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## Neonatal and perinatal mortality trend among 23,000 babies delivered during three years at an urban university teaching hospital of Nepal

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### Abstract

**Introductions:** Perinatal mortality rate (PMR) of Nepal is 31 deaths per 1000 pregnancies and neonatal mortality rate (NMR) is 21 deaths per 1000 live births according to Nepal Demographic and Health Survey (NDHS) 2016. This study aims to analyse the trend of PMR and NMR of babies delivered at Patan hospital, Nepal.

**Methods:** This was a retrospective study done in the department of Pediatrics to analyse the trend of neonatal and perinatal outcome of babies delivered during three years from April 2016 to March 2019 at Patan Hospital, Patan Academy of Health Sciences, Nepal. Data was collected from hospital records and perinatal audit. The mode of delivery (vaginal, instrumental, caesarian), birth status (sex, premature, still, live, APGAR, birth weight) and final outcome (neonatal and perinatal mortalities) were analyzed descriptively using Microsoft Excel 2010.

**Results:** The final outcome of total 22937 deliveries during three years were PMR 4.34, corrected PMR 10.85 per 1000 total births and NMR 3.62 per 1000 live births. There were 22913 (99%) live births, 3090 (13.3%) had low birth weight, 11898 (52%) spontaneous vaginal delivery, 10700 (47%) cesarean and 339 (1.5%) instrumental deliveries.

**Conclusions:** The overall PMR was 4.34 per 1000 total births and NMR was 3.62 per 1000 live births at Patan Hospital.

**Keywords:** neonates, neonatal mortality rate (NMR), Nepal, perinatal mortality rate (PMR), university teaching hospital

## Introductions

Perinatal period is the period between 28 weeks of gestation to the first 7 days after birth of a baby. According to World Health Organization (WHO) perinatal mortality rate (PMR) is defined as the number of stillbirths and the deaths in the first week of life per 1,000 total births.<sup>1</sup> Neonatal mortality rate (NMR) is the death of a live born baby within the first 28 days of life, and reflects quality of hospital care.<sup>1</sup> Early neonatal mortality is the death of a live born baby within the first seven days of life.

Regular perinatal audit helps to reduce the perinatal mortality rate by finding out the preventive factors. The Nepal Demographic and Health Survey (NDHS) 2016 shows PMR is 31 and NMR 21 per 1000 live births<sup>2</sup>. The PMR is estimated to be 50 in Asia and 65 in South-central Asia.<sup>3</sup> Worldwide there are about 6.3 million perinatal deaths per year, almost all of which occur in developing countries and 27% of them occur in least developed countries.<sup>3</sup> Still birth accounts for almost half of all perinatal deaths, one third occurs during deliveries which can be avoided. Intra partum deaths are related to place of delivery and also the care at delivery.<sup>2</sup> Globally 2.9 million babies die in the neonatal period of life, mostly in the developing countries like Nepal. Global NMR has declined from 32 to 22 deaths per 1,000 live births.<sup>3</sup> A two years study done at Kathmandu medical college showed that PMR is 19 per 1,000 births.<sup>4</sup> In Nepal PMR is still a challenge, even though it has decreased from 45 to 31 per 1,000 births in a decade from 2006 to 2016.<sup>1</sup>

Patan Hospital (PH) is a tertiary care university teaching hospital for Patan Academy of Health Sciences (PAHS), in Lalitpur, in the Kathmandu valley, Nepal, providing services with 7000 deliveries an year. This review aims to analyse the outcome of deliveries and causes of neonatal and perinatal death.

## Methods

This was a retrospective study done in the department of Pediatrics at PH, PAHS, Nepal to analyse three years data of neonatal outcome during April 2016 to March 2019. All the deliveries at PH were included. The data was collected from hospital medical record section and perinatal monthly audit. The demographic profiles and outcome of all the neonates in terms of PMR, NMR, still births, live births, number of preterm and full term were noted in proforma. The descriptive data analysis was done by Microsoft excel 2010.

The PMR and corrected PMR (CPMR) and NMR was calculated<sup>2</sup> as follows-

$$\text{PMR} = (\text{still birth} + \text{early neonatal death}) / \text{Total birth} \times 1000$$

$$\text{CPMR} = \text{still birth} + \text{early neonatal death} - (<28 \text{ weeks and } <500 \text{ grams}) / \text{Total birth} \times 1000$$

$$\text{NMR} = \text{early neonatal death} / \text{Total live birth} \times 1000$$

## Results

There were 23175 births. Out of 23175 births, there were 226 twin deliveries and 6 triplet deliveries. Out of 23175 births, 22913 (98.9%) were live births and 262 (1.1%) were still births. Out of total births, 20403 (88%) were term deliveries and 2772 (12%) were preterm deliveries. Out of total births, 12028 (52%) were male and 11147 (48%) were females. The male and female ratio was 1.08:1. The average birth weight of all neonates, all term neonates and all preterm neonates were 2886 grams, 2986 grams and 2168 grams respectively. During this period, the lowest birth weight was 522 grams and highest birth weight was 4561 grams. The ratio of preterm to term births was 1:8.46 in (2016/2017), 1:7.52 in (2017/2018) and 1:6/40 in (2018/2019) (Figure 2)

There were 3090 (13.3%) low birth weight (LBW) babies, 1558 (50.4%) full term and 1532 (49.6%) preterm, 208 (6.7%) very (VLBW) and 154 (5%) extremely (ELBW) babies. Spontaneous vaginal delivery were 11898.

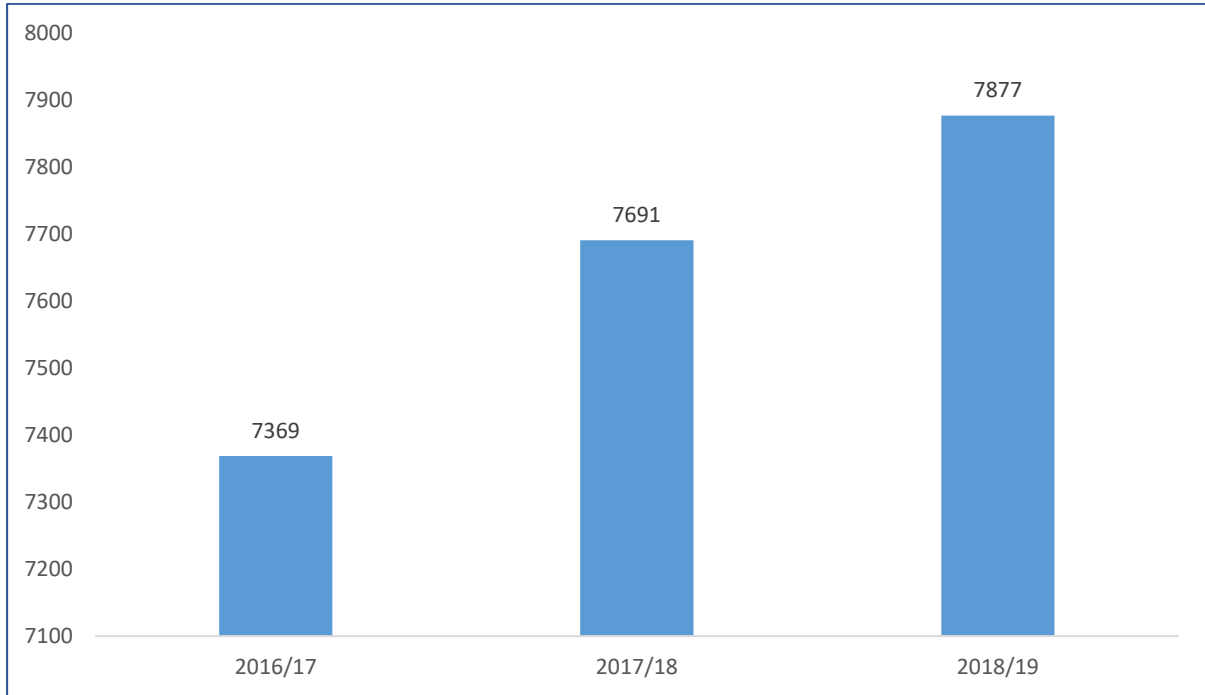


Figure 1. Trends of total deliveries at Patan hospital during three years period

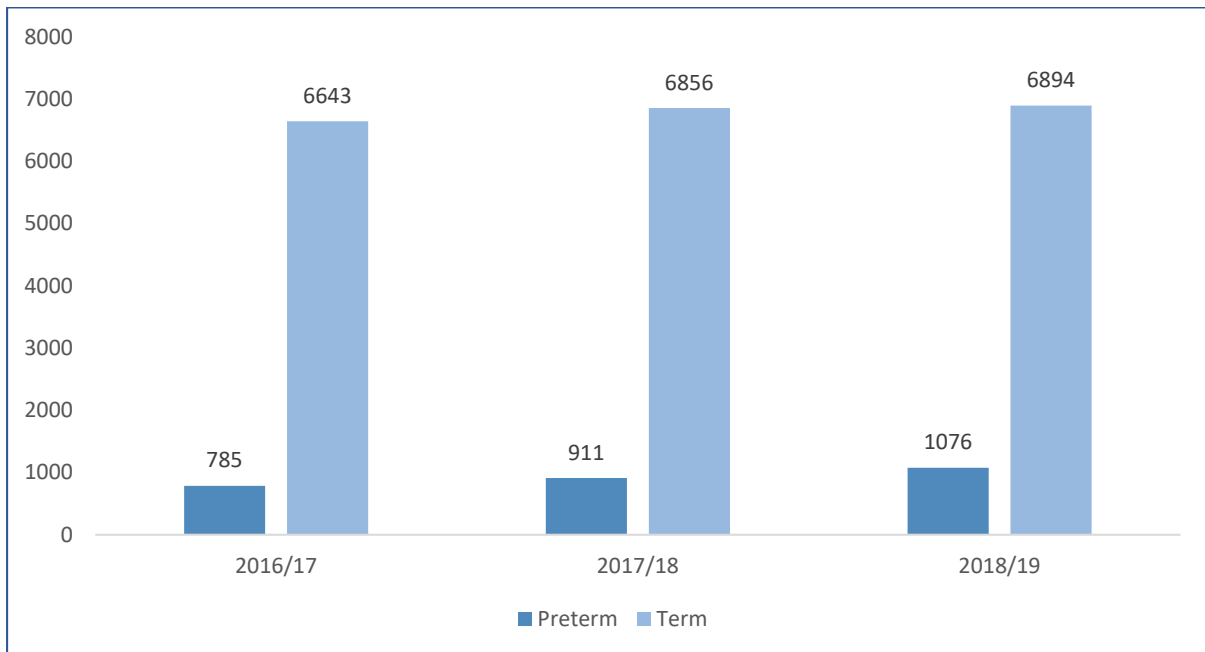
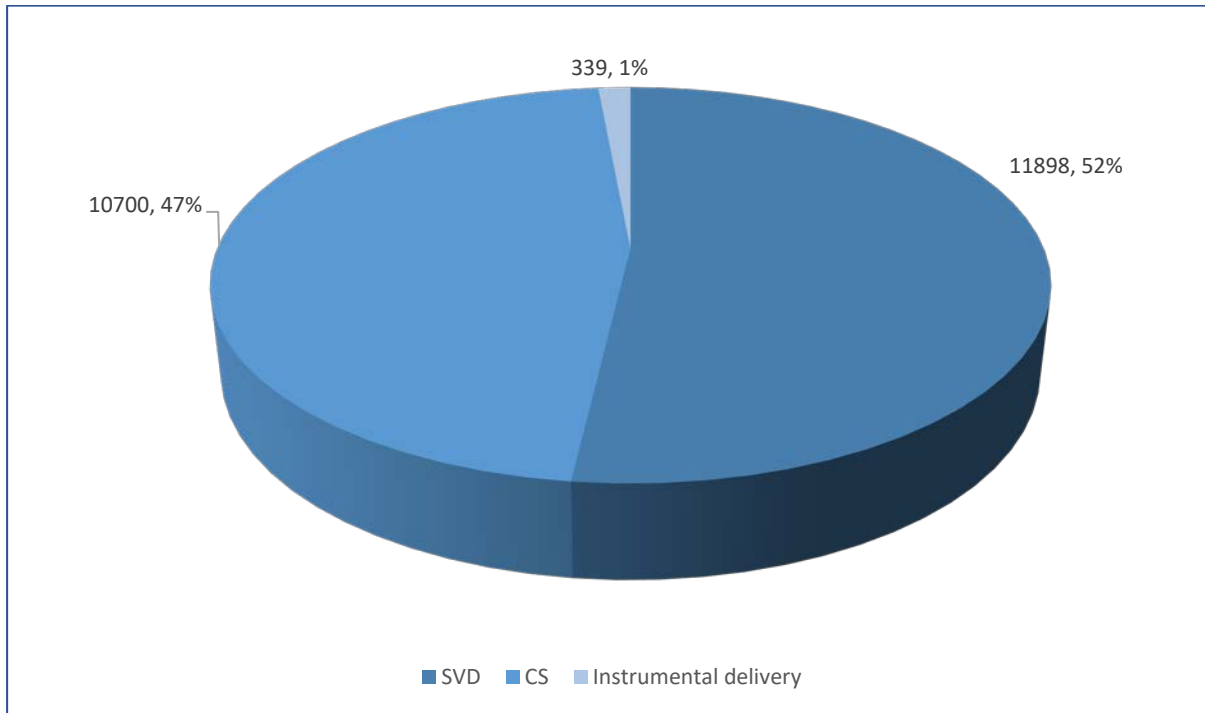
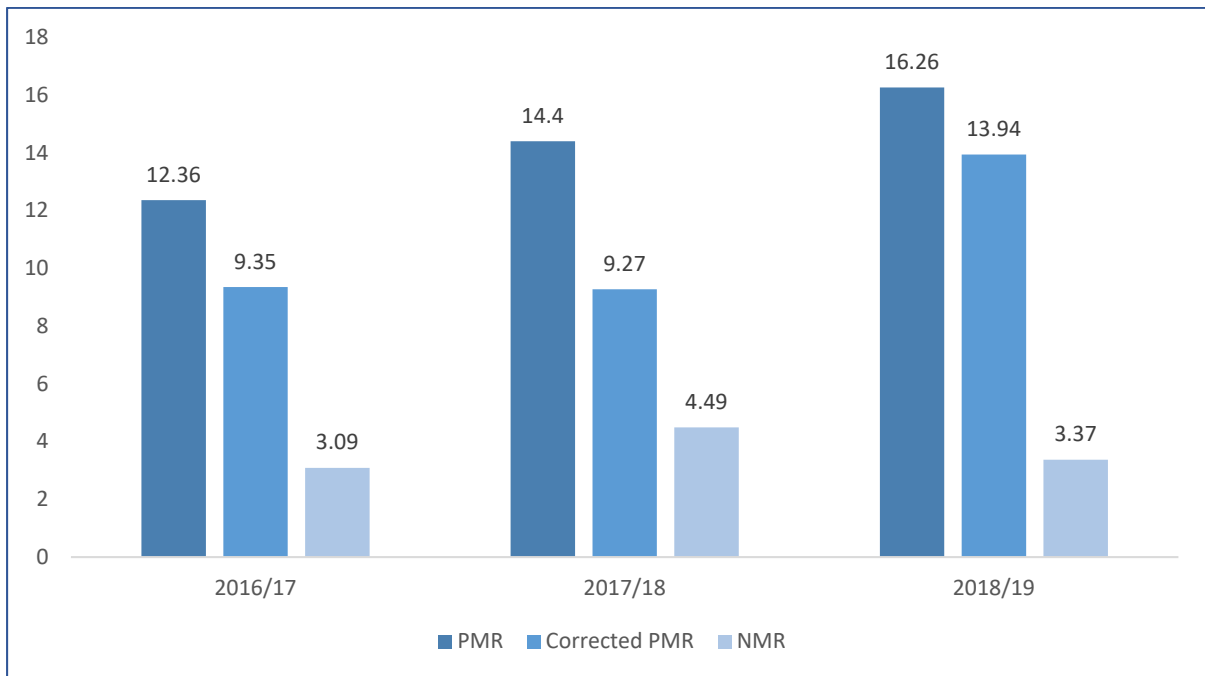


Figure 2. Trend of Term and Preterm births at Patan hospital during three years period



**Figure 3. Modes of delivery in Patan hospital during three years period**



**Figure 4. Trends of Perinatal mortality rate (PMR), corrected Perinatal mortality rate (CPMR) and Neonatal mortality rate (NMR) at Patan hospital during three years period**

(52%), cesarean section 10700 (47%) and instrumental deliveries 339 (1.5%) were out of total 22937 deliveries in 3 years, Figure 3.

Out of total births, 2837 (12.2%) neonates were admitted to nurseries and 397 (1.7%) to neonatal intensive care unit (NICU). Total 105 (0.45%) neonates expired, 81 (77% of 105) were early neonatal death and 24 (23%) late neonatal death. During this period, the PMR was 14.3, CPMR was 10.8 and NMR was 3.6, Figure 4.

Out of total births, there were 31 neonates with identifiable congenital birth defects during the study period, 11 (0.1%) in 2016/17, 10 (0.1%) in 2017/18 and 10 (0.1%) in 2018/19.

## Discussions

Over the three years (2016-9) study period, number of deliveries increased from 7369 in 2106 to 7877 in 2019, Figure 1. This might be due to increased public awareness about hospital deliveries. This was similar to the national health survey of all deliveries from 2001 to 2011.<sup>5</sup> In this study, trend of term or preterm deliveries also increased, Figure 2. Possible socio-cultural and maternal risk factors may have been responsible for preterm deliveries.<sup>6</sup> Similarly, cesarean deliveries (47%) were in increasing trend year by year, Figure 3, also reported in other study showing 41.9% cesarean deliveries.<sup>7</sup>

Out of 3090 (13.3%) of LBW neonates, the PMR of 14.34, all occurred in preterm LBWs, extended LBW and very LBWs, showing association of PMR with preterm and LBWs. The finding is similar to other studies.<sup>5,8-10</sup>

Our findings of NMR of 3.6 is less than 6.1-10.1<sup>10</sup>, 8.8<sup>11</sup> and 7.8<sup>12</sup> reported from earlier studies in Nepal. The PMR 14.3 in our study is also comparatively better than 15-20<sup>10</sup>, 22.4<sup>11</sup>, 38<sup>13</sup> and 37.6<sup>14</sup> from other studies in Nepal. Previous study done before establishment of NICU showed that PMR was 22.4 per 1000 total births and NMR was 8.8 per 1000 live births.<sup>11</sup> This improved trend in our study could be due

to increased use of antenatal steroids, easily available surfactant and establishment of NICU service at PH.

Limitations of the study includes, the retrospective review of data from monthly and yearly perinatal audit and the causes of perinatal and neonatal death could not be analysed due to lack of details.

## Conclusions

Total of 23175 babies were born in a three years study period from 2016-9, an increasing trend in deliveries, 22913 (98.9%) were live birth, 2772 (12%) preterm. We observed comparatively better PMR 14 and NMR 3.6 per 1000 live births probably due to establishment of NICU care.

## Conflict of interests

None

## Fundings

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