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Original Research Article

Sociodemographic factors influencing antenatal booking time at antenatal clinic of mother and child hospital, Akure, Ondo State, Nigeria

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ABSTRACT

Background: Early initiation of antenatal care (ANC) is crucial for optimal maternal and fetal outcomes. The World Health Organization (WHO) 2016 model recommends the first contact during the first trimester, and at least eight contacts overall. Nigeria continues to experience high maternal mortality, with 512 deaths per 100,000 live births reported in the 2018 NDHS.

Methods: A cross-sectional study was conducted at Mother and Child Hospital, Akure, between June 2023 and April 2024. Systematic random sampling recruited 1,043 pregnant women presenting for booking. Data on age, parity, education, occupation, spouse characteristics, and religion were collected via structured questionnaire. Gestational age at booking was categorized by trimester. Chi-square tests examined associations ($p < 0.05$).

Results: Mean age was 32.0 ± 4.93 years. Booking distribution: first trimester 20.6% ($n=215$), second trimester 62.4% ($n=651$), third trimester 17.0% ($n=177$). Maternal age was significantly associated with booking time ($\chi^2=54.926$, $p=0.018$): women aged 15-25 years had the highest first-trimester booking (28.6%) versus 20.1% for 26-35 years and 18.1% for 36-45 years. Parity was also significant ($\chi^2=17.980$, $p=0.008$): nulliparous women booked earliest (25.3% first trimester), while grand-multiparous women had the lowest (16.7%) and highest third-trimester booking (66.7%, standardized residual +2.99, $p < 0.01$). Maternal education, spouse education, maternal occupation, spouse occupation, and religion showed no statistically significant association.

Conclusions: Only one in five women booked in the first trimester. Younger age and nulliparity predicted earlier booking, while grand-multiparity predicted severe delay. Interventions must target experienced mothers who may underestimate risk.

Keywords: Antenatal care, Booking time, Nigeria, Parity, Sociodemographic factors

INTRODUCTION

Antenatal care (ANC) constitutes a cornerstone of maternal and reproductive healthcare, providing a structured platform for early identification and management of pregnancy-related complications, health promotion, and preventive interventions.¹ The World Health Organization (WHO) ANC model recommends that the first contact should be during the first trimester, ideally before 12 weeks of gestation, to maximize clinical benefits.² The model also shifted from the previous focused approach of four visits to an expanded schedule of eight contacts to improve maternal and perinatal outcomes. Early booking affords opportunity to establish baseline health parameters, screen for pre-existing conditions, institute folic acid and tetanus prophylaxis, and develop birth preparedness plans.³ WHO estimates that two-thirds of infant deaths are preventable with proper measures taught during pregnancy, and timely ANC is effective in early detection and management of risky conditions that lead to morbidity or mortality.²

Notwithstanding these benefits, late initiation remains a persistent challenge across sub-Saharan Africa, including Nigeria. Nationally representative data show that among women who attended ANC, only 24% started in the first trimester while 63% started in the second trimester.⁴ The factors associated with late ANC booking are multifactorial these include pregnancy being too early, avoidance of frequent visit, poor knowledge about the right time to commence ANC, financial constraint, educational level, parity, age of the pregnant women, marital status, unplanned pregnancy, history of obstetrics complication, ethnicity, women's involvement in healthcare decision-making women's employment status, household wealth, region and residence, and proximity to health facility.⁵⁻⁸

Studies have been carried out in the south Western part of Nigeria, but these were done in tertiary health facilities, none in secondary facilities hence necessitating the need for this study. The results from this study will provide information on the factors responsible for late ANC booking in secondary health facilities and the factors identified will help policy makers update existing policies, the findings will also help the public health education so as to promote a better pregnancy outcome.

The aim of this study was therefore, to determine the prevalence of late first ANC visit, and the associated factors in a secondary health institution, South-West, Nigeria.

METHODS

Study design and setting

This cross-sectional descriptive study was conducted at the Antenatal Clinic of Mother and Child Hospital, Akure, Ondo State, Nigeria between June 2023 to April 2024. The

hospital serves as a referral centre for maternal and child health services in Ondo State and receives patients from both urban and rural communities within the state.

Study population

The study population comprised pregnant women attending the antenatal clinic for booking during the study period. Inclusion criteria were pregnant women presenting for their first antenatal visit at the facility who provided informed consent. Women with incomplete booking records or those who declined participation were excluded.

Sample size determination

The minimum sample size was calculated using the Cochran formula for cross-sectional studies: $n = Z^2pq/d^2$, where Z represents the standard normal deviate at 95% confidence interval (1.96), p denotes the proportion of women booking in the first trimester estimated at 24.5% from previous Nigerian studies. q equals 1-p, and d represents the margin of error set at 5%. The calculated minimum sample size was 285, increased by 10% to account for incomplete responses, yielding a final sample of 314 participants.

Sampling technique

Systematic random sampling was employed, with every third eligible woman presenting for booking recruited until the desired sample size was achieved.

Data collection

Data were collected using a structured interviewer-administered questionnaire capturing sociodemographic variables including maternal age, parity, educational status of mother and spouse, and occupational status of both partners. Gestational age at booking was determined using last menstrual period and confirmed by ultrasound scan where available. Time of booking was categorized as early (first trimester, ≤ 12 weeks) or late (second and third trimester, > 12 weeks).

Data analysis

Data were analyzed using Statistical Package for Social Sciences version 26.0. Descriptive statistics including frequencies, percentages, means, and standard deviations were computed. Chi-square test examined associations between sociodemographic variables and booking time, while binary logistic regression determined predictors of early booking. Statistical significance was set at $p < 0.05$.

Ethical consideration

Ethical approval was obtained from the Research Ethics Committee of Ondo State Ministry of Health. Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

RESULTS

The mean age of participants was 32.0±4.93 years, with 26-35 years having the highest number of participants (67.7%). Majority of the participants and their spouses had at least primary education. Most (92.5%) of the

participants were Christian. Forty-five percent of the participant were primiparous while grand multiparous accounted for 0.6% of the participants. Most (62.4%) of the participants book for ANC in second trimester.

Table 1: Socio-demographic distribution among the study participants.

Variable	Frequency (N)	Percentage (%)
Total sample size	1,043	100.0
Age (years)		
16-25	119	11.4
26-35	706	67.7
36-45	216	20.7
46-55	2	0.2
Mean±SD	32.0±4.93	
Median (IQR)	32.0 (28-35)	
Range	16-55	
Education level		
No formal education	5	0.5
Primary	203	19.5
Secondary	240	23.0
Tertiary	595	57.0
Spouse education level		
No formal education	8	0.8
Primary	209	20.0
Secondary	200	19.2
Tertiary	626	60.0
Marital status		
Married	1022	98.0
Not married	21	2.0
Religion		
Christian	965	92.5
Muslim	70	6.7
None	8	0.8
Parity		
Nulliparous	249	23.9
Primiparous	470	45.1
Multiparous	318	30.5
Grand-multiparous	6	0.6
Trimester at booking in weeks		
First trimester (<12)	215	20.6
Second trimester (13-27)	651	62.4
Third trimester (≥28)	177	17.0

Table 2: Association between parity, occupation, spouse occupation and education and trimester at booking.

Variable	χ^2 value	df	P value	Cramer's V	Effect size
Age	54.926	6	0.018*	0.162	Small
Parity	17.980	6	0.008**	0.093	Negligible-small
Occupation	20.308	6	0.319	0.099	Negligible
Spouse occupation	32.495	6	0.184	0.125	Small
Education	7.595	6	0.080	0.060	Negligible
Spouse education	7.595	6	0.080	0.060	Negligible
Religion	3.736	4	0.098	0.042	Negligible

Note: *p<0.05; **p<0.01; Cramer's V interpretation: <0.1 = negligible, 0.1-0.3 = small, 0.3-0.5 = medium, >0.5 = large; df = degrees of freedom

There were a significant association age, parity and time of booking for ANC ($p=0.018$) and ($p=0.008$); respectively.

20.1% for 26-35 years and 18.1% for 36-45 years. Conversely, younger women (15-25 years) had a lower second trimester booking rate (54.6%) compared to older age groups (64.3% for 26-35 years).

The age group 15-25 years showed the highest proportion of first trimester booking (28.6%, $n=34$), compared to

Table 3: Association between age and trimester at booking.

Age group	First Tri., N (%)	Expected	Second Tri., N (%)	Expected	Third Tri., N (%)	Expected	Total
15-25 years	34 (28.6)	24.5	65 (54.6)	74.3	20 (16.8)	20.2	119
26-35 years	142 (20.1)	145.4	454 (64.3)	440.6	110 (15.6)	120.0	706
36-45 years	39 (18.1)	44.5	132 (61.1)	134.8	45 (20.8)	36.7	216
46-55 years	0 (0.0)	0.4	2 (100.0)	1.2	0 (0.0)	0.3	2
Total	215 (20.6)		651 (62.4)		177 (17.0)		1,043

Table 4: Standardized residuals: age $\times$ trimester.

Age group in years	First trimester	Second trimester	Third trimester
15-25	+1.92	-1.08	-0.04
26-35	-0.28	+0.64	-0.91
36-45	-0.82	-0.24	+1.37
46-55	-0.63	+0.73	-0.34

Table 5: Association between parity and trimester at booking.

Parity	First Tri., N (%)	Expected	Second Tri., N (%)	Expected	Third Tri., N (%)	Expected	Total
Nulliparous	63 (25.3)	51.3	151 (60.6)	155.4	35 (14.1)	42.3	249
Primiparous	90 (19.1)	96.8	305 (64.9)	293.3	75 (16.0)	79.9	470
Multiparous	61 (19.2)	65.5	194 (61.0)	198.4	63 (19.8)	54.1	318
Grand-multi	1 (16.7)	1.2	1 (16.7)	3.7	4 (66.7)	1.0	6
Total	215 (20.6)		651 (62.4)		177 (17.0)		1,043

Table 6: Standardized residuals: parity $\times$ trimester.

Parity	First trimester	Second trimester	Third trimester
Nulliparous	+1.63	-0.35	-1.12
Primiparous	-0.69	+0.68	-0.61
Multiparous	-0.56	-0.31	+1.29
Grand-multiparous	-0.18	-1.40	+2.99

Table 7: Binary logistic regression analysis.

Predictor	β Coefficient	SE	Wald χ^2	P value	OR	95% CI
Age (years)						
15-25 vs 26-35	+0.421	0.184	5.24	0.022*	1.52	1.06-2.19
36-45 vs 26-35	-0.138	0.176	0.61	0.435	0.87	0.62-1.23
46-55 vs 26-35	-18.72	5247.3	0.00	0.997	0.00	0.00- ∞
Parity						
Nulliparous vs Multi	+0.318	0.165	3.71	0.054	1.37	0.99-1.90
Primiparous vs Multi	-0.004	0.156	0.00	0.980	1.00	0.73-1.36
Grand-multi vs Multi	-0.152	1.183	0.02	0.898	0.86	0.08-8.79
Education (tertiary vs others)	+0.087	0.154	0.32	0.572	1.09	0.81-1.47
Occupation (civil servant vs others)	+0.129	0.147	0.77	0.381	1.14	0.85-1.52
Religion (Christian vs others)	-0.243	0.298	0.67	0.414	0.78	0.44-1.40
Constant	-1.472	0.211	48.65	<0.001	0.23	-

-2 Log Likelihood=1,087.34; Cox & Snell $R^2=0.012$; Nagelkerke $R^2=0.018$; Overall classification accuracy=79.4%; Hosmer-Lemeshow test: $\chi^2=6.82$, $p=0.556$ (good fit)

Younger women (15-25 years) show a trend toward higher first trimester booking (residual = +1.92, approaching significance), while no individual cell reaches the significance threshold.

Younger women aged 15-25 years have 1.52 times higher odds of first trimester booking compared to women aged 26-35 years (OR=1.52, 95% CI: 1.06-2.19, $p=0.022$). Nulliparous women show a trend toward higher odds of early booking (OR=1.37, $p=0.054$), approaching statistical significance. Education, occupation, and religion were not significant predictors in the multivariate model. The low R^2 values indicate that socio-demographic factors explain only a small proportion of variance in booking timing, suggesting other unmeasured factors.

DISCUSSION

The timing of the first antenatal contact is a critical determinant of maternal and perinatal outcomes. World Health Organization recommends that women should book for ANC on or before 12 weeks gestational age.² In this study, 79.4% of pregnant women booked for ANC after the first trimester while 20.6% book in first trimester. The prevalence of late booking found in this study was higher than 62.93% in Burkina-faso, Rwanda (61.1%), Ethiopia (52.5% and Myanmar (56.2%).^{5,9,10,11} These differences could be attributed to some of the studies classified late booking after 16 weeks GA unlike the present study where 12 weeks GA was used as the cut-off point. Cultural factors could also contribute to late booking. In many community there is a strong belief in delaying pregnancy disclosure until after quickening, usually 16-20 weeks for fear of miscarriage or spiritual attack.^{12,13} This prevalence is less than 82.3% reported Yaounde.¹⁴ This difference could be attributed to the socio-cultural factors of the study population. Also, the time difference between the studies because presently there is an improvement of the awareness of antenatal care.¹¹

There was significant association between maternal age, parity and booking time in this study. The Odds for early booking is higher for woman in age 16-25 (OR=1.52) and nullipara (OR=1.37). This contrasts with the national analysis, where respondents aged 40-49 years were 65% more likely to initiate ANC in the first trimester compared with adolescents aged 15-19 years.² This difference could be a combination of health-related anxiety, social support and health system factor.¹² Many women in this age group are primigravidas and experience fear about pregnancy outcomes, which prompts early hospital attendance to confirm the pregnancy and book for ANC.

Parity emerged as the strongest behavioural predictor. Nulliparous women had the highest early booking rate (25.3%), while grand-multiparous women (>4 deliveries) had the lowest (16.7%) and were significantly over-represented in third-trimester booking (66.7%, standardized residual +2.99). Similar findings were obtained among pregnant women attending antenatal care

in south eastern Nigeria where the gestational age at booking amongst grandmultiparous women was significantly higher than that of the primigravida.¹⁵ This was also in agreement with findings from Saudi Arabia where multiparous women booked later for antenatal care because of their deceitful assurance from previous successful pregnancy outcome. Early booking seen in nullipara in this study could be 'premised on heightened health anxiety, lack of previous obstetrics experience and high motivation to ensure a healthy pregnancy hence seek professional guidance immediately upon confirming pregnancy unlike multiparous women who rely on past experiences.

In this study, there was no significant association between maternal education, spouse education, occupation, religion and time of booking for ANC were not significantly associated with booking time in this study.

Despite high education levels, tertiary-educated women actually booked latest (18.3% first trimester vs 25.0% for secondary), ($p=0.080$). This was in variance to what was obtained in Tanzania where women with high education showed to have higher prevalence of booking. ANC services in the first trimester of pregnancy compared to their counterparts with lower or no formal education, this finding implies that, ability of women to acquire education may improve first ANC attendance due to decision making, employment status that may increase income.¹⁶ The finding in this study is consistent with reports from other study in Nigeria where women with tertiary education booked late due to work commitments and belief that early ANC was unnecessary.¹² Similarly, in Malawi, employed and educated women delayed ANC because of busy schedule and preference for private care.¹⁷

There was no significant association between religion and time of booking for ANC, ($p=0.098$). This was not in tandem with study in Nigeria and Northern Ethiopia where it was reported that Muslim women had higher odds of late ANC booking than Orthodox Christian. This was linked to lower female autonomy and health-seeking behavior in some Muslim households.^{12,18} The difference observe in this study could be from multi religion of the participants, also Akure is an urban community with high literacy, multiple health facilities, and strong health education through radio, television. In urban areas, religion tends to have less influence on health-seeking behavior women are more exposed to uniform health messages regardless of faith.

The large sample ($n=1,043$) and systematic sampling strengthen internal validity. Limitations include the cross-sectional design, which precludes causality, and the single-centre, urban, relatively educated population, which limits generalizability to rural Ondo communities. Recall bias for last menstrual period may also affect gestational age estimation.

CONCLUSION

Maternal age and parity significantly influence antenatal booking timing at Mother and Child Hospital, Akure. While younger and nulliparous women demonstrate better early booking practices, the overall first-trimester uptake of 20.6% remains suboptimal given Nigeria's high maternal mortality of 512 per 100,000 live births. The critical vulnerability lies with grand-multiparous women, whose severe delays pose substantial risks. Achieving WHO's vision of eight contacts starting in the first trimester requires parity-specific interventions rather than broad socioeconomic approaches in this setting.

Recommendations

Targeted counselling should be provided to multiparous and grand-multiparous women during postnatal care, immunization clinics, and community outreach, emphasizing that each pregnancy carries independent risks. Workplace antenatal care (ANC) sensitization should be strengthened among civil servants, given their majority representation and delayed booking, with flexible early-morning booking slots to facilitate early attendance. Community health extension activities should specifically target farmers and artisans, who demonstrated the lowest rate of early booking (10%), through town hall meetings and faith-based platforms. A first-trimester incentive package, including free baseline investigations and ultrasound before 12 weeks of gestation, may be considered to encourage early presentation, in alignment with WHO guidance. Health education messages should also be reframed from emphasizing that "first-time mothers need care" to highlighting that experienced mothers require early antenatal care as well."

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