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Prevalence of Preterm Premature Rupture of Membrane and its Associated Factor Among Pregnant Women Admitted in Debre Markos Comprehesive Specialized Hospital, North West Ethiopia,2021

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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCE,

SCHOOL OF MEDICINE

DEPARTMENT OF INTEGRATED EMERGENCY

SURGERY AND OBSTETRICS

PREVALENCE OF PRETERM PREMATURE RUPTURE

OF MEMBRANE AND ITS ASSOCIATED FACTOR

AMONG PREGNANT WOMEN ADMITTED IN DEBRE

MARKOS COMPREHESIVE SPECIALIZED HOSPITAL,

NORTH WEST ETHIOPIA,2021

BY

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SEPTEMBER, 2021

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

College of Medicine and Health Science,

School of Medicine

Department of Integrated Emergency Surgery and Obstetrics

**Prevalence of Preterm Premature Rupture of Membrane and Its
Associated Factor among Pregnant Women Admitted in Debre Markos
Comprehensive Specialized Hospital, North West Ethiopia, 2021**

By

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**Thesis Report Submitted to Department of Integrated Emergency
Surgery and Obstetrics, College of Medicine and Health Science, Bahir
Dar University in the Partial Fulfillment of the Requirements for
Degree of Masters in Integrated Emergency Obstetrics and Surgery**

Advisors:

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Gynecology)**
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SEPTEMBER, 2021

BAHIR DAR, ETHIOPIA

Declaration

This is to certify that the thesis entitled “Prevalence and associated factors of pre term premature rupture of membrane”, submitted in partial fulfillment of the requirements for the degree of Master of Integrated emergency surgery 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 duly acknowledged.

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ABSTRACT

Background: Spontaneous rupture of membranes is a normal component of labor and delivery. Premature rupture of the membranes is defined as rupture of membranes before the onset of labor, and if it occurs before 37 weeks, it is termed preterm premature rupture of membranes. Preterm premature rupture of membranes (PPROM) is one of the major factors that have been found to correlate with adverse pregnancy outcome. It remains a critically important clinical and public health problem.

Objective: To assess the prevalence and associated factor of preterm premature rupture of membrane in pregnant admitted Debre Markos Comprehensive Specialized Hospital.

Methodology: Hospital based cross-sectional study was conducted in the study period. The study was conducted from April 1 to June 30 2021. Total sample size of 425 participants were involved in the study. Systematic random sampling techniques were applied to select study participants. Data was entered into EPI data version 3.1 and then exported to SPSS version 25 for analysis. Bivariable and Multivariable logistic regression used for analysis.

Result: The prevalence of pre term premature rupture of membrane was found to be 14.4%. Pregnant women with abnormal vaginal discharge (AOR=2.15, 95% CI =(1.08-4.29)), urinary tract infection (AOR=2.4, 95% CI=(1.24-4.66) previous history of preterm premature rupture of membrane (AOR=4.31, 95% CI=(1.86-10.01)), previous history of preterm birth (AOR=3.11, 95% CI=(1.29, 7.48)), and mid upper arm circumference <23cm (AOR=2.99, 95% CI=(1.55-5.78)) were associated with preterm premature rupture of membrane.

Conclusions: The prevalence of preterm premature rupture of membrane was high. Abnormal vaginal discharge, urinary tract infection, previous preterm premature rupture of membrane, previous history of preterm birth, and mid-upper arm circumference <23cm were associated with preterm premature rupture of membrane.

Recommendation: Early screening and treatment of urinary tract infections and abnormal vaginal discharges were recommended to reduce the risk of preterm premature rupture of membrane.

Keywords: Premature rupture of membrane, Pre term birth, Debre Markos Comprehensive Specialized, Ethiopia.

ACRONYMS AND ABRRIVATION

ANC	Ante Natal Care
AOR	Adjusted odd ratio
BMI	Body Mass Index
CI	Confidence interval
DMCSH	Debre Markos Comprehensive specialized Hospital
EDHS	Ethiopia Demographic and Health Survey
GA	Gestational Age
IESO	Integrated Emergency Surgery and Obstetrics
IUGR	Intra uterine growth restriction
IM	Intra Muscular
IV	Intra Venous
IUFD	Intra Uterine Fetal Death
LNMP	Last Normal Menstrual Period
MUAC	Mid Upper Arm Circumference
NGO	Non Governmental Organization
OPD	Out Patient Department
PROM	Premature Rupture of Membrane
PPROM	Preterm Premature Rupture of Membranes
QID	Four times a day
ROM	Rupture Of Membrane
SPSS	Statistical Package for Social Science
TPROM	Term Premature Rupture Of Membranes
UTI	Urinary Tract Infection

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CHAPTER 1: INTRODUCTION

1.1 Background

Spontaneous rupture of membranes is a normal component of labor and delivery. Premature rupture of the membranes is defined as rupture of membranes 1 hour before the onset of labor, and if it occurs before 37 weeks, it is termed preterm prelabor rupture of membranes (PPROM). If such an event occurs near or beyond term, it raises less concern about the health of the mother and neonate(1). Rupture of membranes for > 24hours before delivery is called prolonged rupture of membranes. In Ethiopia, the lower limit of gestational age to define PPRM is different from other developing countries and defines PPRM as loss of amniotic fluid before the onset of labor during pregnancy after fetal viability (>28 weeks of gestation) but before 37 weeks of gestation. Rupture of membrane before 28 weeks of gestation is considered as pre-viable or inevitable abortion(2).

The fetal membrane is composed of the inner amnion and the outer Chorion. At term, the amnion is a tough and firm but pliable membrane. This innermost a vascular fetal membrane is contiguous with amniotic fluid and occupies a role of incredible importance in human pregnancy. The amnion provides almost all tensile strength of the fetal membranes. Thus, development of its components that protect against its rupture or tearing is vitally important to successful pregnancy outcome(3).PROM is the cause of about one third of all preterm births and significant cause of Peri-natal morbidity and mortality (4).

A number of risk factors e.g. smoking low socio economic status, UTI have been identified to be directly associated with PPRM. However, the cause is uncertain and it is believed to be multifactorial(5).Premature rupture of membranes results in maternal, infant and neonatal risks. Regarding Maternal risks; Infection of the amniotic cavity is the most common complication after PROM. Endometritis and Abruptio placenta occurs in approximately 2 to 29% and15–25% of cases respectively.

Uncommon but serious complications of PROM managed conservatively include retained placenta and hemorrhage requiring dilation and curettage (12%), maternal sepsis (0.8%), and 0.14% maternal death(4, 6)

Patients with premature rupture of membranes may present with leakage of vaginal fluid or vaginal bleeding but without contractions. Pooling of liquor in the posterior vaginal fornix or leakage of it from the cervical Os confirms the diagnosis. Ferning of liquor as observed on the microscope or change of Nitrazine paper to blue because of the alkalinity of the amniotic fluid is supportive of the diagnosis of PROM(7, 8).

The American College of Obstetricians and Gynecologists (2016d) has recognized the controversies of immediate delivery compared with expectant management. Clearly, gestational age is an important consideration. At 24^{0/7} to 33^{6/7} weeks, expectant management in the absence of non-reassuring fetal status, clinical Chorioamnionitis, or placental abruption is recommended. At 34^{0/7} weeks of gestation or greater, delivery is still recommended by the College for all women with ruptured membranes. In Ethiopia, training manuals and guidelines were prepared to make health professionals experienced in managing and referring a woman with obstetric emergencies including PPRM(9). Pregnant woman with PPRM is referred to hospital in which neonatal intensive care unit is available. The treatment of PPRM depends on the GA, presence of infection, and condition of the fetus. PPRM without Chorioamnionitis is managed expectantly until 37 weeks of gestation (10).

During expectant management, the patient will be admitted at hospital and followed closely. Vaginal examination will be avoided. The patient will have bed rest and IV hydration. Prophylactic antibiotics Ampicillin 2 gm IV QID for 48 hours followed by 500 mg P.O. QID for 7–10 days plus erythromycin 500 mg IV QID for 48 hours followed by erythromycin 500 mg P.O. QID for 7–10 days will be given for the patient. If the gestational age is <34 weeks, Dexamethasone 12 mg IM every 24 hrs for 2 doses or Dexamethasone 6 mg IV every 12 hrs for 4 doses will be given for lung maturity. In case of PPRM with Chorioamnionitis, the pregnancy will be terminated regardless of GA(2)

1.2 Statement of the Problem

Pre term premature rupture of the membranes (PROM) is one of the most common and controversial problems facing the obstetrician(11). Preterm premature rupture of membranes (PPROM) is one of the major factors that have been found to correlate with adverse pregnancy outcome. It remains a critically important clinical and public health problem. The incidence of PROM ranges from about 5% to 10% of all deliveries, and PPRM occurs in approximately 3% of all pregnancies globally. Approximately 70% of cases of PROM occur in pregnancies at term, but in referral centers, more than 50% of cases may occur in preterm pregnancies(4).

.The frequency and severity of neonatal complications after PROM inversely related with gestational age at membrane rupture and at delivery. The rates of these complications are higher in the setting of Chorioamnionitis(12). PPRM is a leading cause of preterm delivery with a third of all preterm births resulting from preterm PROM(13). It is associated with considerable increase in adverse maternal, fetal and neonatal risk. The adverse Peri-natal outcome following preterm delivery is huge, accounting for up to 70% of Peri-natal mortality worldwide(14, 15). A number of risk factors e.g. smoking, low socio economic status, UTI have been identified to be directly associated with PPRM. However, the cause is uncertain and it is believed to be multi factorial (6).

Preterm Premature rupture of membranes results in maternal, infant and neonatal risks. Maternal complication like puerperal infections, disseminated intravascular coagulopathy, placental abruption, operative delivery,chorioamnionitis, and psychological and lactation problems(4).Fetal complications after membrane rupture include infection and fetal distress due to umbilical cord compression or placental abruption. Because of these factors, women with PROM have a higher risk of cesarean delivery for non-reassuring fetal heart rate. Fetal death occurs in 1 to 2% of cases of conservatively managed PROM. Respiratory distress syndrome (10–40%) is the most common serious acute morbidity after preterm PROM. Necrotizing Enterocolitis and intra-ventricular hemorrhage are also common. Serious Peri-natal morbidity can lead to long-term consequences such as chronic lung disease, visual or hearing difficulties,

intellectual disabilities, developmental and motor delay, cerebral palsy, or death. Pulmonary Hypoplasia is a serious fetal complication which occurs following PROM(4, 6).

The burden of Pre term PROM ranges from maternal and neonatal mortality and morbidity to national economic loss due to drug expense, hospitalization, absence from the workplace and expense to the health professionals(5).

Regardless of management or clinical presentation, birth within 1 week is the most likely outcome of any patient with PPRM. A review of 13 randomized trials reported that approximately 75% of patients with preterm PROM who were managed expectantly delivered within 1 week. There is Study on risk factors of premature rupture of membrane at Mekele city, Tigray, Case control study, in 2018 G.C,this study includes both preterm and Term PROM and not assess the prevalence of PPRM. Also important variables like premature uterine contraction, UTI, and Inter pregnancy interval not included.

Even though there institutional based cross sectional study in DebreTabour general hospital on prevalence and associated factor of PPRM in 2019 G.C,this study not include important behavioral variables like Interpregnancy interval that has association with Preterm premature rupture of membrane.

Knowing the prevalence and associated factors of preterm premature rupture of membrane is very important to achieve Maternal, fetal and Neonatal health remains a central concern in the Sustainable Development Goals. Based on the review of literatures and the personal experience of the investigator, there are very few studies dealing with preterm premature rupture of membranes and the Prevalence and associated factors in our county and no study in DMCSH. In order to decrease this situation and to address this important issue, the investigator will like to explore on the Prevalence and associated Preterm premature rupture of the membrane among pregnant women who will admitted to Debre Markos comprehensive specialized hospital.

1.3 Significant of the Study

Global progress for child survival and health cannot be achieved without addressing Preterm premature rupture of the membrane. Prevalence and associated factors of PPRM well studied in high-income countries but no in low income country like Ethiopia. Thus more rigorous examinations for the quality of maternal and fetal health care are needed in order to identify specific problems and develop strategies to improve and reduce maternal and fetal morbidity and mortality. Therefore, the purpose of this study is to determine Prevalence and associated factor preterm premature rupture of membrane in the institution and find out the possible reasons for the findings in the study area.

This study guide the development of policies and programs for improving quality in the outcome of preterm premature rupture of membrane at national level in general and the study area in particular. In addition, the paper may be useful to other researchers as reference material while conducting further studies on similar problems. The results will also form baseline data for improving quality of maternal and fetal health in the study area specifically and subsequently contributing to reduction of maternal & fetal mortality in the country. Also this will have further advantage to minimize maternal morbidities and child mortality and also to achieve the Sustainable Development Goals.

CHAPTER 2: LITERATURE REVIEW

2.1 Pre term Premature Rupture of Membrane in the World

Prevalence of premature rupture of membrane Worldwide was slight difference in the prevalence of premature rupture of membranes and this could be due to the difference in the population studied(4). The magnitude of PPROM varies in different countries and populations. It affects 3–4.5% of pregnancies globally(16). It complicates about 3% of all pregnancies and occurs in approximately 150,000 pregnancies yearly in the United States(17). Evidences also discovered that PPROM accounts 3.1% in Brazil(18). Prevalence of PPEOM in tertiary care center in India 2.01% (19)and Kampala hospital in Uganda 7.5%(20).

The study conducted in Department of Obstetrics and Gynecology, Katihar Medical College and Hospital, Bihar from November 2013to August 2015 G.C, Sixty Pregnant mothers attended and admitted through antenatal clinic OPD and Emergency with complaining PPROM. Preterm prelabor of the fetal membranes contributes to one-third of all preterm births. The various parameters like onset and duration of discharge and its smell, temperature of patient, abdominal tenderness and fetal heart rate etc. on presentation for clinical evaluation. 12 (20%) women have had an indication of labor in the past, 4 (6.67%) have had Preterm PROM, 1 (1.67%) cases were of obstructed labour in the past, 8 (13.33%) had previous history of PROM, 13 (21.67%) have had Cesarean deliveries in the past,4 (6.67%) were the cases of Preterm labour, 10 (16.67%) were patients of Miscarriage in the past, and 7 (11.67%) chose Elective abortion(21).

Based on study on Prevalence and risk factors for prelabor rupture of the membranes (PROM) at or near term in an urban Swedish population, Department of Obstetrics and Gynecology, Sahlgrenska University Hospital prevalence of PROM could be substantiated in 285 of the 2208 deliveries (12.9%). In 212 cases, rupture of the membranes (ROM) was considered to be obvious due to visualization of amniotic fluid on admission and no further diagnostic methods were used. Two hundred and forty eight of the 1253 women included had experienced PROM, 216 of them once, 28 twice, 3 three times and one woman had experienced PROM four times. Accordingly 19.8% of the

women in the population had experienced PROM at least once. PROM was found to be more common at an early gestational age compared to at term. Although the relative frequency of PROM in women who delivered at an early gestational age. The prevalence of PROM after 34 week of gestation in this urban Swedish population was 12.9% and about 20% of the women in the population had experienced PROM at least once(22).

2.2 Pre term Premature Rupture of Membrane in Africa

In Africa the prevalence of Pre labour rupture of membrane is higher than developed countries. PROM complicates approximately 3 percent of preterm pregnancies, 10% of term pregnancy a, 11% of preterm delivery (15, 23).prevalence of pre term pre labour rupture of membrane 5.3% in Egypt (24).

Based on the 10-year retrospective study of PPRM at the University of Nigeria Teaching Hospital (UNTH) Enugu, Nigeria between January 1, 1999 and December 31, 2008 Data was retrieved from antenatal ward admission register, case files, theatre records and ward reports of 119 women who were treated for PROM over the study period This showed an incidence of 4.2% for premature rupture of membranes in general and 3.3% for PROM of all deliveries(25).

In the study conducted Department of Gynecology and Department of Pathology, Ayub Medical College, Abbottabad Prevalence of PPRM was 16%. It was seen to be common among patients who were young (15–25 years) 58.8%, with low socioeconomic status (68.2%), and with an educational status of primary to middle (71.7%). Risk of PPRM was seen to be highest among patients giving birth to their first child (42.2%), with gestational age between 30–35 weeks (43.5% cases) and 35–37 weeks (35.2%). In 69.4% cases there was no previous history of preterm deliveries while in 30.6% cases, there were one, two, or more previous preterm deliveries. Normal vaginal delivery occurred in (65.86%), while instrumental delivery rate in PPRM was 20% and caesarean section rate was 14%. Postnatal 16.47% patients developed infection while 24(28.2%) babies developed infection and required antibiotics. Majority of babies born to patients with PPRM were low birth weight (62.3%), and 30.5% babies' required neonatal intensive care. Perinatal mortality rate was 129.9/1000 (13%) of total births(17).

2.3 Pre term premature rupture of membrane in Ethiopia

The prevalence of pre term premature rupture of membrane was not exactly known. The 2016 Ethiopia Demographic and Health Survey (EDHS) revealed complications of preterm birth, intrapartum related events, and sepsis and meningitis to be the leading causes of neonatal deaths in the country. The survey also showed that only about one-fifth (22 percent) of pregnant women were informed of vaginal gush or fluid as signs of pregnancy complications during their ante natal care (ANC) follow up(26).

A Retrospective cross-sectional descriptive study done at TikurAnbessa Hospital (TAH) Addis Ababa, Ethiopia, 2014, the age of the study subjects ranged from 15-to-39 years while the mean age was 26.31 years. Majority were married, housewives, and from outside of Addis Ababa with proportions of 96.4% (107/111), 67% (75/111) and 82% (91/111) respectively. Fifty three percent (59/111) were nulliparous. All except one (110/111) had ANC follow up. The PPRM occurred at less than 34 weeks in 41.4% (46/111), and between 34 and 37 weeks in 58.6% (65/111) of the mothers(27).

Based Case control study on risk factors of premature rupture of membrane at Mekele city, Tigray, from December/2015 – June/2016 G.C, the incidence of premature rupture of membranes ranges from about 5% to 10% of all deliveries. A woman with premature rupture of membranes is at risk of intra-amniotic infection, postpartum infection, Endometritis, and death(28).

According to the study conducted at the Department of Obstetrics and Gynecology on Prevalence of Preterm Premature Rupture of Membrane and Its Associated Factors among Pregnant Women Admitted in DebreTabour General Hospital from March 14 to June 20, 2019. Prevalence preterm premature rupture of membrane (PPROM) was found to be 13.67% (95% CI)(29).

2.4 Associated factors Pre term Premature Rupture of Membrane

The exact causes of preterm PROM is unknown. However; previous studies indicated that multifactorial etiology such as socio-demographic, obstetric, medical and behavioral factors are responsible for the occurrence of PPRM. Some of those factors

are maternal ethnic origin, previous adverse pregnancy outcome, uterine over distention, smoking, low body mass index, genitourinary tract infection, maternal depression, pre-pregnancy stress, poor diet, assisted fertility, and periodontal disease are the major contributing factors for preterm PROM(18, 28, 30).

PPROM also associated with maternal and fetal pathologies, contributing to the birth of premature Infants(31).It may be related to structural defect in the membranes due to collagen deficiency or malformation to the weakening of the membranes due to enzymatic destruction in inflammatory or infectious processes, and to sac exposure due to isthmus-cervix incompetence(32).

In a retrospective cohort study on Prevalence and risk factors for prelabor rupture of the membranes (PROM) at or near term in an urban Swedish population sample of 2880 women aged 25-41 years risk factors for PROM were prim parity, premature contractions, PROM in a previous pregnancy and bleeding in the first trimester(22).

Based on the study conducted at the Department of Obstetrics and Gynecology on Prevalence of Preterm Premature Rupture of Membrane and Its Associated Factors among Pregnant Women Admitted in DebreTabour General Hospital, UTI during pregnancy was significantly associated with the development of PPRM. The odds of PPRM was 2.62 times higher among those pregnant women with a history of UTI in pregnancy than those who did not have UTI (AOR = 2.62, 95% CI=1.32–5.19) (28).

This study also indicated that a significant association was noted between abnormal vaginal discharge and PPRM. The odds of PPRM was 5.30 times higher among pregnant women with abnormal vaginal discharge as compared to those who did not have abnormal vaginal discharge (AOR = 5.30, 95% CI = 2.07–13.52) previous history of PROM showed a significant association with PPRM. Pregnant women who had history of PROM were 3.31 times more likely to develop PPRM than those who did not have (AOR = 3.31, 95% CI = 1.32–8.27).

In this study pregnant women with MUAC <23 cm were significantly associated with PPRM. Pregnant women whose MUAC <23 cm were 6.26 times higher odds of developing PPRM than those \geq 23 cm (AOR = 6.26, 95% CI = 3.21–12.20). MUAC <23

cm during pregnancy indicates poor nutritional status. Nutritional deficiency particularly Micronutrients deficiencies such as vitamin C or Ascorbic acid affects collagen formation. Ascorbic acid protects the body against degenerative processes resulting from oxidative stress. In addition, it is important to strengthen and stabilize collagen by acting as an enzymatic cofactor(29).

Based on study on risk factors of premature rupture of membrane at Mekele city, Tigray, Case control study, in 2018 G.C History of Abortion was found significantly associated with PROM. Those who had abortion were 3.06 times more likely to develop premature rupture of membranes with AOR 3.06 (CI: 1.39, 6.71). History of C/S also showed a significant association with the AOR 3.15(CI: 1.05, 9.46). Previous premature rupture of membrane was the strongly associated risk factor than the others. The odds of developing premature rupture of membranes among women who had previous PROM was 4.45 times higher than who had not history of PROM(9).

There are not many studies that explored the association between HIV-1 infection and PPRM. In the pre-ARV era, HIV-1 in South Africa was associated with a higher rate of spontaneous preterm births (33).Based on the study conducted on maternal and perinatal outcome of premature rupture of membrane in before 34 week managed expectantly 2013 G.C optimal Interpregnancy interval inversely related with PROM. Strong association between short inter pregnancy interval and PPRM(34).

2.5 Conceptual frame work



Figure 1: Conceptual frame work for associated factors Pre term premature rupture of membrane and its (18, 22, 30, 32)

CHAPTER 3: OBJECTIVE

3.1 General objective

- To assess the prevalence of preterm premature rupture of membrane and its associated factor among pregnant admitted Debre Markos Comprehensive Specialized Hospital Obstetrics and Gynecology ward from April 1 to June 30 2021.

3.2 Specific objective

- To determine the prevalence of preterm premature rupture of membrane among pregnant women admitted in Debre Markos Comprehensive Specialized Hospital from April 1 to June 30 2021.
- To identify factors associated with preterm premature rupture of membrane among pregnant women admitted in Debre Markos Comprehensive Specialized Hospital Ethiopia, 2021.

CHAPTER 4: METHODS AND MATERIEALS

4.1 The Study Area

This study was conducted in Debre Markos Comprehensive specialized hospital. The hospital is located in Debre Markos town, the capital of East Gojjam Zone Administrative which is 299kms away in the North West Addis Ababa, the capital city of Ethiopia., Addis Ababa and 265kms to the capital of Amhara Nation Regional state, Bahir Dar.

Debre Markos Comprehensive specialized hospital was established in 1965. The hospital is expected to provide service for more than 3.5 million people the catchment area. It is the only zonal referral hospital with surgical, Obstetrics/Gynecology, Medical and Pediatric/neonatology intensive care unit. The department of Gyne-obs has a total of 35 beds. Gyn/OBS department has three Gynecologists, one IESO and 30 midwifery. There are 38 beds in Gyn/Obs ward. The annual admission rate is about 2210. The hospital has three major operation theatres with full equipment's and share the same operation theatres with gynecology/obstetric and surgery department as the information gotten from HMIS department of DMCSH.

4.2 Study Period

This study was conducted from April 1 to June 30 2021.

4.3 Study Design

An institutional Based Cross-sectional study design was conducted.

4.4 Population

4.4.1 Source population

All pregnant women who were admitted in Debre Markos Comprehensive specialized Hospital from between 28 and 36⁺⁶ weeks of gestation.

4.4.2 Study population

All pregnant women who were admitted in Debre Markos Comprehensive specialized Hospital from between 28 and 36⁺⁶ weeks of gestation during the study period.

4.5 Eligibility Criteria

4.5.1 Inclusive criteria: Pregnant women who were admitted to Debre Markos Comprehensive specialized Hospital Obstetric ward within the study period.

4.5.2 Exclusive criteria: Those Pregnant women who were admitted to DMCSH and seriously ill during data collection period.

4.6 Sample size determination

The minimum sample size using single population proportion required for ensuring at least 95% confidence and 5% precision levels was determined using power analysis that is: $n = (Z_{\alpha/2})^2 P(1-P)/d^2 = (1.96)^2 0.137(1-0.137)/(0.05)^2$

=182 and 10% expected non-response rate =200 Where, n = sample size

P = Prevalence of Preterm premature rupture of membrane

α = type I error (probability of rejecting true null hypothesis)

d = margin of error. is the estimated prevalence of preterm premature rupture of membrane that is 13.67%(from the study in DebreTabour General Hospital) and q is 1-p. accordingly, around 200(with 10% non responder) pregnant mother admitted to DMCSH Obstetric ward was included in the study.

Table 1:-Sample size for associated factors using Epi info 7.

Variables	Preterm PROM		% of outcome in exposed	% of outcome in unexposed	Calculated OR	AOR ,CI of 95%	Sample size
	Yes	No					
UTI	Yes	23	63	26.74	14.7	2.11 1.32-5.19	386
	No	35	203				
Abnormal vaginal discharge	Yes	13	15	46.42	11.36	6.76 3.02-15.11	62
	No	45	351				
Maternal MUAC	<23	28	39	41.79	8.4	7.82 4.24-14.44	62
	>23	30	327				

Based on single proportion sample size were 200 with 10% non responder. From Double population proportion formula by EPI-info version 7 window is used with 95% CI, Power of 80% and ratio of exposed to unexposed 1:1 and sample size was calculated for different variables from the study conducted in DebreTabourGeneral Hospital in 2019 G.C I get sample size of 386 and this is largest of all sample size and with 10% non-responder my final sample size was **425**.

4.7 Sampling Procedure

Systematic random sampling was applied to select study participants from labor, maternity, and high-risk wards, which was adopted from previous study. The average number of pregnant women who were admitted in Debre Markos Comprehensive Specialized Hospital during the data collection period was estimated based on the previous admission, which was obtained by referring a six-month registration book/record prior to data collection. Around 1750 pregnant women were admitted in labor, maternity, and high-risk wards in six months. The data were collected within six-month duration. The sampling interval (kth unit) was obtained by dividing the entire pregnant women (the total number of pregnant women who were admitted in six months) (1750) by the desired sample size (total number of sample size) and it was approximately 4. The first woman was randomly chosen for the survey by the lottery method, and then every other woman who was admitted in the ward was recruited for the study, because of short study period.

4.8 Variables

4.8.1 Dependent Variables

-Pre term premature rupture of membrane (yes/no)

4.8.2 Independent variable-Age, residence, gravidity, parity, LNMP,ANC follow up, Interpregnancy interval, frequency of ANC follow up, GA, fetal Presentation , Maternal MUAC,HIV status, Previous PROM ,Occupational status, Cervical procedure.

4.9 Operational and term definitions

BMI:-is a measure of body fat based on height and weight that applied to both adult women and men. It calculated by divide person's weight in kilogram to square of height in meter.

FHB:-number fetal heart beat per minute and normally 120 to 160 beat per minute.

Gestational age: - is calculated from the LNMP or fundal height that was documented on the card, if not from the duration of amenorrhea documented from mothers recall & is rounded to the nearest weeks. Amenorrhea of 9 months was taken as 37-42 weeks gestation for all mothers.

Gravidity: - the total number of pregnancies includes abortion, ectopic pregnancy and any other pregnancies. (Twin pregnancies considered as one pregnancy)(34).

Heavy weight lifting during pregnancy:-is considered when a women lifts 26 pound (12 kilo gram) infrequency (less than once every 5minutes),less than an hour of repetitive lifting of 22pound(10 kilogram) a day ,and more than 1 hour of repetitive lifting of 13 pound(6killogram) a day after 28 week of current pregnancy(35)

Interpregnancy interval:-the interval between the most recent previous childbirth and starting time of pregnancy for the current child as reported by the mother at the time of contact. It classified as optimal 2-5 year and short if it is below 2 year (34).

LNMP:-First day of a women's last menstruation.

MUAC: -Measurement of circumference left upper arm, measured at the midpoint between the tip of shoulder and the tip of elbow. It measures using non-elastic ,non-stretchable MUAC tapes, record to the nearest 0.1cm and in this study poor nutritional status of the mother defined as MUAC <23cm(36).

Preterm pre mature ruptures of membrane-defined as rupture of membranes 1hour before the onset of labor and between the gestational ages 28 week to 36⁺⁶week. It confirmed by clinical feature that is gush of fluids that leak out of the vagina and decrease in size of uterus and also sterile speculum examination.

4.10 Data collection procedures

Interview, chart review, and measurements were used to collect the data by structured questionnaires using trained data collectors. Five BSc midwives and one supervisor were used for data collection and supervisory activity, respectively, after training was given for them.

The questionnaires were prepared by review different literatures in English by the principal investigators and translate to Amharic. Questionnaires were categorized into Sociodemographic characteristics, past and current obstetric and gynecological history. Data on respondent's specific questionnaires were collected by reviewing medical records and through interviewing the respondents. In addition, MUAC of each woman was measured at the midpoint between the tips of the shoulder and elbow of the left arm using non-elastic and non-stretchable MUAC tapes. The questionnaire was.

4.11 Data processing and analysis

Data were entered into EPI data version 3.1 and then exported to SPSS version 25 for analysis. Descriptive statistics and binary logistic regressions were compute. Binary logistic regression was used to select variables associated with PPRM. In binary logistic regression, both Bivariate and multivariable logistic regressions was computed.

In Simple binary logistic regression analysis, independent variables with p value <0.25 was select as candidates for multiple binary logistic regressions. In multivariable logistic regression, statistical significant was considered at $p < 0.05$.AOR and their 95% confidence interval (CI) was used to measure strength of the association. Backward stepwise logistic regression was applied. Finally, the data were presented with tables, Chart and figures.

4.12 Data quality assurance

Before the actual data collection the reliability of questionnaire was pre tested in Degen Primary Hospital by taking 5% of the total sample size and check the questionnaire consistency and error, using Cronbach's alpha. Accordingly, the questionnaire will modify. I was supervised and evaluate; errors were corrected by the investigator before the following day activity and to have good quality health

professionals were involved in data collection. To keep the quality of data detail trainings were gave for data collectors and follow day to day activities during data collection

4.13 Ethical considerations

Ethical approval was obtained from the Institutional Review Board Bahir Dar University College of Medicine and Health Science, letter of permission and cooperation was received from Amhara Regional Health Bureau. All interviewee were informed about the objectives, data collection procedure and possible risk and benefits of taking part in the research and confidentiality of obtained information. The informant then voluntary decided to participate, and written consent was obtained from each of them. The participant was allowed to consider their participation and given the opportunity to withdraw from the study if they wish to do so. An official letter was obtained from the Debre Markos General Hospital medical director and respective Department Heads.

4.14 Plan for dissemination of findings

The result of the study will be presented to Bahir Dar University as part of IESO thesis; and it will disseminated to College of public health and medical science, coordinating office of Integrated Emergency OBS/GNY and Surgery, Regional health bureau, Zonal health offices, to the targeted health facility and to NGOs working on this area. It will be presented in different seminar and workshops. Further attempt will be made to publish it on national and international scientific journals.

CHAPTER 5: RESULT

5.1 Sociodemographic Characteristics of Respondents

A total of 425 pregnant women were enrolled in the study with a response rate of 100%. The mean age of the study participants was 28.29 years with standard deviation (SD) 5.7 years and 62 ranges from 17 and 43 years old. Almost all 405(95.3%) of the respondents were married. Three fourth of them were had at least Primary Education. Nearly three-fifth of pregnant women were from urban areas, and the majority 391(92%) of respondents were orthodox Christian follower. (See table 2)

Table 2: Sociodemographic Characteristics of Pregnant Women who were Admitted in Debre Marcos Comprehensive Specialized Hospital, North West Ethiopia, 2021(n=425).

Characteristics	Frequency	Percent
Age(in year)		
<24	110	25.9
24-35	264	62.1
>35	51	12
Ethnicity		
Amhara	416	97.9
Others(Tigray and Oromo)	9	2.1
Marital Status		
Married	405	95.2
Single	8	1.9
Divorced	10	2.4
Widowed	2	0.5
Residency		
Urban	265	62.4
Rural	160	37.6
Religion		
Orthodox	391	92

Muslim	26	6.1
Protestant	8	1.9
Educational status		
No formal education	108	25.4
Primary	78	18.4
Secondary	111	26.1
Above	128	30.1
Occupational status		
Housewife	105	24.7
Government employee	130	30.6
Farmer	92	21.6
Merchant	57	13.4
Private employee	36	8.5
Others(Student, Daily laborer)	5	1.2
Average monthly income (in birr)		
<1000	13	3.1
1000-2000	20	4.7
>2000	392	92.2
MUAC of the woman		
<23	185	43.5
≥23	240	56.5

5.2 Reason for Admission

Nearly one-fourth 149(35.1%) of respondents were admitted for the indications of Hypertensive disorder of pregnancy including Preeclampsia, Gestational Hypertension & Eclampsia. Also 67(15.8%) and 61(14.4%) of respondents were admitted for the indications of APH and PPRM respectively. (See table 3)

Table 3:- Indication (reason) for Admission of Pregnant Women Admitted in Debra Markos Comprehensive Specialized Hospital in North West Ethiopia, 2021. (n=425).

Characteristics	Frequency	Percent
Indication for Admission		
Hypertensive disorder of pregnancy*	149	35.1
Preterm PROM	61	14.4
APH	67	15.8
Preterm labour	42	9.9
GDM	32	7.5
Amniotic fluid disorder	23	5.4
IUGR	20	4.7
IUFD	9	2.1
DM	9	2.1
Others	13	3.1
Total	425	100

5.3 Past and Current Obstetrics-Related Characteristics of Respondents

The majority 414(97.4%) of respondents had ANC follow-up in current pregnancy, and nearly three fifth 254(59.8%) of pregnant women were Multigravida and 118(27.8%) were Primigravida. About 126(29.6%) of the respondents had history of abortion and 77(18.1%) of them had vaginal bleeding in current pregnancy. Most of respondents 393(92.5%) had single tone and 32(7.5%) of them were twin pregnancy and 354(83.3%) cephalic feta presentation. From all respondent 78(18.3%) & 77(18%) had previous history of Preterm PROM and preterm birth respectively. 344(80.9%) of respondent were gestational age between 34 to 36 week. About fifty percent of pregnant women are short interpregnancy interval that is less than 24 month. (See table 4)

Table 4: Past and Current Obstetric Characteristics of Pregnant Women Admitted to Debra Markos Comprehensive Specialized Hospital, North West Ethiopia, 2021.

Characteristics	Frequency	Percent
Gravidity		
Primigravida	118	27.8
Multigravida	254	59.8
Grandmultigravida	53	12.4
Interpregnace Interval		
Short	162	52.6
Optimal	146	47.4
Parity		
Nulipara	165	38.8
Primipara	124	29.2
Multipara	136	32.0
Gestational Age		
29-33	81	19.1
34-36	344	80.9
ANC		
Yes	414	97.4
No	11	2.6
Number of ANC Contact		
One	3	0.7
Two	69	16.2
Three	83	19.5
Four and above	270	63.5
History of abortion		
Yes	126	29.6
No	299	70.4
Number of Abortion		

One	67	53.2
Two	50	39.7
Three and Above	9	7.1
Type of Abortion		
Spontaneous	87	69
Induced	39	31
Vaginal Bleeding		
Yes	77	18.1
No	348	81.9
History of PPROM		
Yes	78	18.4
No	347	81.6
History of Preterm Birth		
Yes	77	18.1
No	348	81.9
History of cervical procedure		
Yes	38	8.9
No	387	91.1
History of CS delivery		
Yes	50	11.8
No	375	88.2
Type of Pregnancy		
Single tone	393	92.5
Twin	32	7.5
Presentation		
Cephalic	354	83.3
Breech	65	15.3
Other	6	1.4

5.4 Medical and Behavioral Characteristics of Respondents

One third 128(30.2%) of the study participants had UTI in current pregnancy, 122(28.7%) history of heavy weight lifting, 84(19.8%) abnormal vaginal discharge, and 31(7.3%) of them had history of chronic cough. Almost all 422(99.3%) of them were screen for HIV/AIDS and 11(2.6%) of them had positive result. All of respondents (100%) did not smoke cigarettes. (See fig 2)

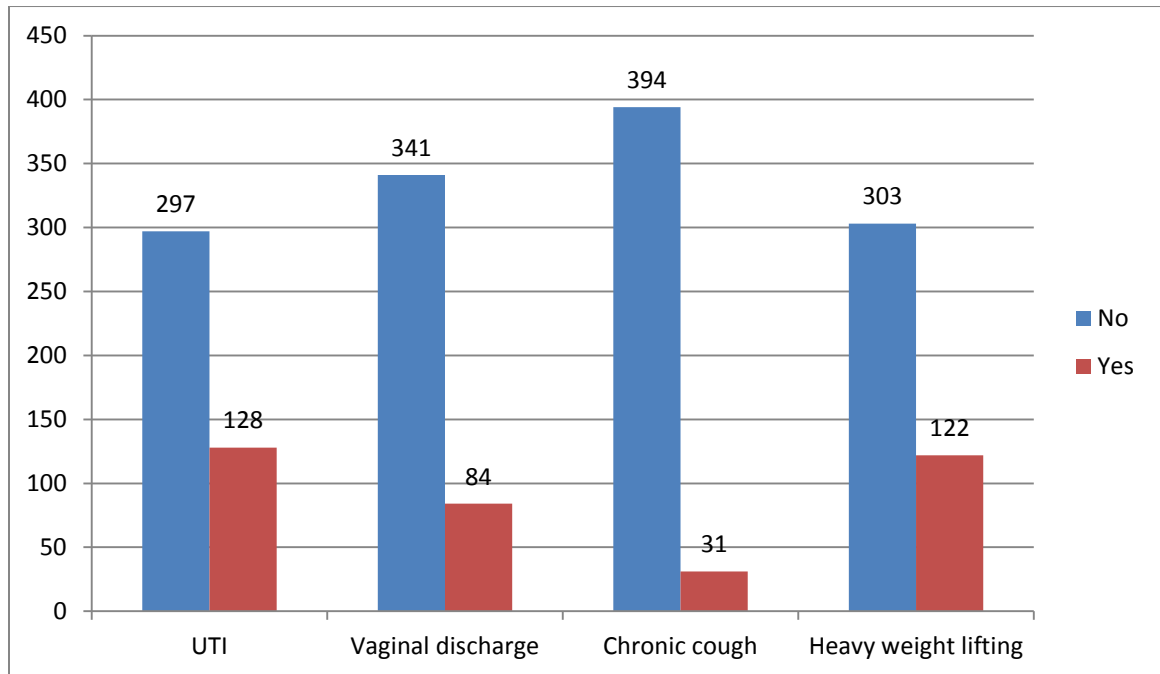


Figure 2: Medical and Behavioral Characteristics of Pregnant Women Admitted to Debre Markos Comprehensive Specialized Hospital, North West Ethiopia, 2021 G.C

5.5 Prevalence of PPRM

The prevalence preterm premature rupture of membrane (PPROM) was found to be 14.4 % (61) with 95% CI (10.6, 18.1).

5.6 Factors Associated with PROM

In binary logistic regression analysis PPRM was significantly associated abnormal vaginal discharge during pregnancy, maternal age, and gravidity, MUAC of the mother, history of heavy weight lifting, UTI, previous history of PROM, previous history of preterm birth and history of abortion. In the multivariate logistic regression analysis

abnormal vaginal discharge, previous history of PROM, MUAC of the mother, UTI and previous preterm birth were significantly associated with PPRM. (See table 5)

Table 5:-Bivariate and Multivariable Association of PPRM and Independent factors among Pregnant Women Admitted in Debre Markos Comprehensive Specialized Hospital, North West Ethiopia, 2021.

Variable	Preterm PROM		COR (95%)	AOR (95%)	P-value
	Yes	No			
Age					0.056
<24	15	95	1	1	
24-35	29	235	0.78(0.4-1.52)	0.39(0.18-0.86)	0.13
>35	17	34	3.16(1.43-7.03)	0.76(0.26-2.30)	0.64
Level of Education					0.83
No formal education	21	87	1.57(0.78-3.16)	1.37(0.42-4.38)	0.59
Primary	9	69	0.85(0.36-2.02)	0.96(0.31-2.99)	0.94
Secondary	14	97	0.94(0.44-2.01)	0.82(0.32-2.12)	0.69
Above	17	111	1	1	
Residence					
Urban	36	229	1	1	
Rural	25	135	1.17(0.68-2.04)	0.86(0.44-1.69)	0.66
UTI					
Yes	31	97	2.84(1.64-4.94)	2.40(1.24-4.66)	0.01
No	30	267	1	1	
Vaginal Discharge					
Yes	26	58	3.92(2.19-6.99)	2.15(1.08-4.29)	0.029
No	35	306	1	1	
Vaginal Bleeding					
Yes	10	67	0.87(0.42-1.8)	0.84(0.34-2.07)	0.72
No	51	297	1	1	
MUAC					
<23	39	146	2.64(1.5-4.64)	2.99(1.55-5.78)	0.001

≥23	22	218	1	1	
Type of Pregnancy					
Single tone	53	340	1	1	
Twin	8	24	2.14(0.91-5.01)	1.32(0.46-3.84)	0.60
Gravidity					
Primigravida	12	106	1	1	
Multigravida	31	223	1.22(0.6-2.48)	0.72(0.26-1.96)	0.52
Grandmultigravida	18	35	4.54(1.99-10.56)	0.77(0.16-3.63)	0.74
Chronic cough					
Yes	5	26	1.16(0.43-3.15)	0.46(0.13-1.54)	0.20
No	56	338	1	1	
Heavy weight lifting during pregnancy					
Yes	30	92	2.86(1.64-4.98)	1.66(0.80-3.42)	0.17
No	31	272	1	1	
History of abortion					
Yes	27	99	2.12(1.22-3.71)	1.28(0.62-2.59)	0.49
No	34	265	1	1	
Previous PPRM					
Yes	33	45	8.35(4.62-15.11)	4.31(1.86-10.01)	0.001
No	28	319	1	1	
History of Preterm Birth					
Yes	30	47	6.52(3.62-11.75)	3.11(1.29-7.48)	0.011
No	31	317	1	1	

CHAPTER 6: DISCUSSION

The results of the study revealed that the proportion of pregnant women who developed preterm premature rupture of membrane at least one hour before the onset of true labor was about 14.4% with 95% CI (10.6, 18.1). This finding was higher than the study finding from Rio Grande in Brazil (3.1%)(37), tertiary care center in India (2.01%)(19), Kampala hospital in Uganda (7.5%)(20), in Ain Shams Maternity Hospital in Egypt (5.3%)(37) and tertiary hospital in Nigeria (3.3%)(38), this difference might be due to the difference between the quality of services they provided and socioeconomic status of study participants. In addition, two of the former studies were from developed countries in which good qualities of health care services were given for early screening and treatment of risk factors for PPRM. Furthermore, this study used data from a selected high-risk population which increases the magnitude of PPRM.

On the other hand, this finding was lower than the study finding in Jiangsu Province Hospital in China (19.2%)(16), the difference might be due to the time gap between the studies. In addition, absence of behavioral risk factors for PPRM such as smoking, cocaine use, and alcohol consumption in the present study might attribute to this difference.

This study finding in line with the study finding in Debre Tabour General Hospital that is 13.67%(29). This might be due to similarity in study Population, Study design, Sampling Procedure and Sample Size.

Were UTI during pregnancy, abnormal vaginal discharge, previous history preterm PROM, MUAC of the mother and previous history preterm birth.

UTI during pregnancy was significant associated with development of PPRM. This finding was consistent with the study performed in Debre Tabour (28). The odd of PPRM was 2.4 times higher among those pregnant women with a history of UTI in pregnancy than those who did not have UTI (AOR=2.40, 95% CI (1.24-4.66)). Elevations of inflammatory mediators such as prostaglandins, cytokines, and proteinases in the local

tissue play a causative role in disruption of fetal membrane integrity and in triggering uterine contractility. They are produced as a part of physiologic maternal defense mechanism in response to pathogens' invasion. The inflammatory mediators and production of matrix degrading enzymes and TNFs are involved in mechanisms of PPRM (30).

The present study also indicated that a significant association was noted between abnormal vaginal discharge and PPRM. The odd of PPRM was 2.15 times higher among pregnant women with abnormal vaginal discharge as compared to those who did not have abnormal vaginal discharge (AOR=2.15, 95% CI 1.08-4.29). This finding was in agreement with the study finding in Mekelle city, Ethiopia (26). Abnormal vaginal discharge is a common symptom of genital infections. Inflammatory cells produced by genital infections are involved in weakening of the fetal membranes among pregnant women thus causing PPRM.

In this study, previous history of PROM showed a significant association with PPRM. Pregnant women who had history of PROM were 4.31 times more likely to develop PPRM than those who did not have (AOR=4.31, 95% CI (1.86-10.01)). This finding was consistent with the study finding in the University of Calabar Teaching Hospital, Nigeria (38) and Mekelle city, Ethiopia (26). This could be due to increased risk of intra-amniotic infection, intra-partum infection and a short cervical length (cervical incompetence). In addition, obstetric complications are highly recurrent by nature.

This study also indicated that pregnant women with MUAC < 23cm were significantly associated with PPRM. Pregnant women whose MUAC < 23cm were 3 times higher odds of developing PPRM than those ≥ 23 cm (AOR=2.99, 95% CI (1.55-5.78)). MUAC < 23cm during pregnancy indicates poor nutritional status. Nutritional deficiency particularly micro nutrients such as vitamin C or ascorbic acid affects collagen formation. Ascorbic acid protects the body against degenerative processes resulting from oxidative stress. In addition, it is important to strengthen and stabilize collagen by acting as an enzymatic cofactor. A dietary deficiency of micronutrients might lead to PPRM due to collagen weakness and capillary hemorrhage.

In this study, previous history of Preterm birth showed a significant association with PPRM. Pregnant women who had history of Preterm birth were 3.11 times more likely to develop PPRM than those who did not have (AOR=3.11, 95% CI (1.29-7.48)). This finding was consistent with the study finding in the University of Calabar Teaching Hospital, Nigeria (39), and Mekelle city, Ethiopia (26). This might be due to untreated genitourinary infection and a short cervical length (cervical incompetence). In addition, obstetric complications are highly recurrent by nature.

CHAPTER 7: LIMITATIONS, CONCLUSIONS AND RECOMMENDATION OF THE STUDY

7.1 LIMITATION OF STUDY

Since the study is cross-sectional it may not demonstrate direct cause and effect between dependent and independent variables. I assessed hospital-admitted pregnant women (high risk population) who might affects the actual prevalence of PPRM and its generalization to the whole target populations in the community as well as in the country as a whole.

7.2. CONCLUSIONS

In general, the study has revealed that the overall prevalence of Preterm Premature rupture of membrane among the participants was considered to be high as compared to the global prevalence, because this study was carried out in hospital-admitted pregnant women (high-risk population). Abnormal vaginal discharge, previous history of Preterm PROM, MUAC of the mother, UTI and previous preterm birth positively associated with premature rupture of membrane.

7.3 RECOMMENDATION

For Researcher

I recommend large low-risk population-based studies in the study area as well as in the country as a whole to interpret difference between countries.

For Debre Markos Comprehensive Specialized Hospital

Factors that tend to facilitate Preterm premature rupture of membrane include abnormal vaginal discharge, UTI, history of previous PROM, history of preterm birth and MUAC of the mother <23cm. Hence, improved nutritional statuses of pregnant women, early screening, diagnosis, and quick treatments of UTI and abnormal vaginal discharges were recommended to decrease PPRM.

For the Government and policy maker

For the Government and policy maker I recommend designing policy and programs that improve nutrition status of women.

8. REFERENCE

1. Kaur P, Saini S. Prelabor Rupture of Membranes. *Labour Room Emergencies*: Springer; 2020. p. 39-52.
2. Food E. Medicine and Healthcare Administration and Control Authority. Continuing Professional Development (CPD) Guideline for Health Professionals in Ethiopia Addis Ababa: FMOH. 2013.
3. Rodríguez Carpio GJ. Facultad de Medicina Humana: Universidad Católica de Santa María; 2019.
4. Gibbs RS, Karlan BY, Haney AF, Nygaard IE. *Danforth's obstetrics and gynecology*: Lippincott Williams & Wilkins Philadelphia, PA; 2008.
5. Parry S, Strauss JF. Premature rupture of the fetal membranes. *New England Journal of Medicine*. 1998;338(10):663-70.
6. Gabbe SG, Niebyl JR, Simpson JL, Landon MB, Galan HL, Jauniaux ER, et al. *Obstetrics: normal and problem pregnancies e-book*: Elsevier Health Sciences; 2016.
7. Allen SR. Epidemiology of premature rupture of the fetal membranes. *Clinical obstetrics and gynecology*. 1991;34(4):685-93.
8. Harding JE, Pang J-M, Knight DB, Liggins GC. Do antenatal corticosteroids help in the setting of preterm rupture of membranes? *American journal of obstetrics and gynecology*. 2001;184(2):131-9.
9. Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ, Gebreheat G, et al. Risk factors of premature rupture of membranes in public hospitals at Mekele city, Tigray, a case control study. *BMC pregnancy and childbirth*. 2018;18(1):1-7.
10. Mercer BM, Arheart KL. Antimicrobial therapy in expectant management of preterm premature rupture of the membranes. *The Lancet*. 1995;346(8985):1271-9.
11. KEIRSE MJ. Progestogen administration in pregnancy may prevent preterm delivery. *BJOG: An International Journal of Obstetrics & Gynaecology*. 1990;97(2):149-54.
12. Soraisham AS, Singhal N, McMillan DD, Sauve RS, Lee SK, Network CN. A multicenter study on the clinical outcome of chorioamnionitis in preterm infants. *American journal of obstetrics and gynecology*. 2009;200(4):372. e1-. e6.
13. Cnattingius S, Mills JL, Yuen J, Eriksson O, Salonen H. The paradoxical effect of smoking in preeclamptic pregnancies: smoking reduces the incidence but increases the

rates of perinatal mortality, abruptio placentae, and intrauterine growth restriction. *American journal of obstetrics and gynecology*. 1997;177(1):156-61.

14. Obi S, Ozumba B. Pre-term premature rupture of fetal membranes: the dilemma of management in a developing nation. *Journal of obstetrics and gynaecology*. 2007;27(1):37-40.
15. Medina TM, Hill DA. Preterm premature rupture of membranes: diagnosis and management. *American family physician*. 2006;73(4):659-64.
16. Chandra I, Sun L. Third trimester preterm and term premature rupture of membranes: is there any difference in maternal characteristics and pregnancy outcomes? *Journal of the Chinese Medical Association*. 2017;80(10):657-61.
17. Noor S, Nazar AF, Bashir R, Sultana R. Prevalance of PPRM and its outcome. *Journal of Ayub Medical College Abbottabad*. 2007;19(4):14-7.
18. Hackenhaar AA, Albernaz EP, Fonseca T. Preterm premature rupture of the fetal membranes: association with sociodemographic factors and maternal genitourinary infections. *Jornal de pediatria*. 2014;90(2):197-202.
19. Singh D, Usham R, Kamei H. Preterm prelabour rupture of membrane: 1 year study. *Journal of Evolution of Medical and Dental Sciences*. 2015;4(49):8495-9.
20. Byonanuwe S, Nzabandora E, Nyongozi B, Pius T, Ayebare DS, Atuheire C, et al. Predictors of premature rupture of membranes among pregnant women in rural Uganda: a cross-sectional study at a tertiary teaching hospital. *International journal of reproductive medicine*. 2020;2020.
21. Khan S, Khan A. Study on preterm pre mature rupture of membrane with special reference to maternal and its fetal outcome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2016;5(8):2768-74.
22. Ladfors L, Mattsson L-Å, Eriksson M, Milsom I. Prevalence and risk factors for prelabor rupture of the membranes (PROM) at or near term in an urban Swedish population. *Journal of perinatal medicine*. 2000;28(6):491-6.
23. ACOG Practice Bulletin No. 80: premature rupture of membranes. Clinical management guidelines for obstetrician-gynecologists. *Obstetrics and gynecology*. 2007 Apr;109(4):1007-19. PubMed PMID: 17400872. Epub 2007/04/03. eng.
24. Abouseif HA, Mansour AF, Sabbour S. Prevalence and outcome of Preterm Premature Rupture of Membranes (PPROM) among pregnant women attending Ain Shams maternity hospital. *Egyptian Journal of Community Medicine*. 2018;36(2):99-107.

25. TC O, Enwereji J, Okoro O, Adiri C, Ezugwu E, Agu P. The incidence and management outcome of preterm premature rupture of membranes (PPROM) in a tertiary hospital in Nigeria. *American Journal of Clinical Medicine Research*. 2014;2(1):14-7.
26. Wolde HF, Gonete KA, Akalu TY, Baraki AG, Lakew AM. in the general population: evidence from the 2016 Ethiopian Demographic and Health Survey (EDHS)—multilevel analysis. 2019.
27. Sirak B, Mesfin E. Maternal and perinatal outcome of pregnancies with preterm premature rupture of membranes (pprom) at tikur anbessa specialized teaching hospital, addis ababa, ethiopia. *Ethiop Med J*. 2014;52(4):165-72.
28. Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ, Gebreheat G, et al. Risk factors of premature rupture of membranes in public hospitals at Mekele city, Tigray, a case control study. *BMC pregnancy and childbirth*. 2018;18(1):386.
29. Addisu D, Melkie A, Biru S. Prevalence of preterm premature rupture of membrane and its associated factors among pregnant women admitted in Debre Tabor General Hospital, North West Ethiopia: institutional-based cross-sectional study. *Obstetrics and Gynecology International*. 2020;2020.
30. Workineh Y, Birhanu S, Kerie S, Ayalew E, Yihune M. Determinants of premature rupture of membrane in Southern Ethiopia, 2017: case control study design. *BMC research notes*. 2018;11(1):927.
31. Smith GN, Rafuse C, Anand N, Brennan B, Connors G, Crane J, et al. Prevalence, management, and outcomes of preterm prelabour rupture of the membranes of women in Canada. *Journal of Obstetrics and Gynaecology Canada*. 2005;27(6):547-53.
32. Caughey AB, Robinson JN, Norwitz ER. Contemporary diagnosis and management of preterm premature rupture of membranes. *Reviews in obstetrics and gynecology*. 2008;1(1):11.
33. Naidoo M, Sartorius B, Tshimanga-Tshikala G. Maternal HIV infection and preterm delivery outcomes at an urban district hospital in KwaZulu-Natal 2011. *Southern African Journal of Infectious Diseases*. 2016;31(1):25-8.
34. Goya M, Bernabeu A, García N, Plata J, Gonzalez F, Merced C, et al. Premature rupture of membranes before 34 weeks managed expectantly: maternal and perinatal outcomes in singletons. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2013;26(3):290-3.

35. Workineh Y, Birhanu S, Kerie S, Ayalew E, Yihune M. Determinants of premature rupture of membrane in Southern Ethiopia, 2017: case control study design. *BMC research notes*. 2018;11(1):1-7.
36. Gebre B, Biadgilign S, Taddese Z, Legesse T, Letebo M. Determinants of malnutrition among pregnant and lactating women under humanitarian setting in Ethiopia. *BMC nutrition*. 2018;4(1):1-8.
37. Hackenhaar AA, Albernaz EP, Fonseca T. Preterm premature rupture of the fetal membranes: association with sociodemographic factors and maternal genitourinary infections. *Jornal de pediatria*. 2014;90:197-202.
38. ACoP B-O. ACOG Practice Bulletin No. 80: premature rupture of membranes. Clinical management guidelines for obstetrician-gynecologists. *Obstet Gynecol*. 2007;109(4):1007-19.
39. Bulletins-Obstetrics ACoP A. practice bulletin no. 80: premature rupture of membranes. Clinical management guidelines for obstetrician-gynecologists. *Obstet Gynecol*. 2007;109:1007-1

Annex I: English version of participant information sheet and consent form

TITTLE:-prevalence and associated factor of preterm premature rupture of membrane in pregnant women admitted in Debre Markos Comprehensive Specialized Hospital, North west Ethiopia

WHO I AM AND WHAT THIS STUDY IS ABOUT

You are invited to participate in a research study on prevalence and associated factors of preterm premature rupture of membrane in pregnant mother admitted to Debre Markos Comprehensive Specialized Hospital. This study/project is being conducted by Bisrat Abaynew (BSc) as partial fulfillment of degree of master in integrated emergency surgery and obstetrics.

WHAT WILL TAKING PART INVOLVE?

Before you decide whether or not you wish to participate in this study/project, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish.

WHY HAVE YOU BEEN INVITED TO TAKE PART?

The purpose of the study will be to determine the prevalence and associated factors of preterm premature rupture of membrane in pregnant mother admitted to Debre Markos Comprehensive Specialized Hospital .You are eligible to participate/take part in this study/project because you are one of the pregnant women admitted to DMCSH.

DO YOU HAVE TO TAKE PART?

Participation in this study is voluntary. Your decision not to participate in this study will not have any effect on any future involvement that you may have with the researcher. If you wish to withdraw from the study once it has started, you can do so at anytime without

having to give a reason. If you agree to being involved in the study, you will be required to complete the attached Participant Consent Form.

CONFIDENTIALITY:-Any information collected will remain confidential and will be disclosed only with your permission, or except as required by law.

TITTLE OF THE STUDY:-prevalence and associated factor of preterm premature rapture of membrane in pregnant women admitted in Debre Markos Comprehensive Specialized Hospital, North west Ethiopia.

CONSENT FORM

I am informed on study to be conducted by master's student in Bahir Dar University College of medicine and health science in Integrated Emergency Surgery and obstetrics. Objective of the study and participation to this study is voluntary no obligation to answer any questionnaire. There is no harm by not answering the questions and no special benefit by answer the question and also the interview will take 25-35 minutes willing to participate in the interview.

Annex II: English version of Questionnaires

Bahir Dar University College of medicine and health science office of Integrated Emergency Obstetrics and Surgery, questionnaire format on study of prevalence and associated factors of preterm premature rupture of membrane at DebreMarkos Comprehensive specialized Hospital, Ethiopia, in 2021 G.C

Part I: SOCIODEMOGRAPHIC INFORMATION

No.	Questions	Response category	Remark
001	Age(in year)	.....
002	Residence	1. Urban	
		2. Rural	
003	Education level	1.No formal education	
		2.Primary	
		3.Secondary	
		4.Above	
004	Occupation	1.House wife	
		2.Merchant	
		3.GOverment employee	
		4.Other(specify)	
005	Monthly income of the Family in ETB	.....
006	Ethnicity	1.Amhara	
		2.Tigray	
		3.Oromo	
		4.Other(specify)	
007	Religious	1.Orthodox	
		2.Muslim	
		3.Protestant	
		4.Other(specify)	
008	Marital status	1.Married	

		2.Unmarried	
		3.Divorsed	

Part II: Past gynecologic and obstetric history

009	History of abortion	1.Yes
		2.No
010	Number of abortion	.....
011	Type of abortion	1.Spontaneous
		2.Induced
012	Previous history of preterm labour	1.Yes
		2.No
013	Previous history of preterm PROM	1.Yes
		2.No
014	History of cervical procedure like cervical cerclage	1.Yes
		2.No
015	History of Cesarean delivery	1.Yes
		2.No

Part III History on current obstetrics and gynecologic history

	Questions	Response category	Remark
016	Reason for admission	.....
017	Gravidity	.....
018	Interpregnancy interval in month	.....
019	Parity	.....
020	Did she remember her LNMP?	1. Yes	
		2. No	
021	If yes for Q021 her GA in weeks are	_____	
022	If No or not stated for Q021 her GA by fundal height	.....
023	Does the mother have ANC follow-up?	1.Yes	
		2.No	

024	If yes for Q023 how many times?	_____	
025	HIV tested	1.Yes	
		2.No	
026	If yes for Q025	1.Non reactive	
		2.Reactive	
027	History of abnormal vaginal discharge	1.Yes	
		2.No	
028	History of vaginal bleeding	1.Yes	
		2.No	
029	Has history of Smoking	1.Yes	
		2.No	
030	Has history of chronic cough	1.Yes	
		2.No	
031	You have history of passage of liquor?	1.Yes	
		2.No	
032	If yes for Q031, duration in hours?	_____ hr	
033	Has history of UTI?	1.Yes	
		2.No	
034	Fetal heart beat for singleton or twin A during decision is?	1. _____ beats/minute	
		2.Negative	
035	If pregnancy is twin FHB for TB is?	1. _____beats/minute	
		2.Negative	
036	Fetal lie on admission is?	1.Longitudinal	
		2.Oblique	
		3.Transverse	
037	If pregnancy is twin fetal lie for TB is?	1.Longitudinal	
		2.Oblique	
		3.Transverse	

038	Is Speculum examination done?	1.Yes	
		2.No	
039	Cervical Status during speculum Examination?		
040	MUAC	____cm	
041	Has history of heavy weight lifting	1.No	
		2.Yes	

Name and signature of data collector _____

Date of data collection _____

Annex III: Amharic version of participant information sheet and consent form

Information sheet (Amharic version)

የሚጃ መዘር ዝር

ሰላምታ

እንደ ምን አደርሽ(ዋልሽ)?

ስሜ.....ይባላል::

ይህ የጥናት ሚጃ የምስጢር ሰበሰብ ወይ ባህሪ ዳርዳራ ኒሽር ሲቲዩ ህክምናና ጠፍሳይን ስኮሌጅ የተቀናጀ የደንገተኛ ቀደምት ስህተት ለመቀነስና ለመቆጣጠር የሚደረግ ጥናት ነው።

የዚህ ጥናት ዓላማ ጽንሰ-ሠርዕ ደረጃ ስለሆነ ለሚገባው ማሳሰቢያ እንደሆነ ማረጋገጥ ማድረግና ለሌሎች ጥናቶች ማስተካከል አስፈላጊ ነው።

ይህ ጥናት የናቶችን እና ህጻናትን ህመም እና ጥፋት ለመቀነስ የሚደረግ ጥናት ነው። በአጠቃላይ የናቶችን እና ህጻናትን ጠፍ ለመቆጣጠር ይረዳል። ከላይ ዕንደተ-በራራው ከዚህ ጥናት ጋር ግንኙነት ባለው ለመጠየቅ ተያይዞ ትንሽ ጊዜዎችን ከኛ ጋር ቢሰጡ በጣም እናመሰግናለን። አይደለም ማጠቃለያ በከፊልም ሆነ በሙሉ ለማቆረጥ ሙሉ መብት ነው። በዝህ ጥናት መተባበር ያለ ጉዳት መሆኑን እንገልጻለን። የግል ጥቅምም እንደሚሆን ማረጋገጥና ነገር ግን በጠቅላላው የጥናቱ ወጠታ የናቶችን እና ህጻናትን ጠፍ ለመቆጣጠር ግባት እንደሚሆን በማሳሰብ ነው።

በዚህ መጠቃለያ ውስጥም ስምዎን እንደሚጠቀስ እና የሰጠዎት መረጃ ያለ እርስዎ ፈቃድ ለማገዝ ሳይገለጥ ምስጢርነቱን እንደሚጠበቅ ልናረጋግጥልዎ እንደሚችልን።

ለበለጠ መረጃ እና ጥያቄ ከዚህ በታች የተሰጠው አድራሻ ለመጠየቅ መግናኘት ይችላሉ።

ብስራት አባይነው
0918202549

Consent form (Amharic version)

የ ስምምነት ቅጽ

እኔ ባህርዳርዩ ኒቨርሲቲ የህክምናና ጠፍሳይንስ ኮሌጅ የተቀናጀ የድንገተኛ ቀድሞ ገና ህክምናና የ ማህጸንና ጽንሰ ህክምና ት/ትክፍል ሲሆን ለሁለተኛ ዲግሪ መመሪያ ቤቅ ጽሁፍ ጽንሰ ጊዜ ወሳይ ደርሰ እና ምጥሳይ ጀምሮ የ ማከሰት የ እንሺር ትውሃ መፍሰስ ጥናት እንደ ማከሰት ድህረ ምረቃ ለ ስምምነት ማስቀመጥ ለ ግዴታ ብፍቃድ ማድረግን ትማንኛውን ምጥያ ቁጠ መጠይቁ ለመጠላለስ ስምምነት ለሁሉ ፡ ይህን ከ 25-35 ደቂቃ የ ማዘድ መጠይቅ ስወስድ ያለ ጉዳት መሆኑ ሰገነ ዘብጅ ቀጥተኛ የ ግልጥቅም እንደ ማዘድ ስንኝ በማወቅና ነገር ግን በጠቅላላው የ ጥናቱ ወጠታ ለ ማሻሻል ጥራት ለ ማዘድ ስንኝ ክብካቤ ግባት እንደ ማሆን በማስብኘት ፡

Annex IV: Amharic version of Questionnaires
ክፍል 1 የ ማህበራዊ እና የ ስነ-ህዝባዊ መረጃ ጽቦች

ቁጥር	ጥያቄ	የ ጥያቄ ወላጅ ማራጫ ኮድ	ምርመራ
001	እድሜዎ ስንት ነው? በዓመት	.....
002	የ መኖሪያ ቦታ?	1. ከተማ 2. ገጠር	
003	የ ትምህርት ደረጃዎ ምን ድን ነው?	1. መደበኛ ትምህርት የለም 2. የ መጀመሪያ ደረጃ 3. ሁለተኛ ደረጃ 4. የ ከፍተኛ እና ከዛበላይ	
004	ስራ?	1. የ ቤት እመቤት 2. አርሶ አደር 3. የ ግል ስራ 4. ነጋዴ 5. የ መንግስት ስራ ተኛ 6. ሌላ	
005	የ ገቢ መጠን በኢትዮጵያ ብር	

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006	ብሄርዎ/ጎሳዎ ምንድን ነው?	1. አሜሪካ 2. ትግሬ 3. ኦሮሞ 4. ሌላ ካለይገለጽ ---	
007	የትኛውን ሃይማኖት ነው የሚከተሉት?	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ሌላ ካለገለጽ ----	
008	የጋብቻ ሁኔታ?	1. ያገባች 2. ያላገባች 3. አግብታየ ፈታች 4. ባሏየ ሞተባት	

ክፍል 2 ከባለፈው የሚጸንናጽን ሁኔታ ጋር የተያያዙ መረጃዎች

ቁጥር	ጥያቄ	የጥያቄው አሜሪካዊ ክፍል	ምርመራ
009	የጽንሰ መቅረጥ አጋጥሞሽ ነበር	1. አዎ 2. የለኝም	
010	009 መልስ አዎ ከሆነ ስንት ጊዜ	-----	
011	ምን አይነት የጽንሰ መቅረጥ ነበር	1. በተፈጥሮ 2. በመድሀኒት	

012	የጽንሰ ጊዜው ሳይደርስ የሚከሰት ምጥ አጋጥሞች ያወቃል	1.አዎ 2.የለኝም	
013	የጽንሰ ጊዜው ሳይደርስ እና ምጥ ሳይጀምር የሚከሰት የእንገርት ወሃ መፍሰስ አጋጥሞች ያወቃል	1.አዎ 2.የለኝም	
014	የሚጸጸን ጭፍ የሚከተብብ ቀዶ ህክምና ተደርጎልኪ ያወቃል	1.አዎ 2.የለኝም	
015	በወሊድ ምክንያት ቀዶ ጥገና ተሰርቶልኝ ያወቃል	1.አዎ 2.የለኝም	
ክፍል3 ከዓሁት የሚጸጸን እና ጽንሰ ሁኔታ ጋር የተያያዘ መረጃ			
016	በምን ምክንያት ነው አልጋ የያዘሽ	.....
017	ስንተኛ እርግዝናዎ ነው?	.....
018	በባለፈው እርግዝና እና በአሁኑ እርግዝና ያለው የጊዜ ልዩነት በወር	.....
019	ከዚህ በፊት ስንት ወልደዋል?	.....
020	ለመጨረሻ ጊዜ የወር አበባሺ የመጠበቅን ቀን ታስታወሻለሽ	1.አዎ 2.አላስታወስም	
021	017 መልስ አዎ ከሆነ : እርግዝናዎ ስንት ሳምንቱ ነው?	.....
022	020 መልስ 2 ከሆነ ጽንሰ/እርግዝናዎ አድማ	-----	

	በአልትራሳ ወንድ ወይም በምርመራ		
023	የነፍሰጠፎ ክትትል ነበረዎት?	1.አዎ 2.የለኝም	
024	020 መልስ አዎ ከሆነ ስንት ጊዜ	-----	
025	የኤች አይ ቪ ምርመራ አድርገሽ ነበር	1.አዎ 2.የለኝም	
026	025 መልስ አዎ ከሆነ ወጠቅዎ ምንድን ነበር	1.ነጋቲቪ 2.ፖዘቲቪ	
027	ሽታ ያለው የማግኔት ፈሳሽ አጋጥሞሽ ያወቃል	1.አዎ 2.የለኝም	
028	የማግኔት ደም መፍሰስ አጋጥሞሽ ያወቃል	1.አዎ 2.የለኝም	
029	ሲጋራ ታጨለሽ	1.አዎ 2.የለኝም	
030	ለረጅም ጊዜ የቆየ ሳል ነበረብሽ	1.አዎ 2.የለኝም	
031	የእንሺርት ወሃ መፍሰስ ነበረሽ	1.አዎ 2.የለኝም	
032	031 መልስ አዎ ከሆነ ከፈሰሰሽ ስንት ሰዓት ሆነ ወ.	-----ሰአት	
033	የሽንት ቧንቧ ኢንፌክሽን ምልክቶች ነበሩሽ	1.አዎ 2.የለኝም	
034	የጽንሱ የልብ ምት በደቂቃ ስንት ነወ.	-----	

035	ጽንሱ መንታ ከሆነ የሁለተኛው ጽንሱ የልብ ምት በደቂቃ ስንት ነው	-----	
036	የፅንሱ አቀማመጥ እንዴት ነው	1.ቀጥብሎ 2.ተንጋዶ/አዘንብሎ 3.ተጋድሞ	
037	ጽንሱ መንታ ከሆነ የሁለተኛው ጽንሱ አቀማመጥ እንዴት ነው	1.ቀጥብሎ 2.ተንጋዶ/አዘንብሎ 3.ተጋድሞ	
038	በመሳርያ የሚገኝ ጭምር መራተደርጎልሽ ነበር፤	1.አዎ 2.የለኝም	
039	038 መልስ አዎ ከሆነ የሚገኝ ጭምን ያክል ከፍቶአል በሳንቲ ሜትር	-----ሳ.ሜ	
040	መዋክ/ በሳንቲ ሜትር	-----ሳ.ሜ	
041	ከባድ ነገር ትሸከሚ ነበር	1.አዎ 2.የለኝም	

ሚጃውን የሚሰበሰቡበት ወሰን እና ፊርማ -----

ሚጃው የተሰበሰበበት ቀን: