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Original Article

Awareness and Perception of Pregnant Women Towards Fetal Anomaly Ultrasound Scan in Secondary Healthcare Facilities in South-West Nigeria

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Abstract

Background: Pregnant women are curious to know about their growing baby, hence they should know about different prenatal diagnostic modalities that can be used to detect any structural or anatomical defect such as prenatal anomaly ultrasound scan. The prenatal identification, diagnosis of congenital defects, and options of intervention including timing are important to the pregnant woman/couple for good outcome of the baby. **Objective**: To assess the awareness and perception of fetal anomaly ultrasound scan among pregnant women attending antenatal clinic in secondary health facilities and factors associated with uptake. **Methods:** A multicenter descriptive cross-sectional study of pregnant women conducted at Adeoyo Maternity Teaching Hospital, Ring Road State Hospital, and Jericho Specialist Hospital, Ibadan. The study participants were pregnant women receiving prenatal care at government-owned secondary healthcare facilities in Ibadan, Nigeria. A pretested semi-structured interviewer administered questionnaire was used. Information obtained include: sociodemographic and obstetric characteristics, knowledge of antenatal obstetric ultrasound and anomaly ultrasound scan. Data was entered using SPSS version 25.0 and analysed using STATA version 16.0. Level of significance was set at $p<0.05$. **Results:** A total of 427 pregnant women were enrolled into the study. About 259(60.6%) had good knowledge of obstetric ultrasound while 24(5.7%) had poor knowledge. Perception about anomaly ultrasound was majorly poor with 146(34.3%) and 208(48.7%) in primiparous and multiparous respectively. Knowledge was associated with age ($p<0.05$), education ($p<0.05$) and number of anomaly-USS done ($p<0.01$). Similarly, good perception was connected to previous congenital anomaly ($p<0.01$) and anomaly-USS awareness ($p<0.001$). Hence, the level of education and awareness of fetal anomaly ultrasound increased good perception. **Conclusion**: The awareness and knowledge of fetal anomaly ultrasound will improve the perception and uptake among pregnant women. Awareness should be improved through counselling and health education on fetal anomaly ultrasound scan in the antenatal clinic.

Keywords: Anomaly Ultrasound, prenatal anomaly ultrasound scan, antenatal anomaly ultrasound scan, second trimester ultrasound, mid-trimester ultrasound

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Introduction

Pregnancy is associated with joy, high expectations and uncertainties for the women and family[1]. It may be associated with obstetric or fetal complications including congenital fetal anomaly[1,2]. Globally, congenital anomalies are among the leading causes of fetal and infant morbidity

and mortality and this burden is high in low/middle-income countries (LMICs) [1].

An estimated 14% of newborns present with major congenital fetal anomalies accounting for 20-30% of perinatal deaths[1,2,3,4,5]. Approximately 303,000 neonates die annually from congenital anomalies within four-weeks of life[3]; infant morbidity and mortality occurs in 94% of congenital anomalies in sub-Sahara Africa.[1]

Some of the modalities used for antenatal fetal assessment and diagnosis of congenital anomalies include prenatal diagnosis, prenatal anomaly ultrasound scan (US), triple tests, quadruple tests. Prenatal US is a non-invasive test for fetal assessment and diagnosis during pregnancy[1] and this has revolutionized the practice of obstetrics worldwide[6]. It is a cost-effective, safe and painless intervention to detect and diagnose fetal congenital anomalies[1,2,3]; commonly used as routine baseline evaluation or in specific medical conditions co-existing with pregnancy[2,3].

Early US at gestational age <13weeks is used for confirmation and location of pregnancy, determination of gestational age, identification of multiple pregnancies, chorionicity, viability, diagnosis of non-viable pregnancy and fetal abnormalities such as nuchal translucency[3,4,5]. Fetal anomaly US or mid-trimester scan, performed in the second trimester of pregnancy between 18 and 22 weeks of gestation, it is used to detect the anatomical and structural defects[6,7,8,9]. Prior to 18 weeks, the fetal organs may be of inadequate size and development to allow for optimal ultrasound evaluation. US performed after 22weeks gestation in which fetal anomaly is identified is associated with counselling challenges and late termination of pregnancy[9].

Fetal anomaly US screening identifies potential structural and functional abnormalities so that parents are aware of existing conditions and able to make informed decisions, to improve the safety of fetus and reduce perinatal morbidity and mortality[10]. It prepares the parents psychologically, mentally and financially for the delivery of a fetus with congenital anomalies that may be compatible with life and/or amenable to medical or surgical intervention.

The second trimester US shows high specificity for identifying fetal anomalies[9,11,12,13]. The diagnosis of a severe congenital anomaly is traumatic and poses a challenge in the decision-making process especially after the age of viability for the woman and family[4]. A delayed obstetric US finding of a fetal congenital anomaly may cause a negative psychological effect on the pregnant woman. It sometimes results in patients rejecting the result and "claiming spiritual powers to overcome evil"[6]. Following the delivery of a newborn with congenital anomaly, the parents encounter psychological stress and burden of high cost of care associated with the immediate and long-term care of the child.

Although routine fetal anomaly screening with US has become an established practice in the developed countries, this is just evolving in the low and middle-income countries like Nigeria[3,4,5]. In Nigeria, pregnant women undergo multiple antenatal US either by antenatal care (ANC) provider referral or self-referral. Women should be educated on anomaly US so that the mid-pregnancy scans can be dedicated to fetal anomaly screen instead of routine obstetric US. It is imperative to assess the awareness and perception of pregnant women on fetal anomaly US. This study assessed the awareness, perception and factors associated with uptake of anomaly US among pregnant women at the secondary healthcare facilities.

Materials And Methods

Study Design: A descriptive cross-sectional study among pregnant women attending ANC clinics in secondary healthcare facilities in Ibadan over a one-month period – April -May 2021.

Study Setting/Area: The study was conducted in Ibadan, Oyo state, South-west, Nigeria with a population of about 6 million; majorly dominated by Yoruba ethnic group. This study was conducted at three government-owned facilities providing maternal and child health services in Ibadan - Adeoyo Maternity Teaching hospital, Yemetu (AMTH), Ring Road State Hospital (RRSH) and Jericho Specialist Hospital (JSH). AMTH is located in Ibadan-North local government area. A training institution that offers maternal and child health services for pregnant women across all socio-economic classes; with a delivery rate of 4000-5000women/year. RRSH is located in Ibadan South-west Local government area; provides ANC and delivery services with a delivery rate of 800-1000women/year. JSH is located in Ibadan North-West local government area; a training institution with a delivery rate of 900-1000women/year.

Study Population: This includes pregnant women receiving ANC at the sites. Inclusion criteria includes consenting pregnant women in all trimesters of pregnancy and no exclusion criteria.

Sample Size Determination: A sample size was calculated using the Leslie Kish formula, Z_α= 1.96, prevalence of 51% (prevalence of women that think the anomaly scan can identify 71-100% of structural abnormalities) reported by Basama et al[11] and a difference of 5%. A sample size of 384 participants was calculated; adding a 10% attrition, a minimum sample size of 422 participants was obtained. A

proportionate allocation was used based on the ANC attendance/delivery rates at the sites using a ratio of 5:3:2 across the health facilities.

Data Collection, Management and Analysis: Participants were counselled and recruited at the ANC clinics using a probability sampling -simple random sampling technique. Data was collected using a pre-tested semi-structured interviewer-administered questionnaire; which comprised of three sections: Section A– Socio-demographic characteristics, Section B– Knowledge and perception of obstetric ultrasound and Section C– Awareness, perception and uptake of Prenatal Anomaly US. The knowledge score was computed from a combination of variables and categorized into three – good, fair and poor. The perception of pregnant women about anomaly US was measured from the awareness of the need to do it and uptake in the current pregnancy. The level of awareness for anomaly US was adjudged as good (coded as 1) or bad (coded as 0) perception. Uptake of fetal anomaly US was measured through dichotomous response that assessed whether the woman had anomaly US in current pregnancy or not (YES was coded 1 and NO as 0).

Data was entered using the Statistical Package and Service Solutions (SPSS) version 25.0; exported and analyzed using STATA version 16.0. Descriptive analysis was performed, frequencies and percentages were reported for the categorical variables while numerical variables were summarized as mean. Bivariate analysis was performed using the Chi-square test of association for the factors associated with the knowledge and perception of anomaly US. The level of significance was $p<0.05$.

Ethical Considerations: The ethical approval was obtained from the University of Ibadan/University College Hospital (UI/UCH) ethics review committee with ethical approval number - UI/EC/21/0080.

Results

Four hundred and twenty-seven pregnant women aged between 18-45 years were recruited into the study and interviewed at the ANC in selected secondary healthcare facilities. Table 1 shows the sociodemographic characteristics of the respondents. The average age was 29.54 (± 5.06) years, the modal age-group was 25-34 years and the mean gestational age at enrolment was 30.86 (±6.92) weeks. Among the respondents, 60.2% had post-secondary education with 95.5% having at least secondary school education. Sixty-five percent were self-employed; 2.1% and 97.9% were single and married respectively.

About 11.9% of the respondents were nulliparous while 55.3% are multiparous and 24.1% have had at least one prior miscarriage. About 63.9% were in the third trimester and 81.3% of respondents have had obstetric US in current pregnancy and 45.6% had first trimester US. About 14.5% had 1 US, 34% had to 2 US while 38% of the women had at least 3 US. Only 5.9% had pregnancy complications.

Table 1: Sociodemographic and Obstetric Characteristics of respondents

Variables	Frequency n = 427	%
Age (in years)		
15-24	69	16.2
25-34	272	63.7
35-45	86	20.1
Education		
None/Primary	21	4.9
Secondary	149	34.9
Postsecondary	257	60.2
Occupation		
Unemployed	70	16.4
Self-employed	276	64.6
Professional	81	19.0
Marital status		
Single	9	2.1
Married	418	97.9
Parity		
Primigravida	140	32.8
Nulliparous	51	11.9
Multiparous	236	55.3
Trimester of pregnancy at enrolment		
First	59	13.8
Second	95	22.3
Third	273	63.9
USS in index pregnancy		
No	58	13.6
Yes	369	86.4
Trimester of Latest US		
1st trimester	195	45.6
2nd trimester	126	29.5
3rd trimester	26	6.2
No USS	80	18.7
Number of US		
None	58	13.5
1	62	14.5
2	145	34.0
3+	162	38.0
Pregnancy complication		
No	402	94.1
Yes	25	5.9

US – Ultrasound scan

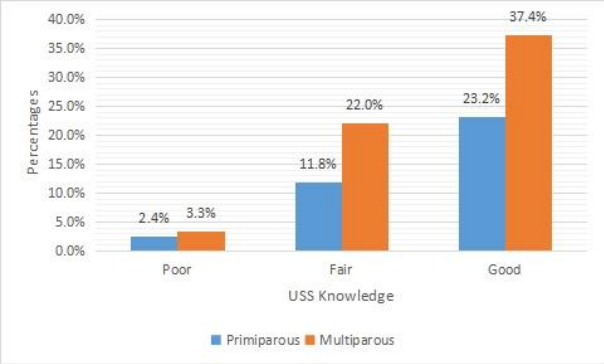

Figure 1: Level of Knowledge of Obstetric Ultrasound Scan Among Pregnant Women

Table 2: Components of knowledge of Obstetric Ultrasound scan

Component	Frequency (N=472) Yes (n)	%
Pregnant women should do antenatal Ultrasound scan to:		
Confirm pregnancy	382	89.5
Check for viability of the fetus	381	89.2
Check fetal growth	378	88.5
Check for gestational age	375	87.8
Check for fetal sex	373	87.4
Check for fetal presentation	372	87.1
Localize the placenta	370	86.6
Check fetal weight	369	86.4
Check for abnormal fetal parts/structures	355	83.1
Estimate date of delivery	350	81.9
Pregnant women should do US for no reason	12	2.8

US – Ultrasound scan (Obstetric)

Figure 1 shows knowledge of obstetric US. A higher proportion of women with good knowledge were multiparous. The prevalence of good knowledge of obstetric US was 60.6% (23.2% in primiparous and 37.4% in multiparous).

The components of knowledge of US and awareness of fetal anomaly US are shown in Tables 2 and 3 respectively. Seventeen percent of pregnant women had good perception of fetal anomaly US, although the multiparous women were more aware than nulliparous (12.3% vs 4.8%) -Figure 2.

Table 3: Awareness of Anomaly ultrasound scan:

Variables	Frequency (n)	%
Aware of fetal anomaly US		
Yes	128	30.0
No	280	65.6
No response	19	4.4
Anomaly* US necessary in pregnancy		
Yes	287	67.2
No	104	24.4
No response	36	8.4
Access to Fetal anomaly US	101	23.7
Yes	261	61.1
No	65	15.2
No response		
Anomaly scan* in Previous pregnancy		
Yes	48	11.2
No	342	80.1
No response	37	8.7
Fetal anomaly scan in index pregnancy		
Yes	45	10.5
No	348	81.5
No response	34	8.0

*Fetal anomaly US; US – Ultrasound scan

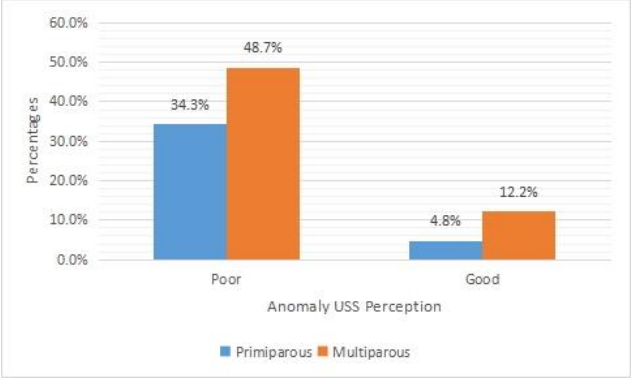

Figure 2: Perception of pregnant women on anomaly Ultrasound Scan

Table 4: Association between Knowledge of routine obstetric USS, Sociodemographic and Obstetrics Characteristics of respondents.

Variables	Poor (%)	Fair (%)	Good (%)	p-value
Age (years)				0.043
15-24	5 (10.6)	15 (31.9)	27 (57.5)	
25-34	10(4.6)	66 (30.6)	140 (64.8)	
35-45	4(6.6)	29 (47.5)	28 (45.9)	
Education				0.027[f]
None/Primary	1 (8.3)	2 (16.7)	9 (75)	
Secondary	10 (50.0)	52 (43.0)	68 (52.3)	
Post-secondary	9 (4.0)	67 (29.9)	148 (66.1)	
Occupation				0.663
Unemployed	1 (1.9)	18 (34.0)	34 (64.2)	
Self-employed	15 (6.2)	83 (34.2)	145 (59.7)	
Employed	4 (5.7)	20 (28.6)	46 (65.7)	
Marital status				0.591[f]
Single	1 (16.7)	3 (50.0)	2 (33.3)	
Married	19 (5.3)	118 (32.7)	223 (61.9)	
Parity				0.753[f]
Nulliparous	4 (22.2)	2 (11.1)	12 (66.7)	
Multiparous	37 (10.0)	13 (3.5)	319 (86.5)	
Pregnancy Trimester				0.371
First/Second trimester	1 (1.5)	22 (33.3)	43 (65.2)	
Third trimester	8 (5.6)	42 (29.2)	94 (65.3)	
USS Done				0.010
No	4 (16.0)	11 (44.0)	10 (40.0)	
Yes	14 (4.31)	105 (32.3)	206 (63.4)	
Trimester US Done				0.812
First	7 (4.0)	52 (29.9)	115 (66.1)	
Second	5 (4.6)	37 (33.9)	67 (61.5)	
Third	2 (8.3)	8 (33.3)	14 (58.3)	
Number of US				0.002[f]
None	1 (11.1)	7 (77.8)	1 (11.1)	
1	1 (2.0)	21 (41.2)	29 (56.8)	
2	8 (7.0)	43 (37.4)	63 (54.8)	
3+	7 (4.9)	38 (26.4)	99 (68.8)	

Table 5: Association between Sociodemographic- Obstetrics Characteristics and Perception of Fetal Anomaly US

Variables	Perception of Anomaly US		p-value
	Poor	Good	
Education			0.091
None/Primary	6 (60.0)	4 (40.0)	
Secondary	90 (86.5)	14 (13.5)	
Post-secondary	147 (81.7)	33 (18.3)	
Occupation			0.779
Unemployed	30 (79.0)	8 (21.1)	
Self-employed	159 (82.8)	33 (17.2)	
Employed	54 (84.4)	10 (15.6)	
Parity			0.098
Primiparous	93 (87.7)	13 (12.3)	
Multiparous	132 (80.0)	33 (20.0)	
US Done			0.577[f]
No	213 (82.2)	46 (17.8)	
Yes	20 (83.3)	4 (16.7)	
US Knowledge			0.309
Poor	15 (93.8%)	1 (6.2%)	
Fair	72 (86.8%)	11 (13.2%)	
Good	132 (81.5%)	30 (18.5%)	
Trimester US was done			0.374
First	117 (81.8)	26 (18.2)	
Second	75 (84.3)	14 (15.7)	
Third	18 (72.0)	7 (28.0)	
Number of US			0.532
None	7 (87.5%)	1 (12.5)	
1	38 (82.6%)	8 (17.4%)	
2	79 (87.8%)	11 (12.2%)	
3+	98 (80.3%)	24 (19.7%)	
Pregnancy complication			0.510[f]
No	224 (82.7%)	47 (17.3%)	
Yes	13 (86.7%)	2 (13.3%)	
Fetal Anomaly-US Awareness			0.000
No	168 (95.5%)	8 (4.6%)	
Yes	73 (62.9%)	43 (37.1%)	
Previous Congenital anomaly			0.009[f]
No	234 (83.8%)	45 (16.2%)	
Yes	2 (33.3%)	4 (66.7%)	
Anomaly US uptake			0.000
No	238 (94.8%)	13 (5.2%)	
Yes	5 (11.6%)	38 (88.4%)	

US – Ultrasound scan (Obstetric), [f]Fisher exact.

Table 4 shows the association between the knowledge of antenatal US, sociodemographic and Obstetrics Characteristics. The good knowledge of antenatal US was associated with level of education (p=0.027), uptake of US in index pregnancy (p=0.01), and number of US (p=0.002).

Table 5 shows the association between sociodemographic characteristics and knowledge of anomaly US.

Discussion

This study assessed the awareness, knowledge and perception of pregnant women in secondary healthcare facilities towards routine obstetric USS and anomaly scan in pregnancy. The study showed that prevalence of use of obstetric USS was high among participants while the awareness, knowledge and uptake of anomaly US was low. Majority of the participants were aged 25-34 years, multiparous and had at least secondary level of education. This is similar to the findings of Saleh et al on the awareness and perception of obstetric USS among pregnant women in Kano that reported majority of the respondents were multiparous women with lower level of education.[14]

In this study, the uptake of obstetric USS was high, 2 of 3 women had good knowledge of obstetric USS and this was relatively higher among multiparous women. This may be attributed to exposure to the uses and benefits of prenatal USS during ANC in previous pregnancy or exposure or previous pregnancy experience.

US – Ultrasound scan (Obstetric), ᶠFisher's exact.

Good knowledge of obstetric USS was associated with age, level of education, multiparity, obstetric USS and number done in the index pregnancy. Pregnant women who did obstetric US in the index pregnancy had good knowledge of US when compared to pregnant women who have not done US. Good knowledge of US increased with increase in the number of US done. This is similar to the findings of Ugwu et al.[10]

The knowledge, perception and uptake of anomaly US in this study was low. A good perception of anomaly US was higher in multiparous than nulliparous woman. Only about 1 in 5 pregnant women were aware of fetal anomaly US. The awareness, knowledge and perception of anomaly US was low despite good knowledge of obstetric US. While good knowledge and awareness of obstetric US was high; the awareness and knowledge of anomaly US was low irrespective of the parity and exposure to obstetric US during ANC.

Contrary to our finding, Abduljabbar et al reported that knowledge of anomaly US was higher among multiparous women.[15] In this study, it was expected that multiparous women should have known about anomaly US from the previous pregnancy experience but surprisingly, this is not so in this study as the parity was not associated with good knowledge of anomaly US. This may be due to the fact that women were unaware of the role and benefits prenatal anomaly US or no prior exposure to fetal anomaly US in the previous pregnancy, the healthcare providers failed to educate or counsel the pregnant women it or failed to request anomaly US evaluation in the previous pregnancies. Lawal et al in South-West, Nigeria, reported low awareness of birth defects among mothers and only a few (4.9%) received information about birth defects.[16] Enakpene and colleagues reported a close association between the age, educational status and request for routine fetal viability during prenatal US among the clients requesting for prenatal US. Pregnant women requested ultrasound for indications such as fetal viability, gender, position, multiple pregnancy, placental location, including routine check with no reasons;[6] but not for the detection of fetal anomaly.

This study identified the dearth of awareness and knowledge of the role and benefits of anomaly US among women who were receiving ANC at the secondary healthcare facilities. The study also identified the need for routine health education and regular review of the content of counselling and education to incorporate innovative health interventions that are beneficial to the care of pregnant women. There is a need to educate, retrain doctors and nurses/midwives on the roles of anomaly USS in enhancing ANC services to reduce perinatal morbidity and mortality and the need to incorporate this into routine antenatal practices.

Pregnant women rely on ANC providers for source of obstetric-related or maternal health-related health education and counselling. Thus, healthcare providers (doctors, nurses and midwives) should educate and provide appropriate counselling on anomaly USS; and encourage women to utilize it. ANC providers need to consider policy review and change to incorporate routine anomaly US as part of prenatal screening investigations to improve quality of service and pregnancy outcomes.

The low uptake and use of prenatal screening in this environment may be due to availability, cost, awareness and perception among the pregnant women. Antenatal fetal anomaly US is usually the first screen to assess for any abnormality in the fetus. Therefore, missing a fetal anomaly US delays identification, diagnosis and optimal preparation for the delivery of the affected fetus. Where the facility is available, some interventions may be instituted prenatally; thus, improving the outcome of the fetus at delivery. For congenital anomalies requiring expert, multidisciplinary care arrangements and early neonatal interventions or correction; prompt referral of the pregnant woman to

specialized centers, evaluation and preparation by the managing teams is imperative and more prudent for the survival of the fetus.

Strength of the Study: The study evaluated current level of knowledge and practice of anomaly US among pregnant women and indirectly assessed the role of doctors in providing information and request for anomaly US during ANC services at secondary healthcare facilities. The study has provided baseline database for current state of anomaly US and decision making to improve ANC services in secondary healthcare facilities.

Limitations of the Study: This study did not specifically explore uptake and utilization of ANC in previous pregnancies and the number of pregnancies in which participants utilized or did not utilize ANC. Also, the quality of previous and current ANC received in the index pregnancy was not evaluated.

Conclusion

While knowledge of obstetric US was good, perception of anomaly US was low and poor. These findings signal the need for pregnancy-health education intervention program that will inform pregnant women on the importance of anomaly US during ANC in secondary healthcare facilities.

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