ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

SURVIVAL STATUS AND PREDICTORS OF MORTALITY AMONG NEONATES BORN FROM WOMEN WITH PRETERM PREMATURE RUPTURE OF MEMBRANE AT PUBLIC HOSPITALS OF ADDIS ABABA, ETHIOPIA, 2024

BY: FENTANESH ALEMU (BSC)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY, DEPARTMENT OF NURSING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN NEONATAL NURSING.

May, 2024

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STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis

This thesis is submitted in partial fulfillment of the requirement for a graduate degree from the Addis Ababa University at College of Health Sciences, School of Nursing and Midwifery, department of nursing. The thesis is deposited in the Addis Ababa University Digital Library and is made available to local, national and international scientific community. I solemnly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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ABBREVIATIONS AND ACRONYMS

AAU	Addis Ababa University
ANC	Antenatal Care
APGAR	Appearance, Pulse, Grimace, Activity and Respiration
BPD	Broncho pulmonary dysplasia
CPAP	Continuous Positive Airway Pressure
EDHS	Ethiopian demographic health survey
GA	Gestational age
HAI	Hospital acquired infection
KMC	Kangaroo Mother Care
LOS	Length of Stay
NICU	Neonatal Intensive Care Unit
PDA	patent ducts arteriosus
PROM	premature rupture of membranes
PPROM	Preterm premature rupture of membranes
PTB	preterm or premature births
ROP	retinopathy of prematurity
PPH	persistent pulmonary hypertension
RDS	Respiratory Distress Syndrome
SDG	sustainable development goal
SSA	sub-Saharan Africa

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ABSTRACT

Introduction: Preterm premature rupture of membranes (PPROM) is defined as rupture of membranes before 37 completed weeks of gestation. Worldwide, approximately 15 million births occur too early (before 37 completed weeks of gestation) every year. These preterm or premature births represent about 11% of all deliveries. Preterm premature rupture of membranes occurs in approximately 2% to 3% of pregnancies and is responsible for one third of preterm deliveries

Objective: The purpose of this study is to assess survival status and predictors of mortality among neonate born from women with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024.

Method: Hospital-based retrospective cohort study was conducted in four selected public hospitals of Addis Ababa, Ethiopia. Data were collected from February 19 to March 19, 2024 by reviewing medical charts of neonates born from woman with PPROM who were registered from January 1, 2019, to December 31, 2023. Data were collected by kobo data collector tool box. SPSS was used for data coding, entering and transferred to STATA version 16 statistical software for further analysis. Cox-proportional hazards regression analysis with 95% confidence interval and P-value < 0.05 level of significance was used to verify predictors of survival status of neonate born from woman with PPROM.

Result: Out of 361 neonates born from woman with PPROM 91.14% were survived while 8.86% were died. Maternal age <20 years old (AHR:7.38, 95%CI: 1.85 ,9.30), birth weight less than 1000gram and 1000-1499grams (AHR: 8.11and 10.99, 95%CI: 9.8, 66.9 and 1.52, 9.57) respectively, Not receiving Antenatal Care (ANC) (AHR: 3.8, 95% CI: 1.16, 12.52) , multiple birth (AHR: 3.63, 95%CI: 1.09, 12.04), intra ventricular hemorrhage (AHR: 9.82, 95%CI: 3.57, 36.95) and maternal steroids administration (1.15,12.7) (AHR: 3.8345 ; 95%CI: 1.15,12.71) were identified as significant predictors of neonatal mortality.

Conclusion: Preterm neonatal death is still a major public health concern. Birth weight, maternal age, antenatal care, pregnancy type, maternal steroid administration and intra ventricular hemorrhage, and were independent significant predictors of mortality, as found in this study.

Key word: PPROM, survival**,** neonate, predictors of mortality

1. INTRODUCTION

1.1. Background

Premature rupture of membranes (PROM) is defined as the rupture of membranes before the onset of labor (1). When rupture of the membranes occurs beyond the 37th week but before the onset of labor, it is called term PROM. When it occurs before 37 completed weeks, it is called preterm premature rupture of membranes (PPROM), where there is at least one hour between rupture of membranes and the onset of contractions (2-4).

The World Health Organization (WHO) defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the woman's last menstrual period (LMP) (5). Preterm births can be subdivided according to gestational age: about 5% of preterm births occur at < 28 weeks (extreme prematurity), 15% at 28–31^{+6} weeks (severe prematurity), 20% at 32–33^{+6} weeks (moderate prematurity), and 60–70% at 34–36^{+6} weeks (near term) (6). Preterm delivery affects one in 10 births, 11% in the USA, and even greater births in developing countries and causes 40-75% of neonatal deaths (7).

The diagnosis of PPROM was confirmed by clinicians through visualization of amniotic fluid passing from the cervical canal and pooling in the vagina or by using a basic pH test of vaginal fluid of dried vaginal fluid identified under microscopic evaluation (8).

The major risk factors for PPROM include a history of PPROM, short cervical length, second or third trimester vaginal bleeding, uterine over distension, nutritional deficiencies of copper and ascorbic acid, connective tissue disorders, low body mass index, low socioeconomic status, cigarette smoking, and illicit drug use (7, 9).

Generally, patients with preterm PROM should be admitted to hospital with periodic assessment for infection, placental abruption, umbilical cord compression, fetal well-being, and labor. Periodic ultrasound evaluation should be performed to monitor fetal growth as well as periodic fetal heart rate monitoring (9).

Management of patients in which PPROM occurs requires careful consideration of multiple factors, including gestational age and risks of expectant management compared with risks of delivery for both mother and fetus. Some prenatal complications associated with PPROM

include preterm labor, intra-amniotic infection, placental abruption, and umbilical cord accidents (10). The risk of these complications increases with decreasing gestational age at membrane rupture (11).

Antenatal corticosteroids after preterm PROM have been shown to reduce neonatal mortality, respiratory distress syndrome, necrotizing enter colitis, and intra ventricular hemorrhage. A single course of corticosteroids is recommended for all pregnant women between 24 0/7 weeks and 34 0/7 weeks of gestation if there is a risk of delivery in the next 7 days (9). Magnesium sulphate administration for fetal neuro protection is recommended following preterm premature rupture of membranes once the patient is in active labor or prior to indicated delivery, when gestational age criteria are met (12).

Latency refers to the interval between rupture of the membranes and the onset of labor. A number of factors are known to affect the latency period, including; gestational age, degree of oligohydramnios, sonographic myometrium thickness, number of fetus and pregnancy complications (13). The latency period from rupture of membranes to delivery is negatively correlated with gestational age at preterm pre labor rupture of membranes (12). Preterm birth resulting from PPROM remains a critical public health problem and is associated with significant perinatal morbidity and mortality. Although prematurity and its associated complications explain much of the morbidity and mortality associated with PPROM (14).

1.2. Statement of the Problem

Globally, approximately 15 million premature births occur annually, constituting around 11% of all deliveries. However, there is substantial global disparity in preterm birth rates, ranging from 5% in high-income European countries to 18% in low-income regions of South Asia and Sub-Saharan Africa (SSA). Notably, nine out of the eleven countries with the highest estimated preterm birth burdens are located in SSA. This discrepancy highlights the urgent necessity for region-specific interventions and healthcare strategies to mitigate and address the prevalence of preterm births, especially in areas with the highest burdens (15). Preterm premature rupture of membranes (PPROM) occurs in approximately 2% to 3% of pregnancies and is responsible for one-third (1/3) of preterm deliveries (10).

The 2022 global report bared that the highest neonatal mortality was reported in Sub-Saharan Countries, which had 27 deaths per 1,000 live births with 43% of global newborn deaths, followed by central and southern Asia which was 23 deaths per 1,000 live births, with 36% of global newborn deaths. The sustainable development goal (SDG) goal 3 geared toward preventing deaths of newborns specifies that all countries should aim to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births by 2030, but without strengthened commitment to newborn survival, many countries couldn’t meet the SDG goal to end preventable neonatal deaths. In Ethiopia, a 2020 report estimated that neonatal mortality rate for Ethiopia was 27 deaths per 1,000 live births. The most common neonatal causes of death are prematurity (21.8 %) (16).

Prematurity is the primary cause of death for children under five worldwide. There are significant disparities in survival rates between countries. In low-income settings, the lack of practical, affordable care such as warming, breastfeeding support, and basic treatment for infections and breathing difficulties causes the death of half of babies born at or below 32 weeks, or two months early. In wealthy nations, nearly all of these infants make it through. Preterm newborns that survive the neonatal period have a higher burden of disability due to suboptimal use of technology in middle-class settings (17). Even in Low- and Middle-Income Countries, improvements in obstetric and neonatal care have reduced the related mortality and viability limit. Preterm babies' odds of surviving, however, are correlated with the area in which they are

born. To enhance results, it is critical to comprehend the regional variations in risk factors. This will need the application of strategies that are sensitive to the unique difficulties and resource constraints of each region (15). In order to provide the right intervention to prevent unfavorable pregnancy outcomes, it is essential to comprehend the scope and effects of preterm PROM. However, there is virtually little information available about PPROM in Ethiopian settings. The primary causes of newborn fatalities in Ethiopia, according to the 2011 Ethiopia Demographic and Health Survey (EDHS), were difficulties from preterm birth, events connected to the intra partum period, sepsis, and meningitis. Additionally, the survey revealed that during their antenatal care (ANC) follow-up, only roughly one-fifth (22%) of pregnant women were advised that vaginal gush or fluid could be an indication of pregnancy difficulties (18).

Although several studies were made in different countries on survival status and determinant factors of new born delivered from women with preterm premature rupture of membrane. In my knowledge like other developing countries there is no national or institutional data about chance of survival for babies delivered from woman with preterm premature rupture of membrane. Therefore, the aim of this study will be to identify survival status and its determinant factors among neonate delivered from women with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia.

1.3. Significance of the Study

Understanding the determinants of survival status in neonates born from women with preterm premature rupture of membranes can aid healthcare professionals in refining their care strategies by anticipating and addressing potential challenges associated with neonatal care in these specific cases. It may lead to improved clinical practice, early intervention, and better management of neonatal health. Obstetricians use this information in the decision-making process when confronted with problems such as preterm labor and medical complications that may necessitate early delivery or transfer to a perinatal center.

Policymakers can use the study findings to inform and shape healthcare policies related to maternal and neonatal care, particularly in public hospital settings. With insights into the determinants of survival in this specific population, policymakers can allocate resources more effectively, implement targeted interventions, and develop policies aimed at improving outcomes for neonates born under these circumstances.

Researchers can benefit from the study by building upon its findings and exploring further avenues of investigation. The research can serve as a foundation for additional studies, helping researchers delve deeper into the identified determinants. It may stimulate the development of new research questions, methodologies, and investigations into potential interventions or preventive measures.

The general public benefits from improved healthcare outcomes, as the study contributes to enhancing the overall understanding of neonatal health in specific high risk scenarios. As healthcare practices are refined and policies are adjusted based on the study's findings, there is potential for improved overall neonatal health outcomes. This contributes to the well-being of families and communities.

2. LITERATURE REVIEW

2.1. Survival Status of Neonate from PPROM

A retrospective study conducted in university of Lowa in USA revealed that PPROM at gestational age of less than 24 weeks of neonate survival to discharge was 90% (19). A retrospective study conducted in Brazil revealed that an overall survival rate 45.9% was observed among fetuses born to women with PPROM at a gestational age from 18 to 26 weeks (20). Similarly, according to a Polish study, the rate of survival to discharge of a neonate delivered from mother with preterm premature rupture of membranes was 93.7% (21).

A prospective study conducted in France, 622 newborns with PPROM survived until discharge (weighted percentage 93.5%). Similarly, according to a Japanese study, 66 children were born to mothers who were diagnosed with PPROM between 20 and 23 6/7 weeks of pregnancy, with 54 (81.1%) surviving to the point of discharge (22, 23). According to a Chinese retrospective study, out of the 360 fetuses, two from a single pregnancy died before delivery, and eight died in the NICU; hence, 350 (97.2%) made it out of the hospital after being discharged from PPROM (24).

According to a Nigerian retrospective study, the take-home baby rate and newborn survival rate were 72.31% (25). Similarly, a retrospective study conducted in Ghana revealed that the proportion of preterm babies that survived and were discharged home alive was 67.6% (26).
According to a prospective study conducted in Ethiopia, out of 407 preterm newborns, 74.7% survived to the 28th day, while 25.3% passed away (27).

2.2. Factors Influencing Survival Status of Preterm Neonate

2.2.1. Socio demographic factors

A prospective study analyzing data showed that GA, birth weight, small for gestational age (SGA) and female sex were significant independent factors influencing survival (28).
A retrospective study conducted in Ghana discovered that the survival status of the preterm neonate was unaffected by the baby's gender and the mother's age (26).
According to a hospital-based prospective cohort study conducted in Uganda, male neonates were twice as likely to die as female neonates, extremely preterm neonates were 12 times more

likely to die than late preterm neonates, and preterm neonates whose mothers were 35 years of age or older were 4.5 times more likely to die than those whose mothers were 25–34 years of age (29).

A retrospective study conducted in Shambu Hospital showed that gestational age (GA), neonatal sex and birth weight were significantly related with the survival time of premature neonates (30). Similarly, a retrospective cohort study conducted in northern Ethiopia revealed that, in bivariate analysis, gestational age and birth weight showed significant statistical association with preterm neonatal death (31).

Retrospective study conducted in Gondar specialized hospital revealed that, findings from bivariate analysis showed, newborns birth weight less than 2000 g, gestational age and weight for gestational age were significantly associated with time to death of preterm neonates. However, in the multi-variable analysis, gestational age and weight for gestational age, remained statistically significant predictors of time to death of preterm neonates (32).

2.2.2. Clinical related factors

A retrospective study conducted in Istanbul showed that in multivariate logistic regression analyses, patent ducts arteriosus (PDA), retinopathy of prematurity (ROP), and persistent pulmonary hypertension (PPH) were significantly correlated with neonatal survival (33).

A retrospective study carried out in Ghana found that, according to Chi square analysis, the Apgar score at one minute, the Apgar score at five minutes and the length of stay in the NICU (neonatal intensive care unit), were all substantially correlated with the survival of preterm neonates (26). On the contrary, a hospital-based prospective cohort study in Uganda, preterm neonates diagnosed with RDS, SGA, apnea, or hypothermia at admission were more likely to die (29).

According to a retrospective study conducted in Felege Hiwot Specialized Hospital revealed that the following factors independently predicted premature infant mortality, admission temperature, jaundice, meningitis, sepsis and necrotizing enterocolitis (NEC). Time to death in preterm newborns was substantially correlated with respiratory distress syndrome (RDS), NEC, jaundice, asphyxia and hospital acquired infection (HAI) in the multivariate Cox regression model (34).

A retrospective study conducted in Shambu Hospital showed perinatal asphyxia (PNA) were significantly related with the survival time of premature neonates. However, jaundice, hypothermia, sepsis were not significantly associated with the survival time of premature neonates (30).

A retrospective cohort study conducted in northern Ethiopia revealed that, in bivariate analysis, first- and fifth-minute Apgar score, respiratory distress syndrome and perinatal asphyxia showed significant statistical association with preterm neonatal death. After adjustment for confounding variables, the fifth minute Apgar score was not continued as a predictor variable of death (31).

Retrospective study conducted in Gondar Specialized Hospital revealed that, findings from bivariate analysis showed that, RDS at admission, clinically diagnosed sepsis, PNA, jaundice, hypoglycemia, and hypothermia were significantly associated with time to death of preterm neonates. However, in the multi-variable analysis, PNA, jaundice and hypoglycemia were remained statistically significant predictors of time to death of preterm neonates (32).

2.2.3. Pregnancy and obstetric related factors

According to cross-sectional data from the most recent Demographic and Health Survey of African Great Lakes countries, mothers who had no prenatal care visits during pregnancy were more likely to have neonatal fatalities than moms who had 4 or more antenatal care visits. Women who had a cesarean section were more likely to have a newborn death than women who did not have a caesarean section (35).

According to a hospital-based prospective cohort study conducted in Uganda, preterm newborns with mothers who did not sign up for ANC had a 4.7-fold increased risk of dying, whereas preterm neonates whose mothers attended three or fewer ANC visits had a 5.3-fold increased risk of dying. An out born neonate's chance of dying was 2.3 times higher than that of an inborn preterm infant. Furthermore, compared to many gestations, the odds of mortality were 3.7 times higher for singleton deliveries (29). A retrospective study conducted in Ghana Parity and mode of delivery are significantly associated with survival of neonate (26).

A retrospective study conducted in Shambu Hospital showed that hypertension status of mother, HIV status of mother, antenatal care, mode of delivery, multiple pregnancy and parity (2–4),

were significantly related with the survival time of premature neonates. However, parity > 5 were not significantly associated with the survival time of premature neonates (30).

Retrospective study conducted in Gondar specialized hospital revealed that, the findings from bivariate analysis showed that, place of delivery, type of pregnancy, bad obstetric history, pregnancy complications during index pregnancy, maternal illness were significantly associated with time to death of preterm neonates. However, in the multi-variable analysis place of delivery, type of pregnancy, were remained statistically significant predictors of time to death of preterm neonates (32).

2.2.4. Treatment and Health service- related factors

A prospective, cohort study conducted in three Iranian hospitals explained that receiving corticosteroid can had a positive significant relationship with the survival rate of infants (P<0.05) (36). According to a prospective cohort research conducted in a Ugandan hospital, preterm neonates who received resuscitation at birth had 3.4 times greater mortality odds than those who did not (29).

According to a retrospective study conducted in Jimma and a prospective descriptive survey conducted in Addis Ababa revealed that preterm neonates born from mothers who used antenatal steroids during their current pregnancy and preterm neonates who had got KMC had a higher survival rate than their counterparts (27, 37, 38).

2.3. Conceptual frame work

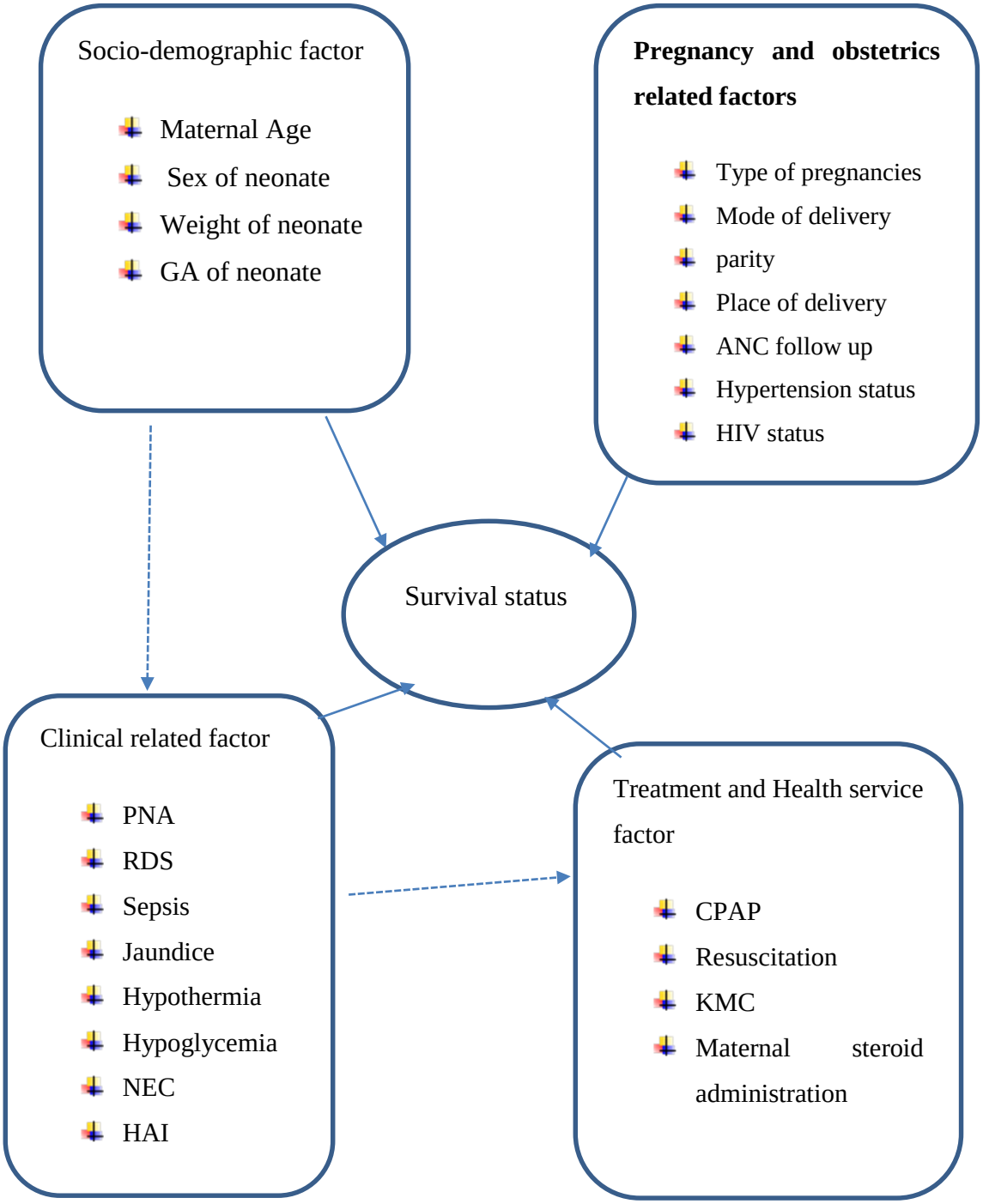

Figure 1: Conceptual framework for survival status and predictors of mortality among neonate born from women with preterm premature rupture of membrane adapted from different literature (18, 27, 29-33, 37,40) Addis Ababa, Ethiopia, 2024

3. OBJECTIVES

3.1. General objective

To assess the survival status and predictors of mortality among neonate born from women with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024

3.2. Specific objectives

1. To determine the incidence rate at 95% CI of neonate born from woman with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024
2. To determine survival status of neonate born from woman with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024
3. To identify predictors of mortality of survival status of neonate born from woman with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024

4. METHODS

4.1. Study Area

The study was conducted in Addis Ababa, the capital and largest city of Ethiopia. It is located on a well-watered plateau surrounded by hills and mountains, in the geographic center of the country with a total population of 4.8 million people. It is the political capital of Africa, where the African Union is headquartered and based. It is also a sit for the United Nations Economic Commission of Africa. There are 11 sub cities and 120 woredas. The city has twelve public Hospitals among these, six hospitals (Gandhi memorial hospital , Yekatit 12 hospital medical college, Zewditu memorial hospital, Ras-Desta Damtew memorial hospital, Menelik II referral hospital, Tirunesh Beijing general hospital) are governed by Addis Ababa health bureau and the rest five (St' peter Specialized hospital, St' Paul's Hospital millennium medical college hospital, Amanuel hospital, Alert hospital and Eka Kotebe hospital are governed by federal ministry of health and one university hospital (Tikur Anbessa Specialized Hospital).

All of these hospitals except Amanuel hospital have their own neonatal intensive care unit. So, the study was conducted in four randomly selected public hospitals of Addis Ababa. These are Black Lion, Gandhi memorial, Saint Paul's millennium medical college and Yekatit 12 hospital medical college (27).

4.2. Study Design and Period

A facility-based retrospective cohort study was conducted from February 19 to March 19, 2024

4.3. Population

4.3.1. Source population

All preterm neonates admitted to NICU at public hospitals of Addis Ababa in the last five years.

4.3.2. Study Population

Medical records of all preterm neonates born from woman with preterm premature rupture of membrane admitted to NICU of selected public hospitals in Addis Ababa.

4.3.3. Study unit

Each systematically selected medical records of preterm neonates born from woman with PPROM who were admitted to the neonatal intensive care unit of selected public hospitals in Addis Ababa.

4.4. Eligibility criteria

4.4.1. Inclusion Criteria

All preterm neonates born to woman with PROM and admitted to NICU was included.

4.4.2. Exclusion Criteria

Preterm neonates whose medical records are incomplete.

4.5. Sample Size Determination and Sampling Procedure

4.5.1. Sample size calculation

Sample size was determined by using Z α/2 as 1.96 at 95% confidence level. Since there was no research on this title in Ethiopia. 0.5 p-value was used. So, for the proportion of preterm survival, the sample size was calculated using the formula;

$$\frac{(\mathrm{Za}/2)2 \text{ x } \mathrm{p}(1-\mathrm{p})}{\mathrm{d}2}$$

$$\frac{(1.96)2 \text{ X } 0.5(1-0.5)}{(0.05)2}$$

= **384**

4.5.2. Sampling procedure

Systematic random sampling technique was used to select cards of preterm neonates delivered from woman with PPROM from each hospital. The total number of preterm neonates delivered from woman with PPROM admitted in NICU during data collection period was estimated from registration book. There are twelve (12) governmental hospitals in Addis Ababa and four hospitals were selected by simple random sampling. The average preterm neonates delivered

from woman with PPROM in TASH, SPMMC, Gandhi memorial hospital and Yekatit 12 were 1120, 1620, 1134 and, 960 respectively with a total of 4834 neonates in 5 years.

The total population is less 10,000. So correction formula was used. $n=\frac{no}{(1+no/N)}$

n_o =sample from an infinite, N= total population and n=sample size from finite population.

n= $\frac{384}{(1+384/4834)}$=355, by adding 5% non-response rate it was 373.

The number of cards to be included in study from each hospital were calculated using the Proportionate to size (PS) allocation technique as follows;

Table 1: Proportional allocation of sample size of study

Hospital allocation		
Hospitals	**Total cases in five year**	**Hospital allocation**
SPHMMC	1620	125
TASH	1120	86
GMH	1134	87
Yekatit 12	960	75
Total	4834	373

Year allocation

	2019		2020		2021		2022		2023	
Hospitals	Total population	Allocation	Total population	Allocation	Total population	Allocation	Total population	Allocation	Total population	Allocation
SPHMMC	332	26	321	24	315	24	325	25	327	26
TASH	204	15	216	17	225	17	249	19	226	18
GMH	187	14	188	14	232	18	261	20	266	21
Yekatit 12	108	8	158	12	199	16	232	18	263	21
Total	831	63	883	67	971	75	1067	82	1082	86

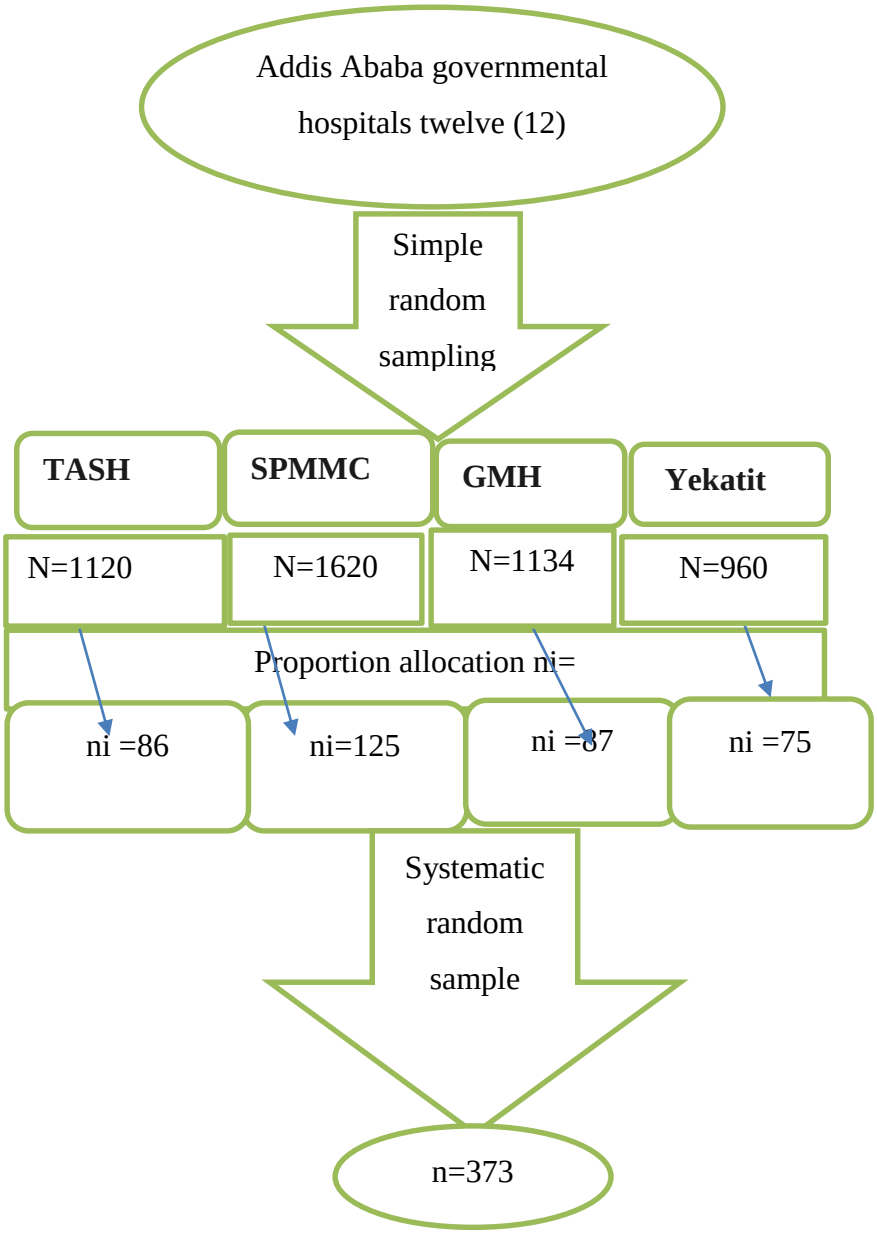

Figure 2: Schematic presentation of the sampling procedure for the study Addis Ababa, Ethiopia, 2024

4.6. Variables of the Study

4.6.1. Dependent Variables

Survival status of neonate

4.6.2. Independent Variables

Socio demographic characteristics: sex of newborn, birth weight of the neonate**,** maternal age**,** Gestational age**,** and Weight for GA

Pregnancy and obstetrics characteristics: Type of pregnancies**,** Place of delivery**,** ANC follow up, Parity, HIV status of mother, Mode of delivery, and Hypertension status of mother.

Clinical related factors: RDS**,** NEC**,** PNA**,** neonatal sepsis, neonatal jaundice, hypoglycemia**,** hypothermia**,** ROP**,** BPD**,** and PPH.

Treatment and Health service predictors: KMC, Maternal steroid administration, CPAP, and Resuscitation at delivery

4.7. Operational Definition

Respiratory distress: Respiratory problem combined with tachypnea, cyanosis chest retraction.

Survival status: the outcome of the neonate, either death or censored.

Censored: preterm neonates those left against medical advice, discharged with improvement and referred to other health institutions were considered as censored.

Death: Neonates cards documented with a death summary claiming that the neonates was dead.

Hypothermia: admission temperature less than 36.5°C

Necrotizing enterocolitis: when the physician diagnosed as suspected NEC or NEC on neonate medical record card.

Hypoglycemia: admission glucose level less than the normal range.

Perinatal asphyxia: is the Apgar score less than 7 at delivery room.

4.8. Data Collection Tool and Procedure

A structured questionnaire adapted from different literatures (27, 30, 31, 39, 41, 42) was used to assess the survival status and its determinants among neonate delivered from women with preterm premature rupture of membrane. The data was extracted from the medical records of

preterm neonates who were admitted to the NICUs. After permission was obtained from both hospitals, the list was prepared by investigator based on the information obtained from the NICU health management system registration book. It consists of Socio demographic characteristics, pregnancy and obstetrics characteristics, clinical related variables and treatment and health service predictors. The data was collected by four nurses who are working out of selected health institutions. The whole data collection process was carefully monitored by the principal investigator and two supervisors (BSc midwives). One day training was given to the data collector and supervisors about the data collection tool and the whole data collection procedure.

4.9. Data Quality Control

Five percent of the questionnaires was pretested for clarity and consistency of the questions in none selected facilities week prior to the actual data collection. Then necessary correction was made based on the feedback obtained from the pretest.

4.10. Data Processing and Analysis

The data was coded and entered by using SPSS and transferred to STATA statistical software version 14 for clearance and analysis. The Cox proportional hazard regression model was used. Cox proportional hazard regression was used for each variable, a variable with a p-value <0.25 was entered for multivariate analysis. Multi collinearity was checked by using the variance inflation factor. The Cox proportional hazard regression assumption was tested by using the Schoenfeld residual test (global test). The overall goodness of model fitness was checked graphically by using the Cox Snell residual graph. Lastly, after multivariate analysis, an association was expressed through the hazard ratio and statistically significant predictors was identified using 95% CI and p-value. The results of this study were presented by way of tables, texts, and graphs.

4.11. Ethical Consideration

Ethical clearance was obtained from the Ethical Review Committee of Addis Ababa University, College of Health Sciences, department of nursing and midwifery and Addis Ababa health bureau. Then, data was collected after getting consent from Addis Ababa health bureau and from selected public hospitals.

5. RESULT

Three hundred seventy three charts of neonates born from woman with preterm premature rupture of membrane were reviewed; 361(96.78%) were eligible for this study; 12 charts were excluded (3 had major congenital malformation and 9 charts were not available during data collection time). Out of 361 neonates born from woman with PPROM 91% was survived while 9% was died. The median length of follow-up was 5 days. The total person-day-observations were 2460 days. The overall incidence of mortality for preterm neonates born from woman with PPROM was 26 (95% CI: 21.7, 30.3) per 1,000 person days.

5.1. Socio-demographic characteristics of the study participant

Around three fourth of the mother were between the age of 20 to 34 years which ranged from 16 to 46 years with the median age being 26 years. A considerable portion of neonate was male 194 (54.6%). A notable portion of neonate was weighted less than 1000gram 17(4.7%) and half of the neonate was weighted1000-2499gram. Most of the neonate 316 (87.5) was appropriate for gestational age **(Table 2).**

Table 2: Socio demographic characteristics of neonate delivered from woman with PPROM at public hospitals of Addis Ababa, Ethiopia, January 1, 2019 to and December 31, 2023 GC (n = 361)

		Survival status		
Variable	Categories	Event (%)	Censored (%)	Total (%)
Maternal age	<20	8(22.9)	27 (77.1)	35 (9.7)
	20-34	14 (5.3)	251 (94.7)	265 (73.4)
	>=35	10 (16.4)	51 (83.6)	61 (16.9)
Sex of neonate	Female	15(9.1)	152 (89.9)	167 (46.3)
	Male	17(8.8)	177 (91.2)	194 (53.7)
Birth weight	<1000	9(52.9)	8 (47.1)	17(4.7)
	1000-1499	6 (40)	9 (60)	15 (4.13)
	1500-2499	12 (6.7)	168 (93.3)	180 (49.9)
	>2500	5 (3.4)	144(96.6)	149 (41.3)
Weight for gestational age	SGA	14 (43.8)	18 (56.3)	32(8.9)
	LGA	6 (46.2)	7 (53.8)	13 (3.6)

	AGA	12(3.8)	304 (96.2)	316 (87.5)
GA t delivery	28-32	17(37.8)	28(62.2)	45(12.5)
	32-34	6(8.7)	63(91.3)	69(19)
	>34	9(3.6)	238(96.4)	247(68.4)

5.2 Pregnancy and obstetric related factors of mother

Health facility deliveries were predominant with three fourth of spontaneous vaginal delivery. Most of 342(94.7%) mother had ANC follow up and Most of 322 (89.2) pregnancy were single. Around one fifth of mother had Chorioaminitis and half of the mother had hypertensive disorder of pregnancy **(Table 3).**

Table 3: Pregnancy and obstetric related factor of woman with PPROM at public hospitals of Addis Ababa, Ethiopia, January 1, 2019 to and December 31, 2023 GC (n = 361)

		Survival status		
Variable	Categories	Event (%)	Censored (%)	Total (%)
Place of delivery	Home	4 (57.1)	3 (42.9)	7 (1.9)
	health facility	28(7.9)	326 (92.1)	354 (98.1)
ANC	Yes	20 (5.8)	322(94.2)	342(94.7)
	No	12(63.2)	7 (36.8)	19(5.3)
Number of parity	0	4 (12.5)	28 (87.5)	32 (8.9)
	1	9 (6.5)	129 (93.5)	138 (38.2)
	2-4	13 (7.7)	156 (92.3)	169 (46.8)
	>=5	6 (28.6)	16 (71.4)	22 (5.8)
Mode of delivery	SVD	18 (7.0)	239 (93.0)	257(71.2)
	C/S	14 (13.5)	90(86.5)	104 (28.8)
Type of pregnancy	Single	20 (6.2)	302(93.8)	322 (89.2)
	Multiple	12 (30.8)	27(69.2)	39 (10.8)
	28-32	19(23.75)	61(76.2)	80(22)

GA at rupture of membrane	32-34	6(6.9)	81(93.1)	87(24)
	>34	7(3.6)	187(96.4)	194(53.7)
Maternal HTN	Yes	5 (11.4)	39 (88.6)	44 (12.2)
	No	27 (8.5)	290(91.5)	317 (87.8)
Maternal Chorioaminitis	Yes	12 (19.4)	50 (80.6)	62(17.2)
	No	20(6.7)	279 (93.3)	299(82.8)
Maternal HIV status	Positive	2(16.7)	10(83.3)	12(3.3)
	Negative	30(8.6)	319(91.4)	349(96.7)

5.3. Clinical related factors of neonate

Around two third 243(67.3) of the neonate had first minute Apgar score >=7 and around 23(6.4%) of the neonate had PNA. Around one fourth of 103(28.5) the neonate had RDS and 212(58.7) had sepsis. Around one third of the neonate were jaundiced and 45.1% were hypothermic during admission. One tenth of the neonate were develop HAI and 6.9% had NEC **(Table 4).**

Table 4: clinical related factors of neonate born from woman with PPROM at public hospitals of Addis Ababa, Ethiopia, from January 1, 2019 to and December 31, 2023 GC (n = 361)

Variable	Categories	Survival status		Total (%)
		Event (%)	Censored (%)	
Latency period	>=72 hrs.	22(9.4)	212(90.6)	234(64.8)
	<72 hrs.	10 (7.9)	117 (92.1)	127(35.2)
1st min Apgar score	>=7	3(1.2)	241 (98.8)	243(67.3)
	<7	29(24.6)	89(75.4)	118(32.7)
5^{th} min Apgar	>=7	19(5.8)	310(94.2)	329(91.1)
	<7	13(40.6)	19(59.4)	32(8.9)
Had the neonate PNA	Yes	11(47.8)	12(52.2)	23(6.4)
	No	21(6.2)	317(93.8)	338(93.6)
Had the neonate RDS	Yes	23(22.3)	80(77.7)	103(28.5)
	No	9(3.5)	249(96.5)	258(71.5)

Had the neonate Sepsis	Yes	21(9.9)	191(90.1)	212(58.7)
	No	11(7.4)	138(92.6)	149(41.3)
Had the neonate jaundice	Yes	15(12.7)	103(87.3)	118(32.7)
	No	17(7)	226(93)	243(67.3)
Had the neonate hypothermia at admission	Yes	18(11)	145(89)	163(45.1)
	No	14(7)	184(93)	198(54.9)
Had the neonate hypoglycemia	Yes	4(12)	29(88)	33(9)
	No	28(8.5)	300(91.5)	328(91)
Had the neonate Hospital acquired infection?	Yes	7(17.5)	33(82.5)	40(11.1)
	No	25(7.8)	296(92.2)	321(88.9)
Had the neonate Patent ducts arteriosus?	Yes	8(40.0)	12(60.0)	20(5.5)
	No	24(7)	317(93)	341(94.5)
Had the neonate necrotizing enter colitis?	Yes	9(36)	16(64)	25(6.9)
	No	23(6.8)	313(93.2)	336(93.1)
Had the neonate Intra ventricular hemorrhage?	Yes	4(66.7)	2(33.3)	6(1.7)
	No	28(7.9)	327(92.1)	355(98.3)

5.4. Treatment and health service -related factors

Around 152(42.1%) mother did not take steroids during their entire pregnancy. Around 31% of the neonate were on CPAP. One tenth of the neonate were resuscitated during delivery. 51(14%) neonate receive KMC during their hospital stay.

Table 5: Treatment and health service -related factors of neonate born from woman with PPROM at public hospitals of Addis Ababa, Ethiopia, from January 1, 2019 to and December 31, 2023 GC (n = 361)

		Survival status		
Variable	Categories	Event (%)	Censored (%)	Total (%)
Maternal steroid administration	Yes	12(5.7)	197(94.3)	209(57.9)
	No	20(13)	132(87)	152(42.1)
Were the neonate on CPAP	Yes	23(20.5)	89(79.5)	112(31)
	No	9(3.6)	240(96.4)	249(69)

Were the neonate on KMC	Yes	5(9.8)	46(90.2)	51(14.1)
	No	27(8.7)	283(91.3)	310(85.9)
Was the neonate resuscitated during delivery	Yes	17(45.9)	20(54.1)	37(10.2)
	No	15(4.6)	309(95.4)	324(89.8)

5.5. Comparison of survival time for different groups of variables

Separate graphs Kaplan-Meier survivor functions are used to compare the probability of survival among different categories of variables, and it was constructed as described below. Time to death was stated as the time from date of birth to the occurrence of death during their period of hospitalization. The survival time was measured in days.

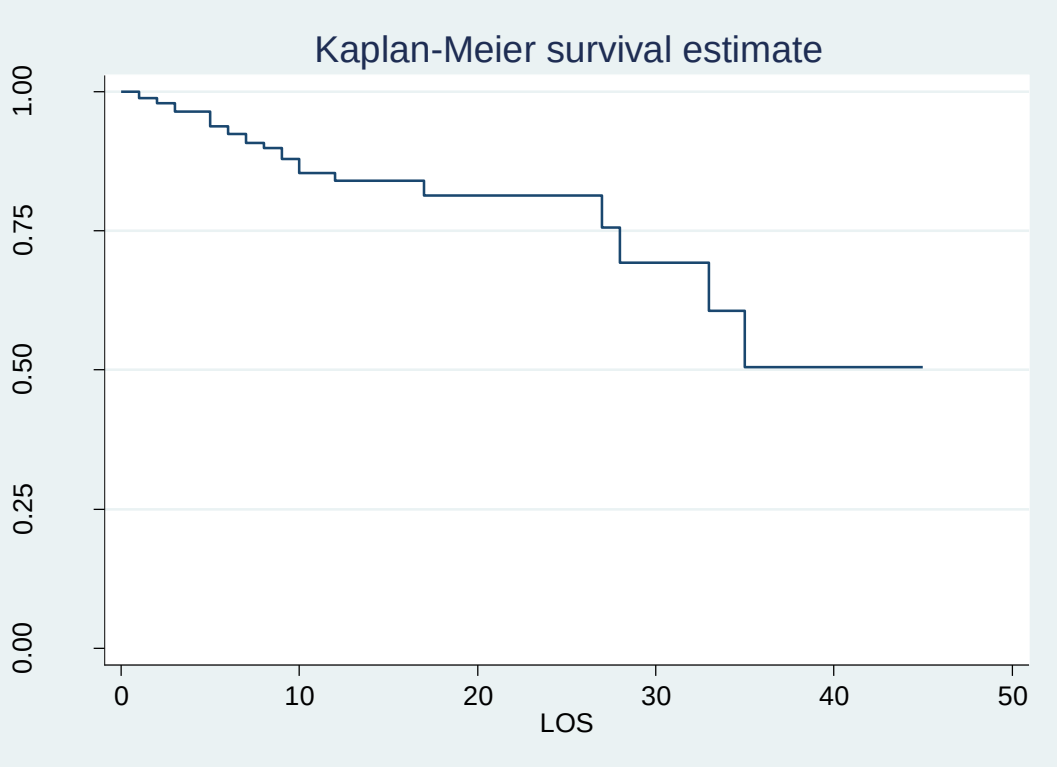

Figure 3: Cumulative survival of neonates born from woman with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia from January 1, 2019 to and December 31, 2023 GC (n = 361)

In this cohort study preterm neonates whose mother receive antenatal steroid during pregnancy had better survival probability than those who did not receive **(figure 4).**

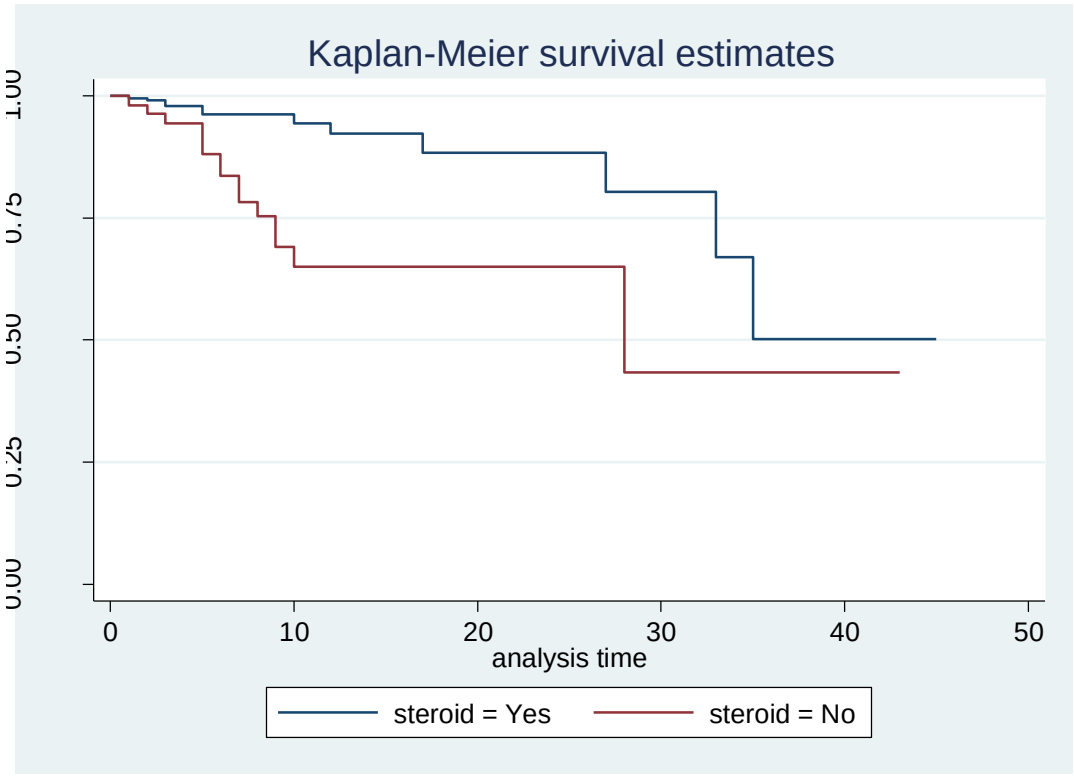

Figure 4: The Kaplan-Meier failure estimates compare survival status of neonates born from woman with PPROM with categories of antenatal steroid administration at public hospitals of Addis Ababa, Ethiopia from January 1, 2019 to and December 31, 2023 GC (n = 361)

Table 6: Median survival time and log-rank test survivors of neonate born from woman with PPROM at public hospitals of Addis Ababa, Ethiopia from January 1, 2019 to and December 31, 2023 GC (n = 361)

Variable	Category	Median survival time in days	Log rank test	P- value
Maternal age	<20	5(3,14)	16.92	0.0002
	20-34	5(2,9)		
	<35	5(3,10)		
Birth weight	<1000	21(6,45)	19.74	0.0002
	1000-1499	27(19,30)		
	1500-2499	6(3,10)		

	<2500	3(2.5)		
Gestational age	28-32	21(11,34)	13.10	0.0014
	32-34	9(6,15)		
	<34	3(2,5)		
Weight for gestational	SGA	10(3,45)	52.95	0.0000
age	LGA	7 (5,17)		
	AGA	5(2,9)		
Place of delivery	Home	21(12,22)	5.76	0.0164
	health	593,9)		
	facility			
ANC	Yes	5(2,9)	50.73	0.0000
	No	21(6,22)		
Type of pregnancy	Single	4(2,9)	11.12	0.0009
	Multiple	9(4,18)		
Maternal Chorioaminitis	Yes	8(4,12)	3.82	0.0506
	No	492,8)		
Maternal HIV status	Positive	6(2,15)	13.06	0.0003
	Negative	5(3.9)		
1st min Apgar score	>=7	3(2,6)	22.32	0.0000
	<7	10(5,18)		
5^{th} min Apgar	>=7	4(2,9)	9.95	0.0016
	<7	20(12,30)		
Had the neonate PNA?	Yes	14(12,30)	19.86	0.0000
	No	5(2,9)		
Had the neonate RDS?	Yes	12(7,19)	6.14	0.0132
	No	3(2,6)		
Had the neonate PDA?	Yes	15(7.20)	8.44	0.0037
	No	5(2,9		
Had the neonate NEC?	Yes	14(4,30)	6.23	0.0126
	No	5(2,9)		

Had the neonate IVH?	Yes	12(12,12)	25.86	0.0000
	No	5(3,9)		
Maternal steroid	Yes	5(3,11)	14.13	0.0002
administration	No	3(2,7)		
Continuous positive	Yes	10(6,18)	5.74	0.0165
airway pressure	No	3(2,6)		
Were the neonate on	Yes	11(6,19)	3.29	0.0699
KMC	No	4(2,7)		
Was the neonate	Yes	18(12,37)	24.84	0.0000
resuscitated during	No	4(2,8)		
delivery				

5.6. Factors associated to survival status of neonate born from woman with preterm premature rupture of membrane

To study the relationship between survival probability and covariates, the Cox proportional hazard regression model was utilized. The independent variables were examined separately with the outcome variable, and those with a P-value less than 0.25 were included in the multivariate Cox regression model, as were non-collinear independent variables. Covariates fit multicollinearity check and doesn't varies with time interval (fit proportionality assumption) were included to bivariate and multivariate cox regression and their hazard ratio was analyzed to determine their effect on survival status.

Birth weight, maternal age, place of delivery, antenatal care ,type of pregnancy ,weight for gestational age, gestational age at rupture of membrane, maternal HIV status, 1st minute Apgar score, 5th minute Apgar score, perinatal asphyxia, respiratory distress syndrome, necrotizing enterocolitis, maternal Chorioaminitis, patent ducts arteriosus, intra ventricular hemorrhage , maternal steroid administration, continues positive airway pressure, kangaroo mother care and neonatal resuscitation at delivery were variables associated in bivariate regression (P< 0.25). Multivariate cox regression identified that six covariates; maternal age <20years,weight of neonate, antenatal care, maternal steroid administration, type of pregnancy, and intra ventricular hemorrhage were significantly associated with survival status of neonate born from

woman with preterm premature rupture of membrane significantly increased proportional hazards of mortality ($P < 0.05$).

Table 7: Bivariable and Multivariable Cox regression analysis to identify factors associated to survival status of neonate born from woman with PPROM at public hospitals of Addis Ababa, Ethiopia from January 1, 2019 to and December 31, 2023 GC (n = 361)

Covariates	Category	Event (%)	Censored (%)	CHR (95% CI)	P value	AHR (95% CI)	P-value
Maternal age	<20	8(22.9)	27(77.1)	4.94(2.04, 11.94)	0.000	7.4(1.86 ,29.31)	0.004
	20-34	14(5.3)	251(94.7)	1		1	
	>35	10(16.4)	51(83.6)	2.9(1.29,6.54)	0.010	1.41(0.35 ,5.57)	0.627
Weight of neonate	<1000	9(52.9)	8(47.1)	6(1.89, 9.62)	0.002	8(9.8 ,66.9)	0.05
	1000-1499	6(40)	9(60)	4.3(1.287, 14.22)	0.018	11(1.52,9.57)	0.018
	1500-2499	12(6.7)	168(93.3)	1.13(.39,3.25)	0.818	1.4(0.28 ,6.98)	0.670
	>2500	5(3.4)	144(96.6)	1		1	
Weight for gestational age	SGA	14(43.8)	18(56.3)	8.6(3.92, 19.)	0.000	1.4(0.32,5.92)	0.677
	LGA	6(46.2)	7(53.8)	10.7(4, 28.71)	0.000	3(.73,12.78)	0.127
	AGA	12(3.8)	304(96.2)	1		1	
Place of delivery	health facility	28(7.9)	326(92.1)	1		1	
	Home	4(57.1)	3(42.9)	3.5(1.17,10.27)	0.024	1.2(.18,7.87)	0.863
ANC	Yes	20(5.8)	322(94.2)	1		1	
	No	12(63.2)	7(36.8)	9(4, 20)	0.000	3.8(1.16,12.52)	0.027
Type of pregnancy	Single	20(6.2)	302(93.8)	1		1	
	Multiple	12(30.8)	27(69.2)	3.3(1.6,7)	0.002	3.6(1.09,12)	0.036
Maternal Chorioamnitis	Yes	12(19.4)	50(80.6)	2(0.9, 4.144.)	0.057	.65(.18,2.25)	0.496
	No	20(6.7)	279(93.3)	1		1	
Maternal HIV status	Positive	2(16.7)	10(83.3)	5.7(1,94, 16)	0.001	3.6(.28,43.66)	0.321
	Negative	30(8.6)	319(91.4)	1		1	
1st min Apgar score	>=7	3(1.2)	241(98.8)	1		1	
	<7	29(24.6)	89(75.4)	10.7(3.12 ,35.52)	0.000	3.6(.57,22.6)	0.171
Had the neonate PNA	Yes	11(47.8)	12(52.2)	4.7(2.2, 9.8)	0.000	3(.89, 9.96)	0.075
	No	21(6.2)	317(93.8)	1		1	

Had the neonate RDS	Yes	23(22.3)	80(77.7)	2.58(1.25,5.9)	0.017	1.15(.28,4.78)	0.844
	No	9(3.5)	249(96.5)	1		1	
Had the neonate PDA	Yes	8(40)	12(60)	3.2(1.4 ,7.3)	0.006	1.38(.41,4.62)	0.599
	No	24(7)	317(93)	1		1	
Had the neonate NEC	Yes	9(36)	16(64)	2.712(1.20,6.1)	0.016	2.8(.787,9.95)	0.112
	No	23(6.8)	313(93.2)	1		1	
Had the neonate IVH	Yes	4(66.7)	3(33.3)	9.87(3.3,28.57)		22(3.57,36.95)	0.01
	No	28(7.9)	327(92.1)	1		1	
Maternal steroid administration	Yes	12(5.7)	197(94.3)	1		1	
	No	20(13)	132(87)	3.5(1.7,7.161)	0.000	3.8(1.2,12.7)	0.028
Were the neonate on CPAP	Yes	23(20.5)	89(79.5)	2.58(1.46,8.38)	0.021	0.54(.145, 2.)	0.360
	No	9(3.6)	240(96.4)	1		1	
Were the neonate on KMC	Yes	5(9.8)	46(90.2)	1		1	
	No	27(8.7)	283(91.3)	2.35(.87 ,6.3)	0.079	6.17(.75, 51)	0.091
Was the neonate resuscitated during delivery	Yes	17(45.9)	20(54.1)	5.57(2.6, 11.68)	0.000	5.2(.74, 36.37)	0.096
	No	15(4.6)	309(95.4)	1		1	

NB: 1=reference, CHR=crude hazard ratio, AHR=adjusted hazard ratio

5.6.1. Multicollinearity Test

The maximum variance inflation factor (VIF) value in this study was 4.20 with a mean VIF of 1.77. The minimal Tolerance value in these study variables was 1.05 (Table 8).

Table 8: Multicollinearity test for variables in study of survival status and associated factor among neonate born from woman with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia from January 1, 2019 to and December 31, 2023 GC (n = 361)

Variable	VIF	1/VIF

Maternal age	1.05	0.953147
Gestational age	4.20	0.238058
Weight of neonate	1.72	0.583039
Gestational age at rupture of membrane	3.39	0.294900
weight for gestational age	1.29	0.778181
Neonatal respiratory distress	2.11	0.474989
Neonatal Perinatal asphyxia	1.75	0.570511
Patent ducts arteriosus	1.29	0.775443
necrotizing enterocolitis	1.17	0.855781
Intra ventricular hemorrhage	1.15	0.866670
Maternal Chorioaminitis	1. 09	0.919293|
1st minute Apgar score	1.58	0.632831
5th minute Apgar score	1.95	0.512408
ANC follow up	1.39	0.718227
Type of pregnancy	1.19	0.840551
Mode of delivery	1.32	0.759402
Maternal steroid administration	1.24	0.808123
Kangaroo mother care	1.51	0.661253
Continuous positive air way pressure	1.92	0.520127
Neonatal resuscitation	1.80	0.555481
Mean VIF	**1.77**	

The overall model fitness by global test was 0.3364.

6. DISCUSSION

According to this study out of 361, 91% of neonates born from women with PPROM survived, while in France, a slightly higher survival rate of 93.5% was reported among 622 newborns with PPROM (22), according to a Chinese retrospective study 350 (97.2%) made it out of the

hospital after being discharged from PPROM (24). These differences likely stem from variations between developing and developed countries in healthcare infrastructure, resources, access to prenatal care, and neonatal management practices. Socioeconomic inequalities, the presence of specialized neonatal care units, and the availability of maternal health services may also play significant roles in shaping these outcomes.

Neonatal survival significantly increase when GA increases three neonates died out of three preterm neonates delivered at GA of 28 (0% survival) weeks while only six neonate died at GA of 35 and 36 weeks from 155 preterm neonates (96.3% survived). The gap in survival of preterm neonates born from woman with PPROM between developed and developing countries were clearly seen in this study. In this study the survival of neonate born at gestational age of 28 weeks is 0%. In contrary retrospective study conducted in university of Lowa in USA revealed that PPROM at gestational age of less than 24 weeks of neonate survival to discharge was 90% (19). Similarly Study conducted in Brazil revealed that an overall survival rate 45.9% was observed among fetuses born to women with PPROM at a gestational age from 18 to 26 weeks (20). This wide gap of survival rate of preterm neonates from developed countries is partly due to availability of mechanical ventilator and surfactant.

According to this study the hazard of death among preterm neonates who had birth weight less than 1000gram was 8 times higher as compared to their counter parts (AHR: 8.12 95%CI: 9.8). Similarly According to a hospital-based prospective cohort study conducted in Uganda extremely preterm neonates were 12 times more likely to die than late preterm neonates (29). The hazard of mortality was 11 times higher for preterm neonates born with VLBW (1000–1499 g) as compared to those neonates with birth weight ≥2500gm (AHR: 10.99, 95%CI: 1.519, 9.57). This result was supported by the study done in Shambu Hospital(31), Gondar specialized hospital(32), and Cape Coast Teaching Hospital (CCTH) (26). This might be due to the fact that VLBW and LBW neonates have high body surface area to body weight ratio and less body brown fat that predispose to hypothermia and hypoglycemia which will further leads to death. These findings underscore the vulnerability of extremely preterm infants and emphasize the importance of tailored medical interventions and specialized care to improve survival outcomes, particularly for the most fragile neonates.

Based on this study preterm neonates who were born from mother who did not have ANC follow-up had 3.8 times higher hazard of death compared to their counterparts (AHR: 3.812, 95% CI: 1.160, 12.52). This study finding was supported by the study done at the University of Gondar Hospital (32), a hospital-based prospective cohort study conducted in Uganda(29), a cross-sectional data from the most recent Demographic and Health Survey of African Great Lakes countries(35). The possible reason might be lack of ANC visits which may result in inadequate monitoring of pregnancy and might lead to neonatal complications during and after delivery which may be associated with increased risk of neonatal death. These findings collectively underscore the critical role of ANC in mitigating neonatal mortality, emphasizing the necessity for comprehensive ANC programs to ensure both initiation and consistent attendance, particularly in resource-constrained settings where access to healthcare services may be limited, thus offering valuable insights for healthcare policymakers and practitioners aiming to improve maternal and neonatal health outcomes.

Mothers who were not given steroids during pregnancy have a hazard 3.83 times neonatal death than those who did receive steroids aligns with the findings of the Iranian study conducted across three hospitals, which demonstrated a significant positive relationship between corticosteroid administration and infant survival rates(36), Nigerian study revealed that taking antenatal dexamethasone increase the survival of neonate (AOR = 10.82, CI: 2.38–48.22) (25). This coherence suggests a potential protective effect of corticosteroids in reducing the risk of neonatal mortality.

Preterm neonates born to mothers under 20 face a 7.4 times higher risk of death compared to those born to their counter parts. This result disagreed with the result found in Uganda cohort study infants born to mothers aged 35 or older have a 4.5 times higher risk of death compared to those born to mothers aged 25-34 (29). These findings underscore the critical influence of maternal age on neonatal outcomes, emphasizing the need for targeted interventions to improve survival rates among both adolescent and older mothers' infants.

This study highlights a significant hazard of death among multiple births compared to single births, with the risk being 3.6 times higher according to the findings (AHR: 3.63, 95%CI: 1.09, 12.04). Similarly, a study conducted at the University of Gondar Comprehensive Specialized

Hospital Neonatal Intensive Care Unit in North West Ethiopia also revealed an increased risk of mortality among infants born from multiple pregnancies, with an adjusted hazard ratio (AHR: 1.67 and a 95% CI: 1.25, 2.23) (32). These findings emphasize that the vulnerability of multiple birth infants stems from various factors, including challenges in multiple gestation pregnancies, a higher likelihood of cesarean delivery, and postnatal care difficulties. Multiples often have lower birth weights and experience intrauterine crowding due to limited space in the womb, heightening their susceptibility to health complications. Simultaneously caring for multiple newborns presents challenges in providing sufficient attention and care, further contributing to their vulnerability to adverse outcomes.

A newborn with intra ventricular hemorrhage had 9.82 times increased risk of dying compared to a newborn without one (AHR: 9.82, 95%CI: 3.57, 36.95). This statistic underscores the severity of IVH as a potentially life-threatening condition in newborns, emphasizing the critical need for prompt detection and effective management strategies to mitigate adverse outcomes.

7. STRENGTH AND LIMITATIONS OF THE STUDY

7.1. Strength

The data was collected using digital data collection platform (kobo toolbox) and the data itself was digitally recorded. The study also included data from 30% of Addis Ababa public hospital, which is scientifically representative of the study area. Furthermore, the study utilized readily available data from records, which can make the study easier and less expensive to conduct than prospective studies. Data were collected over the period of five years (from 2019 – 2023) by well-trained data collectors. This can give a chance to see current situation and give the opportunity to take any corrective measures to enhance the survival of newborns. In addition, it incorporates more than thirty five independent covariant which may have influence on survival of neonate born from woman with PPROM. This gives an intuition for the researchers especially those who need go through prospective cohort. This study represents the pioneering research conducted in both the study area and Ethiopia, as there is no prior study of its kind.

7.2. Limitation

Since the study was conducted using secondary sources, some critical covariates obtain from the mother were missing. These might be significant predictors of neonatal mortality such educational status, occupational status, nutritional status, marital status, economic status, birth interval, history of abortion, and history of stillbirth. Medical records that were incomplete or lost at the time of data collection were excluded. These possibly introduce selection bias that results under or overestimation of the findings of the study. Absence of reference studies.

8. CONCULSION AND RECOMMENDATION

8.1. Conclusion

Out of 361 neonates born from woman with PPROM 91.14% was survived while 8.86% was died. The median length of stay is 5 days and the average (mean) length of stay is 7days. Preterm neonatal death is still a major public health concern. Birth weight, maternal age antenatal care, pregnancy type, maternal steroid administration and intra ventricular hemorrhage, and gestational age were independent significant predictors for time to death, as found in this study.

8.2. Recommendation

Future researchers would be recommended to conduct a prospective study to gather more data and identify additional mortality predictors, particularly those connected to socio demographic characteristics, the family's socioeconomic condition, as well as the educational status of the family.

Healthcare professionals should focus on promoting regular antenatal check-ups for mothers and enhancing their proper administration of steroids. Health education have to be given for the mother that leakage of liquor before onset of labor is danger sign.

REFERENCES

1. Matasariu DR, Dumitrascu I, Bujor IE, Cristofor AE, Boiculese LV, Mandici CE, et al. Mirroring Perinatal Outcomes in a Romanian Adolescent Cohort of Pregnant Women from 2015 to 2021. Diagnostics. 2023;13(13):2186.
2. Mendez-Figueroa H, Chauhan SP. Tocolytic therapy in preterm premature rupture of membranes. Obstetrics and Gynecology Clinics. 2020;47(4):569-86.
3. Diriba TA, Geda B, Wayessa ZJ. Premature rupture of membrane and associated factors among pregnant women admitted to maternity wards of public hospitals in West Guji Zone, Ethiopia, 2021. International Journal of Africa Nursing Sciences. 2022;17:100440.
4. Sharp GC, Stock SJ, Norman JE. Fetal assessment methods for improving neonatal and maternal outcomes in preterm prelabour rupture of membranes. Cochrane Database of Systematic Reviews. 2014(10).
5. Quinn JA, Munoz FM, Gonik B, Frau L, Cutland C, Mallett-Moore T, et al. Preterm birth: Case definition & guidelines for data collection, analysis, and presentation of immunisation safety data. Vaccine. 2016;34(49):6047-56.
6. 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.
7. Dars S, Malik S, Samreen I, Kazi RA. Maternal morbidity and perinatal outcome in preterm premature rupture of membranes before 37 weeks gestation. Pakistan journal of medical sciences. 2014;30(3):626.
8. 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.
9. Matasariu D, Dumitrascu I, Bujor I, Cristofor A, Boiculese L, Mandici C, et al. Mirroring Perinatal Outcomes in a Romanian Adolescent Cohort of Pregnant Women from 2015 to 2021. Diagnostics 2023, 13, 2186. 2023.

10. Shaddeau AK, Burd I. Antenatal monitoring after preterm prelabor rupture of membranes. Obstetrics and Gynecology Clinics. 2020;47(4):625-32.
11. Mohan SS, Thippeveeranna C, Singh NN, Singh LR. Analysis of risk factors, maternal and fetal outcome of spontaneous preterm premature rupture of membranes: a cross sectional study. Int J Reprod Contracept Obstet Gynecol. 2017;6(9):3781-7.
12. Ronzoni S, Boucoiran I, Yudin MH, Coolen J, Pylypjuk C, Melamed N, et al. Guideline No. 430: diagnosis and management of preterm prelabour rupture of membranes. Journal of Obstetrics and Gynaecology Canada. 2022;44(11):1193-208. e1.
13. 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.
14. Boettcher LB, Clark EA. Neonatal and childhood outcomes following preterm premature rupture of membranes. Obstetrics and Gynecology Clinics. 2020;47(4):671-80.
15. Mabrouk A, Abubakar A, Too EK, Chongwo E, Adetifa IM. A Scoping Review of Preterm Births in Sub-Saharan Africa: Burden, Risk Factors and Outcomes. International journal of environmental research and public health. 2022;19(17):10537.
16. Menalu MM, Gebremichael B, Desta KW, Kebede WM, Tarekegn FN, Mulu GB, et al. Time to death and its predictors among neonates who were admitted to the neonatal intensive care unit at tertiary hospital, Addis Ababa, Ethiopia: Retrospective follow up study. Frontiers in Pediatrics. 2022;10:913583.
17. Ohuma EO, Moller A-B, Bradley E, Chakwera S, Hussain-Alkhateeb L, Lewin A, et al. National, regional, and global estimates of preterm birth in 2020, with trends from 2010: a systematic analysis. The Lancet. 2023;402(10409):1261-71.
18. 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.
19. Brumbaugh JE, Colaizy TT, Nuangchamnong N, O'Brien EA, Fleener DK, Rijhsinghani A, et al. Neonatal Survival After Prolonged Preterm Premature Rupture of Membranes Before 24 Weeks of Gestation. Obstetrics & Gynecology. 2014;124(5):992-8.

20. Esteves JS, de Sá RAM, de Carvalho PRN, Coca Velarde LG. Neonatal outcome in women with preterm premature rupture of membranes (PPROM) between 18 and 26 weeks. The Journal of Maternal-Fetal & Neonatal Medicine. 2016;29(7):1108-12.
21. Swiatkowska-Freund M, Traczyk-Łos A, Partyka A, Obara K, Damdinsuren A, Preis K. Perinatal outcome in preterm premature rupture of membranes before 37 weeks of gestation. Ginekologia polska. 2019;90(11):645-50.
22. Sorano S, Fukuoka M, Kawakami K, Momohara Y. Prognosis of preterm premature rupture of membranes between 20 and 24 weeks of gestation: a retrospective cohort study. European journal of obstetrics & gynecology and reproductive biology: X. 2020;5:100102.
23. Lorthe E, Ancel P-Y, Torchin H, Kaminski M, Langer B, Subtil D, et al. Impact of latency duration on the prognosis of preterm infants after preterm premature rupture of membranes at 24 to 32 weeks' gestation: a national population-based cohort study. The journal of pediatrics. 2017;182:47-52. e2.
24. Zhou S, Yang Y, Zhang X, Mu X, Quan Q, Zhong Q, et al. Perinatal outcomes of twin pregnancies with preterm premature rupture of the membranes at 24–34 weeks' gestation. Scientific reports. 2021;11(1):23419.
25. Bako B, Idrisa A, Garba M, Pius S, Obetta H. Determinants of neonatal survival following preterm delivery at the University of Maiduguri Teaching Hospital, Maiduguri, Nigeria. Tropical Journal of Obstetrics and Gynaecology. 2017;34(1):38-44.
26. Agbeno EK, Osarfo J, Ashong J, Anane-Fenin B, Okai E, Ofori AA, et al. Determinants of preterm survival in a tertiary hospital in Ghana: A ten-year review. PloS one. 2021;16(1):e0246005.
27. Dagnachew T, Yigeremu M. Survival of preterm neonates and its determinants in teaching hospitals of Addis Ababa University. J Women's Health Care. 2019;8(2).
28. García-Muñoz Rodrigo F, Fabres J, Tapia JL, D'Apremont I, San Feliciano L, Zozaya Nieto C, et al. Factors associated with survival and survival without major morbidity in very preterm infants in two neonatal networks: SEN1500 and NEOCOSUR. Neonatology. 2021;118(3):289-96.

29. Egesa WI, Odong RJ, Kalubi P, Ortiz Yamile EA, Atwine D, Turyasiima M, et al. Preterm neonatal mortality and its determinants at a tertiary hospital in Western Uganda: a prospective cohort study. Pediatric health, medicine and therapeutics. 2020:409-20.
30. Debelo O. The Determinants of Survival Time of Premature Neonates at Shambu General Hospital. Advances in Public Health. 2023;2023:7257849.
31. Gebreheat G, Teame H. Survival and mortality of preterm neonates in a neonatal intensive care unit in Northern Ethiopia: a retrospective cohort study. Scientific Reports. 2022;12(1):600.
32. Yismaw AE, Gelagay AA, Sisay MM. Survival and predictors among preterm neonates admitted at University of Gondar comprehensive specialized hospital neonatal intensive care unit, Northwest Ethiopia. Italian Journal of Pediatrics. 2019;45(1):4.
33. Kurek Eken M, Tüten A, Özkaya E, Karatekin G, Karateke A. Major determinants of survival and length of stay in the neonatal intensive care unit of newborns from women with premature preterm rupture of membranes. The Journal of Maternal-Fetal & Neonatal Medicine. 2017;30(16):1972-5.
34. Tamene A AG, Addis Z. . Survival and associated factors of mortality of preterm neonates admitted to Felege Hiwot specialized hospital, Bahir Dar, Ethiopia. SAGE Open Med 2020 Aug 29;8:2050312120953646. 2020; doi: 10.1177/2050312120953646. PMID: 32922788; PMCID: PMC7457651.
35. Akombi BJ, Ghimire PR, Renzaho AM. Factors associated with neonatal mortality in the African Great Lakes region: A pooled analysis of national surveys. Journal of Global Health Reports. 2019;3:e2019043.
36. Gargari SS, Kashanian M, Zendedel H, Nayeri F, Shariat M, Haghollahi F. Survival and risk factors of extremely preterm babies (< 28 weeks) in the three Iranian hospitals. Acta Medica Iranica. 2018:181-8.
37. Toma TM, Merga H, Dube L. Survival Status and Predictors of Mortality Among Preterm Neonates in Southwest Ethiopia: A Retrospective Cohort Study. 2021.
38. Birhanu D, Gebremichael B, Tesfaye T, Tadesse M, Belege F, Godie Y, et al. Survival status and predictors of mortality among preterm neonates admitted to neonatal intensive care unit of Addis Ababa public hospitals, Ethiopia, 2021. A prospective cohort study. BMC Pediatrics. 2022;22(1):153.

39. Yismaw AE, Gelagay AA, Sisay MM. Survival and predictors among preterm neonates admitted at University of Gondar comprehensive specialized hospital neonatal intensive care unit, Northwest Ethiopia. Italian journal of pediatrics. 2019;45:1-11.
40. Günes A, Kiyak H, Yüksel S, Bolluk G, Erbiyik RM, Gedikbasi A. Predicting previable preterm premature rupture of membranes (pPPROM) before 24 weeks: maternal and fetal/neonatal risk factors for survival. Journal of Obstetrics and Gynaecology. 2022;42(4):597-606.
41. Herzlich J, Mangel L, Halperin A, Lubin D, Marom R. Neonatal outcomes in women with preterm premature rupture of membranes at periviable gestational age. Scientific Reports. 2022;12(1):11999.
42. Aynalem YA, Mekonen H, Akalu TY, Gebremichael B, Shiferaw WS. Preterm neonatal mortality and its predictors in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: a retrospective cohort study. Ethiopian Journal of Health Sciences. 2021;31(1).

ANNEXES

Annex 1: Information sheet

Good morning/ afternoon. My name is _____ Currently I am a graduate student at Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery. Now I am conducting a study to identify the survival status and its determinant factor among neonate delivered from women with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024.

Title of the research: Survival and its determinant among neonate delivered from women with preterm premature rupture of membrane at public hospitals of Addis Ababa, Ethiopia, 2024.

Name of the organization: Addis Ababa University, College of health science, school of nursing and midwifery department of nursing

Introduction: This information sheet will be used for administrators and NICU coordinators of selected governmental hospital in Addis Ababa. The aim of the form is to make the above concerned offices clear about the purpose of research, data collection procedures and to get permission to conduct the research.

Objective: This study will be aimed at identifying survival and its determinant factor among neonates delivered from women with preterm premature rupture of membrane.

Procedure: In order to achieve the objective, information which is necessary for the study will be taken form neonatal medical records of patients admitted to NICU from 2019-2023G.C.

Risks: Since the study will be conducted by taking information from medical chart, it does not inflect any harm on the patient.

Benefits: The research have no direct benefit for the one whose document is recorded in this research. But it will have indirect benefit for others in the program. Most importantly, the result of the study will be beneficial to design effective preventive and control measures for survival and its determinant factor among neonates delivered from women with preterm premature rupture of membrane. All the information that I will extract from the chart will be kept confidential and private. Only the principal investigator and data collector will have access to the information.

Lastly, for further information and concern contact this address.

Principal investigator: Fentanesh Alemu, Cell phone: +251936313621

ANNEX 2: Data extraction tool

This tool is prepared for the collection of socio-demographic factor, clinical related factor, pregnancy and obstetric factor, treatment and health service-related factor that is important for the assessment of survival status and predictors of preterm neonate delivered from woman with PPROM admitted in neonatal intensive care units of TASH, SPHMMC, GMH and Yekatit 12 hospitals Addis Ababa, Ethiopia, 2024. All the information will be retrieved from the individual patient card without mentioning the name of the neonates. The information will be collected by health care providers (BSc Nurses) possibly working in the NICU of none selected hospitals.

Data collection date ----------

Name of the Hospital ----------

Name of data collector ---------- signature----------

Name of supervisor ----------signature---------- Code no ----------

Part 1. Socio demographic factor		
S. no	Question	Response
101	Maternal age	……..year
102	Sex of neonate	1. male 2.female
103	GA at delivery	1. <32wk 2. 32-35wk 3. 35wk-37wk
104	Birth weight	
105	Weight for gestational age	1. appropriate for GA 2. Large for GA 3. small for GA
Part 2; clinical related factors		
201	latency period	1. <72 hrs. 2. >72 hrs.
202	1st min Apgar score	1. >7 2. <7
203	5th min Apgar score	1. >7 2. <7
204	Neonate who had Perinatal asphyxia	1. Yes 2. No

205	Neonate who had Respiratory distress syndrome	1. Yes 2. No
206	Neonate who had Jaundice	1. Yes 2. No
207	Neonate who had Hypothermia diagnosed at admission	1. Yes 2. No
208	Neonate who had Hypoglycemia diagnosed at admission	1. Yes 2. No
209	Neonate who had Sepsis	1. yes 2. no
210	Neonate who had Hospital acquired infection	1. yes 2. no
211	Neonate who had Retinopathy of prematurity	1. yes 2. no
212	Neonate who had Broncho pulmonary dysplasia	1. yes 2. no
213	Neonate who had Patent ducts arteriosus	1. yes 2. no
214	Neonate who had Necrotizing enter colitis	1. yes 2. no
215	Neonate who had Persistent pulmonary hypertension	1. yes 2. no
216	Neonate who had Intra ventricular hemorrhage	1. yes 2. no
	Part three; pregnancy and obstetric related factor	
301	Place of delivery	1. home 2. health facility
302	ANC follow up	1. yes 2. no
303	Parity	1.<2 2. 2-4 3. >5
304	Mode of delivery	1. SVD 2. C/S
305	Type of pregnancy	1. Single 2. Multiple
306	GA at onset of PPROM	……..WK
307	Maternal hypertensive disorder	1. yes 2. no
308	Maternal HIV status	1. negative 2. positive
309	ANC follow up	1. yes 2.no
Part four; treatment and health service related factor		
401	Maternal steroid administration	1. Yes

		2. No
402	Were the neonate on CPAP	1. Yes 2. No
403	Were the neonate on KMC	1. Yes 2. No
404	Was the neonate resuscitated during delivery	1. yes 2. no
405	Length of stay	……day
406	Survival Status	1. Censored 2. Death