

# Influence of early booking for antenatal care on antenatal and early pregnancy outcomes at Kenyatta National Hospital

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## Abstract

**Objective:** To determine whether mothers who book early experience better birth preparedness, ANC investigations and pregnancy outcomes compared to those who book late.

**Design:** A retrospective cohort study.

**Setting:** Kenyatta National Hospital, Nairobi, Kenya.

**Study population:** An exposed group of patients who had early booking (<16 weeks) for antenatal care and an unexposed group of patients who had late booking (> 28weeks).

**Sample size:** A total of 300 participants, 150 for each group.

**Results:** Late booking was associated with lower odds of birth preparedness evidenced by: lower knowledge of expected date of delivery (OR 0.26; P=0.005; 95% CI 0.1-0.66), and lower likelihood of having a birth plan in terms of desired place of delivery, preferred skilled birth attendant, birth companion, means of transport and blood donor (OR 0.24; P=0.006; 95% CI 0.09-0.67). Late booking was also associated with lower odds of emergency preparedness like knowledge of danger signs during pregnancy (OR 0.09; P=<0.001; 95% CI 0.05-0.18) and postpartum emergency preparedness like knowledge of danger signs in puerperium (OR 0.16; P=<0.001; 95% CI 0.08-0.33) and during infancy (OR 0.05; P=<0.001; 95% CI 0.03-0.09). Late booking was associated with lower knowledge on modern family planning methods (OR 0.17; P=0.001; 95% CI 0.1-0.29), and childhood immunization (OR 0.1; P=<0.001; 95% CI 0.06-0.17). Late booking was associated with lower likelihood of interventions like: Folic acid supplementation (OR 0.02; P=<0.001; 95% CI 0.01-0.03) and iron supplementation (OR 0.39; P=0.001; 95% CI 0.23-0.66).

**Conclusion:** Early booking for antenatal care confers better birth preparedness and better antenatal care interventions compared to late booking. Hence need for structures to be put in place to increase early antenatal bookings.

## Introduction

Antenatal Care (ANC) is the comprehensive antepartum care given to a pregnant woman and the unborn baby by a skilled health care provider to ensure a healthy mother and baby. This involves a coordinated approach to medical care and psychological support that begins as early as before conception and extends throughout the ante partum period (1, 2). World Health Organization (WHO) recommends that, pregnant women in developing countries should seek Antenatal Care (ANC) booking within the first 16 weeks of pregnancy, which is considered as early ANC booking (3, 4). Booking after 16 weeks in the second and third trimesters is generally considered late ANC booking.

WHO and the Kenyan Ministry of Health, recommends that a woman without complications should have four ANC visits, the first of which should take place during the first trimester that is before 16 weeks of gestation (3-7). Early booking for antenatal care in Kenya is low, at 15%, leaving the majority (85%) of women to late booking (8). Birth preparedness and

knowledge of danger signs is also low (9). The Kenyan scenario is typified by several African countries like Benin and Nigeria where pregnant women largely book late for ANC at, a mean gestation of 24 weeks (10-12).

Factors that have been associated with early and late ANC booking include: mothers' age, education level, occupation, parity, inter-pregnancy interval, pre-existing medical conditions, religion and residence (4, 10-12).

Early ANC booking is emphasized as it would impact on mothers in terms of improved outcomes related to better knowledge, early and adequate detection and prophylaxis of obstetric complications and overall reduction of risk of morbidities and mortalities. It too has a positive impact on neonatal outcomes (1).

A lot of emphasis has been put on educating pregnant women on the need to make four ANC visits, and progress has been made towards achieving this. However, many women do not know when to make the first booking visit, hence forming the basis for this study.

## Materials and Methods

This was a retrospective cohort study carried out in 2014 at Kenyatta National Hospital's (KNH) labour ward, ante-natal and post-natal wards, renal unit, Intensive Care Unit (ICU) and High Dependency Unit (HDU). The exposure of interest was booking for antenatal clinic at KNH and outcomes of interest had occurred prior to recruitment of participants. The study population comprised of an exposed group (pregnant women in KNH who had early ANC booking (<16 weeks gestation) and an unexposed group (women who had late ANC booking (>28 weeks gestation). A sample of 300 women (159 in each arm) was required to power the study to detect a 3% rate of poor outcome in the exposed groups with 95% confidence interval.

Enrolment of consenting patients was carried out in KNH labour ward, after delivery and followed up to 72 hours post delivery, in order to document early perinatal and maternal outcomes. Further, information about participants' prior investigations during ANC attendance and other aspects of care provided was retrieved from the participants' medical records (ANC cards) retrospectively. Data were collected using a

structured pretested questionnaire. Data analysis was conducted using the Statistical Package for Social Sciences version 17.0 (SPSS Inc, Chicago; Ill, USA). Summaries of demographic characteristics, patient's obstetric, medical and antenatal profile characteristics, modes of delivery, maternal and neonatal outcomes, level of birth preparedness and adequacy of investigations and related interventions were done. These were presented descriptively in form of means or medians for continuous variables and proportions for categorical variables. Proportions for categorical variables were compared using a Chi square test. Continuous variables were analyzed using a Student t-test. The strength of association was determined through odds ratio (OR) with 95% CI. Association was considered significant if the P-value was less than 5%.

## Results

A total of 300 women were recruited into the study in August 2014, with 150 women being in the exposed group (early ANC booking) and the other 150 being in the unexposed group (late ANC booking).

**Table 1:** Socio-demographic characteristics of women booked for ANC in KNH, 2014, by timing of ANC booking

Characteristics	Early booking (N=150)	Late booking (N=150)	OR (95% CI)	P value	
Maternal age group (years)	< 20	8(5.3)	9(6.0)	1.00	
	20-24	54(36.0)	52(34.7)	1.34(0.4-4.46)	0.593
	25-29	52(34.7)	51(34.0)	1.31(0.45-3.79)	0.617
	30-34	24(16.0)	27(18.0)	1.14(0.37-3.54)	0.817
	35-39	8(5.3)	9(6.0)	1.14(0.29-4.51)	0.849
	≥40	4(2.7)	2(1.3)	2.57(0.36-18.33)	0.346
Formal education	Primary	32(21.3)	38(25.3)	1.00	
	Secondary	51(34.0)	70(46.7)	0.87(0.48-1.57)	0.632
	Tertiary	67(44.7)	42(28.0)	1.94(1.05-3.57)	0.033
Spouses' education	Primary	13(8.7)	16(10.7)	1.00	
	Secondary	38(25.3)	55(36.7)	0.85(0.37-1.97)	0.705
	Tertiary	78(52.0)	57(38.0)	1.68(0.75-3.78)	0.206
Marital status	Single	23(15.3)	22(14.7)	1.00	
	Married	127(84.7)	128(85.3)	0.95(0.5-1.79)	0.872
Occupation	Employed	51(34.0)	35(23.3)	1.00	
	Unemployed	48(32.0)	63(42.0)	0.54(0.31-0.96)	0.036
	Others	51(34.0)	52(34.7)	0.67(0.38-1.2)	0.182
Spouses' occupation	Employed	83(55.3)	80(53.3)	1.00	
	Unemployed	4(2.7)	1(0.7)	3.86(0.42-35.24)	0.232
	Others	42(28.0)	47(31.3)	0.86(0.51-1.44)	0.572
Residence	Rural	14(9.3)	5(3.3)	1.00	
	Urban	136(90.7)	145(96.7)	0.33(0.11-0.93)	0.037

The demographic characteristics of mothers in the early and late booking groups are shown in Table 1. ANC clients in the two groups were similar in terms of age, marital status, spousal education and spousal occupation (all p values > 0.05). Late booking was more

likely among women residing in rural areas compared to those in urban areas (OR 0.33; 95% CI 0.11-0.93, p = 0.037). Late booking was also more likely among unemployed women compared to employed women (OR 0.54; 95% CI 0.31-0.96, p = 0.036).

**Table 2:** Obstetric and antenatal profile of women booked for ANC in KNH, 2014, by timing of ANC booking

Obstetric and ANC profile	Early booking N=150	Late booking N=150	Total	OR(95%CI)	P value
Inter-pregnancy interval (years)					
< 1	5(3.3)	0(0)	5(1.7)	NA	
1-2	12(8)	14(9.3)	26(8.7)	1.0	
> 2	61(40.7)	81(54)	142(47.3)	0.9(0.3-2.2)	0.763
Primigravidae	72(48)	55(36.7)	127(42.3)	1.5(0.6-3.9)	0.342
VDRL					
Negative	146(97.3)	147(99.3)	293(98.3)	1.0	
Positive	2(1.3)	0(0)	2(0.7)	NA	
Not done	2(1.3)	1(0.7)	3(1)	2.0(0.1-120)	0.562
HIV status					
Negative	141(94.6)	143(95.3)	284(95)	1.0	
Positive	6(4)	7(4.7)	13(4.4)	0.9(0.2-3.1)	0.81
Not done	2(1.3)	0(0)	2(0.7)	NA	
Previous CS (>1)	24(16)	30(20)	54(18)	0.8(0.4-1.5)	0.483

There were no significant differences in obstetric and antenatal care profile characteristics between those who booked early and those who booked late. Previ-

ous birth had a higher insignificant likelihood of booking late compared to primigravidae (OR 1.5; P=0.342; 95% CI 0.6-3.9) (Table 2).

**Table 3:** Birth preparedness of women who booked for ANC in KNH, 2014, by timing of ANC booking

Birth preparedness		Early (N=150)	Late (N=150)	OR	95 % CI		P value
Knowledge about :							
Danger signs in infancy	Yes	112(74.7)	19(12.7)	1.00			
	No	38(25.3)	131(87.3)	0.05	0.03	0.09	<0.001
Danger signs in puerperium	Yes	50(33.3)	11(7.3)	1.00			
	No	100(66.7)	139(92.7)	0.16	0.08	0.33	<0.001
Danger signs in pregnancy	Yes	136(90.7)	71(47.3)	1.00			
	No	14(9.3)	79(52.7)	0.09	0.05	0.18	<0.001
Exclusive breast feeding	Yes	146(97.3)	144(96.0)	1.00			
	No	4(2.7)	6(4.0)	0.49	0.12	2.01	0.324
Expected date of delivery	Yes	144(96.0)	129(86.0)	1.00			
	No	6(4.0)	21(14.0)	0.26	0.1	0.66	0.005
Family planning methods	Yes	120(80.0)	61(40.7)	1.00			
	No	30(20.0)	89(59.3)	0.17	0.1	0.29	<0.001
Immunization schedule	Yes	108(71.7)	31(20.7)	1.00			
	No	42(28.3)	119(79.3)	0.10	0.06	0.17	<0.001
Birth plan	Yes	143(95.4)	130(86.7)	1.00			
	No	7(4.6)	20(13.3)	0.24	0.09	0.67	0.006

Late booking was associated with lower odds of birth preparedness as evidenced by: lower knowledge of expected date of delivery (OR 0.26;  $P=0.005$ ; 95% CI 0.1-0.66), and lower likelihood of having a birth plan (OR 0.24;  $P=0.006$ ; 95% CI 0.09-0.67). Late booking was also associated with lower odds of emergency preparedness like knowledge of danger signs during pregnancy (OR 0.09;  $P<0.001$ ; 95% CI 0.05-0.18) and postpartum emergency preparedness like knowledge of

danger signs in puerperium (OR 0.16;  $P<0.001$ ; 95% CI 0.08-0.33) and during infancy (OR 0.05;  $P<0.001$ ; 95% CI 0.03-0.09). Late booking was associated with lower knowledge on modern family planning methods (OR 0.17;  $P=0.001$ ; 95% CI 0.1-0.29), and childhood immunization (OR 0.1;  $P<0.001$ ; 95% CI 0.06-0.17). Knowledge about exclusive breast feeding was not influenced by timing of booking (OR 0.49;  $P=0.324$ ; CI 0.12-2.01) (Table 3).

**Table 4:** Investigations and interventions of women who booked for ANC in KNH, 2014, by timing of ANC booking

Investigations and interventions		Early (N=150)	Late (N=150)	OR	95 % CI		P value
Blood grouping	Not done	3(2.0)	0(0.0)	NA			
	Done	147(98.0)	150(100.0)		NA	NA	NA
Deworming	Not done	17(11.3)	12(8.3)	1.00			
	Done	133(88.7)	138(91.7)	0.63	0.28	1.39	0.252
Folic acid supplementation	Given	133(88.7)	18(12.0)	1.00			
	Not given	17(11.3)	132(88.0)	0.02	0.01	0.03	<0.001
Haemoglobin (During ANC)	Not done	6(4.0)	3(2.0)	1.00			
	Done	144(96.0)	147(98.0)	0.49	0.1	2.35	0.319
HIV testing	Not done	3(2.0)	0(0.0)	NA			
	Done	147(98.0)	150(100.0)	NA		NA	NA
Iron supplementation	Given	123(82.0)	96(64.0)	1.00			
	Not given	27(18.0)	54(36.0)	0.39	0.23	0.66	0.001
Tetanus toxoid	Given	147(98.0)	146(97.3)	1.00			
	Not given	3(2.0)	4(2.7)	0.66	0.11	3.99	0.649
VDRL	Not done	2(1.3)	3(2.0)	1.00			
	Done	148(98.7)	147(98.0)	1.51	0.17	18.3	0.654

Women who booked late were less likely to receive folate and iron supplementation (OR 0.02;  $P<0.001$ ; 95% CI 0.01-0.03) and (OR 0.39;  $P=0.001$ ; 95% CI 0.23-0.66), respectively (Table 4).

**Table 5:** Mode of delivery of women who booked for ANC at KNH, 2014, by timing of ANC booking

Mode of delivery	Early (N=150)	Late (N=150)	OR	95 % CI		P value
SVD	93(62.0)	81(54.0)	1.00			
Assisted	0(0.0)	2(1.3)	NA			
Caesarean	57(38.0)	67(44.7)	0.69	0.43	1.12	0.137

The mode of delivery was not significantly associated with timing of ANC booking (Table 5). Most women in both groups had a SVD (54.7% in exposed versus 54% in unexposed). Slightly more women who

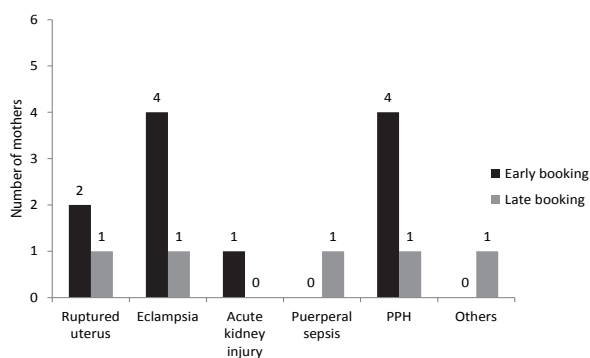
booked late delivered via caesarean section (44.7%), compared to those who booked early (31.3%). This difference was not significant (OR 0.63;  $p=0.137$ ; 95% CI 0.43-1.12).

**Table 6:** Maternal outcomes of women who booked for ANC in KNH, 2014, by timing of ANC booking

Outcomes		Early (N=150)	Late (N=150)	OR	95 % CI		P value
Labour	Obstructed	23(15.2)	28(18.7)	1.00			
	Prolonged	33(22.2)	28(18.7)	1.42	0.66	3.06	0.366
	Preterm	31(20.6)	18(12.0)	2.07	0.91	4.7	0.081
	Term	63(42.0)	76(50.6)	1.02	0.52	1.97	0.965
Maternal outcome	Good	138(92.0)	146(97.3)	1.00			
	Poor	12(8.0)	4(2.7)	3.18	1.00	10.08	0.05

There was no significant difference in the nature of labour between the exposed and unexposed groups (Table 6). The percentages of mothers with prolonged and preterm labour were found to be slightly higher among the exposed compared to the unexposed, while obstructed labour was slightly higher among the unexposed, but these differences were not significant.

Maternal outcomes were generally good (no associated morbidity or mortality) among the exposed (91.3%) and the unexposed (96.7%), OR = 3.18; 95% CI 1.00-10.08. The difference was not statistically significant; P=0.05.

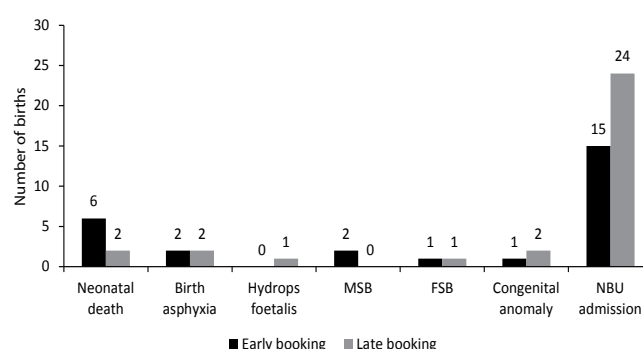
**Figure 1:** Absolute numbers of poor maternal outcomes of women who booked for ANC in KNH, 2014, by timing of ANC booking

Three mothers had ruptured uterus, two were exposed while one was unexposed (Figure 1). The two mothers with ruptured uterus both had previous caesarean section, therefore, likely to book early, and were predisposed to this outcome. Two of the mothers who developed eclampsia had lost at least one prior pregnancy, therefore, likely to book early, while the other two were young (one of them a teenager) primigravidae, who were predisposed to this outcome. The mother who developed acute kidney injury had also lost one prior pregnancy and was likely to book early. All four mothers in the exposed group who developed PPH had prolonged labour, out of which, two had prior pregnancy losses, thus, likely to book early.

**Table 7:** Early neonatal outcomes of women who booked for ANC in KNH, 2014, by timing of ANC booking

Outcomes		Early (N=150)	Late (N=150)	OR	95 % CI		P value
Birth weight	< 1500 g	10(6.7)	12(8.0)	1.00			
	1501-2500 g	30(20.0)	32(21.3)	1.12	0.42	2.99	0.817
	>2500 g	110(73.3)	106(70.7)	1.25	0.52	3.00	0.625
Neonatal outcome	Good	122(81.3)	118(78.7)	1.00			
	Poor	26(17.3)	31(20.7)	0.81	0.45	1.45	0.479

Although poor neonatal outcomes were slightly higher among women who booked late (20.7%) compared to those who booked early (17.3%), this difference was not statistically significant (OR 0.81; 95% CI 0.45-1.45; P=0.479).

**Figure 2:** Absolute numbers of poor early neonatal outcomes of women who booked for ANC in KNH, 2014, by timing of ANC booking

There were 6 neonatal deaths among the exposed and 2 in the unexposed group. Although NBU admissions were more among the unexposed, 24 (16%) compared to the exposed group, 15 (10%), this difference was not statistically significant ( $\chi^2 = 2.4$ ,  $df=1$ ,  $P=0.122$ ) (Figure 2).

## Discussion

Women who booked early for antenatal care were more likely to be birth prepared, counselled on family planning and childhood immunization. Women booking early were also more likely to have iron and folate supplementation compared to those who booked late. There were no significant differences in antenatal investigations and pregnancy outcomes. Early antenatal booking compared to late booking was associated with a high education level, employment and residing in an urban area of the pregnant woman.

Educated women are generally more knowledgeable and more aware of their health needs, culminating in better health seeking behaviors. Similarly employment confers economic empowerment to women enabling them to seek health care early. Urban areas have better awareness and infrastructure, with access roads compared to rural areas, thus making health facilities more accessible. With this convenience, women in urban areas tend to book earlier compared to those in rural areas. Earlier studies on factors influencing early booking for antenatal care have demonstrated similar findings (10, 11, 13, 14).

Women who booked early were found to be better birth prepared compared to those who booked late. They had better knowledge on various danger signs in pregnancy, puerperium and infancy, more knowledgeable on birth plans, childhood immunization and family planning. Iron and folate supplementation was also better among women who booked early. These findings were attributed to the fact that women who booked early had longer contact time with health care providers, enabling them ample time to discuss various aspects of maternal and child health. With more knowledge, women are more empowered, hence likely to seek health care in a timely manner (1,3,15). Birth preparedness is a safe motherhood strategy whose objective is to promote timely access to skilled maternal and neonatal care during child birth (16).

There was no significant difference in antenatal investigations between the exposed and unexposed groups. These are content specific tests that are readily available regardless of the timing of ANC booking (1,3,15); therefore, their uptake was high in both groups. However, those who booked early had the advantage of appropriate timely interventions being undertaken if they tested positive, thus stopping the disease pathogenesis early.

Maternal and neonatal outcomes are the eventual products of the various measures taken during ANC to ensure a safe pregnancy and birth. In our study

however, there was no significant difference in maternal and early neonatal outcomes between the exposed and unexposed.

In conclusion there is need to increase public awareness on the benefits of early booking for antenatal care. There's also need for government to put in place long term measures to enhance education and economic empowerment of women.

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