Determinants of Perinatal Mortality in Bahir Dar Town Governmental Health Institutions, Northwest, Ethiopia, 2019: Case Control Study

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Abstract

Background: Globally, 14,300 perinatal deaths were estimated to occur each day in 2015. Almost all (98%) took place in developing countries. Ethiopia is one of the developing countries with 33 per 1000 perinatal deaths. However, there is limited information about factors associated with perinatal mortality. Therefore this study was aimed to identify determinants of perinatal mortality in Bahir-dar town governmental health institutions.

Methods: Institutional based unmatched case control study design was conducted from 1st March to 30th June, 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 were included and two controls per case were selected using systematic sampling method. A total of 459 (153 cases and 306 controls) participants were involved. Structured questioner and checklist were used for data collection. Multivariable logistic regression analysis was performed. A p-value of <0.05 was considered as significant.

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), delay in seeking care (AOR 2.61, 95% CI; 1.56-4.39) and delay in reaching care (AOR 2.75, 95% CI; 1.49-5.11) were the determinants that increases perinatal mortality ,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 protective factors of perinatal mortality.

Conclusion: The determinants of perinatal mortality in the study area were prematurity, obstructed labor, antepartum hemorrhage; first and second delay and pantograph use in labour follow up.

Keywords: Perinatal mortality, Determinants, Ethiopia

Introduction

Perinatal mortality is defined as a fetal death (stillbirth) and early neonatal death. Stillbirth is a baby born with no sign of life, weighing ≥1000 gram or if missing ≥ 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 nations are five times higher than developed nations [2].

Currently, the quality of antenatal and perinatal care provided to the community is best judged by the perinatal mortality rate. Annually, 2.6 million stillbirths and 2.7 million early neonatal deaths occurs worldwide [3]. In the year 2015, each day an estimated 7,300 newborns die due to pregnancy complication worldwide. From those 98% of deaths occur in developing countries [4].

Although, there was a remarkable decline (40%) in perinatal mortality in Ethiopia in the last two decades, it is still an important public health problem. There is 66-124 deaths per 1000 births in health institution and 25 to 52 deaths per 1000 births in the community [5, 6]. The community based study conducted in Ethiopia showed that perinatal mortality rate was 50.22 deaths per 1000 births [7]. The 2016 Ethiopian demographic and health survey (EDHS) findings showed that perinatal mortality rate was 44 deaths per 1000 pregnancies in Amhara region [8].

Perinatal mortality is good health indicator that 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 are very important for decision makers in building and implementing strategies to improve the care provided to the pregnant mothers and their newborns.

The previous studies identified that hemorrhagic disorders, hypertensive disorders, obstructed labor, prolonged labour, neonatal sepsis, asphyxia, congenital anomalies, prematurity, advanced maternal age were the risk factors ,whereas antenatal care (ANC) follow up, tetanus toxoid (TT) vaccination, use of Partograph during labor, doctor birth attendant were protective factors for perinatal mortality [5, 9-14]. But first delay (delay in deciding to receive care), second delay (delay in reaching care) and maternal behavioral factors such as alcohol consumption, cigarette smoking, drug use during pregnancy, nutritional status, khat 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.

Materials and Methods

Institutional based unmatched case control study design was conducted in Bahir-dar town governmental health institutions from 1st March to 30th June; 2019. The source population was all cases of stillbirth, early neonatal deaths within the first week of life and live births at least 1000 grams birth weight or ≥ 28 weeks of gestation in the study period. Those stillbirths and early neonatal deaths after 28 weeks of pregnancy for cases and live births after 28 weeks of gestation were eligible for study, whereas stillbirths, early neonatal deaths and live births with the maternal mortality were excluded.

The sample size was determined using epi-info version 7 by taking abortion history as risk factor associated with perinatal mortality in the previous study (AOR 2.46 and 8.3% controls exposed) [6], with the following assumption: 80% power, 1:2 case to control ratio, 95% confidence interval and 5% non-response. A total of 459 (153 cases and 306 controls) participant were included in the study. The sample was proportionally allotted for seven health institutions in the town. 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 1st March to 30th June, 2019 were recruited as cases consecutively until the required sample size was reached. And two controls per case were selected using a systematic sampling technique from mothers who had given birth in the study period using the delivery log book. Perinatal mortality were outcome variable (1=died and 0=alive). Whereas, maternal age, maternal occupation, maternal educational status, maternal marital status , prematurity, 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 perinatal death, history of abortion, hemorrhagic disorder, obstructed labour, prolonged, labour hypertensive disorder, HIV, DM, anemia, STI, HBV infection , birth weight ,Congenital anomaly , neonatal jaundice, neonatal sepsis , bleeding, accidental injury/ fall, partograph use, first delay, second delay, qualification of birth attendant, smoking, khat chewing , drug use, alcohol consumption were independent variables

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 stillbirth or born alive but died within seven days after delivery. Gestational age was determined using the last normal menstrual period (LNMP) or ultrasound report.

Control: Is defined as live births at least 1,000 grams of birth weight or corresponding to 28 weeks of gestation in health institutions of the study area and survived the first 7 days after delivery.

Delay in seeking labour care (the first delay): Refers to the time spent at home before a decision is made to seek labour care (it was considered delayed if the mother stay at home ≥3 hours after labour had started).

Delay in reaching care (second delay): Is the problem related to reach the health institutions after the decision had made to do (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 the referral.

Data were collected by 7 midwives and neonatal nurses who were working in the health institutions with face to face interviewer administer questioners from all eligible mothers and some data were also collected from medical records of mothers and new-borns using a checklist.

A questioner was translated to Amharic, the working language in the study area by two people one medical professional and the other English language professional. Pretest was done before the actual data collection period and two days training was given for data collectors and supervisors. The overall activity had been supervised regularly by two supervisors.

Data were coded, entered and cleaned using epi-info version 7, then analysis was performed using SPSS version 23 software. Frequencies, proportions and summary statistics were used to describe the study participants. Both bi-variable and multivariable logistic regressions were used to model the odds of perinatal mortality. The degree of association of selected characteristics and the outcome variables were assessed using adjusted odds ratios with corresponding 95% confidence intervals. The model fitness was checked based on Hosmer and Lemeshow goodness of fit test (P- value > 0.05).

Results

A total of 442 (148 cases and 294 controls) were included with a response rate of 96.3% (96.5% of cases and 96.1% of controls). The mean age of mothers with cases was 28.22 ± 7.50 standard deviation (SD), while controls 26.23 ± 4.88 (SD). The majority, 264 (89.8%) of control and 114 (77.0%) of cases were found in the age category of 20-34 years. About 89 (30.3%) and 21 (14.2%) of controls and cases had tertiary education level respectively. With regard to current occupational status, 73 (24.8%) of controls employed when compared to cases 42 (28.4%). Majority, 248 (84.4%) of controls and 114 (77.0%) cases were married. About 209 (71.1%) mothers with live births were lived in urban areas as compared with 70 (47.3%) cases (Table 1).

Of all 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. About, 249 (84.7%) of control and 127 (85.8%) of case mothers had an antenatal care visit for the current pregnancy respectively. For those mothers who had an antenatal care visit for the current pregnancy, 205 (69.7%) and 96 (64.9%) were started an antenatal care follow up within three months (first trimester) respectively for control and case mothers.

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

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

From all participants in the study, 167(56.8%) of control mothers and 86(58.1%) of case mothers had delivered female newborns of those, 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 delivered low birth weight (<2500gm) newborns, while the remaining, 253(86.1%) and 108(73.0%) of control and case mothers had delivered normal birth weight newborns.

With regard to neonatal complications, about, 21(7.1%) of control and 12(8.1%) of cases accounts neonatal sepsis, 16(5.4%) of controls and 13(8.8%) of cases, 9(3.1%) controls and 11(7.4%) of cases and 40(13.6%) of controls and 72(48.6. %) of cases had congenital anomaly, neonatal jaundice and prematurity respectively (Table 3).

In bivariate analysis maternal age, maternal educational status, residence, TT vaccination, modern family planning use, iron-folate intake during pregnancy, antepartum hemorrhage, hypertensive disorders, anemia, obstructed labour, neonatal sepsis, congenital malformation, neonatal Jaundice, prematurity, first delay, partograph use, second delay were associated with perinatal mortality but others were not.

The determinants of perinatal mortality

Binary logistic regression analysis was done to identify the independent determinants of perinatal mortality. Both bi-variable and multivariable logistic regression analysis revealed that literacy, antepartum hemorrhage, prematurity, obstructed labour, first delay, second delay and partograph use were the determinants of perinatal mortality (Table 4).

Table 1: Demographic characteristic of mothers in Bahir-dar town governmental health institutions from 1st March to 30th June, 2019 North-west, Ethiopia.

Variable	Category	Perinatal outcome		
		Control (N, %)	**Cases** (N, %)	**COR 95% CI**
Maternal age, y	<20	17(5.8)	20(13.5)	2.724 (1.376, 5.393)
	20-34	264(89.8)	114(77.0)	1
	≥35	13(4.4)	14(9.5)	2.494 (1.136, 5.474)
Maternal educational status	Not educated	55(18.7)	59(39.9)	1
	Primary	75 (25.5)	32(21.6)	0.398 (0.229, 0.692)
	Secondary	75 (25.5)	36(24.3)	0.447(0.260, 0.769)
	Tertiary	89(30.3)	21(14.2)	0.220 (0.121, 0.401)
Current maternal occupation	Employed	73(24.8)	42(28.4)	1
	Merchant	81(27.6)	51(34.4)	1.094 (0.653, 1.834)
	House wife	102(34.7)	41(27.7)	0.699(0.413, 1.181)
	Others [a]	38(12.9)	14(9.5)	0.640 (0.311, 1.317)
Residence	Urban	209(71.1)	70(47.3)	1
	Rural	85(28.9)	78(52.7)	2.740 (1.819, 4.126)
Maternal marital status	Single	27(9.2)	21(14.2)	1
	Married	248(84.4)	114(77.0)	0.591 (0.321,1.090)
	Divorced	16(5.4)	10(6.8)	0.804(0.303,2.129)
	Widowed	3(1.0)	3(2.0)	1.286 (0.235,7.030)

Table 2: General obstetric characteristics of mothers in Bahir-dar town governmental health institutions from 1st March to 30th June, 2019 North-west, Ethiopia

Variable	Category	Perinatal outcome		
		Control (N, %)	Cases (N, %)	COR 95% CI
Gravidity	I	107(36.4)	57(38.5)	1
	II-VI	156(53.1)	69(46.6)	0.830 (0.541,1.274)
	>VI	31(10.5)	22(14.9)	1.332 (0.707,2.511)
ANC visit	No	45(15.3)	21(14.2)	4.333(2.752,6.824)
	Yes	249(84.7)	127(85.8)	1
Time of ANC visit	1st trimester	205(69.7)	96(64.8)	2.560 (1.355,4.837)
	2nd trimester	26(8.8)	18(12.2)	0.506 (0.278,0.919)
	3rd trimester	18(6.0)	13(8.8)	1
TT vaccination status	Not received	50(17.0)	52(35.1)	2.643(1.678,4.164)
	Received	244(83.0)	96(64.9)	1
Modern FP use	No	62(21.1)	62(41.9)	2.698 (1.754,4.148)
	Yes	232(78.9)	86(58.1)	1
Iron-folate intake during pregnancy	No	100(34.0)	78(52.7)	2.162 (1.445,3.234)
	Yes	194(66.0)	70(47.3)	1
Previous history of abortion	No	284(96.6)	137(92.6)	1
	Yes	10(3.4)	11(7.4)	2.280 (0.946,5.499)
Previous history of perinatal death	No	286(97.3)	139(93.9)	1
	Yes	8(2.7)	9(6.1)	2.315 (0.874,6.129)
Mode of delivery	SVD	206(70.1)	90(60.8)	1
	Assisted VD	64(21.8)	44(29.7)	1.574 (0.997,2.485)
	CS	24(8.2)	14(9.5)	1.335(0.660, 2.700)
Fetal presenting part	Head	214(72.8)	101(68.2)	1
	Breech	43(14.6)	30(20.3)	1.478(0.876,2.494)
	Feet	23(7.8)	12(8.1)	1.105 (0.529,2.310)
	Arm/hand	14(4.8)	5(3.4)	0.757 (0.265,2.158)

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

Table 3: Neonatal & obstetric complications, health care and maternal behavioral factors of controls (n=294) and cases n=148) in Bahir-dar town governmental health institutions from 1st March to 30th June, 2019, North-west, Ethiopia.

Variable	Category	Perinatal outcome		
		Control (N, %)	Cases (N, %)	COR 95% CI
Antepartum hemorrhage (APH)	No	269(91.5)	112(75.7)	1
	Yes	25(8.5)	36(24.3)	3.459 (1.984,6.030)
Anemia	No	286(97.3)	135(91.2)	1
	Yes	8(2.7)	13(8.8)	3.443 (1.394,8.503)
Hypertensive disorder	No	279(94.9)	125(84.5)	1
	Yes	15(5.1)	23(15.5)	3.422 (1.727,6.781)
Obstructed labour	No	277(94.2)	102 (68.9)	1
	Yes	17(5.8)	46 (31.1)	7.348 (4.029,13.401)
Sex of new born	Female	167(56.8)	86(58.1)	1
	Male	127(43.2)	62(41.9)	0.948 (0.636,1.414)
Birth weight , gm	≥2500	253(86.1)	108(73.0)	1
	1000-2499	41(13.9)	40(27.0)	0.438(0.268,0.714
Number of fetus delivered	Single	280(95.2)	139(93.9)	1
	Twin	14 (4.8)	9(6.1)	1.295 (0.547,3.065)
Neonatal Jaundice	No	285(96.9)	137(92.6)	1
	Yes	9(3.1)	11 (7.4)	2.543 (1.029,6.280)
Neonatal sepsis	No	273(92.9)	136(91.9)	1
	Yes	21(7.1)	12(8.1)	1.16 (1.11,9.43)
Congenital anomaly	No	278(94.6)	135 (91.2)	1
	Yes	16(5.4)	13(8.8)	1.67 (1.44,4.35)
Prematurity	No	254(86.4)	76(51.4)	1
	Yes	40(13.6)	72(48.6)	6.016(3.783,9.565)
Delay in seeking care	No	177(60.2)	48(32.4)	1
	Yes	117(39.8)	100(67.6)	3.152(2.079,4.777)
Delay in reaching care	No	261 (88.8)	85(57.4)	1
	Yes	33 (11.2)	63(42.6)	5.862(3.602,9.541)
Alcohol consumption	No	242 (82.3)	94(63.5)	1
	Yes	52 (17.7)	54(36.5)	2.673(1.706,4.189)
Partograph use	No	49 (16.7)	66(44.6)	1
	Yes	245(83.3)	82(55.4)	0.248(0.159,0.388)

Table 4: The determinants of perinatal mortality in Bahir-dar town governmental health institutions from 1st March to 30th June, 2019, North-west, Ethiopia.

Variable		Perinatal outcome		COR(95%CI)	AOR (95%CI)
		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) *
Delay in reaching care	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 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) *
Alcohol consumption	No	242(82.3)	94(63.5)	1	1
	Yes	52(17.7)	54(36.5)	2.67(1.71-4.19)	1.72(0.94-4.39)

1=reference category * significant COR =crude odds ration AOR= adjusted odds ratio

Discussion

This study had compared the characteristics of women who had encountered perinatal loss and those who had live births and survived the perinatal period. From those educational status, antepartum hemorrhage, obstructed labour, prematurity, first delay, second delay and Partograph use were the determinants associated with the outcome.

The odds of experiencing perinatal mortality were decreased by 65% among mothers who had tertiary education level compared to those who had no education. This study was in line with studies conducted in Dabat [7], Addis Ababa [9] and Kigali, Rwanda [10]. This might be due to literacy improve the economic status, access to health care and improves birth spacing. And also literacy might improve health care services utilization that helps to reduce perinatal mortality.

The odds of experiencing perinatal mortality were 2.55 times more likely among mothers who had an antepartum hemorrhage during pregnancy than those who had no antepartum hemorrhage (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 (12), Zimbabwe (13) ,Rural Bangladesh [14] and Nepal [15]. This might be due to placental abnormalities that could result in perinatal mortality. But a case control study conducted in northern Tigray, Ethiopia [16], indicated that antepartum hemorrhage was not associated with perinatal mortality which is contradicted with the result of this study. The reason might be due to differences in quality of health care service availability and accessibilities that could help with early detection and management of 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 line with the studies conducted in Gojjam [6], Tigray [16], Oromia [17], Tanzania [18], Zimbabwe [13], Ghana [19] and Kerala, India [20]. The study also conducted in Haryana, India [21] showed that odds of perinatal mortality in premature deliveries were about 3.5 times more likely when compared to term deliveries. The other case control study conducted in Brazil [22] also indicated that prematurity was associated with perinatal mortality. The reason might be due to the vulnerability of premature births to many complications, including respiratory distress syndrome, compromised immune system, cardiovascular disorders, and infections. But the study conducted in Jimma specialized hospital, Ethiopia [23] showed that preterm births were not associated with perinatal mortality. The result of the study was disagreeing 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 [24] and Tanzania [25].This might be due to perinatal asphyxia, that those mothers who had obstructed labour might have the greatest risk of perinatal asphyxia.

Partograph use during labour follow up was also 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 indicated that the odds of experiencing perinatal mortality were decreased by 65% compared to women who had no labour follow up using Partograph [9]. The other case control study conducted in Northern Tigray [16] 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 finding was 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 (first delay) 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 delayed in seeking labour care compared to those mothers who were not delayed (AOR 2.61, 95%CI; 1.56-4.39). This finding was agreed with the study conducted in northern Tigray [16]. 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 second delay or delay in reaching care. The odds of perinatal mortality were 2.75 times more likely among mothers who had delayed in reaching care compared to those mothers who had no delay in reaching care (AOR 2.75, 95%CI; 1.49-5.11). The result of this study was consistent with a study conducted in Uganda [26]. 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 (ambulance services). 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. The risk of recall bias by mothers judged to be low because, they were interviewed shortly after delivery or newborn death was the strength of the study.

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 and since the data was collected in institution only the perinatal deaths in the community after discharged were no considered. Since it was also conducted among health centers and specialized hospitals the homogeneity of the study population might not be considerable and determining gestational age using last normal minstrel period is not as accurate as obstetric ultrasound and finally environmental and seasonal factors were not assessed because perinatal mortality were liked with these factors.

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. Health care providers had to be early detect and manage antepartum hemorrhage, obstructed labour and prematurity and partograph use, transports services (ambulance), and female tertiary education need to be encouraged and Counseling and health education about delay in seeking labour care is needed finally identifying the reason of first delay needs further research and qualitative research needs to be done on 3rd delay at the health institutions.

Conflicts of Interest

The author declare that they have no conflicts of interest

Ethical Approval

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 written 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.

Authors' Contributions

DT, KM, and TA conceived the study, involved in the study design, data analysis, drafted the manuscript and critically reviewed the manuscript. All authors read and approved the final manuscript

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