

Expectant mothers' perception of prenatal sonography in a South-Eastern population in Nigeria

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ABSTRACT

Background: Prenatal sonography is very important for quality patient management and effective service delivery in diagnostic radiology during the antenatal period.

Aim: The study was conducted to assess the perception of pregnant women to prenatal sonography and to investigate the factors affecting maternal satisfaction to prenatal sonography in some tertiary institutions in south-eastern Nigeria.

Materials and Methods: The study was a cross-sectional study that involved 150 patients. It was conducted by administering semi-structured questionnaires. The questionnaire contained a total of 17 questions consisting of 16 close-ended questions and 1 open-ended question. The respondents were pregnant women who presented for obstetric sonography in Federal Teaching Hospitals and Federal Medical Centers in south-eastern Nigeria. The data were analyzed descriptively using frequency tables and percentages.

Results: There was a high indication of clinical use of obstetric ultrasound such as the health and well-being of the foetus (35.3%), foetal age determination, and the expected date of delivery (24.7%). Most respondents (84.6%) perceived prenatal sonography as being necessary, and 66.7% of the patients considered the result of obstetric sonography to be reliable. Majority of the respondents (88.7%) considered the services rendered during their sonographic scan to be satisfactory.

Conclusion: Most of the women perceived prenatal sonography as necessary and reliable. The services rendered during sonography were also considered satisfactory by most women; however, most pregnant women did not know about diagnostic ultrasound safety during the prenatal period.

Key words: Maternal; perception; prenatal; sonography.


Introduction

The recommendation of obstetric ultrasound as an indispensable part of modern antenatal care has resulted in its dramatic overuse mainly because of its over commercialization for monetary gains in both public and private health facilities. This was shown in a survey carried out in Vietnam; 400 woman had an average of 6.6 scans during their pregnancy and one-fifth had 10 or more scans. The study concluded by

suggesting the need for guidelines regarding the appropriate use of obstetric ultrasound in antenatal care.^[1]

Prenatal sonography could represent an important area of conflict between patient autonomy and the clinical

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decision-making process, however, reviewed literature has shown that most women did not view ultrasound in pregnancy as a screening tool for abnormalities.^[2]

Sonography has become a routine and indispensable tool in the care of pregnant woman during their antenatal period. It has grown in popularity over the last 20 years and is widely adopted as a standard tool for the management of expectant women in the developed world.^[3] By virtue of its versatility, safety and cost-effectiveness, this imaging technology equally suits developing countries such as Nigeria.^[4]

Prenatal sonography also known as obstetric sonography is the use of diagnostic medical ultrasound in visualization of the embryo or foetus in its mother's uterus. This procedure yields a variety of information regarding the health of the mother and of the foetus, the progress of the pregnancy and further information on the baby. The increasing spread of obstetric ultrasound technology around the world and the conflation of its use with creating a safe pregnancy, as well as the ability to see and determine features such as the sex of the foetus impact the way in which pregnancy is experienced and conceptualized. The views and perception of these pregnant women toward prenatal sonography affects its utilization.^[1]

Bricker *et al.* reported that most expectant women initiate a request for ultrasound for both medical and non-medical reasons.^[5] These reveal that, while pregnant women seek much of the medical information that is of interest to health professionals, they also want additional information that is not typically encompassed by clinical decisions. It is reported that well-educated women are more likely to appreciate the limits of ultrasound whereas the lesser educated ones are more likely to rely more on the impression created outside sonography procedure whether right or wrong.^[6] Encouragement of maternal interaction and the basic training of sonographers or sonologists, obstetricians and others in the counseling session could be beneficial in obstetric sonography. These benefits include increased maternal-foetal attachment, reduced maternal complaints, knowledge of foetal development, positive behaviour towards the clinicians and increased maternal investment in health during pregnancy.

The diagnostic capability of obstetric sonography has important psychological benefits in reducing anxiety in pregnant women, which helps to stimulate a parental bond with the foetus and contribute to positive health behaviour. Moreover, scan results that revealed foetal anomalies significantly increase the maternal anxiety level. Larsen *et al* stated that most pregnant women feel more secure after obstetric sonography^[7] the subjective experience of

ultrasound has been found to be associated not only with the clinical results but also with the clarity of the image, the quality of the explanation given and the attitude of the scanning operator.^[8]

This reveals that the effectiveness of ultrasound depends considerably on the quality of the equipment used and the skill of the sonographer or sonologist. Therefore, ultrasound imaging is highly operator dependent. Cost effectiveness of obstetric ultrasound scan is a measure to ascertain if the benefit and services rendered to the expectant mother are really worth the monetary value, reflecting the degree of reliability on obstetrics ultrasound during pregnancy. The cost-effectiveness of an obstetric sonography is influenced by patient perception, awareness, expectations and experiences regarding obstetric ultrasound. Therefore, this study was conducted to evaluate the perception of pregnant women to prenatal sonography and to investigate the factors affecting maternal satisfaction to prenatal sonography in some tertiary institutions in south-eastern Nigeria.

Patients and Methods

Study setting

The study sites were tertiary institutions in south-east Nigeria. The study was carried out at three Federal Teaching Hospitals [University of Nigeria Teaching Hospital Enugu (UNTH), Nnamdi Azikiwe Teaching Hospital Anambra (NAUTH) and Federal Teaching Hospitals Abakaliki (FETHA)] and two Federal Medical Centres (Imo and Umuahia) in south-eastern Nigeria. These places served as referral centres, and were attended by many patients on a daily basis. These places were chosen because of different perceptions of pregnant women to sonography in the region. Patients from surrounding states also presented to these centres.

Study design

The research was carried out prospectively using a descriptive research design to assess the maternal perception of prenatal sonography in south-eastern Nigeria.

Sample population and sample size

Pregnant women presenting for obstetric scan who were willing to participate in the research within the period of the study, from June to July 2014, formed the target population. Taro Yamani formula: $n = N/[1 + (Ne^2)]$ was used to calculate a sample size of 150 pregnant women,^[9] where n was the sample size, N was the population size, 1 was a constant and e was the error limit or margin of error of level of significance (accepted error at 5%, i.e., 0.05). Statistical significance was set at $P < 0.05$.

Sampling method

This was a cross-sectional study. Convenience sampling was used to select the respondents (pregnant women) who presented for prenatal ultrasound based on the ease of access and availability. Thirty pregnant women were chosen from each of the centres.

Gray-scale two-dimensional machines were used for scanning the patients. Transabdominal route was used for all the patients. Doppler studies were not done for the patients. Experienced and qualified consultants, radiologists, residents and postgraduate imaging scientists performed the procedures.

Instrument for data collection

The study utilized a questionnaire as a source of data collection. The questionnaire was designed to test the research questions formulated in line with the objectives of the study. The questionnaire exhibited good qualities such as brevity, clarity and no leading questions. To ensure cooperation, objectivity and sincerity, anonymity of respondents and confidentiality of their responses was guaranteed. The questionnaire was structured in English language and contained a total of 17 questions consisting of 16 close-ended questions and 1 open-ended question. The questionnaire was divided into 3 sections, i.e., sections A, B and C. Section A contained 5 questions on the demographic data of the respondents; section B contained 11 questions aimed at assessing the respondent's knowledge and perception of prenatal sonography; section C contained an open-ended question aimed at assessing the respondent opinion on how the service rendered during prenatal sonogram can be improved. This instrument was validated on the background of a previous study on maternal perspective on prenatal ultrasound.^[2] One hundred and fifty questionnaires were produced, distributed and collected by the researcher. The questionnaire was completed by respondents after undergoing the obstetric scan.

Methods of data analysis

The data was analysed using the IBM SPSS Statistics for Windows, Version 20.0 (IBM, 2011, Armonk, NY); statistical significance was set at $P < 0.05$. The data was analyzed using descriptive statistics of tables and percentages.

Ethical considerations

The researchers introduced themselves to the respondents and then gave a concise explanation of the objectives of the research. A written informed consent was obtained. Confidentiality of the respondents was assured as neither names nor person identification number was reflected on the questionnaire. Ethical approval was obtained from the

Ethics Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi.

Results

Table 1 below shows the distribution of respondents according to age. It was shown that most of the respondents 61 (40.7%) were 26–30 years old. The distribution of respondents according to their religion showed that 6 out of the 150 respondents (4.0%) followed African traditional religion; most of the respondents (142; 94.7%) were Christians whereas only 2 (1.3%) were Muslims. The distribution of respondents according to marital status showed that most respondents (137; 91.3%) were married, 11 (7.3%) were single mothers, whereas the remaining (2; 1.3%) were separated. Ninety-four of the respondents (62.6%) had previous experience of pregnancy whereas 56 (37.4%) were experiencing their first pregnancy.

The distribution of patients according to their previous experience of sonography showed that 86 of the patients (57.3%) had a previous sonographic scan whereas 64 (42.7%) were experiencing sonography for the first time.

Table 2 presents the reasons for prenatal sonography. The reasons in order of frequency were health and well-being of foetus, 53 (35.3%), determination of the age of the foetus and expected date of delivery, 37 (24.7%), determination of the sex of the foetus, 23 (15.3%), clinician's discretion, 18 (12.0%), maternal health and reassurance, 9 (6.0%), number of foetuses, 7 (4.7%) and foetal growth monitoring, 3 (2.0%).

Table 1: Distribution of respondents according to age

Age Range (Years)	Frequency (n)	Percentage
<20	10	6.7
21-25	44	29.3
26-30	61	40.7
31-35	27	18.0
≥36	8	5.3
Total	150	100.0

Table 2: Reasons for the sonography

Indications/Reasons	Frequency (n)	Percentage
To determine the sex of the foetus	23	15.3
To determine the age of the foetus and the expected date of delivery	37	24.7
Health and well-being of the foetus	53	35.3
Number of foetuses	7	4.7
Clinician's discretion	18	12.0
Maternal health and reassurance	9	6.0
Foetal growth monitoring	3	2.0
Total	150	100.0

Table 3 shows that the majority of the respondents (97; 64.7%) were referred for the obstetric scan by their clinicians, 33 (22.0%) presented for the scan on their own, whereas 20 (13.3%) were referred by their spouse.

Table 4 below illustrates the relationship between the maternal levels of basic formal education to their satisfaction. Fourteen women (9.3%) had basic primary education, 75 (50.0%) had secondary education, and 61 (40.7%) had post-secondary education. All the respondents had a basic formal education.

Figure 1 shows the maternal perception of the cost implication, reliability, possibility of risk to the foetus, possibility of infection to the mother and the necessity of prenatal sonography. These respondent views were scored on a five-point visual analogue (VAS) score. Most respondents (54; 36.0%) perceived the procedure as inexpensive compare to other routine tests performed during antenatal care whereas 47 (31.3%) viewed obstetric sonography to be expensive.

Two-thirds of the 150 patients (100; 66.7%) viewed the result of prenatal sonography to be reliable. Only 13 (8.6%) considered the obstetric scan result to be non-reliable in terms of determination of foetal gender and dating of pregnancy. Majority of the respondents (127; 84.6%) perceived obstetric sonography to be necessary during pregnancy. Most of the respondents (65; 43.4%) considered prenatal sonography to be safe from infecting the patient during scan. Sixty-six (44.0%) of the patients out of the 150 respondents' perceived prenatal sonography to have no risk to the foetus. Only 17 patients (11.3%) believed that sonography during pregnancy was not necessary.

Figure 1 also shows the widespread ignorance of some aspects of sonography by the respondents. Majority of the respondents (66; 44.0%) responded "I do not know" to the question regarding the possible risk to the foetus, 43 (28.7%) responded similarly to the question regarding possible

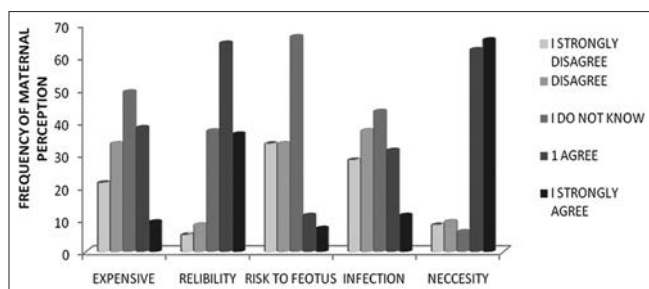


Figure 1: Maternal perception of the cost implication, reliability, possibility of risk to the fetus, possibility of infection to the mother and the necessity of prenatal sonography

infection and 24.7% of them responded in the same manner about the reliability of sonographic scan results.

Table 5 shows that majority of the respondents (133; 88.7%) considered the services rendered during their sonographic scan to be satisfactory no matter how long they waited before their scan. Only 12 patients viewed the service rendered to be non-satisfactory. Eleven among the 86 patients that waited approximately 30 minutes before their sonographic scan considered the services rendered to be non-satisfactory. Three among the 48 respondents that waited approximately 1 hour before their sonographic scan also considered the services rendered to be non-satisfactory.

Table 6 below reveals various opinions of pregnant women on how prenatal sonographic services can be improved. These includes good communication between the patient and the sonographer 22 (14.7%), reducing the cost of scan 17 (11.3%), reducing the patients' waiting time 1 (0.7%), training of more personnel 28 (18.7%), creating more awareness 3 (2.0%) and provision of improved ultrasound machines 26 (17.3%). Most of the respondents (51; 34.0%) left no opinion, which may suggest "they do not know how the sonographic services

Table 3: Distribution of patients according to referral for obstetric scan

Referral	Frequency (-)	Percentage
Self	33	22.0
Clinician	97	64.7
Spouse	20	13.3
Total	150	100.0

Table 4: The relationship between maternal levels of formal education to their satisfaction

Levels of basic formal education	Respondents response to satisfaction of service n (%)		Total
	Yes	No	
None	0	0	0
Primary	14 (9.3)	0	14
Secondary	63 (42.0)	12 (8.0)	75
Tertiary	56 (37.3)	5 (3.3)	61
Total	133 (88.7)	17 (11.3)	150

Table 5: The relationship between the waiting times of patients before the scan with their perception on satisfaction

Waiting time before the scan	Respondents response to satisfaction of service n (%)		Total
	Yes	No	
30 minutes	75 (50.0)	11 (7.3)	86
1 hour	45 (30.0)	3 (2.0)	48
2-3 hours	11 (7.3)	3 (2.0)	14
4 hours	2 (1.3)	0	2
Total	133 (88.7)	12 (11.3)	150

Table 6: Maternal opinion on how to improve the services rendered during prenatal sonography

Opinions	Frequency (n)	Percentage
I do not know	51	34.0
Service is satisfactory	2	1.3
Good communication between the patient and the sonographer	22	14.7
Reduction of cost	17	11.3
Reduction of patient waiting time	1	0.7
Training of more personnel	28	18.7
Creating more awareness	3	2.0
Provision of improved ultrasound machines	26	17.3
Total	150	100.0

can be improved” while only 2 respondents stated that the service was satisfactory.

Discussion

Evaluation of pregnant women perception of prenatal sonography is very important for quality patient management and effective service rendering in diagnostic radiology during antenatal period. The total population studied was 150 pregnant women, 148 among them were from the Igbo ethnic group and were predominantly Christians. There was mixed distribution of prior experience and first time pregnant women with most women having some experience about obstetric sonography, irrespective of their level of education, religion, marital status, age distribution, and their referral; however, their level of knowledge varied depending on the level of formal education. This can be as a result of widespread usage of diagnostic ultrasound, its versatility, safety and cost-effectiveness, which is consistent with a study by Hofmeyr.^[4]

Most views expressed by the respondents was possibly influenced by their sociodemographic characteristics, e.g., age, marital status, religion and/or obstetric history, e.g., parity, despite their educational level.

From this study, there were varied maternal perceived reasons for the prenatal sonography in decreasing order of frequency; health and well-being of foetus, foetal age determination and expected date of delivery, determination of the sex of the foetus and clinician's discretion, which indicates an increased perceived diagnostic use of obstetric sonography rather than the non-diagnostic usage, such as determination of foetal number, which received lesser indication. These reveal an appropriate and good medical practice, which is consistent with a study by Ugwu,^[10] and contrary to the results reported by Stephens *et al.*^[2] that women appear to want sonography for reasons that may not assist their provider with immediate clinical decision making.

Gender determination (15.3%) seem to be an important issue for pregnant women in south-eastern part of Nigeria, which was considered to have been influenced by sociodemography as a result of gender preference, especially of a male child, which was contrary to the result of a study by Ugwu,^[10] Maternal perspectives of prenatal sonography in a North-Eastern population in Nigeria, with 2% indicating sex determination of the foetus.

Few respondents (6.0%) felt that they were referred for prenatal scan on account of maternal health and reassurance. This varies with the finding of Ugwu *et al.* who reported that women often lack information about the purpose for which an ultrasound scan is being done as well as the technical limitations of the procedure.^[10] This may be because a majority of the respondents 133 (88.7%) had basic formal education, whereas 79.3% of this population had formal education beyond senior secondary level. This revealed that well-educated women are more likely to appreciate the limits of diagnostic medical ultrasound than less educated women who accept impressions created outside sonography procedure, which is in accordance with the study by Olusanya *et al.*^[6] Women in general have a good knowledge and understanding of the clinical ground for diagnostic sonography, despite high level of ignorance in some areas such as probability of risk to the foetus and infection to the expectant mother.

This study showed that 35.3% of the scans were sought without referral by a clinician. This is in line with the reports of Stephens *et al.*^[2] and Ugwu *et al.*^[10] that many women want sonography and are willing to pay for the examination even when accustomed to free healthcare. This may be the result of high perceived indication of the necessity (84.6%) of prenatal sonography by pregnant women during their antenatal period which is consistent with Mubuuke, who reported that a majority of the participants found obstetric sonography necessary as it could help them plan better for their pregnancy.^[11]

This study shows that more than two-thirds (66.7%) of the total population viewed the result of the prenatal sonographic scan to be reliable. This significant positive perception could increase the degree to which this medical care is sought for and the extent to which medical advice is accepted and complied with. This reveals that the procedure was cost-effective, which is the measure to ascertain if the benefits and service rendered to the expectant mother are really worth the monetary value, hence reflecting the degree of reliability on obstetrics ultrasound. This is consistent with the results of Larsen *et al.* that most pregnant women feel more secure after obstetric sonography.^[7] The scan results can

have important positive psychological benefits in stimulating maternal–foetal bond, reducing anxiety in pregnant women and negative effects such as increasing the maternal anxiety level in scan results which reveals foetal anomalies. Therefore, the effectiveness of ultrasound significantly depends on the quality of the equipment used and the management skill of the sonographer on both appropriate information delivery and equipment manipulation.

From this study, it was noted that most of the patients did not know whether there was any risk associated with sonography, 66 (44.0%). This is in line with the study by Ugwu *et al.*^[10] Encouragement of patients' interaction with the sonographer and others in the counselling session could be beneficial in enlightening the patients on the safety level of medical sonography to both the mother and the foetus.

This study also showed that majority of the respondents (88.7%) considered the services rendered during their sonographic scan to be satisfactory no matter how long they waited before their scan. This is in contrast with the finding of Eze *et al.* who reported that long waiting time before the scans was a major reason of dissatisfaction with obstetric ultrasound by pregnant women.^[12] This finding may be because of the provision of waiting facilities such as rest room facilities, newspaper and television, improved organizational behaviour, placement of signs, proper regulation of air ventilation and room condition and provision of adequate waiting area for patients, which was also recommended by Ugwu as a means of improving patient satisfaction.^[13]

In this study, patients' dissatisfaction with the service rendered during their prenatal sonography could be a combination of factors such as lack of trained personnel, low standard ultrasound machine, poor patient–staff interaction, and unfixed cost of service among various diagnostic centers. Most respondents had no opinion on how to improve the service rendered during their prenatal sonography, which may be an indication of satisfaction.

Conclusion

Pregnant women considered prenatal sonography to be a very useful and necessary test during their antenatal care.

They had a good knowledge and understanding of the clinical ground for diagnostic sonography despite their high level of ignorance of diagnostic ultrasound safety in some areas, such as probability of risk to the foetus and infection to the expectant mother.

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Conflicts of interest

There are no conflicts of interest.

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