

Influence of antenatal factors on maternal and neonatal outcomes among pregnant women with pre-eclampsia and eclampsia admitted at Kakamega County Referral Hospital, Kenya

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ABSTRACT

Pre-eclampsia and eclampsia are pregnancy related complications affecting majority of women globally. This problem is more prevalent in low- and middle-income countries compared to the developed countries and account for 16% of maternal and neonatal morbidity and mortality. There is paucity of literature linking antenatal factors and interventions with maternal and neonatal outcomes among pre-eclamptic and eclamptic women. The aim of the study was to determine the effect of antenatal factors on maternal and neonatal outcomes of pregnant mothers with pre-eclampsia and eclampsia admitted at Kakamega County Teaching and Referral Hospital (KCTRH). The Donabedian theoretical framework of structure, process and outcome guided this study. The study utilised cross-sectional analytical design. Purposive sampling was used to select 239 respondents who met inclusion criteria. Structured questionnaire was used to collect data from the participants as well as recorded data from files of the participants. Data collected was analysed using Statistical Package for the Social Sciences (SPSS) software version 21. Frequencies, proportions, logistic regression and Odds Ratio (OR) were used to present and analyse the data. High blood pressure during antenatal period among mothers had a significant impact with more adverse maternal outcome compared with their counterparts (OR: 2.5; 95% CI: 1.2 – 5.2; $p = 0.009$). Mothers who met the minimum required ANC visits were 90% less likely to have had adverse neonatal outcome (OR: 0.1; 95% CI: 0.01 – 0.49; $p = 0.0005$) compared to those who had few number of visits. Likewise, mothers with no previous history of abortion were 80% less likely to have had adverse neonatal outcome (OR: 0.2; 95% CI: 0.04 – 0.90; $p = 0.02$). Although not statistically significant, the relationship between presence of fetal heart rate during antenatal period and adverse neonatal outcome was marginally significant (OR: 1.8; 95% CI: 0.9 – 3.3; $p = 0.07$). Cases where fetal heart rate was not heard were almost twice as likely to have presented with adverse neonatal outcome. Conclusion: Regular antenatal visits among these mothers were linked to better health outcomes but persistent hypertension led to more adverse outcomes. Recommendations: Health care workers to increase awareness and education on the importance of regular antenatal care visits among mothers with pre-eclampsia and intensify monitoring and follow-up scheduled programs for these women to reduce adverse maternal and neonatal outcomes.

Keywords Antenatal Factors, Eclampsia, Maternal and Neonatal Outcomes, Pre-Eclampsia

I. INTRODUCTION

Hypertensive disorders of pregnancy (HDP), specifically preeclampsia and eclampsia, remain a leading global public health challenge, contributing significantly to maternal and neonatal morbidity and mortality according to World Health Organization (WHO) in the year 2025. Preeclampsia is a multisystem disorder characterized by new-onset hypertension (blood pressure $\geq 140/90$ mmHg) and proteinuria or multi-organ dysfunction developing after 20 weeks of gestation. When left unmanaged, preeclampsia can progress to eclampsia, an emergency presentation characterized by generalized tonic-clonic seizures or coma (Ndwiga *et al.*, 2020). Globally, these conditions account for roughly 14% of maternal deaths annually. In Sub-Saharan Africa, the burden is disproportionately high due to systemic healthcare challenges, delayed care-seeking behavior, and limited access to critical emergency obstetric care (Simiyu, 2025). In Kenya, preeclampsia and eclampsia are the third leading cause of maternal mortality, trailing only obstetric hemorrhage and obstructed labor. National statistics show eclampsia alone is responsible for approximately 13% of all maternal deaths and a substantial proportion of stillbirths nationwide as per the Ministry of Health (MOH) in Kenya (MOH, Kenya 2026).

Similarly, hypertensive disorders of pregnancy pose a significant public health challenge in Kenya, frequently resulting in severe complications such as placental abruption, organ failure, preterm birth, and fetal growth restriction.

While the pathophysiological mechanisms of preeclampsia are rooted in early placental development, the clinical progression and ultimate outcomes for both mother and child are heavily influenced by the quality and timing of healthcare interventions received during pregnancy (Teka, et al. 2025).

Antenatal care (ANC) serves as the primary mechanism for the early detection and management of hypertensive disorders, yet its utilization and clinical effectiveness vary widely. Critical antenatal factors—such as the timing of the first ANC visit, frequency of attendance, pattern of blood pressure monitoring, and the identification of pre-existing comorbidities (such as chronic hypertension, diabetes, or HIV)—are decisive vectors in altering the trajectory of preeclampsia. Delays in initiating ANC often mean that critical window for starting preventative interventions, such as low-dose aspirin, are missed, allowing the disease to progress unchecked to eclampsia (Croke, et al., 2022).

At the Kakamega County Teaching and Referral Hospital (KCTRH), a major tertiary referral hub in Western Kenya, clinicians frequently manage high-risk pregnancies complicated by severe preeclampsia and eclampsia. Despite existing national guidelines standardizing antenatal care, maternal and neonatal outcomes in this region continue to be burdened by late clinical presentations, inconsistent ANC tracking, and unmanaged comorbidities. Understanding how specific, measurable antenatal variables directly correlate with health outcomes in this specific referral population is critical to optimizing local triage protocols and clinical pathways.

This study aimed to evaluate how specific antenatal factors influence maternal and neonatal outcomes among women diagnosed with preeclampsia and eclampsia at KCTRH. By analyzing the relationships between ANC attendance, blood pressure trajectories, maternal comorbidities, and gestational age at first clinic entry, this study seeks to provide actionable data. Ultimately, the findings will help inform targeted quality-improvement strategies, refine risk-stratification at the primary care level, and reduce preventable maternal and perinatal deaths in Kakamega County.

1.1 Research Objectives

- i. To examine the association between antenatal factors and maternal outcomes among pregnant women with pre-eclampsia and eclampsia admitted at Kakamega County Teaching and Referral Hospital

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 The Donabedian theoretical model of structure, process and outcome

This theoretical framework was crafted by the physician Avedis Donabedian that assesses care through three core interrelated components structure, process and outcome. Structure: This includes baseline resources and characteristics to include maternal socio-demographics, age education, residence, hospital level and availability of diagnostics. Process: The actual care received during antenatal period, frequency of antenatal care visits, early screening/booking, blood pressure measurement, any interventions and treatment. Outcome: The direct clinical results that Include the dependent variables: maternal outcomes (eclampsia progression, postpartum hemorrhage, ICU Admission, caesarean sections, premature labor) and neonatal outcomes (preterm birth, low birth weight, intrauterine growth retardation NICU admission, or mortality (Beyuo et al., 2023)

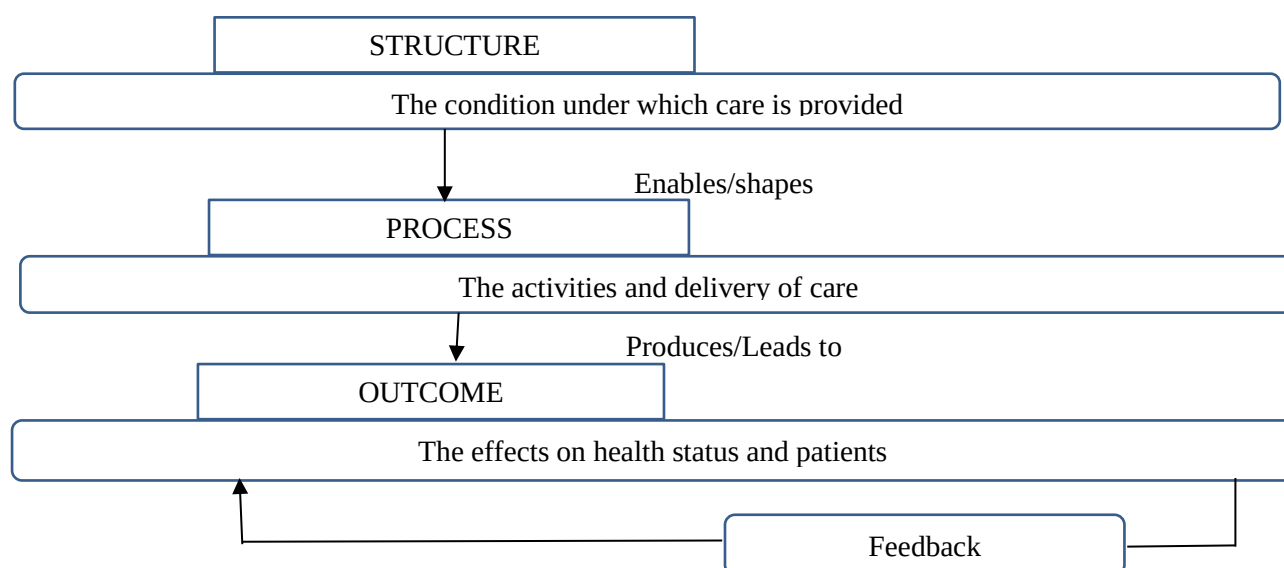


Figure 1

Donabedian theoretical model of structure, process and outcome.

2.2 Empirical Review

Blood pressure during antenatal period has a significant impact on maternal and neonatal outcomes among women with preeclampsia and eclampsia. In a multi country survey on risk factors of preeclampsia and its adverse outcomes in low and middle countries, Bilano et al. (2014) established that chronic hypertension, gestational hypertension among others were risk factors for preeclampsia and eclampsia, the later condition leading to significant maternal and neonatal adverse outcomes to include maternal and perinatal mortalities, preterm births and low birth weight. Other risk factors identified include high body mass index, null parity, absence of antenatal care, severe anemia, cardiac or renal disease. These findings necessitate early screening and minimizing complications associated with preeclampsia and eclampsia. Later studies have also established a strong link of adverse maternal and fetal outcomes with high blood pressure among preeclampsia women. Asphyxia, respiratory distress syndrome, growth retardation, high rates of caesarean sections with severe complications and admission to intensive care units have been recorded as some of the adverse outcomes (Pereira et al., 2022). These complications may lead to long hospital stays and financial burden on the affected members of the family.

Antenatal care is an important aspect of care during pregnancy more so to women who have complications in pregnancy like preeclampsia. Current studies have established an association between the number of antenatal visits and maternal and neonatal outcomes among women with preeclampsia. Beyuo et al. (2023) reported that mothers who had regular antenatal visits that were 8 or more had less poorer maternal and neonatal outcomes. In the same study those mothers who were attended to by obstetricians and gynecologists or midwives similarly had less maternal and neonatal complications. These emphasize the need for quality care and increased antenatal visits in this group of women to improve birth outcomes. Similarly Socol et al. (2024) singled out few prenatal visits as a predictor of adverse maternal and neonatal outcomes among these groups of women. In Ghana, Inadequate antenatal care increased the odds of developing eclampsia among women who dropped out of antenatal care thereby increasing adverse outcomes in this group of women (Adjei et al., 2026). This calls for education and awareness among these group of women on the importance of regular and increased visits antenatal visits.

Prior studies have indicated that history of spontaneous or induced abortion has a protective effect and reduces the maternal and neonatal adverse outcomes as early exposure to paternal antigens help to increase the maternal immunological tolerance with subsequent reduction in the risk of severe preeclampsia (Chang et al., 2023). Moreover Bakhet et al. (2025) in their studies on risk factors for preeclampsia and eclampsia linked the history of abortion during antenatal care period with the risk of developing preeclampsia and eclampsia in the subsequent pregnancies therefore emphasizing the need of frequent antenatal care in this group to reduce adverse maternal and neonatal outcomes associated with preeclampsia and eclampsia. Other antenatal histories of concern include chronic hypertension, family history of diabetes, cardiac or renal disease. These increase the risk of preeclampsia and eclampsia and therefore early intervention during antenatal care to reduce adverse outcomes (Pereira et al., 2022; Chang et al., 2023).

The absence of fetal heart rate during the antenatal period increases the likelihood of adverse neonatal outcomes as reported by Pereira et al. (2022) and Eddy et al. (2022) who noted that absence of fetal heart rate resulted in poorer APGAR scores in the neonate therefore emphasizing the importance of adequate antenatal care. Recent studies have established that preeclamptic women had the complexity of fetal heart rate fluctuations pointing to possible disruptions in the autonomic nervous system in the group that had undiagnosed preeclampsia in comparison with the control group which was normotensive. This necessitates intensive monitoring during antenatal care as well as performing relevant tests for timely intervention (Lucero-Orozco et al., 2024).

Early onset of preeclampsia in women has been reported to have more adverse maternal and neonatal outcomes compared to the late onset (Rahman et al., 2024). This could be attributed to the fact that early onset is associated with prolonged exposure to the negative effects of preeclampsia and eclampsia in the mother and fetus. Early gestation at first antenatal visit could be linked to more visits and better outcomes as the mother has a longer time between pregnancy and birth compared to late gestation where the time of birth is near and most complications may not have been addressed leading to poorer outcomes. In summary antenatal parameters are key in determining both maternal and neonatal outcomes in women with preeclampsia and eclampsia. Early screening and diagnosis as well as prompt interventions and individualized care must be prioritized in order to reduce adverse maternal and neonatal outcomes.

III. METHODOLOGY

3.1 Research Design

The study utilized a cross-sectional analytical design where mothers who had preeclampsia and eclampsia and admitted at antenatal ward or labour ward were evaluated for their maternal and neonatal outcomes within 72 hours after delivery. This design was most suitable since it explored the association between the potential risk factor in this case preeclampsia and eclampsia and a health outcome in this case maternal and neonatal outcome at the same time.

3.2 Study Area

Kakamega County Teaching and Referral Hospital, Western Kenya. As the primary tertiary referral center in the region, it bears the heaviest burden of severe obstetric emergencies. The facility frequently receives advanced cases referred from lower-level dispensaries and health centres that lack the resources for comprehensive emergency obstetric and newborn care.

3.3 Study Population

Expectant mothers who were admitted and diagnosed with pre-eclampsia and eclampsia and admitted at the facility of study

3.4 Inclusion criteria

Pregnant mothers diagnosed with pre-eclampsia and eclampsia admitted at the facility who willingly consented to be part of the study

3.5 Exclusion criteria

Mothers with pre-eclampsia /eclampsia but not in a position to respond due to severe complications

3.6 Sample size determination

The sample size was determined using Fisher's Formula, which calculates the desired sample size (n) based on a 95% confidence interval (z), the proportion in the population estimated (p), and the margin of error (δ). Substituting the values into the formula, $n = (z^2pq)/\delta^2$, gives an initial sample size of 384. Given the target population was less than 10,000, this number was adjusted using the formula $nf = n / (1 + (n/N))$, where N represents the average number of mothers at KCTRH. This adjustment reduces the sample size to 217. To account for a potential non-response rate of 10%, the final sample size increased to 239 respondents.

3.7 Sampling Procedure

Purposive sampling was utilized to select mothers who were diagnosed with pre-eclampsia and eclampsia at the facility since the population was small for a period of 6 months to achieve the required sample size of 239 mothers.

3.8 Data collection tool

Structured Questionnaires were used to collect data from the mothers as well as secondary data from the mothers' files.

3.9 Pretesting & validity

Pre-testing of the tool was done at Vihiga County Teaching and Referral Hospital to correct any anomalies in the tool. Since the questionnaire was adapted, the additional content was thoroughly examined by the researcher and supervisors to ensure that all the variables to be measured were included to answer the study objectives.

3.10 Reliability

Reliability of the research instruments was done to ensure that the tools are suited to collect the data after it was adapted to suit the study. Testing and re-testing of the study instruments was done to ensure reliability. The received inputs from the tests were subjected to the Cronbach Alpha Coefficient test for reliability. Any output from the criteria which was equal or higher than 0.75 was considered to be reliable

3.11 Data Collection Procedure

Two research assistants with diploma in nursing were trained for two days on data collection procedures. Mothers were interviewed on their socio demographic data as well as their antenatal history. Secondary data was also extracted from the mothers' files on antenatal history and maternal and neonatal outcomes. The questionnaire consisted of three sections. Section A consisted of social-demographic characteristics to include age, marital status, parity education level of mothers and their spouse, employment status and type of employment. Section B consisted of antenatal related factors associated with maternal and neonatal outcomes of mothers with pre-eclampsia and eclampsia in pregnancy to include number of antenatal visits, illness during previous pregnancy, past obstetric history, history of abortion, gestation at first antenatal clinic for the current pregnancy fundal height and blood pressure in the current pregnancy

Section C consisted of maternal and neonatal outcomes of mothers with pre-eclampsia and eclampsia in pregnancy as outlined in the last paragraph on the conceptual framework. Eligible mothers who were admitted at the antenatal wards and labor ward were monitored through intrapartum to the postnatal ward and their maternal and

neonatal outcomes recorded within 72 hours after delivery. The purposive selection of mothers continued for a period of 6 months to arrive at the sample size.

3.12 Data analysis

The data was cleaned, coded, entered and analyzed using Statistical Package for Social Science (SPSS) version 21. Frequencies were used to describe maternal characteristics, Estimates of association were calculated using bivariate logistic regression followed by multiple logistic regression to test the association between independent and dependent variables and odd ratio to assess the strength of the relationship between the explanatory and outcome variables and the final determinants of adverse maternal and neonatal outcomes -value of 0.05 was significant

3.13 Ethical Consideration

Ethical clearance from Masinde Muliro scientific ethical review as well as research permit from National Commission for Science Technology and Innovation (NACOSTI) and Kakamega County General Teaching and referral Hospital and the research ethics committee of hospital was sought. Beneficence, respect for human dignity, informed consent, justice, confidentiality and anonymity were upheld.

IV. FINDINGS & DISCUSSION

4.1 Social demographic characteristics of the study participants

The total number of the respondents was 239, with 77.8% (n=186) having pre-eclampsia compared to 22.2% (n=53) diagnosed with eclampsia. Majority of the mothers were aged between 15-34 (84%) years, were married (74%) and had secondary level of education (61%) and in informal employment.

Table 1

Socio-demographic characteristics of participants

Variables	Response	Respondents
Age group in years	15-24	99
	25-34	99
	≥35	41
Marital status	Married	176
	Single	63
	Para 1	113
	Para 2	22
	Para 3	43
Education level of the respondents	Para 4 and more	61
	Primary	40
	Secondary	146
	College	42
	University	16
Spouse	Primary	60
	Secondary	141
	College	70
	University	12
Employment status	Unemployed	96
	Employed	143

4.1.1 Relation between Antenatal History And Maternal and Neonatal Outcomes among Mothers with Pre-Eclampsia/Eclampsia

Table 2 presents antenatal history of the mothers who participated in the study. More than three-quarters in each group had attended ANC four or more times with the main illness reported being pre-eclampsia. Among those with adverse maternal outcome, 11.9% had a history of stillbirth. Few of the mothers 6.9% and 7.9% with adverse maternal and neonatal outcome had reported two cases of abortion, respectively. More than two thirds in the two categories had their first clinic attendance during the 16th to 28th gestational age with a higher proportion having had high blood pressure among those with adverse maternal outcome (63.4%) and neonatal outcome (58.4%). A higher proportion of mothers with adverse neonatal outcome (42.7%) reported absence of fetal heart rate.

Table 2*Ante-Natal History And Maternal and Neonatal Outcomes*

Variable	Response	Adverse Maternal outcome		Adverse Neonatal Outcome	
		Yes (%)	No (%)	Yes (%)	No (%)
ANC attendance	Twice	12 (5.9)	0 (0.0)	12 (6.7)	0 (0.0)
	Thrice	25 (12.4)	0 (0.0)	24 (13.5)	1 (1.6)
	Four times	165 (81.7)	37 (100.0)	142 (79.8)	60 (98.4)
Illness during previous pregnancy	TB	12 (5.9)	3 (8.1)	12 (6.7)	3 (4.9)
	Asthma	6 (3.0)	0 (0.0)	6 (3.4)	0 (0.0)
	Pre-eclampsia	123 (60.9)	29 (78.4)	102 (57.3)	50 (82.0)
	Anaemia	61 (30.2)	5 (13.5)	58 (32.6)	8 (13.1)
Birth history	Stillbirth	24 (11.9)	0 (0.0)	24 (13.5)	0 (0.0)
	Alive	178 (88.1)	37 (100.0)	154 (86.5)	61 (100.0)
Abortion history	Once	7 (3.5)	0 (0.0)	6 (3.4)	1 (1.6)
	Twice	14 (6.9)	1 (2.7)	14 (7.9)	1 (1.6)
	Thrice	5 (2.5)	0 (0.0)	5 (2.8)	0 (0.0)
	None	176 (87.1)	36 (97.3)	153 (86.0)	59 (96.7)
Conditions during current pregnancy	Anaemia	3 (1.5)	0 (0.0)	3 (1.7)	0 (0.0)
	Pre-eclampsia	199 (98.5)	37 (100.0)	175 (98.3)	61 (100.0)
Medications	Haematenics	199 (98.5)	37 (100.0)	175 (98.3)	61 (100.0)
	Antihypertensive	1 (0.5)	0 (0.0)	1 (0.6)	0 (0.0)
	Antimalarial	2 (1.0)	0 (0.0)	2 (1.1)	0 (0.0)
Gestation at first clinic attendance	Less than 16 weeks	56 (27.7)	13 (35.1)	56 (31.5)	13 (21.3)
	16 – 28 weeks	138 (68.3)	21 (56.8)	121 (68.0)	38 (62.3)
	28 – 32 weeks	8 (4.0)	3 (8.1)	1 (0.6)	10 (16.4)
Fundal height	Less than 16 weeks	56 (27.7)	13 (35.1)	56 (31.5)	13 (21.3)
	16 – 28 weeks	138 (68.3)	21 (56.8)	121 (68.0)	38 (62.3)
	28 – 32 weeks	8 (4.0)	3 (8.1)	1 (0.6)	10 (16.4)
Blood pressure in mmHg	Low	74 (36.6)	22 (59.5)	74 (41.6)	22 (36.1)
	High	128 (63.4)	15 (40.5)	104 (58.4)	39 (63.9)
Presence of fetal heart rate	Yes	126 (62.4)	19 (51.4)	102 (57.3)	43 (70.5)
	No	76 (37.6)	18 (48.6)	76 (42.7)	18 (29.5)

4.1.2 Association between antenatal history and adverse maternal outcomes among mothers with pre-eclampsia/eclampsia

Table 3 shows findings on the relationship between antenatal history and the risk of maternal outcomes among mothers with pre-eclampsia/eclampsia. Of the four independent variables examined, mothers with a history of high blood pressure presentation during antenatal period had a significantly higher chance of presenting with adverse maternal outcome compared with their counterparts (OR: 2.5; 95% CI: 1.2 – 5.2; $p = 0.009$). Presence of fetal heart rate, less gestation at first antenatal clinic and with no prior history of abortion were less likely to experience the adverse outcomes.

Table 3*Association between antenatal history and adverse maternal outcomes among mothers with pre-eclampsia/eclampsia*

Independent variable	Categories	n	Maternal outcome		OR	95% CI	P value
			Yes	No			
Previous Abortion history	None	212	83.0	17.0	0.2	0.02 – 1.43	0.09
	Yes	27	96.3	3.7			
Gestation at first clinic attendance	Less than 16 weeks	69	81.2	18.8	0.7	0.3 – 1.5	0.36
	≥ 16 weeks	170	85.9	14.1			
Blood pressure in mmHg	High	143	89.5	10.5	2.5	1.2 – 5.2	0.009
	Low	96	77.1	22.9			
Presence of foetal heart rate	Yes	94	80.9	19.1	0.6	0.3 – 1.3	0.21
	No	145	86.9	13.1			

4.1.3 Association between Antenatal History and Adverse Neonatal Outcomes among Mothers with Pre-Eclampsia/Eclampsia

Table 4 shows results on the association between antenatal history and the risk of neonatal outcomes among mothers with pre-eclampsia/eclampsia. Mothers who met the minimum required ANC visits were 90% less likely to have had adverse neonatal outcome (OR: 0.1; 95% CI: 0.01 – 0.49; $p = 0.0005$). Likewise, mothers with no previous history of abortion were 80% less likely to have had adverse neonatal outcome (OR: 0.2; 95% CI: 0.04 – 0.90; $p = 0.02$). Cases where fetal heart rate was not heard were almost twice as likely to have presented with adverse neonatal outcome.

Table 4

Association between antenatal history and the risk of adverse neonatal outcomes among mothers with pre-eclampsia/eclampsia

Independent variable	Categories	n	Adverse Neonatal outcome		OR	95% CI	P value
			Yes	No			
Number of ANC visits	Four or more times	202	70.3	29.7	0.1	0.01 – 0.49	0.0005
	Less than four times	37	97.3	2.7			
Previous Abortion history	None	212	72.2	27.8	0.2	0.04 – 0.90	0.02
	Yes	27	92.6	7.4			
Gestation at first clinic attendance	Less than 16 weeks	69	81.2	18.8	1.7	0.8 – 3.3	0.13
	≥ 16 weeks	170	71.8	28.2			
Blood pressure in mmHg	High	143	72.7	27.3	0.8	0.4 – 1.4	0.45
	Low	96	77.1	22.9			
Presence of fetal heart rate	No	94	80.9	19.1	1.8	0.9 – 3.3	0.07
	Yes	145	70.3	29.7			

4.5. Discussion

The current study established that high blood pressure during the antenatal period was significantly associated with adverse maternal and neonatal outcomes, increasing the risk by 2.5 times. This is due to the fact that prolonged high blood pressure leads to organ failure and vasoconstriction leads to hypoxia thereby increasing adverse outcomes. This is consistent with findings from Bilano et al. (2014), which identified hypertension as a significant risk factor for adverse maternal and neonatal outcomes among women with preeclampsia and eclampsia. These findings are also in line with Al Khalaf et al. (2021) who established that chronic hypertension was a risk factor for hypertensive disorders of pregnancy and consequently increased the odds of maternal and perinatal morbidity and mortality.

Mothers in the current study who met the required number of antenatal visits were 90% less likely to experience adverse maternal neonatal outcomes. These findings resonate with Beyuo et al. (2023) who similarly recorded that mothers who had increased visits greater than 8 were linked with reduced adverse neonatal outcomes however it did not have an impact on maternal complications therefore emphasizing on quality care rather than quantity care. In the same study, antenatal care under midwives or obstetricians decreased complications in complicated pregnancies with preeclampsia and eclampsia. Socol et al. (2024) singled out few prenatal visits and lower educational level among others as a predictor of adverse maternal and neonatal outcomes among these groups of women. In Ghana, Inadequate antenatal care increased the odds of developing eclampsia among women who dropped out of antenatal care thereby increasing adverse outcomes in this group of women (Adjei et al., 2026).

The current study established that a previous history of abortion reduced the risk of adverse maternal and neonatal outcomes by 80%. This could be attributed to the fact that a history of previous abortion could create anxiety in the mother in the current pregnancy necessitating early and regular antenatal visit thereby diagnosing preeclampsia early as well as intervening therefore reducing adverse outcomes. Prior studies have also supported this finding with owing to the fact that prior spontaneous or induced abortion induced a protective effect as early exposure to paternal antigens help to increase the maternal immunological tolerance with subsequent reduction in the risk of severe preeclampsia (Chang et al., 2023). Moreover Bakhiet et al. (2025) in their studies on risk factors for preeclampsia and eclampsia linked the history of abortion during antenatal care period with the risk of developing preeclampsia and eclampsia in the subsequent pregnancies therefore emphasizing the need of frequent antenatal care in this group to reduce adverse maternal and neonatal outcomes.

The absence of fetal heart rate during the antenatal period nearly doubled the likelihood of adverse neonatal outcomes, aligning with the observations by Pereira et al. (2022), and Eddy et al. (2022) who noted that absence of fetal heart rate resulted in poorer APGAR scores in the neonate therefore emphasizing the importance of adequate antenatal care. Preeclamptic women had the complexity of fetal heart rate fluctuations pointing to possible disruptions in the autonomic nervous system in the group that had undiagnosed preeclampsia in comparison with the control group which

was normotensive. This necessitates intensive monitoring during antenatal care as well as performing relevant tests for timely intervention (Lucero-Orozco et al., 2024).

The current study established that gestation at first antenatal visit had an impact on maternal and neonatal outcomes. Women who attended antenatal care less than 16 visits had reduced odds of having adverse maternal outcomes. However that did not replicate with adverse neonatal outcomes. This could mean that other confounding factors played a significant role and need to be elicited. Early onset of preeclampsia in women has been reported to have more adverse maternal and neonatal outcomes compared to the late onset (Rahman et al 2024). This could be attributed to the fact that early onset is associated with prolonged exposure to the negative effects of preeclampsia and eclampsia in the mother and fetus.

In summary antenatal parameters are key in determining both maternal and neonatal outcomes in women with preeclampsia and eclampsia to include blood pressure, antenatal visits, history of abortion, fetal heart rate, gestation at first antenatal clinic and co-morbidities like anemia history of hypertensive disorders and other conditions like asthma and tuberculosis can severely impart negatively on birth outcomes. This is due to the fact that early onset and severe multiorgan dysfunction as well as induction of systemic inflammation and endothelial stress exacerbating the symptoms in this population. Therefore, early diagnosis, timely intervention as well as specialty referral from the periphery will help improve maternal and neonatal outcomes.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study concludes that antenatal factors play a significant role on impacting maternal and neonatal outcomes among women with preeclampsia and eclampsia. Mothers with persistent high blood pressure during the antenatal period as well as those with absence of fetal heart rate had more adverse maternal and neonatal outcomes, Mothers who met the required number of antenatal visits were less likely to experience adverse maternal and neonatal outcomes emphasizing the importance of regular antenatal visits. Previous history of abortion was linked with less adverse birth outcomes due to early and more regular visits among this group

5.2 Recommendations

Health care workers in high-risk clinics to Increase awareness and education on the importance of early and regular antenatal care visit for early detection and timely interventions likewise, to intensify monitoring and follow-up scheduled programs of pregnant women with a history of chronic diseases, abortion and other co-morbidities alongside pre-eclampsia and eclampsia to improve maternal and neonatal outcomes.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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