

# Determinants of Neonatal Mortality

Parveen Tariq, Zafarullah Kundi ( Department of Paediatrics, Rawalpindi Medical College, Rawalpindi. )

Pages with reference to book, From 56 To 60

## Abstract

**Objectives:** To identify the common causes and contributory factors for high neonatal mortality in Pakistan and propose effective strategies to safeguard against it

**Methods:** This retrospective study was carried out in Neonatal Unit (NNU) of Rawalpindi General Hospital (RGH) from January 1995 to December 1996. Relevant prenatal information obtained from referral forms, admission files or attendants was recorded on a proforma at the time of death of a newborn. This included obstetric and medical management of the mother, neonatal resuscitation and care, birth weight (wt) and gestational age. Cause of death was based on available clinical and laboratory data.

**Results:** During the study period, there were 3005 admissions and 268 deaths, resulting in 9% neonatal mortality. Eighty-eight percent of this mortality was due to early neonatal deaths. More than 50% of deaths were unavoidable due to their critical condition at admission and occurred within first 24 hours of hospitalization. Neonatal infections and birth asphyxia were two major causes of neonatal mortality (37% and 31% respectively), followed by idiopathic respiratory distress syndromes (IRDS), Meconium aspiration syndrome (MAS) and congenital malformations. Sixty eight percent of mortality was contributed by low birth weight (LBW), 74% of them being preterm suggesting high mortality among LBW-preterm infants. Other less common contributory factors were maternal medical disease, complicated deliveries and multiple gestation.

**Conclusion:** These causes and contributory factors of neonatal mortality reflect poor prenatal health services in this country. Hence there is a need for coordinated efforts to organise and regionalize MCH and prenatal health services with the help of a neonatal task force (JPMA49:56, 1999).

## Introduction

Around 12 million children <5 years of age die every year in the third world<sup>1</sup> Of this a large majority die before they reach their 1st birthday<sup>2</sup> About half of infant mortality is constituted by neonatal mortality, mostly during 1st week of life<sup>3,4</sup>. There has been a gradual decline in infant mortality in Pakistan during the last 3 decades with little change in neonatal mortality<sup>5</sup>. This reflects poor perinatal health services and lack of sufficient information about attributable causes of high neonatal mortality in this country<sup>6</sup>. Although considerable attention has been paid to prevention of mortality from neonatal tetanus in Pakistan<sup>7</sup>. Other contributory factors need exploration and attention. This study has been undertaken to identify the major causes and contributory factors for neonatal mortality with an urgent need to plan and propose preventive and effective measures to safeguard against its very high incidence.

## Subjects and Methods

This retrospective study has been conducted in the neonatal unit (NNU) of Paediatrics Department Rawalpindi General Hospital (RGH) affiliated with Rawalpindi Medical College. The NNU has provision of 10 baby cots, 10 incubators and 20 mother beds. All sick newborns both inborn and

outborn (delivered at home, private clinic or other hospital) requiring special and intensive care are admitted in this unit except those with neonatal tetanus who are retained in a separate tetanus ward. Some of the outborns are brought from neighboring towns in a critical condition. All high risk or complicated inborn deliveries and caesarians are attended by a Paediatric resident and a house officer for proper neonatal resuscitation and care. This NNU is equipped with a resuscitation trolley, radiant warmer, glucometer, bilirubinometer, 6 phototherapy units but lacks ventilator, pulse oxymeter or arterial blood gas (ABGs) monitoring facilities. CSF cytological analysis, hemoglobin percentage and urea level are done round the clock in hospital laboratory but rest of the biochemical, metabolic and haematologic screening is done only in the morning hours. One registrar and two house officers, one staff nurse with two senior trainee nurses are on duty in NNU round the clock. Serious babies are monitored two hourly. All neonatal deaths (deaths of newborns within first 28 days of life) from January, 1995 to December, 1996 were recorded on a predesigned proforma. Relevant perinatal information both about the mother and newborn was obtained through obstetric or referral forms and admission files.

Newborns data included gestational age, birth weight (wt), sex, apgar score or history of (H/O) birth asphyxia (delayed cry or bluish discolouration at birth), resuscitation provided at birth, place and mode of delivery, duration of hospital stay, age at expiry, cause of death with contributory factors based on available clinical and laboratory data. Maternal age, parity, multiple gestations, prolonged rupture of membranes (PROM>24 hrs), antepartum haemorrhage, maternal pyrexia (temp >100 F), medical disease and previous obstetric history were also recorded.

Early neonatal deaths were regarded as deaths within 1st 7 days of life. Gestational age was assessed by Parkin scoring. Apgar score at 1 minute of 0-3 was taken as severe birth asphyxia, 4-7 as mild to moderate birth asphyxia and

>8 as normal. Birth weight of <2.5 kg was taken as LBW, 1.0 -<1.5kg as very low birth weight (VLBW) and <1.0 kg as extremely low birth weight (ELBW).

## **Results**

Three thousand and five newborns were admitted in NNU of RGH during the year 1995 and 1996. Out of these 268 expired, accounting for 9% neonatal mortality among total admissions. Among these neonatal deaths, 61% (n=164) were male and 39% (n=104) female. Sixty-eight percent (n=182) of mortality was constituted by LBW and among these, 51% (n=92) had either VLBW or ELBW (Figure 1),

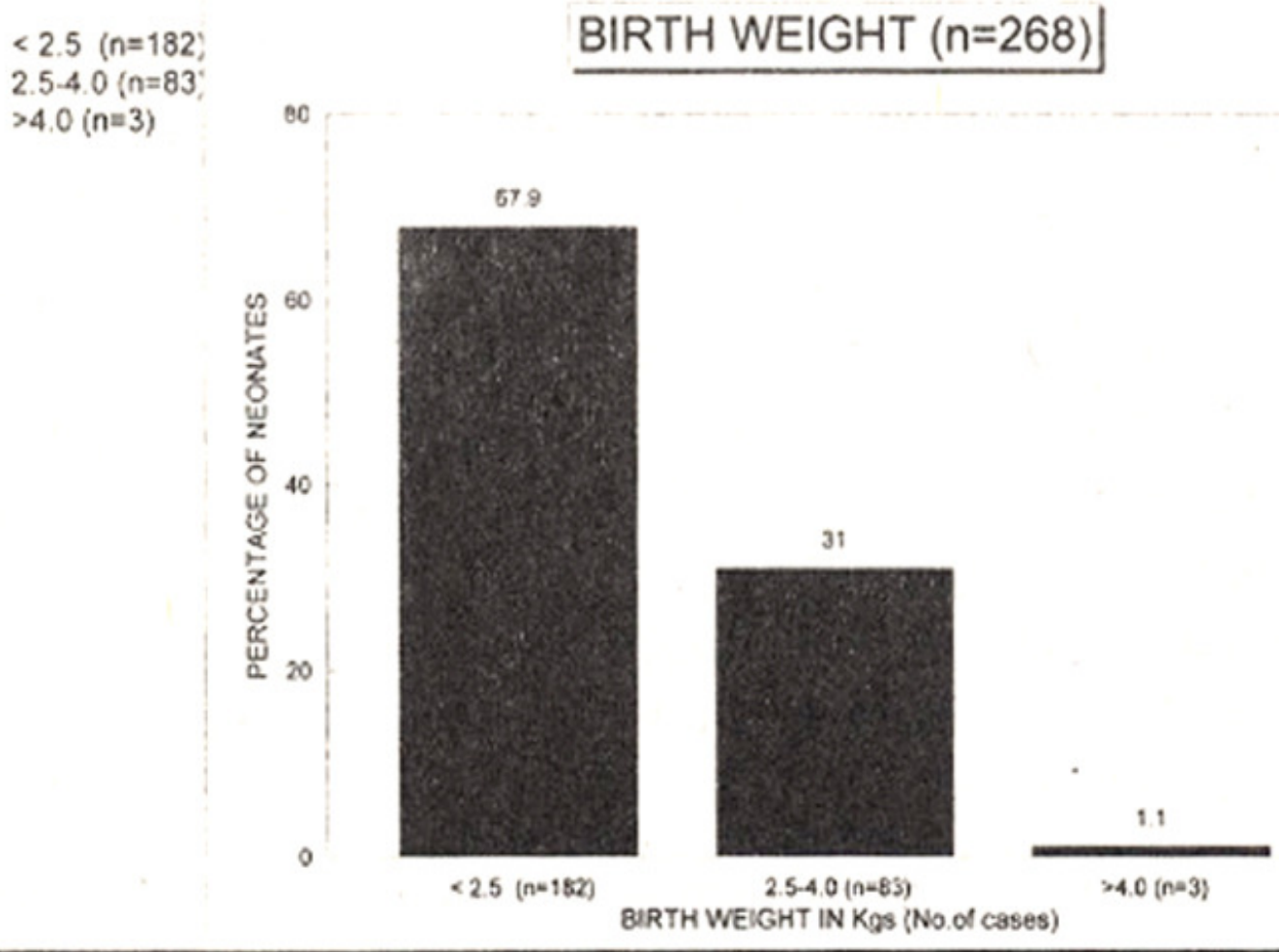


Figure 1.

overall 50% (n=135) and among the LBW 74%(n=135) were preterm, (Figure 2).

<28 (n=15)	5.6
28-33 (n=83)	31
34-36 (n=37)	13.8
>/37 (n=128)	47.8

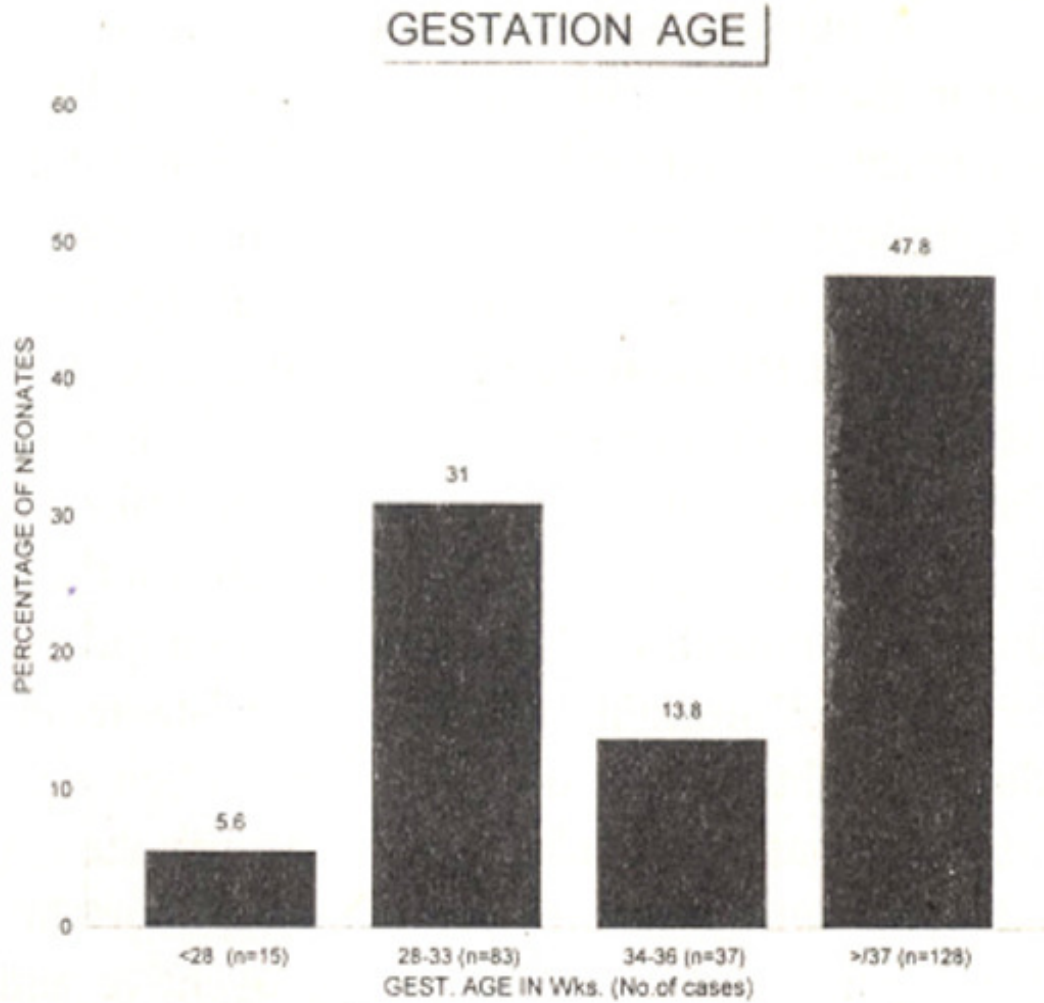


Figure 2.

Place and mode of delivery of neonatal deaths are shown in figures 3 and 4.

HOME (80)	29.8	29.8%
RGH (116)	43.3	43.3%
OTHER HOSPITAL (72)	26.9	26.9%

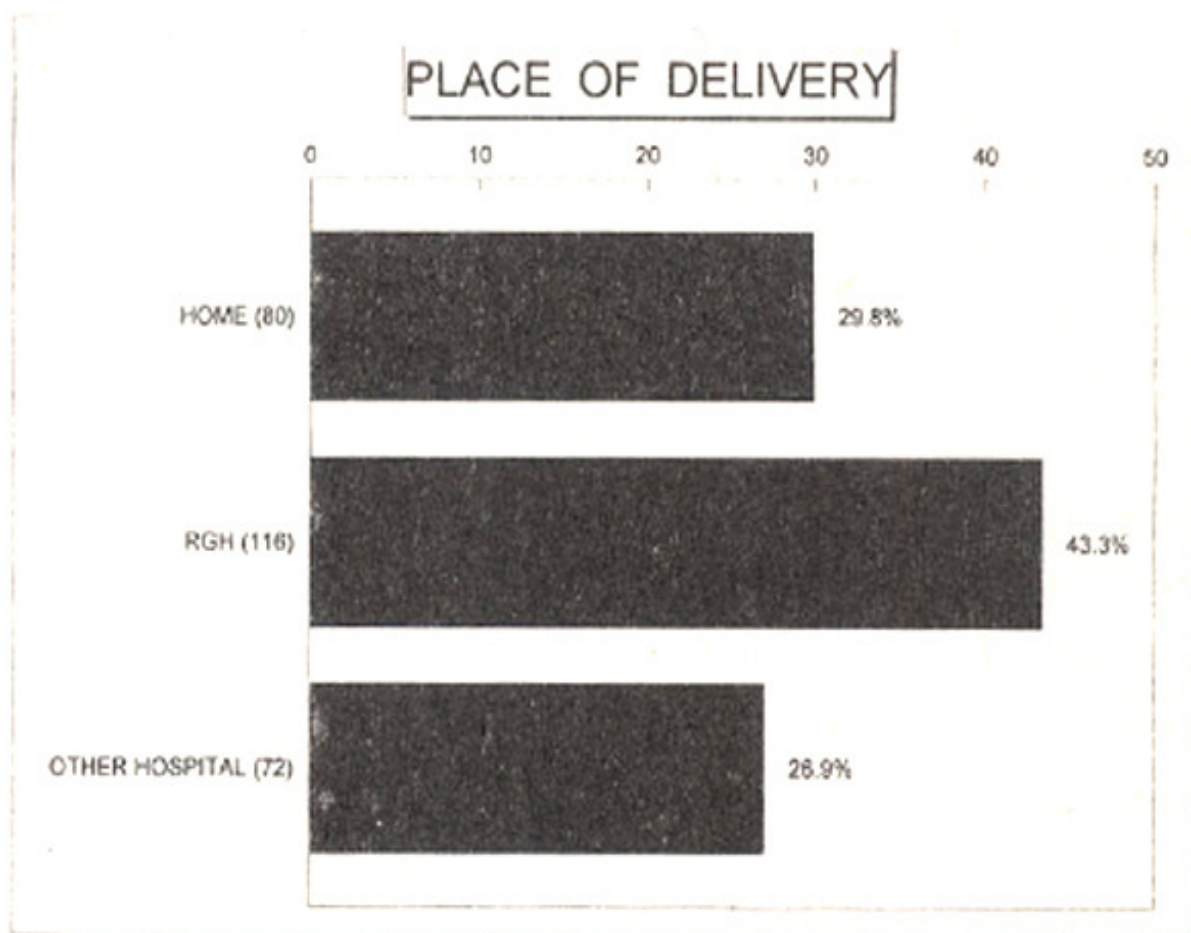


Figure 3.

SVD (195)	72.8	72.8%
FORCEPS (18)	6.7	6.7%
VACCUME (1)	0.4	0.4%
C.SECTION (54)	20.1	20.1%

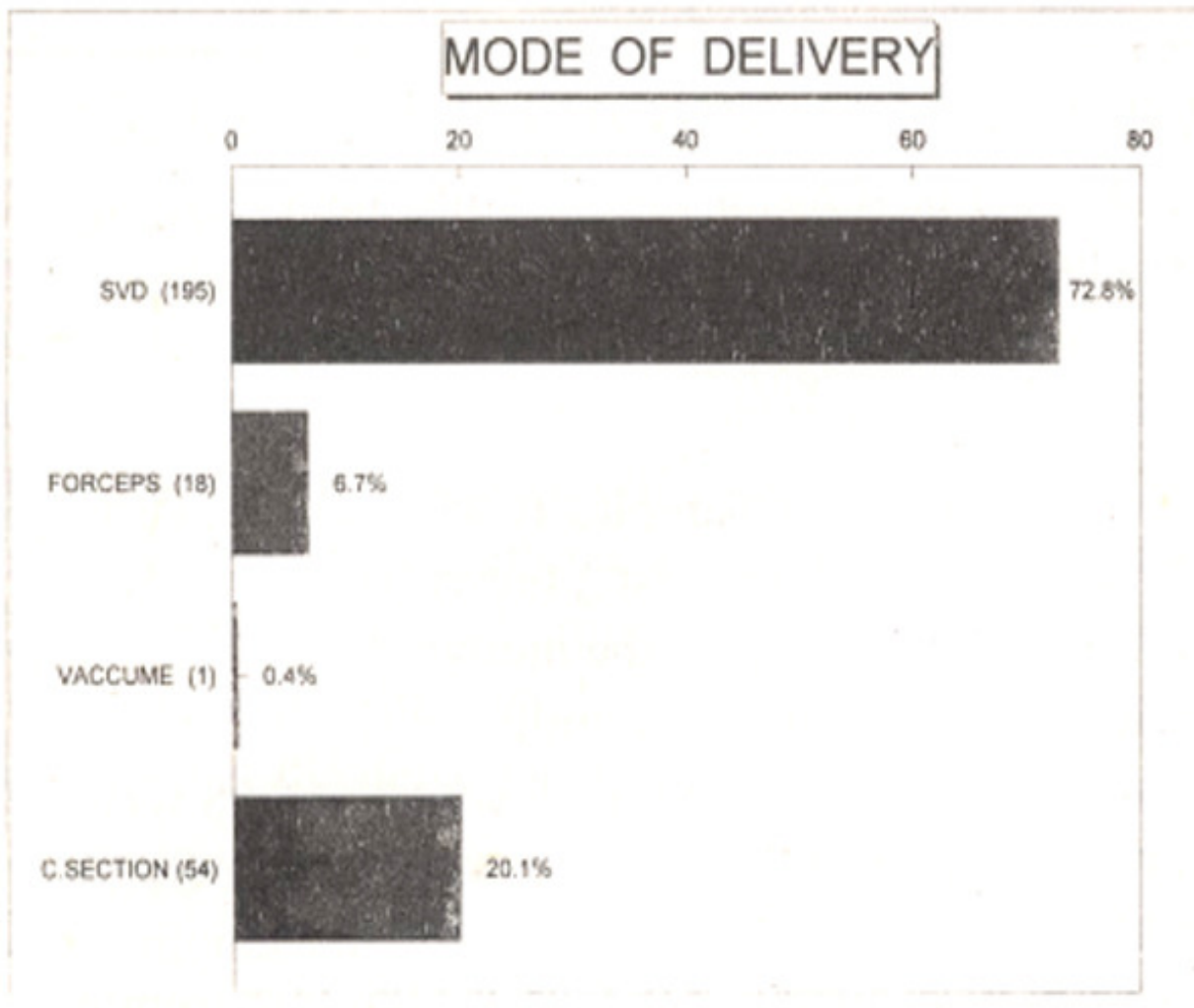


Figure 4.

Sixty-three percent of RGH delivered deaths were the outcome of unbooked cases (none or <3 antenatal visits). Among normal deliveries (SVDs), 74% (n=144) were LBW. Similarly 65-70% were LBW with respect to their place of delivery. Maternal age or parity had no significant contribution towards LBW among these neonatal deaths as only 17% mothers had age >35 years or parity >5 and the comparison was not meaningful. Thirty percent of mothers had bad obstetric history either due to previous abortions (16%), still births (4%) or neonatal deaths (9%).

Eighty-eight percent (n=237) of the neonatal deaths occurred during 1st week of life (figure 5).

<24 Hrs (n=58)	58
1-3 Days (n=134)	134
4-7 Days (n=45)	45
>7 Days (n=31)	31

### AGE AT EXPIRY

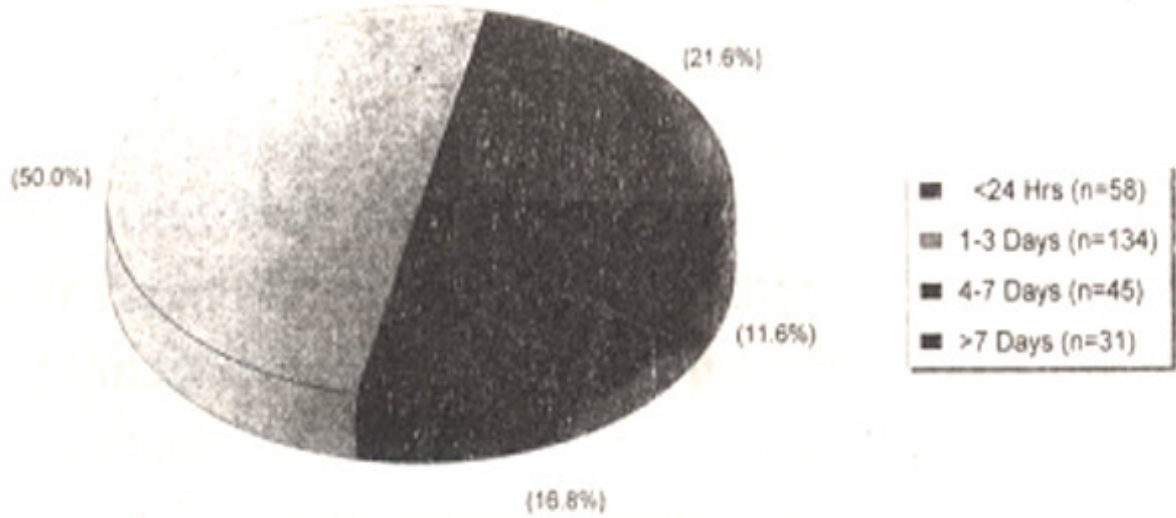


Figure 5.

Prior to death, the duration of stay in the hospital was <24 hours in 55% (n=147) and >7 days in only 4%(n=11, figure 6).

<24 Hrs (n=147)	147
1-3 Days (n=82)	82
4-7 Days (n=28)	28
>7 Days (n=11)	11

### DURATION OF STAY

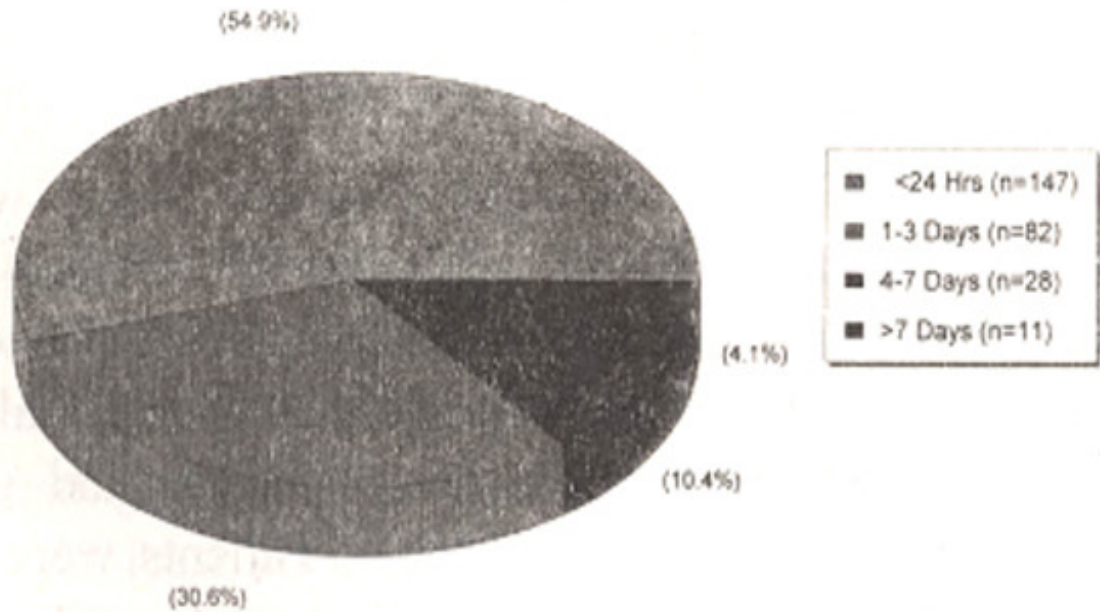


Figure 6.

Thirty one percent (n=84) newborns needed resuscitation at birth but it was provided only to 25% (n=66). The rest of them (6%) were not resuscitated either because of delivery at home by untrained dai or in a private/other hospital lacking properly trained staff for resuscitation. frequency (Table I).

**Table 1. Causes of neonatal mortality.**

	No.	%
Cause of death		
Sepsis	101	37.7
Birth asphyxia	84	31.3
Idiopathic respiratory distress syndrome	27	10.0
Strept. Pneumonia	26	9.7
Meconium aspiration syndrome	9	3.4
Recurrent apnea of prematurity	8	3.0
Kernicterus	5	1.9
Congenital anomalies	5	1.9
Hypoglycaemia	3	1.1

Nine percent (n=9) of those with sepsis also had meningitis. The terminal event was disseminated intravascular coagulation (DIC) in 15% (n=41) and acute renal failure in 6%(n=16). LBW was the single most common and leading determinant of neonatal mortality. Other contributory factors included maternal medical disease, prolonged /obstructed labour (Table II).

**Table 2. Contributory factors for neonatal mortality.**

Contributory factors	No.	%
Low birth weight	182	68.0
Pre-term	135	50.0
Term	47	18.0
PET/Eclampsia	24	9.0
Diabetic mother	15	5.6
Pregnancy induced hypertension	15	5.6
Prolonged/obstructed labour	18	6.7
Multiple gestation (Twins, triplets)	16	6.0
Fetal distress	13	4.8
Prom/maternal pyrexia	7	2.6
Antepartum haemorrhage/ placenta praevia	6	2.2
Rhesus incompatibility	2	0.7

In most cases there was overlapping of more than one contributory factors. Moreover, in each category of contributory factors, 50-70% belonged to inborns.

## Discussion

This and other studies<sup>8,9</sup> has shown higher neonatal mortality among males compared to females (1.5:1). It may be due to the fact that male newborns are at higher risk of contracting disease or acquire slow rate of maturity of their lungs<sup>10</sup> Two third of this mortality was among the LBW babies and two third of these were preterm. High mortality among LBW preterm babies observed in this study has also been reported from Lahore (community based)<sup>3</sup>, Karachi<sup>11,12</sup>, Brazil<sup>13</sup> and Stockholm<sup>9</sup>. Three fourth of this mortality was seen in newborns delivered by SVD at home or in a hospital. Those delivered at RGH were mostly outcome of unbooked, complicated or high risk pregnancies. This has also been supported by a study from Karachi and indicate poor antenatal and perinatal health services in the country.

Twenty-two percent of this mortality was constituted by deaths within 1st 24 hours and 88% within 1st week of life again reflecting poor perinatal and obstetric services. Similar findings have been reported from Pakistan<sup>14,15</sup> and other developing countries<sup>16</sup>. More than half of deaths occurred within 1st 24 hours of hospitalization suggesting that these babies were admitted in critical condition. This could be because of delay in seeking medical advice due to lack of timely recognition of disease or late referral due to paucity of trained personnel and physicians. Moreover, almost all the local private hospitals and even the district hospitals lacked trained personnel and necessary equipment for neonatal resuscitation. Leading causes of neonatal mortality were neonatal infections and birth asphyxia followed by IRDS, MAS and congenital malformations. This observation is supported by both local hospital and community based studies<sup>6</sup>. A substantial number of neonatal deaths were due to LBW (mostly preterm) followed by maternal medical disease and complicated deliveries.

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