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Adverse Perinatal Outcomes And Associated Factors Among Pregnant Women With Preterm Premature Rupture Of Membrane Admitted To Tibebe Ghion Specialized Hospital, Bahir-Dar, Northwest Ethiopia (2025): An Institutional Based Cross-Sectional Study

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ADVERSE PERINATAL OUTCOMES AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN WITH PRETERM PREMATURE RUPTURE OF MEMBRANE ADMITTED TO TIBEBE GHION SPECIALIZED HOSPITAL, BAHIR-DAR, NORTHWEST ETHIOPIA (2025): AN INSTITUTIONAL BASED CROSS-SECTIONAL STUDY

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A THESISREPORT SUBMITTED TO DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, COLLEGE OF MEDICINE AND HEALTH SCIENCES, BAHIR DAR UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SECIALITY PROGRAM IN GYNECOLOGY AND OBSTETRICS

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COLLEGE OF MEDICINE AND HEALTH SCIENCES

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TITLE:ADVERSE PERINATAL OUTCOMES AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN WITH PRETERM PREMATURE RUPTURE OF MEMBRANE ADMITTED TO TIBEBE GHION SPECIALIZED HOSPITAL, BAHIR-DAR, NORTHWEST ETHIOPIA (2025): AN INSTITUTIONAL BASED CROSS-SECTIONAL STUDY

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JANUARY, 2026

BAHIR DAR, ETHIOPIA

Declaration

This is to certify that the thesis entitled, adverse perinatal outcomes and associated factors among pregnant women with preterm premature rupture of membrane admitted to Tibebe ghion specialized hospital, Bahir-dar, northwest Ethiopia (2025): an institutional based cross-sectional study, submitted in partial fulfillment of the requirements for specialty certificate in Gynecology and Obstetrics in Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been fully acknowledged.

Principal Investigator: Arkyhas Minalu Birliew (MD, OBGYN Resident)

Signature ---------- Date -------/-----/--------

Approval of thesis for Defense

I hereby certify that I have supervised, read, and evaluated this thesistitled, adverseperinatal outcomes and associated factors among pregnant women with preterm premature rupture of membrane admitted to Tibebe ghion specialized hospital, Bahir-dar, northwest Ethiopia (2025): an institutional based cross-sectional study byArkyhas Minalu Birliew (MD, OBGYN Resident) prepared under my guidance. I recommend the thesis be submitted for oral defense.

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Approval of thesis for defense result

We hereby certify that we have examined this thesis entitled "Adverse perinatal outcomes and associated factors among pregnant women with preterm premature rupture of membrane admitted to Tibebe ghion specialized hospital, Bahir-dar, northwest Ethiopia (2025)" by Arkyhas Minalu Birliew (MD),we recommend and approve the thesis a degree of "specialty certificate in Obstetrics and Gynecology.

Board of Examiners

External examiner's name	Signature	Date
Internal examiner's name	Signature	Date
Chair person's name	Signature	Date

III

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ABSTRACT

Background: Preterm Pre-labor rupture of membrane refers to a membrane rupture that occurs after the 28th week up to 36+6 weeks of pregnancy but before the start of labor. It is a major contributor to perinatal morbidity and mortality. Globally, it complicates 2-3% of all pregnancies. This study aimed to assess adverse perinatal outcomes and associated factors among pregnant women with preterm premature rupture of membrane.

Methods: An institutional-based retrospective cross sectional study was conducted at TGSH, Bahir Dar, north-west Ethiopia. Retrospective card review was done on 310 women who were admitted and gave birth after having preterm PROM at Tibebe-ghion specialized hospital from September 1, 2023 to August 30, 2025. Systematic random sampling technique was used to select patient medical cards. The collected data were coded and entered into Epi info and then transported to SPSS version 27 for analysis. Bi variable logistic regression was used to determine the association between each independent variable and the outcome variable. Those variables with a p value less than 0.25 were taken as candidates for multivariable logistic regression. P value less than 0.05 at 95 % CI was used to declare statistical association.

Results: In this study the overall adverse perinatal outcome was 62.9% (95% CI: 57.5%-68.3%). This outcome was significantly associated with Primiparity (AOR 4.464, 95% CI: 2.181-9.137, p < 0.001), UTIs (AOR 5.652, 95% CI: 1.523-20.979, p =0.010) and Antepartum hemorrhage (AOR 3.938, 95% CI: 1.453-10.673, p = 0.007). Additionally, Pregestational DM, Pregnancy induced HTN, Chronic HTN, Anemia, and GA at rupture of membrane of 28-33+6 weeks had significant association with adverse perinatal outcomes.

Conclusions: In this study the prevalence of adverse perinatal outcome was lower than other studies conducted in Ethiopia. Primiparity, Urinary tract infections, Antepartum hemorrhage, Pregestational DM, Pregnancy induced HTN, Chronic HTN, Anemia and GA <34 weeks during rupture of membrane were significant associated factors with adverse perinatal outcomes among women with preterm PROM. Pregnancy induced Hypertension and Antepartum hemorrhage were the commonest identified associated factors.

Keywords: Perinatal outcome, Preterm premature rupture of membrane, associated factors, Tibebe-ghion specialized hospital

TABLE OF CONTENTS

ACKNOWLEDGMENT IV
ABSTRACT V
TABLE OF CONTENTS VI
LIST OF TABLES VIII
LIST OF FIGURES IX
ACRONYMS AND ABBREVIATIONS X
CHAPTER 1: INTRODUCTION 1
1.1. Background 1
1.2. Statement of the Problem 3
1.3. Significance of the study 5
CHAPTER 2: LITERATURE REVIEW 6
2.1. Prevalence of Preterm PROM 6
2.2. Associated factors 7
2.3. Adverse perinatal outcomes 8
2.4. Conceptual frame work 13
CHAPTER 3: OBJECTIVES 14
3.1. General objective 14
3.2. Specific objectives 14
CHAPTER 4: METHODS AND MATERIALS 15
4.1. Study area and period 15
4.2. Study design 15
4.3. Population 15
4.3.1. Source population 15
4.3.2. Study population 15
4.3.3. Inclusion & exclusion criteria 15
4.4. Sample size and Sampling procedure 16
4.4.1. Sample Size 16
4.4.2. Sampling Procedure 17
4.5. Study Variables 17
4.5.1. Dependent variable 17

4.5.2. Independent variables 17
4.6. Operational and Term definitions 17
4.7. Data collection, processing and analysis 18
4.8. Data quality control 19
4.9. Ethical consideration & consent 19
4.10. Dissemination of the results 19
CHAPTER 5: RESULTS 20
5.1. Socio-demographic characteristics 20
5.2. Obstetrical and Medical characteristics 20
5.3. Prevalence of adverse perinatal outcomes 23
5.4. Factors associated with Unfavorable perinatal outcome 24
CHAPTER 6: DISCUSSION 26
CHAPTER 7: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS 28
7.1. Conclusion 28
7.2. Strengths and Limitations 29
7.3. Recommendations 29
REFERENCES 31
ANNEXES 33
1) Checklist: Perinatal Outcomes and Associated Factors of PPROM 33

LIST OF TABLES

Table 1: Socio-demographic characteristics of women with PPROM admitted to TGSH from September 1, 2023 up to August 30, 2025 20
Table 2: Obstetrical and Medical characteristics of women with PPROM admitted to TGSH from September1, 2023 up to August 30, 2025 (N-310) 21
Table 3: Prevalence of adverse perinatal outcomes after PPROM admitted to TGSH, 2025 23
Table 4: Logistic regression to identify associated factors with adverse perinatal outcomes among women with PPROM admitted to TGSH, 2025. 25

LIST OF FIGURES

Figure 1: Conceptual framework for the adverse perinatal outcomes and associated factors following preterm PROM (4,8,28,29).....**Error! Bookmark not defined.**
Figure 2: Frequency distribution GA of women with PPROM at the time of rupture of membrane admitted to TGSH from September 1, 2023 to August 30, 2025 22
Figure 3: Frequency distribution of GA of women with PPROM at time of delivery admitted to TGSH from September 1, 2023 to August 30, 2025..... 22
Figure 4: Adverse perinatal outcome of newborns born to a woman with PPROM admitted to TGSH, 2025. 23

ACRONYMS AND ABBREVIATIONS

ABD	Assisted Breech delivery
ANC	Antenatal Care
AOR	Adjusted Odds Ratio
APGAR	Appearance, Pulse rate, Grimace, Activity and Respiratory rate
APH	Antepartum Hemorrhage
BMI	Body Mass Index
CD	Cesarean Delivery
CI	Confidence Interval
DM	Diabetes Mellitus
DNA	Deoxyribose Nucleic Acid
EONS	Early onset neonatal Sepsis
ESOG	Ethiopian Society of Obstetrics and Gynecology
FMoH	Federal Ministry of Health
GA	Gestational Age
GBS	Group B streptococcus
GDM	Gestational Diabetes Mellitus
HTN	Hypertension
IVH	Intraventricular Hemorrhage
IUFD	Intrauterine Fetal Death
LEEP	Loop Electrosurgical Excision Procedure
NEC	Necrotizing Enterocolitis
NGOs	Non-Governmental Organizations
NICU	Neonatal Intensive Care Unit
COR	Crude Odds Ratio
PH	Power of Hydrogen
PPROM	Preterm Premature/Prelabor Rupture of Membrane
RDS	Respiratory Distress Syndrome
SPSS	Statistical Package for the Social Sciences
STIs	Sexually Transmitted Infections
SVD	Spontaneous Vaginal Delivery
TGSH	Tibebe Ghion Specialized Hospital
UTIs	Urinary Tract Infections
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.1.Background

Pretermpremature rupture ofmembranes (PPROM) is definedas membrane rupture beforeonset of labor and 37 weeks of gestation but after the age of viability.Such rupture likely has various causes, but intrauterine infection, oxidative stress–induced DNA damage, and premature cellular senescence are major predisposing events(1-3).

One of the most critical functions of the fetal membranes is to remain intact until the onset of labor to maintain the protective intrauterine fluid environment. In about 70% of pregnancies without interventions, their spontaneous rupture usually occurs near the end of the first stage of labor. Spontaneous membrane rupture occurs physiologically due to the progressive weakening of the membranes with advancing gestational age (GA)(4).

PPROM is one of the four direct causes for preterm births in the United States which are; Spontaneous unexplained preterm labor with intact membranes,idiopathic preterm prelabor rupture of membranes, delivery for maternal or fetal indications, and twins and higher-order multifetal births. Of all preterm births, 30 to 35 percent are indicated, 40 to 45 percent are due to spontaneous preterm labor, and 30 to 35 percent follow preterm membrane rupture(1).

PPROM is multifactorial in nature. Although amniotic fluids have certain bacteriostatic properties thatcan prevent infections and thereby prevent PPROM, there many are factors that cause its occurrence. TheseAssociated risk factors are similar to those at term and include; mechanical factors: Multifetal gestation, polyhydramnios, pulmonary diseases, cervical conization/ LEEP/ cerclage; Urogenital infections: UTI, cervicitis, GBS, bacterial vaginosis; previous history of preterm PROM, preterm labor; Second and third trimester bleeding (e.g. abruptio placenta) and Other risk factors: Low socioeconomic status, nutritional deficiencies, low BMI, smoking and connective tissue disorders. Despite these known risk factors, none are identified in many cases (1, 5, 6).

Speculum examination, ruptured membranes are diagnosed if amniotic fluid pools in the posterior fornix or clear fluid flows from the cervical canal. If the diagnosis remains uncertain, one method involves pH determination of vaginal fluid. There is also other microscopic and highly specific immnunochromatographic tests(1).

Management of PPROM varies according to the gestational age of the fetus. Expectant management and immediate delivery are the two potential options of management in patients with PPROM with its advantages and disadvantages(6).

1.2.Statement of the Problem

Globally, Preterm prelabour rupture of membranes (PPROM) complicates up to 2-3% of pregnancies and is associated with 40% of preterm births. The three causes of neonatal death associated with PPROM are prematurity, sepsis and pulmonary hypoplasia. Women with intrauterine infection deliver earlier than non-infected women and infants born with sepsis have mortality 4 times higher than those without sepsis(7).

Adverse birth outcomes are the leading cause of neonatal morbidity and mortality worldwide, mainly in developing countries. Globally, PROM contributed to 20% of stillbirths, 33% of prematurity, 21% of early neonatal death, and 2% of congenital anomalies. Besides, approximately 22% of women experienced unfavorable maternal outcomes due to PROM.PROM is one of the complications linked to significant maternal and fetal morbidity and mortality. The magnitude of the fetal adverse birth outcome among PROM varies in different countries. Evidence revealed that premature rupture of the membrane causes 14% to 63% of adverse birth outcomes. Up to 50% of preterm births and 80% of maternal infections have been associated with PROM(8).

Births that follow spontaneous labor and PPROM are together designated spontaneous preterm births. The contribution of the causes of preterm births to all preterm births differs by ethnic group. Spontaneous preterm birth is most commonly caused by preterm labor in white women, but by PPROM in black women(9).

The optimal approach to assessment and treatment of women with term and preterm PROM remains challenging. Management decisions depend on gestational age and evaluation of the relative risks of delivery versus the risks (e.g., infection, abruptio placentae, and umbilical cord accident) of expectant management when pregnancy is allowed to progress to a later gestational age(3, 10).

PROM is associated with increased risk of chorioamnionitis, dysfunctional labor, increased cesarean rates, postpartum hemorrhage and endometritis in the mother. In the fetus, there is increased occurrence of hyaline membrane disease, intraventricular hemorrhage, sepsis, cord prolapse, fetal distress and increased fetal wastage(11).

Although the latency period between fetal membrane rupture and birth varies with gestation, spontaneous labor and mode of delivery, it can influence both the immediate-and long-term complications of prematurity. Previous studies reported an overall 34-50% prevalence of positive amniotic fluid cultures in pregnant mothers with PPROM. Use of early and appropriate antibiotic therapy in these mothers has been shown to improve the neonatal outcomes(12).Iconducted this research because Prematurity is the most common cause of perinatal mortality mainly in resource limited countries like Ethiopia and PPROM is one of the most common causes of preterm deliveries. Since there is no study on isolated adverse perinatal outcomes and associated factors among PPROM pregnant women at tertiary hospital level in Amhara region, this study could be a foundation for researchers who want to conduct researches on perinatal mortalities and factors worsen adverse neonatal outcomes. The study could also give an insight for the regional health bureau on causes of perinatal morbidities and mortalities among preterm newborns. A studydone previously in bahir dar studied associated factors withadverse perinatal outcomes of both term and preterm PROM. But this study focused on the preterm one because the perinatal outcomes are different from term PROM and also the adverse outcomes of both term and preterm PROM are not affected by different associated factors equally.

1.3. Significance of the study

Understanding the adverse perinatal outcomes and associated factors of PPROM in TGSH will help clinicians in early diagnosis and timely intervention. Since there is no study about the topic mentioned in our Hospital, this study will be a preliminary and basis for futures researchers.It will also become a foundation for a development of institutional guideline for the management of PPROM and its associated complications.

This study will also offer paramount benefits across multiple sectors. For the community it enhances awareness of early medical care seeking behavior which leads to reduced maternal and neonatal complications. For governmental organizations and policy makers it informs health planning and resource allocation to reduce maternal and neonatal mortality and it gives evidence for improving antenatal care policies. This study also offers a profound insight for NGOs to guiding the design of evidence-based maternal health programs and strengthens funding initiatives in high-risk countries like Ethiopia.Moreover, the findings will contribute to the limited body of literature on PPROM and Perinatal outcomes not only in the region but also in our country Ethiopia.

CHAPTER 2: LITERATURE REVIEW

2.1. Prevalence of Preterm PROM

A study done in Egypt, 2017; which is a cross sectional study on two phases using data retrieved from the computerized hospital information system.The first phase included data collection about all deliveries from 2011-2015 and The second phase included retrieving a sample of files of pregnant women in 2015, conducted to measure the prevalence of PPROM among pregnant women attending Ain Shams maternity hospital, and to identify the fetal/neonatal outcome among pregnant women presentedwith PPROM and potential factors associated with poor fetal/neonatal outcome. Prevalence of PPROM ranged from 2.4% in 2011 to 4.7% in 2015 with the highest rate during 2013 (5.3%). Secondary data collection has its known limitations such as lack of completeness or sometimes doubted accuracy. Incompleteness was avoided by conducting a pilot study that revealed the available datain patient files before conducting the study(13).

Another cross-sectional study done in Bamenda, Cameroon, 2021; on Prevalence, Risk Factors and Outcome of Preterm Premature Rupture of Membranes: Among the 387 participants included in the study, 19 had PPROM giving a prevalence of 4.91%. Of 57 preterm deliveries, PPROM accounted for 33.33% (n = 19)(14).

A study done in Egypt, 2025; a retrospective cross-sectional research on Prevalence of Preterm Premature Rupture of Membranes and Its Correlated Risk Factors among Pregnant Women Attending Women Health Hospital, Assiut University; The prevalence ofPPROM was 1.85%.As a main limitation,the absence of an electronic medical record system added complexity to case identification and data retrieval(15)

A study done in Ethiopia, 2020; Facility-based cross-sectional study was conducted at the Department of Obstetrics and Gynecology ofDebre-Tabor General Hospital on Prevalence of Preterm Premature Rupture of Membrane and Its Associated Factors among Pregnant; the prevalence ofpreterm premature rupture of membrane was found to be 13.7%. And a similar

study done at Wolkite Comprehensive Specialized Hospital, Gurage Zone, Southern Ethiopia, 2021; the magnitude of preterm premature rupture membrane is 6.6%. The main limitation of these studies is the diagnosis of PROM was made based on clinical evaluation, and no other confirmatory tests were done except for ultrasound in some cases(16, 17).

Another study done Ambo town Ethiopia, 2021; Hospitals based cross sectional study on Prevalence of Preterm Premature Rupture of Membrane and Associated Factors amongPregnant Women: The prevalence of preterm premature rupture of membrane was found to be 22.6%(18).

2.2. Associated factors

A study done in Tonekabon, Iran, 2019; A Systematic Review Study on Evaluation of Maternal Risk Factors, Delivery, and Neonatal Outcomes of Premature Rupture of Membrane: Out of 90 articles, 15 articles were finalized including one prospective study, five cross-sectional papers, six retrospective articles, and three historical cohort studies. Maternal factors included age, parity, education, occupation, diabetes, blood pressure, cervical length along with abortion history, history of infection, upper urinary tract infection, and sexually transmitted diseases are associated with adverse perinatal outcomes.The most important risk factors for PROM were diabetes and maternal hypertension associated with neonatal and maternal complications(19).

A study done in Addis Ababa, Ethiopia, 2022; a prospective cohort study conducted on Determinants for perinatal adverse outcomes among pregnant women with preterm premature rupture of membrane:The preterm (PROM) rate was 2.2% with perinatal mortality rate of 206/1,000. Gestational age (GA) at delivery was the determinate for low Apgar score at the 5th minute (AOR: 7.23, p = 0.04). Unable to use steroid (AOR: 8.23 p = 0.000), GA at membrane rupture (AOR: 4.61, p = 0.000) and delivery (AOR: 4.32, p = 0.000) were determinates for NICU admission. EONS was significantly affected by GA at membrane rupture (AOR: 5.9, p = 0.04). Placental abruption was significantly affected by GA at delivery (AOR: 7.52, p = 0.04)(4).

A study done in Bahir-dar, Ethiopian, 2024; A facility-based cross-sectional study design on Adverse fetal birth outcomes and its associated factors among mothers with premature rupture of

membrane in Amhara region: Rural residents [AOR = 2.94, 95% CI:1.73–4.97], have a history of urinary tract infection [AOR = 6.87, 95% CI: 2.77–17.01], anemia [AOR = 7.51, 95% CI: 2.88–19.62], previous history of adverse birth outcome [AOR = 3.54, 95% CI: 1.32–9.47] and less than two years interpregnancy interval [AOR = 6.07, 95% CI: 2.49–14.77] were positively associated with adverse birth outcome compared to their counterparts(8).

2.3. Adverse perinatal outcomes

A study done in Punjab, India, 2015; a retrospective cohort study on Feto-maternal outcome in pregnancies with preterm premature rupture of membranes: a tertiary hospital experience: During the study period, there were 1528 deliveries in the hospital and 75 pregnant women were diagnosed to have PPROM giving an overall incidence of 4.9%. The most common maternal complication was chorioamnionitis (15.7% vs. 2.7%) and most common neonatal complication was physiological jaundice (56.8% vs. 69.2%). The study demonstrated that patients in group 1 had significant increase in the frequency of chorioamnionitis, hyaline membrane disease, septicemia, periventricular leukomalacia, intrauterine pneumonia, need for ventilator support and inotropes. Patients in group 2 had significant increase in the frequency of Apgar score <7 at 1 min, APGAR <7 at 5 min and CD rate. According to this study; Early PPROM is associated with higher rates of perinatal morbidity and mortality(6).

A prospective study in eastern Hyderabad, India, 2017: on immediate neonatal outcomes of preterm infants born to mothers with preterm pre-labor rupture of membranes; Baseline maternal and neonatal variables were comparable across the two groups, except for higher incidence of singletons, maternal pregnancy-induced hypertension in the control group and higher proportion of males, complete steroid coverage and oligohydramnios in the PPROM group. The proportion of infants with combined adverse neonatal outcome was similar between the two groups [odds ratio (OR): 1.43; 95% confidence interval (CI): 0.77-2.6]. Both the groups were comparable for most other neonatal morbidities and outcomes, except screen-positive sepsis (OR: 3.7; 95% CI: 1.17-11.5) which was higher in PPROM group.The results showed that and neonatal the outcomes of mother-infant dyads with PPROM were similar to the control group (without PPROM) when infant and mother were covered with appropriate antibiotics(12).

An observational analytical study done in Maharashtra, India, 2018; on Preterm premature rupture of membranes: maternal and perinatal outcome: maternal morbidity was 16%. Perinatal morbidity was 33% and most common causes were hyperbilirubinemia (23%), RDS (21%). Perinatal mortality was seen in 15% and mainly due to RDS (53%). Twenty-five (25%) neonates were delivered by cesarean. The main indications for cesarean being malpresentation (36%) followed by fetal distress (24%)(11).

A study done in Poland, 2019; a case control study on perinatal outcome in preterm premature rupture of membranes before 37 weeks of gestation;In the study group, median gestational age of delivery was 34 weeks 1 day and the same in control group — 34 weeks and 5 days ($p > 0.05$). Parameters of inflammatory status were more often reported in the PPROM group than in the preterm birth group, even if they weren't statistically significant (positive culture of cervical swab, increased leukocytosis, C reactive protein above 5). The rate of neonate survival was similar in both groups (93.7% and 94.1%). Congenital infection was more often diagnosed in group of neonates from PPROM pregnancies than in neonates from control group; (36% and 21.2% respectively; $p = 0.009$)(20).

A study in Mangalore, India, 2020; A cross sectional study on Early Neonatal Outcomes in Premature Rupture of Membranes Beyond Twenty-eight Weeks of Gestation in a Tertiary Care Hospital of Coastal Karnataka: Prematurity (39.3%) followed by hyperbilirubinemia (15.7%) and respiratory distress (12.2%) were the common complications seen, with a neonatal mortality rate of 2.3%. Antenatal complications (24.8%) and medical issues in the mother (13.7%) were the most common maternal risk factors associated with PROM. Although 59% cases delivered vaginally, Emergency Caesarean section was the mode of delivery in 97% of Caesarean cases.

A latency period >24 hours was found to be a significant factor associated with a poor Appearance, Pulse, Grimace, Activity and Respiration (APGAR) score (OR- 5.83, 95% CI- 2.85-11.93, $p<0.001$) and Neonatal Intensive Care Unit (NICU) admission (OR-5.98, 95% CI- 2.95-12.14, $p<0.001$).Prolonged PROM increases the risk of neonatal complications(21).

A prospective observational study conducted inKerala, India, 2020; on the maternal and perinatal outcome in preterm premature rupture of membrane:Among the patients, 66.7% had a vaginal delivery, and the cesarean section rate was 31.7%. Among maternal morbidities, UTI was on the higher side (13%). Among the babies born, 55 % had NICU admission of which 50.7% had RDS and 20.9 % had septicemia(22).

Another study done in China, 2022; a retrospective study on Analysis of Maternal and Neonatal Outcome of Patients with Preterm Prelabor Rupture of Membranes: all patients were divided with PPROM into four groups according to gestational weeks, namely, group A (GA 24–27+6), group B (GA 28–31+6), group C (GA 32–33+6), and group D (GA34-36+6). Groups B and C were separately divided into two subgroups according to the median latency period of each group, namely, B1, B2, C1, and C2.Group A: the common maternal and neonatal complications were the increased infection index before labor, neonatal hyperbilirubinemia and neonatal respiratory distress syndrome. Groups B, C, and D: the common maternal and neonatal complications were the increased infection index before labor, fetal distress, neonatal pneumonia, neonatal hyperbilirubinemia, and patent foramen ovale. Comparison of pregnancy outcome between group B1 and group B2 showed higher incidence rate of increased infection index before labor, lower incidence rate of respiratory distress syndrome, electrolyte disturbance, and premature brain in group B2 than those in group B1. Comparison of pregnancy outcome between group C1 and group C2 showed the higher incidence of increased infection index before labor, bigger birth weight, and shorter hospital stay in group C2 than those in group C1.prolongation of latency period was beneficial to newborns of patients with gestational week at 28–31+6 weeks, while it did not benefit those with gestational week beyond 32 weeks(23).

A retrospective cohort study done in Saudi Arabia, 2024; on Predictors and outcomes of premature rupture of membranes among pregnant women admitted to a teaching Hospital: A total of 1,894 pregnant women were enrolled in the study, 77.6% had normal onset of ruptured membranes, while 382 (20.1%) were diagnosed with a PROM and 43 (2.3%) diagnosed with PPROM.Significantly more mothers with PPROM were delivered by emergency cesarean Sect. (30.2% vs. 22.9%, $P < 0.01$), develop chorioamnionitis (4.7% vs. 0.1%, $P < 0.01$), and stayed in

the hospital more than three days (16.3% vs. 2.5%, P < 0.01) compared to the control group. Neonates of mothers who had PPROM were more likely to have low birth weight (35.7% vs. 10.4%, P < 0.01), and NICU admission (67.4% vs. 20.4%, P < 0.01) as compared to the control group. Perinatal death rate was not significantly different between the groups(24).

A hospital based prospective study done in Bangladesh, 2025; on Determinants of Premature Rupture of Membrane (PROM) and Feto-Maternal Outcome in a Tertiary Care Hospital:Majority of the patients 31 (62.0%) developed labor pain within 12 hours of PROM. Sixteen (32.0%) patients developed morbidity included puerperal sepsis, UTI, Post-partum hemorrhage, wound dehiscence, and retained placenta. APGAR score at 5 minutes was >7 in 30 (60%) babies. Out of 47 alive babies 19 (40.4%) were affected by the consequences of PROM and birth process. Among them asphyxia was more common 7 (35%) than other morbidities. Total 10 of them required admission in neonatal ward and most of the morbidity of the newborn appeared within 1 to 3 days of delivery(25).

A retrospective cross-sectional study in Maiduguri, North-Eastern Nigeria, 2019; on Maternal and neonatal outcomes in premature rupture of membranes at University of Maiduguri Teaching Hospital: Thirty six women (49.3%) were delivered by emergency caesarean section, while 37 (50.7%) were delivered vaginally (SVD). In the bivariate (crude) analysis, Apgar score < 7 at 5 minutes (P = 0.008, OR 95 % CL: 0.092 (0.011, 0.742), birth weight ≥ 2500g (P = 0.006, 8.944 (1.892, 42.284), and absence of APH (P = 0.007, 4.83 (1.440, 16.196) were factors modifying neonatal outcome. When adjusted regression with only factors with P value < 0.2 in crude analysis were done, only birth weight ≥ 2500 g (P = 0.024, 6.677 [1.286, 34.664]) and absence of APH (P = 0.038, 4.406 [1.085, 17.883]) were independent predictors of neonatal outcome. Thus, neonates with birth weight ≥ 2500 g were about 6.7 times more like to show favorable outcome than those with birth weight < 2500g while those without APH showed 4.4 times more likelihood for a favorable neonatal outcome. Antenatal corticosteroids use also was associated with favorable outcome as it had significantly improved preterm neonatal survival(26).

Another study done in Zagazig University, Egypt, 2022; a prospective case control study on Perinatal Outcomes of Pregnancies with Preterm Premature Rupture of Membranes after 34 Weeks of Gestation: Maternal outcome in this study was evaluated; there were 82.9% of patients with PPROM versus 95.1% discharged from hospital within 4 days after delivery with no bad outcomes. Good Apgar score was (68.3%) in patients with PPROM and 82.9% in control group. In PPROM group; 7 fetuses were diagnosed as fetal distress and only 2 (4.9%) cases had clinical chorioamnionitis. Regarding neonatal morbidity in patients with PPROM, the results showed that respiratory distress syndrome (RDS) was diagnosed in 4 neonates, 7 with tachypnea, 6 with jaundice, and 3 with sepsis and no case of perinatal mortality(27).

A Retrospective cross-sectional descriptive study done at Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 2014; on maternal and perinatal outcome of pregnancies with preterm premature rupture of membranes: Intra-amniotic infection, seen in 31.5% (35/111), was the commonest maternal complication. The mean latency period from rupture of membranes to delivery was 6.6 days. Twenty-six (23.2%) neonates were delivered by cesarean section. There were a total of 12 perinatal deaths, 4 (3.6%) stillbirths (2 antepartum and 2 intrapartum) and 8 (7.1%) early neonatal deaths, making the gross perinatal mortality rate to be 107 per 1000 live births. Prematurity was the commonest cause of neonatal death(28).

A retrospective study done in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia, 2024; on Predictors and perinatal outcomes of preterm pre-labor rupture of membrane among pregnant women:Among 69 women who experienced preterm pre-labor rupture of membrane, 50 (72.5%) of them had adverse perinatal outcomes. Of all 69 neonates 17 (24.64%) were delivered with low birth weight and 20 (29%) of them were born preterm. The overall perinatal mortality rate was 10.1% or 101 per 1,000 live births(29).

2.4.Conceptual frame work

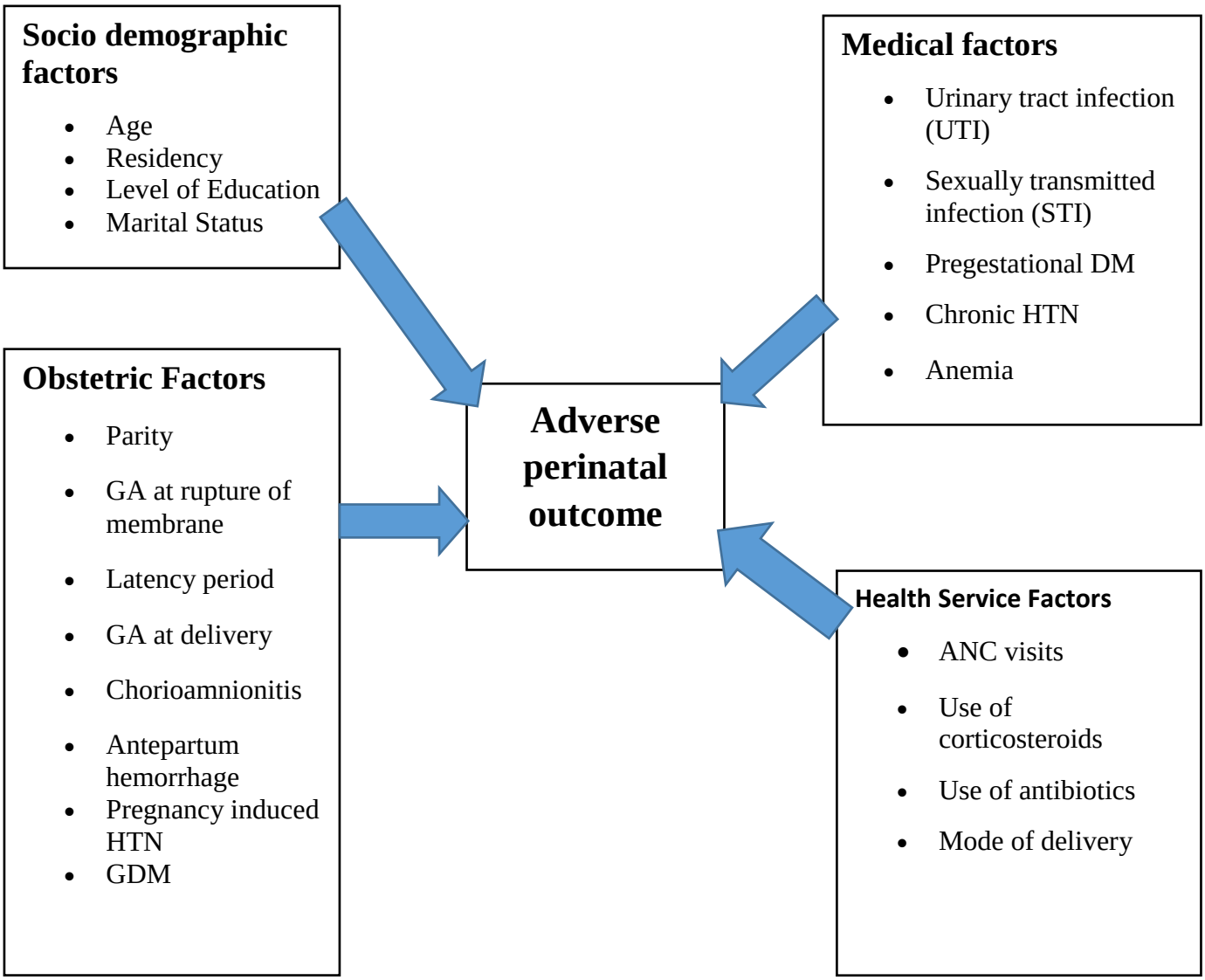

Figure 1: Conceptual framework for the adverse perinatal outcomes and associated factors following preterm PROM (4,8,28,29).

CHAPTER 3: OBJECTIVES

3.1.General objective

- To assess adverse perinatal outcomes and associated factors among pregnant womenwith preterm premature rupture of membrane admitted to Tibebe Ghion Hospital, Bahir-dar,Northwest Ethiopia (2025).

3.2.Specific objectives

- To determinethe prevalence of adverseperinatal outcomes among pregnant women with preterm premature rupture of membrane admitted to Tibebe Ghion Hospital, Bahir-dar, Northwest Ethiopia (2025).
- To identify factors associated with adverse perinatal outcomes among pregnant women with preterm premature rupture of membrane admitted to Tibebe Ghion Hospital, Bahir-dar, Northwest Ethiopia (2025).

CHAPTER 4: METHODS AND MATERIALS

4.1. Study area and period

The study was conducted from June 1, 2025 to November 30, 2025, in Bahir Dar city at TGSH. Bahir Dar is the capital city of Amhara National Regional State, located 565 km Northwest of Addis Ababa with estimated population of 168,899 as per 2021 world population review. TGSH is one of the three governmental hospitals in the city with estimated catchment population of seven million. TGSH is a teaching hospital of Bahir Dar University located in "Sebatamit" 7 km to the south of Bahir Dar. The hospital started its activity in November, 2018 and is working in different departments of which Obstetrics and Gynecology is one. There are four wards, 9 OPD rooms among these three of them are MFM, Gynecology oncology and Urogynecology units. Regarding to the human power, there are 15 general gynecologists, 4 MFM subspecialists, 3 Urognecology and RPS Subspecialists, 2 URPS fellows, 2Gynecology Oncologists,41 residents, and 42 midwives.

4.2.Study design

A retrospective cross-sectional study was conducted to describe perinatal outcomes of PPROM and identify associated factors that affect adverse outcomes.

4.3. Population

4.3.1.Source population

Allpregnant women who were admitted toTGSH for obstetric care during the study period.

4.3.2. Study population

All eligible medical records of pregnant womenwith a confirmed diagnosis of PPROMadmitted to TGSH from September1, 2023 to August 30, 2025, who met the inclusion criteria. Since the study was conducted at a single institution, two years period was used to get enough sample size.

4.3.3.Inclusion & exclusion criteria

4.3.3.1.Inclusion criteria

- Those delivered in the time period at TGSH
- Women with singleton pregnancies
- Complete medical records available

4.3.3.2.Exclusion criteria

- Neonates admitted and treated in other health institution
- IUFD at presentation
- Those who had known fetal congenital anomalies
- Women referred after delivery

4.4. Sample size and Sampling procedure

4.4.1.Sample Size

The sample size was calculated for both adverse perinatal outcomes and associated factors finally the largest sample size was taken as the final sample size. First for perinatal outcome proportion of adverse perinatal outcome was taken; single proportion formula taking the following assumptions. P is proportion level, p = **72.5 %**(29), d is the marginal error which is 0.05, and $Z^a/2$ = 1.96 corresponding to 95% confidence interval.

N= $(\mathrm{Z}\,\alpha/2)^2 p(1-p)/(\mathrm{d})^2$, N = $(1.96)^2 \times 0.725(1-0.725)/(0.05)^2$, N = 306; the final sample size is337by adding 10% contingency for incomplete or missing data. Second for associated factors double population proportion formula by using Epi info 7, Statcalccross sectional with 95% of two sided confidence level, power of 80%, ratio of unexposed to exposed is 2:1and Fleiss with continuity correction statistical method, four associated factors are used to calculate the sample size.

Associated factors with reference		AOR	Sample size	Final size with 10% contingency
Rural Residence	(8)	2.94	143	**157**
UTIs		6.87	56	62
Anemia		7.51	53	58
No Steroid Use	(4)	8.23	50	55

Even though being rural resident has higher score from the associated factors;I took the sample size calculated from the perinatal outcome because it was the highest. So the final sample size is **337.**

4.4.2. Sampling Procedure

Since it's convenient and effective for retrospective card review for sampling, systematic random sampling technique was used. My sampling framework was all PPROM pregnant women's medical charts during the study period .The sampling interval (k-value) was calculated by dividing the total number of cases by the sample size. For my study there were 1001 PPROM cases in the study period so, the k value was calculated as; 1001 ÷ 337 = 3. After the total cases were assigned by numbers from 1–1001 randomly, one case was selected by lottery method among the 1st 3 cases assigned 1–3 which were selected randomly. Then Charts were selected at every 3rd interval.

4.5. Study Variables

4.5.1. Dependent variable

- Perinatal outcome

4.5.2. Independent variables

- Socio-demographic factors : age, level of education, marital status, residence
- Obstetric Factors and complications: Parity, GA at rupture of membrane , GA at delivery, Latency period, Presence of chorioamnionitis, Antepartum hemorrhage , Pregnancy induced HTH, GDM
- MedicalFactors: Urinary tract infection (UTI) or sexually transmitted infections, Pregestational DM, Chronic HTN, Anemia
- Health Service Factors: ANC visits, Use of corticosteroids and Use of antibiotics

4.6. Operational and Term definitions

Adverse perinatal outcome: presence of at least one complicated birth outcome like NICU admission, Preterm birth, LBW, early neonatal death, stillbirth, early neonatal sepsis, RDS etc.

Age of viability: 28weeks and above of gestational age(5).

Anemia during pregnancy: According to WHO; anemia is diagnosed during pregnancy when Hemoglobin is less than 11g/dl for 1st and 3rd trimester, and if it's less than 10.5 g/dl for 2ndtrimester (1).

APGAR score: is the score given to a fetus at or immediately after birth to assess the status of oxygenation and scored out of 10. In this study the 5th minute score will be assessed and taken as abnormal if it's less than 7(5).

Early neonatal death: Death of a neonate within 7days of delivery(1).

Gestational age: is calculated from the last normal menstrual period (LNMP) or early obstetric ultrasound that was documented on the card, if not from the duration of amenorrhea documented from mothers recall & is rounded to the nearest weeks or calculated from average gestational age from the earliest ultrasound scan. Amenorrhea of 9 months will be taken as 37-42 weeks gestation for all mothers.

Latency period: the time between rupture of membrane and onset of labor (1).

Low birthweight:A newborn whose weight is <2500 g(1).

Parity:total number of delivery; including still birth after 28 weeks of gestation (1).

Perinatal outcome: Both adverse and uncomplicated birth outcomeafterage of viabilityup to 7 days of neonatal age(7).

Pregnancy induced HTN: any hypertensive disorder i.e. Blood pressure ≥ 140/90 mmHg after 20weeks of GA with /without proteinuria in patients who were normotensive previously (1).

Sexually transmitted infections: Infections acquired during sexual intercourse causing vaginal discharge syndrome, genital organ swellings or ulcers but not including HIV/AIDS or Hepatitis B virus infection (5).

Still birth: is the birth of an infant that has died in the womb or during intra partum after 28 weeks of gestation(7).

4.7. Data collection, processing and analysis

Data were collectedby trained health professionals from patient cards by using well-structured checklist after cards were selected by using systematic random sampling method, and then the collected data were coded and entered into Epi info and then transported to SPSS version 27 for analysis.I had 1 outcome variable that is perinatal outcome which can be favorable or unfavorable.Bi variable logistic regression was used to determine the association between each independent variable and the outcome. Those variables with a p value less than 0.25 were taken as candidates for multivariable logistic regression. Since this threshold is a balance point between inclusiveness and model efficiency, it was selected.P value less than 0.05 at 95 % CI was used to declare statistical association. Finally the data were presented in tables and figures.

4.8. Data quality control

Prior to data collection, the checklist was checked for readability and consistency.Pretest was carried out to test data extraction method, data availability in the medical cards, completeness of records and the ability of the data collector's performance.One day training and orientation on how to carry out data collection and how to use the checklist were given for the data collectors. The final checklist was checked by data collectors & supervisors for completeness, accuracy, validity and consistency of data. In addition the recorded data was reviewed daily for readability and data reliability.

4.9. Ethical consideration & consent

Ethical approval was asked from the institutional review board of college of medicine and health sciences, Bahir Dar University (CMHS/IRB 4049/2024). Permission letter to conduct the study was obtained from TGSH hospital office of medical director and head of department of Obstetrics and Gynecology. Consent from Medical cards archive officers was takenand the patients' informations gathered were kept confidential.

4.10. Dissemination of the results

After completion of the research the result will be submitted to TGSH, Bahir Dar University College of medicine and health sciences and to the regional health bureau. Attempt will be made to submit to ESOG and to present it in the ESOG annual meeting. And possible options will be tried for publication.

CHAPTER 5: RESULTS

5.1. Socio-demographic characteristics

Out of 337 eligible medical records, atotal of 310 pregnant women with PPROM medical records were complete and included in the data analysis section, resulting in a completeness rate of 92%. The majority of women (78%) were aged 20-34 years old. More than half of them (56.5%) were from rural area. Most women (85.8%) were married and near to one-third of them (32.6%) had no formal education(Table1).

Table 1: Socio-demographic characteristics of women with PPROM admitted to TGSH from September 1, 2023 up to August 30, 2025

Variables		Frequency (N=310)	Percent
Age	<20 years old	29	9.4%
	20-34 years old	242	78%
	≥35 years old	39	12.6%
Residency	Urban	135	43.5%
	Rural	175	56.5%
Marital status	Married	266	85.8%
	Not married	44	14.2%
Educational status	No formal education	101	32.6%
	Primary	90	29.0%
	Secondary	93	30.0%
	Tertiary	26	8.4%

Not married includes: Single, divorced, widowed and separate

5.2. Obstetrical and Medical characteristics

Regarding to obstetric performance, 51.9% of mothers were multiparous and most of them (95.2%) had ANC follow-up. The most common comorbidity was pregnancy induced HTN (18.7%) followed by Antepartum hemorrhage (18.1%) and Anemia (16.5%). History of UTIs and STIs were reported by 10.6% and 5.5% of women respectively. About 3.2% of women had clinical chorioamnionitis. Pregestational and gestational diabetes mellitus were diagnosed in 7.1%and 5.2% of mothers respectively. Chronic HTN occurred in 7.7% of mothers. Most

mothers received prophylactic Antibiotics (94.8%) and antepartum corticosteroids (93.9%). Higher proportion of (58.1%) mothersdeveloped rupture of membrane at 34-36+6 weeks of gestational age and 90.6% pregnant women stayed more than 72 hours till delivery with mean latency period of 13 days. Slightly more than half (51.0%) gave birth at ≥37 weeks of GAand 78.7% of women delivered vaginally (Table 2).

Table 2: Obstetrical and Medical characteristics of women with PPROM admitted to TGSH from September1, 2023 up to August 30, 2025 (N-310)

Variables		Frequency (N=310)	Percent
Parity	Primipara	149	48.1%
	Multipara	161	51.9%
ANC visit	Yes	295	95.2%
	No	15	4.8%
History of UTIs	Yes	33	10.6%
	No	277	89.4%
History of STIs	Yes	17	5.5%
	No	293	94.5%
Clinical chorioamnionitis	Yes	10	3.2%
	No	300	96.8%
Ante partum hemorrhage	Yes	56	18.1%
	No	254	81.9%
Gestational DM	Yes	16	5.2%
	No	294	94.8%
Pregestational DM	Yes	22	7.1%
	No	288	92.9%
Pregnancy induced HTN	Yes	58	18.7%
	No	252	81.3%
Chronic HTN	Yes	24	7.7%
	No	286	92.3%
Anemia	Yes	51	16.5%
	No	259	83.5%
Prophylactic Antibiotics	Yes	294	94.8%
	No	16	5.2%
Antepartum Corticosteroids	Yes	291	93.9%
	No	19	6.1%
Latency period	< 72 hours	29	9.4%
	≥ 72 hours	281	90.6%
Mode of delivery	SVD	244	78.7%
	CD	57	18.4%
	ABD	9	2.9%

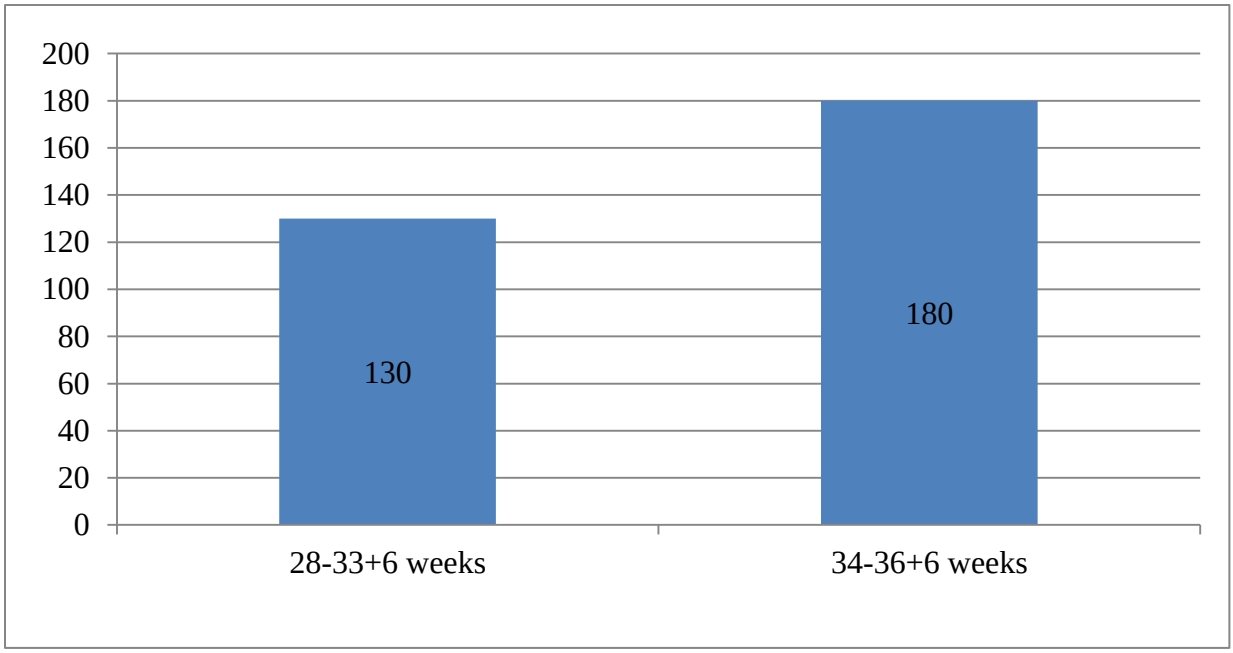

Figure 2: Frequency distribution GA of women with PPROM at the time of rupture of membrane admitted to TGSH from September 1, 2023 to August 30, 2025

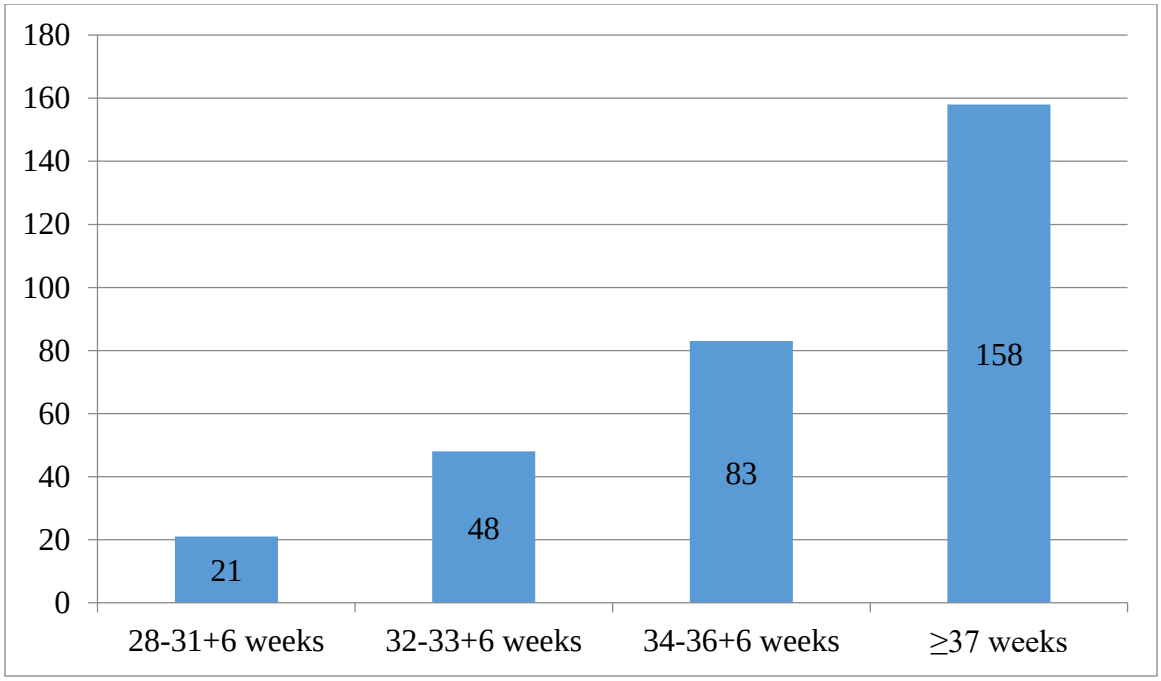

Figure 3: Frequency distribution of GA of women with PPROM at time of delivery admitted to TGSH from September 1, 2023 to August 30, 2025

5.3. Prevalence of adverse perinatal outcomes

The overall adverse perinatal outcome was found to be**62.9%**(95% CI: 57.5%-68.3%). out of 310 newborns 5.5% of them were died within seven days after delivery and 2.3% were stillborn. The overall perinatal mortality rate was 7.7%. More than half (58.1%) of all newborns were admitted to NICU. About 49% of neonates born preterm and 36.1% of them had low birth weight. Early onset neonatal sepsis was the commonest illness (54.5%) (Figure 4&5, Table3).

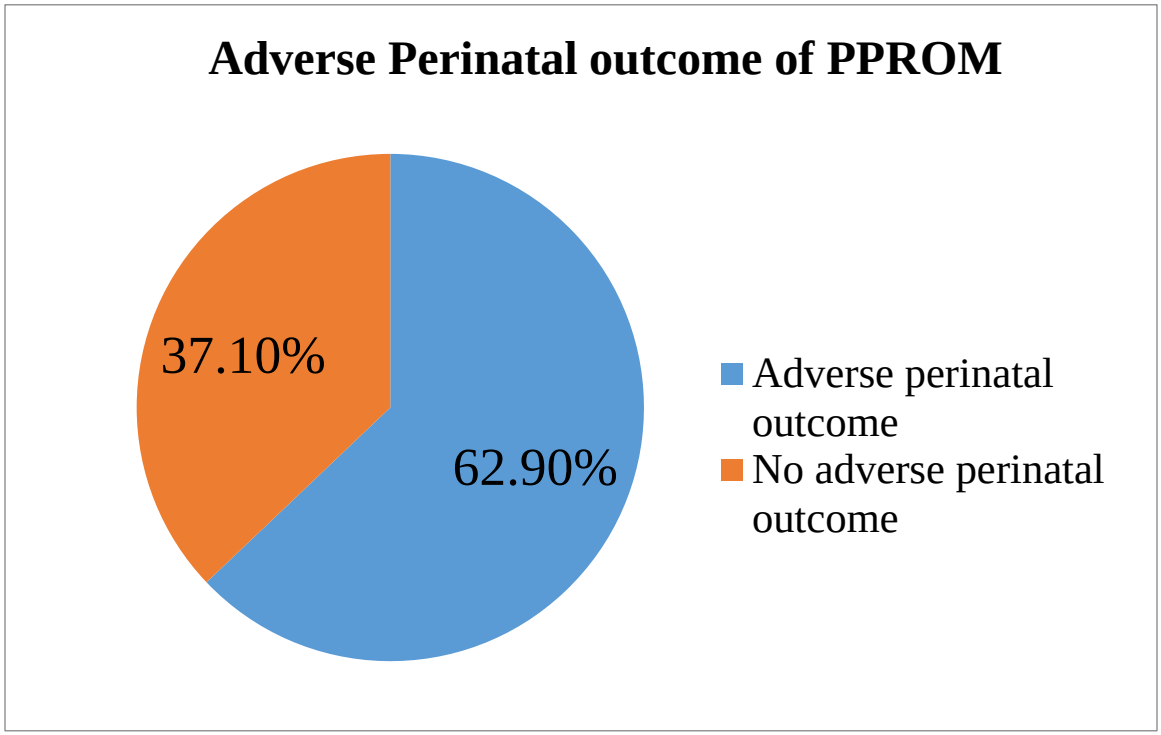

Figure 4: Adverse perinatal outcome of newborns born to a woman with PPROM admitted to TGSH, 2025.

Table 3: Prevalence of adverse perinatal outcomes after PPROM admitted to TGSH, 2025

Variables	Frequency(N=310)	Percent

NICU admission	Yes	180	58.1%
	No	130	41.9%
Preterm	Yes	152	49.0%
	No	158	51.0%
Low birth weight	Yes	112	36.1%
	No	198	63.9%
Respiratory distress syndrome (RDS)	Yes	81	26.1%
	No	229	73.9%
Early onset neonatal sepsis	Yes	169	54.5%
	No	141	45.5%
Jaundice	Yes	46	14.8%
	No	264	85.2%
Hypothermia	Yes	88	28.4%
	No	222	71.6%
Hypoglycemia	Yes	50	16.1%
	No	260	83.9%
Low 5th minute APGAR score	Yes	33	10.6%
	No	277	89.4%
Apnea of prematurity	Yes	14	4.5%
	No	296	95.5%
Early neonatal death	Yes	17	5.5%
	No	293	94.5%
Stillborn	Yes	7	2.3%
	No	303	97.7%

5.4. Factors associated with Unfavorable perinatal outcome

Bivariate and multivariate logistic regression analyses were employed to identify different Socio-demographic, obstetric and medical factors associated with adverse perinatal outcome. Variables including maternal residency, level of education, parity, ANC follow up,history of UTIs, history of STIs, Antepartum hemorrhage, Pregestational DM, Pregnancy induced HTN, Chronic HTN, Anemia, Gestational age during rupture of membrane which had p-value ≤ 0.25 in bivariate logistic regression were further analyzed with multivariable logistic regression.

In the Multivariable logistic regression analysis; after controlling other obstetric and medical factors, the likelihood of developing adverse perinatal outcome were4.5 times higher among Primipara mothers compared to multipara mothers (AOR4.464 , 95% CI: 2.181-9.137, p<

0.001).The odds of adverse perinatal outcome were 5.6 times among mothers who had UTIs compared to mothers who had no UTIs (AOR 5.652, 95% CI: 1.523-20.979, p =0.010). Adverse perinatal outcome were also significantly associated with Antepartum hemorrhage (AOR 3.938,95% CI:1.453-10.673, p = 0.007), Pregestational DM (AOR 5.399,95% CI:1.525-19.118, p = 0.009), Pregnancy induced HTN (AOR4.479,95% CI: 1.737-11.551, p = 0.002), Chronic HTN (AOR 3.973, 95% CI: 1.110-14.218, p = 0.034), Anemia (AOR 3.022,95% CI: 1.172-7.796, p = 0.022),and GA at rupture of membrane of 28-33+6 weeks(AOR3.180, 95% CI: 1.279-7.905, p <0.001) (Table 4).

Table 4: Logistic regression to identify associated factors with adverse perinatal outcomes among women with PPROM admitted to TGSH, 2025.

Variables		Unfavorable perinatal outcome		COR (95% CI)	AOR (95% CI)	P-value
		Yes n (%)	No n (%)			
Residency	Rural	126 (64.6)	49 (42.6)	2.460(1.534-3.943)	1.882(0.812-4.358)	0.140
	Urban	69 (35.4)	66 (57.4)	1	1	
Educational status	No formal education	74 (37.9)	27 (23.5)	3.198(1.316-7.772)	2.869(0.725-11.352)	0.133
	Primary	57 (29.2)	33 (28.7)	2.015(0.834-4.869)	1.795(0.498-6.477)	0.371
	Secondary	52 (26.7)	41 (35.6)	1.480 (0.618-3.542)	1.016(0.346-2.983)	0.977
	Tertiary	12 (6.2)	14 (12.2)	1	1	
Parity	Primipara	112 (57.4)	37 (32.2)	2.845(1.754-4.613)	4.464(2.181-9.137)	<0.001*
	Multipara	83 (42.6)	78 (67.8)	1	1	
ANC visit	Yes	181 (92.8)	114 (99.1)	1	1	
	No	14 (7.2)	1 (0.9)	8.818(1.144- 67.966)	3.625(0.363-36.213)	0.273
UTIs	Yes	30 (15.4)	3 (2.6)	6.788(2.022-22.782)	5.652(1.523-20.979)	0.010*
	No	165 (84.6)	112 (97.4)	1	1	
STIs	Yes	15 (7.7)	2 (1.7)	4.708(1.057-20.976)	3.227(0.604-17.242)	0.171
	No	180 (92.3)	113 (98.3)	1	1	
Antepartum hemorrhage	Yes	50 (25.6)	6 (5.2)	6.264(2.592-15.141)	3.938(1.453-10.673)	0.007*
	No	145 (74.4)	109 (94.8)	1	1	

Pregestational DM	Yes	18 (9.2)	4 (3.5)	2.822(0.931-8.555**)**	5.399(1.525-19.118)	0.009*
	No	177 (90.8)	111 (96.5)	1	1	
Pregnancy induced HTN	Yes	51 (26.2)	7 (6.1)	5.464(2.386-12.512**)**	4.479(1.737-11.551)	0.002*
	No	144 (73.8)	108 (93.9)	1	1	
Chronic HTN	Yes	20 (10.3)	4 (3.5)	3.171(1.056-9.523**)**	3.973(1.110-14.218)	0.034*
	No	175 (89.7)	111 (96.5)	1	1	
Anemia	Yes	43 (22.1)	8 (7.0)	3.784(1.710-8.372**)**	3.022(1.172-7.796)	0.022*
	No	152 (77.9)	107 (93.0)	1	1	
GA at rupture of membrane	28-33+6 weeks	101 (51.8)	29 (25.2)	3.186(1.921-5.285**)**	3.180(1.279-7.905)	<0.001*
	34-36+6 weeks	94 (48.2)	86 (74.8)	1	1	

1=Reference category
***Statistically significant**

CHAPTER 6: DISCUSSION

In this study the overall adverse perinatal outcome was 62.9%(95% CI: 57.5%-68.3%). The result was lower than the study conducted atHiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia (72.5%)(29).However this result was significantly higher than a study done in Maharashtra, India(33%)(11).This significant difference perhaps the difference from sample size used and chronic medical illnesses like DM, HTN and Anemia are excluded in the Indian study.

This study revealed that the odds of adverse perinatal outcome was 4.5 times higher amongPrimipara mothers when compared to multipara (AOR 4.464 , 95% CI: 2.181-9.137, p < 0.001) which was supported by a study done in Iran(19). Primiparity is associated with other

obstetric problems like pregnancy induced HTN and its complications. Additionally, Primipara women might have limited awareness of danger signs of pregnancy and retarded health-seeking behavior; sothey may stay at home for prolonged duration after having rupture of membrane and come with chorioamnionitis(1).

Mothers who had history of urinary tract infections (UTIs) were found to be 5.6 times more likely to develop adverse perinatal outcome compared to those mothers who didn't have the infection (AOR 5.652, 95% CI: 1.523-20.979, p =0.010)which was supported by a study done in Bahir-dar, Ethiopia(8).Urinary tract infections both symptomatic and asymptomatic bacteriuria during pregnancy can cause ascending upper genital tract infections and inflammation of the fetal membrane and bacterial enzymes such as collagenase are released and weaken it to result in PPROM, preterm labor adverse birth outcomes like prematurity, low birth weight and neonatal sepsis(30).

Antepartum hemorrhage is showed in this study as one of the major critical risk factor of adverse perinatal outcome (AOR 3.938, 95% CI: 1.453-10.673, p = 0.007). This study was supported by a study done in Maiduguri, Northeast Nigeria showed that absence of antepartum hemorrhage had favorable outcome when compared to those who had APH(26). Mainly antepartum hemorrhage from abruptio placenta is a major contributory of adverse fetal outcomes. Abruption likely begins with rupture of a decidual spiral artery and hemorrhage into the decidual basalis. The subsequent expanding retroplacental hematoma splits the decidua and leaves a thin layer adherent to the myometrium. The decidual hematoma grows to lift away and compress the adjacent placenta. Both decidual bleeding and hypoxia induces the generation of thrombin which a potent uterotonic agent and a strong stimulator of matrix metalloproteinase and inflammatory cytokines which in turn cause PPROM and preterm labor. Severe abruption can cause fetal loss (1).

The findings of this study showed thatPregestational DM (AOR 5.399, 95% CI: 1.525-19.118, p = 0.009), Pregnancy induced HTN (AOR4.479, 95% CI: 1.737-11.551, p = 0.002) and Chronic HTN (AOR 3.973, 95% CI: 1.110-14.218, p = 0.034)were significantly associated with adverse perinatal outcomes. These findings are supported by a study conducted in Tonekabon, Iran (19). Since these problems can cause vasculopathy which results in uteroplacental insufficiency and

possibly placental abruption, adverse perinatal outcomes like preterm labor and prematurity, growth restriction as well as fetal loss will follow(1).

In this studymothers who had Anemia had more odds of developing adverse perinatal outcomes as compared to mothers who didn't have it(AOR 3.022, 95% CI: 1.172-7.796, p = 0.022).This was supported by a study done in Bahir-dar (AOR = 7.51, 95% CI: 2.88–19.62)(8). The reason could be linked to the effect of anemia on the oxygen-bearing capacity and its transportation to the placental site for the fetus. A low level of hemoglobin or anemia causes a decreased amount of oxygen transported to the tissues, potentially increasing the risk of premature rupture of membranes due to hypoxia in the tissues. Anemia can lead to hypoxia in the tissues, this could cause the fetus not to grow to a healthy weight, preterm birth, or have a low birth weight. Iron deficiency anemia may increase serum concentrations of norepinephrine that cause fetal distress(1).

According to this study Gestational age during rupture of membrane between 28-33+6 weeks had a higher likelihood of adverse perinatal outcomes (AOR 3.180, 95% CI: 1.279-7.905, p < 0.001). A study conducted in Addis Ababa, Ethiopia supported this and showed that Gestational age at rupture of membrane (<34 weeks) was the stronger predictor for adverse birth outcome (AOR: 4.61; 95% CI, 1.98, 31.8; p = 0.000)(4). This finding stated the critical window of gestational age at birth in mediating overall perinatal outcome.

CHAPTER 7: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

7.1. Conclusion

In this study the prevalence of adverse perinatal outcome was lower than other studies conducted in Ethiopia. Primiparity, Urinary tract infections, Antepartum hemorrhage, Pregestational DM, Pregnancy induced HTN, Chronic HTN, Anemia andGA < 34 weeks during rupture of membranewere significant associated factors with adverse perinatal outcomes among women with preterm PROM. Pregnancy induced Hypertension and Antepartum hemorrhage were the commonest identified associated factors.

7.2. Strengths and Limitations

The strength of this study isInvolvement of the 152 mothers via cellphone to fill some information gaps like marital status, educational status and the neonatal conditions up to 7 days of life.

Mislabeling of patients information on patients cards like wrong phone numbers and ages made the data collection a little bit difficult.

In the neonatal cards, causes of neonatal deaths are poorly documented .

The absence of an electronic medical record system added complexity to case identification and data retrieval

Since the studyis cross-sectional; it does not show the cause-effect relationships between the associated factors and the outcome variable.

Since the study was conducted in a single hospital setting, it limits the generalizability of findings to a broader population.

7.3. Recommendations

To Ethiopian FMoH and Regional health bureau

Focus on enhancement of capacity building of health care professionals on early identification and management of high risk pregnancies to improve adverse perinatal outcomes.

To Tibebe-ghion specialized hospital

The clinicians who work at ANC should do early screening and treatment of urinary tract infection, pregnancy induced HTN, Antepartum hemorrhage, premature rupture of membrane and anemia. Iron supplementation and adherence should be checked at every ANC contact. Patients with Chronic illnesses; DM and chronic HTN should be optimized preconceptionaly and throughout pregnancy. Primipara mothers should be inquired and taught about danger signs of pregnancy during every visit to increasetheir health seeking behaviors.

To future researchers

Future research should be case control to show cause-effect relationship and focus on evaluating the effectiveness of intervention programs aimed at the prevention and management of identified risk factors.

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ANNEXES

1) Checklist: Perinatal Outcomes and Associated Factors of PPROM
Study Site: Tibebe Ghion Hospital, Bahir Dar, Northwest Ethiopia

Study Year: 2025

i. Socio-demographic characteristics

1. Age: _____ years
2. Residence: [ ] Urban [ ] Rural
3. Marital status: [ ] Married [ ] Single [ ] Divorced [ ] Widowed [ ] Separate
4. Educational status: [ ] No formal education [ ] Primary [ ] Secondary [ ] Tertiary

ii. Obstetrics and Medical characteristics

1. Parity: _____
2. Gestational age at rupture of membrane (weeks): _____
3. Antenatal care (ANC) attendance this pregnancy: [ ] Yes [ ] No
4. History of urinary tract infection during this pregnancy? [ ] Yes [ ] No
5. History of sexually transmitted infections during this pregnancy [ ] Yes [ ] No
6. Antepartum hemorrhage [ ] Yes [ ] No
7. Pregestational DM or GDM[ ] Yes [ ] No
8. Pregnancy induced / chronic HTN[ ] Yes [ ] No
9. Presence of clinical chorioamnionitis: [ ] Yes [ ] No
10. Presence of Anemia [ ] Yes [ ] No
11. Duration from membrane rupture to delivery: _____
12. Gestational age at delivery: _____ weeks
13. Mode of delivery: [ ] Spontaneous vaginal delivery [ ] Assisted vaginal delivery [ ] Cesarean section
14. Indication for cesarean section (if applicable): _____
15. Weight of the newborn_____.mg

iii. Management and Interventions

1. Was antibiotic given? [ ] Yes [ ] No
2. Was corticosteroid given? [ ] Yes [ ] No

iv. Perinatal outcomes:

1. Neonatal intensive care unit (NICU) admission [ ] Yes [ ] No
2. Preterm [ ] Yes [ ] No

3. Respiratory Distress Syndrome (RDS) [ ] Yes [ ] No
4. Neonatal Sepsis[ ] Yes [ ] No
5. Jaundice[ ] Yes [ ] No
6. Low birth weight[ ] Yes [ ] No
7. Hypothermia[ ] Yes [ ] No
8. Hypoglycemia[ ] Yes [ ] No
9. Apnea of prematurity [ ] Yes [ ] No
10. Low 5th minute APGAR score[ ] Yes [ ] No
11. Stillbirth [ ] Yes [ ] No
12. Early neonatal death[ ] Yes [ ] No
13. Others…….