

Assessment of concern experiences and satisfaction with antenatal ultrasound among postnatal women in Ibadan Nigeria

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Abstract

Ultrasound is a safe, non-invasive, and indispensable part of modern obstetrics, offering real-time imaging at relatively low cost. We assessed women's concerns, experiences, and satisfaction with obstetrics ultrasound services in private and public health facilities and identified factors associated with satisfaction. A total of 478 postpartum women participated. Majority (86.3%) described the experience as exciting, while a few (2.7%) expressed concerns about potential harm. Overall satisfaction was high in both settings, with slightly higher satisfaction in the public (94.4%) than private (93.3%) facilities. In the public facility, satisfaction was significantly associated with occupation, educational levels (women and their spouses), and first-time motherhood ($p < 0.05$). In private facilities, education and being a first-time mother significantly influenced satisfaction regarding sonographer expertise, attitude, and examination thoroughness ($p < 0.05$). Paired analysis revealed significant public-private differences in time ($Z = -5.107, p < 0.001$), expertise ($Z = -4.152, p < 0.001$), cost ($Z = -5.206, p < 0.001$), and communication ($Z = -2.089, p = 0.037$). Although satisfaction was comparable, women reported a marginally better experience in the public facility. Sonographer expertise, communication, respect, attitude, cost, and examination thoroughness significantly influenced satisfaction.

Introduction

Antenatal ultrasound is unique in its ability to provide parents with direct visual access to their developing fetus, thereby fostering early emotional bonding and reassurance. It is an indispensable component of modern antenatal care in both developed and developing countries, valued not only for its diagnostic utility but also for its role in enhancing the pregnancy experience. Ultrasound is a safe, non-invasive, and cost-effective imaging modality with real-time capabilities, making it an essential tool in obstetric practice. Its widespread adoption has significantly improved prenatal monitoring and maternal–fetal outcomes. Recent advances in diagnostic techniques, particularly fetal anomaly scans, have further enhanced early detection and understanding of congenital abnormalities, enabling timely medical or surgical interventions and improving neonatal prognoses.^{1,2}

The WHO recommends early obstetric ultrasound to increase the accuracy of gestational age determination. However, in low-resource settings, where trained personnel, infrastructure, and financial resources are limited, WHO advises at least one ultrasound before 24 weeks gestation.³ This examination serves multiple purposes, including evaluation of gestational age, detection of fetal anomalies and multiple pregnancies, and enhancement of women's overall pregnancy experience. Routine ultrasound beyond 24 weeks is not recommended for women who have already undergone an early scan.⁴

In clinical practice, the use and frequency of obstetric ultrasound vary considerably. While additional scans are beneficial for pregnancies with complications, multiple routine scans in low-risk pregnancies may be unnecessary and contribute to higher healthcare costs.³ Nonetheless, ultrasound is consistently associated with maternal reassurance and satisfaction with care, which has led healthcare systems to increasingly recognize patient satisfaction as an integral component of comprehensive antenatal care, even in clinically low-risk contexts.^{5–7}

For many women, obstetric ultrasound represents the only visual interaction with their unborn child during pregnancy. Studies have shown that viewing the fetus during scanning can strengthen maternal–fetal bonding, reduce anxiety, offer emotional reassurance, shape emerging parental identities, and enhance overall experience of pregnancy and ultrasound service.^{8,9} Beyond its diagnostic value, women also place importance on the accuracy and reliability of the results, especially when used to assess fetal growth and development. Patient satisfaction, a key indicator of healthcare quality, is influenced by factors such as waiting times, environment, communication, provider competence, respect, attentiveness, and privacy.^{10,11} In addition to these service-related factors, socio-demographic characteristics also influence women's perceptions of care.¹² Evidence from Nigeria indicates that age, education, ethnicity, occupation, marital status, gestational age, and parity may influence how women perceive and evaluate ultrasound services and care, though findings vary across settings.^{13,14} Systematic review similarly suggest that knowledge and satisfaction with obstetric ultrasound may be linked to previous exposure to obstetric scan, gestational age, occupation, cost, and environment, but results remain inconsistent across regions and countries.^{14,15} These findings highlight the need to examine how socio-demographic and obstetric ultrasound service-delivery factors interact to shape women's satisfaction in different care contexts. Therefore, this study explores the concerns, experiences, and satisfaction of postnatal

women who underwent obstetric ultrasound, with particular attention to the sonographers' professional conduct and quality of service delivery. Comparisons were made between public and private health facilities.

Method

A cross-sectional descriptive study conducted among 478 postpartum women who had utilized obstetric ultrasound services as antenatal attendees at a tertiary health facility in Ibadan, Nigeria.

The hospital is a federal government tertiary healthcare facility with specialists in over 50 different clinical departments and institutes, providing the major source of referral for the care of high-risk pregnancies and major debilitating congenital malformations within and beyond South-Western, Nigeria. The obstetric clinic of the hospital is a major hub for obstetric care in Oyo State, and its environs and new expectant mothers are registered for care every Wednesday. The clinic offers all stages of comprehensive maternal healthcare, including access to expert obstetric consultations, maternal-fetal medicine specialist services, dedicated radiological services for maternal and fetal imaging, routine antenatal care and investigations to ensure maternal and fetal well-being, and counselling services. On a monthly basis, the hospital has an average of 875 pregnant women attending antenatal clinic and 65 women attend postnatal clinic. All consenting postpartum women, between 6 to 8 weeks postpartum, who had an uncomplicated pregnancy, received antenatal care, and had undergone obstetric ultrasound scans both at the public health facility and at least one private health facility during the index pregnancy, were included in the study. This allowed each participant to provide comparative evaluation of their experiences in the public and private ultrasound services. While the public facility offers comprehensive medical services with specialist care and advanced equipment, private facility may provide more personalized care and shorter waiting times, which could influence women's experience and satisfaction with the service.

A semi-structured self-administered questionnaire developed by specialist obstetrician and radiologist from previous studies and adapted based on the study objectives was used to obtain information from the study participants. The questionnaire was pretested among 20 postpartum women for clarity, understanding of the questions, and validity. The questionnaire demonstrated strong internal consistency with good reliability for the knowledge-related questions (Cronbach alpha > 0.8). The participants' concerns, experience, and satisfaction during the obstetric ultrasound service were assessed with focus on seven domains: time consciousness, expertise, attitude of workers, respect, cost/value for money, examination thoroughness, and communication.

Sample size was calculated using single population proportion formula by considering 71.6% proportion of patient satisfaction for radiologic service,¹⁶ 95% desired confidence level and 5% margin of error. After adding 10% nonresponse rate the minimum sample size to ensure adequate statistical power was 347 women. However, a total of 478 postnatal women who attended the hospital's postnatal clinic and meet the inclusion criteria were recruited. A systematic convenience sampling was used, where eligible women were approached consecutively based on the clinic's attendance and the first 10 consenting eligible women per day were recruited. This was repeated daily till the desired sample size was achieved.

Data obtained was analysed using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY, USA). The satisfaction domains were all assessed on a 10-point Likert scale, with the highest possible score per domain being 10. Scores ≤ 5 on the Likert scale were classified as 'not satisfied,' while scores > 5 indicated satisfaction. Descriptive statistics such as mean, standard deviation, frequency, percentages, and charts were used to summarize the results. Independent t-test and Analysis of variance (ANOVA) were used to examine the relationship between independent variables and mean scores of each domain, with statistically significance level set at $P < 0.05$.

Results

Respondents' characteristics

A total of 478 postpartum women participated in this study. The mean age of the women was 32.36 ± 4.44 years with over half falling in the 31–40 age category (59.6%). Most of the women were employed (69.2%) and a large proportion of the women

(91.6%) and their spouses (93.1%) had tertiary level of education. The mean parity was 1.52 ± 0.88 , 37.7% were first-time mothers, and 34.7% reported the pregnancy resulting in their most recent delivery was their first pregnancy (Table 1).

Table 1
Socio-demographic and Obstetric Characteristics of Respondents'

Variables	Frequency (n = 478)	Percent
Age (years)		
20–30	176	36.8
31–40	285	59.6
> 40	14	2.9
Missing	3	0.6
Mean ± SD	32.36 ± 4.44	
Occupation status		
Employed	331	69.2
Self-employed	129	27.0
Unemployed	18	3.8
Level of education attained		
Secondary or lower	40	8.4
Tertiary	438	91.6
Spouse's level of education		
Secondary or lower	33	6.9
Tertiary	445	93.1
First pregnancy		
Yes	166	34.7
No	312	65.3
Parity		
1 (First-time mothers)	180	37.7
≥ 2	298	62.3
Mean ± SD	1.52 ± 0.88	

Respondents' Ultrasound Scan Experience, Concerns, and Perception

Majority of the women (88.1%) had more than two obstetric ultrasounds performed during their pregnancy and 150 (31.4%) of them reported that none of the scans was done without a doctor's recommendation. In addition, most women (87.0%) were allowed to ask questions during or after the procedure, while 83.9% saw their babies on the screen. A significant proportion of the women (86.3%) expressed excitement during the scan session, and 91.4% were informed of the baby's sex. However, less than half (41.8%) were accompanied by their spouses during the scan. Regarding the overall experience, over two-thirds (68.8%) of women described their ultrasound experience during the last pregnancy as exciting while 13% felt indifferent and 11.7% felt reassured. Despite the high satisfaction levels, almost all the women (95.4%) believed the number of scans performed during

their pregnancy was worth it and stated they would undergo the same number of scans in future pregnancies. However, a small percentage (2.7%) felt that ultrasound scans were dangerous during pregnancy (Table 2).

Table 2
Respondents' Obstetric Ultrasound scan experience, Concerns, and Perception (n = 478)

Variables	Frequency (n = 478)	Percent
Total number of scans during last pregnancy		
≤ 2	57	11.9
> 2	421	88.1
Numbers of scans done without medical referral		
None	150	31.4
≤ 2	267	55.9
> 2	61	12.8
Opportunity to ask questions during or after procedure		
Yes	416	87.0
No	56	11.7
Missing	6	1.3
Maternal viewing of fetus during ultrasound		
Yes	401	83.9
No	74	15.5
Missing	3	0.6
Emotional response to seeing baby on ultrasound (n = 401)		
Excited	346	86.3
Reassured	31	7.7
Indifferent	12	3.0
Missing	12	3.0
Communication of scan results		
Yes	422	88.3
No	41	8.6
Missing	15	3.1
Informed about fetal sex		
Yes	437	91.4
No	40	8.4
Missing	1	0.2
Fetal sex prediction accuracy at birth (n = 437)		
Yes	431	98.6
No	6	1.4
Emotional response to fetal sex disclosure (n = 437)		
Excited	343	78.5

Variables	Frequency (n = 478)	Percent
Just happy	50	11.4
Reassured	31	7.1
Indifferent	2	0.5
Missing	11	2.5
Spousal accompaniment during scan		
Yes	200	41.8
No	278	58.2
Overall experience during obstetric scan sessions in last pregnancy		
Exciting	329	68.8
Unfriendly	10	2.1
Indifferent	62	13.0
Reassuring	56	11.7
Others	4	0.8
Missing	17	3.6
Perception that the number of scans during pregnancy was justified		
Yes	456	95.4
No	22	4.6
Willing to undergo the same number of scans in a future pregnancy		
Yes	366	76.6
No	104	21.8
Missing	8	1.7
Belief that ultrasound use during pregnancy poses any danger		
Yes	13	2.7
No	465	97.3
Perceived danger (n = 13)		
Don't know	6	46.2
Emission of waves/radiation	4	30.8
Belief it weakens the body	1	7.7
Belief it causes stretch mark	1	7.7
Belief it might affect the placenta	1	7.7

The Assessment Scores of Ultrasound Services at Public Health Facility by Respondents' Characteristics

Against socio-demographic factors, for scans conducted in the public health facility, the mean scores for sonographers' expertise were significantly associated with the women's occupation, with employed women reporting the highest mean score

(8.63 ± 1.88) ($F = 3.05$, $P = .049$). Significant differences were also observed in their assessment of cost/value for money ($t = 3.19$, $P = 0.011$), examination thoroughness ($t = 2.91$, $P = 0.014$), and communication ($t = 3.85$, $P = 0.003$) with their educational level. Similarly, significant differences were found between the assessment of communication ($t = 3.10$, $P = .026$) and respect ($t = 4.96$, $P = 0.005$) accorded to the women during the scan sessions with the spouses' educational level. First-time mothers reported higher satisfaction with the public health facility's staff attitude (7.69 ± 2.13 , $t = 0.27$, $P = 0.028$), (Table 3).

Table 3
Mean Differences in Assessment Scores of Ultrasound Services at Public health facility by Respondent Characteristics

Variable	Time consciousness	Expertise	Attitude of workers	Respect	Cost/value for money	Details	Communication during the scan
Age (years)							
20–30	6.16 ± 3.08	8.52 ± 2.05	7.39 ± 2.27	7.29 ± 2.49	8.23 ± 2.02	8.31 ± 2.17	7.60 ± 2.83
31–40	6.69 ± 2.76	8.57 ± 1.89	7.80 ± 2.36	7.89 ± 2.30	8.33 ± 2.30	8.48 ± 2.05	7.97 ± 2.57
> 40	5.55 ± 3.27	8.56 ± 1.93	7.55 ± 2.25	8.40 ± 2.76	7.73 ± 1.56	7.60 ± 2.88	6.82 ± 3.03
F(p-value)	1.95(.144)	0.14(.81)	0.13(.265)	3.02(.050)	0.44(.642)	0.94(.379)	1.52(.221)
Occupation status							
Employed	6.49 ± 2.96	8.63 ± 1.88	7.72 ± 2.40	7.67 ± 2.45	8.41 ± 2.12	8.34 ± 2.18	7.88 ± 2.66
Self-employed	6.60 ± 2.80	7.10 ± 3.11	6.30 ± 2.50	6.20 ± 3.05	7.20 ± 3.01	8.30 ± 2.45	7.50 ± 3.34
Unemployed	6.42 ± 2.80	8.57 ± 1.87	7.60 ± 2.11	7.86 ± 2.15	8.13 ± 2.20	8.51 ± 1.95	7.65 ± 2.67
F(p-value)	0.03(.966)	3.05(.049)	1.82(.163)	2.22(.110)	1.90(.152)	0.261(.771)	0.33(.723)
Level of education attained							
Secondary or lower	8.19 ± 2.48	9.28 ± 1.34	9.12 ± 2.00	9.04 ± 1.88	9.21 ± 1.32	9.29 ± 1.46	9.27 ± 1.67
Tertiary	6.48 ± 2.87	8.55 ± 1.88	7.59 ± 2.74	7.66 ± 2.34	8.27 ± 2.18	8.36 ± 2.09	7.79 ± 2.66
t(p-value)	2.95(.133)	1.91(.056)	3.21(.073)	2.82(.112)	3.19(.011)	2.91(.014)	3.85(.003)
Spouse Education level							
Secondary or lower	8.10 ± 2.92	9.00 ± 1.60	9.05 ± 1.75	9.37 ± 1.38	9.11 ± 1.60	9.05 ± 1.81	9.18 ± 1.70
Tertiary	6.52 ± 2.85	8.58 ± 1.87	7.62 ± 2.29	7.67 ± 2.34	8.29 ± 2.17	8.39 ± 2.07	7.82 ± 2.65
t(p-value)	2.40(.445)	0.96(.702)	2.68(.088)	4.96(.005)	1.62(.076)	1.37(.416)	3.10(.026)
First Pregnancy							
Yes	6.49 ± 3.02	8.69 ± 1.81	7.69 ± 2.13	7.62 ± 2.87	8.35 ± 2.04	8.33 ± 2.14	7.77 ± 2.56
No	6.46 ± 2.84	8.50 ± 1.99	7.62 ± 2.47	7.72 ± 2.47	8.26 ± 2.26	8.42 ± 2.11	7.82 ± 2.74
t(p-value)	0.07(.266)	0.90(.391)	0.27(.028)	-0.40(.190)	0.38(.331)	-0.38(.907)	-0.16(.408)
Parity							
1	6.22 ± 2.82	8.41 ± 1.91	7.41 ± 2.34	7.42 ± 2.47	8.27 ± 2.25	8.33 ± 2.19	7.65 ± 2.73
> 1	6.62 ± 2.94	8.67 ± 1.93	7.79 ± 2.32	7.85 ± 2.34	8.31 ± 2.14	8.43 ± 2.07	7.89 ± 2.64
t(p-value)	-1.31(.474)	-1.26(.905)	-1.49(.439)	-1.69(.273)	-0.18(.629)	-0.43(.377)	-0.85(.525)
Total number of scans during last pregnancy							

Variable	Time consciousness	Expertise	Attitude of workers	Respect	Cost/value for money	Details	Communication during the scan
≤ 2	7.15 ± 2.66	8.89 ± 1.41	7.84 ± 2.20	7.82 ± 2.52	8.43 ± 2.33	8.16 ± 2.29	7.79 ± 2.98
> 2	6.54 ± 2.89	8.57 ± 1.90	7.68 ± 2.30	7.75 ± 2.31	8.32 ± 2.14	8.46 ± 2.03	7.90 ± 2.54
t(p-value)	1.25(.459)	1.01(.089)	0.40(.450)	0.16(.549)	0.30(.294)	-0.83(.209)	-0.24(.164)

The Assessment Scores of Ultrasound Services at Private Health Facility by Respondents' Characteristics

For scans conducted in private facilities, significant associations were found between mean scores for staff attitude and women's educational level ($t = -0.48$, $p = 0.009$). There were also significant differences in the assessment of sonographers' expertise ($t = -0.68$, $P = 0.018$), staff attitude ($t = -1.01$, $P = 0.019$), and examination thoroughness ($t = -1.13$, $P = 0.045$) by spouses' educational level. Sonographers' expertise was rated significantly higher among first-time mothers with mean score of 7.90 ± 2.03 , ($t = 0.29$; $P = 0.042$), (Table 4). On overall satisfaction, women who had their ultrasound services at public health facility reported higher satisfaction levels compared to those who received services at private facilities (94.4% vs 93.3%, respectively).

Further paired analysis revealed significant differences between public and private facilities in terms of time consciousness ($Z = -5.107$, $p < 0.001$), expertise ($Z = -4.152$, $p < 0.001$), cost/value for money ($Z = -5.206$, $p < 0.001$), and communication during scan ($Z = -2.089$, $p = 0.037$). These findings indicate that participants perceived private facilities to outperform public ones in these aspects. In contrast, no significant differences were observed between public and private facilities regarding attitude at work ($Z = -0.849$, $p = 0.396$), respect ($Z = -1.714$, $p = 0.086$), and provision of details ($Z = -1.454$, $p = 0.146$), suggesting that these dimensions of service were rated similarly across both facility types.

Table 4

Mean Differences in Assessment Scores of Ultrasound Services at Private health facility by Respondent Characteristics

Variable	Time consciousness	Expertise	Attitude of workers	Respect	Cost/value for money	Details	Communication during the scan
Age (years)							
20–30	7.53 ± 2.17	7.99 ± 2.18	7.80 ± 2.29	7.94 ± 2.04	7.13 ± 2.52	8.02 ± 2.17	8.08 ± 2.37
31–40	7.52 ± 2.23	7.76 ± 2.28	7.77 ± 2.20	7.89 ± 2.22	7.55 ± 2.42	8.24 ± 2.09	8.15 ± 2.33
> 40	7.56 ± 1.88	8.11 ± 1.05	7.67 ± 1.00	8.12 ± 1.46	7.67 ± 1.66	8.00 ± 2.00	7.56 ± 2.65
F(p-value)	0.00(.999)	0.46(.632)	0.02(.984)	0.06(.940)	1.12(.328)	0.41(.665)	0.28(.755)
Occupational status							
Employed	7.57 ± 2.16	7.80 ± 2.29	7.66 ± 2.89	7.80 ± 2.23	7.31 ± 2.51	8.11 ± 2.20	8.06 ± 2.45
Self-employed	7.89 ± 1.83	7.89 ± 1.45	8.44 ± 1.24	8.33 ± 1.41	7.11 ± 1.69	8.33 ± 1.66	8.56 ± 1.67
Unemployed	7.40 ± 2.30	7.97 ± 2.09	7.97 ± 2.07	8.14 ± 1.94	7.65 ± 2.32	8.23 ± 1.92	8.19 ± 2.13
F(p-value)	0.31(.737)	0.19(.826)	1.04(.354)	0.99(.371)	0.67(.510)	0.14(.870)	0.27(.762)
Level of education attained							
Secondary or lower	8.04 ± 2.27	7.78 ± 2.39	7.50 ± 2.77	7.86 ± 2.17	7.87 ± 2.47	7.95 ± 2.33	8.38 ± 1.99
Tertiary	7.49 ± 2.18	7.86 ± 2.20	7.79 ± 2.16	7.92 ± 2.13	7.37 ± 2.44	8.16 ± 2.09	8.09 ± 2.36
t(p-value)	1.19(1.000)	-0.15(.234)	-0.48(.009)	-0.12(.558)	0.95(.971)	-0.45(.152)	0.55(.904)
Spouse Education level							
Secondary or lower	8.05 ± 2.15	7.42 ± 2.87	7.11 ± 2.79	7.16 ± 2.57	7.58 ± 2.43	7.47 ± 2.58	7.59 ± 2.50
Tertiary	7.50 ± 2.19	7.88 ± 2.16	7.81 ± 2.16	7.96 ± 2.10	7.39 ± 2.44	8.19 ± 2.07	8.14 ± 2.33
t(p-value)	1.08(.873)	-0.68(.018)	-1.01(.019)	-1.60(.099)	0.33(.858)	-1.13(.045)	-0.941(.623)
First Pregnancy							
Yes	7.53 ± 2.13	7.90 ± 2.03	7.92 ± 2.13	8.14 ± 1.95	7.06 ± 2.58	8.10 ± 2.09	8.19 ± 2.32
No	7.53 ± 2.22	7.82 ± 2.31	7.69 ± 2.25	7.79 ± 2.22	7.60 ± 2.33	8.18 ± 2.10	8.06 ± 2.36
t(p-value)	0.03(.879)	0.29(.042)	0.89(.291)	1.41(.171)	-1.94(.312)	-0.33(.786)	0.51(.972)
Parity							
1	7.55 ± 2.30	7.79 ± 2.40	7.64 ± 2.27	7.88 ± 2.09	7.51 ± 2.35	8.24 ± 2.10	8.10 ± 2.44
> 1	7.52 ± 2.13	7.89 ± 2.09	7.85 ± 2.17	7.93 ± 2.16	7.34 ± 2.49	8.10 ± 2.11	8.11 ± 2.29
t(p-value)	0.13(.486)	-0.40(.079)	-0.85(.262)	-0.21(.567)	0.60(.299)	0.56(.456)	-0.02(.962)
Total number of scans during last pregnancy							

Variable	Time consciousness	Expertise	Attitude of workers	Respect	Cost/value for money	Details	Communication during the scan
≤ 2	8.03 ± 1.95	8.31 ± 2.27	7.97 ± 2.02	8.09 ± 2.15	7.37 ± 2.53	8.53 ± 2.02	8.35 ± 2.50
> 2	7.47 ± 2.21	7.79 ± 2.20	7.75 ± 2.23	7.89 ± 2.13	7.41 ± 2.43	8.11 ± 2.11	8.08 ± 2.32
t(p-value)	1.47(.316)	1.32(.855)	0.54(.133)	0.50(.924)	-0.08(.539)	1.11(.402)	0.65(.398)

Discussion

This study assessed the concerns, experience, and satisfaction of postpartum women who had obstetric ultrasound performed during their antenatal care at both public tertiary and private health facilities.

As regards “concerns”, a few of the women expressed their concerns on the potential dangers of using ultrasound during pregnancy. The reported perceived dangers included emission of waves or radiation, placental damage, body weakness, and stretch marks. Studies have also reported similar findings of maternal concerns of potential risks of obstetric ultrasound.^{17,18} In a study by Agbata et al. on women’s views regarding routine antenatal ultrasound in Nigeria, some women reported concerns about the side effects of sonography on their fetus and expressed fears about the procedure.¹⁷ Likewise, in Uganda, Maniragana et al. found that the majority of the women had a misconception that obstetric ultrasound can have harmful effects on either them or their unborn babies.¹⁸ These expressed concerns could be as a result of their inadequate knowledge about the purpose and safety of ultrasound, which reflects a lack of information or insufficient communications from the attending healthcare providers during counselling and consultations.¹⁹ Additionally, some women may have missed educational sessions or health talks on obstetric ultrasound scan during their antenatal visits, which are vital for addressing such concerns. Studies have shown that women’s knowledge, perception, and attitude toward the use of ultrasound technology and its safety are strongly influenced by the level of information they receive.^{18,19} If the information provided to pregnant women before undergoing ultrasound is insufficient or unclear, it can lead to confusion and increased fear regarding the safety of the procedure.

In this study, most women reported undergoing more than two ultrasound scans during their last pregnancy, with nearly a third performed without healthcare provider’s recommendation. Similarly, a study by Susu et al. in Ethiopia found that 51.3% prenatal ultrasound were conducted without a doctor’s referral.²⁰ This suggests a shared trend across both study settings with participants performing obstetric scan outside formal clinical indication. However, a major contrast is in the frequency and timing of scans. In the Ethiopian study, most women underwent a single scan early in pregnancy before 24 weeks, whereas in our study, most women had multiple scans. These variations may be attributed to differences in access to ultrasound services, healthcare infrastructure, maternal expectations, and clinical practices across the two countries. The higher frequency of obstetric scans observed in this study may reflect increased awareness, affordability, availability, heightened maternal interest in fetal development, or provider-driven practices in urban public and private healthcare settings. Interestingly, a substantial majority (76.6%) of the respondents expressed willingness to undergo the same number of scans in a future pregnancy.

Most women reported viewing their fetus on the screen during the scan, with their emotional response overwhelmingly positive with feeling of excitement. These findings underscore the psychological and emotional value of obstetric ultrasound, consistent with previous studies that highlight maternal bonding and reassurance of fetal development as benefits of fetal visualization.^{8,9} Furthermore, 91.4% of participants were informed of fetal sex, with a reported 98.6% accuracy at delivery. This corroborates the findings of a previous study that reported 98.69% accuracy of gender determination.²¹ A significant number of spouses accompanied their partners for ultrasound sessions, which is consistent with findings from previous studies and supporting the growing trend of male involvement in reproductive health.^{22,23,24,25} The women also reported their overall ultrasound experience during pregnancy as “exciting.” For both mothers and fathers, the ultrasound examination is a meaningful and highly positive experience, contributing to parents’ emotional connection and enhanced understanding and engagement with maternal health.²⁶

Comparing both facilities, participants rated private health services significantly higher than public health services across all seven domains - time consciousness, expertise, attitude of workers, respect, cost/value for money, examination thoroughness, and communication. However, Wilcoxon paired analysis revealed only for time consciousness, expertise, cost/value for money,

and communication. This aligns with the literature where private facilities often score better on efficiency and personalized care due to lower patient load, quality interactions, and client-oriented service models.^{27,28,29,30} The lack of significant differences in attitude, respect, and provision of details suggests some parity in interpersonal dimensions. While both facilities hold ground in relational aspects, showing that interpersonal care is comparable irrespective of resource level, this contradicts findings from studies in Gambia and Kenya where staff attitude were worse in public care.^{29,30} This disparity in findings may be attributed to contextual variations in health systems, patient populations, and/or facility levels.

Furthermore, among the seven domains assessed, the areas identified as contributing to women's satisfaction included the sonographer's expertise, cost, examination thoroughness, communication, respect, and the attitude of healthcare workers. Over three-quarters of the women reported being permitted to ask questions during the ultrasound process, which likely contributed to their satisfaction, particularly in the communication domain because of patient engagement. These findings align with the understanding that effective communication and high standards are fundamental components of quality medical practice. Both women and their spouses considered the communication skills of the sonographer to be as important as their technical expertise.³¹ Notably, radiographers' and nurses' attitudes were rated more favourably by patients in private hospitals, with professionalism and communication identified as key sources of satisfaction.³²

Only time consciousness did not show significant differences across the healthcare facilities evaluated. While time spent explaining the procedure and its benefits may not seem immediately productive, it can help mitigate misunderstandings, complaints, and potential legal issues in the long term. Similar to previous studies, this study found that respect and staff attitude strongly influenced satisfaction.^{16,32,33,34} Significantly, satisfaction was associated with women's occupational status, their own and their spouses' level of education, and whether they were first-time mothers. In both public and private health facility, women and their spouses' level of education significantly influenced their perceptions, though the domains affected varied. At the public health facility, women's education influenced their perceptions of cost, examination thoroughness, and communication, while in private facility, the spouse's education influenced ratings of sonographers' expertise. First-time mothers placed greater emphasis on staff attitude in the public health facility and sonographers' expertise in private health facility. These differences may be attributed to first-time mothers being less familiar with the process and more reliant on the professionalism of staff. The observed finding could be because first-time mothers, being less experienced, tend to place more trust in the expertise of sonographers, as the quality of ultrasound imaging largely depends on the sonographer's skill and the sophistication of the equipment. Errors in imaging are possible at any stage of the procedure, but the likelihood of mistakes decreases with increased expertise and experience.³¹ Additionally, at the public health facility, employed women reported greater satisfaction with sonographers' expertise, likely reflecting their higher educational status and ability to critically assess services.

The overall satisfaction with ultrasound services was high, with satisfaction rates being comparable between the public and private healthcare facility. However, women reported slightly higher satisfaction with the ultrasound services provided at public healthcare facility. This finding contrasts with similar studies where patient satisfaction with radiological services was reported to be better at private health facility.^{32,35} The overall satisfaction in this study was also higher than the 71.6% reported by Mulisa et al. in Southern Ethiopia.¹⁶ The observed differences could be attributed to geographical and cultural factors, as well as the availability and quality of ultrasound services.

Limitations

This study is not without limitations. As a hospital-based study conducted at a public tertiary facility where care is predominantly delivered by specialists and the client population was largely composed of well-educated women, the findings may not be generalizable to all public healthcare settings, particularly primary and secondary facilities. Thus, the study should be interpreted with caution in relation to educational status and levels of care. Additionally, the reliance on participants' recall of their antenatal ultrasound experiences during the postpartum period has the potential for recall bias. However, to reduce recall bias, data were collected within 6 to 8 weeks after delivery, a period considered sufficiently recent for accurate recall of pregnancy-related experiences. Despite these limitations, to the best of our knowledge, this is the first study to directly compare women's concerns, experiences, and satisfaction with ultrasound services between a public and private health facilities using the same study population. The findings have the potential to inform policy and practice, particularly in promoting improved service delivery and

patient-centered care by sonographers in public and private facilities. This study also lays a foundation for further research on sonographers' training, service delivery, and their impact on patient satisfaction across different experience levels and the three tiers of healthcare facilities.

Conclusion

Postpartum women's satisfaction with obstetric ultrasound services was influenced by multiple factors across both public and private health facility, including cost, staff attitude, respect, sonographer expertise, communication, and the thoroughness of the examination. These factors played a more significant role in shaping satisfaction at the public health facility compared to private health facility. These findings underscore the importance of both technical quality, patient-centred care, and provider-patient interactions in improving patient satisfaction with maternal healthcare services. There is also the need for consistent healthcare provider-led counselling to dispel misconceptions, improve understanding, and reinforce the safety of obstetric ultrasound as a routine component of antenatal care.

Declarations

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Author Contribution

Oluwasomidoyin Olukemi Bello: Data curation, acquisition, analysis, and interpretation; Writing - original draft, review, and editing. Olaolu O Oni: Data interpretation; Writing - original draft, review, and editing. Oluwatomi Yetunde Oni: Data analysis and interpretation; Writing - original draft, review, and editing. Timothy Abiola Olusesan Oluwasola: Conception and design of the study; Methodology; Writing - original draft, review, and editing. Janet A Akinmoladun: Conception and design of the study; Methodology; Data curation, acquisition, analysis, and interpretation; Writing - original draft, review, and editing.

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Ethics considerations

Ethical approval was obtained from University of Ibadan/University College Hospital Ethics Committee (UI/EC/18/0200), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent to participate

Written informed consents were obtained from the study participants before administering the questionnaire after careful explanation of the study objectives was made. All questionnaires were anonymous, and confidentiality was ensured.

Consent for publication

Not applicable. This study did not involve the publication of identifiable personal data, images, or case details that would require participant or guardian consent for publication.

Data Availability

The data supporting this study's findings are available upon reasonable request from the corresponding author.

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