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## Pregnancy outcomes amongst booked parturients in a semi-urban secondary healthcare setting in Southern Nigeria

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### Abstract

Adverse pregnancy outcomes are significantly reduced by antenatal booking within 12 weeks of gestation (early antenatal booking) according to the World Health Organisation (WHO). Parturients in the developing world tend to book late. Significant and visible benefits of early booking can change this narrative. The quality of antenatal care services especially in resource poor settings may have an impact on the expected benefits of improved pregnancy outcomes from early antenatal care. This study aims to compare the pregnancy outcomes of parturients who booked early (within 12 weeks of gestation) for antenatal care as against late booking in a semi-urban secondary healthcare facility in a resource poor setting. The records of 420 parturients who registered for antenatal care and also delivered at Zonal Hospital Bonny Island in Southern Nigeria were analysed. Adverse pregnancy outcome measures included preterm births, low birth weight, still births, operative deliveries and maternal deaths.

An overwhelming majority (94%) of the participants booked late. There was a marginal improvement (though not statistically significant at  $p < 0.05$ ) in pregnancy outcomes of patients who registered early for antenatal care. The study suggests a need for improvement in the quality of antenatal care services in such resource poor semi-urban healthcare facilities to meet the WHO standard of care and significantly improve pregnancy outcomes so as to encourage early booking.

**Keywords:** Nigeria, pregnancy outcomes, antenatal care, semi-urban

### Introduction

Antenatal care (ANC) is an organised form of care offered pregnant women that includes health promotion, disease prevention, early diagnosis and prompt treatment of pregnancy complications aimed at improving pregnancy outcomes. Traditional antenatal care involves monthly visits until 28 weeks, then 2 weekly visits until 36 weeks then weekly visits until delivery. Focused antenatal care on the other hand aims to reduce the number of visits to 4 while improving the content of each visit. Antenatal care is one of the four pillars of safe motherhood<sup>[1]</sup>. This is particularly important in the developing world where maternal and perinatal morbidity/deaths are unacceptably high with Nigeria amongst the countries with very high maternal mortality<sup>[1]</sup>. Antenatal booking within 12 weeks of gestation (early booking) has been shown to reduce adverse pregnancy outcomes when compared to booking later in pregnancy. The 2016 World Health Organisation Antenatal Care model therefore recommends the first contact in the first 12 weeks of gestation<sup>[2]</sup>. Previous studies have revealed that pregnant women in developing countries like ours are more likely to book late than early. Further more women residing in rural areas tend to book later in pregnancy than women in urban centres<sup>[3]</sup>.

ANC has two components namely ANC attendance (contact coverage) and Standard ANC content (effective coverage). The 2 methods of antenatal care (traditional or focused antenatal care) resulted in similar improved pregnancy outcomes provided it is started early<sup>[4]</sup>. Previously, the quality of ANC was assessed by the number of antenatal visits with healthcare providers (contact coverage), but now this indicator of the quality of ANC is no longer accepted because it measures contact frequency without looking into the content of the care received during antenatal visits<sup>[5]</sup>. In recent years, there has been growing interest in measuring the quality of ANC but there is no standard measurement system. Correlating the quality with pregnancy outcomes which is the goal of ANC has been suggested<sup>[5]</sup>. Some of the major factors adversely affecting the ANC quality include the poor infrastructure of the healthcare system,<sup>[5, 6]</sup> and lack of well-trained human resources<sup>[5, 7]</sup>.

Poor infrastructure and poorly trained manpower constitute major constraints in resource poor settings like semi-urban/rural health facilities. Most of the reported studies on antenatal care in our environment were done in tertiary healthcare facilities in urban centres [8]. There is paucity of data on the effect of antenatal care on pregnancy outcomes for women residing in rural and semi-urban areas. This study will add to the body of knowledge on this subset of the population in Southern Nigeria. This study will review the pattern of antenatal booking as well as evaluate the pregnancy outcomes of these women which will be an indicator of the benefit/quality of antenatal care services in a secondary healthcare facility in a semi-urban/rural area.

### Aim and Objectives

The aim of this study is to determine the pattern of gestational age at booking and relationship between the pregnancy outcomes of the antenatal mothers and the gestational age at booking in a secondary healthcare facility sited in a semi-urban/rural area.

### Methodology

**Study Area:** Rivers State of Nigeria with a population of 5,185,400 according to the report of the last Nigerian National Census (2006) consists of 23 Local Government Areas including Bonny Local Government Area which is made up of predominantly semi-urban/rural communities. The State has government owned Zonal/General Hospitals sited in these Local Government Areas to cater for pregnant women and various morbidities. These hospitals also serve as referral centres to the various Private Clinics and Government owned Primary Health Centres.

**Study Design and Procedure:** The study was a descriptive retrospective study conducted at Bonny Zonal Hospital, the only secondary healthcare facility in Bonny Local Government Area of Rivers State. Retrospective data was collected from the participants records kept at the hospital. The study population included all eligible pregnant women who registered for antenatal care at the hospital and had their babies in the hospital between January 2022 and September 2022.

The records were scrutinized for completeness and records without complete data on variables required were excluded. Participants were serially enlisted until the required sample size was achieved. Data on demography collected included patient's age, parity, occupation, educational qualification, marital status and spouses' employment status. Participants' obstetric data collected included gestational age at booking, gestational age at delivery, mode of delivery, birth weight, still births and maternal deaths. Traditional antenatal care is practiced in the centre and booking at a gestational age of 12 weeks or less was taken as early booking. Based on the reported 26.5% early booking in a previous study at the Rivers State University Teaching Hospital,<sup>9</sup> 5% error margin and 95% confidence interval, the calculated minimum sample size was 330 after allowing for 10% non-response rate using the formula as stated by Hamed T [10].

$$N = \frac{p(100 - p) Z^2}{E^2}$$

Where,  
N is the required sample size

P is 26.5 (The percentage of early booking from a study in Rivers State)

Z is 1.96 (at 95% confidence level)

E is 5% margin of Error

A total of 420 participants were recruited.

### Data Analysis

The data collected were entered into Microsoft Excel Worksheet 2016 version and were analysed using the Statistical Package for Social Sciences (SPSS) software version 21.0. These results are presented in Tables. The data fields were checked for accuracy using visual checking technique to eliminate possible data entry errors or inconsistencies of information. Bivariate analysis was done with chi-square ( $X^2$ ) test to examine the relationship between the variables. In all cases, a probability value (p-value) of < 0.05 was regarded as statistically significant.

### Ethical Consideration

Ethical approval was obtained from the ethical committee of the Rivers State Hospitals Management Board. The identities of all participants will never be revealed by the researchers. The study was conducted at no monetary or material cost to the participants. The cost was borne by the researchers

### Results

**Table 1:** Socio-Demographic Characteristics

	Frequency (/420)	Percentage	
<b>Age (Years)</b>			
0-20	19	4.5	Mean= 29.759 ± 5.24 Min = 15 Max = 49
21-30	181	43.1	
31-40	208	49.5	
41-50	12	2.9	
<b>Occupation</b>			
Unemployed	98	23.3	
Civil/Public Servant	79	18.8	
Private/Artisan	1	0.2	
Business Woman	242	57.6	
<b>Education</b>			
Primary	12	2.9	
Secondary	257	61.2	
Tertiary	151	35.9	
<b>Marital Status</b>			
Married	347	82.6	
Single	73	17.4	
<b>Religion</b>			
Christian	420	100	
Islam	0	0	
None	0	0	

Majority of the patients (49.5%) were aged between 31-40 years old (Table 1). The mean age was 29.76±5.24. Over half of the participants (57.6%) were business women (Table 1) with 61.2% having secondary level of education. They were all Christians with 82.6% being married (Table 1).

More than half of the participants were either nullipara (34%) or primipara (31.4%, Table 2). An overwhelming majority (94%) of the participants booked late, after 12 weeks (Table 2). About 1/3 of the participants (29.8%) had preterm delivery (Table 2) with a mean gestational age at delivery of 36.39±1.19 and a minimum of 28 weeks and a maximum of 41 weeks gestational age. 23.8% had caesarean delivery while 17.6% had either a low birth weight baby or a macrosomic baby (8.8% respectively, Table 2).

**Table 2:** Maternal Obstetric Characteristics

	Frequency	Percentage	Remarks
<b>Parity</b>			
0	143	34.0	
1	132	31.4	
2	80	19	
3	47	11.2	
4 And Above	18	4.3	
<b>Gestational Age At Booking</b>			
			Mean=23.19±5.717
< 12 Weeks	25	6.0	Min=7 weeks
≥ 12 Weeks	395	94.0	Max=36 weeks
<b>Gestational Age At Delivery</b>			
			Mean=36.39 ± 1.19
< 37 Weeks	295	70.2	Min = 28 weeks
≥ 37 Weeks	125	29.8	Max = 41 weeks
<b>Mode of Delivery</b>			
Svd	320	76.2	
Cs	110	23.8	
<b>Birth Weight</b>			
< 2.5kg	37	8.8	Mean = 3.246±1.389
2.5-4.0kg	346	82.4	
>4.0kg	37	8.8	

Over half of the participants spouses (57.9%) were business men (Table 3). 28% of those that booked early had a caesarean section while 23.5% of those that booked late had a caesarean section (Table 4).

**Table 3:** Occupation of Spouse's

Occupation	Frequency	Percentage
Unemployed	14	3.3
Civil/Public Servant	160	38.1
Private/Artisan	3	0.7
Business	243	57.9
Total	420	100

**Table 4:** Gestational age at booking vs mode of delivery

Booking Gestational Age (GA)	Mode of Delivery	
	SVD (%)	CS (%)
< 12 Weeks	18 (5.4)	7 (7.0)
> 12 Weeks	302 (94.4)	93 (93)
Total	320 (100)	100 (100)

**Table 5:** Gestational age at booking vs gestational age at delivery

Gestational Age (GA) At Delivery	Booking Gestational Age (GA)	
	<12 Weeks	≥12 Weeks
< 37 Weeks	16 (64.0%)	279 (70.6%)
≥ 37 Weeks	9 (36.0%)	116 (29.4%)
Total	25 (100%)	395 (100%)

**Table 6:** Fetal outcomes vs gestational age at booking

Booking Gestational Age (GA)	Fetal Outcomes	
	Live Birth (%)	Still Births (%)
< 12 Weeks	25	0
> 12 Weeks	350	45
Total	375 (100)	45 (100)

Of the 25 participants that booked early, 16 (64%) had a preterm delivery while 279 (70.6%) of participants that booked late had preterm delivery (Table 5). None of the participants that booked early had a stillbirth (Table 6). One (4%) of those that booked early had a low birth weight baby while 36 (9.1%) of those that booked late had a low birth weight baby (Table 7). Parity alone

significantly correlated with early booking (Table 8) with the odds in favour of null parity (Table 9). There was no maternal death recorded.

**Table 7:** Gestational age at booking vs birth weight

Booking Gestational Age (GA)	Birth Weight		
	< 2.5Kg	2.5-4.0Kg	> 4.0Kg
< 12 Weeks	1 (2.7%)	22 (6.4%)	2 (5.4%)
> 12 Weeks	36 (97.3)	324 (93.6%)	35 (94.6%)
Total	37 (100%)	346 (100%)	37 (100%)

**Table 8:** Maternal obstetric characteristics vs gestational age at booking (multivariate regression analysis)

Variable	X <sup>2</sup>	DF	P
Parity	13.685	4	0.008
Mode of Delivery	0.134	1	0.715
Ga At Delivery	0.607	1	0.436
Birth Weight	0.986	2	0.611
Age	1.362	3	0.715

**Table 9:** Obstetric Characteristics vs gestational age at booking (univariate regression analysis)

GA at booking < 12 weeks	X <sup>2</sup>	DF	P	OR	SE	Lower	Upper
Variable		95% CI					
GA at booking < 12 weeks	X <sup>2</sup>	DF	P	OR	SE	Lower	Upper
<b>Parity</b>							
0	0.02	1	0.964	1.038	0.842	0.199	5.405
1	2.542	1	0.111	0.225	0.934	0.036	1.407
2	2.627	1	0.105	0.177	1.068	0.022	1.437
3	2.397	1	0.122	0.134	1.299	0.011	1.707
4 and above	-	0	R	R	R	R	R
<b>Mode of Delivery</b>							
SVD	0.136	1	0.712	0.835	0.490	0.320	2.179
CS	R	0	-	R	-	-	-
<b>GA at Delivery</b>							
< 37 Weeks	0.623	1	0.430	0.701	0.450	0.290	1.694
≥ 37 Weeks	R	0	-	R	-	-	-
<b>Birth Weight</b>							
< 2.5Kg	0.180	1	0.672	0.577	1.299	0.045	7.353
2.5 - 4.0Kg	0.157	1	0.682	1.372	0.797	0.288	6.543
> 4.0Kg	R	0	R	R	R	R	R
<b>Age</b>							
0 - 20	1.382	1	0.240	0.161	1.554	0.18	3.384
21 - 30	1.122	1	0.290	0.286	1.183	0.028	2.904
31 - 40	0.888	1	0.346	0.336	1.156	0.035	3.243
41 - 50	-	0	R	R	R	-	-

## Discussion

The WHO advocates for early antenatal booking to improve pregnancy outcomes [2]. Poor antenatal care services may not offer the desired improved pregnancy outcomes. Secondary healthcare facilities in our environment do not always have a full complement of trained personnel including obstetricians and skilled midwives. Antenatal care services are commonly offered by general duty doctors and nurses not trained as midwives due to the general shortage of trained manpower and the preference of the trained manpower to reside in urban centres and work in tertiary centres with better career progression opportunities. The centre chosen for this study had no obstetrician and very few trained midwives. The pregnancy outcome is an assessment of the benefits of early antenatal booking *viz a viz* the quality of antenatal care services offered in a secondary healthcare facility by general duty doctors and nurses to determine areas for improvement.

An overwhelming majority (94%) of the participants booked late. This is in keeping with previous findings<sup>[1, 3]</sup> and remains an area for advocacy by government and non-governmental organisations.

Antenatal care is important in preventing preterm births<sup>[8]</sup>. Preterm births which is one of the major causes of perinatal morbidity and mortality was more in women who booked late (70.6%) compared to those who booked early (64%). Low birth weight is another significant cause of perinatal morbidity and mortality and only 4% of the early bookings had a low birth weight baby compared to 9.1% for the late bookings. This is in keeping with previous studies<sup>[4]</sup>. Although the differences in these obstetric outcomes between early and late bookings were not statistically significant, the marginal gains are a pointer to the benefits of early antenatal care and could be better if the facilities can be improved and skilled care givers provided through regular recruitments and regular re-trainings/refreshers courses. None of the women who booked early had a still birth compared to the 45 still births in the late bookers.

More of the early bookings (28%) had a caesarean delivery while 23.5% of the late bookings had a caesarean delivery. Details of the indications for the caesarean deliveries were not captured in the data and constitutes a limitation to this study and this should be an area for future research interest including other obstetric parameters such as Apgar scores, early neonatal deaths and circumstances surrounding intrauterine fetal deaths before and after admission to hospital. The management outcomes of these preterm and low birth weight babies in such low resource settings is also worth analysing.

### Conclusion

The study reveals some marginal benefits, though not statistically significant, in the pregnancy outcomes of women who registered early for antenatal care compared to those who registered late. These marginal benefits suggests a need for improvement in the obstetric skills of these general duty medical personnel working in semi-urban healthcare settings to meet the WHO standard of care which had shown significant benefits from early antenatal care.

Every facility should regularly review the quality of ANC services by checking: The pattern of booking, frequency of visits, knowledge/deployment of effective screening, available infrastructure for early diagnosis and prompt treatment of obstetrical problems followed by review of pregnancy outcomes. Improved coverage and quality of ANC services will reduce the worrisome maternal/perinatal morbidity and mortality figures.

### Conflict of Interest

The authors have no conflict of interest while preparing this manuscript.

### Authors Contribution

EKO conceptualized, designed and wrote the study. BO coded the data into SPSS. JO proof read the study and made corrections.

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### Conflict of Interest

Not available

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