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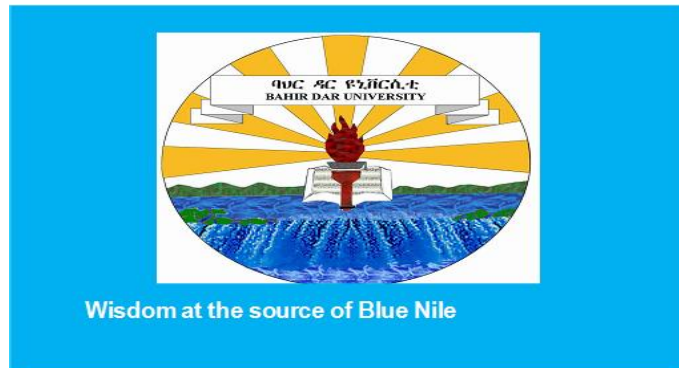
# Determinants of Perinatal Mortality in Bahir Dar Town Governmental Health Institutions, Northwest, Ethiopia, 2019

Daniel, Tarekegn

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**BAHIRDAR UNIVERSITY**  
**COLLEGE OF MEDICINE AND HEALTH SCIENCE**

DETERMINANTS OF PERINATAL MORTALITY IN BAHIR DAR  
TOWN GOVERNMENTAL HEALTH INSTITUTIONS, NORTHWEST,  
ETHIOPIA, 2019:

DANIEL TAREKEGN

A THESIS PAPER SUBMITTED TO COLLEGE OF MEDICINE AND HEALTH  
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**BAHIRDAR UNIVRTY COLLEGE OF MEDICINE AND HEALTH SCIENCE**

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## ACRONYOMS AND ABBREVIATIONS

ANC	Antenatal Care
AOR	Adjusted Odds Ratio
APH	Antepartum Hemorrhage
CI	Confidence Interval
COR	Crude Odds Ratio
EDHS	Ethiopian Demographic and Health Survey
ENND	Early Neonatal Death
GA	Gestational Age
ICD-10	International Classification of Disease of the 10th revision
OR	Odds Ratio
PROM	Premature Rupture of Membrane
WHO	World Health Organization
TT	Tetanus Toxoid

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## ABSTRACT

**Introduction:** Perinatal mortality is defined as fetal death after 28 weeks of gestation and newborn death within seven days. Globally, more than 2.6 million stillbirths and over 2.7 million early neonatal deaths are estimated to occur each year. In the year 2015, each day an estimated 7,300 newborns die from complication during pregnancy, child birth and further neonatal causes and 7000 stillbirth, half of this occurs after labor had started. Almost all (98%) takes place in developing countries and the magnitude of perinatal mortality in the study area was 44 per 1000 pregnancy.

**Objective:** The objective of this study was to identify determinants of perinatal mortality in Bahir-dar town governmental health institutions, northwest, Ethiopia: 2019

**Methods:** Institutional based unmatched case control study was conducted in Bahir Dar town, from 1<sup>st</sup> March to 30<sup>th</sup> May, 2019. Cases were stillbirths and early neonatal deaths and controls were live births that were survived the first seven days after delivery. All stillbirths and early neonatal deaths in the selected health institutions were included and two controls per case were selected using systematic sampling method. A total of 459 participants were involved in this study (153 cases and 306 controls). Pretested, structured questioner with face to face interview was conducted and some data were also extracted using checklist. Multivariable logistic regression analysis was done to analyze the data. A p-value of <0.05 was considered as significant at 95% confidence interval and the strength of association was measured using odds ratio.

**Results:** Antepartum hemorrhage (AOR 2.55,95% CI;1.23-5.26), obstructed labour (AOR 3.11,95% CI; 2.00-8.38), prematurity (AOR 3.29,95% CI;1.86-5.81), first delay (AOR 2.61,95% CI;1.56-4.39) and second delay (AOR 2.75,95% CI;1.49-5.11) were the determinants of perinatal mortality that increase risk of perinatal death. Whereas partograph use (AOR 0.24, 95% CI; 0.14-0.42) and tertiary education (AOR 0.35, 95% CI; 0.17-0.71) were found to be protective factors for perinatal mortality.

**Conclusion and Recommendation:** The determinants of perinatal mortality in the study area was due to medical, obstetric and neonatal complications that are easily identifiable and manageable with the existing health care services whereas health care and maternal behavioral factors were also the important determinants that were associated with the outcome. Partograph use in labour follow up and educating females to tertiary education level is better, first and second delay need to avoided during labour.

**Keywords:** perinatal mortality, case-control, determinants, case mother, control mother, Bahir-dar town

# 1. INTRODUCTION

## 1.1 Background

Perinatal mortality is defined as a fetal death (stillbirth) and early neonatal death. A stillbirth is a baby born with no sign of life, weighing more than 1000 gram or with more than 28 completed weeks of gestation and early neonatal death is a death in the first week of life after delivery(1).

Due to disparity in the quality of services provided for pregnant women and their babies' perinatal mortality in developing nation is about five times higher than developed nations. Pregnancy related death of the women and their babies or soon after delivery is high in low and middle income countries where in health facilities and antenatal coverage is low(2).

Despite having made significant reductions in maternal and under five mortalities during the last two decades to achieve the millennium development goal, Ethiopia continues to have a high estimated rate of maternal and neonatal deaths as well as stillbirths. Most of these losses are believed to be preventable with high-quality, evidence-based interventions delivered before and during pregnancy, labor and delivery, and in the critical hours and days after birth(3).

The 2016 EDHS , finding indicated perinatal mortality was 33 deaths per 1000 pregnancies with (42 versus 32) deaths per 1000 pregnancies in urban and rural respectively ,there is also marked regional variations, highest in Somali 50 and lowest in Afar 26 deaths per 1000 pregnancy. In Amhara region perinatal mortality rate was 44 deaths per 1000 pregnancies (4).

A study conducted in Dabat town ,northwest, Ethiopia finding showed that perinatal mortality rate was 50.22 deaths per 1000 live births (5). The other community based nested case control study conducted in West Gojjam Zone, Amhara region, northwest, Ethiopia finding indicated that perinatal mortality rate was 25.1 deaths per 1000 live births and stillbirths(6).

In Ethiopia there are some studies conducted to assess risk factors for perinatal mortality in some regions of the country and in the capital which were facility and community based mostly using secondary data as sources of information, But ,in Amhara Region, where the study was conducted , there are few studies which were community based and further analysis of EDHS data to assess the risk factors , but in best of author's knowledge there is no published articles on facility based case control using incident cases.

## 1.2 Statement of the problem

Currently, the quality of antenatal and perinatal care provided to the community is best judged by the perinatal mortality rate. Perinatal mortality remains a great burden to the world 2.6 million stillbirths and 2.7 million early neonatal deaths annually worldwide(7).In the year 2015, each day an estimated 7,300 newborns die from complication during pregnancy, child birth and further neonatal causes worldwide. And 7000 still births, half of this occurs after labor had begun. Almost all (98%) takes place in developing countries(3).

Although, there was remarkable decline (40%) in perinatal mortality in Ethiopia in the last two decades, it is still an important public health problem about 66 to 124 deaths per 1000 births in health institution and 25 to 52 deaths per 1000 births in the community(8, 9).The community based study conducted in Dabat , Ethiopia showed that perinatal mortality rate was 50.22 deaths per 1000 births(5).The 2016 EDHS finding in Amhara region, where the study was conducted, showed that perinatal mortality rate was 44 deaths per 1000 pregnancies (4).

Most of the studies identified that hemorrhagic disorders, hypertensive disorders, obstructed labor, prolonged labour, neonatal sepsis, asphyxia, congenital anomalies, prematurity, advanced maternal age were the risk factors and ANC follow up, TT vaccination, use of Partograph during labor, doctor birth attendant were protective factors associated with perinatal mortality(5, 9-14).But first delay, second delay(delay in reaching care) and maternal behavioral factors such as alcohol use , smoking ,drug use during pregnancy, nutritional status, chat chewing were not documented and understood in the study area. Therefore, this institutional based unmatched case control study design was conducted to identify the potential determinants of perinatal mortality in Bahir-dar town governmental health institutions using incident cases.

## 1.3 Significance of the study

Perinatal mortality as health indicator plays an important role in providing the information needed to improve the health status of the pregnant women and their newborn.

Identifying determinants of perinatal mortality is very important for decision makers in building and implement strategies to improve the care provided to the pregnant mothers and their newborns.

This epidemiologic study will help in preventing occurrence of perinatal deaths by identifying potential determinants of maternal, fetal/newborn and health care factors.

The result of the study will provide information for health care providers to improve quality of antenatal, delivery and postnatal care after identifying determinants of perinatal mortality. It will also help to the community to receive quality care at health institutions that will reduce perinatal deaths.

Finally the result may provide information as input for large scale facility and community based quantitative and qualitative studies in the region and as a reference for other researchers interested in perinatal mortality and other studies.

## 2. LITERATURE REVIEW

### 2.1 factors associated with perinatal mortality

A number of risk factors have been observed that have an effect on the adverse pregnancy outcome including perinatal mortality. These factors are grouped into the following five categories of themes: socio-demographic factors, general obstetric factors, intra-partum (maternal medical and obstetric complications) factors, neonatal factors and maternal behavioral and health care factors.

#### 2.1.1 Socio-demographic factors

A maternal age continues to be a risk factor for perinatal mortality as both community and hospital based study reports. For example prospective community-based cluster census and case control still birth and early neonatal death study conducted in West bank and Gaza strip indicates that advanced maternal age > 35 years and above were associated with perinatal mortality when compared to age between 18 to 35 years old(15). Also hospital based study that was conducted in Nepal showed that antepartum still birth is higher among women whose age is greater than 35 than younger counterparts(16).

The case control study which was conducted in India for one year period result showed that low socio-economic status was risk factors for perinatal mortality compared to higher socio-economic status(17).

The study that was conducted in Rwanda indicated that perinatal mortality is higher in women with age greater than 34 when compared to women less than 20 to 34 years old (18). The study conducted in North Shewa zone in Oromia ,Ethiopia, indicated that mothers whose age 35 and above had higher risk of losing their new born babies in perinatal period than younger mothers(14).

#### 2.1.2 General obstetric factors

A case control study that was conducted in India indicated that perinatal mortality in premature birth was more likely higher than term births(17). Another study also conducted in India indicated that newborns whose gestational age less than nine months pregnancy had greater risk of mortality in the perinatal period than term newborns(19). The other case-control study which was conducted in Nepal, indicated that increasing parity, previous stillbirth , number of antenatal care visit and small weight-for-gestational age babies were independent risk factors associated with intra-partum still birth(16).

A case control study that was conducted in Kenya to identify risk factors of fetal and early neonatal death in tertiary hospital indicated that the odds of gestational period below 37 weeks, relative to gestational age of 37-42 weeks were higher for cases than controls(20).

The other factor that have been identified as important predictor of perinatal mortality were related to utilization of maternal health service typically antenatal care follow up during pregnancy. The retrospective case-control study which was conducted in Kenya result indicated that: the odds of having 0-1 antenatal visits relative to 2-3 visits were higher for cases than controls. Compared to controls, cases had lower odds of having four or more antenatal visits relative to 2-3 visits (20, 21).

Many studies conducted in Ethiopia at community and facility based retrospective studies using secondary data and national Ethiopian demographic health survey showed that antenatal care follow up and booking in the first trimester in the timing of initiation had showed that decreased perinatal mortality: further analysis of 2011 Ethiopian demographic and health survey to identify determinants of still birth showed that antenatal care follow up decrease perinatal mortality when compared to mothers who had no ANC visit and one and above ANC visit had lower odds of exposure than who had no visit with regard to number of ANC Visits(22).

The result of the study conducted in Hawassa referral teaching hospital in Ethiopia, indicated that preterm newborns had higher risk of perinatal mortality with adjusted odds ratio of 3.8 times higher more risk of dying than term new born(11). Another community based nested case control study conducted in north Shewa zone Oromia region in Ethiopia indicated that preterm babies had a higher risk of perinatal death than term babies(14).

### 2.1.3 New-born characteristics and complication factors

Low birth weight of new born babies had risk of death in the perinatal period. The association between birth weight and perinatal mortality was modified by gestational age. Preterm babies whose birth weight less than 2500g were more likely to die than term babies of low birth weight(23).

The case control study conducted in India for one year period .The cases were all the fresh and macerated still births and early neonatal death cases during the study period. The result showed that the risk factors for perinatal mortality were prematurity, low birth weight, intra-uterine growth restriction when compared to their counterparts(19).



The retrospective case control study which was conducted in Jimma specialized teaching hospital finding indicated that perinatal mortality in new born babies whose birth weight less than 1500gm is higher than those normal birth weight (2500mg)(10).The other study conducted in Hawassa specialized teaching hospital showed that newborns whose birth weight less than 1500 gm at higher risk of death than those whose birth weight is between 2500 to 4000gm(11).

#### 2.1.4 Medical and obstetric complication factors

Among medical and obstetric complication during pregnancy hemorrhagic disorder is the one that cause maternal and fetal death, a prospective cohort study which was being conducted to evaluate a maternal and child nutrition program in rural Bangladesh in 2013, Result showed that history of bleeding during pregnancy was the strongest risk factor for stillbirths and neonatal deaths (24).

Case-control study which was conducted in Nepal, antepartum hemorrhage was the strong risk factors for perinatal mortality with 3.7 times higher odds of exposure than controls(16).A Prospective community-based cluster census and case-control study of stillbirths and neonatal deaths which was conducted in the West Bank and Gaza Strip result indicated that risk of stillbirth was higher among antepartum hemorrhagic pregnancy than non-hemorrhagic pregnancy(15).

But, facility based case control study which was conducted in Tigray, northern Ethiopia to identify risk factors associated with perinatal mortality result showed that hemorrhagic disorder during pregnancy was not associated with perinatal mortality(13).

A case control study for perinatal mortality was conducted in Hawassa University hospital in Ethiopia result showed that :obstructed labor was responsible for more than one third of perinatal deaths(11). The other case-control study conducted in Kenya, indicated, that dystocia(obstructed/prolonged labor) was the risk factor of perinatal mortality with 3.6 time more likely higher than for the cases compared with the controls(20).

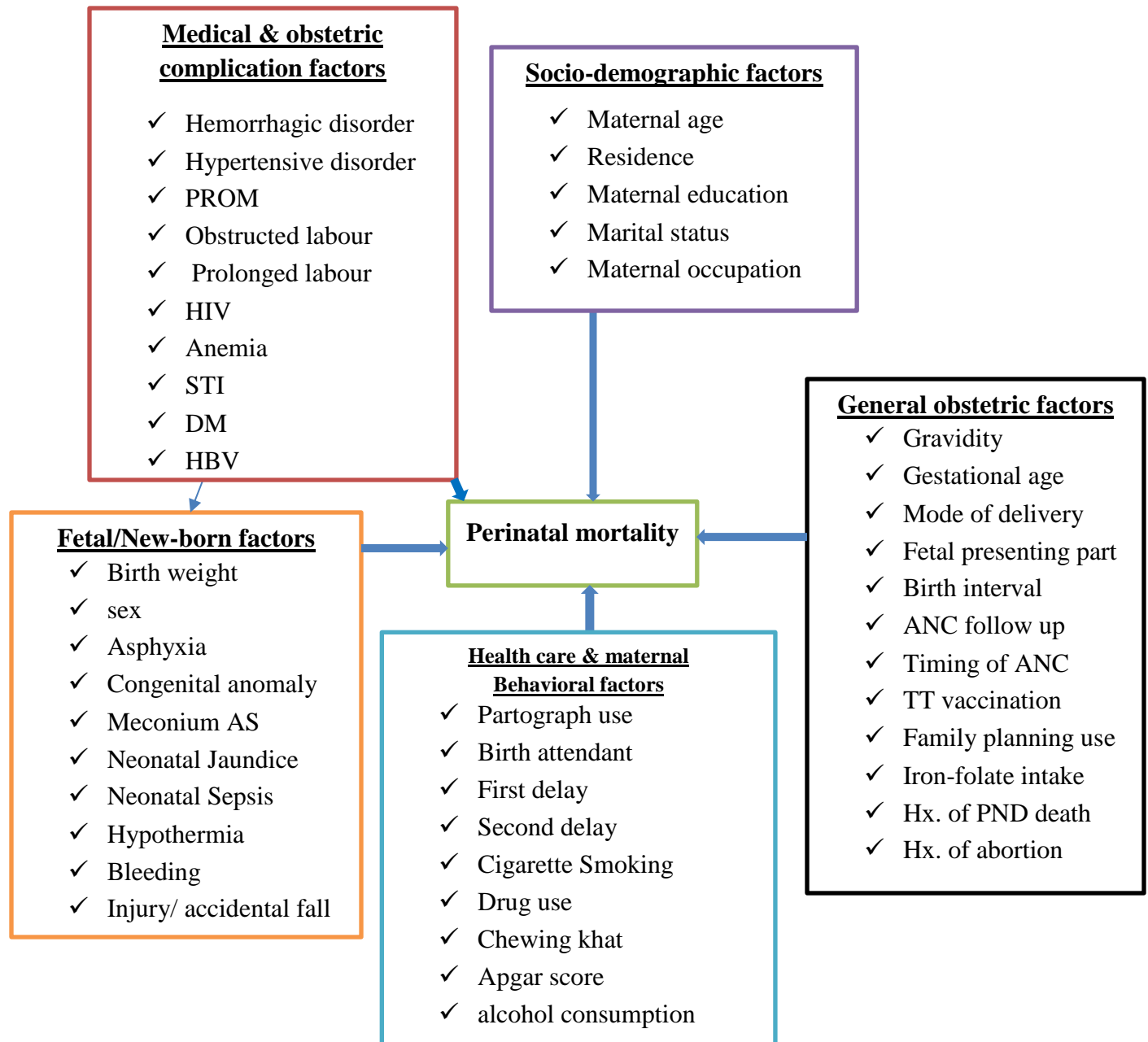
A population-based case–control study which was undertaken in Haryana, India, Indicated that perinatal mortality was higher among labour complications than normal labor (25).

### 2.1.5 Health care and Maternal behavioral factors

The case control study conducted in India result showed that the risk factors for perinatal mortality was lately referred women when compared to their counterparts(19).

A matched case–control study design which was conducted in Burkina Faso assessed potential risk factors related to mothers, neonates, and healthcare provisions from medical records and via interviews. The finding showed that Apgar score at 4–7or 1–3, resuscitation of newborns and referral of the newborn were associated with increased odds of neonatal mortality (26).An unmatched case control study design using secondary data as a source of information was conducted among public health deliveries in Addis Ababa and Tigray, Ethiopia, Cases were still births or early neonatal deaths and controls were live births and neonates who were discharged alive from the hospital and did not die before the age of 7 days. The result indicated that use of Partograph during labor, seeking labor care at the start of labor were a protective factor for perinatal mortality compared to counterparts (12, 13)

## 2.2 Conceptual framework



**Figure 1:** conceptual frame work in different literature on determinants of perinatal mortality in Bahir-dar town governmental health institution, 2019 (8, 22, 27).

### **3. OBJECTIVE**

To identify the determinants of perinatal mortality in Bahir Dar town governmental health institutions, Bahir-dar, northwest, Ethiopia: 2019

## 4. METHODS

### 4.1 Study area and period

The study was conducted in Bahir-dar town governmental health institutions from 1<sup>st</sup> March to 30<sup>th</sup> May, 2019. Bahir-dar town is capital city of Amhara national regional state in northwest, Ethiopia. The town is about 560 km far in northwest from Addis Ababa, capital city of Ethiopia. According to central statistics agency report of 2007 census the total population of Bahir-dar town is 364,339(28). In the town, there are 3 public hospitals that gives comprehensive services including maternal and child health services such as ANC follow up, delivery, postnatal care. Among this Felege hiwot comprehensive specialized referral hospital is a large hospital which is serving as regional comprehensive specialized referral hospital to nearby communities and other referral cases in the region, it is expected to serve for more than 7 million peoples, Adissalem General hospital is the second governmental hospital in the town and the new established Hospital is Tibebe-gion specialized teaching hospital of Bahir-dar university. In addition to these there are 10 governmental health centers in the town. These are Bahir-dar, Han, Abay, Minilik, Shimbit, Shum-abo, Chis-abay, Zenzelema, Meshentie and Zegie health centers. Bahir-dar and Han health centers are the two big health centers that hosted many deliveries; they have obstetric ultrasound and even caesarian section also performed there.

### 4.2 Study design

Institutional based unmatched case control study was conducted in Bahir-dar town governmental health institutions from 1<sup>st</sup> March to 30<sup>th</sup> May, 2019.

### 4.3 Population

#### 4.3.1 Source population

The source population was all cases of still birth, early neonatal deaths with in the first week of life and live births at least 1000 gram birth weight or approximately 28 or above weeks of gestation in the study period.

#### 4.3.2 Study population

**For cases:** The study population was all cases of still birth and early neonatal deaths in the first week of life in the study period in selected health institutions of Bahir-dar town.

**For controls:** The study population was all live births at least 1000 gram birth-weight or approximately 28 or above weeks of gestation in the study period in selected health facilities of Bahir-dar town.

### 4.3.3 Study unit

The unit of the study was mothers who were encountered stillbirth, early neonatal death or live birth during the study period

## 4.4 Eligibility criteria

### 4.4.1. Inclusion criteria

**For cases:** The stillbirths and early neonatal deaths whose birth weight were at least 1000 gram or approximately 28 or above weeks of gestation in the study period were included.

**For controls:** Live births whose birth weight were at least 1000 gram or approximately 28 and above gestation in the study period were included.

### 4.4.2 Exclusion criteria

Live births, stillbirths and early neonatal deaths with maternal mortality were excluded in the study

## 4.5 Sample size determination and sampling procedures

### 4.5.1 Sample size determination

The sample size was determined based on determinant factors associated with perinatal mortality in the previous study(9).Using epi –info version 7, with the assumption of 80% power, 1:2 case to control ratio and 95% confidence interval and 5% non-respondents were considered with total of 459 (153 cases and 306 controls) participants were included in the study.

Variables	OR	% of cases Exposed	% of controls exposed	Sample size		Total
				Cases	Controls	
Primiparus	3.15	12.7%	6.9%	98	195	293
history of PND	9.55	9.8%	6.9%	2	41	43
Preterm birth	9.44	13.7%	1%	95	189	284
Abortion history	2.46	21.6%	8.3%	146	291	437

#### 4.5.2 Sampling procedures

Seven governmental health institutions in the town were selected based on the previous data on perinatal mortalities after made survey before data collection. The sample was proportionally drawn from each health institutions based on the average delivery rate six months prior to data collection. Data were collected in the maternity wards, neonatal intensive care units and postnatal clinics, all mothers whose babies died in the health institutions during the perinatal period from 1<sup>st</sup> March to 30<sup>th</sup> May, 2019 were recruited as cases consecutively until the required sample size was reached. And two controls per case were selected using systematic sampling technique from mothers who had given birth in the study period using delivery log book in each selected health institutions.

#### 4.6 Study variables

##### 4.6.1 Dependent variable

The outcome variable was perinatal mortality (stillbirth plus early neonatal death) and coded as binary (1=died and 0=alive).

##### 4.6.2 Independent variables

- **Socio demographic factors:** maternal age, maternal occupation, maternal educational status, maternal marital status and average monthly income
- **General Obstetric factors:** gravidity, GA, mode of delivery, fetal presenting part, birth interval ,ANC visit, timing of ANC initiation ,TT vaccination , preceding family planning use, Iron-folate intake during pregnancy, history of PND, history of abortion.
- **Medical & obstetric complications:** APH, PROM, obstructed labour, prolonged labour hypertensive disorder (eclampsia, preeclampsia, superimposed chronic hypertension), HIV, DM, anemia, STI, HBV infection.
- **New-born characteristics and complications:** sex , birth weight ,Congenital anomaly , asphyxia, meconium aspiration syndrome, neonatal jaundice, neonatal sepsis , hypothermia, bleeding, accidental injury/fall
- **Health care and maternal behavioral factors :** Partograph use, delay in seeking labour care (measured as waiting time at home after labour had started), delay in reaching in health institutions (measured as transport problem (yes/no), qualification of birth attendant, smoking, chewing, drug use, alcohol consumption.

#### 4.7 Operational definition

- **Case:** is defined as newborn at least 1000 gram of birth weight or corresponding to 28 and above weeks of gestation in the health institutions either as a still birth or born alive but died within seven days after delivery.
- ✓ Gestational age was determined using last normal menstrual period (LNMP) or ultrasound report.
- ✓ Amenorrhea of 9 months was approximated to 40 weeks of gestation
- **Control:** is defined as live births at least 1,000 gram of birth weight or corresponding to approximate 28 weeks of gestation in health institutions of the study area and survived the first seven days after delivery.
- **Early Neonatal death:** A new born with sign of life at least 1,000 gram of birth weight or corresponding to approximately 28 weeks of gestation or more and was died with in first seven days after delivery .
- **Still birth:** Fetus of at least 1,000 gram of birth-weight or corresponding to approximate 28 weeks of gestation or more, with no signs of life before delivery(pre-partum stillbirth or at delivery (intra-partum stillbirth).
- **Delay in seeking labour care (first delay):** is refers to the time spent at home before decision is made to seek labour care (it was considered delayed if the mother stay at home  $\geq 3$  hours after labour had started).
- **Delay in reaching care (second delay):**is the problem related to reach the health institutions after decision had made to do there(it was considered delayed if the mothers were faced transport/ambulance problem during transportation either from home to health institutions or from health institutions to health institutions during referral on labour ( it was measured as **yes/no**).
- **Prematurity:** is defined as a birth that takes place before 37 weeks of gestational (it was measured as **yes** if less than 37 weeks of gestational age and **no** if  $\geq 37$  weeks of gestation).



#### 4.8 Data collection procedure

Data were collected by face to face interview using Amharic version of the questioner from all eligible mothers. First cases were identified in the labour wards and neonatal intensive care units immediately following death confirmation by physicians or other health professionals. Then interview was conducted before the case mothers were discharged to home for women who encountered early neonatal death, whereas mothers who had stillbirth were interviewed after a minimum of 24 hours for spontaneous vaginal delivery and 72 hours for caesarean delivery. Interview for control mothers were conducted on the 7<sup>th</sup> day of postnatal care after given appointment date during delivery for selected mothers in health institution. Some data were also collected from medical records of mothers and foetus/new-borns, admission history, referral sheets, delivery follow up sheets, delivery summary, neonatology and delivery log books, death summary and death confirmation sheets using checklist.

#### 4.9 Data collection instrument

A pretested, structured questioner and checklist were prepared by adapted and modified from different related articles (9, 13, 14), WHO ICD-10 standard verbal autopsy questioner(1) and from Ethiopian national standard maternal and perinatal death surveillance and response verbal autopsy data abstraction form (29) developed by Ethiopian public health institute.

#### 4.10 Data collectors

Seven trained midwife and two neonatal nurses who were worked in labour wards and neonatal intensive care units were recruited in the selected health institutions respectively.

#### 4.11 Data quality control

A questioner was translated to Amharic, the working language in the study area by two person one medical professional and the other English language professional, translated back into English to keep consistency. Two days training was given for data collectors and supervisors. The overall activity was supervised regularly by two supervisors who are BSC holder midwife and experienced in this type of activity. Pretest was done before the actual data collection for 5% of the sample size other than the study sites. All completed questioner and checklist were examined for completeness and consistency during data management, storage and analysis. Some data collected through interview were repeated in the data

extraction checklist to cross-check data accuracy. When the discrepancies were noted, the data were taken from the medical record.

#### 4.12 Data processing and analysis

Data were coded, entered and cleaned using epi-info version 7 then analysis was performed using SPSS version 23 software after imported from epi-info. Frequency distribution was used to describe the characteristics of the study population. Bi-variable logistic regression analysis was done to select candidate variables for multiple logistic regression analysis. Those variables associated at bi-variable analysis with p-value  $<0.25$  were entered into multiple logistic regression analysis. The multiple logistic regression model was fitted using backward elimination technique. The fitness of model was checked using Hosmer-Lemshow test of significance (p-value was  $>0.05$ ). Odds ratio with 95% confidence interval was used to measure strength of association, those variables p-value less than 0.05 were taken as significant.

#### 4.13 Ethical Considerations

Ethical approval was obtained from Bahir-dar University, collage of health science, school of public health Institutional review board. Official letter of co-operation was written to selected health institutions and permission was obtained from respective health institutions concerned officials. All eligible parents who were at the time of the event were given detailed information about the study in local language by the data collectors and then verbal informed consent was taken from every mother who voluntarily agreed to participate in the study. The right of the respondent was informed and respected to withdraw or not to participate in the interview. Confidentiality of the information collected was maintained by avoiding personal identifiers from data collection tool and collected data were used for study purpose only.

## 5. RESULT

### 5.1 Socio-demographic characteristics of study participants

A total of 442 (148 cases and 294 controls) participants were interviewed with response rate of 96.3% (96.5% for cases and 96.1% for controls). The mean age of the case and control mothers were  $28.22 \pm 7.50$ (SD) and  $26.23 \pm 4.88$ (SD) years respectively. About 264(89.8%) of control mothers and 114 (77.0%) of case mothers were found in the age category of 20-34 years. About 89(30.3%) and 21(14.2%) of control and case mothers had attended tertiary and above education level respectively.

With regard to current maternal occupational status only 73(24.8%) of control mothers employed by either government or private organizations when compared to case mothers 42(28.4%) and housewife accounted 102(34.7) in control mothers and 41(27.7) in case mothers. Majority of control mother 248(84.4) and case mothers 114(77.0) were married. About 209(71.1) mothers with livebirths (controls) were lived in urban areas as compared with 70(47.3) case mothers (**Table: 1**).

**Table 1:** Demographic characteristic of control and case mothers in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	Category	Perinatal outcome	
		Control (N, %)	Cases (N, %)
Maternal age, y	<20	17(5.8)	20(13.5)
	20-34	264(89.8)	114(77.0)
	$\geq 35$	13(4.4)	14(9.5)
Maternal educational status	Not educated	55(18.7)	59(39.9)
	Primary	75 (25.5)	32(21.6)
	Secondary	75 (25.5)	36(24.3)
	Tertiary	89(30.3)	21(14.2)
Current maternal occupation	Employed	73(24.8)	42(28.4)
	Merchant	81(27.6)	51(34.4)

	House wife	102(34.7)	41(27.7)
	Others <sup>a</sup>	38(12.9)	14(9.5)
Residence	Urban	209(71.1)	70(47.3)
	Rural	85(28.9)	78(52.7)
Maternal marital status	Single	27(9.2)	21(14.2)
	Married	248(84.4)	114(77.0)
	Divorced	16(5.4)	10(6.8)
	Widowed	3(1.0)	3(2.0)

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a=student, prostitute, daily labour      y=year      (N, %) = (number, percentage)

## 5.2 General obstetric characteristics of control and case mothers

Of the total of women in the study 107(36.4%) and 57(38.5%) of control and case mothers were delivered at the first time (prim-gravida) respectively. Whereas 156(53.1%) of controls and 69(46.6%) of case mothers were multigravida, women who had birth between two and five. About 249 (84.7%) control mothers and 127 (85.8%) case mothers had antenatal care visit for the current pregnancy respectively. From those mothers who had antenatal care visit for current pregnancy 205(69.7%) and 96(64.9%) were started antenatal care follow up within three months (first trimester) from conception respectively for control and case mothers.

With regard to tetanus toxoid vaccination status of the mothers about 244(83.0%) control mothers and 96(64.9%) case mothers had received tetanus toxoid vaccine whereas 194(66.0%) controls mothers and 70(47.3%) case mothers had taken iron-folate pill either before conception or during current pregnancy. A total of 232(78.9%) control mothers and 86(58.1%) case mothers were used family planning before the current pregnancy. About 8(2.7%) control and 9(6.1%) case mothers had previous history of perinatal death. About 206(70.1%) control mothers and 90(60.8%) case mothers had delivered spontaneous vaginally, while the remaining 64(21.8%) of control and 44(29.7%) of case mothers, 24(8.2%) control and 14(9.5%) of case mothers had given birth by assisted vaginally delivery (with forceps & vacuum) and caesarean sections delivery respectively (**Table: 2**).

**Table 2:** General obstetric characteristics of control and case mothers in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	Category	Perinatal outcome	
		Control (N, %)	Cases (N, %)
Gravidity	I	107(36.4)	57(38.5)
	II-VI	156(53.1)	69(46.6)
	>VI	31(10.5)	22(14.9)
ANC visit	No	45(15.3)	21(14.2)
	Yes	249(84.7)	127(85.8)
Time of ANC visit initiation	1 <sup>st</sup> trimester	205(69.7)	96(64.8)
	2 <sup>nd</sup> trimester	26(8.8)	18(12.2)
	3 <sup>rd</sup> trimester	18(6.0)	13(8.8)
TT vaccination status	Not received	50(17.0)	52(35.1)
	Received	244(83.0)	96(64.9)
Modern family planning use	No	62(21.1)	62(41.9)
Before index pregnancy	Yes	232(78.9)	86(58.1)
Iron-folate intake during pregnancy or preconception	No	100(34.0)	78(52.7)
	Yes	194(66.0)	70(47.3)
Previous history of abortion	No	284(96.6)	137(92.6)
	Yes	10(3.4)	11(7.4)
Previous history of perinatal death	No	286(97.3)	139(93.9)
	Yes	8(2.7)	9(6.1)

Mode of delivery	SVD	206(70.1)	90(60.8)
	Assisted VD	64(21.8)	44(29.7)
	CS	24(8.2)	14(9.5)
Fetal presenting part	Head	214(72.8)	101(68.2)
	Breech	43(14.6)	30(20.3)
	Feet	23(7.8)	12(8.1)
	Arm/hand	14(4.8)	5(3.4)

SVD=spontaneous vaginal delivery, Assisted VD =vaginal delivery by forceps or vacuum, CS=caesarean section

### 5.3 The maternal medical and obstetric complications of control and case mothers

From those maternal medical complications antepartum hemorrhage was accounted 25(8.5%) in control and 36(24.3%) of case mothers, anemia 8(2.7%) among control mothers and 13(8.8%) case mothers, hypertensive disorders 15(5.1%) and 23(15.5%) control and case mothers respectively, Whereas from obstetric complication, obstructed labour was accounted in 17(5.8%) control mothers and 46(31.1%) case mothers (**Table: 3**).

**Table 3:** The result showing maternal medical and obstetric complications of controls and cases in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	Category	Perinatal outcome	
		Control (N, %)	Cases (N, %)
APH	No	269(91.5)	112(75.7)
	Yes	25(8.5)	36(24.3)
Anemia	No	286(97.3)	135(91.2)
	Yes	8(2.7)	13(8.8)

Hypertensive disorder	No	279(94.9)	125(84.5)
	Yes	15(5.1)	23(15.5)
Obstructed labour	No	277(94.2)	102 (68.9)
	Yes	17(5.8)	46 (31.1)

#### 5.4 Fetal/Newborn characteristics and complications of controls and cases

From a total of participants in the study 167(56.8%) control mothers and 86(58.1%) case mothers had delivered female newborns. And from all deliveries in the study 280(95.2%) of control mothers and 139(93.9%) case mothers were gave single birth. Whereas 14(4.8%) of control mothers and 9(6.1%) of case mothers delivered twin births. About 41(13.9%) of Control mothers and 40(27.0%) of case mothers had given low birth weight (<2500gm) newborns, while the remaining were 253(86.1%) and 108(73.0%) of control and case mothers were gave normal birth weight newborns.

With regard to neonatal complications neonatal sepsis 21(7.1%) control and 12(8.1%) of cases respectively, congenital anomaly was observed on 16(5.4%) of controls and 13(8.8%) of cases, neonatal jaundice accounts 9(3.1%) and 11(7.4%) of control and cases respectively, Prematurity was observed on 40(13.6%) of controls and 72(48.6. %) of cases (**Table: 4**).

**Table 4:** The result showing fetal/newborn characteristics and complications of controls and cases in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	Category	Perinatal outcome	
		Control (N, %)	Cases (N, %)
Sex of new born	Female	167(56.8)	86(58.1)
	Male	127(43.2)	62(41.9)
Birth weight , gm	≥2500	253(86.1)	108(73.0)
	1000-2499	41(13.9)	40(27.0)

Number of fetus delivered	Single	280(95.2)	139(93.9)
	Twin	14 (4.8)	9(6.1)
Neonatal Jaundice	No	285(96.9)	137(92.6)
	Yes	9(3.1)	11 (7.4)
Neonatal sepsis	No	273(92.9)	136(91.9)
	Yes	21(7.1)	12(8.1)
Congenital anomaly	No	278(94.6)	135 (91.2)
	Yes	16(5.4)	13(8.8)
Prematurity	No	254(86.4)	76(51.4)
	Yes	40(13.6)	72(48.6)

### 5.5 Health care and maternal behavioral characteristics of control and case mothers

From a total of interviewed mothers 117(39.8) control and 100(67.6%) case mothers were delay in seeking labour care after labour had started before went to health institution. And about 33(11.2%) control mothers and 63(42.6%) case mothers had faced transport (ambulance) problem during traveling either from home to health institution or health institution to health institution during referral after labour had started. About 245(83.3%) control and 82(55.4%) case mothers' labour had monitored using Partograph (**Table: 5**).

**Table 5:** Health care and maternal behavioral characteristics of control and cases in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	category	Perinatal outcome	
		Control (N, %)	Cases (N, %)
Delay in seeking labour care	No	177(60.2)	48(32.4)
	Yes	117(39.8)	100(67.6)
Transport (ambulance) problem	No	261 (88.8)	85( 57.4)
	Yes	33 (11.2)	63(42.6)



Partograph use	No	49 (16.7)	66(44.6)
	Yes	245(83.3)	82(55.4)
Referral status	Referred	58(19.7)	86(58.1)
	Not referred	236(80.3)	62(41.9)

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### 5.6 Variables associated with perinatal mortality at bi-variable analysis

In bivariate analysis maternal age, maternal educational status and residence were associated with perinatal mortality from socio-demographic variables whereas maternal occupation and maternal marital status were not associated with the outcome variable.

From general obstetric variables for current pregnancy associated at bivariate analysis were TT vaccination status , family planning use before the index pregnancy, iron-folate intake preconception or during pregnancy but, gravidity , timing of ANC visit, history of abortion, history of perinatal death, mode of delivery and fetal presenting part were not associated with perinatal mortality.

On the maternal medical factors:-antepartum hemorrhage, hypertensive disorder and anemia were associated with perinatal mortality, on obstetric complications: obstructed labour was the risk factor associated with the outcome variable and from neonatal factors, neonatal sepsis, congenital malformation, neonatal Jaundice and prematurity were risk factors associated with perinatal mortality.

Finally from the health care and maternal behavioral factors ,delay in seeking labour care, partograph use during labour care follow up and transport problem were associated with perinatal death but khat chewing ,cigarette smoking and drug use were not associated with the outcome variable at the bivariate analysis.

## 5.7 The determinants of perinatal mortality

Binary logistic regression analysis was done to identify the independent determinants of perinatal mortality. Both bi-variable and multivariable analysis revealed that literacy, antepartum hemorrhage, prematurity, obstructed labour, delay in seeking labour care, transport problem and partograph use were the determinants associated with perinatal mortality.

The odds of experiencing perinatal mortality were 65% less likely among mothers who had attended tertiary education compared to those who had no education (AOR 0.35, 95% CI; 0.17-0.71).

The odds of perinatal mortality were 2.55 times more likely among mothers who had antepartum hemorrhage during pregnancy than those women who had no APH (AOR 2.55, 95% CI; 1.23-5.26).

The result of the current study showed that 3.11 fold higher odds of perinatal mortality were observed on mothers who had obstructed labour than those who had no obstructed labour (AOR 3.11, 95% CI; 2.00-8.38).

The study also revealed that odds of experiencing perinatal mortality were 3.29 fold more likely among premature births compared to those mature births (AOR 3.29, 95% CI; 1.86-5.81).

The odds of experiencing perinatal mortality were 2.61 fold higher among mothers who were delay in seeking labour care compared to those who were not delayed (AOR 2.61, 95% CI; 1.56-4.39) and the odds of perinatal mortality were 2.75 times more likely among mothers who had encountered transport problem during labour compared to mothers who had no transport problem (AOR 2.75, 95% CI; 2.49-5.11).

The odds of experiencing perinatal mortality were 76% less likely among mothers whose labour was monitored using partograph compared with those mothers whose labour was not monitored using partograph (AOR 0.24, 95% CI; 0.14-0.42) (**Table: 6**).

**Table 6:** The determinants of perinatal mortality in Bahir-dar town governmental health institutions, northwest, Ethiopia, 2019

Variable	Perinatal outcome		COR(95%CI)	AOR (95%)	
	Controls	Cases			
Maternal education					
No education	55(18.7)	59(39.9)	1	1	
Primary	75(25.5)	32(21.6)	0.39(0.23-0.69)	0.51(0.25-1.011)*	
Secondary	75(25.5)	36(24.3)	0.45(0.26-0.77)	0.55(0.27-1.11)*	
Tertiary	89(30.3)	21(14.2)	0.22(0.12-0.40)	0.35(0.17-0.71)	
Prematurity	No	254(86.4)	76(51.4)	1	1
	Yes	40(13.6)	72(48.6)	6.01(3.78-9.57)	3.29(1.86-5.81)
Obstructed labour	No	277(94.2)	102(68.9)	1	1
	Yes	17(5.8)	46(31.1)	7.34(4.03-13.40)	3.11(2.00-8.38)
Antepartum hemorrhage	No	269(91.5)	112(75.7)	1	1
	Yes	25(8.5)	36(24.3)	3.45(1.98-6.03)	2.55(1.23-5.26)
Transport problem	No	261(88.8)	85(57.4)	1	1
	Yes	33(11.2)	63(42.6)	5.86(3.60-9.54)	2.75(1.49-5.11)
Delay in seeking labour care	No	177(60.2)	48(32.4)	1	1
	Yes	117(39.8)	100(67.6)	3.15(2.08-4.78)	2.61(1.56-4.39)
Partograph use	No	49(16.7)	66(44.6)	1	1
	Yes	245(83.3)	82(55.4)	0.24(0.16-0.39)	0.24(0.14-0.42)

1=reference category \* non-significant

## 6. DISSCUSSION

The odds of experiencing perinatal mortality were decreased by 65% among mothers who had attended tertiary education compared to those who had no education. This study was in line with studies conducted in Dabat , Amhara region(5) , Addis Ababa(12) and Kigali, Rwanda(18). This might be due to literacy improve economic status, access to health care and improves birth spacing. But primary and secondary educational levels were not associated with perinatal mortality compared to no education in this study.

The odds of experiencing perinatal mortality were 2.55 times more likely among mothers who had antepartum hemorrhage during pregnancy than those who had no APH (AOR 2.55, 95%CI; 1.23-5.26). The finding of this study was consistent with the studies conducted in Hawassa, Ethiopia(11),Kenya(30), Zimbabwe(31) ,Rural Bangladesh (24) and Nepal(16). This might be due to placental abnormalities that could results in perinatal deaths.

But a case control study conducted in northern Tigray, Ethiopia (13), finding indicated that antepartum hemorrhage was not associated with perinatal mortality .The result of the study was disagree with this study. The reason might be due to differences in quality of health care service availability and accessibilities that could help to early detect and manage antepartum hemorrhage during pregnancy.

Prematurity was one of the strongest determinants of perinatal mortality in this study. The odds of experiencing perinatal mortality were 3.29 fold more likely among premature births compared to those mature births (AOR 3.29, 95%CI;1.86-5.81).This finding was in agreement with the studies conducted in Gojjam(9),Tigray(13), Oromia(14),Tanzania(32),Zimbabwe(31),Ghana(33) and Kerala, India(19).

The study also conducted in Haryana, India (25) finding showed that odds of perinatal mortality in premature deliveries were about 3.5 times more likely compared to term deliveries. The other case control study conducted in Brazil(34) also indicated that prematurity was associated with perinatal mortality .The findings of these studies were agreed with the current study. The reason might be due to vulnerability of premature births to many complications, including respiratory distress syndrome, compromised immune system, cardiovascular disorders, and infections and might also be due to low socio-economic status/ nutritional status .

But the study conducted in Jimma specialized hospital, Ethiopia(10) finding showed that preterm births were not associated with perinatal mortality. The result of the study was disagreed with the current study. The reason might be due to difference in nutritional status of the mothers that gave births.

Obstructed labour was the other determinant factor associated with perinatal mortality. The result of this study showed that 3.11 fold higher odds of perinatal mortality were observed on women who had obstructed labour than those who had no obstructed labour (AOR 3.11,95% CI;2.00-8.38).The result of this study was consistent with the study conducted in Hawassa(11),Northern Ghana(35) and Tanzania(36).This might be due to perinatal asphyxia.

Partograph use during labour follow up was found to be protective factor for perinatal mortality. The odds of experiencing perinatal mortality were 76% less likely among mothers whose labour was monitored using partograph compared to those mothers whose labour was not monitored using partograph (AOR 0.24, 95% CI; 0.14-0.42).

Unmatched case control study conducted in Addis Ababa among public health deliveries finding indicated that the odds of experiencing perinatal mortality were decreased by 65% compared to women who had no labour follow up using Partograph (12).The other case control study conducted in Northern Tigray(13) revealed that the odds of perinatal mortality were 90% less likely among women whose labour was monitored using partograph compared to those mothers whose labour was not monitored using partograph. The findings were agreed with this study. This might be due to using partograph may be helpful in early detection of fetal and maternal complications. Partograph is recommended by world health organization and its appropriate use is can help to detect abnormalities of fetus during labour and delivery.

Delay in seeking labour care was the other determinants of perinatal mortality in the current study. The odds of experiencing perinatal mortality were 2.61 times more likely among mothers who were delay in seeking labour care compared to those mothers who were not delay (AOR 2.61, 95% CI; 1.56-4.39). This finding was agreed with the study conducted in northern Tigray (13).This might be due to failure to recognize signs of complications, failure to perceive the severity of illness, cost considerations, previous negative experiences with the healthcare system, and transportation difficulties.

Perinatal mortality was significantly associated with transport problem. The odds of perinatal mortality were 2.75 times more likely among mothers who had encountered transport (ambulance) problem compared to those mothers who had no transport problem during labour (AOR 2.75, 95% CI; 1.49-5.11).

The result of this study was consistent with a study conducted in Uganda(37). This might be due to distance from a mother's home to health institutions or from institutions to institutions during referrals, the condition of roads, and a lack of emergency transportation. The time taken to reach health facility has been indicated as risk factor for perinatal deaths in developing nations(2). A large number of mothers had to travel more than an hour to reach the referral hospitals and other health facilities and most of the public transportations are difficult for mothers who are on labour the best option for this is ambulance serves as government tries to access it to all health centers and hospitals.

## **7. STRENGTH AND LIMITATION**

### **7.1 strength of the study**

The risk of recall bias by mothers judged to be low because, they were interviewed shortly after delivery or newborn death.

### **7.2 limitation of the study**

The health institution based study might had an over-representation of the determinants of perinatal mortality, as more complicated cases are referred to health institutions and since the data also collected in institution only the perinatal deaths in the community after discharge were no considered.

Since it also the study was conducted among health centers and specialized hospitals the homogeneity of the study population might not be considerable.

Determining gestational age using last normal minstrel period (LNMP) is not as accurate as obstetric ultrasound.

## 8. CONCLUSION

The determinants of perinatal mortality in the study area was largely due to medical, obstetric, neonatal complications that are easily identifiable and manageable with the existing basic obstetric and neonatal care whereas health care and socio-demographic factors were also the important determinants that were associated in this study that needs further encouragement in partograph use in labour follow up and educating females to tertiary education.

## 9. RECOMMENDATION

### **I. For health care providers**

It is better to prevent antepartum hemorrhage, obstructed labour and prematurity  
Partograph use during labour follow up should be strengthened  
Counseling and health education about delay in seeking labour care is needed

### **II. For government health officials at each level**

Transport system must be strengthening  
Educating females to tertiary educational level is better

### **III. For researchers**

Identifying the reason of first delay needs further research  
Qualitative research needs to be done on 3<sup>rd</sup> delay at the health institutions

## 10. REFERENCE

1. World Health Organization. The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM. 2016:77.
2. Yadufashije C, Sangano GB, Samuel R. Factors Associated with Perinatal Mortality in Africa. SSRN Electronic Journal. 2017.
3. World Health Organization . Making Every Baby Count: Audit and Review of Stillbirths and Neonatal Deaths.2016.
4. Central Statistical Agency - CSA/Ethiopia, ICF. Ethiopia Demographic and Health Sruvey 2016. Addis Ababa, Ethiopia:CSA and ICF; 2017.
5. Andargie G, Berhane Y, Worku A, Kebede Y. Predictors of perinatal mortality in rural population of Northwest Ethiopia: a prospective longitudinal study. BMC Public Health. 2013;13:168.
6. Yirgu R, Molla M, Sibley L, Gebremariam A. Perinatal Mortality Magnitude, Determinants and Causes in West Gojam: Population-Based Nested Case-Control Study. PLoS One. 2016;11(7):e0159390.
7. Blencowe H, Cousens S, Jassir FB, Say L, Chou D, Mathers C, et al. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis. The Lancet Global Health. 2016;4(2):e98-e108.
8. Berhan Y, Berhan A. Perinatal mortality trends in Ethiopia. Ethiopian journal of health sciences. 2014;24 Suppl(Suppl):29-40.
9. Yirgu R MM, Sibley L, Gebremariam. Perinatal Mortality Magnitude, Determinants and Causes in West Gojam: Population-Based Nested Case-Control Study. PLoS ONE:2016; 11(7)(e0159390. ).
10. Aragaw YA. Perinatal Mortality and associated Factor in Jimma University Specialized Hospital, South West Ethiopia. Gynecology & Obstetrics. 2016;6(11).
11. Bayou G, Berhan Y. Perinatal mortality and associated risk factors: a case control study. Ethiopian journal of health sciences. 2012;22(3):153-62.
12. Getiye Y, Fantahun M. Factors associated with perinatal mortality among public health deliveries in Addis Ababa, Ethiopia, an unmatched case control study. BMC Pregnancy Childbirth. 2017;17(1):245.
13. Goba GK, Tsegay H, Gebregergs GB, Mitiku M, Kim KA, Alemayehu M. A facility-based study of factors associated with perinatal mortality in Tigray, northern Ethiopia. Int J Gynaecol Obstet. 2018;141(1):113-9.
14. Roro EM, Sisay MM, Sibley LM. Determinants of perinatal mortality among cohorts of pregnant women in three districts of North Showa zone, Oromia Region, Ethiopia: Community based nested case control study. BMC Public Health. 2018;18(1):888.
15. Kalter HD, Khazen RR, Barghouthi M, Odeh M. Prospective community-based cluster census and case-control study of stillbirths and neonatal deaths in the West Bank and Gaza Strip. Paediatr Perinat Epidemiol. 2008;22(4):321-33.
16. K CA, Nelin V, Wrammert J, Ewald U, Vitrakoti R, Baral GN, et al. Risk factors for antepartum stillbirth: a case-control study in Nepal. BMC Pregnancy Childbirth. 2015;15:146.
17. Viswanath K PR, Chakraborty A, Prasad JH, Minz S, George K. A community based case control study on determinants of perinatal mortality in a tribal population of southern India. Rural and Remote Health september 2015;15: 3378.
18. Musafili A, Essen B, Baribwira C, Selling KE, Persson LA. Social equity in perinatal survival: a case-control study at hospitals in Kigali, Rwanda. Acta Paediatr. 2015;104(12):1233-40.
19. Brahmanandan M, Murukesan L, Nambisan B, Salmabeevi S. Risk factors for perinatal mortality: a case control study from Thiruvananthapuram, Kerala, India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2017;6(6):2452.
20. Yego et al. A case-control study of risk factors for fetal and early neonatal deaths in a tertiary hospital in Kenya. BMC Pregnancy and Childbirth 2014;14(389).
21. Al-Shahethi AH, Zaki RA, Al-Serouri AWA, Bulgiba A. Maternal, prenatal and traditional practice factors associated with perinatal mortality in Yemen. Women Birth. 2018.
22. Lakew D, Tesfaye D, Mekonnen H. Determinants of stillbirth among women deliveries at Amhara region, Ethiopia. BMC Pregnancy Childbirth. 2017;17(1):375.
23. Makwala TI, Tozin RR, Lusanga CN, Akilimali PZ. [Determinants of perinatal mortality in premature newborns in university clinics in Kinshasa]. Mali Med. 2014;29(4):59-63.



24. Owais A, Faruque AS, Das SK, Ahmed S, Rahman S, Stein AD. Maternal and antenatal risk factors for stillbirths and neonatal mortality in rural Bangladesh: a case-control study. *PLoS One*. 2013;8(11):e80164.
25. Neogi SB, Negandhi P, Chopra S, Das AM, Zodpey S, Gupta RK, et al. Risk Factors for Stillbirth: Findings from a Population-Based Case-Control Study, Haryana, India. *Paediatr Perinat Epidemiol*. 2016;30(1):56-66.
26. Kabore R, Meda IB, Koulidiati JE, Millogo T, Kouanda S. Factors associated with very early neonatal mortality in Burkina Faso: A matched case-control study. *Int J Gynaecol Obstet*. 2016;135 Suppl 1:S93-S7.
27. Berhie KA, Gebresilassie HG. Logistic regression analysis on the determinants of stillbirth in Ethiopia. *Maternal health, neonatology and perinatology*. 2016;2:10-.
28. Agency CS. 2007 population and housing census of Ethiopia 2007.
29. EPHI.national technical guidance for maternal and perinatal death surveillance and response. 2017;1(1).
30. Yego F, D'Este C, Byles J, Nyongesa P, Williams JS. A case-control study of risk factors for fetal and early neonatal deaths in a tertiary hospital in Kenya. *BMC Pregnancy Childbirth*. 2014;14(389):389.
31. Tachiweyika E, Gombe N, Shambira G, Chadambuka A, Mufuta T, Zizhou S. Determinants of perinatal mortality in Marondera district, Mashonaland East Province of Zimbabwe, 2009: a case control study. *The Pan African medical journal*. 2011;8:7-.
32. Macheku GS PR, Oneko O, Mlay PS, Masenga G, Obure J., MJ. M. Frequency, risk factors and fetomaternal outcomes of abruptio placentae in Northern Tanzania: a registry-based retrospective cohort study. *BMC Pregnancy Childbirth*. 2015;15(242).
33. A Kraft C. Identifying Risk Factors Associated With Intrapartum Stillbirth and Neonatal Mortality in Rural Ghana. *Neonatology & Clinical Pediatrics*. 2015;2(2):1-3.
34. Moura et al. Me. Risk factors for perinatal death in two different levels of care: a case-control study. *Reproductive Health*. 2014;11(11).
35. Engmann C, Walega P, Aborigo RA, Adongo P, Moyer CA, Lavasani L, et al. Stillbirths and early neonatal mortality in rural Northern Ghana. *Trop Med Int Health*. 2012;17(3):272-82.
36. Rose Mpembeni NM JR, Mughamba J (2014). Perinatal Mortality and Associated Factors Among Deliveries in Three Municipal Hospitals of Dar Es Salaam, Tanzania. *J Pediatr Neonatal Care* 1(4):(00022.).
37. Beatrice Akello 1 EN, Christine Zirabamuzaale 2 and Christopher Garimoi Orach 2. risk factors for perinatal mortality in Arua regional referral hospital, west Nile, Uganda. *East African Journal of Public Health*. 2008;5(3).

## ANNEXES

### **Annex 1- information sheet**

Hello! My name is ..... I am here on behalf of the School of master of public health Bahir - Dar University; to identify determinants of perinatal mortality in Bahir-dar town governmental health institutions.

I am going to interview you about socio-demographic factors, general obstetric factors, medical and obstetric complication factors, fetal/newborn factors and health care factors and your behavioral factors encountered you in the current pregnancy and delivery to identify association of this factors for perinatal mortality, the result will contribute in access to and improvement for quality ANC follow up, delivery , post-natal care, basic emergency obstetric care in the governmental health institution in this town and finally will help to prevent maternal and perinatal mortality.

I had received permission from the health institution and respective health offices to conduct this study. The information from this study will not be used for other purposes by any of the institutions and individuals without your agreement and the information will be completely confidential. Please direct any questions or problems you may encounter during this study to:

1. Daniel Tarekegn

Department of Epidemiology

College of Health Science

Bahir Dar University

Mobile +251 918 217172

Email- [tadan2020@gmail.com](mailto:tadan2020@gmail.com)

for additional information, please contact

2. Mrs Keadnew Mulatu Mobile +251 924491976

3. Mrs Taye Abuhay Mobile +251 918806940

**Annex 2. Consent form**

I the under sign all the information is kept confidential and will be used solely for this study. My agreement to participate in this study is with the assumption that, the information that I gave will greatly improves access to and quality basic emergency and obstetric care, ANC follow up, delivery and postnatal care and health care service in general in gynecologic, obstetric and neonatal units. Generally, I will explain about this research study and I will understand the same. And, I hereby agree to participate in this research study and give my voluntary consent.

Interviewer Name.....Signature.....

Date of interview.....

Witness Signature..... Date.....

Supervisor Name ..... Date.....Signature.....

Please direct any questions or problems you may encounter during this study to

Daniel Tarekegn  
Department of Epidemiology  
College of Health Science  
Bahir Dar University  
Mobile +251 918217172  
Email- [tadan2020@gmail.com](mailto:tadan2020@gmail.com)

### Annex-3 English version Questioner form

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

Name of supervisor-----signature----- Date-----

Code-----name of health institution-----

#### Part-I General Socio-demographic information

S. n	Variables	Categories /response	Code	skip
1	Maternal age during delivery	-----years		
2	Maternal educational status	1. Not educated 2. Primary (1-8) 3. Secondary (9-12) 4. Tertiary (>12)		
3	Marital status of the mother	1. Single 2. Divorced 3. Married 4. Widowed		
4	Residence	1. Urban 2. Rural		
5	Occupation of the mother	1. Employed 2. Merchant 3. Housewife 4. Others -----		
6	Average monthly family income in ETB	-----		

#### Part- II General obstetric and maternal history of the mother for the index pregnancy

1	Gravidity	-----		
2	Gestational age in weeks current pregnancy	-----		
3	Birth interval in months for the last pregnancy	1. <24 months 2. 24-36 months 3. >36 months		
4	Did the women had ANC visit	1. Yes 2. No	2	7

5	If yes for Q-4 number of ANC visit	1. 0-1 2. 2-3 3. $\geq 4$		
6	Timing of ANC initiation	1. 1 <sup>st</sup> trimester 2. 2 <sup>nd</sup> trimester 3. 3 <sup>rd</sup> trimester		
7	Maternal tetanus toxoid vaccine received	1. Received 2. Not received	2	9
8	If received in Q8 dose of tetanus toxoid vaccine received	1. single dose 2. 2-3 doses 3. 4-5 doses		
9	family planning use before the index pregnancy	1. Yes 2. No		
10	Did the mother taken Iron-folate pill during preconception or pregnancy?	1. Yes 2. No		
11	Previous history of perinatal death	1. No 2. Yes		
12	Previous of History of abortion below 7 months	1. No 2. Yes		
<b>Iv. Medical and obstetric complication for the index pregnancy</b>				
1	Mode of delivery	1. SVD 2. Cesarean section 3. Assisted VD		
2	Hemorrhagic disorder	1. No 2. Yes		
3	History of diabetes mellitus	1. No 2. Yes		
4	History of Hypertensive	1. No 2. Yes		
5	History of hepatitis B infection	1. No 2. Yes		
6	History of malaria during pregnancy	1. No 2. Yes		
7	History of epileptic disorder	1. No 2. Yes		
8	History of sexually transmitted disease	1. Yes 2. No		
<b>Part-V Fetal/Newborn factors</b>				
1	Sex of new-born	1. Male 2. Female		

2	Number of fetus delivered	1. Single 2. Multiple		
3	Birth weight in grams	-----		
<b>Part-V Maternal behavioral and health care factors</b>				
1	Time spent at home After labour had started before decision was made to go health institution , hr.	-----		
2	Did you got transport (ambulance) problem during traveled from home to health facility or from health facility to health facility during referrals	1. No 2. Yes		
3	Did you chew chat during pregnancy	1. No 2. Yes		
4	Did you smoking cigarette during pregnancy	1. No 2. Yes		
5	Did you take drugs for other health problem during pregnancy not prescribed	1. No 2. Yes		
6	Did you drink alcohol during pregnancy	1. No 2. Yes	2	End
7	If yes ,type of alcohol(Tela,Areki,beer,wine,wuski)	-----		
8	Frequency per week	-----		

**Annex: 5-ፈቃድ መጠየቂያ ቅጽ**

ጤና ደስጥስኝ ስሜ -----ደባሳስ ስቶ ዳንኤስ ታረቀኝ ከባህርዳር ዩኒቨርሲቲ በሚሰራው ጥናት ሳይ ስባስ ነኝ ጥናቱ የሚያተኩረው ከእርግዝና 28 ሳምንት ጀምሮ ከወሲዱ በ1ሳምንት ውስጥ ስለሚሞቱ ስዲስ የተወሰዱ ህዳናት የሚሞቱበትን ምክንያቶች መስየት ሳይ ነው። በጥናቱ በመሳተፍዎ ከሰብ ስመስገናህ ። ከሳይ ከተጠቀሰው ሁኔታ ጋር ያሉትን ሁኔታዎች እጠይቀውታለሁ እርስዎ የሚሰጡት ትክክለኛ መረጃ ስጤና ተቋማት፤ሰዎን እና ሰበሰብ ስቀፍ የህዳናትን ሞት ስመቀነስና ስገሰገሱችንን ስማሻሻል ስላማ ይወሳሰድ፤ ቃስ-መጠይቅ ከ 15 እስከ 20 ደቂቃ ሲወስድ ይችላል። የሚሰጡት ማንኛውም መረጃ ምስጢራዊነቱ የተጠበቀ ነው። በጥናቱ መሳተፍ የጎሳ ችግር የሰውም ስቃስ-መጠይቅ ከሚወስድብዎት ጊዜ ባሰፈ፤ የርስዎ በጥናቱ መሳተፍ የህዳናትን ሞት ስመቀነስ ጠቃሚ ነው ።

በጥናቱ በመሳተፍዎ የሚያገኙት ቀጥተኛ ጥቅምም ሆነ ጉዳት የሰውም፤ በጥናቱ መሳተፍ በፈቃደኝነት ሳይ የተመሰረተ ነው ከጥያቄዎች የተወሰነውን ወይም ሙሉ በሙሉ ያስመመስስ መብት ስለዎት፤ነገር ግን የርስዎ መሳተፍ እጅግ ስኬላጊ ስለሆነ ስንደሚሳተፍ ተስፋ ስለኝ።

የበሰጠ መረጃ ካስፈለገዎት በሚከተሉት ስድራሻ መጠቀም ይችላሉ ጥናቱን የሚያካሂደው ሰው ስድራሻ፡

ዳንኤስ ታረቀኝ ፤ ስ.ቁ: 0918 217172

ከሳይ በተዘረዘረት የቃስ ስምምነት

ከተስማሙ ቃስ-መጠይቅን ይጀምር

ፈቃደኛ ካሰሆኑ ወደሴሳ ተሳታፊ ሰሂዱ

ስቃስ-መጠይቅ ሁ-እስማማሰሁ  ስ-ስስሰማማም

**Annex-6 የስማኝ መጠይቅ-ቅጽ**

መመሪያ: ስመራዎ ሳስቸው ጥያቄዎች ከተሰጡት ስማራዎች ውስጥ ትክክለኛውን ያክብቡ ዝርዝር ሃሳብ ስሚያስፈልጋቸው በተሰጠው በታ ሳይ ሃሳብዎን ይጻፉ።

የመረጃ ሰብሳቢዉ ስም-----ፎከማ ----- ቀን -----

የተቆጣጣሪዉ ስም-----ፎከማ-----ቀን -----

ኮድ(መስደ)-----የጤና ተቋሙ ስም -----

**ክፍል-1 ስጠቃሳይ ማህበራዊ እና ስነ ህዝብ መረጃ**

ተ.ቁ	መጠይቅ	ምሳሌ	መሰደ	ስድ
1	የስነ-ምግባር ስነ-ምግባር ስራ	----- ስራ		
2	የስነ-ምግባር የትምህርት ደረጃ ምን ያህል ነው	1. ደብዳቤ 2. ከ1-8የተማሪዎች 3. ከ9-12 የተማሪዎች 4. ከ12 ክፍል በላይ		
3	የስነ-ምግባር የትምህርት ደረጃ	1. ደብዳቤ 2. ደብዳቤ 3. የደብዳቤ 4. የሞተር		
4	የስነ-ምግባር መኖሪያ ቦታ	1. ከተማ 2. ገበያ		
5	የስነ-ምግባር ስራ ምን ያህል ነው	1. ተቀማጭ 2. ነጋዴ 3. የቤት ስራ 4. ሌላ ካለ ደግሞ-----		
6	የቤተሰብ ስነ-ምግባር ወራጭ ገቢ ስነ-ምግባር ነው	-----		
<b>ክፍል-2 ጠቅላላ ክስተት ጋር የተያያዘ መረጃ</b>				
1	የሰው ስነ-ምግባር ስርዓት ነው	-----		
2	የሰው ስርዓት በስነ-ምግባር ስርዓት ተወስኗል	-----		
3	የመጨረሻው ስርዓት በስነ-ምግባር ወራጭ ወሰን	-----		
4	የሰው ስርዓት የስርዓት ክትትል ስርዓት ነው	1. ስዎ 2. የሰዎ	2	7
5	ስዎ ከሆነ መሰረት ስነ-ምግባር ነው ክትትል ያደረገው	-----		
6	በስርዓት በስነ-ምግባር ወራጭ ነው የስርዓት ክትትል የጸመው	-----		
7	የመንገድ ቅጽ ክትትል በስርዓት ወራጭ ከሰርዓት በፊት ተከትሎ ነው	1. ስዎ 2. የሰዎ	2	9
8	ስዎ ከሆነ መሰረት ስነ-ምግባር ተከትሎ;	-----		
9	የስርዓት መከላከያ ከሰርዓት በፊት ተጠቅሟል ነው	1. ስዎ 2. የሰዎ		
10	በስርዓት ወራጭ ከስርዓት በፊት የሰዎ ማንስ ወራጭ የሰዎ ስነ-ምግባር ወራጭ ነው	1. ስዎ 2. የሰዎ		
11	ከዚህ በፊት በወራጭ ገቢ ወራጭ በወራጭ በ1 ስነ-ምግባር ወራጭ ስርዓት	1. የሰዎ 2. ስዎ		
12	ከዚህ በፊት ስርዓት 7 ወር ሳይሆን ስርዓት ያደረገው	1. የሰዎ 2. ስዎ		



<b>ክፍል-3 በወሲቱ ጊዜ የነበረ ስጦታዎች መረጃ እና ከወሲቱ ጋር ተያይዞ የሚመጡ የስነ ጥናት ዓይነቶች</b>				
1	በምንጭን ነጠ ያወሰዱት	1. ስምጠሽ 2. በየደብዳቤው በቀደም ጥገና 3. ስምጠሽ በመሳሪያ በመታገዝ		
2	ከወሲቱ በፊት ደም መፍሰስ ስጋጥሞች ነበር	1. የስም 2. ስዎ		
3	የስኳር ህመም ነበረብኝ	1. የስም 2. ስዎ		
4	የደም ግፊት ነበረብኝ	1. የስም 2. ስዎ		
5	የሂፓታይትስ ቢ ቫይረስ በሽታ ስሞች ያወጡታል	1. የስም 2. ስዎ		
6	የስባሳዘር በሽታ ስሞች ነበር	1. የስም 2. ስዎ		
7	በስርግዝኛዎች ውቅት የወጣ በሽታ ስሞች ያወጡታል	1. የስም 2. ስዎ		
8	የሚጥሱ በሽታ ህመም ነበረብኝ	1. የስም 2. ስዎ		
<b>ክፍል-4 የተወሰደው ህዳግ ስጦታዎች መረጃና ያጋጠሙት የጤና ዓይነቶች</b>				
1	የተወሰደው ህዳግ ይታ ምንጭ ነጠ	1. ሴት 2. ወንድ		
2	ስሁን የወሰደሽዉ ስንት ሰዓት ነጠ	-----		
3	የተወሰደው ህዳግ ክብደት ስንት ገራም ነጠ	-----		
<b>ክፍል-5 የጤና ተቋም እና የስነ ጥናት የባህሪ መረጃ</b>				
1	ምጥ ክፍሎች በኋላ ጤና ተቋም ሳትሃይ ቤት ስንት ሰዓት ቆየሽ	-----		
2	ወደ ጤና ተቋም(ከጤና ተቋም ጤና ተቋም) ሰጠህድ የመገገግ ችግር ስጋጥሞች ነበር	1. የስም 2. ስዎ		
3	በስርግዝኛዎች ውቅት ሲጋራ ስሞች ጋወቁሰሽ	1. የስም 2. ስዎ		
4	በስርግዝኛዎች ውቅት በሀኪም ክታዘዝ መድሃኒት ወይንም ወሰደሽ ጋወቁሰሽ	1. የስም 2. ስዎ		
5	በስርግዝኛዎች ውቅት ጫት ቅመሽ ጋወቁሰሽ	1. የስም		



1. SVD
2. Cesarean section
3. Assisted VD

7. Fetal presenting part

- |           |             |
|-----------|-------------|
| 1. Head   | 3. Feet     |
| 2. Breech | 4. Arm/hand |

8. Partograph use during labour follows up

1. Yes
2. No

9. Qualification of birth attendant

1. Doctor/Emergency surgeon
2. Midwife
3. Other health professionals

10. One minute Apgar score-----

11. Five minute Apgar score -----

12. Did the new-born resuscitated

1. Yes
2. No

13. Birth weight in grams .....

## **Annex- 7 Declaration of the study**

I, the under signed declared that this is my original work ,has never been presented in this or other any university ,and that all the resources and materials used for the research have been fully acknowledged.

<b>Principal Investigator:</b>	<b>signature</b>	<b>date</b>
1. Daniel Tarekegn:	_____	<u>8/7/2019</u>

Approval of the advisor (s)

<b>Advisors Name</b>	<b>Signature</b>	<b>Date</b>
1. Mr. Keadnew Mulatu	_____	<u>8/7/2019</u>
2. Mr. Taye Abuhay	_____	<u>8/7/2019</u>

<b>Internal examiner</b>	<b>signature</b>	<b>date</b>
1. Mr. Yihun Mulugeta	_____	<u>8/7/2019</u>