.

Data Collection Instrument

A self-administered online questionnaire and an interviewer's guide was used for data collection for the cross-sectional survey and FDG. Information on the sociodemographic characteristics, knowledge, attitude, and perception on the use of telemedicine was obtained from the respondents.

Data Collection Procedure

The participants were contacted through their personal WhatsApp and doctors, pharmacists and nurses WhatsApp groups. The self-administered online questionnaire was sent to obtain relevant information during the research. The assessment of telemedicine knowledge was conducted using a short-answer question and a Likert scale item on the questionnaire, with response options ranging from "Very Poor" to "Excellent." The utilization of telemedicine was

evaluated through a dichotomous question on prior use in obstetric care ("Yes" or "No"), followed by a series of statements addressing specific areas of telemedicine application. These statements were rated using a Likert scale with options: "Strongly Disagree," "Disagree," "Neutral," "Agree," and "Strongly Agree." Focus group discussion was conducted concurrently using an interviewer's guide among 10 obstetricians in the Department of Obstetrics and Gynaecology to obtain relevant information on how telemedicine can improve obstetric practice.

Data Analysis

Data was analysed with the IBM SPSS Statistics software version 25.0. Descriptive statistics were calculated in frequencies and percentages. Inferential statistics (multiple linear regression analysis) was employed for analyses at 0.05 level of significance. P-value less than 0.05 was considered significant. The qualitative data collected from the FDG was transcribed verbatim and analysed thematically with the aid of NVivo version 12. Finally, the result was presented with tables, charts and textual forms.

Ethical Consideration

Ethical clearance was obtained from the Hospital Research Ethics Committee (HREC) of the Federal Medical Centre, Makurdi (FMH/FMC/HREC/108/VOL1). All jointly analysed data was without personal identifiers, fully anonymized. For protection of subjects the ethical principles of autonomy, privacy, non-maleficence and confidentiality was adhered to and informed consent obtained.

RESULTS

Table 1 described the socio-demographic characteristics of the study participants. Two hundred and ten (210) respondents participated in the study out of which 44.3%

Figure 1: Level of Knowledge of Telemedicine

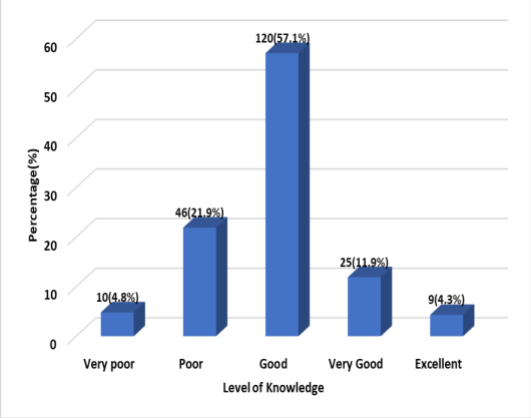

Table 1: Socio-demographic Information of Study Participants (N= 210)

Variables	Frequency (n)	%
Age in years		
22-31	74	35.2
32-41	93	44.3
42-51	31	14.8
52 and above	12	5.7
Gender		
Male	70	33.3
Female	140	66.7
Highest Level of Education		
Tertiary	176	83.8
Postgraduate	34	16.2
Tribe		
Tiv	83	39.5
Idoma	58	27.6
Igede	8	3.8
Hausa	1	0.5
Igbo	24	11.4
Yoruba	8	3.8
Others	28	13.3
Religion		
Christianity	206	98.1
Islam	3	1.4
Others	1	0.5
Occupation		
Nursing	134	63.8
Medical Doctor	71	33.8
Pharmacist	5	2.4
Designation of Participants		
Consultant Obstetrician	20	9.5
Other Specialist Doctors	14	6.7
Resident Doctor	30	14.3
Medical Officer	7	3.3
Nurse/Midwives	134	63.8
Pharmacist	5	2.4
Total	210	100.0

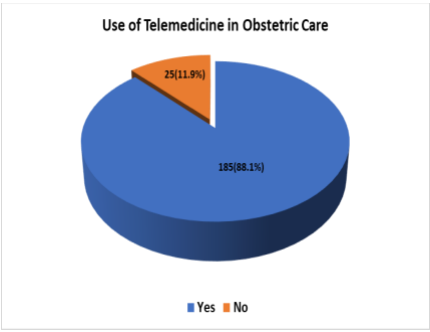

Figure 2: Use of Telemedicine in Obstetric Care

were between the age of 32-41years, 66.7% were female, 83.8% had tertiary education, 39.5% were Tiv, 98.1% were Christians and 63.8% were Nurses.

Figure 1 Shows that there was a high level of knowledge of telemedicine in the tertiary hospital in North Central Nigeria. This was scored based on the participants responses on the perception of the knowledge of telemedicine.

Thematic Analysis FDG among Obstetricians:

Knowledge of Telemedicine:

This Corroborates with the quantitative finding from the cross-sectional study among health workers. The participants demonstrated good knowledge of telemedicine with definitions and descriptions of telemedicine.

The first participant in the FDG defined telemedicine as the use of telecommunication technology to offer patients health care mostly in remote areas through the use of computer and smart phones.

The second participant in the FDG defined telemedicine as the use of telecommunication technology for diagnosis and treatment of patients. It is not necessarily in remote areas; it can be used to communicate with fellow medical practitioners.

The third participant in the FDG stated that… telemedicine is a form of telecommunication technology use in management of patient and this communication can be between health professionals like doctors and doctors, nurses and doctors, doctors and patients. I have been using this platform in managing patient.

The fourth participant in the FDG stated that… mostly, telemedicine possesses a lot of benefits. From giving access to quality care in remote locations to engaging patients in a more connected way. The platform has the potential of changing the healthcare delivery landscape. A laptop or a smart device with a stable internet connection will be enough. Although, we recommend using headsets for clear audio interaction. We as a professional medical doctor will ensure that the quality of care won't be compromised, regardless from which platform you are receivin*g that care.*

Figure 4.2 shows that 88.1% of the respondents have used use telemedicine in obstetric care while 11.9% have not used telemedicine.

Thematic analysis FDG among obstetricians: Use of Telemedicine in Obstetric Care

Supporting the quantitative finding above was the FGD among obstetricians. They all agreed that they have used telemedicine in patient management using various telecommunication platforms. During the FGD one of the participants stated that… We use telemedicine to manage patients and follow up treatment.

Another participant stated that… I've been using telemedicine to interact with health professionals, like doctors in other specialties, my colleagues, and my senior colleagues to improve patient care.

Table 2 shows the perception of how telemedicine can improve obstetric care among the study participants. Majority (> = 80%) of the participants agreed that telemedicine can be used to improve obstetric practice in LMICs in areas such as E-learning, prenatal care and health education, referrals, improve collaborations among specialists, follow up management, improve research and data collection, increase access to obstetric care, reduce waiting time of patients, reduce patient load per doctor during clinic and reduce patient visits to the hospital

Thematic Analysis FDG among Obstetricians:

Perception of How Telemedicine can Improve Obstetric Care

Supporting the quantitative finding above was the FGD held with some selected obstetricians. They all agreed telemedicine can be applied during the antenatal, intrapartum and postpartum periods to reduce perinatal and maternal morbidity and mortality

During the FGD one of the participants stated that… You can schedule an online doctor appointment if you are in a location where you can't access professional healthcare services or if you are seriously ill and can't leave your home. You can schedule an online appointment if you know your problem could be catered for online.

One of the participants stated that… Telehealth eliminates the need for physical appointment as well as the additional cost of healthcare. Additionally, a participant during the FGD stated that… Telemedicine provides a way to ask questions and access medical support without leaving home.

A participant stated that…. Family planning counselling can be done postpartum through telemedicine to help the patient make an informed choice. Also, another participant stated that…. telemedicine can be used to reduce the number of antenatal visits and number of patients per doctors thus reducing burnout among obstetricians.

Table 3 shows multiple linear regression analysis on factors limiting the use of telemedicine in obstetric care. There was a significant effect of ICT illiteracy of medical personnel and patients, Lack of awareness of the availability of telemedicine services, High cost of set-up and maintenance, Expensive internet

services, Poor, unstable and limited internet access, Lack of trust in the telemedicine system, Ethical issues, Lack of government and other policy makers commitment, Lack of infrastructure for Telemedicine and Doctors and patient preference for physical consultations and treatment on the use of telemedicine in obstetric care.

This is because the P-value (0.000) of the ANOVA regression is less than the alpha value (α= 0.05). The R^2 = 89% indicates that the model is well fitted and suitable for explaining the effect of the predictor variables on the response variable.

Table 2: Perception of how telemedicine can improve obstetric care among study participants (N = 210)

Statements	SA	A	N	DA	SDA
Improve prenatal care and health education	72(34.3%)	111(52.9%)	13(6.2%)	10(4.8%)	4(1.9%)
Remote consultation especially in rural areas	39(18.6%)	87(41.4%)	30(14.3%)	37(17.6%)	17(8.1%)
Improve monitoring of high-risk patients	65(31.0%)	96(45.7%)	17(8.1%)	15(7. %)	17(8.1%)
Management of obstetric emergencies	39(18.6%)	67(31.9%)	38(18.1%)	42(20.0%)	24(11.4%)
Improve prompt referral of patients to tertiary centers	80(38.1%)	102(48.6%)	10(4.8%)	10(4.8%)	8(3.8%)
Improve E-learning in obstetrics	86(41.0%)	96(45.7%)	15(7.1%)	7(3.3%)	5(2.4%)
Provide Obstetric services to clients at PHC centers in the rural and remote communities?	41(19.5%)	93(44.3%)	35(16.7%)	21(10.0%)	20(9.5%)
Improve postpartum care?	53(25.2%)	114(54.3%)	23(11.0%)	11(5.2%)	9(4.3%)
Improve collaboration among specialist	88(41.9%)	104(49.5%)	9(4.3%)	5(2.4%)	4(1.9%)
Improve continuity of care (follow up management)	85(40.5%)	107(51.0%)	8(3.8%)	6(2.9%)	4(1.9%)
Improve research and data collection	80(38.1%)	105(50.0%)	13(6.2%)	9(4.3%)	3(1.4%)
Improve on cost-effectiveness in patient management	62(29.5%)	103(49.0%)	23(11.0%)	15(7.1%)	7(3.3%)
Increase access to obstetric care	62(29.5%)	106(50.5%)	21(10.0%)	17(8.1%)	4(1.9%)
Reduce the waiting time of patients	76(36.2%)	108(51.4%)	14(6.7%)	8(3.8%)	4(1.9%)
Reduce patient load per doctor in clinic day	75(35.7%)	94(44.8%)	23(11.0%)	13(6.2%)	5(2.4%)
Reduce patient visits to the hospital	83(39.5%)	96(45.7%)	18(8.6%)	8(3.8%)	5(2.4%)

Table 3: Multiple linear regression analysis on the factors limiting the use of telemedicine in obstetric care

Variable	Coefficient	Standard Error	t-value	P-value
Constant	0.355	0.035	10.219*	0.000
ICT illiteracy of medical personnel and patients	-0.412	0.106	-3.901*	0.000
Lack of awareness of the availability of telemedicine services	-0.438	0.071	-6.174*	0.000
High cost of set-up and maintenance	-0.258	0.074	-3.486*	0.001
Expensive internet services	-0.207	0.064	-3.257*	0.002
Poor, unstable and limited internet access	-8.638	2.016	-4.284*	0.000
Lack of trust in the telemedicine system	-0.453	0.196	-2.308*	0.025
Ethical issues	-2.120	0.694	-3.056*	0.004
Lack of government and other policy makers commitment	-0.009	0.002	-4.269*	0.000
Lack of infrastructure for Telemedicine	-0.057	0.003	-19.256*	0.000
Doctors and patient preference for physical consultations and treatment	-0.005	0.001	-9.211*	0.000
F-value = 47.179	5.723			0.000
R^2 = 0.887 (89%)				

Independent Items: ICT illiteracy of medical personnel and patients, Lack of awareness of the availability of telemedicine services, High cost of set-up and maintenance, Expensive internet services, Poor, unstable and limited internet access, Lack of trust in the telemedicine system, ethical issues, lack of government and other policy makers commitment, lack of infrastructure for telemedicine, Doctors and patient preference for physical consultations and treatment dependent Item (use of telemedicine in obstetric care).

Thematic Analysis FDG among Obstetricians:

Factors Limiting the Use of Telemedicine in Obstetric Care

Corroborating the above finding was the FGD among the obstetricians. Some of the barriers to the use of telemedicine in obstetric care enumerated include lack of familiarity with telemedicine technology, poor network connectivity, need for sophisticated technical and electronic infrastructure, and high cost of equipment.
During the FGD, one of the participants stated that…Even though the usage of digital platforms is very prevalent these days, the introduction of telemedicine in the healthcare sector is relatively new. Therefore, telemedicine doctors need to be trained in order to gain an understanding of how to use these platforms.

The participants during the FGD stated that… barriers such as lack of familiarity with the telemedicine technology, poor network connectivity, need for sophisticated technical and electronic infrastructure, and high cost of equipment are some of the factors limiting the use of telemedicine in obstetric care in North central Nigeria.

DISCUSSION

There was a good level of knowledge of telemedicine among the participants in this study. This was evident from both the quantitative and qualitative data analysis. This study was in agreement with similar study by Uwaezuoke whose participants demonstrated good level of knowledge of telemedicine[1]. However, this finding differs from that of Hertlings et al in which the majority of the participants rated their knowledge of telemedicine as insufficient.[11]. With the good level of knowledge of telemedicine among the participants in this index study, it implies that telemedicine can be practice in obstetrics successfully at the FMC, Makurdi and throughout Nigeria and beyond. Therefore, telemedicine can serve as a means of reducing maternal and perinatal morbidity and mortality which is prevalent in this part of the world.

A large proportion of the participants in this present study used telemedicine in obstetric practice. This fact was further validated by the FGD with the data analysed showing that telemedicine can be used in various aspect of obstetric care. This finding was corroborated by other researchers who similarly found telemedicine useful in several aspect of obstetric care [4,12,13]. This finding further buttresses the essence of establishing a functional telemedicine department in various tertiary centre across the country to render quality obstetrics care and thus reduce the burden of maternal and perinatal morbidity and mortality in LMIC.

Telemedicine have been demonstrated in this current study that it can be used to improve obstetric care. This was substantiated by majority of the participants strongly agreeing and agreeing to the various areas in which telemedicine can improve obstetric practice and this was corroborated by the finding from the FGD among the obstetricians in the study centre. This finding is in keeping with other studies [3,7,13].This signifies that a better package of obstetric care can be given to the ever increasing obstetrics population through telemedicine especially in our rural communities where there are limited specialized manpower to render quality obstetric services. Therefore, a fully equip and funded telemedicine department should be established in all tertiary centres across the country to help in rendering obstetric services to the rural communities to mitigate the high burden of maternal and perinatal morbidity and mortality in developing countries.

Several factors have been highlighted as limitations to the use of telemedicine in obstetric care in this study. This finding was supported by several studies [1,4,11] . Therefore, there is the need for stakeholders in the health sector at various levels of government to as a matter of urgency make polices to address these bottlenecks confronting the successful practice of telemedicine in obstetrics in Nigeria. Furthermore, various telecommunication companies in the country can key into this novel method of rendering quality obstetric health by partnering with government and hospitals in the country through provision of telecommunication gadgets, training of manpower, development of platforms to operate telemedicine and expansion of the already existing networks to provide the needed excellent network coverage to the rural communities for effective telemedicine practice.

This study has several limitations. Firstly, as a cross-sectional study, it captures data at a single point in time, limiting the ability to establish causation or observe trends over time. Secondly, the research was conducted exclusively among health workers in a tertiary hospital, excluding perspectives from professionals in secondary, primary, and private healthcare facilities, which may affect the generalizability of the findings. Thirdly, the study did not include other categories of health workers,

such as laboratory scientists and medical record staff, whose roles are also relevant to telemedicine deployment. Lastly, the qualitative data analysis relied solely on a focus group discussion (FGD) involving obstetricians, potentially limiting the depth and diversity of insights obtained.

The strength of this study lies in its use of a mixed-methods approach, which provides a comprehensive means of addressing the research questions and objectives. Additionally, the quantitative component of the study incorporates both cross-sectional and analytical designs, enhancing its ability to capture data systematically and explore relationships between variables

CONCLUSION

This study highlights a good level of knowledge of telemedicine among respondents and demonstrates its potential to enhance obstetric practice. However, several factors limiting its application in obstetrics were identified. Based on these findings, the study recommends integrating telemedicine into obstetric care, particularly in rural communities, through all tertiary centers nationwide. Furthermore, it advocates for additional research employing a mixed-methods approach. Such studies should include in-depth interviews and key informant interviews alongside focus group discussions (FGDs) involving antenatal participants, obstetricians, midwives, pharmacists, laboratory scientists, and other relevant hospital staff. A multi-center study spanning all levels of healthcare, including the private sector, is also recommended to provide broader insights and inform effective telemedicine implementation.

Acknowledgement: Nil

Conflict of Interest: Nil

Conflicting Interest: Nil

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