Original Research Article

Obstetric Ultrasonography Beliefs, Expectations, and Experiences among Women Attending a Tertiary Healthcare Center in North-Central Nigeria

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ABSTRACT

Background: In this era of reproductive health-rights, evidence-based medicine, and universal access to ultrasonography services, pregnant women's opinions must be documented because they are the primary stakeholders in obstetric ultrasonography.

Aim: We aim at assessing obstetric ultrasonography beliefs, expectations, and experiences among women attending a tertiary healthcare centre in north-central Nigeria.

Methods: A self-administered questionnaire-based cross-sectional study was conducted on 250 pregnant women who had obstetric ultrasound at Benue State University Teaching Hospital Makurdi, between May 2022 and May 2023. The data consisted of 36 items assessing women`s sociodemographics and obstetric ultrasonography beliefs, expectations, and experiences. Data was entered into SPSS version 23 and Microsoft Excel 2017 for statistical analysis with P-value set at <0.05. Frequency tables were used to present data for categorical variables, while means and standard deviations were used to present data for quantitative variables.

Results: There was 100.0% response rate. Most, 239(95.6%) women had good beliefs regarding obstetric ultrasonography. Expectations were high among 217(86.8%) women that obstetric ultrasonography would, at least, confirm pregnancy, fetal gender and gestational age. Majority,216(86.4%) of respondents had positive obstetric ultrasonography experiences, with satisfactory rating of services by 233 (93.2%) others, notwithstanding suggestions for further improvements. There was statistically significant correlation between beliefs versus expectations and satisfaction ($P = 0.000$, 0.000), as well as satisfaction versus expectations and experiences ($P = 0.001$, 0.000).

Conclusion: Obstetric ultrasonography, which can promote safe-motherhood and reduce maternal and prenatal mortality, was well-received by pregnant Nigerian women, who also had favorable beliefs, expectations and experiences with it.

Keywords: Beliefs, Expectations, Experiences, Nigeria, Obstetric Ultrasonography, Tertiary Healthcare

INTRODUCTION

Obstetric or prenatal ultrasonography (USG) has become a vital part of modern antenatal care (ANC) in both developed and developing countries since its introduction in 1958, providing direct access to images of the fetus. Ultrasonography is cost-effective, portable, non-invasive, safe, and

provides real-time imaging, which is important in obstetrics. Recent advancements in prenatal USG have resulted in more positive beliefs, expectations, and experiences with this innovative technology, which has significantly reduced the number of harmful radiological examinations performed throughout pregnancy. For example, x-ray tests for placenta localization, intrauterine death, and fetal maturity have all but been discontinued with the advent of real-time USG.[1,2]

Obstetric scans at various trimesters of pregnancy provide information on the mother, placenta, and baby. Routine fetal anomaly scan at 18 to 22 weeks, can detect pregnancy complications, fetal anomalies, and any syndrome associated with genetic abnormalities, leading to a reduction in infant mortality. [3] This has become standard practice in industrialized nations, despite the fact that, fetal anomaly scan is still in its infancy stage in developing countries. [4]

Although several studies have raised concerns about the safety of obstetric US, current research has found no substantial adverse effects in pregnant women. Colour and spectral Doppler US, however when used in the first trimester for evaluation of the fetal heart function, cardiac valves, and ductus venosus, should be carefully checked for bioeffects and fetal safety.[5,6]

While obstetrics USG has a good impact on patient management when used strictly for medical reasons, non-medical uses of US, such as for fetal gender determination, have yet to exhibit the intended positive impact on maternal, perinatal, or neonatal mortality.[7]

Previous research has found that a variety of factors, including cost of care, time spent to access care at the hospital, accessibility to care provider, staff attitude, doctor-patient interaction, and care provider`s knowledge and skills can influence patient satisfaction to the point where they will return for obstetric ultrasonography and even recommend these services to others.[8,9]

This research, therefore lays the groundwork for public health interventions and was motivated by a dearth of literature from our center on the use of obstetrics USG. The purpose of the study was to assess obstetric ultrasonography beliefs, expectations, and experiences among women attending a tertiary health care centre in north-central Nigeria. Thus, forming a basis for comparison with studies elsewhere nationally and internationally, when the need arises by clinicians in our environment.

MATERIALS & METHODS
Study design and setting
This was a prospective survey of pregnant women at a tertiary healthcare center in north-central Nigeria to assess their beliefs, expectations, and experiences with obstetric USG at Benue State University Teaching Hospital (BSUTH), Makurdi, between May 2022 and May 2023. Situated on the south bank of the Benue River, between latitudes 7.3 and 8.32 degrees, Makurdi, the capital of Benue State, is easily accessible by air, water and land.[10] The survey did not use the names of the participants; instead, it used codes. Before data collection, the questionnaire was piloted to ensure its validity and reliability, and any necessary changes made. In accordance with global and institutional guidelines, the authors collected and stored the patients' signed consent. Before being enrolled in the study, patients gave their informed consent. All personal information was collected in a confidential manner, and individual participation in the study was purely optional. Delivery of USG services to expecting women at our center was unaffected by opting out or declining to give consent.

The sample size and study population
The sample size (n) was calculated using the following formula $n = Z^2pq/e^2$ for population greater than 10,000. where, n=

Sample size, Z= 1.96 at 95% confidence interval, p = prevalence (50%), q = 1-p, e= margin of error, 7 %. Therefore n = $(1.96)^2$x0.5x0.5/ $(0.07)^2$ = 196.[11,12] However, a sample size of 250, was used to boost the study's statistical power, with the researchers adopting the technique of consecutive sampling to recruit participants at their point of scanning until the specified sample size was reached.

Inclusion criteria

Inclusion criteria were pregnant women attending antenatal clinic (ANC) who were referred for scanning either as required by our hospital policy (routine ANC) or due to specific or obstetric indications such as blood spotting, hydrocephalus, expected fetal weight (EFW) estimation, assessment of fetal viability, theca lutein cyst, fetal distress, and anomaly scan, with each participant allowed to participate only once. In both cases, primigravida and multiparous women were recruited to get a better understanding of their obstetric USG beliefs, expectations, and experiences.

Exclusion criteria

Exclusion criteria included outpatients who were not registered for ANC at our hospital or even those who were registered but later declined their participation and withdrew from the study. Acutely critically-ill expectant mothers with obstetric emergences or pregnancy complications were also excluded because their current state of health made accurate completion of the questionnaire extremely difficult.

Data collection.

The evaluation tool was a well-structured self-reporting questionnaire with a total of 36 items divided into subheadings, most of which were multiple-choice type. The sections examined the pregnant women's sociodemographic data, among other things, to see if there were aspects of their existing beliefs, expectations, and experiences that contributed to their overall satisfaction or dissatisfaction with obstetric USG services at BSUTH and to see if recommendations for their improvement could be made.

The pregnant women were rated on their beliefs (very poor, poor, good, or very good), expectations (very low, low, high or very high), experiences (very negative, negative , positive or very positive), and level of satisfaction with obstetric USG services at BSUTH (highly dissatisfied, dissatisfied, satisfied or highly satisfied) based on a systematic scoring methodology of the 16 item questionnaire's subheadings, using the Likert scale,[13] which assumes that the strength or intensity of an attitude is linear, with each of the responses assigned a numerical value of between 1-5, as appropriate, which was used to measure the attitude under study. Marks were suitably awarded for each answered question, while unanswered questions received no marks. Multiple selections did not get any marks when it wasn't allowed. Pregnant women with scores of 1-25,26-50,51-75 and 76-100 out of a possible maximum of 100 marks on individual item subheadings representing approximately 1-25,26-50,51-75 and 76-100 % of their obstetric USG beliefs were rated to have had very poor, poor, good, or very good conviction of the topic matter, respectively. Those who scored ≤16.3 out of a possible maximum of 65marks, that is 25% or lower on specific item subheadings describing obstetric USG expectations, were considered to have had a very low obstetric USG expectations, while those who scored 16.4-32.5, 33.6-48.8, 48.9-65 marks i.e., 26-50,51-75 and 76-100 % respectively had low, high or very high obstetric USG expectations, in that order.

Scores of 1.0-1.8, 1.9-3.5, 3.6-5.3, and 5.4-7.0 out of a possible maximum of 7 marks on individual item subheadings representing approximately 1-25, 26-50, 51-75, and 76-100 % of the pregnant women obstetric USG experiences were rated to have had very negative, negative, positive or very positive experiences of the subject matter, respectively. Those who scored ≤8 out of a possible maximum of 32marks, that is 25% or lower on specific item subheadings

describing level of satisfaction with obstetric USG services at BSUTH, were considered to have been highly dissatisfied with services, while those who scored 9-16,17-24,25-32 marks i.e., 26-50,51-75 and 76-100 % respectively were dissatisfied, satisfied or highly satisfied with level of obstetric USG services, in that order.

Data analysis

The data from the structured questionnaire was entered into the statistical package for social sciences (SPSS) version 23 software and Microsoft Excel 2017, for data analysis with statistical significance at a *P* value of <0.05. The data distribution was displayed in tables, figures, and percentages.

RESULT

Out of 250 pregnant women, 249 (99.6%) were Nigerians. Women in their 26–35 age range made up the majority, 154(61.6%) with mean and median ages of 29.6 ± 4.9 and 29.0 years respectively. Nearly all, 248(99.2%) of the respondents were married, while a quarter, 56(22.4%) were traders. Two hundred and thirty-two (92.8%) women were urban dwellers. More than half 158(63.2%) others, had tertiary education. One hundred and ninety-eight (79.2%) respondents were low-income earners with a monthly income of less than 74,000 Naira. More than a third, 86(34.4%) of the cases presented at first trimester and 82 (32.8%) during the third trimester. While 157 (62.8%) women were between para 0 and 1, 193 (77.2%) others were between gravida 1and 3. A good number of the study population experienced no miscarriages or stillbirths in 201(80.4%) and 242(96.8%) cases, respectively. The above data is as presented in tables 1&2.

Table 1: Distribution of personal socio-demographic data

Variable	Frequency	Percentage (%)
Age(years)		
18-25	55	22.0
26-35	154	61.6
36-45	41	16.4
>45	0	0
Total	250	100
Nationality		
Nigerians	249	99.6
Non-Nigerians	1	0.4
Total	250	100.0
Marital status		
Single	2	0.8
Married	248	99.2
Total	250	100.0
Residence		
Rural	18	7.2
Urban	232	92.8
Others	0	0.0
Total	250	100.0
Religion		
Christianity	237	94.8
others	13	5.2
Total	250	100.0
Educational status		
Non-formal	9	3.6
Primary	14	5.6
Secondary	69	27.6
Tertiary	158	63.2
Total	250	100.0
Ethnicity		
Tiv	190	76.0
Idoma	25	10.0
Igede	8	3.2
Hausa	2	0.8
Yoruba	3	1.2
Ibo	12	4.8
Others	10	4.0
Total	250	100.0
Occupation		
Civil servants	35	14.0

Teacher	25	10.0
Trader	56	22.4
Unemployed	34	13.6
Housewife	38	15.2
Farming	29	11.6
Student	26	10.4
Tailoring	6	2.4
Hair-dressing	1	0.4
Total	250	100.0
Gravidity		
1-3	193	77.2
4-5	51	20.4
>5	6	2.4
Total	250	100.0
Parity		
0-1	157	62.8
2-3	78	31.2
>4	15	6.0
Total	250	100.0
Miscarriages(≤20weeks)		
Nil	201	80.4
1	32	12.8
2	11	4.4
3	6	2.4
Total	250	100.0
Stillbirths(≥20weeks)		
Nil	242	96.8
1	7	2.8
2	1	0.4
Total	250	100.0
Trimesters(weeks)		
1st (0-13)	86	34.4
2nd (14-28)	74	29.6
2nd Anomaly scan (18-23)	4	1.6
3rd (29-40)	82	32.8
Unknown	4	1.6
Total	250	100.0
Income		
Low class	198	79.2
Middle class	46	18.4
Upper class	6	2.4
Total	250	100.0

Table 2: Distribution of descriptive statistics of some of the respondents' variables

Variable	N	Minimum	Maximum	Mean	Median	Mode	Std.dev
Age(years)	250	19	42	29.6	29	30	4.9
Gravidity	250	1	8	3.0	2	2	1.3
Parity	250	0	4	1.0	1	1	1.1

A preponderance of women who underwent obstetric USG, 239(95.6%) did so as part of routine antenatal care (ANC), while 11(4.4%) had specific indications for the scan, such as blood spotting, hydrocephalus, estimating expected fetal weight (EFW), confirming fetal viability, fetal distress, anomaly scan and theca lutein cyst as depicted in figure 1and table 3.
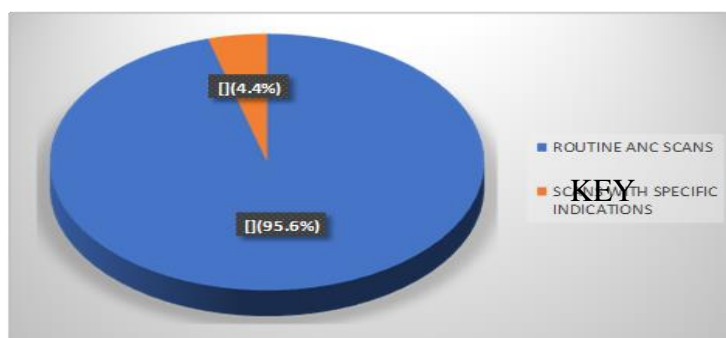

Figure 1: Distribution of scan types

Table 3: Distribution of specific indications for obstetric ultrasonography

Indication	Frequency	Percentage (%)
Theca lutein cyst	1	0.4
Fetal distress	1	0.4
Anomaly scan	1	0.4
Blood spotting	2	0.8
Hydrocephalus	2	0.8
Expected fetal weight (EFW) estimation	2	0.8
Fetal viability	2	0.8
Total	11	4.4

Regarding the distribution of beliefs statements towards obstetric ultrasonography scanning, the results revealed that the most common beliefs statements with ≥90% were assessment of fetal wellbeing 235(94.0%), detection of fetal heart rate 229(91.6%)), and prediction of fetal gender 225(90.0%), respectively as shown in figure 2.
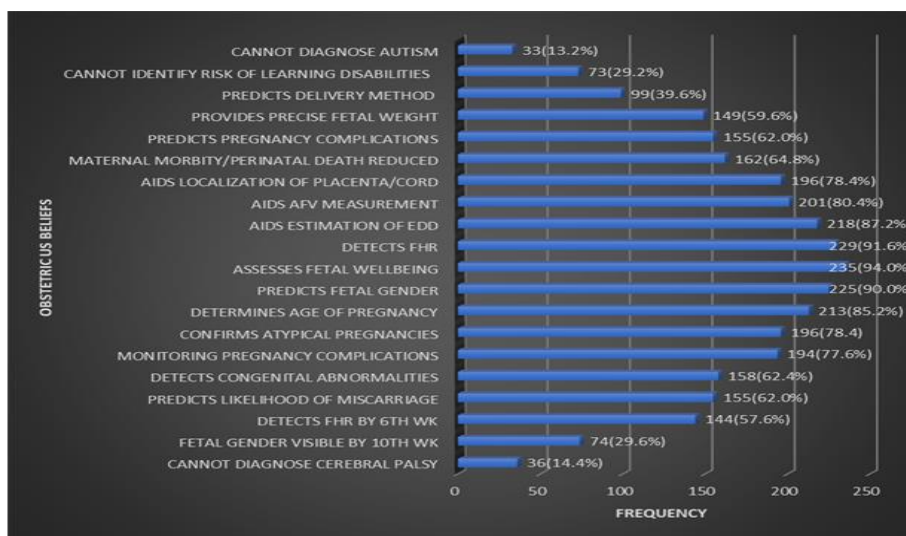

Figure 2: Distribution of beliefs statements towards obstetric ultrasonography at BSUTH

The distribution of beliefs score category indicated that 239 (95.6%) respondents had good beliefs, while 11 (4.4%) had poor beliefs as depicted in figure 3
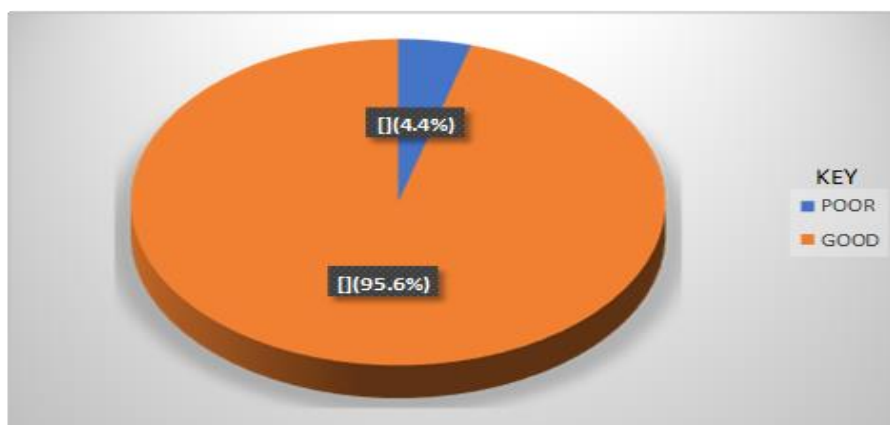

Figure 3: Distribution of Beliefs score category (n=250).

In comparing the beliefs score with sociodemographic indices, there was positive relationship between some variables, ranging from r=0.005 to 0.064. The strongest positive correlation was found with miscarriages (r = 0.064). The correlation was however, negative but statistically significant between beliefs score

versus scan type, ethnicity and religion, (*P*=0.000,0.012 and 0.048) in that order as depicted in table 4.

Table 4: The distribution of sociodemographic indices with belief scores

Sociodemographic indices	Beliefs score			Pearson's correlation (r)	*P*-value
	Good	Poor	Total		
Age(years)					
18-25	53(21.2%)	2(0.8%)	55(22.0%)		
26-35	146(58.4%)	8(3.2%)	154((61.6%)		
36-45	40(16.0%)	1(0.4%)	41(16.4%)	0.012	0.849
>45	0(0.0%)	0(0.0%)	0(0.0%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Nationality					
Nigerians	238(95.2%)	11(4.4%)	249(99.6%)		
Non-Nigerians	1(0.4%)	0(0.0%)	1(0.4%)	0.014	0.831
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Marital status					
Single	2(0.8%)	0(0.0%)	2(0.8%)		
Married	237(94.8%)	11(4.4%)	248(99.2%)	-0.019	0.762
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Residence					
Rural	18(7.2%)	0(0.0%)	18(7.2%)		
Urban	221(88.4%)	11(4.4%)	232(92.8%)	-0.060	0.347
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Religion					
Christianity	228(91.2%)	9(3.6%)	237(94.8%)		
Others	11(4.4%)	2(0.8%)	13(5.2%)	-0.125	0.048
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Education					
Non-formal	9(3.6%)	0(0.0%)	9(3.6%)		
Primary	14((5.6%)	0(0.0%)	14(5.6%)		
Secondary	65(26.0%)	4(1.6%)	69(27.6%)	-0.037	0.557
Tertiary	151(60.4%)	7(2.8%)	158(63.2%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Ethnicity					
Tiv	185(74.0%)	5(2.0%)	190(76.0%)		
Idoma	23(9.2%)	2(0.8%)	25((10.0%)		
Ibo	10(4.0%)	2(0.8%0	12(4.8%)	-0.158	0.012
Others	21(8.4%)	2(0.8%)	23(9.2%)		
Total	239(95.6%)	11(4.4%)	250!00.0%)		
Occupation					
Employed	169(67.6%)	9(3.6%)	178(71.2%)		
Housewife	36(14.4%)	2(0.8%)	38(15.2%)		
Unemployed	34(13.6%)	0(0.0%)	34(13.6%)	0.036	0.231
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Scan type					
Routine ANC	228(91.2%)	11(4.4%)	239(95.6%)		
Scans with specific or obstetric indication	11(4.4%)	0(0.0%)	11(4.4%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)	-0.154	0.000
Gravidity					
1-3	184(73.6%)	9(3.6%)	193(77.2%)		
4-5	49(19.6%)	2(0.8%)	51(20.4%)		
>5	6(2.4%)	0(0.0%)	6(2.4%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)	0.053	0.400
Parity					
0-1	150(60.0%)	7(2.8%)	157(62.8%)		
2-3	74(29.6%)	4(1.6%)	78(31.2%)		
$\geq$4	15(6.0%)	0(0.0%)	15(6.0%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)	0.036	0.575
Miscarriages					
0-1	222(88.8%)	11(4.4%)	233(93.2%)		
2-3	17(6.8%)	0(0.0%)	17(6.8%)		
Total	239(95.6%)	11(4.4%)	250(100.0%)	0.064	0.314
Stillbirth					
0	232(92.8%)	10(4.0%)	242(96.8%)		
1	6(2.4%)	1(0.4%)	7(2.8%)		
2	1(0.4%)	0(0%)	1(0.4%)	-0.057	0.369
Total	239(95.6%)	11(4.4%)	250(100.0%)		
Gestational age					
1$_{st}$ trimester	82(32.8%)	4(1.6%)	86(34.4%)		
2nd trimester	74(29.6%)	4(1.6%)	78(31.2%)		
3rd trimester	79(31.6%)	3(1.2%)	82(32.8%)		
Unknown	4(1.6%)	0(0.0%)	4(1.6%)	0.005	0.943

Total	239(95.6%)	11(4.4%)	250(100.0%)		
Income					
Low class	189(75.6%)	9(3.6%)	198(79.2%)		
Middle class	44(17.6%)	2(0.8%)	46(18.4%)		
Upper class	6(2.4%)	0(0.0%)	6(2.4%)	0.023	0.722
Total	239(95.6%)	11(4.4%)	250(100.0%)		

The results from table 5 revealed that 222 (88.8%), 221(88.4%), 215(86.0%) and 186(74.4%) women, had expectations that obstetric ultrasonography would determine gestation age, confirm pregnancy, predict fetal gender, and atypical gestations in that order. Further,187 (74.8%) and 185 (74.0%) of the respondents entertained no fear of fetal cancer or congenital anomalies as a result of obstetric USG, respectively. However, 150 (60.0%) thought the cost of obstetric USG was as expected or affordable, 142 (56.8%) thought it was average, and 76 (30.4%) thought it was unexpected or exorbitant.

Table 5: Distribution of expectations towards obstetric ultrasonography (n=250).

Variable	Frequency	Percentage (%)
Obstetric US expectations		
i. **Under which conditions would you expect an Ultrasound scan to be done on you during pregnancy?**		
a. **Confirm that you're expecting a child**		
➢ Strongly agree	62	24.8
➢ Agree	159	63.6
➢ Undecided	5	2.0
➢ Disagree	11	4.4
➢ Strongly disagree	13	5.2
Total	250	100.0
b. **Determination of gestational age**		
➢ Strongly agree	69	27.6
➢ Agree	153	61.2
➢ Undecided	10	4.0
➢ Disagree	7	2.8
➢ Strongly disagree	11	4.4
Total	250	100.0
c. **Gender determination**		
➢ Strongly agree	70	28.0
➢ Agree	145	58.0
➢ Undecided	10	4.0
➢ Disagree	12	4.8
➢ Strongly disagree	13	5.2
Total	250	100.0
d. **Previous and present bad obstetric history (e.g., miscarriage, stillbirth and other unwanted conditions)**		
➢ Strongly agree	33	13.2
➢ Agree	114	45.6
➢ Undecided	77	30.8
➢ Disagree	15	6.0
➢ Strongly disagree	11	4.4
Total	250	100.0
e. **Suspected congenital anomalies or fetal defect**		
➢ Strongly agree	41	16.4
➢ Agree	102	40.8
➢ Undecided	86	34.4
➢ Disagree	5	2.0
➢ Strongly disagree	16	6.4
Total	250	100.0
f. **Atypical gestations (e.g., multiple, Ectopic, molar pregnancy)**		
➢ Strongly agree	57	22.8
➢ Agree	129	51.6
➢ Undecided	50	20.0
➢ Disagree	3	1.2
➢ Strongly disagree	11	4.4
Total	250	100.0
ii. **What kind of effect would you expect an obstetric scan to have on your pregnancy?**		
a. **Congenital anomaly to the baby**		
➢ Strongly agree	11	4.4
➢ Agree	9	3.6

	➢ Undecided	45	18.0
	➢ Disagree	75	30.0
	➢ Strongly disagree	110	44.0
	Total	250	100.0
b. **Cancer**			
	➢ Strongly agree	8	3.2
	➢ Agree	11	4.4
	➢ Undecided	44	17.6
	➢ Disagree	64	25.6
	➢ Strongly disagree	123	49.2
	Total	250	100.0
c. **Aches and Pain**			
	➢ Strongly agree	10	4.0
	➢ Agree	16	6.4
	➢ Undecided	35	14.0
	➢ Disagree	70	28.0
	➢ Strongly disagree	119	47.6
	Total	250	100.0
d. **No deleterious effect**			
	➢ Strongly agree	57	22.8
	➢ Agree	98	39.2
	➢ Undecided	34	13.6
	➢ Disagree	14	5.6
	➢ Strongly disagree	47	18.8
	Total	250	100.0
iii. **What are your thoughts on the hospital bill for the obstetric ultrasound scan that you paid?**			
a. **Expected/Affordable**			
	➢ Strongly agree	44	17.6
	➢ Agree	106	42.4
	➢ Undecided	8	3.2
	➢ Disagree	49	19.6
	➢ Strongly disagree	43	17.2
	Total	250	100.0
b. **Average**			
	➢ Strongly agree	25	10.0
	➢ Agree	117	46.8
	➢ Undecided	19	7.6
	➢ Disagree	50	20.0
	➢ Strongly disagree	39	15.6
	Total	250	100.0
c. **Unexpected/Exorbitant**			
	➢ Strongly agree	38	15.2
	➢ Agree	38	15.2
	➢ Undecided	10	4.0
	➢ Disagree	86	34.4
	➢ Strongly disagree	78	31.2
	Total	250	100.0

The distribution of expectations score category is as illustrated in figure 4, where 6(2.4%),18(7.2%),217(86.8%) and 9(3.6%) had very low, low, high and very high expectations consecutively regarding obstetric USG.
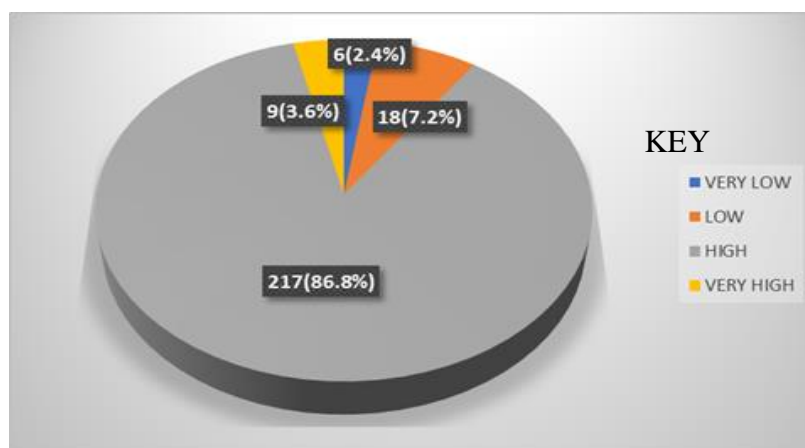
Figure 4: Distribution of obstetric ultrasonography expectations score category (n=250).

In terms of obstetric USG experiences, 154 (61.6%) women had it conducted 1-2 times, 37 (14.8%) had it performed >5 times, and only 16 (6.4%) had never used USG before. Majority, 189(75.6%) of respondents, received specific and clear information about their babies from the sonographer after scanning, while 36(14.4%) did not. The primary sources of information were Obstetrician,102 (40.8%), then family & friends, 86(34.4%). A good number of women, 195(78.0%) had no experiences with congenital abnormalities, however 39(15.6%) did have first trimester fetal demise as illustrated in table 6.

Table 6: Distribution of experiences towards obstetric ultrasonography (n=250).

Variable	Frequency	Percentage (%)
i. Have you had any previous obstetric scans?		
➢ Nil	16	6.4
➢ 1-2	154	61.6
➢ 3-4	43	17.2
➢ >5	37	14.8
Total	250	100.0
ii. Did the sonologist give you information about your baby?		
➢ Yes, specific & clear info.	189	75.6
➢ Yes, specifics, but unclear info.	25	10.0
➢ No	36	14.4
Total	250	100.0
iii. Your sources of information on obstetric ultrasonography?		
➢ Media e.g., TV, press, radio	30	12.0
➢ Obstetrician	102	40.8
➢ Family and Friends	86	34.4
➢ Internet	12	4.8
➢ Medical students	20	8.0
Total	250	100.0
iv. What is your experience with Congenital abnormalities?		
➢ First-trimester fetal demise	39	15.6
➢ Second trimester fetal demise	8	3.2
➢ Birth defects e.g., club foot, down syndrome, cerebral palsy	2	0.8
➢ Stillbirth or stillborn	6	2.4
➢ Nil	195	78.0
Total	250	100.0

The distribution of experiences scores category show that 4(1.6%),30(12.0%),156(62.4%) and 60(24.0%) had very negative, negative, positive and very positive experiences in that order as depicted in figure 5.
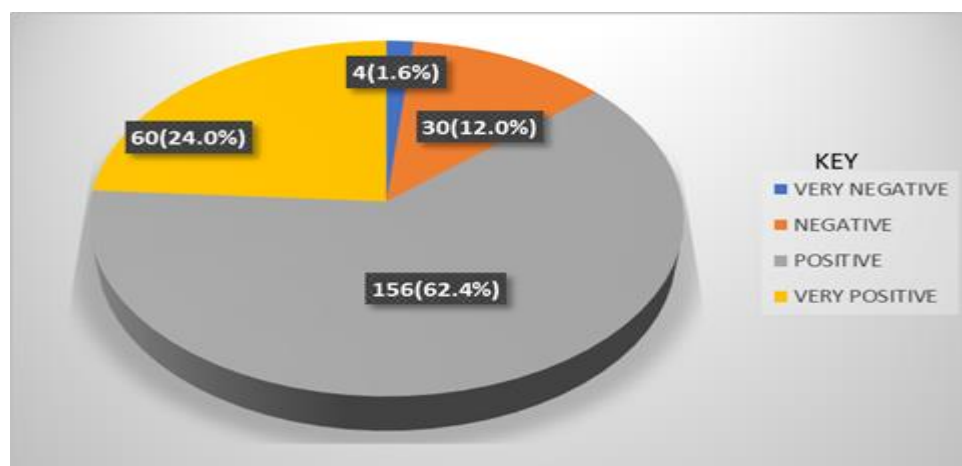

Figure 5: Distribution of obstetric ultrasonography experiences score category (n=250).

Satisfaction ratings with different aspects of obstetric USG services shows that the most common services with ≥ 90% patients` satisfaction were patient-other health workers` relationship, patient privacy, patient-doctor relationship, ease of assessing care and hospital bill payment method, with 230(92.0%),227(90.8%).226(90.4%).226(90.4%) and 225(90.0%) in that order as illustrated in table 7.

Table 7: Distribution of different aspects of obstetric ultrasonography services alongside satisfaction ratings versus level of satisfaction with these services at BSUTH (n = 250)

Aspects of USG services alongside Satisfaction ratings	Level of Satisfaction		Total
	Satisfied Frequency (%)	Dissatisfied Frequency (%)	Frequency (%)
Ease of assessing care			
Good	226(90.4%)	9(3.6%)	235(94.0%)
Poor	7(2.8%)	8(3.2%)	15((6.0%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Waiting time			
Good	219(87.6%)	7(2.8%)	226(90.4%)
Poor	14(5.6%)	10(4.0%)	24(9.6%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Time to get scan report			
Good	224(89.6%)	7(2.8%)	231(92.4%)
Poor	9(3.6%)	10(4.0%)	19(7.6%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Hospital bill payment method			
Good	225(90.0%)	8(3.2%)	233(93.2%)
Poor	8(3.2%)	9(3.6%)	17(6.8%)
Total	233(93,2%)	17(6.8%)	250(100.0%)
Hospital facilities/environment			
Good	222(88.8%)	7(2.8%)	229(91.6%)
Poor	11(4.4%)	10(4.0%)	21(8.4%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Patient-Doctor relationship			
Good	226(90.4%)	8(3.2%)	234(93.6%)
Poor	7(2.8%)	9(3.6%)	16(6.4%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Patient-other Health workers` relationship			
Good	230(92.0%)	8(3.2%)	238(95.2%)
Poor	3(1.2%)	9(3.6%)	12(4.8%)
Total	233(93.2%)	17(6.8%)	250(100.0%)
Patient privacy			
Good	227(90.8%)	7(2.8%)	234(93.6%)
Poor	6(2.4%)	10(4.0%)	16(6.4%)
Total	233(93.2%)	17(6.8%)	250(100.0%)

Figure 6 depicts the recommendations for improving obstetric USG services, with the top three being health talks at antenatal clinic to correct misconception regarding perceived harmful effects of obstetric ultrasonography especially cancer-concerns, reduce time to collect scan reports and more personnel training with 92(36.8%) ,40(16.0%) and 31(12.4%) respondents consecutively.
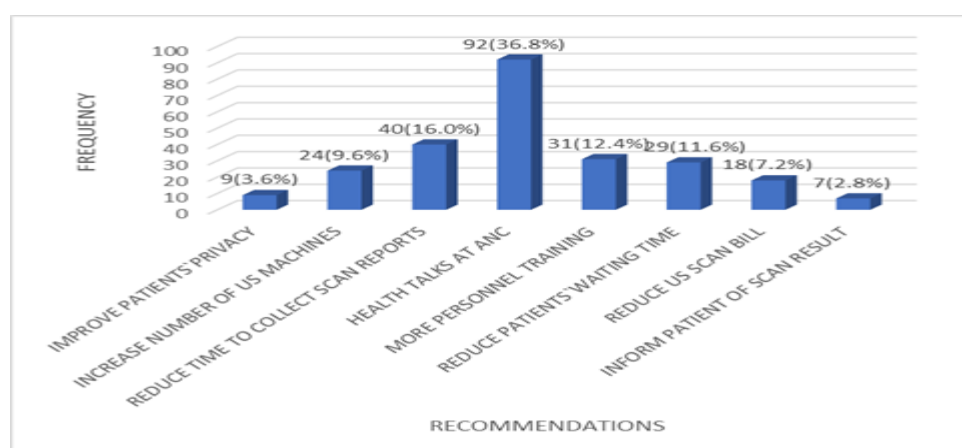

Figure 6: Distribution of recommendations to further improve obstetric ultrasonography services at BSUTH (n=250).

There was a statistically significant correlation between beliefs versus expectations (*P*=0.000), satisfaction (*P*=0.000) and expectations versus satisfaction (*P*=0.001), as well as between experiences versus satisfaction (*P*=0.000) as shown in table 8.

Table 8: The distribution of Pearson's correlation (r) between study variables at BSUTH (n=250).

Variable/Scores	Pearson's correlation(r)	*P*-value
Beliefs vs Expectations	0.402	0.000
Beliefs vs Experiences	-0.038	0.555
Beliefs vs Satisfaction	0.223	0.000
Expectations vs Experiences	0.026	0.685
Expectations vs Satisfaction	-0.205	0.001
Experiences vs Satisfaction	0.242	0.000

DISCUSSION

The questionnaire received 100.0% response rate. This was accomplished by using the technique of consecutive sampling to recruit participants, by which the researchers chose participants at their point of scanning until the specified sample size was reached. Furthermore, a resident medical interviewer administered the questionnaire, making it easy for those lacking formal education to take part in the study. This strategy produced such a high response rate while also minimizing potential errors that could have resulted from misinterpretation of the questions. Similarly, 100% response rates have been reported in related studies.[14,15]

More than half of our respondents, 154 (61.6%), were in the age group of 26-35, with a mean age of 29.6±4.9years, which is consistent with the findings of other researchers.[14,15] This is a common finding, particularly in developing countries such as ours, where females marry at younger ages, most commonly in their early twenties. This trend in age may also be related to our respondents' educational status, with more than a quarter 92(36.8%) of them having less than a secondary school education, implying that some of them may have abandoned school at a younger age to marry. The age group with the least number of respondents 41(16.4%)) was the 36–45 years and older, most likely due to women becoming less reproductive as they approach menopause.[14] The reported trends in the racial and religious affiliations of our respondents were probably related to the population and religious make-up of Makurdi, where BSUTH is situated. Tiv 190(76.0%) dominated the other tribes, followed by Idoma and Ibo. This is predictably consistent with previous studies.[16,17] Another explanatory variable responsible for our respondents' obstetric USG beliefs, expectations, and experiences was their residential area, whereby women living in urban areas outnumber those living in rural areas by about thirteen-fold, with urban women having access to better infrastructure, obstetric USG information, and favorable variation in distance between health facilities.[18] Monthly income, a sociodemographic component was associated with obstetric USG beliefs, expectations and experiences, even though a good number of our women, 189 (79.2%), were predominantly low-income earners. Women whose incomes were below N74,000 were less likely to exhibit the same obstetric USG beliefs, expectations, and experiences as those who had a monthly income above N100,000. Consistent findings were reported by a study in Kenya,[19] on the enablers and barriers that affect obstetric USG services. This is because women with higher incomes could more easily afford prenatal USG services, travel expenses and US bills.[18,19] Although our study showed no statistically significant association between history of miscarriages and women`s obstetric USG beliefs, expectations, and experiences(*P*=0.061-0.875), Yetwale et al,[18] reported a statistically significant correlation between history of miscarriages and obstetric USG utilization, with those having a history of abortion in their study being 5.8 times more

likely to make use of obstetric USG than their counterparts. This could be because they are afraid of losing their pregnancy and the complications that come with it. Besides, mothers with a history of abortion might feel that their abortion was related to poor utilization of prenatal USG services.

The current study evaluated the beliefs statements of 250 pregnant women at BSUTH regarding obstetric USG. The results showed that majority of women 239 (95.6%) had good beliefs. This was corroborated by another study,[20] which reported that 275(94.8%) women had adequate beliefs. Our results were however quite higher when compared to the report by Singh et al ,[21] which revealed that only 15(7.5%) pregnant women had adequate beliefs. Other researchers,[14,22] have documented varying levels of women's obstetric USG beliefs with the discrepancies most likely attributable to variations in geographic locations and socioeconomic statuses. A good number of respondents made affirmative beliefs statements regarding the value of obstetric USG in terms of fetal health assessment 235 (94.0%), fetal heart rate evaluation 229 (91.6%), and fetus gender disclosure 225 (90.0%), respectively. This is not surprising considering the fact that more than half 158 (63.2%) of our respondents had formal education, though it also raises the possibility of selection bias because formal education may have multiple effects on respondents' beliefs statements about the USG services provided in the study center and the cost of those services. Besides, education influences the socioeconomic status, and the capacity to comprehend health talks given by healthcare providers at ANC.[11] Participants' beliefs about obstetric ultrasonography were higher among those who were married 237(94.8%), attended routine ANC 228(91.2%), worked 169(67.2%), and had a higher education 151(60.4%), in that order, with a statistically significant correlation (P=0.000) between beliefs scores and scan type as shown in table 4. Comparative

studies revealed that women with higher educational attainment did better on beliefs scores than women with lower educational qualifications,[3,11] most likely because educated and employed women have more opportunities to learn from others and share their experiences, which leads them to make decisions about visiting ANC earlier than the other women.[3]

Most, 217 (86.8%) of our women had high expectations scores towards obstetric ultrasonography. Related studies,[14,23,24] reported similar findings. Majority of our respondents expected the scan to disclose fetal gender, gestational age, confirm pregnancy and aid in the diagnosis of atypical gestations, in that order. There is always a chance that USG will have adverse effects on both the mother and child, as with most diagnostic procedures.[11] It is hardly surprising, then, that some of our respondents expected that excessive exposure to USG could have negative consequences, such as congenital fetal anomalies 20(8.0%) or cancer 19(7.6%)). A good number of participants also expected ultrasound scan to be affordable 150(60.0%). These expectations are consistent with the findings of previous studies in which participants expressed some concerns about safety to themselves and their babies due to excessive exposure to US scanning,[11,23] thus, underscoring the need for inclusion of safety issues in the health talks at ANC. The women`s high expectations may be due to a number of factors, including the accuracy of the scan reports, professionalism of the medical staff and affordable costs. Dasan et al,[24] reported that participants wanted more scans and even told others about their center because of the friendly healthcare workers, accuracy of scan reports, and low costs. Furthermore, some respondents' expectations to know the fetal gender, the expected date of delivery, and the baby's well-being may have heightened their expectations,[16] prompting some to even contemplate self-request for a scan, a finding that was previously reported.[17] However, a small

proportion of our respondents 6(4.4%) expressed low expectations which were possibly related to what was incorrectly perceived as harmful effects of US, such as cancer, discomfort, and fetal anomaly.[14] Obstetric USG experiences score (figure 5), shows that a good number of our women 216(86.4%) had positive experiences. Most 197 (78.8%) of the women had fewer than five scans, with a mean scan of 2.4 per woman from a total of approximately 480 scans. Our mean value, while slightly lower than the 3 scans per woman recorded by Oche et al,[11] in Nigeria, is consistent with findings from a study conducted in the United Kingdom, where the mean scan was 2.6 per woman.[25] In contrast, the mean scan in Vietnam was 6.6 per woman.[26] Our findings are most likely due to women`s experiences with poor services, such as long waiting times and a lack of privacy, which discourages them from attending ANC on a regular basis.[14] Perhaps, our mean scan values will begin to improve, as public awareness increases, more ultrasound facilities open up, and more personnel are available to provide the needed obstetric USG services in good time, confidentially and at affordable cost. The top three sources of information on obstetric ultrasonography at BSUTH were from obstetricians 102(40.8%), family & friends 86(34.4%) and the media 30(12.0%) in that order. This is in contrast to the findings in previous studies,[11,23] that reported their commonest sources of information as from other healthcare workers and family & friends respectively. Although no comparative study on the accuracy of the sources of information was reported, it is likely that information from obstetricians will be more accurate, scientific and professional, compared to information from family and friends, which will be more speculative than scientific, while information from the media, will be more generalized and less patient-specific.[11] Majority of our women, 189 (75.6%), who had obstetric ultrasonography reported that the sonologist's information/report was specific

and clear (table 6). Apart from 39(15.6%) women who experienced first trimester fetal demise with congenital fetal anomaly,195(78.0%) others experience no adverse events. A national policy regarding the sonologist`s role in communicating adverse findings to pregnant women is urgently needed, with unanimous acceptance by obstetricians, sonologists and sonographers. Such a policy must be patient-centered and ensure that pregnant women's needs are met within the obstetric ultrasonography practice setting.[27] We investigated different determinants of satisfaction, and the results revealed that the highest level of satisfaction was found with the following aspects of obstetric USG services; the patient-other healthcare workers` relationship 230 (92.0%), followed by patient privacy 227 (90.8%), and patient-Doctor relationship/ease of assessing care 226 (90.4%). The overall level of patient satisfaction with obstetric USG at BSUTH was very high 233 (93.2%). This high level of patient satisfaction must be attributed primarily to the facility's high level of professionalism, technical expertise, and excellent service delivery. This is in agreement with related earlier researches [8,9,28], which reported overall satisfaction ratings of 337 (83.2%), 194 (81.1%), and 120 (60.0%), respectively. A small proportion of our respondents, 7-17 (2.8-6.8%), expressed dissatisfaction with services, which could be attributed to the casual attitude towards service delivery frequently displayed by some government hospital staff, when compared to private diagnostic centers or hospitals.[28] However, the correlation between patients' obstetric USG satisfaction versus beliefs, expectations and experiences was statistically significant (P=0.000, 0.001, 0.000).

Some recommendations were made for the improvement of women satisfaction with obstetric USG services at BSUTH, such as holding health talks at ANC to dispel myths about the alleged negative effects of obstetric ultrasound, particularly cancer-

related concerns 92(36.8%), shortening the time it takes to collect scan reports 40(16.0%), and providing more staff training 31(12.4%). This necessitates a strategic re-positioning of our healthcare system to make it more women-friendly because women are the primary stakeholders in prenatal USG. Women's dissatisfaction with modern USG -based healthcare must be addressed in order to improve maternal health access, reduce maternal morbidity and mortality, and adopt gender-sensitive obstetric ultrasonography services in our society.[29]

CONCLUSION

Obstetric ultrasonography is now a valuable tool in prenatal care. Our respondents' good beliefs, high expectations and positive experiences demonstrate the wide acceptability of the technology in today's healthcare delivery system, with direct access to images of the fetus, thus promoting early bonding, reassuring pregnant women about fetal well-being, and encouraging them to abandon habits that are harmful to both mother and child. However, women's beliefs, expectations and experiences towards obstetric ultrasonography can differ, resulting in either positive or negative outcomes. Positive outcomes are expected in terms of patient care when USG is used solely for medical purposes, however, when it is used for non-medical reasons, like fetal gender disclosure, as some of our respondents expected, negative outcomes occur with no reported meaningful impact on maternal, perinatal, or neonatal mortality. Even though patients` satisfaction was quite high in our case, the hospital can still do more by improving those areas of service where a few women were dissatisfied. Waiting times, for example, can be minimized by providing more manpower, scanning rooms and ultrasound machines. Healthcare professionals and pregnant women should be made aware of the goal of obstetric ultrasonography, its capabilities and limitations in order to dispel the myths held

by a few of our respondents that ultrasonography has deleterious effects and can cause cancer or fetal anomalies.

Recommendations for future research

These suggestions are based in part on the findings of Firth et al,[23] and chronicles the methodology of our research, which excluded women who did not attend ANC and those under the age of 19. These groups are particularly susceptible to pregnancy complications, so ANC and obstetric USG should be strongly encouraged among them because they are probably even less likely to have had prior obstetric USG experiences than the older women who have attended ANC. It is also recommended that future research of this kind be broadened to include expectant mothers from our community who practice traditional prenatal lifestyles that are hazardous to the mother and child. It could be wise for future study methodology to employ community interpreters rather than medical practitioners, as we did, in order to support free speech and avoid "medicalized" interpretations of pregnant women`s opinions. National guidelines are also recommended for the medical use of obstetric USG, how to integrate it into the antenatal care (ANC) plan, and how to prevent its excessive non-medical use as well as commercialization of the technology.

Limitations of the study

The use of questionnaires has its inherent limitations, such as lack of details and the fact that most of the responses are predetermined, leaving less room for respondents to provide answers that reflect their true obstetric ultrasonography beliefs, expectations, and experiences. Additionally, the study was restricted to only expectant mothers in Makurdi and used a relatively small sample size, which further added to the shortcomings. In the light of these considerations, care must be taken when interpreting the results because they might not be an accurate representation of the

collective obstetric USG beliefs, expectations, and experiences of all the pregnant women in north-central Nigeria.

REFERENCES
1. Ikeako LC, Ezegwui HU, Onwudiwe E, Enwereji JO. Attitude of Expectant Mothers on the Use of Ultrasound in Pregnancy in a Tertiary Institution in South East of Nigeria. Ann Med Health Sci Res. 2014; 4(6):949-952.
2. Lamina MA, Oloyede OA, Adefuye PO. Should ultrasonography be done routinely for all pregnant women? Trop J Obstet Gynaecol.2004;21(1):11-14.
3. Abduljabbar HS, Jabal NA, Hussain FA, Alqabbaa RM, Marwani FA, Alghamdi SA et al. Knowledge, Attitudes and Practice about Obstetric Ultrasonography among Women Attending a University Hospital: A Cross-Sectional Study. Open J Obstet Gynecol. 2020; 10: 1763-1775.
4. Akinmoladun JA, Ogbole GI, Lawal TA, Adesina OA. Routine prenatal ultrasound anomaly screening program in a Nigerian university hospital: Redefining obstetrics practice in a developing African country. Niger Med J. 2015; 56(4): 263–267
5. Bly S, Vandenhof MC. Obstetric ultrasound biological effects and safety. J Obstet Gynaecol Can 2005;27(6):572-575.
6. Yakubu IM, Banerjee. Reasons for Obstetric Scan Among Pregnant Women in Keffi, Nigeria: A Cross-Sectional Study of a Low-Cost Ultrasound Centre. Int J Nurs Stud. 2020; 5(4):16-25.
7. Kim ET, Singh K, Moran A, Armbruster D, Kozuk N. Obstetric ultrasound use in low-and middle-income countries: a narrative review. Reprod. Health .2018; 15:129.
8. Okoror CE, Enabudoso EJ, Okoroh MI. Women's perception and satisfaction with the quality of antenatal care services in mission hospitals in Benin City, Nigeria. Pyramid J. Med. 2020; 3(82):23-28.
9. Nwaeze IL, Enabor OO, Oluwasola TA, Aimakhu CO. Perception and satisfaction with quality of antenatal care services among pregnant women at the university college hospital, Ibadan, Nigeria. Ann Ibd. Pg. Med. 2013;11(1):22-28.
10. Makurdi. [Internet].2021[updated 2021 Nov.23; cited 2022 Mar 6th]. Available from https://en.wikipedia.org/wiki/Makurdi.
11. Oche OM, Umar AS, Raji MO, Kaoje AU, Godwin G, Ango JT et al. Knowledge of the use and indications for obstetric ultrasound scan among women attending a main referral hospital, Sokoto, Nigeria. J. Obstet. Gynaecol. Res 2013;2(5): 55-62
12. Kirkwood B, Sterne AC. Essentials of Medical Statistics. 2nd edition. United Kingdom: Blackwell Scientific Publications Ltd Oxford; P.197 [Internet]. Available from: https://epdf.tips/essentials-medical-statistics-second-edition.html .
13. Mcleod S. Likert scale questionnaire: examples & analysis. [Internet].2023 [updated 2023 Jul.31; cited 2023Aug.1st] Available from https://www.simplypsychology.org/likert-scale.html.
14. Maniragena J, Kasozi D, Mubuuke GR, Murachi EJ. Knowledge, Attitudes and Practices of Pregnant Women towards Obstetric Ultrasound at Mulago Hospital: A Cross-sectional Survey. Int. j. sci.: basic appl. res. 2021;60(5):78-92
15. Saleh AA, Idris G, Dare A, Yahuza MA, Suwaid MA, Idris SK. Awareness and perception of pregnant women about obstetrics ultrasound at Aminu Kano Teaching Hospital. Sahel Med J. 2017; 20, 38– 42.
16. Chia DM, Annongu IT, Utoo BT, Hameed M, Abdullahi A, Ugande AA et al. Reasons Pregnant Women seek Prenatal Sonographic Gender Disclosure in Makurdi, Nigeria. J Res Bas Clin Sci. 2021; 2(1):25-34
17. Chia DM, Annongu IT, Hameed M, Magaji GO, Ugande AA. Assessment of the baseline pattern of obstetric sonography referrals, indications, and findings at Benue

State University Teaching Hospital (BSUTH), Makurdi. Int. J. Radiol. Diagn. Imaging**.** 2022; 5(4): 104-112

18. Yetwale A, Kabeto T, Biyazin T. Fenta B. Prenatal Ultrasound Utilization and Its Associated Factors among Pregnant Women in Jimma Town Public Health Institutions, Ethiopia. Health Serv. Res. Manag. 2022;9: 1-8

19. Matiang'I M, Ngunju P, Kiilu C, Harkx R, Hangelbroek M, Omogi J. Barriers and enablers that influence utilization of ultrasound screening services among antenatal women in Kajiado and Kisii counties Kenya. Open J Clin Diagn. 2021;11(1):1-17.

20. Yadav JU, Yadav DJ. Ultrasonography Awareness among Pregnant Women Attending Medical College Hospital in Kolhapur District of Maharashtra, India. Int J Res Med Sci. 2017;5(6):2612-2616.

21. Singh V, Singh VK., Shankar P, Singh D, Lakhani P, Tutu S et al. Knowledge Attitude and Practice among General Female Population Regarding Usefulness of Ultrasound during Pregnancy. World J Pharm Pharm Sci.2015; 4(10):1680-1683.

22. Krishnamoorthy N, Kasinathan A. Knowledge and attitude regarding obstetric ultrasound among pregnant women: a cross sectional study. Int J Reprod Contracept Obstet Gynecol. 2016; 5, 2192–5.

23. Firth ER, Mlay P, Walker R, Sill PR. Pregnant women's beliefs, expectations and experiences of antenatal ultrasound in Northern Tanzania. Afr. J. Reprod. Health 2011; 15(2), 91– 108.

24. Dasan, T. A., Singh, S., Koratagere, R. S., Raja, B., & Rangaswamy, N. B. Knowledge and Attitude of Antenatal Women towards Routine Ultrasound Screening in Pregnancy at a Tertiary Institution in Bengaluru. Int J Anat [Internet]. 2016; 5(4), 11–14

25. Whynes, DK. Receipt of information and women's attitudes towards ultrasound scanning during pregnancy. Ultrasound Obstet Gynecol. Ultrasound Obstet Gynecol 2002; 19: 7–12

26. Gammeltoft T, Nguyen HT. The commodification of obstetric ultrasound scanning in Hanoi, Viet Nam. Reprod Health Matters. 2007;15(29):163-71

27. Thomas S, O'Loughlin K, Clarke J. Sonographers' communication in obstetrics: Challenges to their professional role and practice in Australia. Aust. Soc Ultrasound Med. 2020; 23 (2):129-139

28. Okpara-Ijeruh J , Ugwu AC , Ogolodom MP , Mbaba AN , Okpara-Ijeruh S , Alazigha Assessment of the Level of Patient Satisfaction with Obstetric Sonography in Port Harcourt, Rivers State, Nigeria. Crit Care Obst Gyne . 2019;5(2):1-11.

29. Okonofua FE, Ogu RN, Agholor K, Okike O, Abdus-salam R, Gana M et al. Qualitative assessment of women's satisfaction with maternal health care in referral hospitals in Nigeria. Reproductive Health. 2017;14(1):1-8

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