Obstetrics Outcomes among Women with Incomplete Antenatal Care Visits at Homa Bay Teaching and Referral Hospital, Kenya

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Abstract

BACKGROUND

Perinatal morbidity and mortality present significant challenges in Kenya, particularly in regions with high rates of such adverse outcomes, including Homa Bay County. Universal health coverage and antenatal care (ANC) services play pivotal roles in improving obstetric outcomes, yet ANC uptake remains low in these areas. This study aimed to investigate the impact of incomplete ANC visits on obstetric outcomes among pregnant women at Homa Bay Teaching and Referral Hospital (HBTRH).

MATERIALS AND METHODS

From October 5 to November 13, 2020, we conducted an observational prospective study in the hospital's maternity unit. A random sample of 168 pregnant women in labour was selected. We closely monitored their deliveries, recording data on delivery mode, gestational age, birth weight, birth outcomes, APGAR scores, Neonatal Care Unit (NBU) admissions, and congenital defects. Additionally, we reviewed each mother's ANC visitation history.

RESULTS

There were positive correlations between the frequency of ANC visits and key obstetric indicators, including higher birth weight, longer gestational age, a greater likelihood of vaginal delivery, and improved APGAR scores. Furthermore, increased ANC visits were associated with a reduced incidence of congenital defects and NBU admissions. These findings align with existing research conducted in similar healthcare settings.

CONCLUSION

A statistically significant positive correlation was noted between ANC visits and Apgar scores. The findings thus suggest other influential determinants of the obstetric outcome at HBTRH exist hence future studies should focus on determining key influencers of obstetric outcomes in the facility.

Key Words: *Antenatal Care, Obstetric Outcomes, Homa Bay Teaching, and Referral Hospital*

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Introduction

Homa Bay County, one of Kenya's 42 administrative units established under the new constitution, is characterized by a population of approximately 1.1 million residents, boasting a population density of 359 individuals per square kilometre and an average household size of 4.3 [1]. Notably, women make up 52.33% of the total population, with nearly 46% of the county's inhabitants being under the age of 20, and with an average age of sexual debut at 16 years [2]. These demographic factors pose challenges to the accessibility of sexual and reproductive services,

not only due to availability but also due to awareness among the relatively youthful populace. It is imperative to highlight that Homa Bay County faces significant public health concerns, with the highest HIV/AIDS prevalence in the nation [3]. The county's principal referral facility, Homa Bay Teaching and Referral Hospital (HBTRH), situated in the county's administrative headquarters, plays a pivotal role in addressing these health challenges.

In line with the inception of the Sustainable Development Goals (SDGs) in 2012, the government has relied on these goals as pillars to formulate various developmental objectives. Of particular interest is the third SDG, which emphasizes universal health coverage as its core tenet, with a key indicator being the accessibility of primary healthcare services to all members of society, irrespective of their social strata [5]. Reproductive and child health represents a fundamental component of primary healthcare, with antenatal care (ANC) services being integral to this framework, as outlined in 1990.

The World Health Organization (WHO) introduced the focused ANC (FANC) model of care for pregnant women in 2002, specifically targeting the enhancement of pregnancy care in low and middle-income countries [6]. The FANC model advocated for a minimum of four healthcare worker contacts, commencing between 8 and 12 weeks of gestation. These contacts served as critical opportunities for screening and addressing common obstetric complications such as hypertension, diabetes, and infections [5]. Simultaneously, they served as educational platforms for discussing danger signs, nutritional guidance, and maternal general health. However, despite efforts to improve ANC, many women expressed dissatisfaction with the timing and frequency of these contacts, leading to a significant portion failing to achieve the recommended eight ANC contacts [6].

Annually, approximately 287,000 women lose their lives due to pregnancy-related causes, predominantly in low and middle-income countries within Sub-Saharan Africa [7]. This region reports a mere 68% access rate to ANC services, with the majority of women seeking care during their third trimester [8]. Kenya, a Sub-Saharan nation, bears a high burden of maternal mortality stemming from preventable conditions, ranking as the leading cause of death among women aged 15 to 49 [9]. Research has indicated that these tragic deaths are amenable to prevention through adequate ANC follow-up, with at least two ANC visits significantly lowering the risks of stillbirth and low birth weights [10,11].

In addition to the existing challenges in accessing reproductive health services in many Sub-Saharan countries, the advent of the SARS-CoV-2 pandemic further exacerbated the decline in primary healthcare access. This was largely attributed to various public health measures, including curfews, lockdowns, and the enforcement of social distancing protocols to reduce overcrowding [12]. Our study was conducted between October 5 and November 13, 2020, during which it became apparent that a substantial number of expectant mothers presenting at the facility for delivery had incomplete ANC visits during their pregnancies.

Therefore, the overarching objective of this study was to investigate obstetric outcomes among women with incomplete ANC visits, with the specific aim of determining the pregnancy outcomes of women admitted to the maternity unit of HBTRH. While the potential contributing factors were discernible from previous research and the prevailing circumstances outlined above, the precise role of this factor in shaping obstetric outcomes remained uncertain. Thus, our study sought to elucidate the obstetric outcomes among women with incomplete ANC visits admitted to the maternity unit at HBTRH, thereby addressing a notable gap in information within this facility.

Methods

The study was carried out in the maternity unit of Homa Bay Teaching and Referral Hospital from October 5 to November 13, 2020. It was an observational prospective study involving follow-up of gravid women admitted with labour until delivery. All pregnant women admitted to the maternity unit for labour during the study period study were eligible for participation in the study, except those younger than 18 years. A sample size of 168 women was determined using the modified Fischer's formula based on a 5% error margin, 95% (z score: 1.96) confidence interval and a standard deviation of 0.5. According to facility records, 300 women were delivered in the department per month, hence served as population proportion (p).

Recruitment was done through a random sampling technique and data collection involved both primary and secondary sources. The patient was followed up to delivery and data was collected on the mode of delivery, the outcome of delivery (live or stillbirth), birth weight, gestation at delivery, APGAR scores, admission to NBU, and congenital malformations. Records on their ANC visitations were obtained from the mother-child booklet. Data analysis was performed using IBM SPSS Statistics 20 software. Descriptive statistics of the data included calculating the mean, median, standard deviation, and variance of the mother's age, gestation at delivery, and birth weights. In parity analysis, women were categorized as primiparous if pregnant for the first time, multiparous if they were pregnant between twice and four times, and grand multiparous if they had five more pregnancies. The proportion of various modes of delivery, parity categories, admission to NBU and the presence of congenital malformation were determined. A correlational study with a 95% confidence interval was performed to assess ANC visits' influence on obstetric outcomes.

The study was approved by the Maseno University Ethics Review Committee (MSU/DRPI/MUERC/00905/20) and Homa Bay Teaching and Referral Hospital administration (HB/MED/B/10/VOL.7/182). Study participants signed an informed consent form and were assured of anonymity and confidentiality throughout the conduct of this study.

Results

Demographics

The study enrolled 149 gravid women with incomplete ANC visits out of the target sample size of 168 gravid women, which is 88.7% of participants turn up. The women were aged between 18 years and 41 years with a mean age of 26.62 ± 5.6 years.

Descriptive analysis

Amongst women with incomplete ANC visits, the average visit was 2.4 ± 0.744 visits. The majority of the women had three ANC visits (82, 55.03%), while non-attendance contributed the least to one woman (0.67%). The above-average proportion of the studied women was multiparous (94, 63.09%) followed by primiparous women (36, 24.16%). Spontaneous vertex delivery was the most common form of delivery among the study participants (108, 72.48%). There were more cases of emergency caesarian sections than elective caesarian sections (31, 20.81% versus 10, 6.71%) and no documented case of instrument delivery. The majority of the deliveries resulted in a live neonate (138, 92.62%) without congenital malformation (144, 96.64%) and no requirement for admission into the newborn unit (131, 87.92%). The average gestation at delivery for the study participants was 37.64 ± 1.974 weeks. The lowest gestation by weeks at delivery was 28 weeks, while the highest was at 44 weeks.

The birth weights of resultant neonates ranged from 1000 grams to 5420 grams, with an average birth weight of 3100.05 ± 738.098 grams.

Number of ANC visits and mother's age

Younger women tended to have more visits than older women. However, the correlation was

negligible and statistically insignificant. There was a negligible statistically insignificant negative correlation between the mother's age and the number of ANC visits in the last pregnancy (r = -0.131, 0.113).

Influence of ANC Visits on gestation at delivery and newborn birth weight

There was a statistically insignificant negligible positive correlation between the number of ANC visits and gestation in weeks at delivery time (r = 0.151, 0.066). As illustrated in Figure 2, gestation at delivery rises with an increase in ANC visits. There was a positive correlation between the number of ANC visits and birth weight, which was statistically insignificant and negligible (r = 0.14, 0.89). As illustrated in Figure 2, increasing numbers of ANC visits were associated with high birth weights.

Table 1:

The proportions of various variables in the measured categories.

Category	Variables	Count	Percentages
ANC Visits	0 Visit	1	0.67
	1 Visit	20	13.42
	2 Visits	46	30.87
	3 Visits	82	55.03
Parity	Primiparous	36	24.16
	Multiparous	94	63.09
	Grand Multiparous	19	12.75
Mode of Delivery	Emergency CS	31	20.81
	Elective CS	10	6.71
	Instrument Delivery	0	0.00
	SVD	108	72.48
Delivery Outcome	Stillbirth	11	7.38
	Live Infant	138	92.62
Congenital Malformation	Present	5	3.36
	Absent	144	96.64
Admission to NBU	Yes	18	12.08
	No	131	87.92

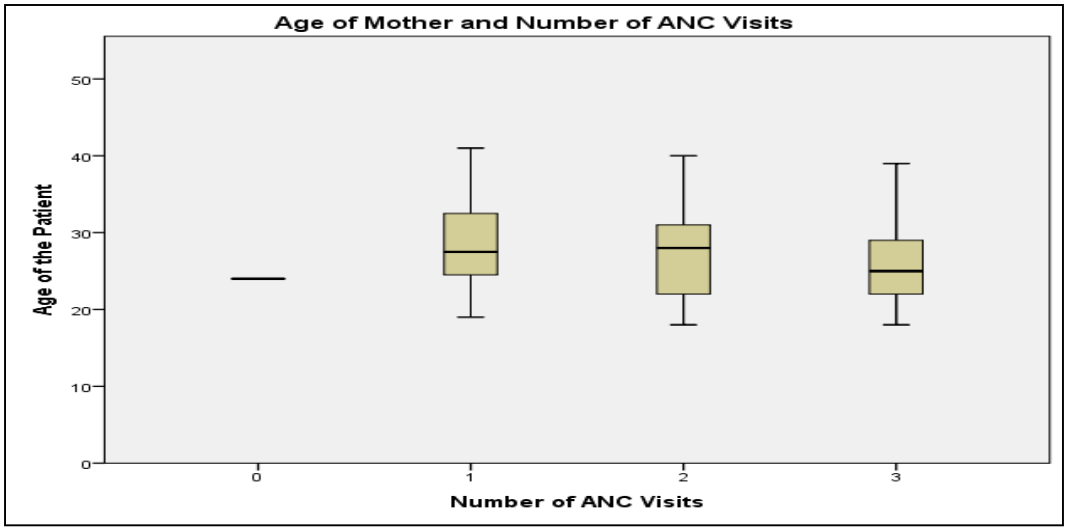

Figure 1:

The association between the mother's age and the number of ANC visits amongst gravid women visiting the HBTRH maternity unit. Emergency CS cases were highest amongst women with two visits.

Effects of ANC visits on mode of delivery and delivery outcomes

The proportion of SVD increased with an increase in ANC visits (Fig. 3(A)). No neonatal deaths were recorded during ANC visits, however, a rise in the number of ANC visits was associated with an increase in the percentage of live births. (Fig. 3(B)). However, there was a statistically insignificant negligible positive correlation between the number of ANC and both mode of delivery and delivery outcome (r = 0.054, 0.511, and r = 0.119, 0.149, respectively).

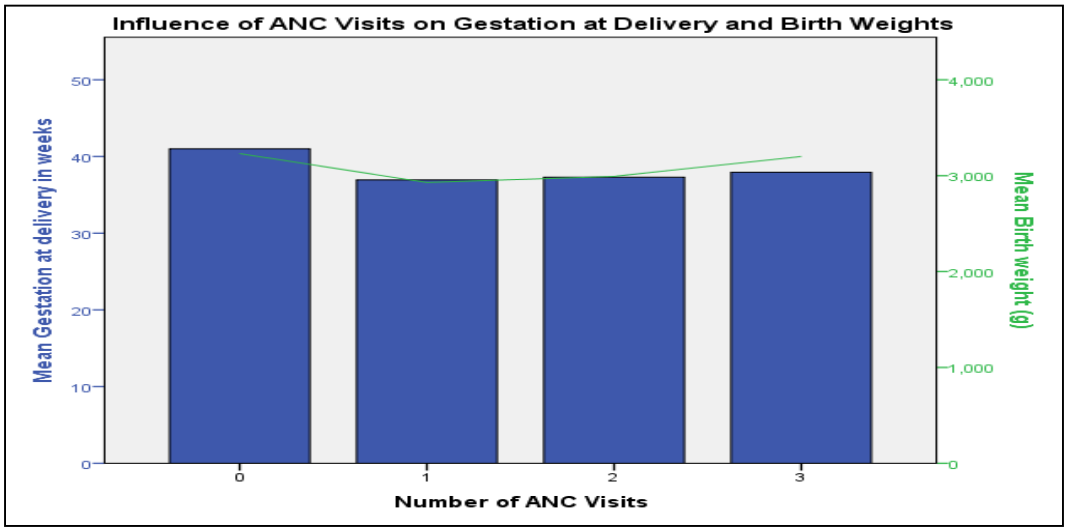

Figure 2:

The relationship between the number of ANC visits and birth weight and gestation at delivery. Both show a negligible positive correlation with the number of ANC visits.

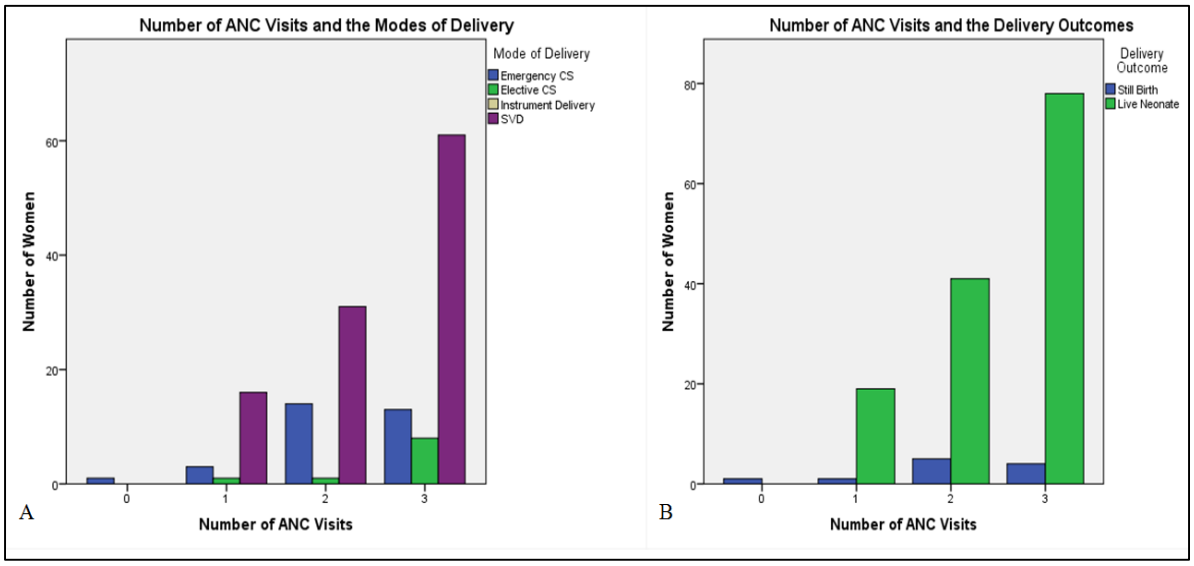

Figure 3:

The effects of the number of ANC visits on delivery mode (A) and delivery outcomes (B). The proportion of SVD rises with the number of ANC visits. A similar trend is observed with the proportion of live births to stillbirths.

Number of ANC visits, presence of congenital malformation and admission to NBU

The majority of the newborns without congenital disabilities and who did not require newborn unit care were born to mothers with three ANC visits. There was a statistically insignificant negligible negative correlation between the number of ANC visits and congenital defects (r = 0.007, 0.934). Women with 2 ANC visits had the highest number of NBU admissions and cases of congenital malformation (Fig. 4(A) and (B), respectively).

Number of ANC visits and APGAR scores

The average score at 1 minute was 7.67 ± 2.717, while the mean scores at 5 and 10 minutes were 8.42 ± 2.864 and 8.75 ± 2.850, respectively. There were statistically significant negligible positive correlations between the number of ANC visits and Apgar Scores at both 5 and 10 minutes (r = 0.18, 0.028, and r = 0.185, 0.024, respectively). Apgar score in the majority of the neonates improved between 5 and 10 minutes. There was a significant difference in average Apgar scores at 5 minutes and 10 minutes (t_{149} = 6.715, p < 0.001). On average, Apgar scores at 10 minutes were 0.329 points higher than the Apgar scores at 5 minutes (95% CI [0.234, 0.426]).

Discussion

Interestingly, all the women who participated in the study did not complete all the recommended antenatal care (ANC) visits according to the 4-visit model, which is known as the focused ANC visit model (FANC) by the WHO. The Ministry of Health (MOH) recommended this 4-physical-visit model during the COVID-19 pandemic, and the majority of women in the study were attending their ANC clinic visits during this period. The women's mean age was 26 years, with most of them (63%) being multiparous. Of these women, 55% had gone for three physical visits, with only one mother having not attended the ANC clinic. The majority of these women gave birth via spontaneous vaginal delivery to live infants who did not need NBU admissions and had no congenital anomalies. There were more cases of emergency caesarian sections than elective caesarian sections.

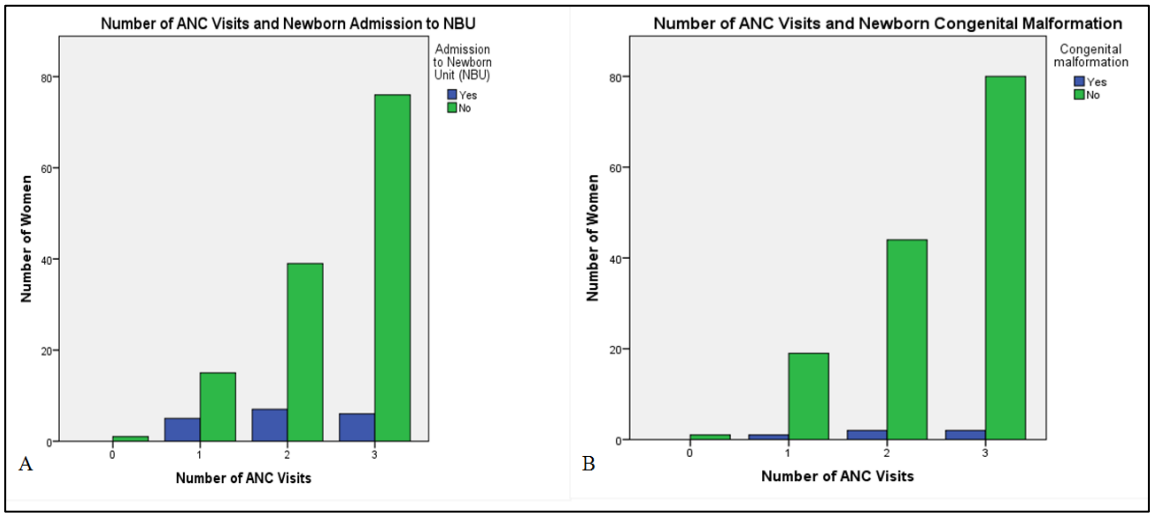

Figure 4:

The link between the number of ANC visits admission to NBU and the presence of congenital malformation. High ANC visits were associated with fewer congenital defects.

We report a negative correlation between the age of the mother and ANC visit attendance. With increasing maternal age, there was lower attendance at the ANC clinic. Most mothers were aware of FANC (91%), the benefits, risks, and the required number of visits, however, long-distance, transportation costs, and health-seeking behaviours affect visitations[13]. A study looking at determinants of FANC uptake among women in Tharaka Nithi County, Kenya, found that women aged below 20 years were associated with the least uptake (31%) of FANC compared to women aged 30–34 years (63%)[14]. The opposite was observed at HBCTRH. This could be because some women, who had safe pregnancies before, didn't see the need to attend all four ANC visits. This difference could also be attributed to variations in the cultural and sociodemographic characteristics of the two regions.

A positive correlation was discovered in investigating the relationship between ANC visits and birth weight, although statistically insignificant and negligible (r = 0.14, 0.89). The finding is consistent with previous studies that showed an association between ANC visits and preterm birth. The women who attended more ANC visits had fewer probabilities of having preterm birth[15]. It has also been determined that mothers who received adequate and intermediate prenatal care had a significantly decreased risk of delivering a low birth weight infant than those who had inadequate care[16]. Studies have also demonstrated that low birth weight incidence was almost twice in women with incomplete ANC visits than those with at least four visits by the FANC model[17].

Gestation at delivery rises with an increase in the number of ANC visits. However, little research has been carried out to determine the influence of ANC visit attendance on gestation at delivery. Previous literature has correlated the gestation at the first ANC clinic visit with obstetric outcomes or skilled birth attendants instead. A review of the KDHS reports showed that there is a graded relationship between the use of ANC and delivery assistance[18]. Women who attended the first ANC visit early in pregnancy are more likely to deliver with the assistance of TBA or skilled professionals than women who never attended ANC[19]. The use of skilled professionals during delivery could help mitigate the occurrences of adverse obstetric outcomes or the need for emergency CS.

Emergency CS cases were highest amongst women with two visits. The proportion of women who delivered via SVD increased with an increase in the number of ANC visits. However, the correlation between the number of ANC visits and the mode of delivery, although positive, was statistically insignificant and negligible (r = 0.054, 0.511). Assessment of the influence of the early booking for antenatal care on antenatal and early pregnancy outcomes at Kenyatta National Hospital showed that most women who came earlier (and hence more ANC visits) or later (and hence fewer ANC visits) delivered via SVD[20]. It was also discovered that slightly more women who booked late and had fewer visits delivered via cesarean section (44.7%), compared to those who booked early and had more visits (31.3%)[20]. However, this difference was not significant and concurred with the findings in this research that the delivery mode was not significantly associated with timing and the number of ANC bookings. Other factors, such as the quality of the ANC visit and socioeconomic characteristics, should be examined.

According to this study, no neonatal mortality was observed in women who attended ANC visits. However, an increase in the number of ANC visits was associated with a higher proportion of live births. Therefore, the study suggests that pregnant women who attend more ANC clinic visits are more likely to have a successful pregnancy resulting in the birth of a live infant. This positive correlation, although

statistically insignificant, is consistent with previous studies that showed that the incidence of stillbirth among women with incomplete adherence to ANC clinic visits was four-fold that of the women with complete adherence to antenatal visits[17]. It was postulated in Kwale, Kenya, that women who had a minimum of 2 ANC visits were more likely to have a live birth versus stillbirth[11].

A Bangladesh study by Mazharul Islam *et al.* also showed that mothers who received the minimum ANC visit required were about 2.4 times more likely to give birth to live infants of normal birth weights (2.5 - 4.0 kg) compared with those who received fewer services[21]. Without prenatal care, neither identification nor intervention can prevent adverse outcomes, which could mean the loss of pregnancy. Prenatal care may promote healthier maternal behaviours and provide a beneficial effect on intrauterine growth and gestation duration, either by early diagnosis and timely treatment of pregnancy complications or by eliminating or minimizing modifiable risk factors.

This study found that women with 2 ANC visits had the highest number of NBU admissions and congenital malformation cases. This correlates with the study by Sozan K. Ameen in Erbil City, Iraq, on patterns of congenital anomalies at birth and their correlation with maternal characteristics. According to the univariate and bivariate analysis in the study, birth weight, maternal medical diseases, and inadequate antenatal care, among other factors, were significantly associated with congenital anomalies. Inadequate antenatal care alone had an Odds Ratio of 19.0,95% with a confidence interval of 7.43–48.56, indicating a significant influence of ANC visits (in both number and quality) on the development of congenital anomalies[22].

Of the total sample size for the study, 12% of the neonates required NBU admissions. Of these neonates, the majority were born to mothers who had 2 ANC visits or less. However, the negative correlation between the number of ANC visits and the likelihood of NBU admission was negligible and statistically insignificant. Timely execution of the first ANC visit allows more time for more such visits. The more the number of visits, the more the guarantee that potential pregnancy complications are identified and mitigated[23]. The study investigated the impact of early antenatal care booking on antenatal and early pregnancy outcomes at Kenyatta National Hospital, with similar findings to previous studies. It was found that, although NBU admissions were more among women who had booked late, 24 (16%) compared to those who had booked for the ANC clinic earlier, 15 (10%), this difference was not statistically significant[20].

There were statistically significant positive correlations between the number of ANC visits and APGAR Scores at both 5 and 10 minutes ($r = 0.18$, 0.028, and $r = 0.185$, 0.024, respectively). This means that the more the number of ANC visits, the better the newborn's APGAR scores. The findings are consistent with the outcome of a retrospective chart review examining the relationship between prenatal visits and infant APGAR scores.

A comparison of infant APGAR scores among women who received inadequate, intermediate, and adequate prenatal care found a positive relationship between the number of prenatal visits and infant APGAR scores. The more prenatal visits, the higher the infant APGAR scores were at 1 minute and 5 minutes[24]. This is because women who obtain early, continuous prenatal care have earlier gestation at the first visit and more prenatal visits. More prenatal visits ensure a safer, healthier pregnancy. Women who do not obtain prenatal care or are late to seek care have a lower total number of prenatal visits with less utilization of ANC services and lower newborn APGAR scores.

Conclusion

The study demonstrated the existence of a relationship between ANC visits and favourable obstetric outcomes. Though increasing ANC visits were shown to correlate positively with the gestation at delivery, birth weight, the proportion of SVD, and the Proportion of live infants, these correlations were statistically insignificant and negligible. A statistically significant positive correlation was, however, noted between ANC visits and Apgar scores. The findings thus suggest other influential determinants of the obstetric outcome at HBTRH exist hence future studies should focus on determining key influencers of obstetric outcomes in the facility. The focus of departmental improvement should be directed to other peripartum factors such as staffing at maternity centres and availability of proper equipment that has been shown to have a greater impact on obstetric outcomes. Meanwhile, aggressive campaigns should be initiated to increase ANC visitation by the gravid mother to benefit from the illustrated gain of complete ANC visitations.

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