National Neonatal Perinatal Database

Human Reproduction Research Centre Network

Report 2002-2003

NNPD NETWORK

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Preface

The National Neonatal – Perinatal Database (NNPD) report from the Human Reproduction Research Centres (HRRC) of Indian Council of Medical Research is a unique milestone in collation of information on neonatal – perinatal morbidities which represents more like that are encountered in district hospitals. The profile of extramural sick neonates admitted in these centers provide useful information about the basic needs required to strengthen similar healthcare facilities in the country. The report will be of considerable help to planners, researchers and health care providers, who are committed to improve neonatal health care services in the country.

For the participating HRRC network, it has been an educative and rewarding experience. A systematic approach for collection of data and team-work has been the hallmark of this effort.

On behalf of the faculty of Investigators of the HRRC, we wish to thank each and every consultant, nurse, resident doctor and data entry staff without whose help this task of data collection would not have been possible. We would also like to thank all the secretarial staff who have helped in this effort with their secretarial skills.

Editors

Rationale

1. Improvement in neonatal-perinatal survival is a priority health agenda in India. Over 1 million newborn infants die every year before completing first four weeks of life, amounting to the highest burden of newborn deaths for any country in the world. The current neonatal mortality rate of 44 per 1000 live birth accounts for two thirds of infant mortality in India. Likewise, perinatal mortality continues to be unacceptability high due to maternal under nutrition, anemia and lack of basic antenatal care and deliveries by untrained personnel.

2. There are no reliable prospective neonatal – perinatal data from district hospitals in the country. Even the requirements for management of extramural neonates born in the community, who report to these facilities are not documented in a systematic manner.

3. A fundamental pre-requisite for planning, implementing and monitoring the health care programmes is to ensure an accurate and ongoing assessment of the morbidity and mortality from community/first level health care units.

4. Realizing this, ICMR entrusted Nodal Centre at All India Institute of Medical Sciences to collect neonatal – perinatal morbidity and mortality data on standardized pre-tested format from HRCC spread all across the country.

5. This data will provide information on the current status of newborn health at district level health care facilities, which can be put to use for programme – relevant academic and research initiatives.

Objectives

The objectives of the present initiative of the HRRC Network

1. To generate generic neonatal-perinatal data on intramural deliveries from HRRC hospitals (more representative of population similar to district hospitals).

2. To generate generic neonatal – perinatal data on extramural neonates admitted to HRRC hospitals (this will provide insight to needs of sick neonates reporting to hospital).

Methodology

Eight human reproduction research centers (HRRC) of Indian Council of Medical Research (ICMR) were selected for collection of data prospectively on individual neonates using a pre-tested data sheets. Standard criteria were used to define the morbidity and classify neonatal mortality & still births. Neonates were observed till discharge or death.

Each center which was more or less representative of a typical district hospital collected information on pre-designed/pre-tested data sheets. The data was entered locally on computer and electronically sent on floppy diskettes or email to the nodal center. At the nodal center, after quality checks, feedback was sent to individual centers. After due corrections, data from all eight centers were amalgamated.

The data thus collected was analysed using the Stata 7 statistical software and Microsoft Excel 97.

REPORT FOR THE YEAR 2002-2003: SALIENT FINDINGS

Intramural Live-births – Salient Findings

1. Data from a total of **31,007 deliveries** are included in this report.
2. There were 30,038 livebirths, 969 stillbirths, and 266 neonatal deaths.
3. Males constituted 53.2 % of all live births, females 46.8 %.
4. Amongst livebirths, there were 880 females per 1000 males.
5. Majority of livebirths were full-term infants (88.6%); 6.1% were preterm and a minority (1.6%) were post-term infants.
6. Of the 30,038 livebirths, 21.1% were low-birth-weight infants.
7. The percentage of infants delivered by caesarean section was 16.0%.
8. Meconium stained liquor complicated 5.7% of all livebirths while fetal distress was detected in 2.5%. Premature rupture of membranes was reported in 1.2 %.
9. Mean birth weight was 2742±468 gm.
10. There were 98.4% singleton births and 1.5% multiple births.
11. While 96.8% of infants were discharged home,2.0% were referred to higher centres,0.9% died and 0.3% refused for care.
12. There were 266 neonatal deaths amongst the 30,038 live-borns, thus the Neonatal Mortality Rate (NMR) was 8.9 per 1000 live births.
13. Of the 30,038 live births for whom data on initiation of breathing after was available, 96.4% babies cried within 1 minute of birth, 2.3% cried

between 1 and 5 minutes and 0.8% babies cried more than 5 minutes after birth. Data was not available in 0.5% babies.

14. Administration of oxygen was the most commonly used resuscitative measure in 4.4 %, followed by bag and mask ventilation in 2.2 %. Intubation for meconium was resorted to in 1.9 % while intubation for indications other than meconium was needed in 0.5 %. Chest compressions were used to resuscitate 0.5 % while use of medications was resorted to in 1.4 %.

15. Amongst birth trauma reported, cephalhematoma was the commonest (0.05 %).

16. Respiratory distress was seen in 4.9% babies.

17. Seizures were observed in 0.3% babies.

18. The commonest congenital malformations were limb defects (0.1%).

19. Hyperbilirubinemia was detected in 0.7 % neonates; hypoglycemia in 0.6 %; apneic spells in 0.3 % while hypothermia was seen in 0.8 %.

20. Conjunctivitis was the most common superficial infection, affecting 0.4 %.

21. The incidence of septicemia was 0.7%.

22. Antibiotics were used in 5.5% and oxygen therapy in 4.1% neonates, while phototherapy was given to 1.5% of neonates. Intravenous fluids were given to 3.5% and blood products to 0.1% neonates.

23. Of those who died in the neonatal period, 60.9% died within 24 hours of birth, 33.5% died after 24 hrs but before 7 days of life and 5.6% died beyond the first week in the neonatal period.

24. Early neonatal deaths accounted for 94.4% of all neonatal deaths.

25. The commonest primary cause of neonatal death was perinatal asphyxia (54.9%). Other major causes were extreme prematurity (28.6%), congenital malformations (4.5%) and septicemia/meningitis (4.1%).

Intramural Still-births – Salient Findings

1. Data from 969 still-births is presented in this report.
2. Still birth rate was 31.3 per thousand total births.
3. Macerated still birth accounted for 39.7% of cases.
4. Still birth was detected before onset of labor in 44.3% and during labor in 51.3% of cases.
5. Of all stillbirths, 52.6% were male fetuses.
6. The mean birth weight 1996±778 gm. 62.9% of babies were LBW
7. 36.1% of stillbirths were preterm.
8. The causes of still birth included asphyxia (20.7%), trauma (4.3%), congenital malformation (16.3%), infection (3.6%) and others (1%). The cause was not established in 39.7% cases.
9. In mothers 14.4% were severely anemic, 20.0% had pregnancy induced hypertension, and 3.7% had ecclampsia.
10. Maternal mortality was 13.3 per 1,00,000 live births .

Extramural Admissions – Salient Findings

A total of 11162 neonates were admitted to the 8 centers of the network.

1. Over two-third (67.1%) of extramural admissions were male.
2. Of all admitted neonates, 81.3% were born in hospitals while 16.9% were born in home settings.
3. 60.0% babies were low birth weight, while 68.1% were preterm.
4. At admission the mean weight of babies was 2205 gm (±765) and mean age was 5.0 (±8.0) days.
5. Overall mortality was 16.8% while 0.1% babies left the hospital against medical advice and 13.1% of babies were referred for further care.
6. Mean age at death was 6.0 (±8.0) days.
7. Single most important cause of death included sepsis (34.2%), asphyxia (18.6%), pneumonia (3.9%), extreme prematurity (5.8%), hyaline membrane disease (8.5%), intraventricular hemorrhage (5.2%) and tetanus (1.4%).
8. Key morbidities included sepsis (40.0%), hyperbilirubinemia (21.9%), seizures (18.1%), hypoxic ischemic encephalopathy (15.9%), anemia (8.8%), hypothermia (15.5%), hypoglycemia (9.2%), meconium aspiration syndrome (7%), hyaline membrane disease (6.3%), hemorrhagic disease of newborn (3.2%), apnea (7.9%), Rh isoimmunization (2.1%), hypocalcemia (5.7%) and polycythemia (1.1%).
9. Of sepsis cases, 35.5% has were blood culture positive. 19.7% of babies had associated meningitis.
10. Treatment modalities used included antibiotics (83.3%), oxygen administration (58.6%), blood transfusion (22.7%), phototherapy (32.5%), assisted ventilation (23.6%) and exchange transfusion (5.9%).

NEONATAL PERINATAL DATABASE

Human Reproduction Research Centres (HRRC) Network

2002-2003

TABLES OF DATA

Part 1
TABLES ON INTRAMURAL BIRTHS

Part 2
TABLES ON EXTRAMURAL ADMISSIONS

PART 1

TABLES ON INTRAMURAL BIRTHS

1.1Live births

1.2Still births

PART 1 : REPORT ON INTRAMURAL BIRTHS

Panel 1
Major neonatal and maternal outcomes
(All -- centres provided data for these indices)

Total births	**31,007**	
Total live births	**30,038**	
Total neonatal deaths	**266**	
Early neonatal deaths		*251 (94.4%)*
Late neonatal deaths		*15 (5.6%)*
Neonatal Mortality Rate	**8.9 per 1000 live births (NMR)**	
Early Neonatal Mortality Rate	– *8.4 per 1000 live births*	
Late Neonatal Mortality Rate	– *0.5 per 1000 live births*	
Maternal deaths	4	
Obstetric causes		*4*
Non-obstetric causes		*-*
Maternal Mortality Ratio	**13.3 per 100,000 live births**	

Panel 2
Perinatal outcomes

Total births	**31,007**
Live births	**30,038**
Still births	**969**
Early neonatal deaths	**251**
Perinatal deaths	**1220**
Still birth rate	*31.3 per 1000 births*
Perinatal mortality rate	*40.6 per 1000 live births*

1.1 REPORT ON INTRAMURAL LIVE BIRTHS

Table 1: Sex distribution and gestation group details

Category	Number of infants (n = 30,038)	Proportion (%)
Sex distribution		
Males	15974	53.2
Females	14055	46.8
Ambiguous	6	0.0
Gestation groups		
Preterm (<37 weeks)	1844	6.1
Term	26623	88.6
Post term (>41 weeks)	467	1.6
Unknown	1104	3.7%

Table 2: Birth weight and Intrauterine growth categories

Category	Number of infants (n = 30,038)	Proportion (%)
A. Birth weight*		
Total LBW	6334	21.1
Very low birth weight#	280	0.9
Neonates <2000 gm	1227	4.1

** Low birth weight: (<2500 gm)*
 # Very low birth weight: (< 1500 gm)
$ Extremely low birth weight: (< 1000 gm)

Tables 3: Details of singletons and multiple live births

Category	Number of infants (n = 30,038)	Proportion (%)
Singletons	29570	88.6
Multiple	458	1.5
Unknown	10	0.03

Tables 4: Details of labor and fetal distress

Category	Number of infants (n = 30,038)	Proportion (%)
Oxytocin use	4525	15.1
Meconium stained liquor	1711	5.7
Foul smelling liquor	45	0.1
Acute fetal distress	*753*	2.5

Tables 5: Mode of delivery

Category	Number of infants (n = 30,038)	Proportion (%)
Vaginal delivery	24205	80.6
Cesarean section	4811	16.0
Forceps extraction	406	1.4
Vaccum extraction	178	0.5
Others	381	1.3
Unknown	57	0.2

Table 6: Cry after birth

Minutes after birth	Number of infants (n = 30,038)	Proportion (%)
<1	28769	95.8
1-5	816	2.7
>5	253	0.8
Unknown	200	0.7

Table 7: Resuscitation measures used*

Resuscitation measure	Number of infants (n = 30,038)	Proportion (%)
Free flow oxygen	1325	4.4
Bag-mask ventilation	669	2.2
Chest compressions	161	0.5
Overall Intubations	723	2.4
(a) Intubation for meconium	*570*	*1.9*
(b) Intubation otherwise	*153*	*0.5*
Drug(s)	425	1.4

**Resuscitation measures are not mutually exclusive, hence more than one measure may have been used on a given infant.*

Table 8: Birth trauma

Type of trauma	Number of infants (n = 30,038)	Proportion (%)
Cephalhematoma	16	0.0
Cuts	5	0.0
Subgaleal bleed	240	0.2
Fractures	3	0.0

Table 9: Principal Morbidities*

Type of morbidity	Number of infants (n = 30,038)	Proportion (%)
Respiratory distress	1463	4.9
Any systemic infection	224	0.8
Any superficial infection	210	0.7
Hypothermia	232	0.8
Apneic spells	97	0.3
Hypoglycemia	194	0.6
Rh isoimmunization	58	0.2
Neonatal seizures	98	0.3
Hyperbilirubinemia	203	0.7

** Not mutually exclusive*

Table 10: Congenital malformations

Type of malformation	Number of infants (n = 30,038)	Proportion (%)
Meningomyelocele	12	0.0
Hydrocephalus	37	0.1
Limb defects	33	0.1
Gastro-intestinal	13	0.0
Genito-urinary	11	0.0
Cleft lip/palate	15	0.0
Down syndrome	10	0.0

Table 11: Superficial Infections

Type of infection	Number of infants (n = 30,038)	Proportion (%)
Conjunctivitis	121	0.4
Pyoderma	12	0.0
Umbilical sepsis	43	0.1
Thrush	44	0.1

Table 12: Systemic infections

Category	Number of infants (n = 30,038)	Proportion (%)
Overall incidence	224	0.8
Time of onset (n = 212)		
Early onset	*156*	*0.5*
Late onset	*25*	*0.1*
Clinical category*		
Septicemia	*212*	*0.7*
Pneumonia	*23*	*0.1*
Meningitis	*4*	*0.0*
Tetanus neonatorum	0	0.0

* *Not mutually exclusive*

Table 13: Indicators of conditions of care

Category	Number of infants (n = 30,038)	Proportion (%)
Outcome		
Discharged	29064	96.8
Died*	266	0.9
Refusal for care	100	0.3
Referred	606	2.0
Not known	2	0.0
Therapy given#		
IV Fluids	1041	3.5
Antibiotics	1654	5.5
Oxygen	1239	4.1
Phototherapy	438	1.5
Blood/plasma transfusion	22	0.1

 # Not mutually exclusive

Table 14: Neonatal Mortality – major indices (live births = 30,038)

Index	Number of infants (n = 30,038)	Proportion (%)
Neonatal deaths	266	0.9
Early neonatal deaths	251	94.4
Deaths < 24 hrs	*162*	*64.5*
Deaths 1 to 7 days	*89*	*35.5*
Late neonatal deaths (7-28 days)	15	5.6
Neonatal mortality rate	*- 8.9 per 1000 live births*	
Early neonatal mortality rate	*- 8.4 per 1000 live births*	
Late neonatal mortality rate	*- 0.5 per 1000 live births*	

Table 15: Primary causes of mortality

Cause	Number of deaths (n = 266)	Proportion (%)
Perinatal asphyxia	146	54.9
Extreme prematurity	76	28.6
Congenital malformation	12	4.5
Septicemia/Meningitis	11	4.1
Birth trauma	1	0.4
Others	14	5.3
Not established	6	2.3

Table 16: Significant factors for adverse outcome of neonates on multivariate analysis (Forward logistic regression)

Variable	Odd ratio (95% CI)	P value
Preterm gestation	2.0(1.0-4.3)	0.06
Birth weight 2000-2499 gm	2.1(1.3-3.2)	0.001
Birth weight 1500-1999 gm	9.7(2.9-32.3)	0.00
Birth weight less than 1500 gm	37.3 (7.9-175.6)	0.00
Presence of any major malformation	12.5 (5.0-31.6)	0.00
Presence of respiratory distress	10.7 (4.6-24.9)	0.00
Presence of septicemia	5.3 (2.7-10.8)	0.00

1.2 REPORT ON INTRAMURAL STILL BIRTHS

Table 1 : Sex distribution and gestation group details

Category	Number of infants (n = 969)	Proportion (%)
Sex distribution		
Males	*510*	*52.6*
Females	*449*	*46.4*
Ambiguous	*7*	*0.7*
Not known	*3*	*0.3*
Preterm (<37weeks)	350	36.1
Term	494	51.0
Post-term (>41weeks)	20	2.1
Not known	105	10.8

Table 2 : Birth weight and Intrauterine growth categories

Category	Number of infants (n = 969)	Proportion (%)
Low birth weight	610	62.9
Very low birth weight[#]	238	24.6
Extremely low birth weight[$]	76	7.8

** Low birth weight (<2500 gm)*
 # Very low birth weight < 1500 gm
$ Extremely low birth weight < 1000 gm

Tables 3 : Details of singletons and multiple still births

Category	Number of infants (n = 969)	Proportion (%)
Singletons	924	95.4
Multiple	35	3.6
Unknown	10	1.0

Tables 4 : Mode of delivery

Category	Number of infants (n = 969)	Proportion (%)
Vaginal delivery	673	69.5
Cesarean section	137	14.1
Forceps extraction	23	2.4
Vaccum extraction	6	0.6
Other	130	13.4

Table 5: Time of detection of still birth

Category	Still births (n = 969)	Proportion (%)
Detected before labor	430	44.4
Detected during labor	498	51.4
Not known	41	4.2

Table 6 : Types of still birth

Category	Still births (n = 969)	Proportion (%)
Fresh	387	40.0
Macerated	385	39.7
Not Known	197	20.3

Table 7 : Birth weight distribution of still births

Birth weight group (gm)	No of still births (n = 969)	Proportion (%)
<1000	76	7.8
1000-1249	122	12.6
1250-1499	40	4.1
1500-1749	118	12.2
1750-1999	55	5.7
2000-2249	148	15.3
2250-2499	62	6.4
2500-2999	209	21.6
3000-3499	96	9.9
≥3500	24	2.5
Not known	19	2.0

Table 9 : Primary causes of still births

Causes	No of still births (n = 969)	Proportion (%)
Asphyxia	188	19.4
Congenital malformations	135	13.9
Infection	30	3.1
Trauma	35	3.6
Rh-isoimmunization	4	0.4
Others / Not established	577	59.5

PART 2

TABLES ON EXTRAMURAL ADMISSIONS

Table 1 : Sex distribution and gestation group details

Category	Number of infants (n=1047)	Proportion (%)
Sex distribution		
Males	*618*	*59.0*
Females	*429*	*41.0*
Preterm (<37 weeks)	342	32.7
Term	626	59.8
Post-term (>41 weeks)	4	0.4
Not known	75	7.1

Table 2 : Age at admission

Age (days)	Number of infants (n = 1047)	Proportion (%)
<1 day	58	5.5
1 to <3 days	490	46.8
3 to <7 days	209	20.0
7 to <14 days	153	14.6
14 to <21 days	72	6.9
≥21 days	65	6.2

Table 3 : Place of delivery

Place	Number of infants (n=1047)	Proportion (%)
Home	311	29.7
Hospital	573	54.7
Elsewhere	127	12.2
Not known	36	3.4

Table 4 : Person conducting delivery

Person	Number of infants (n=1047)	Proportion (%)
Doctor	196	18.7
Nurse/ANM*	394	37.6
Trained Dai	123	11.7
Other	139	13.3
Not known	195	18.7

* *ANM = Auxillary Nurse Midwife*

Table 5 : Birth weight category of admitted neonates

Category	Number of infants (n=1047)	Proportion (%)
Low birth weight *(<2500 gm)*	563	53.8
Normal birth weight *(≥2500 gm)*	465	44.4
Not known	19	1.8

Table 6 : Birth trauma

Trauma	Number of infants (n = 1047)	Proportion (%)
Cephalhematoma	0	0
Cuts	0	0
Fracture(s)	1	0.1

Table7: Congenital malformation

Malformation	Number of infants (n=1047)	Proportion (%)
Cardiac	0	0.0
Gastrointestinal	1	0.1
Genito-urinary	0	0.0
Neural tube defect	1	0.1
Limb defects	3	0.4
Hydrocephalus	1	0.1
Cleft lip/palate	1	0.1
Down syndrome	0	0.0

Table 8: Principal Morbidities*

Type of morbidity	Number of infants (n = 1047)	Proportion (%)
Respiratory distress	264	25.2
Any systemic infection	?185	17.7
Any superficial infection	210	0.7
Hypothermia	31	3.0
Apneic spells	13	1.2
Hypoglycemia	33	3.2
Rh isoimmunization	1	0.1
Neonatal seizures	37	3.5
Hyperbilirubinemia	66	6.3

** Not mutually exclusive*

Table 9: Superficial infections

Infection	Number of infants (n=1047)	Proportion (%)
Conjunctivitis	6	0.6
Umbilical sepsis	20	1.9
Thrush	5	0.5
Pyoderma	5	0.5

Table 10: Systemic infections

Category	Number of infants (n=1047)	Proportion (%)
Overall incidence	**185**	**17.7**
Time of onset		
Early onset	73	39.5
Late onset	93	50.3
Clinical category# ***(not mutually exclusive)***		
Pneumonia	35	3.3
Meningitis	5	0.5
Tetanus neonatorum	0	0.0

Table 11: Therapies given

Therapy given*	Number of infants (n = 1047)	Proportion (%)
Antibiotics	555	53.0
IV Fluids	533	50.9
Oxygen	410	39.2
Phototherapy	133	12.7
Blood/plasma transfusion	13	1.2

* *Therapies provided are not mutually exclusive.*

Table 17 : Outcomes of admitted neonates

Outcomes	Number of infants (n=1047)	Proportion (%)
Discharged	499	47.7
Expired	119	11.4
Left against medical advice	24	2.3
Referred	65	6.2
Not known	340	32.5

Table 18: Death by weight at admission

Weight at admission (gms)	No of infants (n=1047)	No of deaths (n=119)	Intra group mortality
<1000	10	3	30.0
1000-1499	90	15	16.7
1500-1999	200	33	16.5
2000-2499	260	30	16.2
≥2500	484	38	11.9
Not known	3	0	0.0

Tables 19: Admission to death interval

Interval (days)	Number of infants (n = 119)	Proportion (%)
< 1 day	3	2.5
1 – 2 days	98	82.4
3 – 6 days	14	11.9
≥ 7 days	4	3.2

Table 15: Primary causes of mortality

Cause	Number of deaths (n =119)	Proportion (%)
Perinatal asphyxia	58	48.7
Extreme prematurity	16	13.4
Congenital malformation	5	4.2
Septicemia/Meningitis	30	25.2
Others	1	0.8
Not established	1	0.8
Not known	8	6.7

NNPD HRRC NETWORK
WORKING DEFINITIONS

I GENERAL

INTRAMURAL BABY
A baby born in your center

EXTRAMURAL BABY
Baby not born in your center

FETUS
Fetus is a product of conception, irrespective of the duration of pregnancy, which is not completely expelled or extractedfrom its mother.

BIRTH
Birth is the process of complete expulsion or extraction of a product of conception from its mother.

LIVE BIRTH
A live birth is complete expulsion or extraction from its mother of a product of conception, irrespective of duration of pregnancy, which after separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movements of voluntary muscles. This is irrespective of whether the umbilical cord has been cut or the placenta is attached. [Include all live births >500 grams birth weight or 22 weeks of gestation or a crown heel length of 25 cm]

STILL BIRTH
Death of a fetus having birth weight >500 g (or gestation 22 weeks or crown heel length 25 cm) or more.

BIRTH WEIGHT
Birth weight is the first weight of a live or dead product of conception, taken after complete expulsion or extraction from its mother. This weight should be measured within 24 hours of birth, preferably within its first hour of live itself before significant postnatal weight loss has occurred.

LOW BIRTH WEIGHT (LBW)
Birth weight of less than 2500 g.

VERY LOW BIRTH WEIGHT (VLBW)
Birth weight of less than 1500 g.

EXTREMEY LOW BIRTH WEIGHT (ELBW)
Birth weight of less than 1000 g.

GESTATIONAL AGE (best estimate)
The duration of gestation is measured from the first day of the last normal menstrual period. Gestational age is expressed in completed days or completed weeks. PLEASE PROVIDE THE BEST ESTIMATE OF GESTATION. IT MEANS THAT, IN YOUR JUDGEMENT, BASED ON ALL THE HISTORICAL, ULTRASOUND AND BABY EXAMINATION DATA, THE ESTIMATE AS ENTERED IN THE DATABASE IS MOST ACURATE.

PRETERM
Gestational age of less than 37 completed weeks (i.e. less than 259 days)

TERM
Gestational age of 37 to less than 42 completed weeks (i.e. 259 to 293 days)

POST TERM
Gestational age of 42 completed weeks or more (i.e. 294 days or more).

FETAL GROWTH CATEGORIES (Use AIIMS chart in Dr. Meharban Singh's book)

- SMALL FOR DATES (SFD)
  Neonate with a birth weight less than 10th centile for the period of gestation.
- APPROPRIATE FOR DATES (AFD)
  Neonate with birth weight between 10th to 90th centile for the period of gestation.
- LARGE FOR DATES
  Neonate with birth weight over 90th centre for the period of gestation.

PERINATAL PERIOD
Commences from 22 weeks (154 days) of gestation (the time when the birth weight is 500 g), and ends at 7 completed days after birth.

NEONATAL PERIOD
It refers to the period of *less than* 28 days after birth. Early neonatal period refers to the period before 7 days of age. Late neonatal period refers to the period from completion of 7 days upto 28 days of life.

MATERNAL DEATH
A maternal death is the death of a woman known to be pregnant within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accident or incidental causes.

PROLONGED RUPTURE OF MEMBRANES
Rupture of membranes or leaking for more than 24 hours.

ANTEPARTUM HEMORPHAGE

Bleeding per vaginum after 20 weeks of gestation.

MATERNAL ANEMIA
Clinical pallor should be chosen if pallor is present and hemoglobin has not been done.

FETAL BRADYCARDIA
Fetal heart rate of less than 120 per minute.

FETAL TACHYCARDIA
Fetal heart rate of more than 160 per minute.

II NEONATAL DETAILS

BIRTH ASPHYXIA
Definition I
Moderate birth asphyxia: Slow gasping breathing at 1-minute of age.
Severe birth asphyxia: No breathing at 1-minute of age.
Definition II
Birth asphyxia : Apgar score of less than 7 at 1 minute of age
Moderate birth asphyxia: Apgar score between 4 to 6 at 1-minute of age
Severe birth asphyxia: Apgar score of 3 or less at 1-minute of age.

For HRRC sites:
Cry after 5 minutes of age or no cry at all

RESPIRATORY DISTRESS
Presence of at least 2 of the following criteria:
Respiratory rate > 60/minute
Subcostal/intercostal recessions
Expiratory grunt/groaning
(Note: the baby should be evaluated in between the feeds and in a quiet state. Respiratory rate should be recorded for at least 1 minute.

TRANSIENT TECHYPNEA/DELAYED ADAPTATION
Respiratory distress in a term or borderline term or preterm neonate starting within 6 hours after birth, often requiring supplemental oxygen, but recovering spontaneously within 3-4 days and showing characteristic x-ray changes (linear streaking at hila and interlobar fluid).

HYALINE MEMBRANE DISEASE
(A) Presence of all of the following three criteria
- Pre-term neonate
- Respiratory distress having onset within 6 hours of birth
- Amniotic fluid L/S ratio of <1.5, or negative gastric aspirate shake test, or skiagram of chest showing poor expansion with air bronchogram/ reticulo-granular pattern/ ground glass opacity.

(B) Autopsy evidence of HMD.

MECONIUM ASPIRATION SYNDROME
Presence of two of the following:
- Meconium staining of liquor or staining of nails or umbilical cord or skin.
- Respiratory distress soon after birth, within one hour of birth
- Radiological evidence of aspiration pneumonitis (atelectasis and or hyperinflation).

PNEUMONIA
In a neonate with respiratory distress, pneumonia is diagnosed in the presence of a positive blood culture or if any two one of the following are present.

- Existing or predisposing factors: maternal fever, foul smelling liquor, prolonged rupture of membranes or gastric polymorphs more than 5 per high power field.
- Clinical picture of septicemia (poor feeding, lethargy, poor reflexes, hypo, hyperthermia, abdominal distension etc.)
- X-ray picture suggestive of pneumonia.
- Positive septic screen (see septicemia)

For HRRC centres, sepsis screen and x-ray may not be necessary for the diagnosis

SEPTICEMIA (SYSTEMIC BACTERIAL INFECTION):
CULTURE NEGATIVE (CLINICAL)
In an infant having clinical picture suggestive of septicemia, the presence of any one of the following criteria is enough for assigning probable diagnosis of infection:

- Existence of predisposing factors: maternal fever or foul smelling liquor or prolonged rupture of membranes (>24 hrs) or gastric polymorphs (>5 per high power field).
- Positive septic screen (two of the four parameters (namely, TLC (<5000/mm, band to total polymorph ratio of > 0.2, absolute neutrophil count less than 1800 / cmm, C-reactive protein >1mg/dl and micro ESR>10 mm 1st hour).
- Radiological evidences of pneumonia.

For HRRCs clinical diagnosis will suffice

CULTURE POSITIVE SEPSIS
In an infant having clinical picture suggestive of septicemia, pneumonia or meningitis along with either of the following.

- Isolation of pathogens from blood or CSF or urine or abscess(es)
- Pathological evidence of sepsis on autopsy.

EARLY/ LATE ONSET SEPSIS (Pneumonia, septicemia, Meningitis, NEC, UTI etc.)
Early onset: Onset <72 hours.
Late onset: Onset >72 hours.

MENINGITIS
In the setting of septicemia, if CSF culture is positive; or CSF microcopy and biochemistry are suggestive of meningitis.

NECROTISING ENTEROCOLITIS (NEC)
In a baby at risk for NEC (pre-maturity, sepsis, umbilical venous/arterial catheterization, birth asphyxia, extreme pre-maturity, formula feeding) presence of any two of the following:

- Pre feed gastric aspirate of >50% of previous feed or abdominal distension.
- Bloody stools or occult blood in the stools.
- Radiological evidence of pneumatosis intestinalis/portal air/free air under the diaphragm.

HYPERBILIRUBINEMIA
Serum bilirubin of >15 mg/dl

HYPOTHERMIA
Skin temperature <36 C

HYPOGLYCEMIA
Whole blood glucose of less than 40 mg/dl

HYPOCALCEMIA
Any one of the following.

- Serum total calcium <7 mg/dl. or
- Serum ionized calcium <4 mg/dl.
- Q_OT_C >0.2 seconds on ECG which normalizes after calcium therapy.

INTRAVENTRICULAR HEMORRHAGE (IVH)
CLINICALLY SUSPECT if at least 3 clinical criteria in a pre-term infant in whom hypoglycemia and pyogenic meningitis have been excluded:

- Onset of symptoms within 0-72 hours of age
- Apneic attacks or seizures
- Sudden pallor or falling hematocrit
- Gross hypotonia
- Flat or bulging fontanel

CONFIRMED if corroborated by ultrasound or CT or autopsy findings

ANEMIA
Hemoglobin <13 g/dl or PCV <40 per cent.

HEMORRHAGIC DISEASE OF THE NEWBORN
Bleeding from any site especially from the gastrointestinal tract
Onset 2nd to 5th day of postnatal life
Prolonged pro-thrombin time and thrombin time, with normal platelet count.

APNEIC SPELL
Period of respiratory arrest of a duration of more than 20 seconds: or of less than 20 seconds if accompanied by bradycardia (<100/minute) and/or cyanosis.

POLYCYTHEMIA
Capillary hematocrit of more than 70% or venous hematocrit more than 65% after 24 hours of age

MAJOR CONGENITAL MALFORMATION
A malformation that is life threatening or requires surgical correction.

III. CAUSES OF NEONATAL DEATH
(This entry should be verified by the PI)

Important Note:
You will be first asked the cause(s) of death and you would choose from the following 11 causes of death. You may assign more than one cause of death at this stage.

You will then be asked to identify the single most important cause of death. Here you will choose only one cause. This is the primary or underlying cause of death which is defined as disease or injury, which initiated the train of morbid events leading directly to death. You will exercise your judgement to assign this cause keeping in mind this definition

1. **Perinatal asphyxia:** Death of a neonate in the setting of and with features of perinatal hypoxia and / or birth asphyxia followed by manifestations of or hypoxic ischemic injury of brain (hypoxic ischemic encephalopathy) or other organs.

2. **Birth trauma :** Death due to birth trauma.

3. **Extreme prematurity:** Extreme prematurity as a cause of death is assigned to infants having birth weight of less than 750g

4. **Hyaline membrane disease:** Death in a neonate attributable to hyaline membrane disease

5. **Intraventricular hemorrhage :** Death in a neonate attributable to intraventricular hemorrhage

6. **Pneumonia :** Death in a neonate attributable to pneumonia

7. **Septicemia :** .Death in a neonate attributable to septicemia or meningitis

8. **Tetanus neonatorum :** Death due to tetanus neonatorum

9. **Congenital malformations:** Death due to lethal congenital malformation.

10. **Others:** Mention the cause not classified by above

11. **Not established** : Cause of death not established

IV CAUSES OF STILLBIRTHS
(This entry should be verified by the PI)

Important Note:
You will be first asked the cause(s) of stillbirth and you would choose from the following 11 causes of death. You may assign more than one cause of stillbirth at this stage.

You will then be asked to identify the single most important cause of stillbirth. Here you will choose only one cause. This is the primary or underlying cause of death which is defined as disease or injury, which initiated the train of morbid events leading directly to death. You will exercise your judgement to assign this cause keeping in mind this definition

1. **Aspyhxia:** Death of a fetus in the setting of preeclampsia, hypertension, eclampsia, fetal growth retrdation, oligihydramnios, prolonged / obstructed / precipitate labor, meconium passage, cord around the neck, fetal heart slowing or instrumentation.

2. **Trauma :** Death of a fetus in the setting of cephalopelvic disproportion or obstructed labor or instrumentation with obvious evidence of traumatic lesions,

3. **Infection:** Death of a fetus in the setting of intrauterine infections (TORCH group) or chorioamnionitis (maternal fever, abdominal tenderness, foul smelling liquor)

4. **Congenital malformations:** Death of a fetus due to lethal congenital malformation.

5. **Rh Isoimmunization :** Death of a fetus attributable to erythroblastosis fetalis

6. **Others:** Mention the cause not classified by above

7. **Not established** : Cause of death not established