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Original Research Article

Prognostic factors of preeclampsia at Laquintinie Hospital in Douala, Cameroon: a hospital-based study

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ABSTRACT

Background: Preeclampsia (PE) remains a leading cause of maternal and perinatal morbidity and mortality in Sub-Saharan Africa (SSA). Delayed diagnosis and limited resources compromise outcomes. Identifying predictors of favorable maternal outcomes may improve risk stratification and targeted interventions. This study evaluated predictors of favorable maternal prognosis among women with PE at Laquintinie Hospital, Douala, Cameroon.
Methods: We conducted an analytical cross-sectional study with retrospective data collection over five years (March 2020-2025). Medical records of women with PE were reviewed. Bivariate and multivariate logistic regression analyses were performed to identify factors independently associated with favorable maternal outcomes.
Results: Among 333 women with PE, maternal complications occurred in 32.4% of cases: eclampsia (33%) and maternal death (29%), with fetal distress the leading fetal complication (37.7%). Independent predictors of favorable maternal outcomes were ≥4 antenatal visits (adjusted OR=2.47; p=0.004), no previous PE (adjusted OR=1.99; p=0.027), gestational age ≥37 weeks (adjusted OR=1.72; p=0.001), and preserved consciousness at presentation (adjusted OR=4.91; p=0.019). Notably, neurological status emerged as the strongest predictor of prognosis, underscoring the importance of early recognition of severe disease before neurological deterioration occurs.
Conclusions: Favorable maternal outcomes in PE are driven not only by clinical severity but also by timely engagement with antenatal care (ANC) services. Identifying ANC use, gestational maturity, previous PE, and neurological status as key prognostic indicators provides targets for strengthening surveillance and referral systems in resource-limited settings. These findings support prioritizing early detection and close monitoring of high-risk women to reduce preventable maternal complications and deaths.

Keywords: Preeclampsia, Maternal prognosis, Antenatal care, Risk factors, Cameroon, Maternal outcomes

INTRODUCTION

Preeclampsia (PE), a subset of hypertensive disorders in pregnancy, is a common pregnancy disorder that generally occurs in the later months of pregnancy. It is defined by the association of hypertension (blood pressure ≥140/90 mmHg) and proteinuria ≥300 mg/24 hours occurring after 20 weeks of gestation in a previously normotensive woman.[1] Hypertensive disorders are reported as the second most frequent direct obstetric cause of death in many settings, including both developed and developing countries.[2] Globally, PE affects approximately 2-8% of pregnant women and is responsible for about 15% of maternal deaths and between 275,000 and 1,375,000 fetal deaths annually.[3,4]

PE results from maternal endothelial dysfunction of placental origin. It usually resolves after delivery of the placenta; however, it may occur up to 6 weeks postpartum. PE may progress to systemic involvement and lead to severe maternal complications such as eclampsia, acute pulmonary edema, acute renal failure, and placental abruption, as well as fetal complications including intrauterine growth restriction and fetal death.[5,6]

Reports of its prevalence in Africa vary widely. According to a systematic review and meta-analysis conducted between 1997 and 2007, prevalence of PE in SSA was estimated at 5.3%. However, in Chad its prevalence was reported to be 2.9% in 2019 whereas in Guinea, study conducted at University Clinic of Gynecology and Obstetrics at Donka National Hospital reported 150 cases of PE among 226 hypertensive pregnant women (66%).[7,8] Cameroonian study conducted at Laquintinie Hospital in Douala showed that out of 17,644 deliveries, 1,080 cases of PE were recorded, corresponding to a frequency of 6.12%, with a prevalence of 46.7% among primiparous women aged 20-29 years.[9] The same study showed that PE was also frequently observed in twin pregnancies (10.1%).

Management of PE requires a multidisciplinary approach involving obstetricians, anesthetists, internists, and neonatologists to optimize maternal and fetal outcomes, particularly in resource-limited settings.[5,6] In SSA, it remains suboptimal due to gaps in adherence to WHO-recommended practices, including limited use of magnesium sulfate and anti-hypertensives, inadequate monitoring, compounded by weak referral systems and resource constraints.[10,11]

Although several studies have addressed this condition, further progress remains necessary. Therefore, objective of this study was to evaluate the prognostic factors of PE at Laquintinie Hospital, a referral facility, in Douala.

METHODS

Study design and setting

We conducted an analytical cross-sectional study with retrospective data collection at Laquintinie Hospital, a second-level referral hospital located in metropolitan Douala, Cameroon.

Study period

The study implementation, including protocol development and data extraction, was carried out between November 2024 and June 2025, and data over a 5-year period were collected (March 2020 to March 2025).

Study population

The study population consisted of pregnant women and parturients diagnosed with PE, either at admission or during hospitalization.

Inclusion criteria

Women admitted for PE, and those who developed PE during hospitalization were included in the study.

Exclusion criteria

Patients with incomplete or missing medical records, patients with PE associated with other major medical comorbidities were excluded from the study.

Sampling and data collection

A consecutive and exhaustive sampling method was used and data extracted from medical records and admission registers using a structured data collection form was.

Study variables included sociodemographic including age, marital status, education level, religion, occupation, region of origin; clinical including parity, gravidity, medical history, blood pressure, proteinuria, clinical symptoms, toxicological history; management including seizure prophylaxis medications, antihypertensives treatment, mode of delivery. Outcome variables were also sought via maternal and fetal complications

Statistical analysis

Data were analyzed using IBM SPSS version 25.0. Descriptive statistics were used to summarize variables. Bivariate analysis was performed to identify factors associated with prognosis. Multivariate logistic regression was conducted to identify independent predictors of favorable prognosis.

Results were expressed as odds ratios (OR) with 95% confidence intervals (CI). A $p<0.05$ was considered statistically significant

Ethical considerations

Ethical approval was obtained from the Ethics Committee of the University of Douala. Administrative authorization was granted by Laquintinie Hospital. Confidentiality was ensured through anonymization of patient data. Given the retrospective design, the study posed no direct risk to participants.

RESULTS

Sociodemographic characteristics

The study population showed a varied age distribution, with the most represented age group being 31-35 years (27.3%, n=91). Most participants were single (76.3%, n=254), and more than half had attained secondary education (54.4%, n=181). No sociodemographic variable was significantly associated with prognosis ($p>0.05$), although occupation approached statistical significance ($p=0.058$).

Maternal and fetal complications

Maternal complications occurred in approximately one-third of patients 32.4%, reflecting a substantial burden of morbidity. Figure 1 below shows that eclampsia was the most frequent maternal complication, accounting for 33% (n=36) of cases, followed by maternal death, which represented 29% (n=31). HELLP (Hemolysis elevated liver enzymes low platelet count) syndrome was the third most common complication at 17% (n=18), with less frequent complications including retroplacental hematoma at 11% (n=12), acute renal insufficiency at 6% (n=6), and acute pulmonary edema (5%).

Regarding fetal complications, Figure 2 shows that acute fetal distress (AFD) was the most frequent complication, accounting for 37.7% (n=43) of cases.

Sociodemographic and obstetrical factors associated with favorable maternal outcomes after management of severe PE

Table 2 shows that only two variables were statistically significantly associated with favorable maternal outcomes after management of severe PE. Firstly, the number of ANC visits was significantly associated with prognosis (p<0.001). Women who had attended ≥4 ANC visits were more frequently observed in the good prognosis group (77.3%) compared to the poor prognosis group (51.4%). Conversely, women with <4 ANC visits were more represented in the poor prognosis group (48.6%) than in the good prognosis group (22.7%).

Secondly, a history of PE was also significantly associated with prognosis (p=0.003). Women without a prior history of PE were more common in good prognosis group (89.2%) compared to poor prognosis group (77.0%), while those with a history of PE were more represented in poor prognosis group (23.0%) than in good prognosis group (10.8%). No other variables in table showed statistically significant associations with maternal prognosis.

Analysis of clinical and paraclinical factors associated with a favorable prognosis

Table 3 shows that gestational age (p<0.001), systolic blood pressure (p=0.024), amniotic fluid characteristics (p=0.002), level of consciousness (p<0.001), performed obstetrical ultrasound (p=0.040), and urine dipstick proteinuria (p=0.041) were significantly associated with maternal prognosis. Favorable outcomes were more frequent among women delivering at ≥37 weeks, with lower systolic blood pressure, clear amniotic fluid, normal consciousness, having done an obstetrical ultrasound, and lower levels of proteinuria (1+), whereas poorer outcomes were associated with earlier gestational age, severe hypertension, altered consciousness, abnormal amniotic fluid, absence of ultrasound, and higher proteinuria levels.

Impact of management on pregnancy outcomes in PE with severe features

As shown on Table 4, the mode of delivery was the only variable significantly associated with maternal prognosis (p=0.024). Vaginal delivery was more frequent in the good prognosis group (24.9% vs. 14.9%), whereas cesarean section was more common in the poor prognosis group (85.1% vs. 75.1%). No statistically significant associations were found for antihypertensive treatment (p=0.788) or anticonvulsant use (p=0.276).

Multivariate analysis

Table 5 illustrates multivariate analysis which identified four independent predictors of favorable maternal outcomes: ≥4 ANC visits (adjusted OR=2.47, p=0.004), no history of PE (adjusted OR=1.99, p=0.027), gestational age ≥37 weeks (adjusted OR=1.72, p=0.001), and normal consciousness (adjusted OR=4.91, p=0.019). Other variables significant in bivariate analysis-such as amniotic fluid status, ultrasound, proteinuria, and mode of delivery-were no longer significant after adjustment, indicating confounding effects.

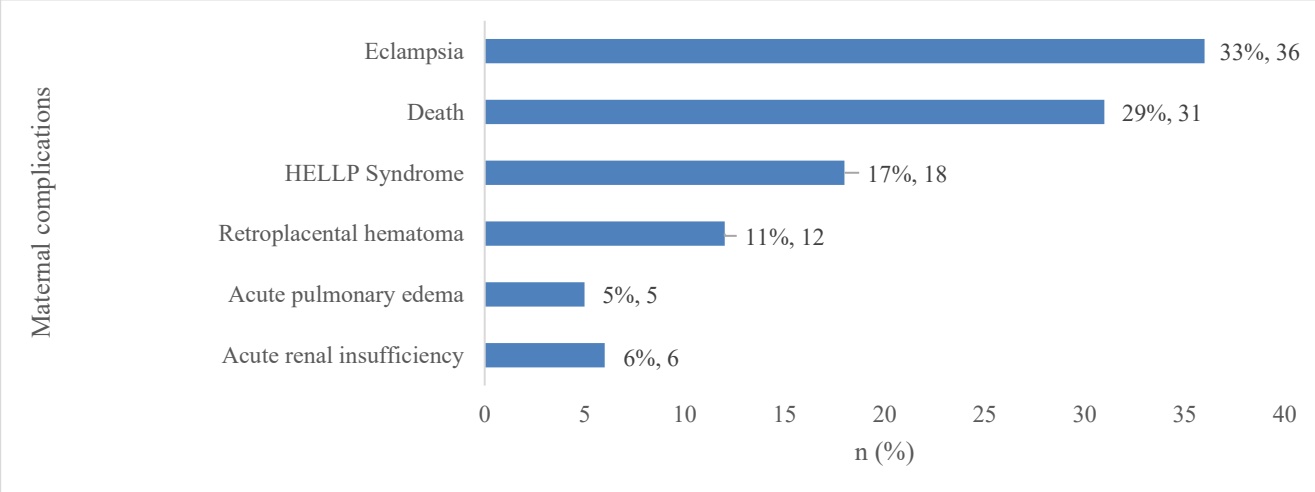

Figure 1: Distribution of participants according to maternal complications.

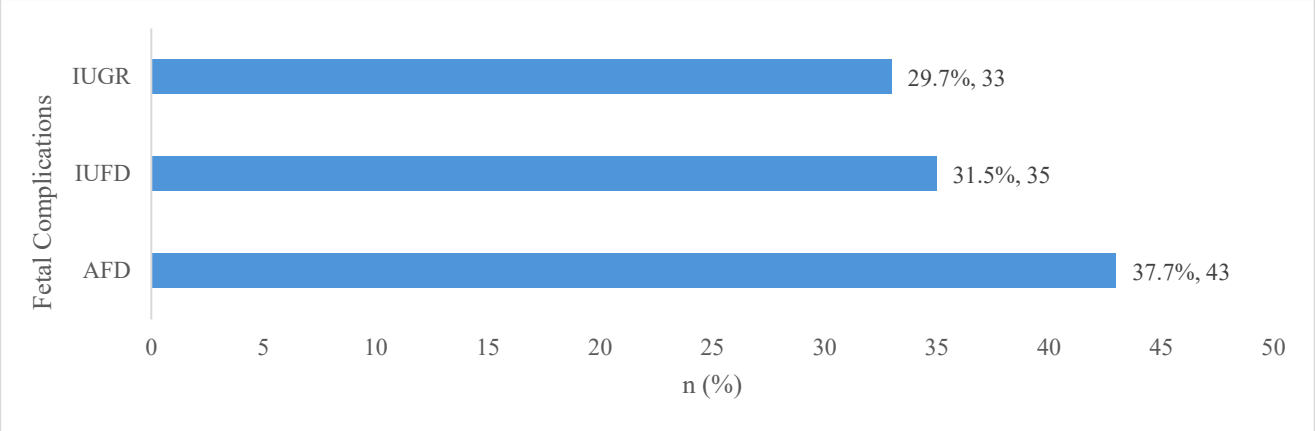

Figure 2: Distribution of participants according to fetal complications.
IUGR-Intrauterine growth restriction, IUFD-Intrauterine fetal demise, AFD-Acute fetal distress

Table 1: Distribution of participants based on sociodemographic characteristics.

Variables	N	Percentage (%)
Age (in years)		
≤20	29	8.7
21-25	72	21.6
26-30	73	21.9
31-35	91	27.3
36-40	60	18.0
>40	8	2.4
Marital status		
Single	254	76.3
Married	79	23.7
Educational level		
Primary	40	12.0
Secondary	181	54.4
Tertiary	83	24.9
Unschooled	29	8.7

Table 2: Analysis of factors associated with a favorable prognosis.

Variables	Good prognosis, n=185 (%)	Poor prognosis, n=148 (%)	Total, n=333 (%)	P value
Age (in years)				
≤20	16 (8.6)	13 (8.8)	29 (8.7)	0.113
21-25	31 (16.8)	41 (27.7)	72 (21.6)	
26-30	48 (25.9)	25 (16.9)	73 (21.9)	
31-35	50 (27.0)	41 (27.7)	91 (27.3)	
36-40	34 (18.4)	26 (17.6)	60 (18.0)	
>40	6 (3.2)	2 (1.4)	8 (2.4)	
Marital status				
Single	139 (75.1)	115 (77.7)	254 (76.3)	0.584
Married	46 (24.9)	33 (22.3)	79 (23.7)	
Educational level				
Primary	26 (14.1)	14 (9.5)	40 (12.0)	0.268
Secondary	99 (53.5)	82 (55.4)	181 (54.4)	
Tertiary	41 (22.2)	42 (28.4)	83 (24.9)	
Not schooled	19 (10.3)	10 (6.8)	29 (8.7)	
Number of ANCs				
<4	42 (22.7)	72 (48.6)	114 (34.2)	<0.001
≥4	143 (77.3)	76 (51.4)	219 (65.8)	

Continued.

Variables	Good prognosis, n=185 (%)	Poor prognosis, n=148 (%)	Total, n=333 (%)	P value
Gravidity				
G1-2	113 (61.1)	72 (48.6)	185 (55.6)	0.061
G3-4	32 (17.3)	38 (25.7)	70 (21.0)	
G≥5	40 (21.6)	38 (25.7)	78 (23.4)	
Interpregnancy interval (in years)				
<5	124 (67.8)	94 (63.5)	218 (65.9)	0.418
≥5	59 (32.2)	54 (36.5)	113 (34.1)	
History of pre-eclampsia				
Yes	20 (10.8)	34 (23.0)	54 (16.2)	0.003
No	165 (89.2)	114 (77.0)	279 (83.8)	
Toxicological history				
Tobacco use	1 (0.5)	1 (0.8)	2 (0.6)	0.734
Alcohol	78 (42.2)	58 (39.2)	78 (23.4)	
Medicinal plants use	2 (1.1)	11 (7.4)	13 (3.9)	

Table 3: Analysis of clinical and paraclinical factors associated with a favorable prognosis.

Variables	Good prognosis, n=185 (%)	Poor prognosis, n=148 (%)	Total, n=333 (%)	P value
Gestational age (in weeks)				
≤22	1 (0.5)	6 (4.1)	7 (2.1)	<0.001
23-33	32 (17.3)	54 (36.5)	86 (25.8)	
34-36	52 (28.1)	37 (25.0)	89 (26.7)	
≥37	100 (54.1)	51 (34.5)	151 (45.3)	
Clinical signs/symptoms				
Headache	62 (33.5)	48 (32.4)	110 (33.0)	0.784
Pedal edema	112 (60.5)	79 (53.4)	191 (57.4)	
Epigastric pain	23 (12.9)	24 (15.5)	47 (14.1)	
Systolic blood pressure				
140-149	21 (11.4)	9 (6.1)	30 (9.0)	0.024
150-159	36 (19.5)	23 (15.5)	59 (17.7)	
160-169	66 (35.7)	49 (33.1)	115 (34.5)	
≥170	62 (33.5)	67 (45.3)	129 (38.7)	
Diastolic blood pressure				
90-99	19 (10.3)	15 (10.1)	34 (10.2)	0.091
100-109	31 (16.8)	20 (13.5)	51 (15.3)	
110-119	73 (39.5)	54 (36.5)	127 (38.1)	
≥120	62 (33.5)	59 (39.9)	121 (36.3)	
Uterine fundal height (cm)				
<28	5 (2.7)	31 (21.0)	36 (10.8)	0.061
28-34	84 (45.4)	72 (48.7)	156 (46.9)	
34-37	71 (38.4)	36 (24.3)	107 (32.1)	
≥37	25 (13.5)	9 (6.1)	34 (10.2)	
Amniotic fluid characteristic				
Clear	144 (77.8)	92 (62.2)	236 (70.9)	0.002
Straw-colored	41 (22.2)	56 (37.8)	97 (29.1)	
Conscience				
Normal	182 (98.4)	131 (88.5)	313 (94.0)	<0.001
Clouded consciousness	3 (1.6)	17 (11.5)	20 (6.0)	
Obstetrical ultrasound				
Done	120 (64.9)	79 (53.7)	199 (59.9)	0.040
Not done	65 (35.1)	68 (46.3)	133 (40.1)	
Urine dipstick proteinuria				
1+	60 (32.4)	33 (22.3)	93 (27.9)	0.041
≥2+	125 (67.6)	115 (77.7)	240 (72.1)	

Table 4: Analysis of the impact of management on pregnancy outcomes in PE.

Variables	Good prognosis, n=185 (%)	Poor prognosis, n=148 (%)	Total, n=333 (%)	P value
Antihypertensive				
Nicardipine	172 (92.9)	146 (98.6)	318 (95.5)	0.788
Alpha-methyldopa	155 (83.7)	139 (93.9)	294 (88.3)	
Anticonvulsants				
$MgSO_4$	129 (69.7)	111 (75.0)	240 (72.1)	0.276
Diazepam	0 (0.0)	3 (2.0)	3 (0.9)	
Mode of delivery				
Vaginal	46 (24.9)	22 (14.9)	68 (20.4)	0.024
Cesarean	139 (75.1)	126 (85.1)	265 (79.6)	

Table 5: Summary of multivariate analysis (logistic regression) for factors independently associated with a favorable prognosis.

Variables	OR [95% CI]	P value	Adjusted OR [95% CI]	Adjusted p value
Number of ANC ≥4	3.23 [1.33-8.76]	<0.001	2.47 [1.28-11.56]	0.004
No history of PE	2.46 [1.18-13.16]	0.003	1.99 [1.09-17.34]	0.027
Gestational age ≥37SA	2.24 [1.68-6.91]	<0.001	1.72 [1.54-9.22]	0.001
Clear amniotic fluid	2.14 [1.32-3.45]	0.002	1.45 [0.96-7.43]	0.063
Appropriate consciousness	7.87 [2.26-27.42]	<0.001	4.91 [1.93-34.06]	0.019
Obstetrical ultrasound done	1.59 [1.02-2.48]	0.040	1.09 [0.72-3.88]	0.284
Urine dipstick 1+	1.67 [1.04-2.74]	0.041	1.11 [0.56-4.70]	0.309
Vaginal delivery	1.90 [1.18-3.33]	0.024	1.07 [0.91-8.44]	0.073

DISCUSSION

This study examined prognostic factors of PE in a tertiary hospital in Douala, Cameroon, highlighting both clinical determinants and health system-related influences on maternal outcomes. Findings underscore the significant burden of complications and identify key predictors of favorable prognosis in a resource-limited setting.

The sociodemographic profile of participants-predominantly young, single women with secondary education-reflects patterns commonly reported in SSA, where PE often affects women in their peak reproductive years.[12] However, no sociodemographic factor was significantly associated with prognosis in this study. Similar findings have been reported in SSA, where clinical severity and access to care appear to outweigh sociodemographic determinants in predicting outcomes.[12-14] The high burden of maternal complications, particularly eclampsia and maternal death, is consistent with reports from LMICs where delayed diagnosis and suboptimal management remain major challenges. Studies from Cameroon and countries in the same region have shown that hypertensive disorders contribute substantially to maternal mortality.[13,15,16] The predominance of acute fetal distress and intrauterine fetal death in this study similarly reflects the impact of placental insufficiency and inadequate monitoring in severe disease.[16]

A key finding of this study is the strong association between adequate ANC (≥4 visits) and favorable outcomes. This aligns with evidence demonstrating that regular antenatal follow-up enables early detection of hypertensive disorders and timely intervention, thereby reducing complications.[17-19] In LMIC settings, inadequate antenatal attendance is consistently associated with delayed diagnosis and worse outcomes.[17] These findings highlight ANC as a critical modifiable factor.

The absence of a prior history of PE was also independently associated with better prognosis, consistent with previous studies that have shown that a history of PE is a strong predictor of recurrence and adverse maternal outcomes, with higher rates of severe disease and complications in subsequent pregnancies.[20-22] This reinforces the importance of risk stratification and close monitoring in women with previous disease.

In our study gestational age emerged as a major determinant, with delivery at ≥37 weeks significantly associated with favorable outcomes. This finding is well established and consistent with global evidence, as early-onset PE is typically more severe and linked to poorer maternal and fetal outcomes compared with late-onset disease likely due to greater placental dysfunction.[23-25]

The strong association between normal consciousness and favorable prognosis reflects the clinical severity of PE. Altered consciousness is often indicative of impending or established eclampsia and severe neurological involvement, which are known predictors of maternal morbidity and mortality.[20,26] This highlights the

importance of neurological assessment in the clinical evaluation of these patients

Although variables such as amniotic fluid characteristics, proteinuria level, and obstetrical ultrasound were significant in bivariate analysis, they lost significance after adjustment, suggesting confounding effects. Nonetheless, their trends are clinically relevant. Clear amniotic fluid and lower proteinuria are typically associated with less severe disease, while access to ultrasound reflects improved monitoring and earlier detection of complications.[27-29]

Mode of delivery was the only management-related factor significantly associated with maternal prognosis (p=0.024), with vaginal delivery more frequent in favorable outcomes and cesarean section more common in poor outcomes. This likely reflects confounding by indication, as cesarean delivery is typically performed in severe cases or emergencies rather than causing poor outcomes. Similar findings have been reported in LMIC and SSA settings, where high cesarean rates in severe PE are linked to disease severity and urgent maternal or fetal indications.[24,30] Although antihypertensive and anticonvulsant treatments were not significantly associated with prognosis in our study, their widespread use-particularly magnesium sulfate-reflects standard management practices and their role in preventing complications rather than reversing disease severity, as demonstrated in SSA and global studies.[26] We could also argue that this finding can be explained by confounding by indication, as patients with more severe PE -and therefore a higher risk of poor outcomes-are more likely to receive antihypertensive treatment, particularly nicardipine. The higher proportions observed in the poor prognosis group thus reflect greater disease severity rather than a negative effect of the drugs. Additionally, treatment may often be initiated late, when complications are already present, limiting its impact on prognosis. Antihypertensives also play a supportive rather than curative role, controlling blood pressure without addressing the underlying placental pathology.

CONCLUSION

PE remains associated with a high burden of maternal and fetal complications in this setting. Favorable outcomes were independently associated with adequate ANC (≥4 visits), absence of prior PE, term delivery, and preserved consciousness, highlighting the key role of early detection and clinical severity in prognosis. Sociodemographic factors were not significant, while the association between cesarean delivery and poor outcomes likely reflects disease severity. Strengthening ANC and timely management is essential to improve outcomes, especially in resource-limited settings.

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