

Correlates of Antenatal Clinic Attendance Pattern and Labour Outcomes among Nigerian Women

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Abstract

Background: Antenatal clinic attendance increases the opportunity for good labour outcomes. There is paucity of studies on how pattern of antenatal attendance modifies the labour outcome. This facility-based *ex-post-facto* study assessed the influence of pattern of antenatal attendance on labour outcomes.

Method: Cross sectional study of 302 women (15 - 49 years) that delivered and are within first 24 hours postpartum in four selected hospitals in Owerri, Imo state, Nigeria. Observational checklist and structured questionnaire are instruments for data collection which was administered via interview. The maternal antenatal records were consulted for some obstetrics and gynecological data. Chi-square was used to analyze the data and level of significance was 5% (0.05). **Result:** Most of the participants 134 (44.4%) were within the age of 29 - 35 years with mean age of 30.00 ± 5.82 . Majority of them were married 281 (93.0%), most 219 (72.5%) were multiparous and 179 (59.3%) had tertiary education while 7 (2.3%) had no formal education. Majority of the women that attended ANC visit > 5 times had the highest number of spontaneous vaginal delivery 58 (45.3%), normal birth weight 89 (47.8%), Apgar score 93 (49.7%) ≥ 7 , favourable peripartum maternal condition 72 (55.4%) and postpartum neonatal conditions 99 (48.1%), while those that had less than five ANC visit especially those that had < 3 ANC visit had the highest number of maternal distress 22 (71%), obstructed labour 8 (57.1%), and retained placenta 15 (60.0%), assisted vaginal delivery 13 (43.3%), post term babies 22 (48.9%), still birth 16 (53.3%), low birth weight 22 (48.9%) and very poor Apgar score 22 (52.4%). Peripartum maternal condition, mode of delivery, postpartum neonatal condition, 5th minute Apgar score and birth weight had significant relationship with the number of ANC visit ($P < 0.001$). The gestational age at

booking was also significantly associated with labour outcome ($P < 0.001$). Majority of the participants who booked within 13 - 28 weeks GA had spontaneous vaginal delivery 86 (67.2%), satisfactory peripartum condition 91 (70.0), the highest live birth, good 5th minute Apgar score 133 (71.1%) and normal birth weight 124 (66.7%). Those who booked at third trimester (>28 weeks) had the highest emergency CS 48 (47.1%), maternal distress 28 (90.3%), ruptured uterus 2 (100%), post term 31 (68.9%), while those that booked at first trimester (<13 weeks) had no prolonged labour 0 (0%), ruptured uterus 0 (0%) and post term. The number of intermittent preventive therapy for malaria (IPT) taken had a significant relationship with labour outcome ($P < 0.001$). Women who had 2 doses of IPT 143 (47.4%) had favourable labour outcome; 60 (46.9%) had SVD, 57 (43.8%) had no complication, 88 (42.7%) had live birth, 80 (42.8%) had good 5th minute Apgar score and 82 (44.1%) women had normal birth weight babies. Percentage of RDS taken is significantly associated with the labour outcome ($P < 0.001$). Among the 54 (17.9%) that took less than 9% of their given RDS, 15 (50.0%) had AVD, 25 (80.6%) had maternal distress, 14 (56.0%) had retained placenta 14 (56.0%), 27 (60.0%) had post term babies, 17 (56.7%) had still birth, 22 (52.4%) of their babies had poor 5th minute Apgar score, while 20 (44.4%) had LBW babies. Among 66 (21.9) women who took 70% or more of their RDS, 4 (13.35) had AVD, 1 (3.2%) had maternal distress, 0 (0.00%) had retained placenta, 0 (0.00%) had post term babies, 2 (6.7%) had still birth, 6 (14.3%) had poor 5th minute APGAR score, 16 (13.3%) had LBW babies. **Conclusion:** Poor antenatal health seeking behavior and non-adherence to antenatal advice are associated with some maternal and neonatal complications during labour and the postpartum period.

Keywords

Antenatal Care, Labour Outcome, Newborn

1. Introduction

Antenatal care is important for prevention of neonatal and maternal mortality and morbidity. About 59,000 maternal mortalities occur every year in Nigeria [1]. National Demographic Health Survey 2013 indicates that antenatal care coverage in Nigeria is to be 61% and only about 54% had at least four ANC visit [2]. Antenatal clinic is the entry point to have contact with skilled birth attendants [3].

Early antenatal booking, regular attendance and adherence to antenatal advice increases opportunity for accessing quality care and ensuring a healthy mother and baby. While antenatal clinic (ANC) attendance increases the opportunity for pregnant women to have good labour outcome [4] [5], quality outcomes of pregnancy for the woman and her baby may depend on the pattern of the antenatal clinic (ANC) attendance. WHO recommends eight antenatal clinic visits to achieve this goals [3]. ANC attendance is defined in this study as number of ANC visits,

gestational age at booking, number of IPT-SP taken and percentage of RDS the woman had throughout the present pregnancy. WHO also recommends that a woman with no, or unknown TT immunization status should receive two doses of a tetanus toxoid-containing vaccine (TT-CV) at one month interval, and one dose during each subsequent pregnancy but this was not part of this study. Health education on danger signs in pregnancy, labour, and postpartum period and utilization of other reproductive health services including family planning are done during ANC visits [6]. Identification of pregnant woman at risk of complicated labour outcome is also a vital part of ANC [7].

Number of ANC visit and time of commencement of ANC determine the services to receive. Non-use of the services may lead to complicated perinatal outcome [3]. In a study done by Abbas, Rabeea, Abdel Hafiz and Ahmed in Egypt, still birth, low birth weight (LBW) and preterm births were found to be significantly common among irregular ANC attendees. Also a study done in Mexico [8] found that women who received fewer clinical services had 76% increase risk of LBW associated with premature delivery. In Kumasi Ghana [5], less than four ANC visit was found to be associated with poor pregnancy outcome. In that study part of the sample population were women presenting for delivery to sixteen selected TBAs which may have affected the outcome. On the contrary, Gissler and Hemminki [9] found out that caesarean section, induction of labour and adverse infant outcome occurred more in women with several number of ANC contacts.

WHO in 2001 recommended focused ANC (F-ANC) model which advocates four ANC contacts with each contact having specific intervention stipulated according to the gestational age of the woman [10]. Regardless of this, in the developing countries pregnant women still receive poor quality antenatal care, which becomes even worse with fewer antenatal contacts. WHO affirmed that regardless of a country' stage of development, the higher the number of antenatal clinic attendance the more the women are satisfied [11]. WHO [11] in 2016 observed that F-ANC model does not also offer women adequate contact with health-care practitioners, hence a new guideline on antenatal care called "positive pregnancy experience model" was introduced. The model recommends at least eight ANC contacts during pregnancy and scheduled the contacts as follows; first contact at first trimester (at about 12 weeks), two contacts in the second trimester (at 20 and 26 weeks) and five contacts at third trimester (at 30, 34, 36, 38 and 40 weeks). Despite adopting this 2016 WHO new ANC attendance model, implementation has remained suboptimal in Nigeria. Nigeria accounts for 10% of global maternal deaths and has the second highest maternal mortality rate in the world. It is also reported that for every woman that dies from pregnancy related causes, 20 - 30 more will develop short and long term damage to their reproductive organs resulting in disabilities such as obstetric fistula, pelvic infection and ruptured uterus. The lower the ANC coverage in a country, the higher the maternal mortality rate, a trend shown by an analytical review involving many countries by Adeniyi and Erhabor [12] (ANC coverage in United Arab Emirates was 100% with MMR of 8 per

100,000, Ghana was 96% with MMR of 560 per 100,000 while Nigeria had ANC coverage of 61% with MMR of 560 per 100,000). A similar trend is observed in neonatal mortality by Gissler and Hemminki [9]. A study [13] in Southwest Nigeria found that women with poor prenatal service utilization (less than 4 ANC visits) had significantly more babies with LBW and 5 minutes APGAR scores less than 7. This study therefore, aimed to correlate pattern of antenatal attendance and the labour outcomes among Nigerian women. Considering the need to mobilize measures for reduction of maternal and perinatal mortality indices, findings of this study will help policy makers to develop and institute context-specific strategies to facilitate program implementation on ANC and sensitize health personnel on the factors that lead to poor labour outcome.

2. Materials and Method

2.1. Study Design and Area

Cross sectional design was adopted to investigate the relationship between antenatal attendance pattern and labour outcome among women attending health facilities in Owerri. Owerri is the capital of Imo state in south eastern Nigeria. Imo State has an estimated population of 4.6 million people with about four hundred and seventy thousand (470,000) of these residing in the Owerri. An estimated one hundred and thirty thousand (26.87%) are women of reproductive age [14] [15]. Owerri has different categories of health institution as orthodox source of health care. They include tertiary-Federal Medical Centre (FMC), secondary- Imo Specialist hospital, four PHCs, and many private hospitals. Four prominent health facilities chosen for the study were FMC which is located along Owerri Orlu road, Imo Specialist Hospital, located off Port Harcourt road, and two private hospitals namely St. David Hospital located off Owerri Okigwe road while Holy Family is located in Ikenegbu layout Owerri. The study was carried out in the labour wards and postnatal wards of the above-mentioned hospitals.

2.2. Study Population and Sampling

Women within 24 hours postpartum in the four selected facilities chosen for the study were the target population. An estimate population of 930 pregnant women from an average monthly ANC attendance in the hospitals was obtained from unpublished medical records of each hospital (FMC—551, Imo specialist hospital—254, Holy family hospital—68 and St. David hospital—57). Using the creative research system survey software, sample size calculator was used to calculate the sample size. $SS = (Z [2] * (P) * (1 - P) / C [2]$; where: $Z = 1.96$, $p =$ proportion of target population (expressed as 0.5), $C =$ Confidence Interval (0.04 ± 4) [14]. The original sample size was 283, considering that the participants may exit before the end of data collection, an adjusted sample size formula for anticipated 10% attrition rate: $q = n / 1 - f$ (where q is adjusted sample size; n is original sample size; and, f is estimated non-response rate) [15]. Thus the original sample size was adjusted to 314.12 participants exit before the end of data col-

lection. 302 participants were conveniently selected from the four study facilities according to their proportion.

2.3. Eligibility Criteria and Ethical Approval

The Inclusion Criteria include women within 24 hours postpartum in any of the study facilities, both booked and unbooked who volunteered to participate. Women with chronic medical conditions and those that refused to participate were excluded. FMC Owerri health research ethics committee gave approval of the study (FMC/OW/HREC/5809). Informed consent was obtained from each Participants of the study. Information provided by the participants was treated confidentially and participant's anonymity was maintained. This study was at no extra cost to the patient and no form of financial reward was given to encourage participation. They were informed that declining consent to participate will not in any way affect their care.

2.4. Method of Data Collection

Observational checklist and structured questionnaire are instruments for data collection which was administered via interview. Antenatal records were consulted to collect some medical/obstetrics and gynecological history and to confirm some data given by the participants. Data on labour outcome were collected in the labour or postnatal ward after delivery within 24 hours postpartum using the checklist. Labour outcome comprises of maternal outcome and neonatal outcome. Maternal outcome measures were peripartum condition: laceration, maternal distress, obstructed labour, peripartum pyrexia, prolonged labour, retained placenta, ruptured uterus; and mode of delivery. Neonatal outcome measures were postpartum neonatal condition: preterm, post term, SCBU admission and stillbirth; Apgar score; and birth weight. On ANC visits, the participants were divided into three groups: unbooked (< 3 ANC visit), inadequate ANC (3 - 5 ANC visit) and adequate ANC (>5 ANC visit),

Four midwives from each study facility were the research assistants trained and they helped in the data collection. The data were collected within the first 24 hours postpartum. Eligibility of the participants to participate was assessed and women who meet the inclusion criteria were recruited. The participants were allotted serial number, which was recorded in the instrument.

2.5. Reliability of the Instrument

The reliability of the instrument was determined using the test-retest method. The instrument was administered to 30 women of comparable characteristics at Imo state teaching hospital Orlu L.G.A. of Imo State. Then an interval of two weeks was allowed before going back to administer the same test to the same group of mothers who took the test previously. The two sets of data were correlated using Pearson Product Moment Correlation coefficient which determined the reliability coefficient of the instrument. It gave a score of 0.86.

2.6. Data Analysis

Data collected were analyzed using descriptive statistics (frequency, percentages, and mean) and inferential statistics (Chi-square). The relationship between labour outcome and Antenatal attendance pattern was studied. Antenatal attendance pattern was defined by these 4 parameters viz; Number of Antenatal visits (<3 times was interpreted as “unbooked”, 3 - 5 times was irregular, while > 5 is regular), Gestational age at booking, number of IPT-sp taken, Percentage and frequency of RDS (routine drugs/approved nutritional supplements received) taken. Participants noted to have poor antenatal attendance pattern during the study were counseled on importance of ANC and followed up during postnatal clinic visits. All analyses were done with the aid of Statistical Package for Social Sciences (SPSS version 21). *P*value ≤ 0.05 was considered statistically significant. Data were presented in tables.

3. Results

The number of women that were recruited into the study were: Federal Medical centre Owerri 159 (56%); Imo Specialist Hospital 85 (28%); Holy Family Hospital 30 (10%); and St. David’s Hospital 18 (6%) with 96% return rate.

Table 1 shows the socio-demographic characteristics of the participants. Most of the participants 134 (44.4%) were within the age of 29 - 35 years with mean age of 30.00 ± 5.82 . Majority of the participants 219 (72.5%) were multiparous women and most of them 179 (59.3%) had tertiary education while 7 (2.3%) had no formal education. Majority of them were married 281 (93.0%). Most 114 (37.7%) of the women were of a middle socioeconomic class, while 105 (34.8%) were of low social class.

Table 1. Socio-demographic characteristics of the participants (n = 302).

Socio-demographics		Total	(%)
Age	15 - 21	25	8.3
	22 - 28	86	28.5
	29 - 35	134	44.4
	36 - 42	52	17.2
	43 - 49	5	1.7
	$\bar{x} \pm SD$	30.00 \pm 5.82	
Parity	Nulliparous	13	4.3
	Primiparous	57	18.9
	Multiparous	219	72.5
	Grand multiparous	13	4.3
Highest level of education	None	7	2.3
	Primary	12	4.0

Continued

	Secondary	104	34.4
	Tertiary	179	59.3
Marital status	Single	18	6.0
	Married	281	93.0
	Divorced	1	0.3
	Separated	2	0.7
	Social economic status	High	83
	Middle	114	37.7
	Low	105	34.8

A study of the ANC attendance showed that most women 119 (39.4%) had 3 - 5 ANC visits while 71 (23.5%) had less than 3 ANC visits. Further analysis of ANC visits showed that only 56 (18.5%) women had adequate (8 or more) ANC visits. Most women 176 (58.3%) booked for ANC between the gestational ages of 18 to 28 weeks while 78 (25.8%) women booked after 28weeks gestation (**Table 2** & **Table 3**).

Table 2. The women's pattern of antenatal attendance.

Pattern of antenatal attendance		n (302)	%
No of ANC visits	<3	71	23.5
	3 - 5	119	39.4
	≥5	112	37.1
Gestational Age at Booking	<18 weeks	48	15.9
	18 - 28 weeks	176	58.3
	>28 weeks	78	25.8
Overall pattern of ANC attendance	Adequate	56	18.5
	Inadequate	246	81.5

Table 3. Women's adherence to ANC advise n (%).

Number of IPT Received	
None	5 (1.7)
One	106 (35.1)
Two	143 (47.4)
Three or More	48 (15.9)

Continued

<i>Percentage of Drugs Taken</i>	
<9	54 (17.9)
9 - 49	69 (22.8)
50 - 69	113 (37.4)
≥70	66 (21.9)
<i>Frequency of routine drug intake</i>	
None	16 (5.3)
Occasionally	93 (30.8)
Often	110 (36.4)
Very Frequently	83 (27.5)

Table 4 shows relationship between prenatal health seeking behaviours of the women and their labour outcome using chi-square test. Prenatal health seeking behaviour is significantly associated with labour outcome ($P < 0.001$). Majority of women that had more than 5 ANC visits had spontaneous vaginal delivery 58 (45.3%), satisfactory peripartum maternal condition 58 (45.3%), and satisfactory neonatal condition as 99 (48.1%) had live babies, 89 (47.8%) had babies with normal baby weight thus higher number of ANC visits is significantly associated with good labour outcome. Although those with more than 5 ANC visits had more elective CS 25 (59.5%), those with less than 3 ANC visit had more emergency caesarean section 34 (33.3%), maternal distress 22 (71.0%), obstructed labour 8 (57.1%), retained placenta 15 (60.0%) and unfavourable neonatal conditions such as post term 22 (48.9%), stillbirth 16 (53.3%), poor 5th minute Apgar score 22 (52.4%) and low birth 22 (48.9%). The gestational age at booking was also significantly associated with labour outcome ($P < 0.001$). Majority of the participants who booked within 13 - 28 weeks GA had spontaneous vaginal delivery 86 (67.2%), satisfactory peripartum condition 91 (70.0), the highest live birth, good 5th minute Apgar score 133 (71.1%) and normal birth weight 124 (66.7%). those who booked at third trimester (>28 weeks) had the highest emergency CS 48 (47.1%), maternal distress 28 (90.3%), ruptured uterus 2 (100%), post term 31 (68.9%), while those that booked at first trimester (< 13 weeks) had no prolonged labour 0 (0%), ruptured uterus 0 (0%) and post term.

Table 5 shows the relationship between adherence ANC advice and labour outcome using chi-square test. It was found that adherence to health advise is significantly associated with the labour outcome. The number of intermittent preventive therapy for malaria (IPT) taken was significantly associated with labour outcome ($P < 0.001$) as women who had 2doses of IPT 143 (47.4%) came out with favourable labour outcome, 60 (46.9%) had SVD, 57 (43.8%) had no complication, 88 (42.7%) had live birth, good apgar score 80 (42.8%) and 82 (44.1%) women had normal birth weight babies. It was also found that the

percentage of RDS taken is significantly associated with the labour outcome ($P < 0.001$) as those that took 50 percent and above of their RDS had favourable maternal and neonatal labour outcome while those that took less than 50% had more unfavourable outcome. For example, among women that took less than 9% of their given RDS, 15 (50.0%) had AVD, 25 (80.6%) had maternal distress, 14 (56.0%) had retained placenta 14 (56.0%), 27 (60.0%) had post term babies, 17 (56.7%) had still birth, 22 (52.4%) of their babies had poor 5th minute Apgar score, while 20 (44.4%) had LBW babies. This is in contrast to what is seen among women who took 70% or more of their RDS, 4 (13.35) had AVD, 1 (3.2%) had maternal distress, 0 (0.00%)

Table 4. Relationship between prenatal health seeking behaviors of women and their labour outcome (n = 302).

prenatal health seeking behaviours		Mode of del				Maternal Peripartum condition		Postpartum neonatal condition		APGAR score at 5 minutes			Birth weight		
		SVD (128)	AVD (30)	ELCS (42)	EMCS (102)	NC (130)	C (172)	NLB (206)	CB (96)	≤3 (42)	4 - 6 (73)	≥7 (187)	NBW (186)	LBW (45)	MB (71)
Number of visits	< 3 (71)	19	13	5	34	13	58	24	47	22	29	20	21	22	29
	3 - 5 (119)	51	11	12	45	45	74	33	86	13	32	74	76	10	33
	>5 (112)	58	6	25	23	72	40	99	13	7	12	93	89	13	10
χ^2		33.8				12.4		69.2		58.4			52.9		
p-value		0.001				0.001		0.001		0.001			0.001		
Gestational age at booking	<13 (48)	22	7	9	10	24	24	37	11	11	5	32	31	10	7
	13 - 28 (176)	86	17	29	44	91	85	138	38	17	26	133	124	23	29
	> 28 (78)	20	6	4	48	15	63	31	47	14	42	22	31	12	35
χ^2		38.7				104.4				64.4			30.4		
p-value		0.001				0.001				0.001			0.001		
Frequency of ANC visit	None (12)	1	5	0	6	2	10	2	10	8	4	0	2	8	3
	Occasionally (97)	28	16	5	48	22	75	45	52	19	38	40	43	19	35
	Often (85)	41	7	11	26	37	47	64	21	7	20	58	54	6	25
	Very Frequently (108)	58	2	26	22	69	39	95	13	8	11	89	87	12	9
χ^2		64.3				151.2		83.2		71.7			61.1		
p-value		0.001				0.001		0.001		0.001			0.001		

Note: SVD: Spontaneous Vaginal Delivery; AVD: Assisted Vaginal Delivery; ELCS: Elective Caesarean Section; EMCS: Emergency Caesarean Section; NC: No Complication; C: Complication; NLB: Normal Live Birth; CB: Complicated Birth; NBW: Normal Birth Weight; LBW: low birth weight; MB: Macrosomic baby.

Table 5. Relationship between adherence to ANC advice and their labour outcome (n = 302).

Adherence to ANC advice	Mode of delivery	Maternal Peripartum condition		Postpartum neonatal condition		APGAR score at 5 minutes			Birth weight						
		SVD (128)	AVD (30)	ELCS (42)	EMCS (102)	NC (130)	C (172)	NLB (206)	CB (96)	≤3 (42)	4 - 6 (73)	≥7 (187)	NBW (186)	LBW (45)	MB (71)
Number of IPT	None (5)	3	0	1	1	2	3	4	1	0	1	4	4	1	0
	One (106)	49	20	8	29	39	67	71	35	29	13	64	63	27	16
	Two (143)	60	9	19	55	57	86	88	55	9	54	80	82	13	48
	Three or more (48)	16	1	14	17	32	16	43	5	4	5	39	37	4	7
χ^2		29.4		87.9		58.1		46.5			27.5				
p-value		0.001		0.001		0.001		0.001			0.001				
Percentage of drug taken	<9 (54)	6	15	1	32	4	50	6	48	22	26	6	8	20	26
	9 - 49 (69)	32	6	13	18	39	30	59	10	4	17	48	50	8	11
	50 - 69 (113)	51	5	17	40	53	60	82	31	10	26	77	75	11	27
	≥70 (66)	39	4	11	12	34	32	59	7	6	4	56	53	6	7
χ^2		62.9		182.6		126.5		85.7			66.8				
p-value		0.001		0.001		0.001		0.001			0.001				
Frequency of routine drug	None (16)	2	6	1	7	4	12	5	11	10	2	4	6	8	2
	Occasionally (93)	25	15	12	41	30	63	43	50	16	41	36	37	20	36
	Often (110)	51	6	15	38	53	57	84	26	9	24	77	75	11	24
	Very Frequently (83)	50	3	14	16	43	40	74	9	7	6	70	68	6	9
χ^2		46.5		129.5		70.9		78.1			51.8				
p-value		0.001		0.001		0.001		0.001			0.001				

Note: SVD: Spontaneous Vaginal Delivery; AVD: Assisted Vaginal Delivery; ELCS: Elective Caesarean Section; EMCS: Emergency Caesarean Section; NC: No Complication; C: Complication; NLB: Normal Live Birth; CB: Complicated Birth; NBW: Normal Birth Weight; LBW: Low Birth Weight; Mac: Macrosomi.

had retained placenta, 0 (0.00%) had post term babies, 2 (6.7%) had still birth, 6 (14.3%) had poor 5th minute APGAR score, 16 (13.3%) had LBW babies.

4. Discussion

Despite adopting the 2016 WHO ANC model that recommends 8 ANC visits, Nigeria accounts for 10% of global maternal deaths. This has been attributed to fac-

tors like poor utilization of antenatal services and lack of skilled birth attendants during delivery.

In this study majority of women that had more than 5 ANC visits had spontaneous vaginal delivery, satisfactory peripartum maternal condition, and satisfactory neonatal condition thus higher number of ANC visits is significantly associated with good labour outcome. This is similar to findings by Haftu *et al.*, Awoleke and Olofinbiyi, Asundep *et al.* [6] [13] [16]. In the study by Haftu *et al.* [16], less than 4 ANC visits was associated with increased risk of postpartum haemorrhage which was not analysed separately in this study. In a similar study, Danish, Fawad and Abbasi [17] found that aside postpartum complications, prolonged labour was also associated with less than 4 ANC visits. In index study, mode of delivery was significantly associated with number of ANC visits ($P < 0.001$) whereby those that had greater than 5 ANC visits had more Spontaneous vaginal delivery and elective caesarean section while those with less than 5 ANC visits had more Assisted vaginal deliveries and emergency caesarean section. This finding could be because elective caesarean section is a planned procedure. This finding is supported by the findings of Sodje and Ande [18]. In contrast, Gissler and Hemminki [9] reported that women with many ANC visits had higher number of instrumental delivery and caesarean section. However, their study was a retrospective study and based on women's saved records.

Postpartum condition of babies showed significant relationship with the number of ANC visits ($P < 0.001$). Majority of the participants who attended ANC more than five times had no postpartum neonatal complication while those that had less than 3 ANC visit had the highest number of preterm, post term and still birth. Haftu and his co-workers [16] had similar findings. In their study LBW, early neonatal death and preterm delivery reduced by 46%, 61% and 52% respectively among women who adhered to 5 or more ANC visits. Similarly, Abbas *et al.* [3] reported that preterm birth and stillbirth were significantly more among women with less than 4 ANC visits. Gupta and Talukdar [19], found a significant association between receiving ANC frequently (4 - 9 visits) and lower risk of neonatal death; 5th minute Apgar score showed significant relationship with the pattern of ANC visit ($P < 0.001$). Majority of neonates delivered by the participants who attended ANC more than five times had 5th minute Apgar score of seven and above whereas most of those that had 3 - 5 and less than 3 ANC visits and less than 3 had 5th minute Apgar scores of 5 - 6 and less than 5 respectively. Study done by Awoleke and Olofinbiyi [13] was in support of this finding where the women with less than four antenatal visits had significantly more babies with less than Apgar score of less than 7. An analysis of the gestational age at booking showed that gestational age at booking was significantly associated with labour outcome ($P < 0.001$). Majority of the participants who booked within 13 - 28 weeks GA had spontaneous vaginal delivery, satisfactory peripartum condition, the highest live birth, good 5th minute Apgar score and normal birth weight while those who booked at third trimester (>28 weeks) had the highest emergency CS rate, mater-

nal distress, ruptured uterus and post term delivery. Those that booked in the first trimester (<13 weeks) had no prolonged labour 0 (0%), ruptured uterus 0 (0%) and post term delivery. This study agrees with the findings of Ehiemere and his colleagues [20] among rural women in Enugu state. In that study majority of the respondents (women) booked for ANC within the first trimester and most of the respondents were strong to take care of their babies after delivery, indicative of satisfactory postpartum condition. They also found that most of the babies cried vigorously immediately after birth.

In this study adherence to ANC health advise (number of IPT-SP received and percentage of RDS taken) was found to be significantly associated with the labour outcome ($P < 0.001$). Majority of women who had 2 doses of IPT-SP had SVD, no maternal complications, live births, good 5th minute APGAR scores and normal birth weight babies. This finding is in keeping with the findings in Ado-Ekiti [21] which showed that babies born to mothers who received IPT-SP had a higher average weight than those who did not receive IPT-SP. The study also found a shorter duration of labour in women who received IPT-SP. Similarly, Celliche and co-workers [22] in Papua New Guinea found that compared to women receiving 0-1 dose of IPT-SP, women receiving 2 or more doses had 45% lower odds of low birth weight. They also reported a 16% further reduction with 3 or more doses of IPT-SP.

It was also found that the percentage of RDS taken is significantly associated with the labour outcome ($P < 0.001$) as those that took 50 percent and above of their RDS had favourable maternal and neonatal labour outcome while those that took less than 50% had more unfavourable outcome. For example, among women that took less than 9% of their given RDS, 15 (50.0%) had AVD, 25 (80.6%) had maternal distress, 14 (56.0%) had retained placenta 14 (56.0%), 27 (60.0%) had post term babies, 17 (56.7%) had still birth, 22 (52.4%) of their babies had poor 5th minute Apgar score, while 20 (44.4%) had LBW babies. This is in contrast to what is seen among women who took 70% or more of their RDS, 4 (13.35) had AVD, 1 (3.2%) had maternal distress, 0 (0.00%) had retained placenta, 0 (0.00%) had post term babies, 2 (6.7%) had still birth, 6 (14.3%) had poor 5th minute APGAR score, 16 (13.3%) had LBW babies [23].

Nutrient supplementation in pregnancy is a popular evidence based ANC practice. In this study percentage of RDS taken is significantly associated with the labour outcome ($P < 0.001$) as those that took 50 percent and above of their RDS had favourable maternal and neonatal labour outcome while those that took less than 50% had more unfavourable outcome. Though There are not enough data in our region to support or disagree with the findings of this study but a review by Hemminki and Starfield to determine whether routine administration of iron and vitamins during pregnancy had beneficial effects on birth weight, length of gestation, infant morbidity and mortality, maternal morbidity and mortality in developed western countries. Seventeen trials were found. In one trial, women who received vitamin B6 developed less dental caries. In another trial women receiving several different minerals and vitamins had fewer deliveries before the 40th week

and less pre-eclampsia. In a third study, women receiving polyvitamin concentrate had less pre-eclampsia.

Some of the limitations of this study include the fact that some factors that affect prenatal health seeking behavior and adherence to health advice among pregnant women like socioeconomic status, highest educational attainment were not studied. The reliability of information obtained from participants within that first day of delivery may be affected by their emotional state.

5. Conclusion

Poor antenatal health seeking behavior and non-adherence to antenatal advice are associated with some maternal and neonatal complications during labour and the postpartum period. These complications are worse with less than three antenatal visits. This underscores the need for better uptake of antenatal services.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] WHO, UNICEF & UNFPA (2017) Advocacy Brief: In family Planning/Child Birth Spacing for Health and National Development Action Points for Policy Maker.
- [2] Population and Housing Census, National Population Commission [Nigeria] & ICF (2014) Nigeria Demographic and Health Survey 2013. NPC and ICF International.
- [3] Abbas, A.M., Rabeea, M., Abdel Hafiz, H.A. and Ahmed, N.H. (2017) Effects of Irregular Antenatal Care Attendance in Primiparas on the Perinatal Outcomes: A Cross-Sectional Study. *Proceedings in Obstetrics and Gynecology*, **7**, Article No. 2. <https://doi.org/10.17077/2154-4751.1341>
- [4] Joshi, C., Torvaldsen, S., Hodgson, R. and Hayen, A. (2014) Factors Associated with the Use and Quality of Antenatal Care in Nepal: A Population-Based Study Using the Demographic and Health Survey Data. *BMC Pregnancy and Childbirth*, **14**, Article No. 94. <https://doi.org/10.1186/1471-2393-14-94>
- [5] El-Zanaty, F. and Way, A.A. (2014) Egypt Demographics and Health Survey. <http://dhsprogram.com/pubs/pdf/PR54/PR54.pdf>
- [6] Asundep, N.N., Jolly, P.E., Carson, A., Turpin, C.A., Zhang, K. and Tameru, B. (2013) Antenatal Care Attendance, a Surrogate for Pregnancy Outcome? The Case of Kumasi, Ghana. *Maternal and Child Health Journal*, **18**, 1085-1094. <https://doi.org/10.1007/s10995-013-1338-2>
- [7] Arsenault, C., Mfeka-Nkabinde, N.G., Chaudhry, M., Jarhyan, P., Taddele, T., Mugenya, I., *et al.* (2024) Antenatal Care Quality and Detection of Risk among Pregnant Women: An Observational Study in Ethiopia, India, Kenya, and South Africa. *PLOS Medicine*, **21**, e1004446. <https://doi.org/10.1371/journal.pmed.1004446>
- [8] Coria-Soto, I.L., Bobadilla, J.L. and Notzon, F. (1996) The Effectiveness of Antenatal Care in Preventing Intrauterine Growth Retardation and Low Birth Weight Due to Preterm Delivery. *International Journal for Quality in Health Care*, **8**, 13-20. <https://doi.org/10.1093/intqhc/8.1.13>
- [9] Gissler, M. and Hemminki, E. (1994) Amount of Antenatal Care and Infant Outcome. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, **56**, 9-14.

- [https://doi.org/10.1016/0028-2243\(94\)90146-5](https://doi.org/10.1016/0028-2243(94)90146-5)
- [10] World Health Organisation (2002) Antenatal Care Randomized Trial: Manual for the Implementation of the New Model. http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/
- [11] World Health Organisation (2016) WHO Guidelines on Antenatal Care for a Positive Pregnancy Experience. <https://www.who.int/reproductivehealth/news/antenatal-care/en/>
- [12] Adeniyi, F.F. and Erhabor, S.I. (2015) Barriers to Antenatal Care Use in Nigeria: Evidences from Non-Users and Implications for Maternal Health Programming. *BMC Pregnancy Childbirth*, **15**, Article No. 95. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4407543/>
- [13] Awoleke, J.O. and Olofinbiyi, B.A. (2020) Poor Prenatal Service Utilization and Pregnancy Outcome in a Tertiary Health Facility in Southwest Nigeria. *Pan African Medical Journal*, **35**, Article No. 28. <https://doi.org/10.11604/pamj.2020.35.28.20426>
- [14] Creative Research Systems Sample Size Calculator (n.d.) Your Complete Systems Survey Software. <https://www.surveysystem.com/sscalc.htm>
- [15] ANGEL STAT 509 (n.d.) Design and Analysis of Clinical Trials. Lesson 6: Sample Size and Power. <https://onlinecourses.science.psu.edu/stat509/node/57>
- [16] Haftu, A., Hagos, H., Mehari, M. and G/her, B. (2018) Pregnant Women Adherence Level to Antenatal Care Visit and Its Effect on Perinatal Outcome among Mothers in Tigray Public Health Institutions, 2017: Cohort Study. *BMC Research Notes*, **11**, Article No. 872. <https://doi.org/10.1186/s13104-018-3987-0>
- [17] Danish, N., Faward, A. and Abbasi, N. (2010) Assessment of Pregnancy Outcome in Primigravida: Comparison between Booked and Un-Booked Patients. *Journal of Ayub Medical College Abbottabad*, **22**, 23-25. <https://www.ncbi.nlm.nih.gov/pubmed/21702258>
- [18] Sodje, J.D. and Ande, A.A. (2016) Socio-Demographic Characteristics and Pregnancy Outcome of Booked and Un-Booked Women at the University of Benin Teaching Hospital. *Journal of Biomedical Science*, **15**, 109-120. <https://www.ajol.info/index.php/jmbr/article/view/154140>
- [19] Gupta, R. and Talukdar, B. (2017) Frequency and Timing of Antenatal Care Visits and Its Impact on Neonatal Mortality in EAG States of India. *Journal of Neonatal Biology*, **6**, Article ID: 1000263. <https://doi.org/10.4172/2167-0897.1000263>
- [20] Ehiemere, I.O. (2016) Maternal Health Seeking Behaviour and Pregnancy Outcome in Rural Communities in Enugu State, Southeast Nigeria. *Journal of Community Medicine and Health Education*, **6**, 26.
- [21] Peter, A. (2013) Effect of Intermittent Preventive Treatment of Malaria on the Outcome of Pregnancy among Women Attending Antenatal Clinic of a New Nigerian Teaching Hospital, Ado-Ekiti. *Nigerian Medical Journal*, **54**, 170-175. <https://doi.org/10.4103/0300-1652.114582>
- [22] Cellich, P., Unger, H.W., Rogerson, S.J. and Mola, G.D.L. (2024) Impact on Pregnancy Outcomes of Intermittent Preventive Treatment with Sulfadoxine-Pyrimethamine in Urban and Peri-Urban Papua New Guinea: A Retrospective Cohort Study. *Malaria Journal*, **23**, Article No. 201. <https://doi.org/10.1186/s12936-024-05010-0>
- [23] Hemminki, E. and Starfield, B. (1978) Routine Administration of Iron and Vitamins during Pregnancy: Review of Controlled Clinical Trials. *BJOG: An International Journal of Obstetrics & Gynaecology*, **85**, 404-410. <https://doi.org/10.1111/j.1471-0528.1978.tb14905.x>