

Original Article

An Analysis of Causes and Avoidable Factors of Perinatal Deaths at Tertiary Care Hospital

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ABSTRACT

Introduction: Perinatal deaths are potentially preventable and reflect the quality of care provided in the prenatal period, during labour, and to a newborn. The purpose of this study was to assess the causes and avoidable factors contributing to perinatal deaths in the year 2018-19 and compare these with the previous two years at Tertiary Care Hospital.

Materials and Methods: This study was conducted from a retrospective analysis of all stillbirths and early neonatal deaths in the year July 2018 to July 2019. The Perinatal Mortality Rate, causes, and avoidable factors leading to perinatal deaths were analysed during this year and were compared with that of the previous two years at KIST Medical College and Teaching hospital.

Results: PMR was 16.09 per 1000 births in the year 2018-19. Previous two studies at this hospital in the year 2017-18 and 2016-17 showed a Perinatal Mortality Rate of 14.61 and 16.27/1000 births respectively. The commonest primary cause of perinatal deaths was intrapartum hypoxia 6 (30%), preterm delivery 5 (31.25%), and congenital anomalies 4 (19%) during the year 2018-19, 2017-18, and 2016-17 respectively. The most common avoidable factors identified were a maternal delay to seek health care, inadequate antenatal checkups, and inadequate antenatal counseling of danger signs by a service provider over the last three years.

Conclusions: Maternal delay to seek health care and lack of maternal knowledge of danger signs during pregnancy were the common avoidable factors identified. More efforts should be made to raise awareness of pregnant women during antenatal care visits regarding early healthcare-seeking behavior when needed.

Keywords: Congenital anomaly; Intrapartum Hypoxia; Perinatal deaths; Preterm delivery

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INTRODUCTION

The perinatal period starts at 22 completed weeks of gestation and ends seven completed days after birth. Perinatal mortality refers to the number of stillbirths and early neonatal mortality within 7 days of life from 22 completed weeks of gestation or a baby weighing at least or more than 500 grams. Perinatal mortality Rate (PMR) directly reflects prenatal, intrapartum, and newborn care.¹

Nepal has shown significant progress in reducing maternal and perinatal mortality over the past two decades. The PMR has decreased from 45 in 2006, 37 in 2011 to 31 per 1000 births in 2016. Antenatal care from a skilled provider increased to 84% from 58% in 2011, and nearly 70% received four or more antenatal care visits. Similarly, delivery by a skilled provider

increased from 36% in 2011 to 58% in 2016.² Despite this progress, the perinatal mortality rate is still high in Nepal. It is therefore important to get information to better understand what can be done to prevent perinatal deaths in addition to having a perinatal mortality audit.

Perinatal audit and feedback is a clinical approach widely utilized to improve the quality of care and to reduce perinatal mortality.³ A meta-analysis of studies on a perinatal audit conducted in low and middle-income countries suggested that up to 30% of perinatal deaths could be averted after the implementation of a perinatal audit.⁴

In line with the recommendations of the Commission on Information and Accountability / World Health Organization (CoIA/WHO), the Government of Nepal (GoN) initiated a maternal and perinatal death surveillance and response (MPDSR) system in 2014. The goal of MPDSR is to reduce preventable maternal and perinatal deaths. MPDSR provides information about avoidable factors that contribute to maternal and perinatal deaths and uses the information to guide actions that must be taken at the community level, within the formal healthcare system, and at the inter-sectorial level (i.e. in other governmental and social sectors) that are critical for preventing similar deaths in the future.⁵ KIST Medical College Teaching Hospital (KISTMCTH) is one of the tertiary care teaching hospitals located in Lalitpur, Nepal where the Maternal Perinatal Death Surveillance and Response system is being implemented. So the purpose of this study was to assess the causes of perinatal deaths and to find any avoidable factors contributing to these perinatal deaths at KIST Medical College and Teaching Hospital and to compare these with the previous two years. This would result in a better understanding of the causes and factors responsible for perinatal deaths and would aid in future planning to prevent perinatal deaths. This process will also help to identify key actions required for the hospital/service provider on improving clinical outcomes.

MATERIALS AND METHODS

This study was conducted from a retrospective review of monthly audit in Maternal and Perinatal Death Surveillance and Response System⁵ in one year period from July 2018 to July 2019 (Shrawan 2075 to Asar 2076) at KIST Medical College and Teaching Hospital. Ethical clearance was taken from the institutional review committee. All still birth and neonatal death within the first seven days of age, occurring after 22 weeks of gestation and or weighing up to 500gm at birth are included in the study, and those before 22 weeks of gestation or below 500grams were excluded from the study. All deliveries in the hospital irrespective of antenatal booking status were included and those with home delivery and delivery outside KIST hospital were excluded from the study.

Characteristics of entire stillbirths and early neonatal deaths in the year 2018-2019 were evaluated which were filled within 24 hours of death in the especial form adapted from national maternal and perinatal mortality surveillance reporting guidelines.⁵ The data evaluated include Antenatal care visits, Booking status, Maternal age, Parity, Gestational age, Sex of baby, Mode of delivery, Birth weight of baby, and Primary cause of perinatal death. Each perinatal death was classified according to Wigglesworth classification and maternal and neonatal in-patient records were

analyzed for the presence of any avoidable risk factors- maternal related and/or health facility/service provider related. The criteria for booked status were a minimum of 4 antenatal visits in index pregnancy at KISTMCTH.

Wigglesworth classification included; Group I: normally formed macerated stillbirths; Group II: deaths due to congenital anomalies; Group III: conditions associated with immaturity; Group IV: asphyxia conditions developing in labor and Group V: specific conditions like sepsis.⁶

PMR is calculated as the number of perinatal deaths/the total number of births (still births+live births) x 1000. Lastly comparison of PMR, primary cause, Wigglesworth classification, and avoidable factors of perinatal death done with previous two years data at KISTMCTH. Data entered in excel and analysed by SPSS 17.

RESULTS

During the one year, from July 2018- July 2019, there were 1234 deliveries of which 808 (65.48%) were Vaginal deliveries and 426 (34.52%) were Lower Segment Cesarean Section (LSCS). The total number of births was 1243 with nine sets of twin births and 1231 live births. There were 20 perinatal deaths with a PMR of 16.09 per 1000 births. There were twelve stillbirths (SB) and eight early neonatal deaths (ENND) with ENND rate of 6.49 per 1000 live births. Table 1 summarizes the deliveries and perinatal deaths over the last three years at KISTMCTH.

Table 1 Comparison of deliveries and perinatal deaths over three years

Category	2016-2017	2017-2018	2018-2019
Total no. of deliveries	1275	1088	1234
Total no. of births	1283	1095	1243
Twin births	8	7	9
Total no. of live births	1269	1086	1231
Total no. of Still births	14	9	12
Fresh SB	11	5	5
Macerated SB	3	4	7
Early NND	7	7	8
Total Perinatal death	21	16	20
Perinatal mortality rate (per 1000 births)	16.27	14.61	16.24
Still birth rate/1000 births)	10.91	8.21	9.65
Fresh SB rate/1000 birth	8.57	4.56	4.02
Macerated SB rate	2.33	3.65	5.63
Early NND rate/1000 live births	5.51	6.44	6.49
LSCS out of total deliveries	473 (37.09%)	378 (35.75%)	426 (34.52%)
Vaginal deliveries out of total deliveries	802 (62.90%)	710 (65.25%)	808 (65.48%)

There were 20 perinatal deaths with PMR of 16.09 per 1000 births in the year 2018-19. Two previous studies at KISTMCTH in the year 2016-17 and 2017-18 showed 21 cases of perinatal deaths with PMR of 16.27 and 16 cases of perinatal deaths with PMR

of 14.61/1000 births respectively. The PMR, SB, and ENND are depicted in figure 1.

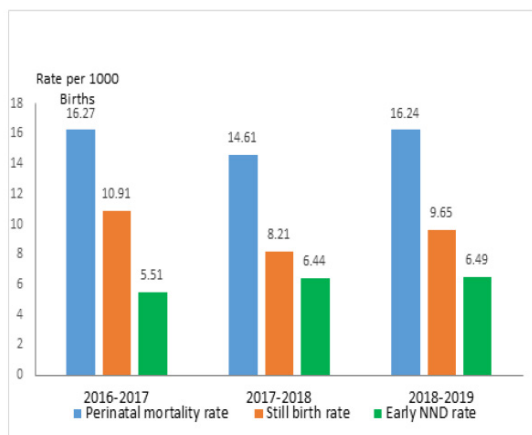


Figure 1: Bar diagram showing PMR, SB rate, and ENND rate of 2016 to 2019

All babies were born to women who had attended at least one antenatal care visit and 9 (45%) were born to mothers who had attended the recommended four antenatal care visits. 3 (15%) perinatal deaths occurred among booked patients and 17 (85%) among unbooked patients.

Out of total perinatal deaths, 12 (60%) mothers were of age group 20-30 years while 4 (20%) were adolescence pregnancy and 2 (10%) were more than 35 years. 11 (55%) perinatal death occurred in primigravida mothers and 9 (45%) in multi. 18 (90%) perinatal deaths were delivered by vaginal delivery and 2 (10%) by LSCS with an equal number of males 10 (50%) and female 10 (50%). About 14 (70%) of perinatal deaths were preterm births (22 – 36 weeks) while 6 (30%) occurred in term pregnancy. 14 (70%) of the babies weighed less than 2.5 Kg. Table 2.

Table 2 Characteristics of women with perinatal deaths in the year 2018-2019

	Still Birth	Early NND	Total Perinatal death
Antenatal visits			
0	0	0	0 (0%)
1-3	8	3	11 (55%)
4 or >4	4	5	9 (45%)
Booking status			
Booked	1	2	3 (15%)
Unbooked	11	6	17 (85%)
Maternal Age in years			
15-19	3	1	4 (20%)
20-25	3	3	6 (30%)
25-30	3	3	6 (30%)
30-35	2	0	2 (10%)
35-40	1	1	2 (10%)
Parity			
Primipara	6	5	11 (55%)
Multi para	6	3	9 (45%)
Gestational Age in weeks			

	Still Birth	Early NND	Total Perinatal death
<28	4	4	8 (40%)
28-33	1	0	1 (5%)
34-36	5	0	5 (25%)
37-41	2	4	6 (30%)
Mode of delivery			
Vaginal delivery	10	8	18 (90%)
LSCS	2	0	2 (10%)
Sex of the baby			
Female	5	5	10 (50%)
Male	7	3	10 (50%)
Birth weight of baby			
<1kg	2	4	6 (30%)
1-<1.5kg	4	0	4 (20%)
1.5-<2.5kg	4	0	4 (20%)
≥2.5kg	2	4	6 (30%)

The primary cause of perinatal deaths in the year 2018-2019 were Intrapartum hypoxia 6 (30%), Preterm delivery 4 (20.0%), Unexplained cause 4 (20.0%), Congenital anomalies 3 (15.0%), Cord accidents/cord prolapse 1 (5.0%), Gestational Diabetes Mellitus (GDM) 1 (5.0%) and Trauma 1 (5.0%). While in the year 2016-2017, the majority of perinatal deaths occurred due to Congenital anomalies 4 (19%) followed by Hypertensive disorder in pregnancy 3 (14%), Intrapartum hypoxia 3 (14%), Unexplained causes 3 (14%), Cord prolapse 2 (9.5%), Antepartum hemorrhage (APH) 2 (9.5%), and 1 (5%) due to intrauterine growth restriction (IUGR), GDM, Preterm labor and Medical Induction (MI) for other cause. The major causes contributing to perinatal deaths in the year 2017-2018 were Preterm delivery in 5 (31.25%) followed by Unknown cause in 4 (25%), Hypertensive disorders during pregnancy in 3 (18.75%), Congenital anomalies in 2 (12.5%), APH in 1 (6.25%) and Rh Isoimmunization in 1 (6.25%). Figure 2.

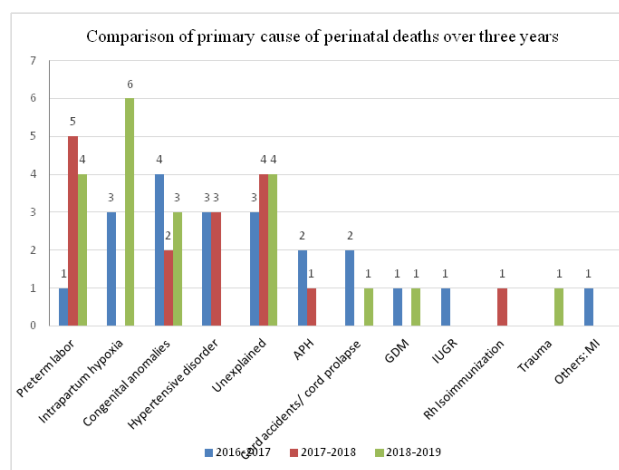


Figure 2 Comparison of primary cause of perinatal deaths over three years

Table 3 shows the causes of perinatal death using Wigglesworth's classification, in the year 2018-19, 2017-18, and 2016-17. Among all groups of Wigglesworth's classification, group IV was the most common in the fiscal year 2016-17 and group III and IV in 2017-18. In the 2018-19 group I was the most common followed by group IV.

Table 3 Comparison of Perinatal deaths by Wigglesworth's classification over three years

Group	2016-2017	2017-2018	2018-2019
Group I	3(14.28%)	4(25%)	7 (35.0%)
Group II	4 (19.04%)	2 (12.5%)	3 (15.0%)
Group III	4 (19.04%)	5(31.25%)	4(20.0%)
Group IV	10 (47.61%)	5(31.25%)	6(30.0%)
Group V	0 (0%)	0 (0%)	0 (0%)
Total	21 (100%)	16 (100%)	20 (100%)

There was more than one avoidable factor identified in most of the perinatal deaths. The total number of avoidable factors identified in the perinatal deaths were 29, 26, and 34 during the year 2016-17, 2017-18, and 2018-19 respectively. The common patient-related avoidable factors were delay to seek health care in 6 (20.68%), 9 (34.61%), 10 (29.41%) and no/inadequate antenatal checkup visit in 7 (24.13%), 6 (23.07%), 7 (20.58%) respectively during the three consecutive years. The most common health facility/service provider-related avoidable factors observed were inadequate antenatal counseling of danger signs in 7 (24.13%), 7 (26.92%), 7 (20.58%) during the year 2016-17, 2017-18 and 2018-19 respectively. (Table 4)

Table 4. Comparison of avoidable factors in perinatal deaths over three years

Avoidable factors in total perinatal death	2016-2017 (n=29)	2017-2018 (n=26)	2018-2019 (n=34)
Patient-related			
Delay to seek Health care	6 (20.68%)	9 (34.61%)	10 (29.41%)
No/ Inadequate ANC visit	7 (24.13%)	6 (23.07%)	7 (20.58%)
Health facility/ Service provider related			
Inadequate antenatal counselling of danger signs	7 (24.13%)	7 (26.92%)	7 (20.58%)
Delay to recognize congenital anomaly/Lack of anomaly scan	5 (17.24%)	2 (7.7%)	3 (8.82%)
Inadequate intrapartum care	1 (3.44%)	1 (3.84%)	5 (14.70%)
Delay in referral	1 (3.44%)	1 (3.84%)	2 (5.88%)
Lack of initial management of cord prolapse at primary care	2 (6.89%)	0	0

DISCUSSION

This study demonstrated the PMR of 16.24 per 1000 births with a Stillbirth rate of 9.65 per 1000 births and an Early neonatal mortality rate of 6.49 per 1000 live births during the period 2018-19 at KISTMCTH. Two previous studies of perinatal mortality rate at KISTMCTH from 2016-17 and 2017-18 showed a perinatal mortality rate of 16.27 and 14.53/1000 total births respectively.^{7,8} The perinatal mortality rate has been static over the last 3 years at KISTMCTH. However, the perinatal mortality rate was 12.3 per thousand birth in the study conducted at Bharatpur Hospital,

Nepal with the increasing trend of PMR over the two years.⁹

Intrapartum hypoxia, Prematurity, and congenital anomalies were the main primary cause of perinatal deaths over the three years in this study which is similar to that of the study conducted at Kathmandu Medical College Teaching Hospital in Nepal.¹⁰ The primary cause of perinatal death in the study conducted at Bharatpur Hospital werethe five most important causes as unexplained intrauterine foetus death (IUID), birth asphyxia, neonatal sepsis, extreme prematurity/low birth weight, and respiratory distress syndrome.⁹ Similarly, in the study by Mukherjee SB et al, the three major causes of neonatal deaths were complications from Preterm birth (35%), Infections (33%), and Intra-partum related conditions or Birth asphyxia (20%).¹¹

Intrapartum hypoxia was the main contributor to 6 (30%) of perinatal deathin the year 2018-19 in this study. Birth asphyxia is a leading cause of neonatal mortality and morbidity in developing countries, with an incidence rate of 100-250/1000 live births compared to 5-10/1000 live births in the developed world.¹² Although birth asphyxia can be predicted in some conditions such as fetal distress and preterm birth, most cases of birth asphyxia cannot be predicted. Thus intrapartum care to prevent birth asphyxia are the use of partograph for vigilant labor monitoring, ensure supportive second stage management based on fetal and maternal condition, correct management of hypertensive disorders during pregnancy, and timely intervention when required.¹³

Among perinatal deaths, 70% were Preterm births with low birth weight during the year 2018-19 in this study. Preterm birth is the most common cause of perinatal death not only in developing countries but also in developed countries. Preterm birth is truly a global problem.¹⁴ Every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising. Preterm birth complications are the leading cause of death among children under five years of age, responsible for approximately one million deaths in 2015.¹⁵ In a study from Kerala (India), Brahmanandan M et al¹⁶ found that the most significant risk factors for perinatal mortality were low socio-economic status, late referrals, late registration, prematurity, low birth weight, intrauterine growth restriction, maternal diseases like gestational hypertension and gestational diabetes and intrapartum complications like abruption.¹⁶

Half of the perinatal deaths were judged to be potentially avoidable in a study from Africa with poor resources. The delay in seeking health care along with poor recognition of danger signs was identified in the majority of perinatal deaths.¹⁷ Our study also revealed common avoidable factors as maternal delay to seek health care, inadequate antenatal checkups, and inadequate antenatal counseling of danger signs by a service providerover the three years. Further improvements in perinatal mortality may be achieved by greater emphasis on the importance of antenatal care and educating women to recognize signs and symptoms that require professional assessment.¹⁸ Counseling should be given to women during their antenatal visit to contact a healthcare provider right away if they have any dangerous symptoms and signs like the perception of less fetal movement, severe headache, vision problems, swollen extremities/face, convulsions/fits, high fever, features of threatening preterm labor like abdominal pain, increased vaginal discharge, leaking fluid or bleeding from the vagina.

Advancement in the care of premature babies, prevention of preterm labor and hypertensive disorders of pregnancy, timely referral of high-risk cases, early identification of congenital anomalies, good obstetric care, and improvement in maternal education could lead to a substantial decrease in future perinatal deaths.¹⁹

In addition, in case of perinatal deaths with unexplained cause 4 (20.0%) in the year 2018-19, the postmortem examination of the baby and the placenta could have shown the unexpected causes that can guide an obstetrician to prevent such deaths in future pregnancies, which was not done in this study. Future research should put more effort to find the cause in every aspect. The interpretations of this study should be considered given a single hospital-based study with a small number of total births and perinatal deaths. More prospective studies with large populations in different regions and setting both at communities and hospitals

are needed to further identify the causes and avoidable factors attributed to perinatal deaths in Nepal.

CONCLUSIONS

The perinatal mortality rate has largely remained unchanged over the last 3 years at our center. Since the majority of perinatal deaths were attributed to intrapartum birth asphyxia and preterm delivery, strengthening intrapartum fetal surveillance and prevention of preterm birth are the cornerstone to reduce perinatal mortality at KISTMCTH. Likewise, the most common avoidable factors identified in these perinatal deaths were a maternal delay to seek health care and lack of maternal knowledge of danger signs during pregnancy. Medical personnel should put more effort into raising the knowledge of the mothers and their families during antenatal care visits besides the obstetrics management.

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