



**ST. PAUL'S HOSPITAL MILINIUM  
MEDICAL COLLEGE  
DEPARTEMENT OF NEONATAL NURSING**

**ASSESSMENT OF THE PREVALENCE, ITS  
IMMEDIATE OUTCOME AND ASSOCIATED  
FACTORS OF PRETERM BIRTH AT YEKATIT 12  
HOSPITAL MEDICAL COLLEGE NICU FROM  
OCTOBER 2015 TO SEPTEMBER 2016, ADDIS ABABA,  
ETHIOPIA, 2017.**

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**Ababa, Ethiopia**

**ST.PAUL'S HOSPITAL MILINIUM  
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## **Acronyms**

|              |                                                      |
|--------------|------------------------------------------------------|
| <b>A.A</b>   | Addis Ababa                                          |
| <b>ANC</b>   | Antenatal Care                                       |
| <b>APGAR</b> | Appearance, Pulse, Grimace, Activity And Respiration |
| Score        |                                                      |
| <b>ART</b>   | Anti Retroviral Therapy                              |
| <b>BMI</b>   | Body Mass Index                                      |
| <b>BSc</b>   | Bachelor of Science                                  |
| <b>C/S</b>   | Caesarean Section                                    |
| <b>DM</b>    | Diabetes Mellitus                                    |
| <b>EDHS</b>  | Ethiopian Demographic Health Survey                  |
| <b>ELBW</b>  | Extremely Low Birth Weight                           |
| <b>GA</b>    | Gestational Age                                      |
| <b>Gm</b>    | Gram                                                 |

|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <b>HPT</b>      | Hypertension                                                      |
| <b>HIV/AIDS</b> | Human Immuno-deficiency Virus/Acquired immune deficiency Syndrome |
| <b>IUGR</b>     | Intra Uterine Growth Retardation                                  |
| <b>IRB</b>      | Institutional Review Board                                        |
| <b>Kg</b>       | Kilogram                                                          |
| <b>LBW</b>      | Low Birth Weight                                                  |
| <b>LGA</b>      | Large Gestational Age                                             |
| <b>MSc</b>      | Master Of Science                                                 |
| <b>NICU</b>     | Neonatal Intensive Care Unit                                      |
| <b>PROM</b>     | Premature Rapture of Membrane                                     |
| <b>PTB</b>      | Preterm Birth                                                     |
| <b>RDS</b>      | Respiratory Distress Syndrome                                     |
| <b>SD</b>       | Standard Deviation                                                |
| <b>SGA</b>      | Small Gestational Age                                             |
| <b>SPHMMC</b>   | ST. Paul's Hospital Milinium Medical College                      |
| <b>SVD</b>      | Spontaneous Vaginal Delivery                                      |
| <b>VLBW</b>     | Very Low Birth Weight                                             |
| <b>WHO</b>      | World Health Organization                                         |

## **ABSTRACT**

**Background:** Every year, an estimated 15 million babies are born and this number is rising. Pre-term birth complications accounts for 35% of the estimated 3.1 million global neonatal deaths and are the second leading cause of death in children less than 5 years of age. Preterm births have different causes and risks of mortality, morbidity, impaired growth, and non-communicable diseases. Specially, infants born before 32 weeks of gestation are at particularly high risk of adverse outcomes [2-14].

**Objective:** The objective this study is to assess the prevalence of preterm birth, its immediate outcome and associated factor from October 2015 to September 2016 G.C at Yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia 2017.

**Methodology:** This is an institution based retrospective cross sectional study. The study was conducted from October, 2015 to September, 2016 on 2187 new born births admitted to NICU I yekatit 12 hospital, Addis Ababa, Ethiopia. The hospital selection is purposively selected from the six Addis Ababa Public hospitals having Neonatal intensive care unit. Data was collected using structural check list by group members. The data was code, checked and entered using Epi-Info version 7.0. It was cleaning and editing accordingly and exported to SPSS Version 21.0 and checked for missing values before analysis. Analysis was based on our findings.

**Result:** This study showed that preterm birth was 715(33.53%), term was 1252(58.67%) and post term was 167(7.8%) from a total 2134 new born registry at INCU of yekatit 12 hospital. The mean age of mother new born was 32 yrs. The majority age of mother new born was between ages 25-29 is 821(38.47%). From those admitted to Neonatal intensive care unit, the majority of outcome was improved is 1770(82.95 %), and improved with disability is 177(8.29 %) and Death is 187(8.76 %). Maternal hypertension 816(38.24 %), and DM 255(11.95 %), It was one of the factors associated with both preterm birth and immediate death outcome of preterm birth. The other associated with death and disability was low birth weight, low APGAR score, and delay admission. The low birth weight is 597(27.98 %), very low birth weight is 517(24.22 %), extremely low weight is 103(4.83 %), low APGAR score was 869(40.72 %) and very low is 91(4.27 %) and delay new born admission was 7<sup>th</sup>-28<sup>th</sup> days is 1019(47.75 %). There was found to be significantly associated with preterm birth on the multi variety logistic regression.

**Conclusion and Recommendation:** Prevalence of preterm birth was found to be higher (33.53%) yekatit 12 hospital. The main factors for this were maternal history of chronic illness and previous pregnancy problem presence. The factors of maternal hypertension, low birth weight, and low APGAR score remained significantly associated with both preterm birth and immediate death outcome of preterm birth. Health institutions and Health professionals are better to continuous regularly screen out pregnant mother of disease to Paying detail attention to early diagnoses and giving priority treatments. For Policy makers more to identified Preventable

causes of preterm birth as well as immediate death outcome of preterm birth. For researches it was more valuable if a primary study was conducted to find more factors associated with preterm birth.

**Key words:** Preterm birth, immediate outcome of Preterm birth, maternal factors and neonate.

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## **1. Introduction**

### **1.1. Background**

Preterm birth is defined as a delivery which occurs at less than 37 completed weeks of gestation.. Preterm birth can also be spontaneous or provider initiated. Spontaneous preterm birth is commencement of labor with intact or pre labor rapture of membrane and birth before 37 weeks of gestation. Provider-initiated preterm birth results from intervention such as

induction of labor or caesarian section taken for maternal or fetal condition. Spontaneous onset of labor accounts for 65-70% of all preterm births and provider initiated for 30-35% [1].

Gestational age and birth weight are the principal determinants of new born health status. Preterm is classified as extremely preterm (<28 weeks), very preterm (28 to <32 weeks), and moderate to late preterm (32 to <37 weeks). Likewise preterm birth can be categorized on the basis of birth weight. Neonates less than 2500g are classified as low birth weight (LBW), <1500g very low birth weight (VLBW) and <1000g extremely low birth weight (ELBW) [1].

An Estimated 15 million babies are born preterm every year and this number is rising. The vast majority of global preterm births occur in Asia and Africa where health systems are weak and access to and utilization of health services are limited. Different factors are associated with the occurrence of preterm births. Among these; low socio-economic status in which getting utilization of health facility is reduced, history of having preterm siblings, gynecologic and obstetric problems like uterine over distension secondary to multiple pregnancy, rupture of membrane were commonly identified in different countries. It was also found to be one of adverse birth outcome in women having medical disorders like pregnancy related hypertension [2-6].

Being born preterm is a risk factor that put infants to higher risks of chronic diseases and mortality later in life. Preterm births have different causes and risks of mortality, morbidity, impaired growth, and non-communicable diseases. Thus, being born preterm predisposes infants to higher risks of chronic diseases and mortality later in life. Specially, infants born before 32 weeks of gestation are at particularly high risk of adverse outcomes [7-14].

## **1.2. Statement of the Problem**

Preterm birth is the leading cause of infant morbidity and mortality throughout the world. It has considerable health, social, psychological and economic consequences. The rate of preterm birth is escalating globally and ranges from 5% to 7% in developed countries and significantly higher in least developed countries. Of the global 135 million live births 14.9 million (11.1%) babies were born preterm in 2010. More than 60% of preterm births occurred in Sub-Saharan Africa 47.2% and south Asia 12.8% (9.1 million) In 2010, preterm-small for gestational age (SGA) babies account 2.8 million births in lo w-income and middle-income countries [15].

The prevalence of preterm was 33% in Asia, 38% in Africa. Prevalence of preterm-SGA infants was 1.2% in North Africa and 3.0% in Southeast Asia. According to Chilean national birth registry the prevalence of preterm birth (<37 weeks) ranged from 2.7% to 28%. The rate of preterm birth in Southeast Nigeria rose from 9.8% in 2009 to 17.1% in 2013 after peaking at 23% in 2012. Approximately 57% of preterm births were spontaneous preterm births while provider initiated births occurred in 43% of them [16].

In United Kingdom, more than 50% of preterm births are potentially preventable, but remain associated with risk factors such as increased uterine contractility, preterm premature rupture of the membranes and uterine bleeding whose etiology is unknown. Women who had history of either preterm delivery or low birth weight were more likely found to have preterm birth than their counter parts. Preterm births usually have different medical disorders including congenital anomalies. Out of total 18 million low-birth weight infants in north Africa and Southeast Asia , 41% were preterm (16% preterm- SGA, 25% preterm and appropriate size for gestational age)[2,3,18].

In East Africa, ninety nine percent of low birth weight babies were either small for gestational age or preterm. Whereas, around 69% of preterm babies in Southeast Nigeria had either low birth weight, very low birth weight, or extreme low birth weight. [5, 16, 19].

In Gondar University hospital, Northwest Ethiopia about one in seven adverse birth outcomes (14.3%) was found to be preterm birth and in Mettu Karl hospital, Southwestern Ethiopia, the recorded rate of preterm delivery in mothers having pregnancy related hypertension was 31.4% [6, 17] .

The estimate of population risks for preterm birth at < 35 gestational weeks were 3.6%, 2.8%, and 7.8%, in all races, whites and blacks, respectively. The rate of preterm birth less than 35weeks for mothers who resided in countries within the lowest quartile of poverty was found to be 2.8%. The rate of preterm birth increased when the county poverty rate increases. In similar way, early preterm births (< 32 weeks) occurred more commonly in mothers who resided in countries with higher poverty rates. The rate of early pre-term birth almost doubled from 1.0% in the 1st quartile to 1.9% in the 2nd quartile of the highest poverty rate [2, 14].

Preterm birth is the major cause of death and substantial cause of long-term impairment of human potential amongst survivors all over the world. Preterm birth associated complications are the largest direct causes of neonatal deaths (35% of the world's 3.1 million deaths a year) and the second most common cause of under-5 deaths following pneumonia. Preterm birth is the leading cause of child death in almost all high and middle income countries. It is at least accountable for 50% of all neonatal deaths in which it increases risk of baby's dying from other causes, especially from neonatal infections. Out of 7.6 million deaths in under-five children, prematurity accounts for 17% and being the first leading cause of neonatal deaths, preterm birth attributed to about 35% deaths. [15, 20]

As gestational age decrease mortality rate increases, and being born both preterm and small for gestational age are at even high risk. In many low income countries only 30% of those born at 28 to 32 weeks survive while almost all preterm births <28 weeks die within the first few days of life. In all settings majority of deaths stands for very or extremely preterm births, especially where simple care is lacking in low income countries. Although their absolute numbers are lower, preterm-SGA infants carry a higher risk of mortality in the newborn and infant periods than do term-SGA infants. Estimate of 86% of extremely preterm live birth babies died in the early neonatal period compared to 50.5% of very preterm babies. [16, 19, 21, 22]

Trends of Ethiopian neonatal, early neonatal and late neonatal mortality rates over 2006- 2011 were 36.7, 29.2 and 7.5 per 1000 live births respectively. Regardless of significant success in infant and under-5 mortality in Ethiopia, the reduction in neonatal mortality is relatively low. From report of EDHS 2011, the Neonatal Mortality Rate (NMR) was 37/1000 live births, which has not shown significant declines from the 2005 EDHS report of 39/1000 live births. According to the recent UN estimate, the neonatal mortality reduced by 48% from the 1990 estimate to 28 per 1000 live births in 2013 while the reduction rate of under-five mortality rate was by about 67%. Prematurity (37%), infection (28%), and asphyxia (24%) are the most common causes of death in neonates. [19,24].

Neonatal mortality rate of Jimma zone, Southwest Ethiopia in 2013 was 35.5 per 1000 livebirths. 69.1% of them died within the first week of life making weighted early neonatal mortality rate to be 23.7 and risk of neonatal death was found to be increased in Prematurity as compared to term births. The aim of this study is to assess the prevalence, associated factor and

its immediate outcome of preterm birth which can show the way for decreasing both preterm birth occurrence and risk of its death that contributes for neonatal mortality significantly. [19,23,24].

### **1.3. Significance of the study**

Global progress for child survival and health cannot be achieved without addressing preterm birth. Despite of improvements in under-5 mortality rates in many countries worldwide, neonatal mortality rates (deaths in the first 28 days of life) have shown much less progress. Preterm birth is one cause of fluctuating early and late neonatal as well as post neonatal deaths. Preterm birth associated complications are the leading causes of neonatal deaths (35% of the world's 3.1 million deaths a year). [15,26].

The issue of addressing preterm birth is crucial for accelerating progress towards Universal Sustainable Development Goal. Different reasons contribute for the deaths of preterm neonate. Varieties of medical disorders which are diagnosed earlier and missed to be diagnosed are the major causes for this death. So, identifying common factors associated with preterm births and their immediate outcome, support for the readiness of health facilities so as to make appropriate diagnoses and evaluation of the causes of preterm births and their deaths. Thus, this study was tried to make all these possible.

In addition to the above, little is known about prevalence, associated factors and immediate outcome of preterm birth in Hospital setups. Therefore, this study serves as base line information about prevalence, factors associated with preterm birth and immediate out come in the context of Hospital setups. This study was also help researchers as input for other studies which was conducted on the related subject matter in the future time.

## **2. Literature Review**

Every year fifteen million babies are born too soon, more than one in 10 babies are born preterm. Preterm birth rates are increasing in almost all countries. Annually Sub-Saharan accounted for over 60% of preterm births and South Asia 12.8% of preterm births. However, the rate of preterm birth < 35 weeks for mothers living in least developed countries is 2.8%.Preterm birth rates were 11.8% in low-income countries, 11.3% in middle-income countries, 9.4% upper

middle and 9.3% in high-income countries. India, China, Nigeria, Pakistan, Indonesia, United States, Bangladesh, the Philippines, Democratic Republic of the Congo and Brazil had the highest preterm births. [10, 14, 26]

## **2.1 Prevalence of preterm birth.**

The prevalence of preterm was 33% in Asia, 38% in Africa. Prevalence of preterm-SGA infants was 1.2% in North Africa and 3.0% in Southeast Asia. According to Chile study mothers age 35 and older increased in population from 10.6% in 1991 to 16.7% in 2012 prevalence of pre-term delivery of 6.7% high prevalence than 20-29 age group 4.7%. In aging mothers, the odds ratio for pre-term birth adjusted for education, marital status and parity was 1.68 (95%CI (1.66-1.70)) compared to mothers aged 20-29. During Chilean demographic transition mothers aged 35 or older increased steadily and significantly maintaining high risk of pre-term births. [49]

According to South east Nigeria study in 2014 of preterm birth there was 3760 live births over the five years study period out of which 636 were pre term births, giving a prevalence rate of 16.9% spontaneous preterm births occurred in approximately 57% of pre-term birth while provider initiated births occurred in 43%. Approximately 89% of pre-term births involved single tone pregnancies. 68% of pre-term births were moderate to late pre-term. The male and female ratio pre-term babies born during the period was 1.2:1. The adjusted pre-natal mortality rate for pre-term babies in the study center was 46.1% (236/512). The still birth rate for preterm babies was 22.0% (149/678) and early neonatal death was 24.0% (87/363). [16].

## **2.2. Factors associated with preterm births**

### **2.2.1. Maternal Socio demographic factors**

Preterm birth is affected by a multitude and interrelated factors. Socio economic factor is one of the predictor of preterm birth. Women who were poor, young, black, less educated, and unmarried, were more likely to give preterm births. In high-income countries, approximately 40-45% of preterm births follow preterm labor. [14,27]. In Nova Scotia, Canada Preterm birth rates were significantly higher among women in the lowest (6.1%) versus the highest (5.6%) family income group for spontaneous preterm birth. [14,27].

According to western China 46.0% of women who had a preterm birth have average family income  $\leq$  320USD/ month compared with 36.7% in the control group, the difference had statistical significance. 43.3% were unemployed or housewife, 30.8% were peasant, 11.4% were commercial service staffs, professional staffs occupied 5.2%, and government staffs were 1.0%. Unlike the occupation, educational status showed significant statistical relation. [28-30]. Spontaneous preterm birth was associated with increasing maternal age ( $\geq 40$  years) and also highest risk of preterm birth is evidenced in nulliparous/age  $< 18$  category followed by parity  $\geq 3$ / age  $\geq 35$  and parity  $\geq 3$ /age 18- $< 35$ . In case of Preterm-SGA, nulliparous/age  $< 18$  mothers again had the highest association, followed by nulliparous/age 18- $< 35$ . Parity  $\geq 3$ / age  $\geq 35$  had slightly increased association and parity  $\geq 3$ /age 18- $< 35$  had no association. [27].

According to study in a tertiary referral hospital of UK, The mean maternal age for those preterm births was 29.4 within range of 16-46, whereas the majorities (87.3%) were in the age group of 19-39. In Taiwan Greater risk for preterm birth was found in Pregnant women aged  $< 25$  years or  $> 28$  years compared to those aged 27 years. [4]. The risk of preterm births declined to ages of 25 $\sim$ 28 years, but it was highest at ages of  $< 14$  years, and then steadily increased to ages of  $\geq 44$  years. In rural South Africa and Malawi, significantly greater proportion of women with preterm births was less than 20 years old.[34,35].

### **2.2.2. Obstetric and gynecologic related factors**

As evidenced by different studies causes of preterm vary in different countries. Preterm birth may result from preterm labor with intact fetal membranes, preterm rupture of the fetal membranes, or from iatrogenic preterm delivery for maternal or fetal indications. Globally, 25-40% are for premature ruptures of the fetal membranes, and 30-35% are indicated deliveries. Almost 70% are spontaneous preterm births; 16-21% involves rupture of membranes. Commonly recognized pathways leading to preterm birth occur most often during the gestational ages are: (1) inflammation caused by infection (22-32 weeks); (2) decidua hemorrhage caused by utero placental thrombosis (early or late preterm birth); (3) stress (32-36 weeks); and (4) uterine over distention, often caused by multiple fetuses (32-36 weeks).

Other contributors include cervical insufficiency and systemic infections. Other maternal medical disorders like depression/psychiatric disease, infections involving vaginal discharge were also associated with preterm birth. Preterm births also increase by 40% when the birth interval was shorter than 6 months, relative to babies born after a birth interval of 18- 23 months. It is also indirectly associated with parity, previous cesarean section, previous low birth weight and prenatal death. [27, 28] In tertiary referral hospital of UK, 72.8% and 56.1% of the mothers who gave preterm birth were gravid >0 and Para >0 respectively.

Stated gestation ages were under 34 Weeks for 14.8% of preterm cases and the smallest case was 22 + 5 weeks in Study of Western China. 85.2% cases' gestation age were from 34 weeks to 36 + 6 weeks. In Vali-e ASR hospital, Tehran Iran, the average gestational age for preterm births was 28.19 (25-36) weeks. [4, 36, 37] Carrying twins were also reported as associated with an increased risk of preterm delivery. [29, 31] Also previous history of preterm delivery affects the occurrence of preterm delivery. Previous preterm delivery ( $\geq 20$  and  $<37$  weeks' gestation) accounts for 25.4% of preterm births in UK tertiary referral hospital. In sub-Saharan Africa there were 3,836 (7.6%) women who delivered preterm in the first pregnancy, of which 1,160 (30.7%) repeated in the second. There was time correlation of delivery in the first delivery with delivery in the consequent pregnancy. For instance, if a woman had a prior preterm delivery at 28 weeks, the cumulative incidence of any preterm delivery  $< 37$  weeks was 37.9% but the incidence of delivery  $\leq 28$  weeks was only 10.4%.

Compared to women with two prior term deliveries the risk of preterm birth  $< 37$  weeks of gestation in the third delivery was over 10-fold higher for women with two prior preterm deliveries. For women with a history of one prior preterm and one prior term delivery, the risk for subsequent preterm birth in the third pregnancy was higher, 5.5-fold versus 3.5-fold, when the preterm birth occurred in the immediate preceding pregnancy compared to a preterm birth in the first pregnancy.

The risk of subsequent spontaneous preterm delivery was 5.6-fold increased with history of Prior spontaneous preterm delivery. However, the strongest association was for a prior indicated delivery and subsequent risk of both in dictated preterm delivery and elective delivery or no recorded indication. In Malawi, history of previous preterm birth were more likely reported in

women who gave preterm birth (13.2% vs. 6.1%) and previous neonatal death (8.1% vs. 4.1%) compared to women who delivered at term. During pregnancy women who had lower mean weight gain (kg) between the first (booking, 24 weeks gestation) and subsequent assessment (28–32 weeks gestation) (2.95 vs. 3.39) had a preterm birth. [4, 34, 38]

### **2.2.3. Medical disorders in mother**

Approximately 30% of all preterm births are indicated for either maternal or fetal complications, such as maternal illness or fetal growth restriction 11-15% have medically induced causes. Clinical risk factors such as hypertension were differently associated with spontaneous and iatrogenic preterm but factors such as diabetes mellitus were not. [4, 28-30, 36] In rural South Africa, although it was not statistically significant; the proportion of preterm deliveries was slightly higher in HIV-positive than in HIV-negative women. Also among HIVInfected Tanzanian Women who gave birth, 24% were premature and 9% were very premature.

Low weight gains during pregnancy, malaria, Entameoba infection, HIV disease stage  $\geq 2$  and pre hypertension or hypertension were significantly and independently associated with increased risk of preterm delivery. But no statistical differences were noted for the prevalence of syphilis ( $p = 0.12$ ) or HIV positive status ( $p = 0.30$ ) between those who delivered preterm versus term in Malawi. [29,32 ,39]

### **2.2.4. Maternal Physical factors**

The risk of induced preterm birth was increased among overweight and obese women. When the woman is heavier, the risk of induced preterm birth before 37 weeks is higher; with overweight, obese, and very obese women having a higher relative risk. The risk of spontaneous preterm birth did not vary. Overweight and obese women had an increased risk of preterm birth before 33 weeks. The heavier the woman, the higher the risk of early preterm birth. Overweight, obese, and very obese women had a higher relative risk. [4, 40] In Peru any intimate partner violence (IPV) during pregnancy had the prevalence of 34.6% for controls and 52.2% for preterm birth (PTB) cases. Comparing to women who were not exposed to IPV, women exposed to any IPV during pregnancy had approximately twofold increased odds of spontaneous PTB [41]

### **2.2.5. Maternal life style**

Smoking, drinking alcohol and drug using during pregnancy were maternal factors found in preterm births. [4, 34, 42] But Studies in Western Europe stated as inverse relationship was observed between alcohol consumption and the risk of preterm birth. Similarly there was no significant association between smoking and preterm birth rather preterm birth was only detectable in non-smokers. [43]

### **2.3. Outcome of Preterm births**

The increased risk of adverse outcomes associated with short birth interval than long birth interval. Birth interval of less than 18 months was significantly associated with almost all adverse neonatal outcomes. Birth interval <18 months did not increase the risk of neonatal mortality to a level of statistical significance; however there was increase odds of infant mortality in 83%. Similar report was evidenced in Ghana that neonatal deaths were observed to occur most often in newborns having birth spacing less than 18 months Nulliparous/age 18-<35 had a 28% and parity  $\geq 3$ / age  $\geq 35$  had a 66% increase in odds of neonatal mortality whereas parity  $\geq 3$ / age 18-<35 had a 30% increase in odds for infant mortality.

Also in western China, risk of neonatal death was significantly higher at the extremes of maternal age; <14 years, which declined to an age of 28 years, and then increased again to ages of  $\geq 44$  years. [16, 30, 32, 44, 45] Death outcome of preterm births also varies depending on their gestational age. In East Africa, newborn deaths were among newborns born either small for gestational age or preterm. 28% of neonatal mortality was associated with being born preterm and 39% of neonatal mortality was associated with being born either preterm or small for gestational age. From very preterm infants (<34 wk), less than 1% were live births and 20% were deaths. But among those born moderately preterm (34–36 wk) and small for gestational age, just 1% of live births, but 8% of deaths were recorded.

In addition extremely preterm died in early neonatal period than other preterm. [16, 46] Medical disorders preterm births have been diagnosed with also contribute to their death outcome. Twenty-four preterm individuals in Quebec with BPD died following their 11 initial discharge from hospital. From 23 newborns (46%) died during hospital stay in Vaile-ASR, 68.5% of the

deaths occurred in the first 7 days of life and 31.5% during 8-28 days of life. Forty percent of dead neonates are ELBW infants. In Sub-Saharan Africa up to 90% of newborns who die are low birth weights (< 2,500 grams) including preterm babies, who had the greatest risk of death compared with those AGA, SGA infants had a 2-fold significantly increased hazard of death. Those infant born to HIV positive mothers in rural South Africa had greater risk of death than those from HIV negative mothers. In the preterm group there were more reported deaths due to respiratory problems (17.4% versus 13.5) and fewer due to gastroenteritis (26.1% versus 43.2%) but the differences were not statistically significant in Malawi.

In Mettu, southwest Ethiopia Preterm newborns are more likely to develop unfavorable fetal outcome. Unlike newborns with good APGAR score, newborns with low APGAR score are more likely to develop unfavorable fetal outcome. [6, 47, 39, 36, 48] Generally, the rate of preterm birth left to be increased throughout the world. Factors found to be associated in one study were not repeated in other studies.

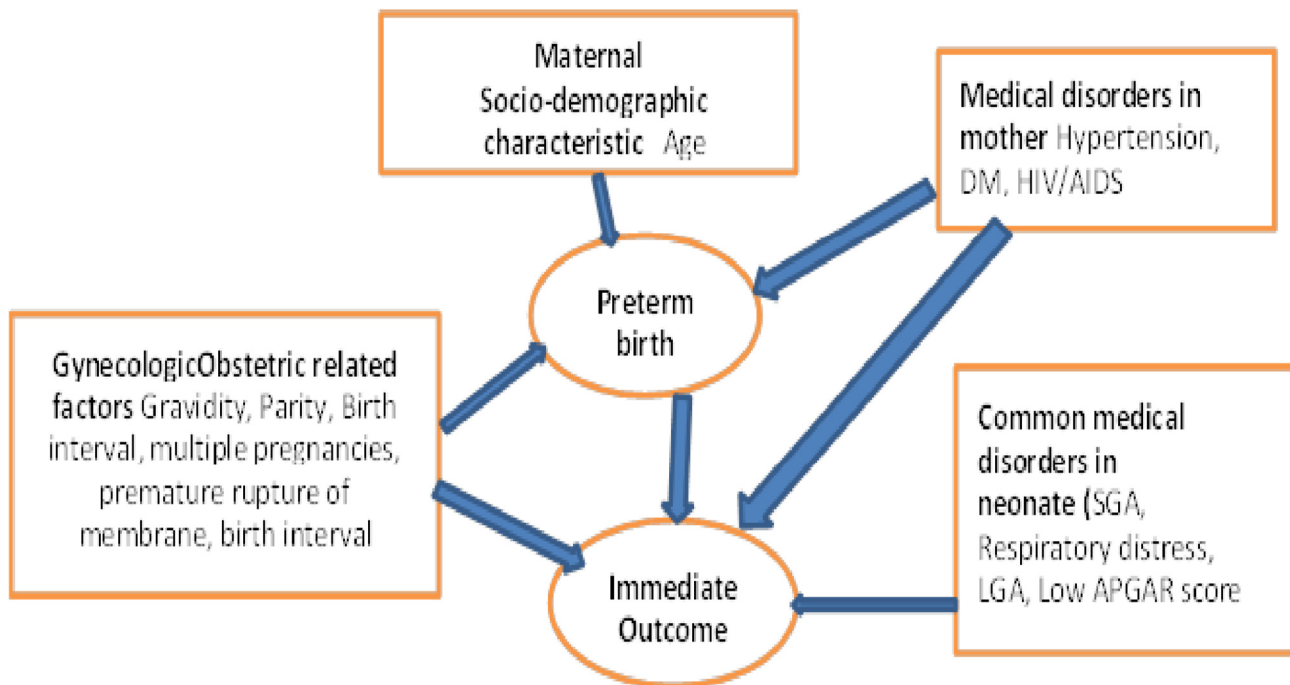
Generally, maternal socio demographic characteristics (Age, educational status, occupation, monthly income), her life styles like Smoking and alcohol consumption; maternal medical problems (Hypertension, DM, HIV/AIDS, malaria, syphilis, depression or other psychiatric diseases); gynecologic and obstetric related factors (gravidity, parity, birth interval, multiple pregnancies, ANC use, premature rupture of membrane, cervical insufficiency); Maternal physical factors (Overweight, Obesity, body mass index, intimate partner violence) were common factors associated with preterm births. Only few of them survive without long term complications where as others die or survive with long term sequel.

### **2.3. Conceptual framework**

This conceptual frame work was developed after reviewing different related literatures. It is mainly developed based on evidences found in different studies. There is stated association between maternal factors (maternal socio demographic characteristics, maternal life style, physical factors, gynecologic-obstetric related factors and medical disorders in mother) and preterm birth, medical disorders in mother and neonate and immediate outcome of preterm neonate.

**Figure 1: Conceptual frame work of factors associated with preterm birth and its immediate outcome. [2-48]**

## 2.4. Operational definition



**Immediate outcome:** Outcome of preterm birth being dead, disability or alive as it has been recorded on discharge summary of the neonate.

**Medical disorders in mother:** Any history of medical diagnosis in the mother as it has been registered on the neonate's medical record.

**Medical disorders in the neonate:** Any recorded medical diagnosis for the preterm neonates on their medical records.

**Multi-gravidity:** is the mother has two or more than two pregnancy number recorded gravidity.

**Multi-parity:** is the mother has two or more than two birth number recorded parity.

**Normal APGAR score:** Registered APGAR score from 7 to 10. It is measured of new born condition after birth up to 5 minutes.

**Low APGAR score:** Registered APGAR Score of the neonate between 0-6.

**Preterm birth:** being spontaneous preterm for those which labor was started spontaneously and indicated for which labor was induced either for maternal or fetal cases.

**Extremely preterm** is preterm birth < 28 weeks of gestational age.

**Very preterm** is 28 to <32 weeks gestational age.

**Moderate to late preterm** is 32 to <37 weeks as it gestational age has been recorded on date of admission.

### **3. OBJECTIVE**

#### **3.1. General objective**

To assess the prevalence of preterm birth, it's immediate out come and associated factors from October 2015 to September 2016 G.C at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia 2017.

### **3.2 Specific objective**

- To assess prevalence of preterm birth from October 2015 to September 2016 G.C at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia 2017.
- To determine the immediate outcome of preterm birth from October 2015 to September 2016 G.C at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia 2017.
- To explore factors that is associated with preterm birth from October 2015 to September 2016 G.C at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia 2017.

## **4. METHODS**

### **4.1 study area**

The study was conducted at Yekatit 12 Hospital medical collage NICU which situated in Addis Ababa the Capital City of Ethiopia. Addis Ababa are has a total of 14 governmental Hospital and 73 health centers. Yekatit 12 hospital medical college is a referral Hospital under the Addis Ababa City Government Health bureau with 265 beds .It also serves emergency cases without referral and provides services for a population of approximately 4 million from its catchment area; Arada sub city and Oromia region. The Hospital has total pediatric bed capacity of 81 beds are distributed for general pediatrics; NICU (31 beds) isolation room and pediatric surgical unit (a room with 5 bed).

### **4.2 study design and period**

Retrospective institutional based review of patient charts and registry book at NICU of Yekatit 12 Hospital Medical College was conducted in Addis Ababa from July1-July 15 of one year (from October 2015-september 2016) collected patient chart.

### **4.3 Source population**

The source of population was all neonatal charts and neonatal registry book at NICU of yekatit 12 Hospital Medical collage which were legible registered

### **4.4. Study population**

All preterm birth registry book which admitted from October 2015 to September 2016.at yekatit 12 Hospital medical college NICU.

### **4.5 Study unit**

All neonate birth medical records (registry book) From October 2015 to September 2016 at yekatit 12 Hospital medical college NICU registry log book Neonates with preterm birth

## **4.6. INCLUSION AND EXCLUSION CRITERIA**

### **4.6.1. INCLUSION CRITERIA**

- ✓ All Neonate age of less than 28 days admitted to yekatit 12 Hospital Medical College NICU during October 2015 to September 2016.
- ✓ Neonate whose medical record number was legibly registered.

### **4.6.2. EXCLUSION CRITERIA**

- ✓ Neonate (<28days) whose not recorded or admitted to yekatit 12 Hospital Medical collage NICU during October 2015 to September 2016.

## **4.7 Sampling size**

A. All neonate registry book which admitted from October 2015 to September 2016 at yekatit 12 Hospital medical college NICU which fulfill inclusion crit. The sample size is 2187 including non-response rate.

## **4.8-Sampling procedure**

All preterm birth admitted at yekatit 12 Hospital Medical College NICU during October 2015 to September 2016 was involved and study subjects was cross checked through checklist till the total sample size was achieved.

## **4.9-Data collection instrument**

Data Was collected July 1- July 15/2017 by using check list part 1 socio-demographic characteristics, part 2 medical history of mother, reproductive characteristics and new born history from the patient charts and register book in yekatit 12 Hospital Medical College NICU. The check list was prepared by group members and it was collected by group members.

## **4.10. Data management**

Data quality management was checked in different point of view to insure the quality of data. Before actual data collection pre-test was employed on 21.8% neonate babies chart based on checklist format, then after cross check performed unrecorded variable were reduced from the

checklist and other were arranged as usual, continues cross check data for completeness accordingly, and before data analysis the collected data was cleaned for missing and logically inconvenient variable. Also each collected data was checked by group member every day.

#### **4.11. Data analysis procedure**

The data was code, checked and entered using Epi-Info version 7.0. It was cleaning and editing accordingly and exported to SPSS Version 21.0 and checked for missing values before analysis. Descriptive statistics using measure of central tendency and dispersion, frequencies, proportions and diagrams were used to check its distribution and describe the study population in relation to relevant variables. Cross tabulation was also performed to see distribution of different variables in relation to outcome variable. Bivariate logistic regression analysis was used to assess the degree of association between dependent and independent variables and test significance of the association. Odds ratio with 95% confidence interval was used to measure strength of associations. Those variables associated at bivariate logistic regression with significance level of  $p \text{ value} < 0.2$  were entered into multivariate logistic regression model to identify the important determinants by controlling possible confounding effects.

#### **4.12. Study variable**

##### **4.12.1. Dependent variable**

- ❖ Prevalence of preterm birth
- ❖ Immediate outcome of preterm birth

##### **4.12.2. Independent variable**

- ❖ Maternal Socio demographic data - (age, occupation, educational status, address)
- ❖ Identification of preterm birth - (gestational age, sex, weight, height)
- ❖ Maternal medical history - ( HTN,DM,STD,HIV/ADIs and other infection )
- ❖ Gynecologic and obstetric information-(LMP, ANC, Gravida, parity, HX of abortion, PROM, Previous mode of Delivery, IUGR, multiple pregnancy)

#### **4.13. Ethical consideration**

Ethical clearance was obtained from institutional review board (IRB) of nursing education directorate St. Paul's Hospital Millennium Medical College nursing department in Addis Ababa. Following the endorsement by IRB of St. Paul's Hospital Millennium Medical college, Yekatit 12 Hospital Medical College was informed about the objectives of the study through a formal letter from IRB of St. Paul's Hospital Millennium Medical College and then written permission from Yekatit 12 Hospital Medical College administration was obtained to Neonatal intensive care unit in which the study is conducted .Since this study is from medical records it doesn't require informed consent for the card review.

#### **4.14. Dissemination of result and presentation**

The result was presented at the St. Paul's Millennium Medical College in the neonatal Nursing department and it was given to the St. Paul's Millennium Medical College library. Another copy was given for yekatit hospital medical college NICU and concerned organization working on NIUC governmental and nongovernmental organizations.

## 5. RESULT

### 5.1. Socio demographic & obstetrics factors of the mother

A total of 2187 respondents of the response rate was 2134(97.57 %) with that of non-respondents rate 53(2.43%). The mean age of mother of babies respondents was 32 years. Majority age of mother of new born respondents was between ages 25-29 is 871(40.81%). The highest percentage parity mother of new born was parity I is 976(45.7%), and the second was parity II is 687(32.2%). The mother of new born no related to previous obstetric disease is 1395(65.36 %), and previous obstetric disease related to premature birth is 197(9.3 %) and abortion is 197(9.3 %). Maternal chronic disease was hypertension is 816(38.24 %), DM is 255(11.95 %), No history of chronic disease is 1048(49.11 %). The majority of blood group & RH factor of mother was A<sup>+</sup> is 700(32.8 %), and B<sup>+</sup> is 486(22.77 %). (See table below table 1).

**Table 1:- Socio demographic & obstetrics factors of the mother, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

| Variable (n=2134) |         | Frequency | Percent |
|-------------------|---------|-----------|---------|
| Age of mother     | 15-19   | 166       | 7.78 %  |
|                   | 20- 24  | 265       | 12.42 % |
|                   | 25- 29  | 871       | 40.81 % |
|                   | 30 -34  | 649       | 30.41 % |
|                   | 35 – 49 | 183       | 8.57 %  |
| Parity            |         |           |         |
|                   | I       | 976       | 45.7 %  |
|                   | II      | 687       | 32.2 %  |
|                   | III     | 322       | 15.1 %  |
|                   | IV      | 100       | 4.7 %   |

|                                    |                   |      |         |
|------------------------------------|-------------------|------|---------|
|                                    | ≥V                | 49   | 2.3 %   |
| <b>Mother previous</b>             |                   |      |         |
| <b>Obstetric history</b>           | Abortion          | 198  | 9.3 %   |
|                                    | IUFD              | 150  | 7.03 %  |
|                                    | Premature birth   | 342  | 16.03 % |
|                                    | Neonatal death    | 49   | 2.3 %   |
|                                    | No abnormal Hx.   | 1395 | 65.36 % |
| <b>Maternal chronic disease</b>    |                   |      |         |
|                                    | Hypertension      | 816  | 38.24 % |
|                                    | DM                | 255  | 11.95 % |
|                                    | Respiratory       | 15   | 0.70 %  |
|                                    | Thyroid           | 00   | 0.0 %   |
|                                    | No Hx. Of disease | 1048 | 49.11 % |
| <b>Blood group &amp; RH factor</b> |                   |      |         |
|                                    | A <sup>+</sup>    | 700  | 32.8 %  |
|                                    | A <sup>-</sup>    | 76   | 3.56 %  |
|                                    | B <sup>+</sup>    | 486  | 22.77 % |
|                                    | B <sup>-</sup>    | 97   | 4.55 %  |
|                                    | AB <sup>+</sup>   | 461  | 21.6 %  |
|                                    | AB <sup>-</sup>   | 52   | 2.43%   |
|                                    | O <sup>+</sup>    | 248  | 11.6 %  |
|                                    | O <sup>-</sup>    | 14   | 0.66 %  |

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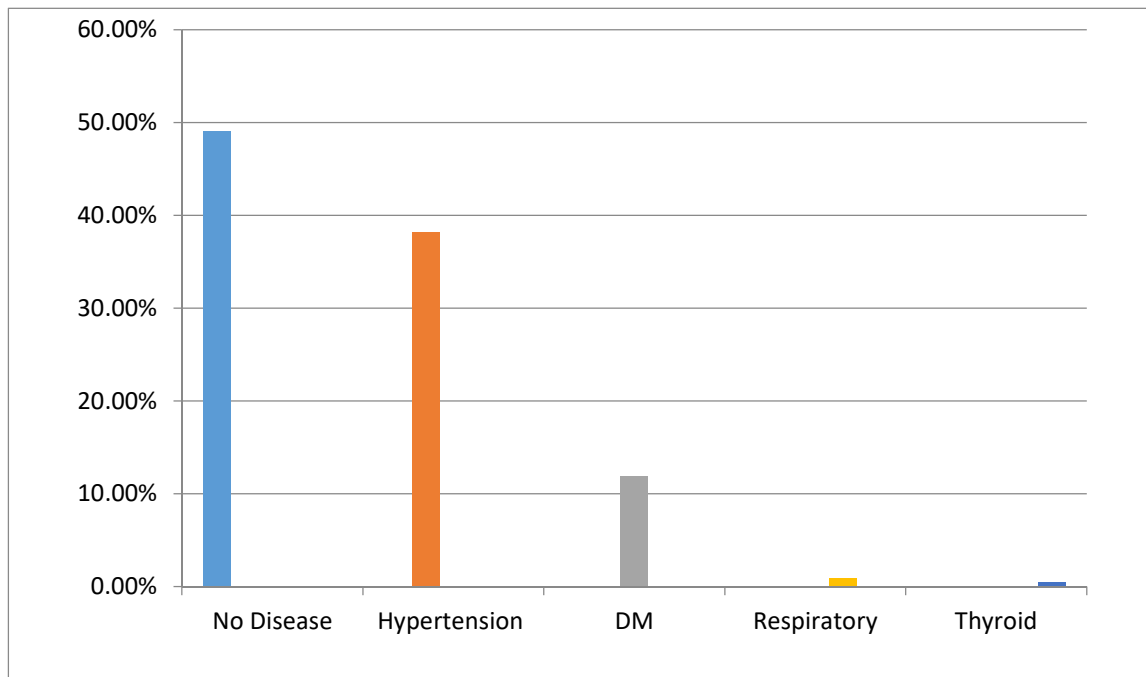


**Figure 2. Maternal disease factors of preterm at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

## 5.2. Current pregnancy and delivery

The highest number of new born delivery of gestational age was 37-42 weeks or term is 1252(58.67%), and the second was <37 weeks or preterm is 715(33.53%). Duration of labor majority was <24 hours is 1289(60.4 %), and >24 hours is 849(39.6 %). Mode of delivery the majority was SVD is 1322(61.95 %), C/S is 673(31.54 %) and Instruments 139(6.51 %). (See table below table 2).

**Table 2:- Related to current pregnancy and delivery, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

| Variable (n=2134) | Frequency | Percent |
|-------------------|-----------|---------|
|-------------------|-----------|---------|

**Gestational age**

|                    |      |         |
|--------------------|------|---------|
| <37completed weeks | 715  | 33.53 % |
| 37-42 weeks        | 1252 | 58.67%  |
| More than 42weeks  | 167  | 7.8 %   |

**Duration of labor**

|         |      |        |
|---------|------|--------|
| >24 hrs | 849  | 39.6 % |
| <24 hrs | 1289 | 60.4 % |

**Mode of delivery**

|             |      |         |
|-------------|------|---------|
| SVD         | 1322 | 61.95 % |
| C/S         | 673  | 31.54 % |
| Instruments | 139  | 6.51 %  |

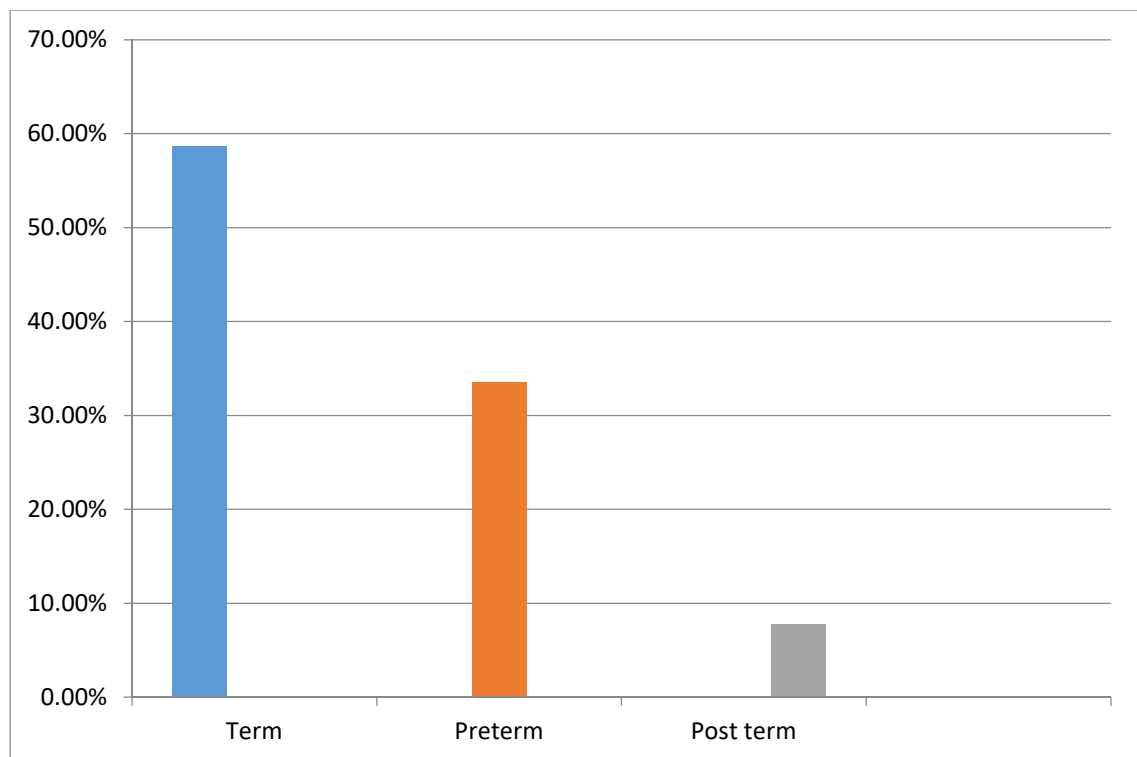


**Figure 3. Classification of the Gestational age delivery, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

### **5.3. NEW BORN RELATED FACTORS**

The majority of new born sex was male is 1273(59.65%) and female is 852(40.35%). The majority of new born weight was normal birth weight (2500-3999 gram) is 752(35.24 %), and the second was low birth weight (1500-2400 gram) is 597(27.98 %). The majority of APGAR score was normal (7-10) is 1174(55.0 %), and the second was low (4-6) is 869(40.71 %). The majority of new born admission was 1<sup>st</sup> day up to 7<sup>th</sup> days is 1115(52.25 %) and 7<sup>th</sup>-28<sup>th</sup> days is 1019(47.75 %). The majority of outcome was improved is 1770(82.95 %). (See table below table 3).

**Table 3:- New Born Related Factors, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

|                    | Variable (n=2134)   | Frequency | Percent |
|--------------------|---------------------|-----------|---------|
| <b>Sex</b>         | Male                | 1273      | 59.65 % |
|                    | Female              | 852       | 40.35 % |
| <b>Birth Wight</b> |                     |           |         |
|                    | 4000 gram and above | 165       | 7.73 %  |
|                    | 2500-3999 gram      | 752       | 35.24 % |
|                    | 1500-2400 gram      | 597       | 27.98 % |
|                    | 1000-1499 gram      | 517       | 24.22 % |
|                    | <1000 gram          | 103       | 4.83 %  |
| <b>APGAR score</b> |                     |           |         |
|                    | 0-3                 | 91        | 4.27 %  |

|                         |                                          |      |         |
|-------------------------|------------------------------------------|------|---------|
|                         | 4-6                                      | 869  | 40.71 % |
|                         | 7-10                                     | 1174 | 55.0 %  |
| <b>Age of admission</b> |                                          |      |         |
|                         | 1 <sup>st</sup> day-7 <sup>th</sup> days | 1115 | 52.25 % |
|                         | 7 <sup>th</sup> -28 days                 | 1019 | 47.75 % |
| <b>Out come</b>         |                                          |      |         |
|                         | Improve                                  | 1770 | 82.95 % |
|                         | Improve with disability                  | 177  | 8.29 %  |
|                         | Death                                    | 187  | 8.76 %  |

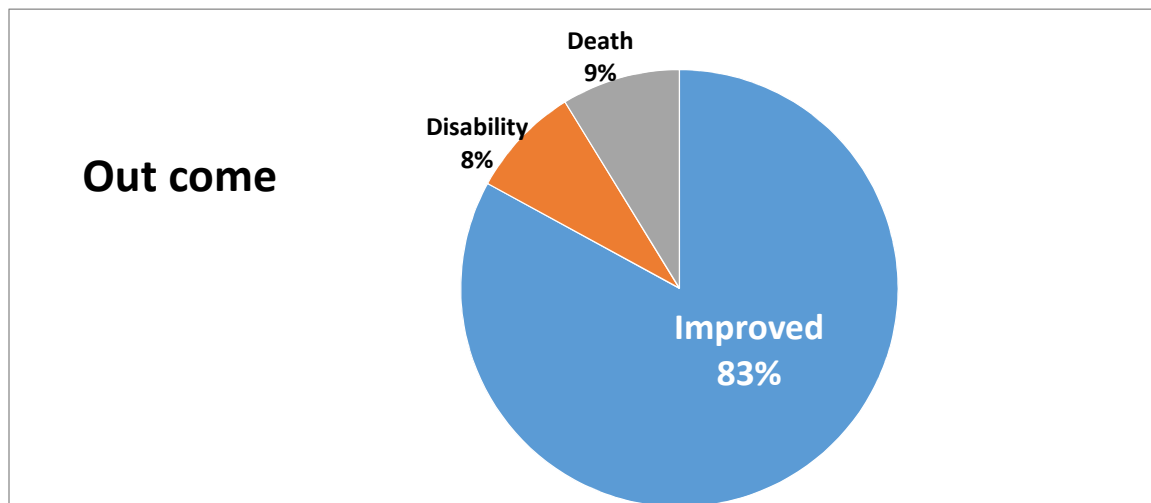


**Figure 4. The outcome of new born, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

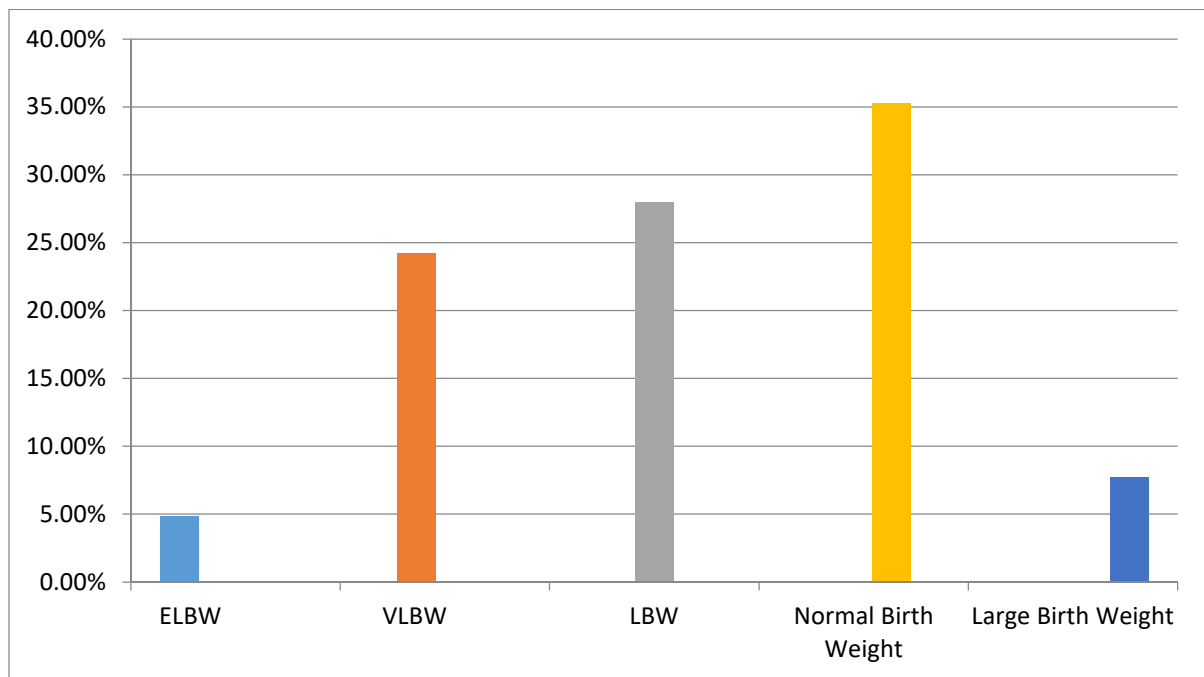


**Figure 5. Classification of weight of new born, at yekatit 12 Hospital NICU admitted neonate in Addis Ababa Ethiopia October 2015 to September 2016 G.C.**

## **6. Discussion**

### **6.1. Discussion**

Worldwide Preterm birth and its consequences constitute a major health problem. The birth of a preterm infant results in significant health consequences, mortality and subsequent disabilities to the neonate and emotional and economic costs for families, communities and to the nation. In this study the prevalence of preterm birth was found to be 33.53%. This finding is higher than the prevalence of preterm birth in Ethiopia, 10.1%, which was reported by the Global Action Report on Preterm Birth in 2010 [50].

The finding on this study was also higher than a study conducted in Addis Ababa on 2016, which reported the prevalence rate of preterm birth in NICU admission in of 16.5%. This discrepancy might be due to difference on exclusion criteria for multiple pregnancies. In our study mothers with multiple pregnancies were included, whereas these mothers were excluded from the mentioned study. Therefore lower incidence rate is expected in their study as obstetric disease and gynecologic problem is a known cause for preterm birth. Another possible reason for the discrepancy could be due to the difference in study areas.

Developed countries for instance, the 2010 WHO bulletin on cross sectional analyses of prospective surveys reported that preterm birth rates have been reported to range from 5% to 7% of births [53]. The main reasons for this discrepancy might be due to the increased risk of infection during pregnancy in our country than in developed countries, as presence of infection during pregnancy predisposes to preterm birth. Another reason could be due to resource gap between these two worlds. In situations with better resource early intervention may help reduce at least preventable preterm birth. Also better ANC follow up in developed countries was contributed for the reduced incidence of preterm birth.

The prevalence of preterm birth in our study was found to be higher than some studies conducted in different parts of the world. For instance in a cross-sectional study conducted in Nigeria on 2010, a prevalence rate of 19.9% was reported [54]. This higher prevalence of preterm birth in Nigeria might be due to the higher rate of multiple pregnancies in Nigeria, as this is a known predisposing factor for preterm birth. Also a national cross-sectional study in Brazil showed that a prevalence of 21.7%, which is higher than this study [55]. Also a study

done in USA at different times had reported higher rates of preterm birth, 12.5% in 2004 and 12.8% in 2006 [56]. Unlike other developed countries the higher prevalence rate in USA might be due to higher prevalence of elective CS. Another reason might be due to a trend of American women to give birth in their late reproductive ages.

This study revealed that a significant association was found between complications of current pregnancy and preterm birth. Mothers who had one or more of complications of pregnancy, like hypertension, and diabetes mellitus, high risk of having a preterm birth than those mothers without these problems during their pregnancy. This finding is in consistence with cross sectional studies conducted in Ethiopia in 2007 [51] and Global report on preterm birth and stillbirth in 2010. The possible explanation might be due to chronic medical illnesses being able to cause utero-placental vasculopathy, this was activating premature fetal hypothalamic-pituitary-adrenal axis activation, which intern can result preterm birth [52].

From those admitted to Neonatal intensive care unit, the majority of outcome was improved is 1770(82.95%), and improved with disability is 177(8.29 %) and Death is 187(8.76 %). This study expressed of associated with death and disability was low birth weight mild low is 597(27.98%), moderate low is 270(12.65%), very low weight is 103(4.83%), low APGAR score was 869(40.71%) and very low is 98(4.29%), duration of labor was >24 hours is 849(39.6 %), Instruments delivery was 139(6.51%) and delay new born admission was 7<sup>th</sup>-28<sup>th</sup> days is 1019(47.75%). There was found to be significantly associated with preterm birth and outcome on the multi variety logistic regression.

## **6.2. Strength and Limitations of the study**

### **6.2.1. Strengths**

To our knowledge this study is from those at beginning to assess factors associated with preterm birth in such category especially in the context of this country.

### **6.2.2. Limitations**

Since data collected from secondary source, lack of complete information was the major problem to assess different socio-economic characteristics and other important variables that would have associations with preterm birth and its immediate outcome.



## **7. Conclusion and Recommendations**

### **7.1. Conclusion**

Preterm birth was a problem in Yekatit 12 hospitals NICU. This study showed that preterm birth was 715(33.53%) and the prevalence of preterm birth was found to be higher in Addis Ababa. This study revealed different factors associated with preterm birth and its immediate outcome. Associated preterm having at least one medical disorder during pregnancy like maternal hypertension, DM other infections and multiple pregnancy was remained significant in multivariate analysis were factors found to have significant association with both spontaneous and indicated preterm birth.

Some maternal and neonatal factors were significantly associated with immediate death outcome of preterm birth. Maternal infection, RH incompatibility, prolonged of labor, instrumental delivery and new born extremely preterm, very preterm, extremely low birth weight, very low birth weight, low APGAR Score, being spontaneous preterm birth, neonatal sepsis and respiratory distress had significant statistical association with immediate death outcome of preterm births. From these factors only maternal hypertension, low birth weight, and low APGAR score remained significantly associated in multivariate analysis.

### **7.2. Recommendations**

**For health institutions:-** Continuous to regularly screen out pregnant mothers for hypertension, DM and other infections; so that they was alarmed as this can put in risk of preterm birth and unfavorable neonatal outcome which can end with death.

**For those health professionals who are working in NICU and obstetric unit:-** Paying detail attention to early diagnoses and identified factors to be associated with immediate death outcome of preterm births and giving priority treatments for these factors was significantly decrease proportion of death and disability outcome in preterm births.

**For Policy makers:-** More identified Preventable causes of preterm birth as well as immediate death outcome of preterm birth need to be taken in to consideration in health transformation plan to be worked on so that survival chance of preterm birth was increased. Again it is

important if standard format of sufficient history taking is distributed uniformly for health facilities which can be great privilege for collection of sufficient data in research and add on registration necessary information of maternal disease and socio-demographic factors.

**For further researches:-** It was more valuable if a primary study was conducted on this subject matter with alternative cross sectional study design, so as to find more factors associated with preterm birth and it's immediate and long term outcome.

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## 9. Annex

### 9.1. Consent form and information

How are you, I am \_\_\_\_\_. This is a secondary data check list study that is being conducted by st. paul's hospital milinium medical college school of nursing department of neonatal nursing specialty. I would like to ask you few questions and your waringness in the study. This check list is prepared by neonatal nursing specialty student of St. Paul's hospital milinium medical college, as a partial fulfillment of the requirements of the program, to conduct field study on assessment of the prevalence of preterm birth and immediate outcome in yekatit 12 hospital medical college NICU from October 2015 to September 2016, Addis Ababa, Ethiopia,

Your participation in the study is very important in reducing the neonatal morbidity and mortality rate, which is caused by pre term and its complication. All the information given by you was kept strictly confidential and only used for this study. Thank you in advance for your participation in the study.

### 9.2. Socio-demographic Characteristics Related to Mother

101. Age of mother \_\_\_\_\_

102. Address

A. Addis Ababa

B. Oromia

C. Amhara

D. Others

103. Occupation of mother

A. House wife

B. Private

C. Government

D. NGO

E. other

104. Religion of mother

A. Orthodox

B. Protestant

C. Muslim

D. Other

105. Ethnicity

A. Oromo

B. Amhara

C. Gurage

D. Tigire

E. Other

### 9.3. Medical history of mother

201. Mother Blood group& RH factor

A +

A-

B+

B-

AB+

AB-

O+

O-

202. Chronic disease

A. Hypertension

B. Diabetes maltase

C. C. Thyroid disease

D. Hepatitis B virus

E. HIV/AIDS

F. Other

203. Mother took medication during pregnancy

- A Modern medicine
- B Traditional medicine

204. Mother substance abuse

- A Alcohol
- B Chats
- C Cigarettes
- D No substance Abuse

#### 9.4. Reproductive characteristic

301. Number of gravidity -----

302. Number of Parity -----

303. Number of still birth -----

304. Number of abortion -----

305. Premature birth \_\_\_\_\_

306. Neonatal death \_\_\_\_\_

#### 9.5. New born and related factors

401. New born birth of gestational age

- a) >42 weeks
- b) 37-42 weeks
- c) <37 weeks

402. Types of delivery

- A. SVD
- B. Vacuum delivery
- C. Forceps delivery
- D. C/S delivery

403. APGAR score of new born

A. At birth within 1 minutes

B. After 5 minutes

404. Sex

A. Male

B. Female

405. Birth weight \_\_\_\_\_

406. Reason of admission

A. Under Wight

B. Preterm

C. Respiratory distress

D. Sepsis

E. Congenital abnormality

407. Duration of admission \_\_\_\_\_

408. Types of treatment \_\_\_\_\_

409. Outcome of new born

A. Improve

B. Improve with disable

C. Death

D. Others

**THANK VERY MACH!**

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