



Colleges of Health sciences

School of medicine

Department of Obstetrics and Gynecology

Perinatal Morbidity and Mortality in Late and Post Term Pregnancy in Three Teaching Hospital Addis Ababa, Ethiopia: a Facility Based Comparative Cross-Sectional Study

RESEARCH REPORT

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July, 2023GC
Addis Ababa, Ethiopia

Addis Ababa University

College of Healthy Science, Department of Obstetrics and Gynecology

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Research Report Attesting Page

Student Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself

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Supervisors' Declaration

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ACKNOWLEDGMENT

I would like to thank department of Obstetrics and Gynaecology of Tikur Anbesa Health Science of Addis Ababa University for giving me the opportunity to conduct this research.

I would also like to thank my advisors' Dr Endalkachew Mekonen and Dr Ahmed Abdella for their very helpful advice and valuable comments starting from the selection of the topic to the development of this research proposal

ACRONYMS

ACOG -American college of Obstetricians and gynaecologists

aOR - adjusted odds ratio

BMI - Body Mass Index

CD -caesarean delivery

CI -Confidence interval

CRL -crown rump length

EDD -estimated date of delivery

ENND –early neonatal death

EM -expectant management

GW - gestational week

IOL-induction of labour

IUFD –intrauterine fetal death

FIGO -International Federation of Gynaecology and obstetrics

LMP-last menstrual period

MAS- meconium aspiration syndrome

NICU -neonatal intensive care unit

OR- odds ratio

PNM --perinatal mortality

PPH-post-partum hemorrhage

RR- relative risk

RCT-Randomized control trial

WHO-world health organization

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ABSTRACT

Background: The early term and full term pregnancy is defined as that occurring between 37⁺⁰-40⁺⁶ weeks of gestation. Pregnancies with duration outside of this range are associated with perinatal morbidity and mortality. Assessment of the prevalence of adverse outcomes between term, late term and post term deliveries helps to reduce perinatal morbidity and mortality associated with late term and post term pregnancies.

Objective: To assess and compare the perinatal outcomes of pregnancies at early term, full term, late term and post term

Method: A facility based comparative cross-sectional study was carried out on 654 pregnant women & their newborns delivered at gestational age of 37⁺⁰ weeks & more weeks of gestation at the three teaching hospital in Addis Ababa: Tikur Anbesa, Gandhi Memorial and Zewditu Memorial Hospital. In the study the prevalence rates of adverse perinatal outcomes for each gestational age group were estimated. Data was collected by trained data collectors using a pretested structured questionnaire developed from available relevant literature. Data was checked for completeness, cleaned, entered, and analysed by principal investigators using SPSS version 25. Binary and multiple logistic regression analysis were done to see the association of variables.

Result: There was significant statistical differences in the rate of meconium aspiration syndrome (p=0.039), cesarean section (p=0.027) and macrosomia (p=0.038). The rate of cesarean section was more frequent in group 3 (GA $\geq$ 42 weeks) compared with group 2 (GA 41-41⁺⁶ week) (40%; versus 30.9 % P=0.038) frequency of meconium aspiration syndrome and macrosomia were no significant difference in group 2 compared with group 3. Results were also compared between group 1 (GA 37-40⁺⁶ week) and group 3 (GA $\geq$ 42 weeks (table 7). The frequency of meconium aspiration syndrome was lower in group 1 compared with group 3 (4.1 % versus 5.1%; p=0.023), the rate of cesarean section was more frequent in group 3 compared with group 1 (42.2 % versus 31.4%; p=0.013), and macrosomia was lower in group 1 compared to group 3 (5% versus 15%; p=0.022). There were no significant difference in the rate perinatal asphyxia, respiratory distress syndrome, neonatal intensive care unit, early onset of sepsis and APGAR score less than 7 in 5th minute in group 1 and group 3.

Conclusion: This study showed that participants whose gestational age of post term had increased adverse perinatal outcomes than Gestational age of term (GA 37-40⁺⁶.) and late term pregnancies. A significant increased risk of perinatal complication like MAS, NICU admission, caesarean delivery and macrosomia observed in GA $\geq$ 42 weeks compared with 37⁺⁰-40⁺⁶ weeks' gestation and late term pregnancies.

Recommendation: To decrease the perinatal adverse outcomes in post term pregnancy induction and delivery will better before 42 weeks.

Key words: Adverse perinatal outcome, late term delivery, Post term delivery

1. Introduction

1.1. Background

According to American Obstetricians and gynecologists(ACOG) , 2013 and World health Organization(WHO) 1977 post term pregnancy is define as pregnancy that has reached or extended beyond 42 0/7weeks of gestation from the last menstrual period (LMP), whereas a late-term pregnancy is defined as one that has reached between 41 0/7 weeks and 41 6/7 weeks of gestation (1,2).The incidence of postterm pregnancy varies from 3-12%, depending on definition used, the population studied and the dating criteria utilized. Late gestational age is at risk of perinatal morbidity and mortality especially in older women and null parity (3, 4). Compared to term pregnancy perinatal mortality is relatively high in post term pregnancy. It has also been associated with an increased risk of neonatal morbidity such as meconium aspiration syndrome, fetal distress, and asphyxia in neonatal period, pneumonia, malformations, macrosomia and fetal birth injury. Although it is known that increases in post term pregnancies, what has received less attention is whether and to what extent these risks increase before 42 weeks of gestation (5).

Adverse perinatal outcomes gradually increase after 40 gestational weeks and are substantially increased post –term (≥ 42 weeks (≥ 294 days)). The risk of stillbirth has been shown to increase after term and worldwide as much as 14% of stillbirths are associated with prolonged pregnancy. The supposed increased risk factor is mainly an important factor in decision making for delivery at or beyond 41 week gestation at different countries and hospitals. Additionally, maternal complications also increase with duration of pregnancy beyond 40 weeks (5,6).To prevent these complications no agreement exist on how to manage late term and post term pregnancies. The World health organization recommends induction of labor at 41 weeks and many countries offer induction between 41 and 42 weeks to avoid prolonged pregnancy adverse effects (6, 7, 8, 9).

When we come to our country, Ethiopia concerning the issue of management of late term pregnancies without other obstetric complication have no difference with term pregnancy. According to our new guideline induction of labor was indicated only for post term pregnancy despite the recommendation of earlier termination of pregnancy at 41 weeks of gestation by World Health Organization (WHO).For developing country like Ethiopia where the financial issue is a concern it is better to deeply investigate the depth of the problem before applying the

recommendation. The other very important issue to be raised in our context is iatrogenic prematurity since lack of early milestones. In Ethiopia there is scanty studying papers on perinatal outcomes prior to 42 gestational week. Most of the research was focused only on the post term. This research was tried to fill the gap and to see the necessity of elective induction at late term to improve our obstetric care.

1.2. Statement of the Problem

Among the important determining factors that affect the neonatal outcome, gestational age remains the most essential factor. Even though prematurity is more associated with short term and long term neonatal complications, the prolongation of pregnancy beyond term has also effect on maternal and perinatal outcomes. Nowadays the late term and post term pregnancies complication has been recognized among obstetricians and received intensive attention in order to reduce the adverse out comes.

Even though absolute mortality risk have been decreased by advances in obstetrics and neonatal care, researches have shown that late term and post term pregnancies are at increased risk of the mother and fetus. The perinatal mortality rate of two to three deaths per 1000 deliveries at 40weeks' gestation approximately doubles by week and is four to six times greater at 44 weeks gestation. Coming to our context, there is lack of adequate data that compares the perinatal morbidity and mortality between full term, late term and post term pregnancies. This paper was attempted to assess the perinatal outcome in this specific gestational age and came up with possible recommendation to improve our obstetric care.

1.3. Significance of the study

In Ethiopia even though studies on the perinatal morbidity and mortality associated with post term was conducted there was few study on both late term and post term perinatal morbidity and mortality. In clinical practice, pregnancies that continue beyond term $\geq 41+0$ weeks gestation were a matter of concern. Several studies have demonstrated that late term and post term pregnancies are associated with an increased risk of perinatal morbidity and mortality. Though most of the institutions manage post term pregnancies with induction of labor, there is a controversy on the management of late term pregnancies to be managed with induction of labor

to reduce adverse perinatal outcomes. In Ethiopia, the national guideline uses post-term definition of 42 +0 weeks to assess pregnancies that might be eligible for induction of labor.

In developing country like Ethiopia where the facilities and economic constraints are a great problem, clear prevalence of morbidity and mortality should be known before adopting the induction at 41 weeks of gestation. This research was tried to assess the perinatal morbidity and mortality in full term, late term and post term pregnancies in three teaching hospitals, Addis Ababa. In addition the study helps to improve our care to prevent the complication associated with late term and post term pregnancies.

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2. Literature Review

2.1 .Definition of late term and post term pregnancy

In 1970, World health organization (WHO) and in 2013, American college of Obstetricians and gynaecologists (ACOG) defined post term pregnancy as pregnancy lasting 294 days or one which continues beyond 42 weeks after the first day of last menstrual period .Currently a pregnancy that lasts for 41 weeks (41 weeks+0 and up to 41 weeks+6) has been described as “late term” (1, 10, 11, 12).

2.2. Incidence of late term and Post term Pregnancies

Globally, the incidence of pregnancies that continue beyond 42 weeks’ gestation varies between 3 and 12 % (11,13,14). On a multinational cross sectional study on variation in use of childbirth intervention of 13 high –income countries has shown that, the incidence of pregnancies 41+0 GW and beyond varied between 3.5% and 25.7%. The corresponding numbers of post term pregnancies was 0.1% and 6.7% respectively (15,16). In Ethiopia on cross sectional study done at two teaching hospital in Addis Ababa the incidence of post term pregnancy was 8.8% (17). The exact incidence of late term pregnancy was not well known, but on approximately 20% of pregnant women have not gone into spontaneous labor at gestational week of 41+0 (18). Currently the incidence of post- term pregnancies increase as the accuracy of the dating criteria used increases. In obstetric care the accuracy of gestational age plays a great role. In order to know when the pregnancy is full term, late term or postterm properly dating is needed. To calculate the gestational age and due date different methods are applied. One of the method of gestational age and due date estimation is by calculation from the date of the LMP for spontaneous conceived pregnancies, and the other is the date of embryo transfer for pregnancies conceived by assisted reproduction, the most reliable method is by ultrasound measurement of the embryo in the first trimester up to and including 13 6/7 weeks of gestation (19). Both under estimating and over estimating of gestational age calculated from LNMP alone can be a source of problem in managing the pregnant women .If the gestational age is underestimated prematurity may be misdiagnosed, and unnecessary obstetric intervention will be made.

However overestimation of gestational age is more likely, increasing the risks of unnecessary induction in labour. Error in estimating gestational age from LNMP is due to inaccurate women recall, maternal preference of date of LMP and random errors. To reduce error arising from using LNMP, use of early ultrasound is preferred option for accurate dating. Using early ultrasound for gestational age estimation is derived from high income countries where an early ultrasound is a standard component of antenatal care, however, for low –income settings; the World Health Organization (WHO) recommends at least one ultrasound before 24 weeks' gestation (20). There are also other factors that affect the accuracy of gestational age estimation include late booking for antenatal care(ANC) or late presentation to first antenatal visit, menstrual cycle irregularity, or recall bias. High body mass index (BMI) and fibroids may also hinder the accuracy of gestational age estimation by fundal height measurement (20).

Regarding the better gestational age estimation studies have shown that ultrasound before 24 weeks gestation are better to provide a better gestational age assessment. A Cochrane review found that, compared with selective ultrasonography, routine prenatal ultrasonography before 24 weeks' gestation provides better gestational age assessment and earlier detection of multiple pregnancies and fetal malformations. In the study 11 trials 37505 women were involved and ultrasound for fetal assessment in early pregnancy reduces the failure to detect multiple pregnancy by 24 weeks GA (RR 0.07, 95% CI 0.03 to 0.17). Routine scan is associated with a reduction in induction of labor for post term pregnancy (RR 0.59, 95% CI 0.42 to 0.83)(21). Another Cochrane review in 2021 has reached on conclusion that estimation of EDD by ultrasound in the first trimester may result in fewer induction of labor(IOL) due to postterm pregnancies compared to an estimation of EDD with second trimester Ultrasound or if the latest normal menstrual period was used(22). Even in using ultrasonography for estimation of gestational age there is a difference in turned to be post term. In Sweden, in 2019, 4.8% of a population turned postterm when EDD was estimated between 12+4 and 13+6 week of gestation, compared with 5.2 %in a population where the estimation was performed during 18-20 gestational week and 5.8%in the group estimated with CRL(23) .Comparison between using the last menstrual period and early ultrasound for estimation of gestational age was made on a retrospective study of a total of 34,249 pregnant women with “certain” menstrual dates (i.e. , patient stated that she was sure of her dates, that she had regular menstrual cycles ,and that she had not taken oral contraceptive pill in the preceding three months), ultrasound dating during the

estimated gestation age range of 13 to 24 weeks gave a more accurate prediction of the delivery date than estimates based on the last menstrual period alone or in combination with ultrasonography. Early ultrasound dating also result in a 70 percent reduction in the number of pregnancies that were considered post term (23).

2.3 .Etiology of Postterm pregnancy

For truly existing post term pregnancy the etiology is usually unknown, though the most common cause of prolonged pregnancies is inaccurate dating. Many Studies have identified a positive association between post-term pregnancy and advanced maternal age ≥ 30 years, nulliparity, obesity, previous post-term pregnancy, male fetus, hormonal factors and genetic predisposition (5). Obesity can also affect the duration of pregnancy and time of delivery but the mechanism is not well known. Study has shown that women who have high BMI have a higher incidence of postterm pregnancy (24). Both maternal and paternal genetic factor play a role in post term pregnancy. One population cohort study has shown that a post term mother >42 weeks had a 49% increased risk of giving birth to Child at >42 weeks (relative risk (RR) 1.49, 95% CL 1.47-1.51) and post –term father had a 23% increased risk of fathering a child at >42 weeks (RR 1.23, 95%CI 1.20-1.25) (25). Certain fetal conditions, such as anencephaly ,trisomy 16 and 18 and Seckel’s dwarfism (primordial dwarfism characterized by microcephaly, typical craniofacial appearance with a beak like prominent nose, mental retardation and various other congenital anomalies) are also associated with post term pregnancy(26). Placental sulfatase deficiency is also associated with post term although the precise physiologic reasons for this association are unknown (27). The physiologic process of onset of labor is not fully understood .The mechanisms for initiation of labor and timing of human parturition have been studied in an attempt to understand how to prevent preterm and post-term birth, both of which are associated with poor perinatal outcomes but have so far remained a mystery (28).

2.4 .Neonatal Adverse Outcomes

Pregnancies beyond 41 weeks’ gestation are said to be associated with a number of perinatal and maternal complication when compared with term pregnancies. The perinatal morbidities such as meconium aspiration syndrome, infant injury, and asphyxia in neonatal period, pneumonia,

sepsis, macrosomia, neonatal convulsions, peripheral nerve damage and severe birth depression have been shown to increase with increasing gestational age (5). Although most researches focus on perinatal outcome of postterm pregnancies, what has received less attention is whether and to what extent these risks increase before 42 weeks of gestation. Ongoing pregnancy from 41 weeks onwards is also associated with an increased risk of perinatal death and morbidity although the absolute risk of perinatal death is low (29). A population based, unmatched case-control study done in Australia has shown that the risk of neonatal encephalopathy increases significantly in newborns late term and post term (41GW: aOR 3.3 and 42 GW: aOR 13.2 versus 39GW) (30).

As passage of meconium increased with advanced gestational age, the incidence of meconium aspiration syndrome is also increased. Meconium aspiration syndrome is responsible for substantial morbidity like respiratory distress and pulmonary infection and mortality in late term and post term pregnancy. Its incidence increases regularly between 38+0 and 42+6 weeks, from 0.24% to 1.42 % (7). Similarly, the risks of neonatal acidosis, 5 minute Apgar score less than 7 and admission to neonatal intensive care unit increases progressively between 38+0 and 42+6 weeks. Delivery after 42 weeks of gestation also was associated with a significant increase in the rate of neonatal intensive care unit admission (OR, 2.05; 95% CI, 1.35-3.12) (7). A Swedish cohort study has shown that among primiparous there was an increased risk of Apgar score <7 at 5 minutes (OR 1.27; 95 %CI 1.16-1.41) and meconium aspiration (OR 1.49, 95%CI 1.14-1.95) was found after birth at most expectant units compared with most active units (31). These risks appear to double for post term growth restricted newborns.

Fetal macrosomia is also one of the concerns in late term and post term pregnancies. Post term newborns have a risk of macrosomia five times higher than that of term newborns, and macrosomia increases the risk of hypoglycemia. This increased in fetal macrosomia is believed to contribute increased risk of operative vaginal delivery, cesarean delivery, obstetric injuries related to shoulder dystocia and bone fractures. Finally post maturity is a risk factor for polycythemia and the risk of neonatal sepsis increased by a factor of 1.3 in post-term newborns (7).

From 37+0 to 43 +6 weeks, the risk of perinatal mortality increases regularly, from 0.7%-5.8 %. In prolonged pregnancies the fetus is at increased risk of oligohydramnios, fetal heart rate abnormalities and meconium staining in utero (7). The risk of still birth was significantly higher

in post term pregnancies than in term pregnancies (5). A retrospective cohort study in California have shown that the risk of the intrauterine death at term increases with gestational age from 2.1 per 10,000 ongoing pregnancies at 37 weeks gestation up to 10.8 per 10,000 ongoing pregnancies. At 38 weeks of gestation, the risk of expectant management carries a similar risk of death as gestational age of delivery increases (39 weeks of gestation: 12.9 compared with 8.8 per 10,000; 40 weeks of gestation: 14.9 compared with 9.5 per 10,000; 41 weeks of gestation: 17.6 with 10.8 per 10,000) (32,33). The Danish study has also showed an adjusted odd ratio (aOR=1.36; 95 % CI 1.08-1.72) for stillbirth in post term compared to term pregnancies (5).

According to observational studies and systemic reviews, we can summarize that the perinatal morbidity and mortality is increased in late term and post term pregnancies when compared with term pregnancies

Maternal complications also increase in late term and post term pregnancies when compared with term pregnancies. A Danish register study showed that the risk of labor dystocia, cephalopelvic disproportion, cervical laceration, emergency caesarean deliveries, postpartum hemorrhage and puerperal infection was higher in postterm than in term pregnancies (aOR 1.2-1.6) (5).

2.5. Management of Late term pregnancies

In spite of efforts to improve pregnancy dating and gestational age estimation, a significant number of pregnancies continue beyond term and are at risk of adverse outcomes. In order to reduce these adverse outcomes different interventions are forwarded including induction of labor at 41 weeks of gestation (34, 35, 36). Membrane sweeping, which involves the digital separation of the membranes from the lower uterine segment during pelvic examination with a dilated cervix, is associated with a decreased risk of late term and post term pregnancies (35,37). A Cochrane review has shown that membrane sweeping may be effective in achieving a spontaneous onset of labor associated with a significant reduction in the number of pregnancies that progressed beyond 41 weeks of gestation (38). Currently there are no tests available to ascertain whether it would be better to continue with the pregnancy or to induce birth or test that can determine the best possible time for induction. Although antepartum fetal surveillance is also considered as one of the measure preventive of adverse effect for pregnancies at or beyond 41

weeks of gestation there are insufficient data to define the optimal type or frequency of testing. A Cochrane review of five randomized and quasi randomized trials of fetal surveillance in 2,974 high pregnancies that include post term pregnancies found no difference in perinatal death between the BPP and NST groups (RR, 1.35 ;95% CI 0.6-2.98) (38). To reduce the risk of late term and postterm pregnancy most countries have guidelines advising on elective labor induction at late term (≥ 41 WG). According to these guidelines elective labor induction before 42 weeks gestation has been proposed to reduce rates of adverse fetal and maternal complication. The Canadian Multicenter Post term pregnancy Trial is the largest individual randomized controlled trial (RCT) to date comparing labor induction at 41 weeks with expectant management. In this study 3,407 women with pregnancies at least 41 weeks' gestation were randomized to immediate induction or expectant management with fetal monitoring. Monitoring consisted of daily counts, non-stress test three times per week and ultrasound amniotic fluid volume assessment two or three times per week. The expectant management group had a significantly higher rate of cesarean deliveries than the induction group (OR, 1.22; 95% CI, 1.02-1.45). The expectant management group had a significantly higher rate of cesarean deliveries resulting from fetal distress, but there was no difference between groups in rate of cesarean deliveries resulting from dystocia. No differences were found in perinatal mortality rates and no differences were found in neonatal morbidity outcomes (38). The Society of Obstetricians and gynecologists of Canada Clinical Practice Guidelines proposed induction of labor between 41 and 42 weeks of gestation. However there is no similarities between times of induction in these guidelines (37). World health organization (WHO), 2018 recommended IOL for women who are known with certainty to have reached 41+0GW based on Cochrane systematic review (33). The other Cochrane review which includes 34 RCT was also conducted to compare a policy to induce labour usually at 41 completed weeks' gestation with waiting for labor to start and /or waiting for a period before inducing a labour. A policy of labour induction was associated with fewer perinatal deaths (RR 0.31, 95% CI 0.15 to 0.64). There were four perinatal deaths in the labor induction group compared with 25 perinatal deaths in the expectant management group. There were also fewer stillbirths in the induction group (RR 0.30; 95% CI 0.12 to 0.75). The study has shown also there were fewer cesarean sections compared with expectant management (RR 0.90, 95% CI 0.85 to 0.95); and probably little or no difference in operative vaginal delivery with induction (RR 1.03, 95% CI

0.96 to 1.10).According to this study induction made little or no to perinatal trauma (RR 1.04,95% CI 0.85 to 1.26) (35).

On contrary to this RCTs have found no significant differences in perinatal mortality rates after 41 completed week's gestation. Among the 1701 women in the induction group, 360(21.2%) underwent cesarean section, as compared with 418 (24.5%) of the 1706 women in the monitoring group ($p=0.003$).This difference resulted from a lower rate of cesarean section performed because of fetal distress among the women in the induction group (5.7% Vs 8.3 %, $P=0.003$).There were no perinatal deaths in the induction group and two stillbirth in the monitoring group.(36, 37).Another systemic review has found that induction of labor at or just after 41weeks gestation doesn't significantly reduce perinatal mortality rates(OR 0.41; 95% CI 0.14 to 1.18).It has also been suggested that induction of labor may be associated with an increase in perinatal morbidity, especially when the cervix is not favorable for induction (28).

These variations in findings have led to much controversy and confusion over how women with late term and post term pregnancy should be cared for. Therefore conducting this research is important since it provides additional information in our context to improve our practice in obstetrics care

3. Objectives

3.1. General Objective

To assess the adverse outcome of full term, late term and post term pregnancy in three teaching hospital in Addis Ababa.

3.2. Specific Objectives

1. To assess the perinatal morbidity and mortality in full term, late term and post term pregnancies
2. To compare the perinatal outcome among full term, late term and post-term pregnancies.

4. Methods and Materials

4.1. Study Site

The study was conducted in Addis Ababa, the capital city of Ethiopia. As of 2018, the city has a total estimated population size of 7,823,600. Regarding health facilities and health services, there are 994 clinics, 99 health centres and 42 hospitals. Of the hospitals, 15 are registered public. (Addis Ababa Health Bureau, 2021) the three teaching hospitals selected were affiliated with Addis Ababa University even though the two hospitals are managed by Addis Ababa city health administration bureau. The study was implemented on three selected teaching hospitals: Tikur Anbesa, Ghandi memorial and Zewditu Meorial Hospital in Addis Ababa. The hospitals provide antenatal care, delivery and post-natal services to a pregnant woman from different parts of the country based on

4.2. Study design

A facility based comparative cross -sectional study was conducted in three teaching hospitals in Addis Ababa from December 1, 2022-May30, 2023

4.3. Source of Population

All deliveries in selected three teaching hospitals Addis Ababa during the study period

4.4. Study population

All deliveries at or beyond 37+0 weeks' gestation in selected three teaching hospitals during the study period

4.5. Inclusion and Exclusion Criteria

4.5.1. Inclusion Criteria

All deliveries from women who had clinical diagnosis of early ultrasound before 24 weeks gestation or reliable LNMP and /or gestational age used by the attending physician in managing the case in the selected three teaching Hospital, who gave informed consent to participate in the study.

Singleton pregnancy

Cephalic presentation

4.5.2. Exclusion Criteria

Multiple births

Mother with any uterine scar

Babies with inaccurate gestational age or babies with gross congenital malformations, and

Babies delivered before 37+0 weeks of gestation were excluded

Mother who had current medical, obstetrics or surgical complications like pre-eclampsia, chronic hypertension diabetes mellitus.

4.6. Sampling Technique and Procedure

Currently, there are 15 public hospitals and 27 registered private general hospitals in Addis Ababa. Of the 15 public hospitals, three teaching hospital: Tikur Anbesa, Zewditu Memorial and Gandhi Memorial Hospitals are selected.

The three teaching hospitals were chosen in order to attain convenient sample size. In selected hospitals, all deliveries within the study period were recruited and participants were selected as long as the inclusion /exclusion criteria were met at all three hospitals managed by similar OBGYN and follow the similar protocol.

4.7. Sample Size Determination

Since we had three sets of population to be compared, EpInfo software was used to calculate sample size. Unpublished cross section research done in 2016 in three teaching hospital was used NICU admission late term deliveries 26.3%, (OR=1.85, 95% CI 1.02-3.35; P<0.05)

Two sided significance level (1-alpha):	95
Power (1-beta, chance of detecting:	80
Ratio of sample size, unexposed/exposed:	1
Percent of Unexposed with outcome:	11
Percent of Exposed with outcome:	19
Odds Ratio:	1.9
Risk/Prevalence Ratio:	1.7
Risk /Prevalence difference:	8
Sample size –Exposed (≥ 41 weeks)	312
<u>Sample size-Non exposed (term)</u>	<u>312</u>
Total sample size:	624

5% (30) non respondent $624+30 = 654$. The sample was collected for full term, late term and post term deliveries in 1:1: 1 ratio. Based on the number of deliveries in three selected hospitals the number of sample was from the three teaching hospital, Zewditu Memorial Hospital, Gandhi Memorial hospital and Tikur Anbesa Hospital during the study period.

4.8. Study Variables

4.8.1. Dependent Variables

Perinatal morbidity and mortality: 5th minute Apgar score less than 7, still birth, neonatal death within 7 days, NICU admission at for one or more days of stay and treated , MAS/RDS, Birth weight, Meconium aspiration syndrome, birth injury
Caesarean section

4.8.2. Independent Variables

Socio-demographic variables (age, marital status, educational status, religion, occupation, income, address)

Gravidity

Parity, abortion, (ectopic/GTD), previous c/s, previous uterine surgery

Current Gestational age

4.9. Operational Definitions

Early neonatal death: is the death of a baby born after GA of 39+0 week and above and within the first 7 days or until discharge.

Early term: pregnancy at Gestational age of 37+0through 38+6 weeks

Full term: pregnancy at Gestational age of 39+0 through 40+6 weeks

Late term: pregnancy At Gestational age of 41+0 weeks through 41+6 weeks

Post term: pregnancy at gestational age of 42+0weeks and beyond

Term pregnancy: pregnancy at gestational age of 37-41+6 weeks

Early ultrasound: First trimester and second trimester ultrasounds up to GA of 24 weeks

Poor perinatal outcome: a composite of perinatal mortality, a 5 minute Apgar score below 7 , meconium aspiration syndrome, birth injury, and /or NICU admission.

Meconium Aspiration syndrome: as clinician /neonologist attending to the neonate and treated for MAS at delivery in the presence of meconium.

Gestational age: clinical diagnosis of gestation of the fetus made by attending physician Obstetrician in the management of the pregnancy (using early U/S or LNMP).

Still birth: None of the signs of life are present at birth at or after 37 weeks of gestation or registered as Still birth by attending physicians (and may be no APGAR or sign of life registered in the clinical record.

Non reassuring fetal status: category three FHRP, latent with Grade III MSAF, cord prolapse

4.10. Data Collection and analysis

Data was collected by a validated structured questionnaire developed from previous published literature which was tested on late term and post term deliveries. The questionnaire was used to elicit information regarding socio-demographic characteristics, gestational age, parity, previous obstetric history, perinatal morbidities and mortality.

The data was collected by trained interns, residents and the principal investigator. The consent was obtained by the data collectors. The participants was recruited during labor or after admission to labor ward and after delivery daily by checking the deliverology book and clinical record then if fulfilled criteria, data collectors approaches the potential participant and whenever the clinical record was not complete interviewing.

The consent was taken when potential participant was well and comfortable after delivery before discharge .The consent was taken to see the perinatal morbidity and mortality in late term and post term pregnancies. Hence, I am asking you to consent for data extraction and brief an

interview for some information missing from your clinical records before I start collecting data. The data collection similarly, involved the attending physicians in the labor or maternity ward and neonatology for possible interview if the new born clinical record was not completed. After consent from the participant, data extraction from clinical record was undergone.

The data was analyzed using the statistical package SPSS. Pretest of the questionnaire was done in selected 15 respondents prior to the data collection. The information sheet was translated to local language and read to potential participants before data extraction or interview.

4.11. Data Quality Assurance

Training was given for data collectors and supervisors. Data compilation system and data completeness was checked and strictly controlled by the principal investigator and supervisors. Double data entering and random checking was done to ensure the validity of the study.

Confidentiality and privacy of the participants was kept during the training session and data collection time

4.12. Data Analysis and Interpretation

After the data have been collected, the data was first checked for completeness, edited, and coded. The exact data was cleaned; checked for accuracy and consistency, then it was entered into SPSS version 25 and analyzed. Descriptive and analytic statistical procedures was used as statistically significant determinants of perinatal adverse outcome. The population was divided into three groups: post-term (≥ 42 weeks gestation), a late term group of 41 to 41+6 week gestation, full term 37-40+6 week gestation. The baseline characteristics primary outcomes of the three groups were compared using one way ANOVA (followed by Scheffe post hoc test) for continuous variables and the chi-square test for categorical variables. The Statistical Package for Social Sciences 25 version (SPSS) was used for data analyses. Chi-square test was used to compare categorical variables and Odds ratio (OR) [95% confidence interval (CI)] calculation were made. $P < 0.05$ was considered significant

Table 1. The sociodemographic and obstetric characteristics of the study participants who gave birth at full term, late term and post term pregnancy.

5. Result

5.1 Sociodemographic characteristics of the study participants

In this study 654 were involved with a response rate of 100%. More than ninety one percent (n=599) of the study participants were in the age group of 20-34 years with mean and SD of 26.9±4.3 respectively. Majority (64.1%, n=419) of the study participants completed either primary or secondary education level. Almost all (97.2%, n=636) had married and 58.4% (n=382) were unemployed. One-fourth of the study participants had a monthly income of 5250-7800 ETB. Fifty eight percent (n=7) of under 19 aged participants delivered in (37-40⁺⁶ week) pregnancy while 48.8% of aged ≥35 years delivered in post term (≥42wks) pregnancy. Eighty three percent (83.2%, n=544) of the study participants gestational age were calculated from ultrasound before 24 weeks of gestational age (Table 1)

	37-40 ⁺⁶ n=220	41-41 ⁺⁶ n= 216	≥42 n =218	
Variable	No Col (%)	No Col (%)	No Col (%)	Total (Raw %)
Age				
≤19	7(58.3)	3(25)	2(16.7)	12(1.8)
20-34	201(33.6)	203(33.9)	195(32.6)	599(91.6)
≥35	12(19.7)	10(23.3)	21(48.8)	43(6.6)
Odd's ratio (CI: 95%)	1	6.9(1.15, 41.18)	2.74(1.18, 6.35)	
Education				
Illiterate (no formal education)	41(32)	43(33.6)	44(34.5)	128(19.6)
Primary and Secondary	143(34.1)	133(31.7)	143(31.4)	599(91.6)
Tertiary	36(33.6)	40(23.9)	31(18.6)	107(16.4)
Odd's ratio (CI: 95%)	1	1.07(0.56, 2.05)	0.82 (0.38, 1.77)	
Religion				
Orthodox	129(37.8)	108(31.7)	106(31.2)	341(52.1)
Muslim	63(29.7)	73(34.4)	76(35.8)	212(32.4)
Protestant and catholic	30(29.7)	35(34.6)	36(35.6)	101(15.4)
Odd's ratio (CI: 95%)	1	0.73 (0.42, 1.26)	0.899 (0.48, 1.68)	
Marital status				
Married	213(33.5)	212(33.3)	211(33.2)	636(97.2)
Single/ divorced ¹	6(40%)	4(26.7)	5(33.3)	15(2.3)
Odd's ratio (CI: 95%)	1	2.64(0.18, 39.57)	2.60 (0.14, 47.26)	
Occupation /profession				
Employed(self and government)	94(34.6)	87(32.0)	91(33.4)	272(41.6)
Unemployed	126(32.9)	129(33.8)	127(33.2)	382(58.4)
Odd's ratio (CI: 95%)	1	0.90(0.62, 1.32)	0.96 (0.65, 1.4)	
Family monthly income				
≤3200	9(45)	3(15)	8(40)	20(3.1)
3201-5250	45(35.4)	41(32.3)	41(32.3)	127(19.4)
5250-7800	58(35.2)	60(36.4)	47(28.5)	165(25.2)
7801-10900	55(29.7)	62(33.5)	68(36.8)	185(28.3)
≥10900	53(33.8)	50(31.8)	54(34.4)	157(24.0)
Odd's ratio (CI: 95%)	1	(1.15(0.53, 2.49)	1.49(0.89, 2.73)	
Family size				
≤2	104(36.4)	76(26.6)	106(37.1)	286(43.7)
3-4	99(32.8)	111(36.8)	92(30.4)	302(46.2)
≥5	17(25.6)	29(43.9)	20(30.3)	66(10.1)
Odd's ratio (CI: 95%)	1	1.35 (0.64, 2.86)	0.41(0.20, 0.84)	
Base line for GA calculation				
Early u/s before 14 weeks	78	67	70	215(32.9)
U/s 14-24 weeks	102	121	106	329(50.3)
LNMP	40	28	42	110(16.8)

5.2 Obstetric characteristics of the study participants

Forty-three percent (n=283) of the study participants were primigravida and from those primigravida 34.6% (n=98) were delivered in post term pregnancy. More than half (52.1%, n=340) were nulliparous and 29 % (n=193) were primiparous. Eighty nine percent (n=581) were referred from other health institution and from those 28.7% were referred with an assessment of prolonged LFSOL followed by post term, late term, oligohydramnios and NRFS (fig.1) (table 2).

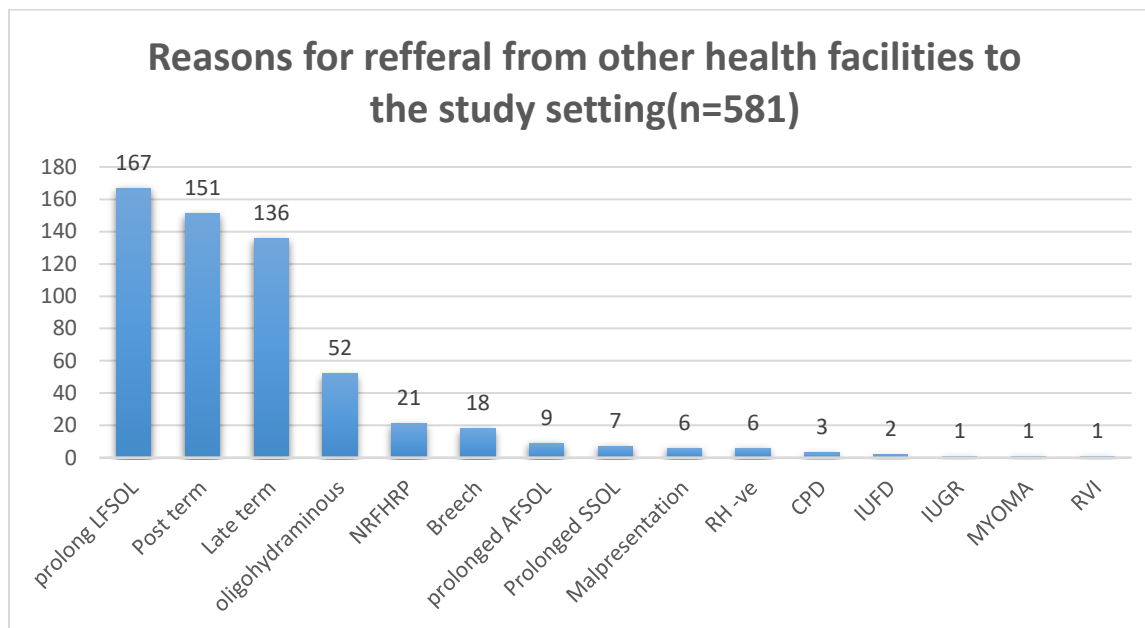


Figure 1. The reasons of referred participants to the current study setting from other health facility.

Table 2. The obstetric characteristics of the study participants who gave birth in full term, late term and post term pregnancy: AA, Eth,2023

Variable	Gestational age	Total (%)
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	37-40 ⁺⁶ n=220(33.6 %)	41-41 ⁺⁶ n=216(33.1%)	≥42 n =218(33.3%)	N=654	p-value
Gravidity	N (%)	N (%)	N (%)		0.307
Primigravida	101(35.6)	84(29.7)	98(34.6)	283(43.3)	
Gravida 2-4	60(31.25)	68(35.4)	64(33.3)	192(29.4)	
Gravida 4 and above	59(32.9)	64(35.8)	56(31.2)	179(27.4)	
Odd's ratio (CI: 95%)	1	2.1(1.03, 14.21)	3.2(2.10, 14.36)		
Parity					0.089
Nulliparous	120(35.3)	98(28.8)	122(35.9)	340(52.0)	
Primiparous	69(35.8)	73(37.8)	51(26.4)	193(29.5)	
Multiparous	31(25.6)	45(37.2)	45(37.2)	121(18.5)	
Odd's ratio (CI: 95%)	1	1.4(0.36, 9.81)	3.4(0.86, 16.21)		
Currently alive children					0.058
None	121(35.5)	98(28.7)	122(35.8)	341(52.1)	
One	69(35.2)	75(38.3)	52(26.5)	196(30.0)	
Two and above	30(25.6)	43(36.8)	44(37.6)	117(17.9)	
Odd's ratio (CI: 95%)	1	3.1(1.36, 15.21)	3.6(2.88, 22.64)		
having history of abortion					0.666
No	169(32.8)	171(33.2)	175(34)	515(78.7))	
Yes	51(36.7)	45(32.4)	43(30.9)	139(21.3))	
Odd's ratio (CI: 95%)	1	1.6(0.38, 18.32)	1.2(0.06, 24.31)		
Have previous history spontaneous deliveries					0.076
No	124(35.7)	101(29.1)	122(35.2)	347(53.1)	
Yes	96(31.3)	115(37.5)	96(31.3)	307(46.9)	
Odd's ratio (CI: 95%)	1	0.65(0.24, 11.45)	0.48(0.23, 9.24)		
Place of antenatal care					.001
health center	179(31.1)	200(34.7)	197(34.2)	576(88.1)	
private clinic and hospitals	41(52.6)	16(20.5)	21(26.9)	78(11.9)	
Odd's ratio (CI: 95%)	1	2.86(1.55, 5.28)	2.15(1.22, 3.78)		
Number antenatal care					0.030
<8	171(35.2)	160(32.9)	155(31.9)	486(74.3)	
≥8	49 (29.2)	56(33.3)	63(37.5)	168(25.7)	
Odd's ratio (CI: 95%)	1	2.4(0.19, 23.21)	3.1(0.64, 28.12)		
Was she referred					0.024
Yes	180(30.9)	202(34.8)	199(34.3)	581(88.8)	
No	40(54.8)	14(19.2)	19(26)	73(11.2)	
Odd's ratio (CI: 95%)	1	2.1(0.29, 12.33)	1.8(0.42, 18.44)		

5.3 The Labour and delivery characteristics of the study participants

Three-fourth (78.4%, n=513) of the study participants labour was started spontaneously and 21.6% (n=141) were induced. Oligohydramnios was the major indication of induction (56.7%, n=80). More than half 50.1 % (n=71) induction was at post term of gestational age. Almost all (97.2%, n=137) were primed with trans- cervical Foley catheter and 98.6% were induced with oxytocin. Among the induced pregnant women 54.9 % (n= 76) were delivered vaginally and 46.1 % (n=65) were delivered by cesarean section.

Seventy one percent (n= 470) of the study participants delivered within 12 hours of membrane ruptured. More than eighty two percent (82.4%, n=539) of the study participants had normal amniotic fluid volume and 65 % (n=425) were achieved vaginal delivery.

One-third (35.2%, n=230) of the participants were delivered by cesarean section and almost all surgery was done by residents the most indication for cesarean section 86.5 % (199) was NRFS and 40 % (n=92) at post term gestational age. All of them had an estimated blood loss of less than 500ml and also the total duration of surgery for all cesarean section were less than 60 minutes. (Table 3)

Table 3. The labor and delivery characteristics of the study participants.

Variable		GA			Frequency (%)
		37-40 ⁺⁶ n=220(33.6 %)	41-41 ⁺⁶ n=216(33.1%)	≥42 n =218(33.3%)	
Onset of labor					
Spontaneous	SVD	141(40.5)	118(33.9)	89(22.6)	348(53.2)
	CS	60(36.4)	47(28.5)	58(35.2)	165(25.2)

	1	1.07(0.68,1.60)	0.65(0.417,1.02)	
Odds ratio (CI: 95%)				
Induced	SVD	12(15.8)	27(35.5)	37(48.7)
	CS	7(10.7)	24(36.9)	34(52.3)
Odds ratio (CI: 95%)	1	0.65(0.22,1.94)	0.64(0.22,1.8)	76(11.6)
Indication for induction (+/-ripening)				65(9.9)
post term	0	0	54(100)	54(38.3)
Oligohydramnios and IUGR	19(17.5)	50(62.5)	18(20)	87(61.7)
Method of cervical ripening				
Misoprostol	0	3(75)	1(25)	4(2.8)
trans cervical Foley catheter	19(13.5)	48(35)	70(51.1)	137 (97.2)
Was oxytocin used for induction				
Yes	19(13.7)	51(36.7)	69(49.6)(	139(98.6)
No	0	0	2(100)	2(1.4)
Does induction +/-ripening initiate contraction				
Yes	19(13.6)0	50(35.7)	71(50.7)	140(99.3)
No	0	1	0(100)	1(.7)
Does ripening or /and induction failed				
YES	3(18.8)	6(37.5)	7(43.8)	16(11.3)
NO	16(12.8)	45(36.)	64(51.2)	125(88.7)
Odd's ratio (CI: 95%)	1	0.71(0.16, 3.189)	0.58(0.14, 2.51)	
Reason for failed induction +/-ripening				
Inadequate Uterine Contraction	2(14.3)	5(35.7)	7(50)	14(2.1)
no cervical change	1(50)	1(50)	0	2(0.3)
Duration of labour before admission				
<8	62(34.4)	62(34.4)	56(31.1)	180(35.1)
≥8	139(41.7)	103(30.9)	91(27.3)	333(64.9)
Odds ratio	1	1.36(0.87-2.01)	1.38(0.88-2.01)	
Cervical dilatation on admission				
Latent (≤4)	126(33.2)	126(33.2)	127933.5)	379(58.6)
Active (≥5)	93	87	88	268(41.1)
Odds ratio	1	1.38(0.9-2.11)	1.84 (1.17-2.89)	
Augmentation initiated				
Yes	13(43.3)	12(40)	5(16.7)	30(5.8)
No	207(42.9)	207(42.9)	213(44.1)	483(94.2)
Amniotic membrane status on admission				
Intact	75(26.8)	93(33.2)	112(40.0)	280(42.8)
Rupture	145(38.8)	123(32.9)	106(28.3)	374(57.2)
Odds ratio CI:95%	1	1.46(0.99,2.15)	2.04(1.33,3.152)	
Duration of membrane rupture to delivery				
<12	145(30.9)	151(32.1)	174(37)	470(71.9)
≥12	75(40.8)	65(35.3)	14(23.9)	184(28.1)
Odds ratio CI:95%	1	1.2(0.8,1.79)	2(1.33,3.15)	
AF volume status on admission(SDP)				
Normal	186(34.5)	160(29.7)	193(35.8)	539(82.4)
Oligo	25(25)	52(52)	23(23)	100(15.3)
Poly	9(60.0)	4(26.7)	2(13.3)	15(2.2)
Odds ratio CI:95%	1	1.94(0.58,6.404)	4.67(0.99,21.89)	
mode of delivery				
vaginal delivery	153(36.1)	145(34.2)	126(29.7)	424(64.8)
Emergency caesarean section	67(29.1)	71(30.9)	92(40.0)	230(35.2)
	1	0.89(.59-1.34)	0.6(0.41,0.89)	

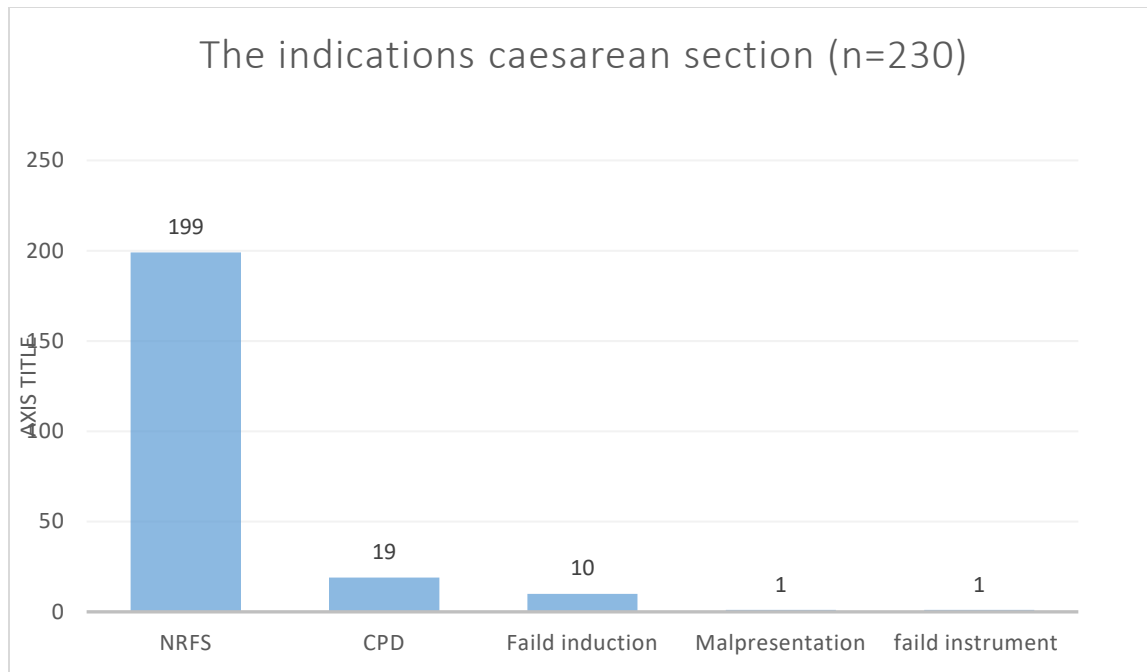


Figure 2. Indications of emergency caesarean delivery.

5.4 The Perinatal outcome characteristics the study participants

Seventeen percent (n=114) of newborn had adverse perinatal outcome. 17.2% (n=112) were admitted in NICU and the main diagnosis for NICU admission were EONS 93.7 % (n=105) MAS 36.6% (n=41), RDS 31.25% (n=35), PNA 1.4% (n=9) of the neonate were an APGAR of less than 7 at five minutes. (Figure 4). 0.9 % (n=2) neonate were still birth. The cause of early neonatal death were respiratory failure and multiorgan failure. The perinatal morbidity 14.1 % (n=31), 14.3 % (n=31) and 20.6% (n=45) in term, late term and post term pregnancies respectively

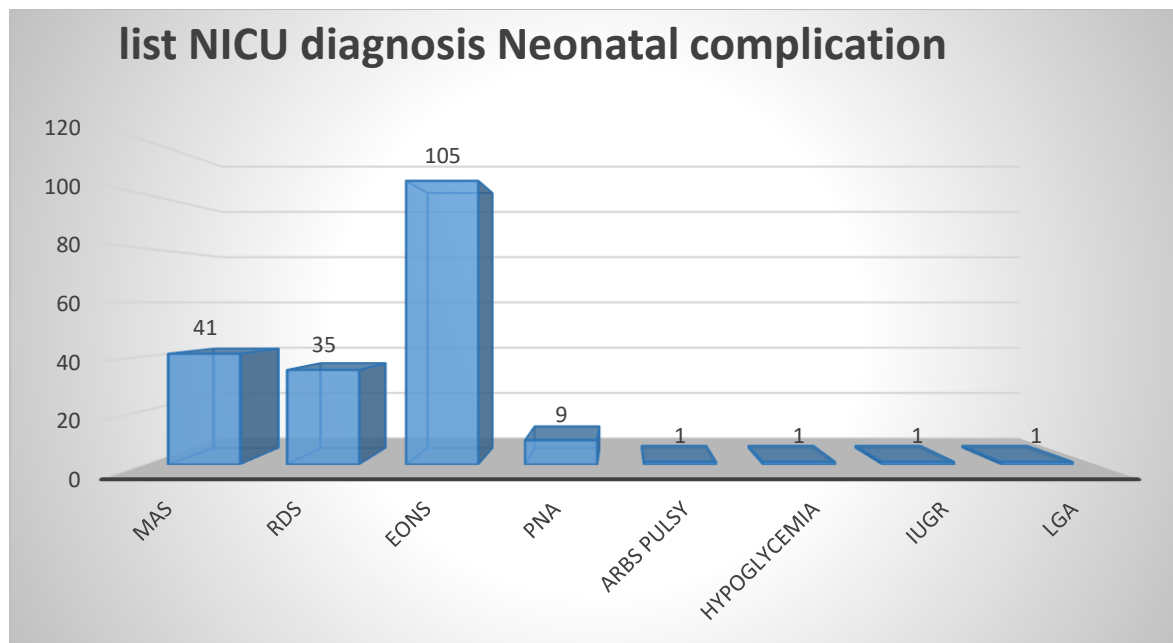


Figure 3. The admission diagnosis in neonatal intensive care unit

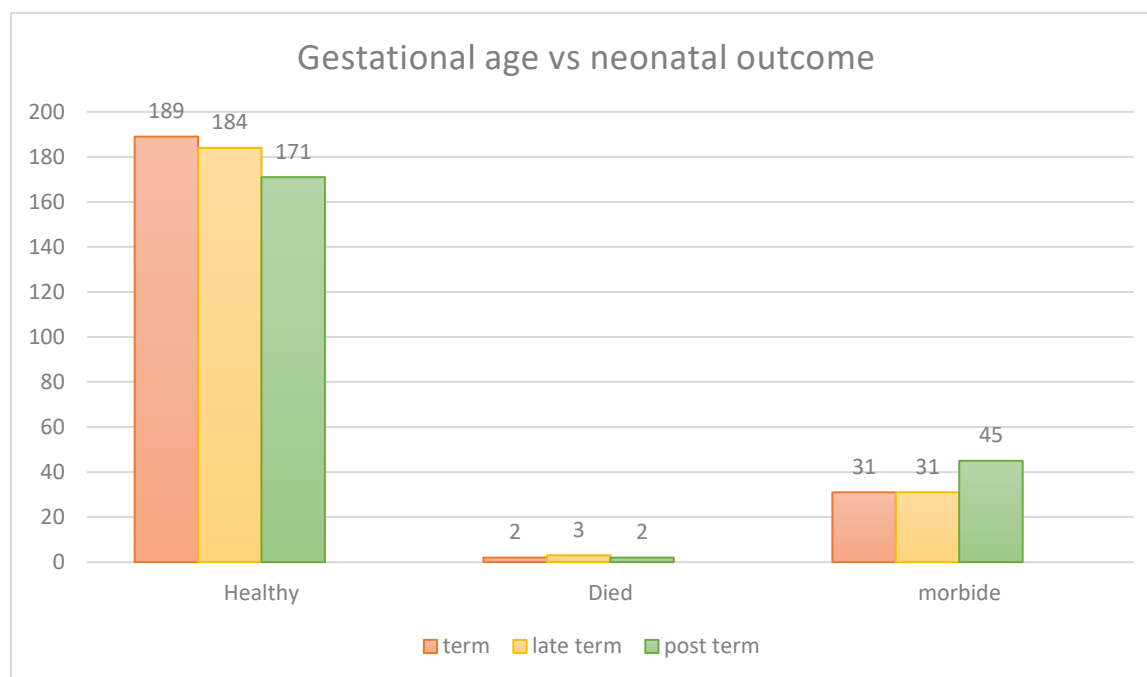


Figure 4. The relationships of gestation of delivery with composite perinatal outcome

5.5 The Adverse perinatal outcome in full term, late term and post term pregnancy

Adverse perinatal outcomes between the three groups are shown in table 4. There was significant statistical differences in the rate of meconium aspiration syndrome (p=0.039), cesarean section (p=0.027) and macrosomia (p=0.038). There were no significant difference in the respiratory distress syndrome, early neonatal sepsis, perinatal asphyxia, neonatal intensive care unit admission and 5th minute Apgar score.

Table 4. Adverse perinatal outcome between the three group

Variable	37-40 ⁺⁶ (n=220)	41-41 ⁺⁶ (n=216)	≥42 (n=218)	p-value
Weight in gram(mean and sd	3101.36 (381.24)	3272.69 (364.91)	3291.28 (393.93)	< 0.001
MAS				0.039
Yes	9(4.1)	11(5.1)	21(9.6)	
No	211(95.9)	205(94.9)	197(90.4)	
RDS				0.309
Yes	8 (3.6)	11(5.1)	15(6.9)	
No	212(96.4)	205(94.9)	203(93.1)	
EONS				0.120
Yes	32(14.5)	29(13.4)	44(20.2)	
No	189(85.9)	186(86.1)	174(79.8)	
PNA				0.874
Yes	3(1.4)	2(0.9)	2(0.9)	
No	217(98.7)	214(99.1)	216(99.1)	
NICU admission				0.104
Yes	33(15)	32(14.8)	47(21.7)	
No	187(85)	184(85.2)	171(78.5)	
Caesarean delivery				0.027
Yes	67(29.13)	71(32.9)	92(40.2)	
No	153(69.5)	145(67.1)	126(57.8)	
Macrosomia				0.038
Yes	5(2.3)	7(3.2)	15(6.8)	
no	215(97.7)	209(96.8)	203(93.2)	
Five-7minute APGAR≤6				0.174
Yes	14(6.3)	12(8.7)	19(8.7)	
No	206(93.7)	204(91.3)	199(91.3)	

Note: - * means p-value<0.05.

Results compared between group 1 and group 2 in table 5. There was no significant difference in perinatal adverse effect between group 1 (GA 37-40⁺⁶ week) and group 2 (Ga 41-41⁺⁶ week).

Table 5. Adverse perinatal outcome between group 1 and group 2 of the study

Variable	37-40 ⁺⁶ (n=220)	41-41 ⁺⁶ (n=216)	p-value
MAS			0.647
Yes	9(4.1)	11(5.1)	
No	211(95.9)	205(94.9)	
RDS			0.482
Yes	8(3.7)	11(5.1)	
No	212(96.3)	205(94.9)	
EONS			0.736
Yes	31(14.1)	30(13.9)	
No	189(85.9)	186(86.1)	
PNA			.0.893
Yes	3(1.4)	2(0.9)	
No	217(98.6)	214(99.1)	
NICU admission			0.653
Yes	33(15)	32(14.8)	
No	187(85)	184(85.2)	
Caesarean delivery			0.680
Yes	67(31.4)	71(32.9)	
No	153(68.6)	145(67.1)	
Macrosomia			0.558
Yes	5(2.3)	7(3.2)	
no	215(97.7)	209(96.8)	
Five-7minute APGAR≤6			0.916
Yes	14(6.3)	12(5.6)	
No	206(93.7)	204(94.4)	

Result between group 2 and 3 was shown in table 6. The rate of cesarean section was more frequent in group 3 (GA ≥42 weeks) compared with group 2 (GA 41-41⁺⁶ week) (40%; versus 30.9 % P=0.038) (OR: 95% CI; 1.5(1.02-2.23) but frequency of meconium aspiration syndrome and macrosomia were no significant difference in group 2 compared with group 3.

Table 6. adverse perinatal out come between group 2 and group 3 of the study

Variable	41-41 ⁺ 6 (n=216)	≥42 (n=218)	p-value
MAS			0.066
Yes	11(5.1)	21(9.6)	
No	205(94.9)	197(90.3)	
RDS			0.419
Yes	11(5.1)	15(6.8)	
No	205(94.9)	203(93.2)	
EONS			0.121
	30(13.9)	44(20.2)	
	186(86.1)	174(79.8)	
PNA			0.653
Yes	11(5.1)	2(0.09)	
No	205(94.9)	216(99)	
NICU admission			0.083
Yes	32(14.8)	47(21.5)	
No	184(85.2)	171(78.5)	
Caesarean delivery			0.038
Yes	71(32.8)	92(40)	
No	145(67.12)	126(57.8)	
Odd's Ratio CI; 95%	1.7(1.12, 2.47)		
Macrosomia			0.080
Yes	7(2.3)	15(55.6)	
no	209(97.7)	203(93.2)	
Five-7minute APGAR≤6			0.335
Yes	14(6.3)	19(42.2)	
No	206(93.7)	199	

Results were also compared between group 1(GA 37-40+6week) and group 3(GA ≥ 42 weeks)(Table 7).The frequency of meconium aspiration syndrome was higher in group 3 compared with group 1(5.1 % versus 4.1%; p=0.023) post term pregnancy versus full term pregnancy was associated with an increased risk of meconium aspiration syndrome (OR :95, CI; 2.5(1.1-5.59) the rate of cesarean section was more frequent in group 3 compared with group 1(42.2 % versus 31.4%;p=0.013) (OR : 95% CI; 1.5(1.02-2.23) and macrosomia was higher in in group 3 compared to group (15% versus 5%;p=0.022) (OR;95% CI ; 3.2(1.13, 8.90),there were no significant difference in the rate perinatal asphyxia, respiratory distress syndrome ,neonatal intensive care unit , early onset of sepsis and APGAR score less than 7 in 5th minute in group 1 and group3

Table 7. Adverse perinatal out come between group 1 and group 3 of the study

Variable	37-40 ⁺⁶ (n=220)	≥42 (n=218)	p-value
MAS			0.023
Yes	9(4.1)	21(9.6)	
No	211(95.9)	197(90.4)	
Odd's ratio CI :95%		2.5(1.1-5.59)	
RDS			0.134
Yes	8(3.7)	15(6.8)	
No	212(96.3)	203(93.2)	
EONS			0.121
	31(14.1)	44(20.2)	
	209(85.9)	174(79.8)	
PNA			1.000
Yes	3(1.4)	2(0.09)	
No	217(98.6)	216(99)	
NICU admission			0.062
Yes	33(15)	47(21.5)	
No	187(85)	171(78.5)	
Caesarean delivery			0.013
Yes	67(31.4)	92(42.2)	
No	153(68.6)	126(57.8)	
Odd's ratio CI :95%		1.7(1.12, 2.47)	
Macrosomia			0.022
Yes	5(2.3)	15(6.8)	
no	215(97.7)	203(93.2)	
Odd's ratio CI :95%		2.5(1.1-5.59)	
Five-7minute APGAR≤6			0.434
Yes	14(6.3)	19(8.7)	
No	206(93.7)	199(91.3)	

6. Discussion

Among 654 deliveries 17.4% (n=114) had an adverse perinatal outcome. 17.2% (n=112) were admitted in NICU and the main diagnosis for NICU admission were EONS 105(97.3%) MAS, 6.2% and RDS 5.4% respectively. There was 0.3 % (n=2) still birth and 0.8 % (n=5) was early neonatal death. 1.4% (n=9) of the neonate were an APGAR of less than 7 at five minutes. Thirty five percent (n=230) of the participants were delivered by cesarean section the most indication for cesarean section 86.5 % (n=199) was NRFS and 40 % (n=92) at post term gestational age. Meconium aspiration syndrome, cesarean section and macrosomia was associated with gestational age ≥ 42 weeks when compared with GA 37-40⁺⁶ week and 41 -41⁺⁶ week gestation.

The main finding was that post term pregnancy was an independent risk factor for neonatal morbidity even in low risk singleton pregnancies. In this study there was a significant statistical difference in the rate of meconium aspiration syndrome, rate of cesarean section and macrosomia among the three groups. The rate of meconium aspiration syndrome increased after 42 weeks of gestation when compared with both 37-40⁺⁶ week and 41-41⁺⁶ week gestation, but perinatal adverse outcomes in group 2 (41-41⁺⁶ week gestation) such as the rate of meconium aspiration syndrome, Apgar score <7 at 5th minute score, NICU admission and rate of cesarean section were similar with group 1 (37-40⁺⁶ week gestation).

The frequency of meconium aspiration syndrome was frequent in group 3 compared with group 1 (5.1 % versus 4.1%; p=0.023) (OR=2.5, 95%CI=1.11, 5.59) was similar with the prospective cohort study done in Iran and retrospective study done in Israel which showed that group 3 compared to group 1 (10% versus 0.9%; P < 0.001) and (OR 2.2, 95% CI 1.3 to 3.8) respectively (45, 47)

In this study GA ≥ 42 weeks was at increased risk of cesarean section. Gestational age was frequent GA ≥ 42 weeks compared with 37-40⁺⁶ (42.2 % versus 31.4%;p=0.013) (AOR=1.7; 95 % CI 1.12-2.47) and our finding was comparable with a finding in A Danish register study showed that the risk emergency caesarean deliveries was higher in post-term than in term pregnancies , and prospective Cohort study done in Iran that showed women in the in group 3 compared group 1 (33.3% versus 13.6%, P < 0.001)(5,45).

Our findings also showed significant association of macrosomia and delivery after 42 week of gestation was 3.2 times increased in fetal macrosomia when compared with 37-40⁺⁶ week gestation (AOR, 3.2, 95% CI: 1.13-8.90) which was expected at post term .This finding was in congruent with the study that showed post term newborns have a risk of macrosomia higher than that of term newborns (7, 10).

The rate of cesarean section was more frequent in group 3(GA ≥ 42 weeks) compared with group 2(GA 41-41 +6week) (40% versus 30.9 % P=0.038) (OR: 95% CI; 1.5(1.02-2.23) this finding was in congruent with a prospective study that showed women in the post-term group versus the late-term group had a significantly higher rate of caesarean section (8.9% vs 5.6%, p<0.001) (46).

In this study there was no significant risk of cesarean section between group 1 and group 2 in our study .This finding was contradict with finding in which the cesarean section was more frequent

in group 2 compared with group 1 (24.8% versus 13.6%; $P < 0.001$) in prospective cohort study despite similar population (45).

Even though post-term pregnancy versus full-term pregnancy was associated with an increased risk of NICU admission (OR 2.0, 95% CI 1.4 to 2.8), respiratory morbidity (OR 2.2, 95% CI 1.3 to 3.8) and infectious morbidity (OR 1.88, 95% CI 1.32 to 2.69) in retrospective Cohort study done in Israel ;there were no significant difference in the respiratory distress syndrome, early neonatal sepsis ,perinatal asphyxia neonatal intensive care unit admission and 5th minute APGAR score between group 1 and group 2 in our study(46)

There were no significant difference in the rate of meconium aspiration syndrome, Apgar score ≤ 7 of newborn at 5 minutes and NICU admission between the groups 2 and 3 in this study which is a similar finding in prospective cohort study that compared the late term and post term pregnancies adverse outcomes(45)

7. Conclusion

The finding of this study showed that participants whose gestational age of post term ($GA \geq 42$ weeks) had increased adverse perinatal outcomes than Gestational age of term ($GA 37-40+6$) week and late term pregnancies. A significant increased risk of perinatal complication like MAS, caesarean delivery and macrosomia were observed in $GA \geq 42$ weeks compared with 37-40 +6 weeks' gestation and late term pregnancies but there was no significant difference between term and late term pregnancies.

8. Strength and Limitation of study

Strength of the study

-comparing the three gestational group

Limitation of the study

-The study was conducted at referral hospitals which might not be representative to the general population.

9. Recommendations

To decrease the perinatal adverse outcomes in post term pregnancy induction and delivery will better before 42 weeks. In order to prepare guideline a national wide community level study is recommended.

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Informed consent sheet

Addis Ababa University, College of Health Sciences, Department of Obstetrics and Gynecology, Questionnaire designed to determine the prevalence of perinatal morbidity and mortality in term, late term and post term pregnancies in three teaching hospitals.

Procedure

Greetings,

My name is Dr. Befekadu Amentie, resident in Obstetrics and gynecology, from Addis Ababa University, College of health sciences.

We are conducting a study to determine the prevalence and associated factors of perinatal morbidity and mortality in term(37+0 to 40+6weeks), late term(41 to 41+6weeks) and post term(>42+0 weeks) pregnancies in three teaching hospitals in Addis Ababa

Procedure

We kindly request you to participate in this study. It may take 10-15 minutes of your time to fill the questionnaire. The study is anonymous; your personal information will be kept strictly confidential. Your participation in the study is voluntary and you have the right not to participate in the study.

The study has approval and ethical clearance from department of Gynecology and Obstetrics research and publication committee of Addis Ababa University.

✓ Do you agree to participate in this study?

Yes ☐ No ☐

If no thank you for your time

If yes proceed to the questionnaires

Data Collection tool (Questionnaire)

Part I: Socio-demographic data encircle your response

No		No	
AHNO	Hospital number_____	A1AG	Age of the mother _____years
A2ED	Highest level of education completed 1. No education 2. Primary(1-8 3Secondary(9-12) 4.Tertiary(12+) 5.Otherspecify_____	A3RL	Religion 1. Orthodox 2. Muslim 3.Protestant 4.catholic 5. Others specified_____
A4MS	Marital Status 1. Married 2.Single 3. Divorced 4. Widowed	A5PR	Occupation /profession 1. Employed 2. Self- employed 3. Unemployed or list type of occupation_____
A6IN	Monthly income of the family in ETB_____	A8FM	Family size _____

Part II: Obstetrics Variables

B1PR	Gravidity __ (if prim gravida ,skip to ANC)	B2AB	Abortion _____
B3PR	Parity_____	B4ME	Molar/ectopic(specify)_____
B5LV	Currently alive children_____	B6SV	No of spontaneous Vaginal delivery_____
B7ID	No of instrumental delivery_____	B8CD	No of cesarean delivery_____
B9OT	No of other deliveries specify_____		

Part III:ANC follow up

C1AN	Does she have antenatal care follow up? 1.Yes 2.No If no skip to C5AN	C2AN	Place of ANC 1.Health center 2.private clinic 3.this hospital
C3AN	Total No of ANC visit_____	C4AN	No of ANC visit at this hospital_____
C5AN	If no ANC ,reason_____	C6AN	Was she referred? 1. Yes 2. No
C7AN	Reason for referral_____		

Part IV :Gestational age at delivery

D1GA	Gestation Age at delivery ascribed by attending physician_____	D2GA	GA from LNMP_____(99 if unkown)
D3GA	GA from early US_____(99)if unknown		

Part V :Antepartum maternal complication					
E1OB	Obstetric complication 1.APH 2.PROM 3.preeclampsia 4.other specify		E2OB	Medical /surgical complication 1._____2._____. 3._____4._____	
Part VI: Onset of labor					
F1OL	Onset of labor 1.spontaneous(Go to labor: spontaneous & induced , 2.induced (Go to Induction & ripening- 3.planned c/s				
Part VII: Induction and ripening					
G1IR	Indication for induction (+/-ripening) 1.post term 2.oligohydraminous 3.IUGR 4.PROM 5.If other specify_____		G2IR	Bishop score at the time of priming/induction___/13	
G3IR	Method of cervical ripening 1. Misoprostol 2. trans cervical Foley catheter 3.if other specify_____		G4IR	Was oxytocin used for induction? 1. Yes 2. No	
G5IR	Any other method of induction used? 1. Yes 2. NO		G6IR	If yes for G5 IR specify_____	
G7IR	Does induction +/-ripening initiate contraction? 1. Yes 2. No If 1 ,skip to G9IR If 2 go to G8 IR		G8IR	Duration from initiation of induction +/-ripening to failed induction:_____hr____min	
G9IR	Possible reason for failed induction +/-ripening_____		G10IR	Action taken after failed induction 1.Emergencyc/ 2.Others specify_____	
G11IR	Duration from initiation of induction to at least 1contraction/10min/4hrs _____				
Part VIII: Augmented spontaneous labor					
H1LA	Was labor augmented? 1.yes 2.no If your answer is no go to labor		H2AL	Cervical dilatation at initiation of augmentation_____cm	
H3LA	Duration of labor before augmentation _____ in hours from admission till augmentation		H4LA	Method of augmentation other than oxytocin (specify	
H5LA	Was adequate contraction achieved? 1. Yes 2. No		H6LA	Duration from initiation of augmentation to delivery (or failed DX) _____hours _____Min	
Part IX. LABOUR: SPONTANEOUS & INDUCED					
I1LO	Duration of labor before admission _____ hours (insert 0 if induced)		I2LO	Cervical dilatation on admission: _____ cm (Insert 0 if induction or if admitted with no cervical dilatation)	

I3LO	Station on admission_____	I4LO	TOTAL duration of labour after admission till delivery_____
I5LO	Duration of the latent phase (< 5 CM) after admission ____ hrs & ____minutes	I6LO	0 if admitted after ≥ 5 cm (or if ECS was done immediately on admission in latent phase 10 min
I7LO	Duration of the active phase (from 5 cm) or after admission ____ hrs & ____minutes	I8LO	0 if admitted in second stage (or if ECS done immediately on admission in active phase <10 min
I9LO	Was vaginal delivery achieved 1. Yes _0. No_	I10LO	If no, Reason for not achieving vaginal delivery: 1. Adequate contractions not achieved ____ 2. CPD____ 3. Others (specify

Part X: Amniotic membrane (AM) & Amniotic fluid (AF) characteristics: IF PROM, CASE IS EXCLUDED!

J1AM	Amniotic membrane status on admission: 1. Intact ____ 2 .Ruptured _____	J2AM	Duration of membrane rupture before admission: ____hours (0 If admitted with intact membrane)
J3AM	Duration of membrane rupture after admission: ____ hours (0 if CD or referred or died before AM rupture)	J4AM	Total duration AM rupture (before & after admission till delivery): _____ (0 If CS before rupture or died/ referred before delivery)
J5AM	Cervical dilatation at rupture of membrane ____ cm 0 if delivered by CS/ died/ referred before rupture-‘Inappropriate’; 99 ruptured before admission	J6AM	Method of AM rupture 0. CD before rupture or died/referred before delivery 1 spontaneous in labour before admission 2 spontaneous after admission 3.ARM (after admission) 4 Others (specify)_____
J6AM	AF volume on admission (latest before delivery)? 1. Normal Oligohydramnios 3. Polyhydramnios 99. Not applicable/ Unknown/ not ruptured____	J7AM	MODE OF DELIVERY _____ 0. Died before delivery (Go to section M) 1. Spontaneous vaginal delivery 2. Vaginal instrument delivery (specify) _____ 3. Emergency caesarean section (go to N: CS section) 4. Elective caesarean section (go to N: CS section) 5. Laparotomy (go to laparotomy) 6. Other (specify) _____ - (& GO TO APPROPRIATE SECTION)

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Part XI CESAREAN SECTION

K1CS	Planning of operation (PREGNANCY TERMINATION) 1. Planned/ elective 2. Urgent (planned within < than 24 hours,/ not in labour) ____ 3. Emergency in labour ____ 4. Others (specify) ____	K2CS	Primary surgeon: 1. Consultant 2. Resident (specify year) ____ 3. Others (specify) ____
K3CS	Total blood loss ____	K4CS	Duration of surgery ____ hours ____ minutes
K5CS	Total blood transfusion ____	K6CS	Other blood products given(SPECIFY) ____
K7CS	Type of CS: 1. Lower transverse 2. Lower vertical (DeLee) 3. Classical CS 4. Inverted T 99. Others (specify) _	K8CS	Indications for any other than lower transverse CS: list common indications at least 1.____ 2.____ 3.____

Part XIII: Neonatal Outcome

LNB1	Date of delivery ____ year(EC) time of delivery ____ hr ____ min	LNB2	Birth weight ____ grams
LNB3	Sex 1.M 2.F 3. Ambiguous	LNB4	1.1 st minute APGAR score ____ 2. 5 th minute APGAR score ____ 3.10 th minute APGAR score ____
LNB5	Outcome 1.alive 2. Dead		

Part XIV NB Complications INCLUDING NICU DIAGNOSIS, labour, delivery, CONGENITAL

1. _____	2. _____	3. _____	4. _____	5. _____
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Part XV .New born complication including NICU admission diagnosis ,labor, delivery and congenital anomaly

PNB1	NICU admission 1.No 2.yes	PNB2	Duration of NICU admission_____days
PNB3	If Neonatal death ,NB age at death 1._____hrs 2._____days 3.Not applicable	PNB 4	Cause of Early Neonatal Death 1._____ 2._____ 3._____
PNB5	Cause of still birth list common causes(if known) least the common 1._____2._____3._____4.NA		