Original Article

Sociodemographic, Obstetric And Clinical Determinants Of Uterine Rupture In a Nigerian Tertiary Hospital: A Retrospective Analysis

*Okoacha I[1], Isogun JK[1], Ekoh A[1], Okolo SA[2], Akpososo MW[2]
[1]Department of Obstetrics and Gynaecology, Delta State University, Abraka, and Delta State University Teaching Hospital, Oghara, Delta State, Nigeria
[2]Department of Obstetrics and Gynaecology, Delta State University Teaching Hospital, Oghara, Delta State, Nigeria

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***Correspondence:** Innocent Okoacha
Email: innochi4life@gmail.com; **Tel-**+2348030856451

ABSTRACT
Uterine rupture continues to be a significant obstetric emergency; however, its determinants are not well documented in low-resource settings, including Nigeria. We assessed the sociodemographic, obstetric, and clinical determinants of uterine rupture in Delta State University Teaching Hospital (DELSUTH), Oghara, Nigeria. This study reviewed hospital records of 16 women managed for uterine rupture at the Department of Obstetrics and Gynaecology, DELSUTH, between January 2015 and December 2024. Data on sociodemographic characteristics, obstetric and surgical history, clinical features, and selected haematological parameters were extracted and analyzed. Categorical variables were compared using Chi-square or Fisher's exact test, while continuous variables were analyzed using independent *t*-tests, with statistical significance set at $p < 0.05$. The mean maternal age was 36.2 ± 5.4 years. Most women were married 14 (87.5%) and resided in rural areas 13 (81.3%). Grand multiparity was common 10 (62.5%), while 9 (56.3%) were booked for antenatal care. The mean gestational age at rupture was 37.88 ± 2.19 weeks. Half had a previous caesarean section, and 10 (62.5%) had prior obstetric or gynaecological surgery. Major contributing factors included obstructed and prolonged labour, oxytocin use, fetal malpresentation, and rupture during trial of labour after caesarean section. Advanced maternal age was significantly associated with rural residence ($p = 0.013$), and the mean haemoglobin level was 7.59 ± 2.53 g/dL. Uterine rupture in this setting is linked to advanced maternal age, grand multiparity, prior uterine surgery, and labour complications. Enhanced antenatal care and rural access to skilled obstetric services are essential.

Keywords: Clinical factors, DELSUTH, Nigeria, Obstetric determinants, Retrospective study, Sociodemographic factors, Uterine rupture.

INTRODUCTION
Women's health during pregnancy and childbirth is still a major public health concern worldwide, especially in developing nations where pregnancy outcomes are greatly impacted by avoidable obstetric complications.[1,2] Pregnancy-related complications continue to be a major cause of death for women of childbearing age, despite significant progress in reducing severe maternal morbidity.[3,4] Among these complications, uterine rupture is widely recognized as one of the most severe obstetric emergencies and often leads to severe maternal haemorrhage, fetal compromise, and a higher risk of maternal and fetal death.[5-9]

Uterine rupture is the "complete separation of the uterine wall involving the endometrium, myometrium, and serosa, sometimes resulting in extrusion of the fetus or placenta into the peritoneal cavity".[10,11] The condition requires early recognition and immediate obstetric intervention to prevent serious complications. The consequences of rupture of the uterus may include massive haemorrhage, hypovolaemic shock, hysterectomy, infection, and fetal death.[12] In severe cases, it may also result in long-term reproductive complications and psychological distress for affected women.

Across the world, uterine rupture is relatively rare; however, its occurrence varies across regions reflecting differences in the availability, accessibility, and quality of obstetric care, with the burden of the condition more in the developing nations such as Nigeria. In developed countries, the incidence of uterine rupture varies between 0.005% and 0.13%.[13-18] Hospital-based studies conducted in different parts of Nigeria have reported prevalence rates of 0.4% to 1.2% of deliveries, which is considerably higher

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than figures reported in developed countries.[9, 19-21] The higher burden these settings have been attributed to poor access to quality healthcare services, delays in referral, inadequate intrapartum monitoring, and deliveries conducted by unskilled birth attendants. In addition, poverty, low educational status, and rural residence are important determinants of maternal health-seeking behaviour and utilization of skilled obstetric care.

The epidemiology of uterine rupture differs significantly between developed and developing countries. In high-income settings, uterine rupture most commonly occurs among women with uterine scars, particularly following caesarean section (CS), and is often associated with trial of labour after caesarean section (TOLAC). [22] However, in many developing countries, uterine rupture frequently occurs in unscarred uterus and is mainly associated with obstructed labour, prolonged labour, grand multiparity, use of uterotonic agents, and delayed access to standard obstetric care.[7,21,23] These differences highlight the impact of the country's health system and obstetric practices on the occurrence of uterine rupture.

Uterine rupture remains a significant obstetric problem in several healthcare institutions in Nigeria. Previous Nigerian studies have consistently identified grand multiparity, obstructed labour, unbooked pregnancies, previous caesarean section, and delayed referral as major contributors to uterine rupture.[9,24] Furthermore, socioeconomic determinants have been associated with poor utilization of antenatal care services and increased adverse obstetric outcomes.

Despite being largely preventable with appropriate antenatal care and timely obstetric intervention, uterine rupture continues to occur in many resource-limited settings such as Nigeria due to delays in accessing appropriate maternal healthcare. The widely recognized "three delays" model, which includes delays in deciding to seek care, delays in reaching healthcare facilities, and delays in receiving adequate medical treatment, remains an important framework for understanding maternal morbidity and mortality in developing countries, [25,26] Additionally, the increasing rate of CS has led to a growing population of women with uterine scars, which may predispose them to rupture of uterus in subsequent pregnancies, particularly when pregnancy and labour are not adequately monitored. [9,27]

Despite several studies on uterine rupture in Nigeria, there remains limited recent evidence examining the combined influence of sociodemographic, obstetric, and clinical determinants within specific tertiary healthcare settings. To identify high-risk women and implement targeted interventions aimed at reducing adverse materno-fetal outcomes associated with uterine rupture, a comprehensive understanding of these determinants is essential.

This study therefore sought to evaluate the sociodemographic, obstetric, and clinical determinants of uterine rupture among women managed at DELSUTH using a retrospective study design.

MATERIALS AND METHODS

Design and Setting of the study

At the Obstetrics and Gynaecology (Ob/Gyn) department, Delta State University Teaching Hospital (DELSUTH), Oghara, we conducted a retrospective descriptive study. DELSUTH is a tertiary center in South-South Nigeria and it serves as a referral center for complicated obstetric cases from surrounding rural and urban communities.

Study Population

This comprised all women who delivered at DELSUTH between January 2015 and December 2024. Clinical records of women managed for rupture of uterus during this period were identified and included in the study. Women with incomplete or missing medical records were excluded from the analysis.

Sample Size

During the ten-year period, there were 1,654 deliveries at the hospital. A total population sampling approach was used to include all eligible cases that satisfied the inclusion criteria during the ten-year study period. A total of 16 cases of uterine rupture were analyzed.

Data Collection

Data were extracted from hospital delivery registers, patients' case notes, and theatre records using a structured data extraction form. Information collected included: Sociodemographic characteristics (maternal age, marital status, occupation, level of education, and place of residence); obstetric characteristics (parity, booking status, gestational age at rupture, history of previous caesarean section or gynaecological surgery); clinical characteristics (onset and type of labour, use of oxytocin, obstructed or prolonged labour, fetal presentation, haemoglobin level at presentation, and maternal complications). The variables were collated and analyzed.

Data Management and Analysis

The collected data were entered and analyzed using SPSS version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize categorical variables as frequencies and percentages, while continuous variables were summarized as mean ± standard deviation (SD). Associations between maternal age, obstetric, and clinical factors with uterine rupture were assessed using Chi-square test or Fisher's exact test as appropriate. For continuous variables, independent t-tests were used to compare means between groups. A p-value < 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval for the study was obtained from the Research and Ethics Committee of DELSUTH, Oghara. All extracted data were anonymized to ensure confidentiality and stored in password-protected files accessible only to the research team.

RESULTS

During the ten-year study period, a total of 1,654 deliveries were recorded at the obstetric unit of DELSUTH. Seventeen cases of uterine rupture were identified; however, only 16 case records had complete data and were included in the final analysis.

The baseline socio-demographic and obstetric characteristics are presented in Table 1. The mean maternal age was 36.2 ± 5.4 years (range: 28–45 years), with the majority 10 (62.5%) aged 30–39 years. Most participants were married (14, 87.5%) and predominantly resided in rural areas (13, 81.3%). Half of the women (8, 50.0%) had primary education, while only (2, 12.5%) attained tertiary

education. Trading was the most common occupation (9, 56.3%).

Obstetrically, grand multiparity was predominant (10, 62.5%). Slightly more than half (9, 56.3%) were booked for antenatal care, while (7, 43.7%) were unbooked. The mean gestational age at rupture was 37.88 ± 2.19 weeks, with most cases occurring at early term (10, 62.5%).

Table 2 shows that (10, 62.5%) women had prior obstetric or gynaecological surgery, while (6, 37.5%) had none. Previous caesarean section was noted in (8, 50.0%), with (5, 62.5%) having one and (3, 37.5%) two prior procedures. Gynaecological surgery occurred in three (18.7%), and only one woman (6.3%) had both.

Table 3 presents the clinical and haematological characteristics of the participants. Hypertension was observed in (4, 25.0%) women, while (12, 75.0%) were normotensive. The mean systolic and diastolic blood pressures were 117.25 ± 15.19 mmHg and 75.25 ± 12.77 mmHg, respectively. The mean haemoglobin was 7.59 ± 2.53 g/dL, indicating moderate to severe anaemia.

Figure 1 shows obstetric factors associated with uterine rupture. Prolonged labour was most frequent (11, 68.8%), followed by grand multiparity and obstructed labour (10, 62.5%) each. Oxytocin use, fetal malpresentation, and TOLAC were least reported (6, 37.5%). Multiple responses were allowed.

Table 4 shows the relationship between advanced maternal age and selected factors. Women aged ≥35 years were predominantly grand multiparous (8, 80%), whereas parity was more evenly distributed among those <35 years. All older women were married, while (2, 33.4%) of younger women were single or cohabiting (p = 0.051). A significant association existed between maternal age and residence, with all older women residing in rural areas (p = 0.013). No significant associations were found with booking status, gestational age, previous surgeries, or labour-related factors.

Table 1: Distribution of socio-demographic/Obstetrics

Characteristics		Frequency (n)	Percentage (%)
Age (years)			
	20-29	2	12.5
	30-39	10	62.5
	. . .	4	25.0
	Mean ± SD	36.2 ± 5.4	
Marital Status			
	Married	14	87.5
	Single/Cohabiting	2	12.5
Residence			
	Urban	3	18.7
	Rural	13	81.3
Level of Education			
	Primary	8	50.0
	Secondary	6	37.5
	Tertiary	2	12.5
Occupation			
	Traber	9	56.3
	Business woman	4	25.0
	Tailor	3	18.7
Obstetrics characteristics			
Parity			
	Primiparous	2	12.5
	Multiparous	4	25.0
	Grand multiparous	10	62.5
Booking Status			
	Booked	9	56.3
	Unbooked	7	43.7
Gestational Age at Rupture (weeks)			
	Early term (37-38 weeks)	10	62.5
	Full term (39-40 weeks)	4	25
	Late term (41 weeks)	2	12.5
	Mean ± SD	37.88 ± 2.19	

Ranges: Age range = 28 – 45 years; Gestational Age = 33 – 41 weeks

Table 2: History of Obstetric and Gynaecological Surgery among Women with Uterine Rupture

Characteristic	Category	Frequency (n)	Percentage (%)
Previous obstetric or gynaecological surgery	Yes	10	62.5
	No	6	37.5
Caesarean section	Yes**	8	50.0
	No	8	50.0
Number of previous CS**	1	5	62.5
	2	3	37.5
Gynaecological surgery	Yes	3	18.7
	No	13	81.3

Note: Percentages for caesarean section (CS) and the number of previous CS were calculated among participants with a history of obstetric surgery (n = 8). **One participant (6.3%) had both a previous CS and prior gynaecological surgery.

Table 3: Clinical and Haematological Characteristics of Women with Uterine Rupture

Variable	Frequency (n)	Percentage (%)	Mean ± SD
Hypertension			
Yes	4	25.0	
No	12	75.0	
Systolic Blood Pressure (mmHg)			117.25 ± 15.19
Diastolic Blood Pressure (mmHg)			75.25 ± 12.77
Haemoglobin			7.59 ± 2.53

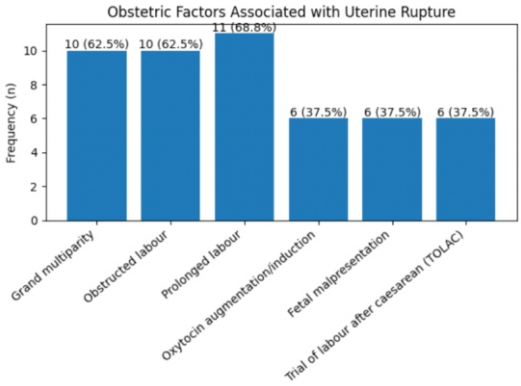

Figure 1: Obstetric Factors Associated with Uterine Rupture

Table 4: Association between Advanced Maternal Age and Demographic, Obstetric, and Clinical Factors

	<35 years n (%)	≥35 years n (%)	Test statistics	p-value
Parity				
Primipara	2 (33.4)	0 (0)	4.907	0.086
Multipara	2 (33.4)	2 (20)		
Grand multipara	2 (33.4)	8 (80)		
Marital Status				
Married	4 (66.7)	10 (100)	3.810	0.051
Single/Cohabiting	2 (33.4)	0 (0)		
Place of Residence				
Urban	3 (50)	0 (0)	6.154	*0.013
Rural	3 (50)	10 (100)		
Level of Education				
Primary	1 (16.7)	7 (70)	5.867	0.053
Secondary	3 (50)	3 (30)		
Tertiary	2 (33.4)	0 (0)		
Occupation				
Trader	3 (50)	6 (60)	0.356	0.837
Business woman	2 (33.4)	2 (20)		
Tailor	1 (16.7)	2 (20)		
Booking Status				
Booked	4 (66.7)	5 (50)	0.423	0.515
Unbooked	2 (33.4)	5 (50)		

GA at rupture				
Early term (37-38)	5 (83.4)	5 (50)	2.133	0.344
Full term (39-40)	1 (16.7)	3 (30)		
Late term (41)	0 (0)	2 (20)		
Mean ± SD	37.33 ±2.34	38.20±2.15	-0.740	0.477
History of Surgery				
Previous surgeries	5 (83.4)	5 (50)	1.778	0.182
Previous CS	5 (83.4)	3 (30)	4.267	0.119
Gynae Surg	0 (0.0)	3 (30)	2.215	0.137
Obstetric picture at presentation				
Obstructed Labour	4 (66.7)	6 (60)	0.071	0.790
Prolonged Labour	4 (66.7)	7 (70)	0.019	0.889
Oxytocin use	1 (16.7)	5 (50)	1.778	0.182
Fetal Malpresentation	2 (33.4)	8 (80)	3.484	0.062
Rupture at TOLAC	2 (33.4)	4 (40)	0.071	0.790

- Significant at $p < 0.05$; TOLAC- Trial of labour after Caesarean section; GA-Gestational age

DISCUSSION

This study explored the sociodemographic, obstetric, and clinical factors linked to uterine rupture at DELSUTH, highlighting key areas where targeted interventions may help reduce complications.

The mean maternal age was 36.2 ± 5.4 years, indicating a predominance of advanced maternal age among affected women. This finding is consistent with reports by Abrar *et al.*[5] in Pakistan and Oguejiofor *et al.*[21] in Nnewi, Nigeria, which demonstrate an increased risk of uterine rupture with advancing maternal age. This association may be explained by the higher prevalence of grand multiparity and previous uterine surgery, particularly CS, among older women. In our cohort, many women were grand multiparous, highlighting high parity as a key risk factor for uterine rupture. Reduced uterine tone, along with increased risks of prolonged or obstructed labour and malpresentation in older women, may contribute.

This pattern however differs from findings by Jombo *et al.*[9] in Asaba and Ochima *et al.*[19] in Keffi, where uterine rupture was more common among younger women, with mean ages of 31.3 ± 4.7 years and 29.7 ± 4.2 years, respectively. This disparity may reflect differences in the distribution of key risk factors across populations. In our setting, higher rates of grand multiparity, previous caesarean section, and labour complications likely increased risk among older women, highlighting the need for closer antenatal surveillance and careful intrapartum monitoring, especially when uterine scars are present.

Most women in the present study were married (87.5%). This finding is consistent with that of Mare *et al.*, who reported a high prevalence of high-risk fertility behaviours among married women of reproductive age presenting to tertiary healthcare facilities in sub-Saharan Africa, further emphasizing the role of such factors in adverse obstetric outcomes. [28] Although marital status is not a direct biological risk factor, it may reflect fertility patterns, as married women often have larger family sizes. [28] This suggests uterine rupture in this population occurs mainly among married women, indirectly increasing exposure to risk factors such as grand multiparity and previous uterine surgery.

A striking finding in this study was that 81.3% of the women resided in rural areas, and rural residence was significantly associated with advanced maternal age. This finding is consistent with several studies in Africa that have reported rural residence as a major determinant of uterine rupture. For instance, Abebe *et al.*[7] in Ethiopia reported that the odds of having a uterine rupture were found to be more than six times higher among rural compared to urban residents. Similarly, Ekine *et al.*[29] in a study in the Niger Delta University Teaching Hospital, Okolobiri found that 86.21% of women with uterine rupture were rural dwellers. Women living in rural areas often encounter barriers to accessing skilled obstetric care, including long distances to health facilities, poor transportation systems, and reliance on traditional birth attendants. These factors contribute to delays in seeking, reaching, and receiving obstetric care, which increase the likelihood of prolonged or obstructed labour and ultimately uterine rupture. [25] The implication of this finding is that improving rural maternal health services and strengthening referral systems are necessary in preventing uterine rupture in the Niger Delta region of Nigeria.

Half of the women in the present study had only primary education, while a small proportion had tertiary education. This pattern aligns with the findings of Nonye-Enyidah *et al.*[30] in Rivers State, who reported that low educational attainment is associated with an increased risk of uterine rupture. This may reflect delayed health-seeking behaviour and reduced access to skilled obstetric care among less educated women. In contrast, Jombo *et al.*[9] in Asaba, Delta State, observed a higher occurrence of uterine rupture among women with higher levels of education. This disparity may reflect differences in study populations and referral patterns, as more educated women may be more likely to access care at FMC Asaba, a tertiary centre in the state capital where complicated cases are managed. Higher rates of previous caesarean section and trial of labour may also contribute.

The present study demonstrated that grand multiparous women constituted the majority (62.5%) of cases of uterine rupture, followed by multiparous women. In keeping with our findings, Oguejiofor *et al.*[21] in Anambra State, Nigeria, and Abrar *et al.*[5] in Ethiopia also identified grand multiparity as a major risk factor for uterine rupture**.** Grand multiparity may predispose to uterine rupture because repeated pregnancies can lead to progressive thinning and weakening of the uterine musculature, increasing the risk of rupture during labour. [31] In addition, grand multiparous women may experience rapid labour, malpresentation, or obstructed labour, further increasing the risk of uterine rupture. This finding reinforces the importance of family planning services, which can help reduce high parity and consequently lower the risk of uterine rupture.

Notably, all patients with uterine rupture in our study were referred to DELSUTH for further management. Of these, 43.7% were unbooked, while 56.3% were booked. This pattern contrasts with findings from several other studies in Nigeria and elsewhere, which have reported a higher proportion of unbooked patients among cases of uterine rupture. [9,19,21,22] This difference may be explained by referral patterns, as DELSUTH serves as a tertiary centre that receives both complicated booked and unbooked cases from peripheral facilities.

The majority of uterine ruptures in this study occurred at early term gestation (37–38 weeks), with a mean

gestational age of 37.88 ± 2.19 weeks. This is consistent with the findings of Trichal *et al*. in India who reported a similar mean gestational age of 37.5weeks. [32] This pattern may be explained by the fact that uterine rupture most commonly occurs during active labour, when uterine contractions are strongest and intrauterine pressure is highest. At term, the uterus is maximally distended, and in the presence of risk factors such as previous uterine scar, grand multiparity, or obstructed labour, the risk of rupture is further increased.

Fifty percent of the women had a previous CS, making it one of the most important identifiable risk factors. Previous caesarean delivery is widely recognized as a major determinant of uterine rupture because the uterine scar represents a structurally weaker area that may rupture during labour. This finding is consistent with global literature which shows that previous caesarean delivery significantly increases the risk of uterine rupture, particularly during TOLAC. [5,9,20] The study identified several obstetric factors associated with uterine rupture, including obstructed labour, prolonged labour, oxytocin use, fetal malpresentation, and rupture during TOLAC. Similar factors have been reported in multiple studies across low-resource settings. [5,9,20,24]

Obstructed labour and prolonged labour are particularly important because they lead to excessive uterine contractions and progressive thinning of the lower uterine segment, ultimately resulting in rupture. [21] Additionally, injudicious use of oxytocin may produce hyperstimulation of the uterus, increasing the risk of rupture. These findings suggest that appropriate labour monitoring using partographs, careful use of uterotonics, and timely obstetric intervention are critical for preventing uterine rupture.

The mean haemoglobin level of 7.59 g/dL observed in this study indicates that a substantial proportion of women with uterine rupture presented with moderate to severe anaemia. This finding is consistent with the report by Aziz and Yousfani from a teaching hospital in Pakistan, where all study participants were anaemic; 18 (29.5%) had severe anaemia (Hb <7 g/dL), while 43 (70.5%) had moderate anaemia (Hb 7–10 g/dL). [33] Anaemia in women with uterine rupture may result from acute blood loss during rupture or pre-existing nutritional deficiencies common in low-resource settings. These findings reinforce the significant burden of anaemia among women with uterine rupture, which may further worsen maternal outcomes.

Overall, uterine rupture is preventable and linked to socioeconomic disadvantage, high parity, prior surgery, and poor monitoring; improved care is essential.

CONCLUSION

This study shows that uterine rupture in this tertiary hospital occurred mainly among women of advanced maternal age, rural residence, and grand multiparity, with many having a history of prior obstetric surgery, especially caesarean section. Contributing factors included obstructed and prolonged labour, oxytocin use, fetal malpresentation, and rupture during TOLAC. Many affected women also presented with significant anaemia, reflecting severe clinical consequences. Overall, these findings highlight the persistent burden of uterine rupture in resource-limited settings and the interaction between sociodemographic factors, obstetric history, and intrapartum complications.

RECOMMENDATIONS / IMPLICATIONS FOR PRACTICE

Strengthening antenatal care, improving access to skilled obstetric services, promoting family planning, ensuring careful labour monitoring, and providing counselling for TOLAC, alongside maternal health education, can reduce uterine rupture and its adverse outcomes.

STRENGTHS AND LIMITATIONS

This study offers valuable insight into the sociodemographic, obstetric, and clinical determinants of uterine rupture in a Nigerian tertiary hospital. Its strengths include the use of detailed clinical records, enabling comprehensive assessment of obstetric and surgical histories, as well as clinical and haematological parameters. It also provides locally relevant evidence and highlights the role of maternal age and parity. However, the retrospective design limits data completeness, while the small sample size (n=16) reduces statistical power and generalizability. Being a single-centre study further restricts applicability, and the absence of maternal and perinatal outcomes is notable. Larger, prospective multicentre studies are therefore recommended.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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