Assessment of Maternal and Perinatal Outcome in Pre-Eclampsia with Severity Feature and Associated Factors in Two Governmental Hospital in Addis Ababa, Ethiopia

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ABSTRACT

Background*:* Pregnant women with pre-eclampsia are at an increased risk of adverse maternal, fetal and neonatal complications. In Ethiopia, Hypertensive disorders of pregnancy (HDP) complicates about 6% of all pregnancies**.**

Methods*:* A hospital-based cross-sectional study was conducted to evaluate the maternal and perinatal outcome of pregnant women with the diagnosis of pre-eclampsia with severe feature from January 1 to July 2023. Checklist was used to collect data from charts.   Binary logistic regression was fitted to assess the factor associated with maternal and perinatal outcome with PEWSF. Variable p-value<=0.25 in the binary logistic regression was considered in multiple logistic regressions to control the confounding factors. AOR along with 95% cl was estimated to assess the strength of the association and p-value <0.05 were used to declare the level of statistical significance.

Result*:* There were a total of 8736 deliveries in both hospital within study period, the prevalence of PEWSF feature in the study period is 4.19%. There were about 33.9% and 59.2% Unfavorable maternal and perinatal outcome respectively. The most common maternal complication was abruptio placentae (17.2%) while perinatal complication was low birth weight (48.9%. Mothers with sever blood pressure record are 2.32 times more likely to develop maternal complication, (AOR (CI)= 2.32 (1.03-5.19) * and Mothers who didn't attend formal education were five times more likely to develop unfavorable perinatal outcome compared to those who attended higher education, (AOR (CI)= 5.14 (1.93-13.63), headache is most common complaint at admission (51.7%).

CONCULUSION: Maternal age, residence, occupation, blood pressure on admission, and headache complain have shown a statistically significant association with unfavorable maternal outcomes. Whereas, level of education, occupation, mode of admission, number of Ante natal care (ANC) contact, and family history of hypertension have shown a statistically significant association with unfavorable perinatal outcomes.

Keyword: Pre-eclampsia with severity feature, perinatal outcome, maternal outcome

INTRODUCTION

Pre-eclampsia is described as a systemic illness characterized by the start of elevated blood pressure >140/90 mm Hg and proteinuria after 20 weeks of gestation in a previously normotensive woman. Pre-eclampsia complicates 2-8% of pregnancies worldwide and contributes to 10-15% maternal mortality. Pre-eclampsia with severity is defined as the presence of any of the following features: cerebral symptoms (such as visual disturbance or headache), right upper quadrant or epigastric pain, serum transaminase concentration > twice normal, systolic blood pressure >=160 mm Hg and or diastolic blood pressure >=110 mm Hg on two occasions at least four hours apart, severe thrombocytopenia ((100,000 platelets/micro), Oliguria <500 mL in 24 hours and pulmonary edema)(1).

Pre-eclampsia that occurs in a woman who already has chronic hypertension is known as superimposed pre-eclampsia. This is characterized by hypertension worsening, the development or abrupt increase in proteinuria, and/or severe new end-organ impairment. Pregnant women with a history of preeclampsia or persistent hypertension are more likely to acquire the condition.(2).

Pre-eclampsia affects 5-7% of pregnant women worldwide, leading to maternal and fetal morbidity and mortality. Hypertensive disorders are the second most common cause of maternal death after hemorrhage in developed countries, causing 70,000 maternal fatalities and 500,000 newborn deaths annually. A Saudi Arabian study found a 2.4% prevalence of hypertensive disease during pregnancy, with PE being the most prevalent hypertensive disorder at 54.9%(2).

Pre-eclampsia, the precursor to eclampsia, affects 2-10% of pregnancies globally and varies significantly across countries(3).

A systematic review by USA investigators reveals pregnancy-induced hypertension is a leading cause of maternal and perinatal morbidity and mortality worldwide. A study in Mettu Karl referral hospital found that severe preeclampsia and eclampsia account for 12% of perinatal mortality(4).

Pre-eclampsia can lead to high maternal and perinatal mortality and morbidity, with perinatal mortality reaching 30-50%. Poor fetal outcomes include iatrogenic prematurity, respiratory distress syndrome, intra uterine asphyxia, intra uterine growth restriction, and intra uterine death. IUGR may cause neurodevelopmental defects in children. Maternal morbidity and mortality due to disseminated intravascular coagulation, abruptio placentae, acute kidney

injury, cerebrovascular accident, cardiovascular complications, pulmonary edema, HELLP syndrome, retinal detachment, and aspiration pneumonia(5).

Multiple observational studies reported Pre-eclampsia prevalence in Ethiopia ranges from 4 -12%, contributing to 15% maternal deaths. A five-year retrospective review found it contributes to perinatal mortality of 290/1000 total births (1).

Severe pre-eclampsia management involves blood pressure control and seizure prophylaxis with drugs like diazepam, phenytoin, and magnesium sulfate, with MgSO4 being superior to other anticonvulsants, according to emerging evidence(6). Health institutions in Nigeria are increasingly utilizing MgSO4 for pre-eclampsia management, replacing diazepam in the protocol since 2007, as seen at the University of Nigeria Teaching Hospital in Enugu(6).

Pre-eclampsia is managed by assessing maternal and fetal status and deciding on timely delivery, typically at 37 weeks, to reduce maternal and neonatal morbidity (2). Expectant management is crucial in severe pre-eclampsia, allowing for consideration until 34 weeks of gestation if strict inclusion criteria and resources are met. Monitoring maternal and fetal well-being is essential, and delivery should be considered at any moment when conditions deteriorate, regardless of gestational age(2).

The Hospital Corporation of America suggests that timely administration of antihypertensive medications can reduce the risk of fatal cerebral bleeding, renal failure, injury, and cardiovascular morbidity and mortality. Treatment of acute hypertension may require intravenous medicine. Labetalol is the first-line antihypertensive medicine, while oral antihypertensive drugs include methyldopa, labetalol, and calcium channel blockers like nifedipine. Magnesium sulfate is the preferred medicine for preventing eclamptic seizures and is recommended by the World Health Organization(2) .

Conceptual framework.

Sociodemographic factor

- ✓ **Age**
- ✓ **Occupation**
- ✓ **Place of residence**
- ✓ **Level of education**
- ✓ **Religion**
- ✓ **Marital status**

Maternal and perinatal outcome of sever preeclampsia

Maternal OUTCOME

- ✓ **Pulmonary edema**
- ✓ **eclampsia**
- ✓ **PPH**
- ✓ **HELLP SYNDROME,DIC**
- ✓ **DEATH**

  NEONATAL OUTCOME
- ✓ **IUGR, IUFD, A/REDF**
- ✓ **LOW-APGAR/BIRTH WEIGHT**
- ✓ **PRETERM BIRTH**
- ✓ **NEONATAL DEATH**

Reproductive characteristics

- ✓ **Gravidity**
- ✓ **Parity**
- ✓ **number of living children**
- ✓ **Gestational age at time of admission**
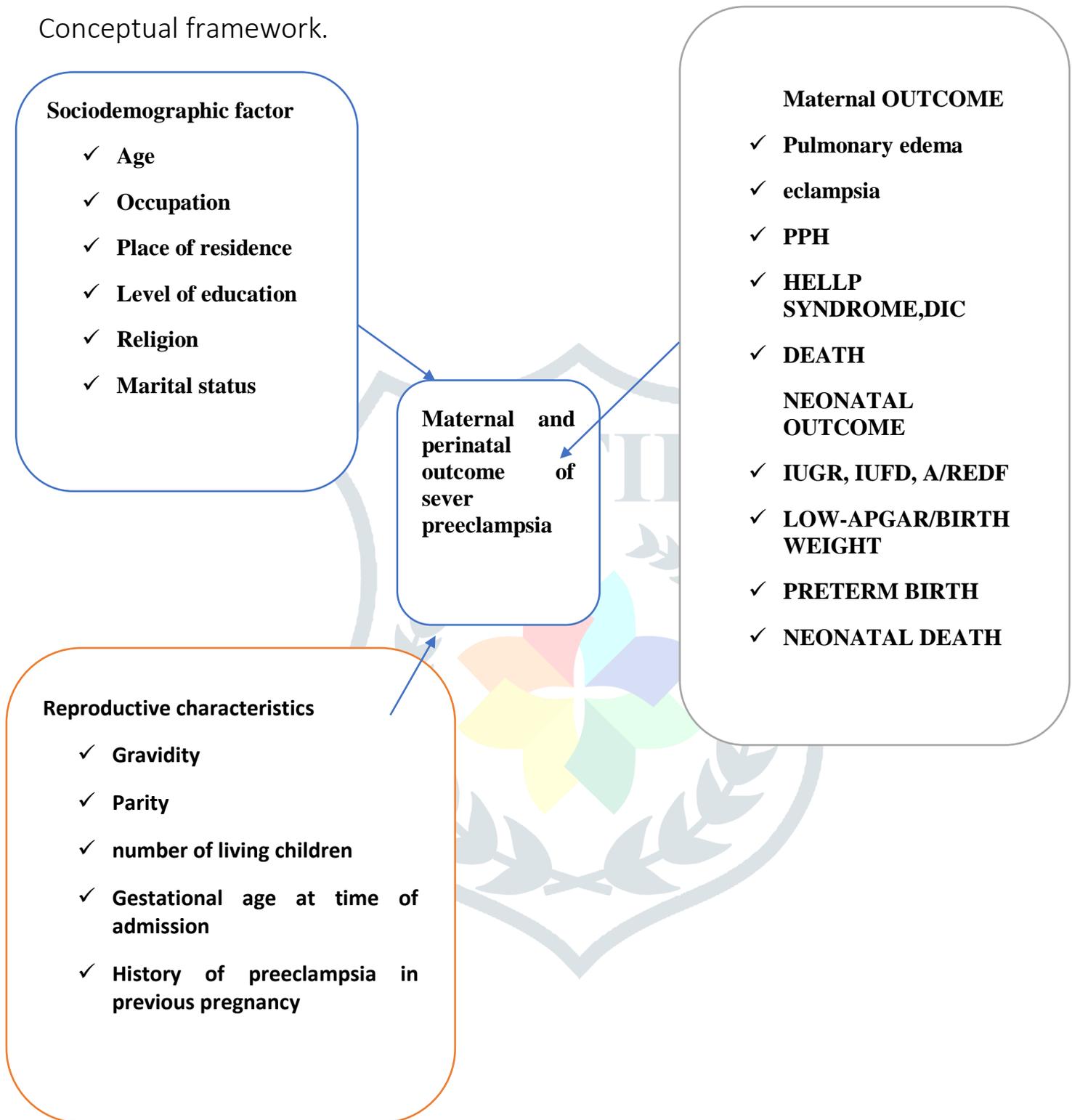- ✓ **History of preeclampsia in previous pregnancy**

Figure 1 : conceptual framework to determine maternal and neonatal outcome of pregnant mother who diagnosed and admit with preeclampsia with severity feature at AGMCH hospital

OBJECTIVE

GENERAL OBJECTIVE

To assess perinatal and maternal outcome and associated factor of pregnant mother admitted to Abebech Gobena Maternal and Child care Hospital and St. peter specialized hospital with diagnosis of pre-eclampsia with severity feature and associated factor from January 1, 2033 to September 30,2023

SPECIFIC OBJECTIVES

To verify maternal outcome of preeclampsia with severity feature.

To identify factor associated with maternal outcome in preeclampsia with severity feature,

To determine perinatal outcome in preeclampsia with severity feature.

To identify factor associated with perinatal outcome in preeclampsia with severity feature.

METHODS AND MATERIALS

STUDY AREA AND STUDY PERIOD

This is a hospital based Cross sectional study and took place at Abebech Gobena MCH and St. petros specialized hospital January 1, 2023 to July 30,2023 in Addis Ababa, capital city of Ethiopia. Abebech Gobena MCH hospital is one of the tertiary referral hospitals directly under Addis Ababa Health Bureau. It is also a teaching hospital for Yekatit 12 hospital medical college. The hospital gives service to more than 200,000 people annually who were referred from around 18 catchment health center from Addis Ababa city and Oromia regional state and one primary hospital from Oromia regional state. AGH MCH is the only Public MCH center in the town which gives system based service for obstetrics and gynecology. St. petros compressive specialized hospital is one of governmental which was the first TB referral hospital in the country. The hospital was established in 1953. Currently serving as specialized hospital f and directly responsible for FMOH which gives service for about more than 100,000.MCH center was established in 2006 E.C and gives service for 15 catchment health center and 3 primary hospital from Addis Ababa city and Oromia region

STUDY DESIGN

Facility based cross-sectional study was conducted at AGH MCH and St. peter specialized hospital from February 1,2023 –August 30, 2023.

ELIGIBLITY CRITERIA

INCLUSION CRITERIA

All pregnant mothers who diagnosed admitted and managed for preeclampsia with severity feature and give birth and followed for 48hr at AGH MCH/ St. petros specialized hospital during study period.

ECLUSION CRITERIA

Pregnant mothers who diagnosed with pre-eclampsia but not with severity feature and who were not give birth at study period with unknown maternal and neonatal outcome during study period.

SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUE

The sample size was calculated by using a single population proportion sample size calculation formula ($Z_{\alpha/2}^2$ *p*(1-p) / (d)^2 by considering the following assumptions: d = margin of error of 5% with 95% confidence interval and P=35%. By considering 5% none response rate, the final sample size became 366. The total sample size was proportionally allocated to the two public hospitals based on their source population from each hospital. The source population of each hospital was taken from seven-month delivery reports of in the same period. Then, the sum of each hospital was considered as source population (8717). Afterwards, the study participants were systematically selected from each hospital (70% and 30%), and admitted mothers for delivery who were eligible to the study(All pregnant mother with GA>=28weeks,who were diagnosed, admitted and managed for PEWSF and followed for 48hr at AGH MCH/ St. petros specialized hospital) were included until the required sample size was obtained
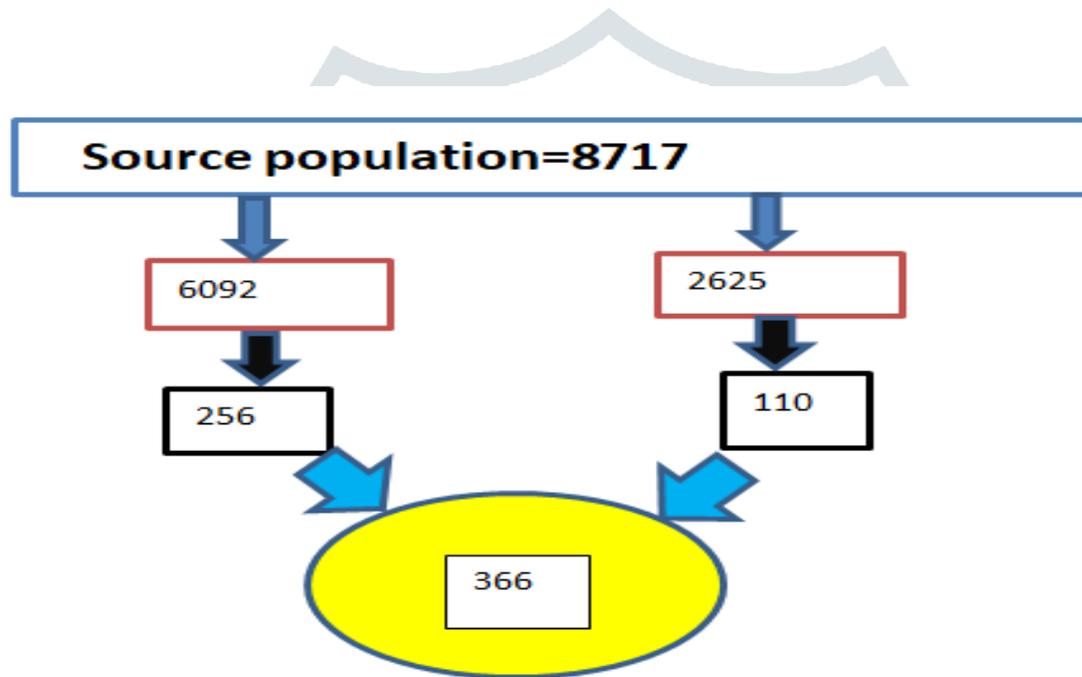
Schematic presentation of sampling procedure

Figure-2 Schematic presentation of sampling procedure.

DATA COLLECTION PROCEDURE (INSTRUMENT AND PERSONNEL)

Data were collected through face to face interviews and reviewing of medical records of pregnant mother at labor ward, high risk, EOPD, ANC, postnatal, and maternity ward by using pretested structured questionnaires .Year one Residents/medical interns and trained midwives were collect information through review of charts and note down perinatal and maternal outcome, laboratory results and followed for 48hr for any complication of Neonate if admitted to NICU.

Operational manual for the study, with detailed instruction to the data collectors were prepared to assure a uniform standard to carrying out the study with good quality control. All data were collected and stored. During data analysis completeness, accuracy, and consistency of data was rechecked again.

OPERATIONAL DEFINITION

Unfavorable Maternal outcome - Immediate post operation/partum (within first 48hr) Complications of the mother due to severe preeclampsia including eclampsia, abruption, DIC, PPH, pulmonary edema, maternal death.

Sever BP measurement -is if SBP> 160 and / or DBP 110 mmHg [14]

Elevated AST -is AST value > 70(16)

Elevated ALT- is ALT value > 70 (16)

Elevated creatinine- is creatinine value > 1.2 (16)

Low platelet- is platelet count <100,000 (16)

Unfavorable perinatal outcome

Immediate post operation/partum (within first 72hr) Complications Perinatal Complications of the newborn due to severe preeclampsia and eclampsia including low birth weight, still birth, intra uterine growth restriction, intra uterine fetal death, preterm birth, low APGAR score, birth asphyxia (12).

Favorable perinatal outcome (14)-Newborns from severe preeclampsia and eclampic mothers end up without perinatal complications of severe preeclampsia and eclampsia.

Low APGAR: - score is fifth minute APGAR score < 6, excluding zero [14,16]

IUFD -Antepartum death of the fetus after 28weeks of GA.

IUGR - ultrasound estimated fetal weight (EFW) of less than the 10th percentile (19)

Low birth weight - Birth weight of < 2.5kg

DATA PROCESSING AND ANALYSIS

Data was entered to epi data version 4.6 and analyzed using SPSS version 26.0. Coding of individual checklist was undertaken before data entry in to the software. Descriptive statistics was used to characterize the dependent and independent variables. Quantitative data was presented as number, frequency and percentage. Binary logistic regression was fitted to assess the factor associated with maternal outcome with PEWSF and variable which have p-value >=0.25in the binary logistic regression was considered for multivariate logistic regressions to control the confounding factors. AOR along with 95%clwas estimated to assess the strength of the association and p-value <0.05 were used to declare the level of statistical significance. Finally the data were presented in text table and graph.

ETHECAL CONSIDERATION

Ethical clearance & permission letter was obtained from the Institutional Review Board (IRB) of yekatit 12 hospital medical college. Confidentiality was maintained during data collection, analysis and interpretation by avoiding recording of names and returning client records to its place after completion of data entry

Result

Socio demographic characteristics of participants

A total of 348 respondents were took part, in the study a 95.1% response rate. Participants had a mean (SD) age of 27.55 $\pm$ 5.179 and ranged from 18 – 42 years. Over three-forth, 272(78.2%), of them were urban residents. Additionally, most, 324(93.1%), of participants were married, 204(58.6%) were employed, 134(38.5%) of them had attended secondary education and 296(85.1%) were referred cases (Table 1).

Table 1;Socio-demographic characteristics of participants at Abebech Gobena Maternal and Children's Health (MCH) and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Category	Frequency	Percent (%)
Age in years	20 – 34	294	84.5%
	<20	13	3.7%
	≥35	41	11.8%
Residence	Urban	272	78.2%
	Rural	76	21.8%
Level of education	No formal education	45	12.9%
	Primary	97	27.9%
	Secondary	134	38.5%
	Higher education	72	20.7%
Marital status	Married	324	93.1%
	Others*	24	6.9%
Occupation	Employed	204	58.6%
	Unemployed	144	41.4%
Mode of admission	Self	52	14.9%
	Referral	296	85.1%

*Single, Divorced and Widowed

Past medical and obstetric history

More than half, 179(51.4%), of mothers were primigravida and 69(19.8%) of them have history of abortion. Almost all 342(98.3%) of participants had antenatal care (ANC) contact for the current pregnancy. However, only, 22(6.3%) of them had adequate/full ANC contact. Additionally, 34(9.8%) of mothers had history of pregnancy induced hypertension. Twenty-seven (7.8%) of participants had a history of medical disorder. Of these, chronic hypertension and anemia was reported in 12(3.4%) and 8(2.3%) of cases, respectively.most of pregnancy was singleton ,326(93.3%) (Table 2).

Table 2: Past medical and obstetric history of mothers admitted at Abebech Gobena MCH and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Category	Frequency	Percent (%)
Gravidity	Primigravida	179	51.4%
	Multigravida	162	46.6%
	Grand multipara	7	2.0%
Parity	Nulliparous	12	3.4%
	1 – 3	322	92.5%
	≥4	14	4.0%
History of abortion	Null	279	80.2%
	1	61	17.5%
	≥2	8	2.3%
Antenatal care (ANC) contact	Yes	342	98.3%
	No	6	1.7%
Number of ANC contact	1 – 3	74	21.3%
	4 – 6	252	72.4%
	7 – 8	22	6.3%
Number of fetuses	Singleton	326	93.7%
	Twin/Multiple	22	6.3%
History of pregnancy induced hypertension (PIH)	Yes	34	9.8%
	No	314	90.2%
Family history of hypertension	Yes	70	20.1%
	No	278	79.9%

Past medical history	Yes	27	7.8%
	No	321	92.2%
Anemia	Yes	8	2.3%
	No	340	97.7%
Chronic hypertension	Yes	12	3.4%
	No	336	96.6%
Diabetes mellitus	Yes	5	1.4%
	No	343	98.6%
Renal disease	Yes	2	0.6%
	No	346	99.4%

Clinical features and investigations on admission

In this study, 180(51.7%), 119(34.2%), and 87(25.0%) of mothers were admitted with a chief complaint of headache, epigastric pain, and edema, respectively. Whereas, on investigation, 38(10.9%) of women had deranged liver function test and 53(15.2%) of them had protein 3+ on admission. Further, labor induced in 196(56.3%) of mothers and 213(61.2%) of them stayed in the hospital for more than three days (Table 3).

Table 3: Clinical features of participants admitted to Abebech Gobena MCH and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Category	Frequency	Percent (%)
Headache	Yes	180	51.7%
	No	168	48.3%
Dizziness	Yes	45	12.9%
	No	303	87.1%
Epigastric pain	Yes	119	34.2%
	No	229	65.8%
Visual disturbance	Yes	59	17.0%
	No	289	83.0%
Nausea and/or vomiting	Yes	15	4.3%
	No	333	95.7%
Convulsion	Yes	33	9.5%
	No	315	90.5%

C/S:	Edema	Yes	87	25.0%
		No	261	75.0%
	Grade of edema (n=87)	Grade 1	46	52.9%
		Grade 2	38	43.7%
		Grade 3	3	3.4%
	Blood pressure at admission	Severe range	297	85.3%
		Mild range	51	14.7%
	Medications	Mgso4 alone	92	16.3%
		Methyldopa+Mgso4	256	45.3%
		Hydralazine+methyldopa+Mgso4	119	21.1%
		Nifedipine+methyldopa+mgso4	51	9%%
		Methyldopa+nifedipine+hydralazine+mgso4	57	8.3%
	Urine protein (Dipstick)	Negative	105	30.2%
		1+	50	14.4%
		2+	140	40.2%
		3+	53	15.2%
	Onset of labor	Spontaneous	104	29.9%
		Induction	196	56.3%
		Elective C/S	18	5.2%
		Emergency C/S	30	8.6%
	Mode of delivery	SVD	186	53.4%
		Instrumental	14	4.0%
		Cesarean section	148	42.5%
	Sex of the neonate	Male	186	53.4%
		Female	162	46.6%
	Duration of hospital stay	$\leq$ 3 days	135	38.8%
		$\geq$ 4 days	213	61.2%

Cesarean section   PEWSF: Pre-eclampsia with severe feature   SVD: Spontaneous vaginal delivery

Maternal and perinatal outcomes

The overall prevalence of unfavorable maternal outcome was 33.9% (95% CI: 28.7-38.8). Abruptio placenta (17.2%), HELLP syndrome (15.5%), and postpartum hemorrhage (13.8%) were common complications that occurred among mothers admitted with a diagnosis of pre-eclampsia with severe feature (Table 4).

The overall prevalence of unfavorable perinatal outcome was 59.2% (95% CI: 54.0-63.8). Low fifth minute APGAR score (14.7%), NICU admission (20.4%), low birth weight (48.9%) prematurity (39.4%) were frequently occurred adverse perinatal outcomes among mothers with pre-eclampsia with severe feature (Table 4).

Table 4: Maternal and perinatal outcomes of participants admitted with PEWSF at Abebech Gobena MCH and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Category	Frequency	Percent (%)
Maternal outcomes	Favorable	230	66.1%
	Unfavorable	118	33.9%
Perinatal outcomes	Favorable	142	40.8%
	Unfavorable	206	59.2%
Maternal and perinatal outcomes		Yes (%)	No (%)
Maternal complications	Eclampsia	33(9.5%)	315(90.5%)
	Abruptio placenta	60(17.2%)	288(82.8%)
	HELLP syndrome	54(15.5%)	294(84.5%)
	DIC	6(1.7%)	342(98.3%)
	Acute renal failure	12(3.4%)	336(96.6%)
	Postpartum hemorrhage	48(13.8%)	300(86.2%)
	Pulmonary edema	27(7.8%)	321(92.2%)
	Maternal death	3(0.9%)	345(99.1%)
Perinatal complications	Low 5th min APGAR score	51(14.7)	297(85.3%)
	Need for resuscitation	19(5.5%)	329(94.5%)
	NICU admission	71(20.4%)	277(79.6%)
	Stillbirth/IUFD/END	46(13.2%)	302(86.8%)
	IUGR	39(11.2%)	309(88.8%)
	Low birth weight	170(48.9%)	178(51.1%)
	Prematurity	137(39.4%)	211(60.6%)

APGAR: Appearance, Pulse, Grimace, Activity, and Respiration,DIC: Disseminated intravascular coagulation , HELLP: Hemolysis, Elevated liver enzymes, and Low platelet   IUFD: Intrauterine fetal death ,

IUGR: Intrauterine growth retardation,END:Early neonatal death , NICU: Neonatal intensive care unit
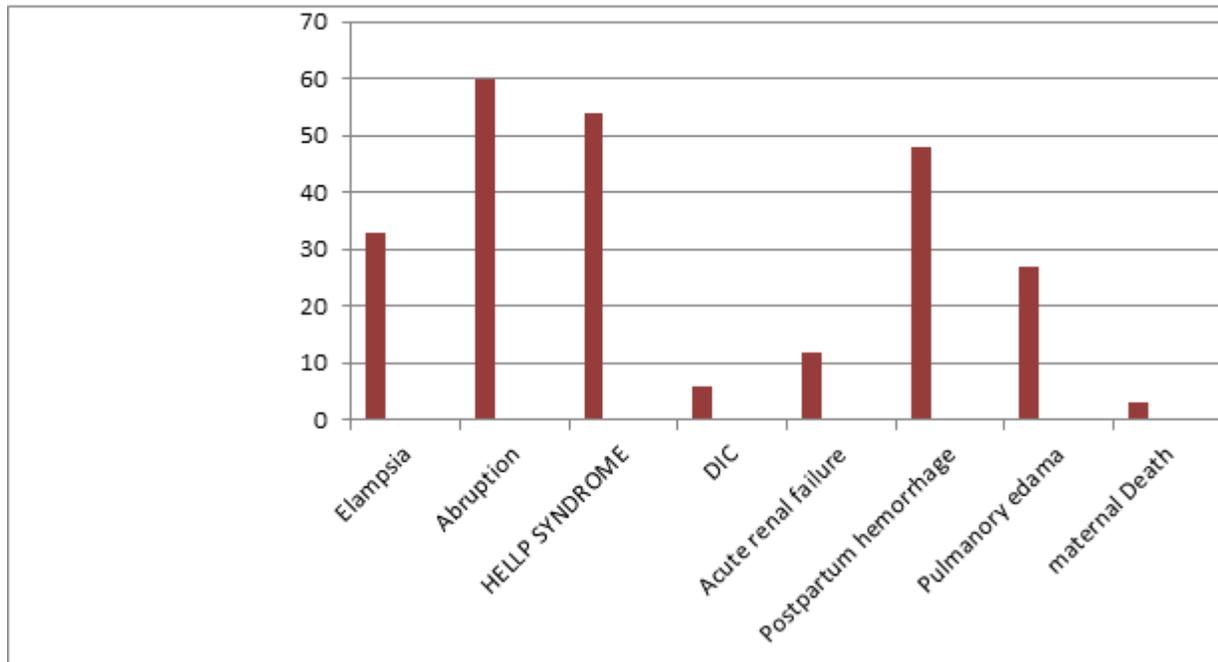

Figure 2.*graphical representation of unfavorable maternal outcome among PEWSF in Abebech gobena MCH center and St.Petros Specialized Hospital 2023*
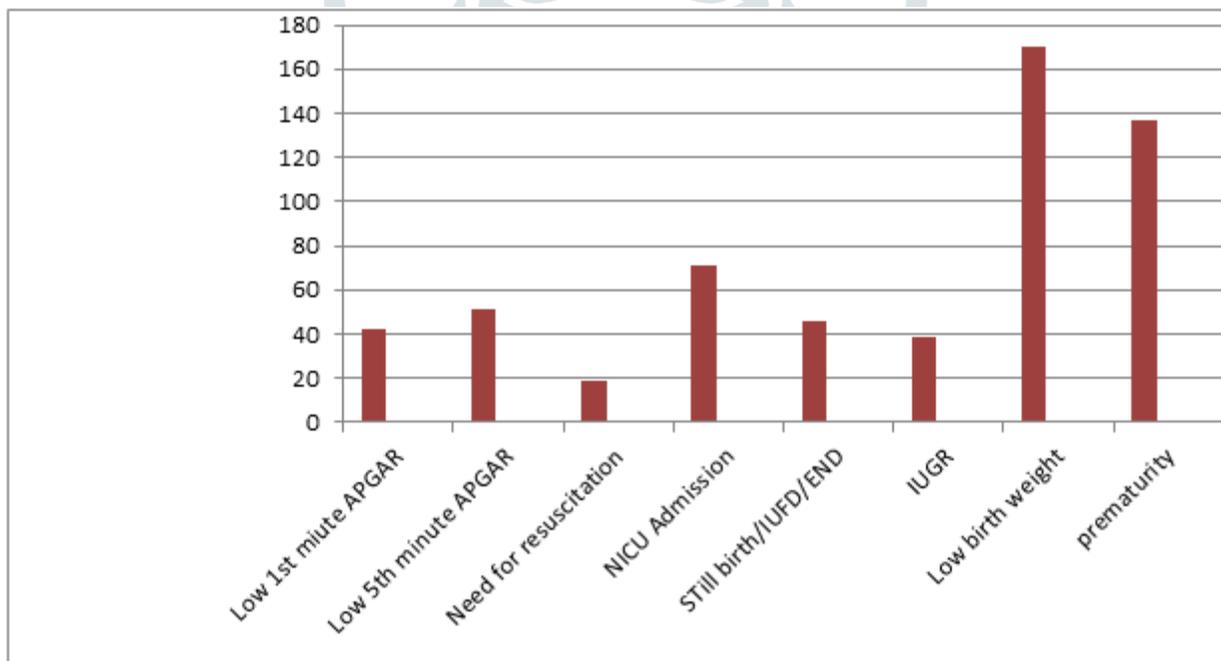

Figure-3.*graphical representation of unfavorable neonatal outcome among PEWSF in Abebech gobena MCH center and St.Petros Specialized Hospital 2023*

5.5 Factors associated unfavorable maternal outcome

Bivariable logistic regression analysis was computed, and variables with a p-value of ≤0.25 were selected for the multivariable logistic regression analysis model. In the final model, maternal age, residence, occupation, blood pressure on admission, and headache complain have shown a statistically significant association with unfavorable maternal outcomes.

Mothers aged above 35 years were approximately three times more likely to develop unfavorable maternal outcomes compared to those aged between 20 – 34 years (AOR (CI)= 2.70 (1.31-5.59). The odds of unfavorable maternal outcomes were 94% higher among rural residents than the urban counterparts (AOR (CI)= 1.94 (1.07-3.53). Unemployed mothers had 65% less risk of unfavorable maternal outcomes compared to those employed (AOR (CI)= 0.35 (0.20-0.62). Severe blood pressure measurement on admission increased the risk of unfavorable maternal outcome by two-fold (AOR (CI)= 2.32 (1.03-5.19). Additionally, unfavorable maternal outcomes were 91% more common in women admitted with a chief complain of headache (AOR (CI)= 1.91 (1.16-3.16) (Table 5).

Table 5: Factors associated with adverse maternal outcome among mothers admitted with PEWSF at Abebech Gobena MCH and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Unfavorable maternal outcome		COR (95% CI)	AOR (95% CI)
	Yes	No		
Age in years				
20 – 34	92 (78.0%)	202 (87.8%)	1	1
<20	5 (4.2%)	8 (3.5%)	1.37 (0.44-4.31)	1.33 (0.39-4.52)
≥35	21 (17.8%)	20 (8.7%)	2.31 (1.19-4.46)	2.70 (1.31-5.59)*
Residence				
Urban	84)71.2%)	188 (81.7%)	1	1
Rural	34 (28.8%)	42 (18.3)	1.81 (1.08-3.05)	1.94 (1.07-3.53)*
Level of education				
No formal education	22 (18.6%)	23 (10.0%)	1.80 (0.84-3.84)	2.15 (0.89-5.17)
Primary	35 (29.7%)	62 (27.0%)	1.06 (0.56-2.01)	1.73 (0.82-3.67)
Secondary	36 (30.5%)	98 (42.6%)	0.69 (0.37-1.28)	1.00 0.51-1.98)
Higher education	25 (21.2%)	47 (20.4%)	1	1
Occupation				
Employed	81 (68.6%)	123 (53.5%)	1	1
Unemployed	37 (31.4%)	107 (46.5%)	0.53 (0.33-0.84)	0.35 (0.20-0.62)*
Number of fetuses				
Singleton	106 (89.8%)	220 (95.7%)	1	1
Twin/Multiple	12 (10.2%)	10 (4.3%)	2.49 (1.04-5.95)	2.04 (0.79-5.24)
Sex of the neonate				
Male	70 (59.3%)	116 (50.4%)	1.43 (0.92-2.25)	1.43 (0.88-2.33)
Female	48 (40.7%)	114 (49.6%)	1	1

Blood pressure on admission				
Severe range	109 (92.4%)	188 (81.7%)	2.71 (1.27-5.77)	2.32 (1.03-5.19)*
Mild range	9 (7.6%)	42 (18.3%)	1	1
Headache complains				
Yes	74 (62.7%)	106 (46.1%)	1.97 (1.25-3.10)	1.91 (1.16-3.16)*
No	44 (37.3%)	124 (53.9%)	1	1

*Statistically significant at p-value <0.05

Factors associated unfavorable perinatal outcome

In the multivariable logistic regression analysis model, level of education, occupation, mode of admission, number of ANC contact, HELLP syndrome and family history of hypertension have shown a statistically significant association with unfavorable perinatal outcomes.

Mothers who didn't attend formal education were five times more likely to develop unfavorable perinatal outcome compared to those who attended higher education (AOR (CI)= 5.14 (1.93-13.63). The odds of unfavorable perinatal outcomes were 58% lower among unemployed mothers than the employed (AOR (CI)= 0.42 (0.24-0.73). Unfavorable perinatal outcomes were two times more common among referred cases than self-admitted (AOR (CI)= 2.03 (1.08-4.06). Mothers who have only 1 – 3 Antenatal care (ANC) contact were three times more likely to have unfavorable perinatal outcomes compared to those who have 7 – 8 contact (AOR (CI)= 3.63 (1.22-10.71). Mothers who develop HELLP syndrome 3.92 times more likely to have unfavorable perinatal outcome AOR(CI)=3.92(1.73-9.17). Further, family history of hypertension significantly increased the risk of unfavorable perinatal outcomes by approximately twofold (AOR (CI)= 1.99 (1.03-3.85) (Table 6)

Table 6: Factors associated with adverse maternal outcome among mothers admitted with PEWSF at Abebech Gobena MCH and St. Petros Specialized Hospital, Ethiopia, 2023.

Variables	Unfavorable perinatal outcome		COR (95% CI)	AOR (95% CI)
	Yes	**No**		
Residence				
Urban	155 (75.2%)	117 (82.4%)	1	1
Rural	51 (24.8%)	25 (17.6%)	1.54 (0.90-2.63)	1.13 (0.61-2.09)
Level of education				
No formal education	35 (17.0%)	10 (7.0%)	3.50 (1.51-8.12)	5.14 (1.93-13.6)*
Primary Secondary	65 (31.5%)	32 (22.5%)	2.03 (1.09-3.80)	3.18 (1.47-6.89)*

Higher education	70 (34.0%)	64 (45.1%)	1.09 (0.62-1.94)	1.48 (0.77-2.82)
	36 (17.5%)	36 (25.4%)	1	1
Marital status				
Married	187 (90.8%)	137 (96.5%)	1	1
Others	19 (9.2%)	5 (3.5%)	2.78 (1.01-7.64)	1.44 (0.47-4.44)
Occupation				
Employed	127 (61.7%)	77 (54.2%)	1	1
Unemployed	79 (38.3%)	65 (45.8%)	0.74 (0.48-1.14)	0.42 (0.24-0.73)*
Mode of admission				
Self	25 (12.1%)	27 (19.0%)	1	1
Referral	181 (87.9%)	115 (81.0%)	1.70 (0.94-3.07)	2.03 (1.08-4.06)*
Number of ANC contact				
1 – 3	59 (28.6%)	15 (10.5%)	5.68(2.05-15.78)	3.63 (1.22-10.7)*
4 – 6	138 (67.0%)	114 (80.3%)	1.75 (0.72-4.24)	1.08 (0.42-2.76)
7 – 8	9 (4.4%)	13 (9.2%)	1	1
Number of fetuses				
Singleton	188 (91.3%)	138 (97.2%)	1	1
Twin/Multiple	18 (8.7%)	4 (2.8%)	3.30 (1.09-9.98)	3.01 (0.92-9.83)
Family history of hypertension				
Yes	52 (25.2%)	18 (12.7%)	2.33 (1.29-4.18)	1.99 (1.03-3.85)*
No	154 (74.8%)	124 (87.3%)	1	1
HELLP syndrom				
Yes	46()	8(5.6)	4.8(2.29-10.55)	3.92(1.7-9.48)*
No	160(77.7)	134(94.4)	1	1
Abruption				
Yes	48(23.3)	12(8)	3.29(1.67-6.45)	1.94(.89-4.23)
No	158(76.7)	130(92)	1	1
Eclampsia				
Yes	29(13.8)	4(2.8)	5.65(1.94-16.46)	2.48(.76-8.04)
No	177(86.2)	138(97.2)	1	1

*Statistically significant at p-value <0.05

Discussion

The overall prevalence of unfavorable maternal and perinatal outcome was 33.9% (95% CI: 28.7-38.8) and 59.2% (95% CI: 54.0-63.8), respectively. Maternal age, residence, occupation, blood pressure on admission, and headache complain have shown a statistically significant association with unfavorable maternal outcomes. Whereas, level of education, occupation, mode of admission, number of ANC contact, and family history of hypertension have shown a statistically significant association with unfavorable perinatal outcomes.

Unfavorable maternal outcome

In our study, unfavorable maternal outcomes occurred in 33.9% of pre-eclamptic mothers. This finding is higher than the study done in India, 16.9% (17), Kuwait, 27% (18). This disparity may be due to the differences in sample size, time, setup, study population, good antenatal and obstetric care, the quality and standard of care available, and the presence of modern well-equipped maternity hospitals.

Advanced maternal age was found to be an associated risk factor for unfavorable perinatal outcomes. Mothers aged above 35 years were nearly three times more likely to have an adverse birth outcome. This finding is in line with the studies done in Awi zone (19), Debre Tabor (20), Shashemene (21), and Ethiopia (22). The reason might be that aging makes the uterus lax and limits the physical ability to bear a child. Old blood vessels in the uterus may also cause uteroplacental insufficiency and may result in abortion, growth retardation, and stillbirths. In addition, the risk of developing medical and obstetrical complications increases as age advances, i.e., hypertension, diabetes, and preterm birth.

The odds of unfavorable perinatal outcomes were 94% higher among rural residents than their urban counterparts. A similar finding was reported in Canada (23), Wag Himra Zone (24), and Arba Minch (25). The possible explanation is that urban mothers had better socioeconomic status, i.e., better education and income, and access to health facilities. More likely to reach health institutions before a complication arises. Besides, rural women had a high workload and problems with transportation to reach health facilities that result in delays in accessing medical care. They are also less likely to deliver in comprehensive hospitals that have specialized NICU and emergency obstetric care as this is found in more urban areas.

Unemployed mothers had less risk of unfavorable maternal and perinatal outcomes compared to those employed. This is in contrast with a study done in South Korea (26), where employment during pregnancy and several occupation types were associated with a higher risk of pregnancy loss. The possible explanation might be that unemployed mothers are more likely to have adequate time to care for themselves and listen to updated information regarding pregnancy induced hypertension via TV, Radio or others. This might help them to have lower risk of unfavorable outcomes.

Severe blood pressure measurement on admission increased the risk of unfavorable maternal outcome by two-fold. Similar finding was reported by study done in Three developing Countries(27). Severe blood pressure at the first

occasion indicates the progress of the disease to a higher stage and may show poor progress and unfavorable outcome. Additionally, unfavorable maternal outcomes were 91% more common in women admitted with a chief complain of headache. This is consistent with study done in Ayder Comprehensive Specialized Hospital (ACSH)(12).possible explanation is a neurologic symptoms(headache) signify an imminent eclampsia. Headaches are one of the most common presenting symptoms of preeclampsia. This is consistent with study done in Ayder Comprehensive Specialized Hospital (ACSH)(12) and Yekatit-12 Teaching Hospital(10)

Unfavorable perinatal outcome

The study results showed that the prevalence of unfavorable perinatal outcomes was 59.2%, which is lower than 46.5% in Amhara region referral hospitals (4). However, it was higher than a cross sectional study in Addis Ababa town (66.4%). This difference might be due time gap as time goes, there is a likelihood of better health care system.

Mothers who didn't attend formal education were five times more likely to develop unfavorable perinatal outcome compared to those who attended higher education. This is consistent with study in Amhara region referral hospitals (4). It shows that the higher the women`s educational status is, the lower the perinatal unfavorable outcomes of severe preeclampsia/eclampsia. It could be due to the fact that as educational status is good, the mothers are likely to improve their health care seeking behaviors including having adequate ante-natal care follow up which can improve the perinatal outcomes.

Unfavorable perinatal outcomes were two times more common among referred cases than self-admitted. Most of the referred cases might had potentially life-threatening conditions involving the central nervous system, coma or loss of consciousness lasting 12 hours or more; metabolic coma (loss of consciousness and the presence of glucose and ketoacids in the urine); stroke; or status epilepticus, uncontrollable fits or total paralysis. In most cases, these abnormalities lead to unfavorable outcomes.

Mothers who have only 1 – 3 Antenatal care (ANC) contact were three times more likely to have unfavorable perinatal outcomes compared to those who have 7 – 8 contact. This was consistent with the studies done in Wag Himra Zone (24) and Southern Ethiopia (28). Similarly, a systematic review and meta-analysis study indicated that mothers who attended at least one ANC visit were more likely to give birth to an alive neonate that survives (22). Prenatal care follow-up allows the women to access information related to danger signs of pregnancy, birth plan, and place of delivery. It also helps to early identify and treat complications/diseases, i.e., HIV/AIDS, syphilis, hypertension in pregnancy, and malaria. Moreover, women attending prenatal care are more likely to have a skilled birth attendant and hence their newborns will have access to basic essential newborn care and neonatal resuscitation. Thus, further improvement of the quality of antenatal care and mobilization of pregnant women to the new WHO recommended focused ANC care is needed to reduce adverse birth outcomes and achieve sustainable development goals.

Further, family history of hypertension significantly increased the risk of unfavorable perinatal outcomes by approximately twofold. This is comparable with the study done in Nekemte Referral Hospital, Ethiopia. It revealed

that a positive family history of chronic hypertension was a risk factor for hypertensive disorder of pregnancy (HDP) (29). From these findings, it seems that both maternal and fetal genes play a role in this syndrome. Therefore, for pregnant women with a family history of HDP, it should be monitored carefully both perinatally and in the postpartum period.

Conclusion and recommendations

In this study, the unfavorable maternal and perinatal outcome was high. Maternal age, residence, occupation, blood pressure on admission, and headache complain have shown a statistically significant association with unfavorable maternal outcomes. Whereas, level of education, occupation, mode of admission, number of ANC contact ,HELLP syndrome and family history of hypertension have shown a statistically significant association with unfavorable perinatal outcomes. Socio-economic development, good antenatal care, and early identification and treatment of complications are needed to reduce unfavorable outcomes. Attention should be focused by Addis Ababa city administration health bureau and Oromia region health bureau on raising awareness at community level and strengthening health facilities for early detection/ prevention and management of pre-eclampsia by equipping health facilities to manage the complication of the mothers and neonate and There should be Further longitudinal studies to investigate the outcome of mothers with pre-eclampsia with severe features.

Limitations

The finding of this study should be interpreted with the following limitations. Since it is a snapshot, it shares the limitation of cross-sectional study to draw a causal relationship. There may be recall bias on previous obstetric characteristics. In addition, this study is not generalizable as it was limited to only two of the hospital in the city and as this was done in the hospital setting, the perinatal outcome of women delivered at home was not assessed. Further, this study does not include adverse maternal and perinatal outcomes after 48 hours of birth.

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