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BARRIERS AND ENABLERS OF BASIC OBSTETRIC IMAGING SERVICE PROVISION IN PRIMARY HEALTHCARE FACILITIES IN RIVERS STATE: A QUALITATIVE STUDY

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Abstract

For the effective provision of Basic Obstetric Imaging Services (BOIS), there is the need to ensure the availability of necessary infrastructure, sufficient manpower resources, equipment, drugs and consumables, among others. When there is adequate political will to provide these services, the populace benefits immensely as accessibility to these services improves. It is on this backdrop that this study aims to explore the enablers and barriers affecting the provision of basic obstetric imaging services in Primary Health Care (PHC) facilities in Rivers State. This was a qualitative study carried out among 20 PHC workers in Rivers State, Nigeria. Data collection was done using topic-guided in-depth and key informant interviews to identify their perceptions of enablers and barriers affecting the provision of BOIS in the PHC facilities. All necessary ethical considerations were also adhered to, and a thematic content analysis was used to analyze and code collected data into respective subthemes, using NVivo software. The identified enabling factor favouring the provision of BOIS was the availability of a trained doctor, radiographer, ultrasound scans to provide the services. Barriers limiting service provision however included the shortage of the required professional manpower to provide these services, the lack of skilled personnel for handling specialized equipment for obstetric imaging, poor drug availability, and the lack of equipment. Others included poor logistics to provide BOIS as well as the lack of training and retraining for available PHC manpower. The provision of BOIS faces various barriers that can potentially limit the quality of the services provided at the PHC level in Rivers State. Formulating and implementing a strategic framework to address the identified challenges facing the provision of these services in the State, as well as improving government commitment and support towards BOIS provision were recommended.

Keywords: *Basic Obstetric Imaging Services (BOIS); BOIS Provision; Barriers; Enablers; Rives State.*

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Introduction

Pregnancy is a critical period in a woman's life, and it is important to ensure that she and her baby receive the best care available. [1] Out of the estimated 295,000 maternal fatalities globally, complications associated with pregnancy and delivery are the primary causes of maternal mortality, more than 95% of occur in developing nations [1] including in Nigeria which has been ranked among the top 10 nations that contribute to the high rate of maternal fatalities. [2, 3] In order to reduce this burden, various high-quality, evidence-based interventions have been put in place including the provision of antenatal care services. [4] Antenatal care provides a gateway for expectant mothers and their families to access the healthcare system, and it increases the possibility that a trained birth attendant will help. [5] A minimum of eight ANC visits before delivery, including one ultrasound and obstetric imaging, are advised during pregnancy before 24 weeks of gestation by the revised World Health Organization's (WHO) guideline. [6, 7] The ultrasound scan is a dynamic tool that allows imaging of the body in real-time without exposures to the risk of ionizing radiation, and can be applied in emergency, inpatient, and outpatient settings to effectively enhance patient outcomes and care quality. [7–9] The availability of basic obstetric scans in primary health care settings is crucial for promoting maternal and foetal health by effectively increasing routine access (financial and structural) in rural and hard-to-reach settings. [10, 11] The practice of routine antenatal ultrasound enables timely detection of some pregnancy conditions that need special care and are not immediately obvious. [12] It helps in the detection of foetal factors such developmental anomalies, gestational age, position, presentation, and heart rate. [13] Despite the benefits of the application of the ultrasound scan, access to routine, quality obstetric imaging is still limited in many developing nations due to a certain barrier. [12] Some of the common barriers have been reported to include lack of training of health personnel, insufficiently trained personnel, inadequate ultrasound machine, cost of maintaining/updating ultrasound machines, poor ultrasound maintenance capability. [8, 12] There are also the barriers related to ignorance of the importance of the ultrasound scan among women which is sometimes fueled by their culture, society, and literacy level. [12, 14] In addition, adequate information is not given to the patients, after the obstetric scanning is done, while nurses who frequently interact with the women may not be fully aware of the value of obstetric ultrasonography. [13, 14] In a study assessing problems facing the provision of ultrasound services, it was reported that the lack of specialists, inadequately trained health workers (60%), inadequate ultrasound machines and consumables (45%), as well as the lack of maintenance capability (47%), contribute to the unavailability of ultrasound scan services, especially at the Primary Health Care level (PHC). [10] Other factors that have been implicated in the poor access to obstetric ultrasound services include health system barriers to early entry to ANC, unclear practice and referral guidelines, inconsistent attention to infection prevention and control as well as environmental controls for ultrasound equipment. [12] The inequitable rural/urban distribution of obstetric ultrasound services has also been implicated and results in far distance travels, more expenses, and discomfort for the women who were referred. [13] In Nigeria, this problem has been reported and is worsened by low female literacy levels in some areas, the lack of basic infrastructure such as power and the unavailability of skilled health workers. [15] In Rivers State, Nigeria, there are scant published studies assessing of problems affecting the provision of obstetric ultrasound services in PHC facilities. Considering that the burden of high maternal mortality remains in Rivers State [11, 16] and evidence generated from this research can be used to improve the provision of obstetric ultrasound services at the PHC level, there was thus the need to conduct this study. It was aimed at using a qualitative research approach in exploring enablers and barriers affecting the provision of basic obstetric ultrasound services at PHC facilities in Rivers State.

Methodology

The study was carried out using a stratified purposive sampling to select primary health care centres in the three senatorial districts in Rivers State. A purposive sampling approach was used in recruiting the study participants (Heads of Model Primary Health Care (MPHC) facilities) for the key informant in-depth interview. The maximum variation sampling type was used to recruit widespread interviewees who supplied adequate and necessary information necessary for the study. Health workers who were officers-in-charge in model primary health care facilities were included in the study; heads of facilities who were present during the time of study were also included in the study. Health workers who were in charge of health posts, comprehensive health centres and cottage hospitals, and those who were on annual or sick leave were excluded from the study. Face-to-face interviews were employed in gathering the necessary information for this study. Participants were verbally asked open-ended questions to which they gave responses.

The interviewer guide was used to gather (qualitative) responses from key informants on their views regarding the enabling and limiting factors affecting the provision of BOIS by the PHC facilities.

A semi-structured key informant in-depth interview was conducted by two trained research assistants using an interviewer guide, on the heads of facilities. A thematic or data saturation was therefore used to determine the sample size. The sample size was therefore twenty (20)

heads of facilties. Therefore, twenty key informant in-depth interviews were conducted.

The in-depth interview occurred on June, 2024. The interviewer and the caregiver were alone in the office of the head of facility during the interview session to avoid distractions and unintended interruptions. An informed consent was obtained from the participants before any interview was conducted. The interview was recorded on a recording application on an Android phone. Intelligent verbatim transcription of all audio-recorded interviews was done into English language. To maintain anonymity, participants' names were not included on transcriptions and each interview took approximately 30minutes to be completed appropriately.

Trustworthiness of the qualitative data was assessed in terms of credibility (truth-value), transferability (applicability), dependability (consistency), and confirmability (neutrality). [17]

The strategies utilized in establishing credibility in this study, were member checking (informant feedback) and peer examination. Identified themes, sub-themes and quotes were reviewed by the heads of facilities, who are the study participants, and feedback was gotten. Any discrepancies observed was taken into consideration and modified accordingly. The research processes and findings were also discussed with colleagues with good experience in qualitative methods thereby aiding to improve the credibility of this study. Peer examination was also used to check dependability. Transferability was achieved by asking various questions to elicit detailed responses from participants and keeping of detailed field notes. Triangulation was used in checking for confirmability. There are various types of triangulations: triangulation of data methods, data sources, investigators and theoretical triangulation.[18] Triangulation of investigators was the approach employed in this study to ensure confirmability. A Medical Doctor and a Radiologist formed the research (investigating) team.

Content analysis was used to analyze the qualitative data. Transcripts were read numerous times to become familiar with it and generate initial inductive codes. The codes were then compiled, overall themes were defined and a report was then produced. The codes and themes were independently reviewed by an additional study member and issues raised were reviewed and resolved. The themes were then defined, and presented. The analysis was performed NVivo software

Interview Guide for BOIS

1. Position of health personnel interviewed?
2. What is your opinion on the readiness of this primary health centre to provide ultrasound scan services to the Rivers State population? (in terms of manpower, equipment, technical know-how, logistics, drugs)
3. Have there been cases of high-risk pregnancies in this facility before?
4. If yes to question 3 above, can you provide some details on the high-risk pregnancies that have been treated in this facility in the past?
5. Are basic obstetric imaging services provided in your facilities?
6. Were any challenges experienced during the course of providing these ultrasound scan services?
7. If yes, what were the challenges that were experienced?
8. Do you believe that the pregnant clients utilizing health care services in this facility will be willing to seek ultrasound scan services here?
9. Are there specific examples you can provide to show the importance of providing ultrasound scan services in PHC facilities in Rivers State?

Ethnics Conformity Statement

Ethics Approval was obtained for this study from the Health Research Ethics Committee of the Rivers State Hospital Management Board (Approval number: RSHMB/RSHREC/2024/013). Permission to carry out the evaluation was obtained from the Executive Secretary and Director Planning, Research and Statistics of the Rivers State Primary Health Care Management Board (RSPHCMB) as well as the Medical-Officers-of-Health and facility heads of the various PHC facilities in Rivers State. Additionally, each respondent gave their informed consent prior to conducting interviews, and their consent was also obtained for the recording of the interviews to be done. Also, the data collection tools were anonymized to ensure protection of the privacy of respondents and confidentiality of their responses. The interviews were recorded on a recording application on an android phone, were then transcribed and analysed using thematic content analysis.

Results

Sociodemographic details of study participants

Among the 20 heads of facility that participated in this study, it was identified that their ages ranged between 38 and 54 years with a mean age of 45.0±4.5 years. In addition, 13 (65.0%) were females and 7 (35.0%) were males, and most were married 19 (95.0%). Also, 9 (45.0%) were nurses, 6 (30.0%) were community health officers, 4 (20.0%) were medical doctors, and there was a community health extension worker 1 (5.0%). These are shown in Table 1.

Table 1: Sociodemographic details of participants

Characteristics	Frequency n=20	Percentage (%)
Age group (years)		
36 – 40	3	15.0
41 – 45	8	40.0
46 – 50	7	35.0
51 – 54	2	10.0
Mean ± SD	**45.9±4.58**	

Sex of parent		
Male	7	35.0
Female	13	65.0
Cadre		
Medical Officer		
Nurse	4	20.0
Community Health Officer (CHO)	9	45.0
Community Health Extension Worker (CHEW)	6	30.0
	1	5.0
Marital Status		
Married	19	95.0
Single	1	5.0

Table 1 above revealed that the heads of facilities were within the age ranges of 36-54years old. Heads of facilities who were aged 36-40years old was 15.0%. The proportion of heads of facilities within the 41-45years old age group was 40.0%, those within the 46-50years old age group was 35.0% and 10.0% were 51-54years old. The proportion of respondents that were males was 35% while 65% were females. The proportion of heads of facilities that were doctors was 20.0%, while nurses were 45.0%.

Report on the Qualitative Data

The responses were coded into major themes and sub-themes as shown in Table 2

Table 2: Themes and subthemes generated in this study

s/n	Themes	Subthemes
1.	Enablers of BIOS provision	• Availability of a trained doctor (skilled personnel) • Availability of ultrasound scan machines • Training of health personnel
2.	Barriers facing BOIS provision	• Shortage of manpower • Poor logistics • Lack of training • Lack of technical expertise to use the ultrasound scan machine • Lack of equipment

There were two major themes identified: Enabling factors and Barriers. The major theme, enabling factors comprised of three sub-themes including: availability of a trained doctor (skilled personnel), availability of ultrasound scan machines, and training of health personnel. The second major theme, barriers, comprised of five sub-themes including: shortage of manpower and skilled personnel, poor logistics, lack of training, lack of technical expertise to use the ultrasound scan machine, and lack of equipment

Enabling Factors for BOIS Provision

Most respondents recognized the factors that will support the provision of BOIS. They also acknowledged that these factors when available will reduce maternal morbidities and will lead to better health outcomes.

On availability of a trained doctor, some participants agreed that there was a doctor in the PHC facility that was trained.

An informant (Nurse, 46 years old, Female) said:

"…. We have a doctor….., so he can carry out these services."

Another respondent (Medical officer, 42 years old, Male) shared similar opinion.

"…We have a very good doctor so if all this equipment are here, we're going to do well… ."

On availability of ultrasound scan machines, very few agreed that they had an ultrasound scan machine in their facility.

A respondent (Nurse, 44 years old, Male) said:

"… We have the machine here but, only one."

On training of health personnel, most heads of facilities agreed that they had been trained.

An informant (Nurse, 46 years old, Female) said:

"… Because our doctor recently, he went for training, so he can carry out these services."

An informant (Nurse, 42 years old, Female) shared same opinion:

"… but recently the doctor was trained, like he told us, and that we should be expecting the equipment for that."

An informant (Nurse, 44 years old, Male) also said:

"…It's just one person that was trained. I don't know if he can do more than 20 persons in a day …"

Barriers limiting provision of BOIS

Most respondents recognized the barriers limiting the provision of BOIS. They also acknowledged that these factors will impede on service delivery and also increase feto-maternal morbidities and mortalities.

On shortage of manpower, most respondents agreed that there was shortage of manpower.

An informant (CHEW, 39 years old, Male) also said:

"…Our primary health care centre is fully prepared to provide ultrasound scan services to the population of Rivers State. We still require additional staffing,.. ."

Another respondent (Nurse, 43 years old, Female) shared a similar opinion:

"… But we do not have adequate workforce trained in ultrasound,… "

On poor logistics, heads of facilities agreed that logistics to conduct and carry out BOIS were poor and limited.

A respondent (CHO, 54years old, female) said:

"… I believe there are significant gaps in …, logistics,….".
Another respondent (Nurse, 50years old, Female) shared a similar opinion:
"…There are no logistics,…".
On lack of training, respondents revealed that lack of training is also a barrier to the provision of BOIS.
A participant (Nurse, 43years old, Female) shared that:
"…But we do not have adequate workforce trained in ultrasound,…"
Another respondent (Nurse, 50 years old, Female) also shared similar opinion:
"…, people are not trained".
On lack of technical expertise to use the ultrasound scan machine, respondents revealed that lack of technical expertise is a major limiting factor in BOIS provision.
A participant (Nurse, 43 years old, Female), shared that:
"…But we do not have adequate workforce trained in ultrasound,…, technical expertise, … to do the ultrasound..."
Another respondent (CHO, 54years old, female) said:
"… I believe there are significant gaps in …,technical know-how, ….".
Another (CHO, 46 years old, Female) said:
" …The manpower is there, but we still need someone who knows how to use the scan. We need someone who is advanced in scan issues. Most people who go for a scan are pregnant women, about 70% in my own estimation, and the rate of antenatal care is high. So, it will be well utilized. So, all those women we are taking to outside to do a scan, can be done inside, and it will give the opportunity for some of us to learn."
On lack of equipment, most respondents agreed that lack of equipment is a major barrier to BOIS provision.
A respondent (Nurse, 45years old, Female) said:
"… so there is no equipment…"
Another respondent (Nurse, 43years old, Female) also shared similar opinion:
"…But we do not have …. necessary equipment,… to do the ultrasound."
Another (Medical Officer, 45 years old, Female) also said:
"… We have not seen any equipment like that".

Discussion

In an effort to explore the enabling factors and limitations as it has to do with BOIS in PHCs in Rivers State, twenty heads of facilities were interviewed consisting of medical officers, nurses, CHOs, among others. This diverse sample is a strength of the study as different views were captured from different professionals. While BOIS is very important in pregnancy management and a necessary contributor to improved maternal health and pregnancy outcomes especially in low-resource settings, findings from this study revealed barriers that negatively impact on BOIS in PHC as well as enablers that will improve BOIS in PHCs in Rivers State.
Several enablers were identified from this study including availability of a medical doctor, availability of ultrasound scan machines and training of health personnel to use these scan machines.
Findings from this study revealed that the availability of a medical doctor, was a strong enabler in BOIS provision in PHCs. Some PHCs especially, the MPHCs, in Rivers State have medical doctors as the heads of the PHC facilities. This therefore could explain this finding. This therefore implies that certain PHC facilities with medical doctors are more likely to render BOIS. This is similar to findings conducted in Benin, which also revealed the availability of a doctor though few. [19] This however contrasts findings done in Southeastern Nigeria with no doctor in PHCs.[20]. The availability of a medical doctor who possesses the technical know-how in performing BOIS can effectively enhance the provision of these services and contribute in improving the maternal and neonatal mortality indices in Rivers State.
The availability of an ultrasound scan machines is another enabling factor in BOIS provision in PHC facilities in Rivers State. This finding is similar to findings by Kongnyuy and colleagues which revealed that ultrasound scanning has become increasingly available to pregnant women in resource poor settings [21]. It however contrasts with findings from a study conducted in Rwanda [22], sub-Saharan Africa [23] and other resource-poor regions.[10]
The provision of training was also identified as an enabler for BOIS provision in this study. This implies that the heads of facilities will have the needed knowledge and skill to render BOIS to pregnant women. With training, there will be early detection of complication, prompt referral, and better feto-maternal outcomes. This finding corroborates findings from a study conducted in sub-Saharan Africa, which revealed that the training was beneficial and participants reported positive experiences that rotated around the importance of gaining skills in obstetric ultrasound, improving management of pregnant women and the aspect of role extension to them [11].
Barriers to BOIS in PHCs were also identified in this study to include shortage of manpower, poor logistics, lack of training, lack of technical expertise to use the ultrasound scan machine, and lack of equipment.
Lack of training is a very important barrier and limitation to pregnancy surveillance in this study. This implies that the most heads of facilities in PHCs lack the knowledge on performing BOIS. It therefore implies that, if ultrasound scan machines were to be available, it will not be used because the healthworkers have not been trained to use it. Without training, there will be no technical expertise in utilizing the ultrasound scan machine. This finding corroborates findings from a study done in Rwanda.[22] It also corroborates findings from other

low- and middle- income countries. [10] It also corroborates findings from several studies which shows that BOIS is usually performed by healthworkers with little or no formal training, according to the WHO recommended standard, who possess no technical expertise. [24,25,26] When there is a lack of health personnel who possess the technical know-how and lack of in-service training for healthcare workers in the provision of basic obstetric ultrasound services in primary health care (PHC) facilities, it implies that early detection of pregnancy-related complications such as fetal anomalies, growth restrictions, and placental issues becomes challenging.[27,12] It can also potentially reduce the quality of prenatal care received by pregnant women, increase reliance on referrals to distant facilities, which can be burdensome for pregnant women, and in some cases, it promotes the adoption of traditional pregnancy care practices as well as utilization of unskilled birth attendants to take deliveries [28-30] This can potentially result in higher rates of maternal and neonatal morbidity and mortality.[8,12] It has however, been advocated that task-shifting activities can be adopted where specialized healthcare manpower resources are lacking.[31] This can be done by providing training on basic obstetric imaging to mid-level health professionals in order to provide them with some basic skills to produce diagnostic images with adequate interpretation, which can impact patient management and outcomes and increasing the efficiency of the available human healthcare resource. [31] This has been done in other resource-poor settings where training of midwives and other healthcare workers in BOIS has been shown to be successful [32] For example, studies from Tanzania, Zambia and Uganda have shown positive outcomes when midwives with no prior ultrasound experience have been trained to perform basic obstetric scans. After a few months of training (6 weeks to 6 months), the midwives' use of ultrasound lessened the workload of specialists and made ultrasound available when needed, [33] prompted change in clinical decision-making [33,34] and improved diagnosis of early pregnancy complications, twin pregnancy and fetal presentation. [35]

Shortage of manpower is another barrier as revealed in this study. This is indeed a system-level barrier. This implies that BOIS may not be performed in majority of the facility due to inadequate staffing. This may be as a result of unemployment, brain drain and relocation of health personnel, or inequitable distribution of the health workforce in PHCs. This thus poses the need to ensure a balanced and fair distribution of healthcare manpower in a population, in order to ensure their access to quality healthcare services at all times.[27] The barriers identified in this study have however also been corroborated by the findings of other studies which have reported similar barriers as being capable of hindering the effective provision of obstetric ultrasound services. [8,10,12]

Lack of equipment and poor logistics are also major barrier in BOIS in PHCs in this study. Poor access to functional ultrasound machines even with the availability of necessary manpower, and other logistics including the scan gels, gloves, amongst others, implies that critical antenatal imaging assessments, which are vital for detecting pregnancy complications cannot be performed, and this may result in delayed or missed diagnoses, leading to preventable adverse pregnancy outcomes. [8,11,16] This corroborate findings from studies done in Rwanda and developing countries. [22,10]

This study has some limitations including that it does not incorporate the experiences and opinions of direct service beneficiaries and supervisors of the study participants. In addition, the small sample size did not allow for generalizability.

Conclusion

Despite the enabling factor of the availability of a trained doctor, provision of trainings, and availability of ultrasound scans to provide basic obstetric ultrasound services in some PHC facilities in this study, most facilities were still faced with barriers that limited the effective provision of these services in PHC facilities in Rivers State.

In light of the findings made in this study, the following recommendations have been made:

- Healthcare stakeholders in Rivers State should ensure the equitable distribution of relevant ultrasound equipment as well as human-resource-for-health for the provision of basic obstetric ultrasound services across the various PHC facilities in the State. This would enhance availability and subsequent utilization of these services.
- Task-shifting initiatives can also be adopted by the management team of the RSPHCMB, in order to enhance the efficiency of the available healthcare manpower in Rivers State.
- The management team can also ensure the provision of in-service training to continually improve the functionality of human-resource-for-health working in the PHC facilities in Rivers State.

Authors Contribution

All authors were involved in Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Visualization, Original Draft, as well as Review & Editing.

Conflict of Interest

The authors declare no conflict of interest.

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