

Appendices Saving Babies 2003-2005

Methods, definitions and common abbreviations used in the Survey

Methods

All provincial Maternal, Child and Women's Health units were requested to submit to the national Maternal, Child and Women's Health unit data relating to perinatal care in their provinces. This minimum perinatal data set was agreed to at the first Perinatal Care Survey Workshop in 2000. Data included the number of deliveries and deaths per weight category, as well as information relating to the number of caesarean sections, the number of babies born before arrival, and the number of maternal deaths. The basic form is shown in figure 1.1. Collecting the data was effected either by the provincial MCWH units collecting the minimum data from the institutions directly or by requesting the information from the provincial Health Information Systems units. The provincial data is shown under the respective provinces reports.

The MRC unit contacted all people currently using PPIP and requested them to electronically send their PPIP data to the unit. The MRC unit electronically collated the data using PPIPWIN v2 (Simply Software®). The PPIP sentinel sites were grouped into three categories, those from metropolitan areas (as defined by the new 'mega-cities'), city and town areas, and rural areas. This categorisation was chosen as it grouped the hospitals into naturally comparable units and covered most of the institutional deliveries occurring in those areas and was thought to be more representative of population based data than any other combination. Furthermore, the metropolitan grouping represents a fully functioning tiered health care system, with all patients in the area having relatively easy access to tertiary care if needed. The city and town grouping represents areas where patients usually have easy access to primary and secondary level institutions, but there is some difficulty in accessing tertiary institutions. Finally the rural grouping represents primary care, with the patients having to be referred for secondary and tertiary care. This categorisation was not always easy. It was decided not to combine the data by levels of care across the country because of the very different referral patterns. Data for each province is given separately.

PPIP was developed in the 1990s by the MRC unit and been extensively field tested since 1996. PPIP is a simple, user friendly computer-based programme that, once simple perinatal data is entered, calculates various perinatal care indices, describes the medical conditions that led to the perinatal death and describes the avoidable factors, missed opportunities and substandard care that led to the deaths. The data from various sites can be collated, thus perinatal care indices, patterns of disease and avoidable factors can be analysed for various groupings of sites, e.g. provincial, or primary, secondary and tertiary levels of care, or metropolitan, city and town, and rural areas. Once this information is available, the priority problems are clearly identified and solutions can be sought. PPIP follows the 'ICA solution' audit system, first described in 1995¹. This system, although not time consuming or labour intensive, relies on the presence of regular perinatal mortality meetings to

discuss the various deaths and the possible shortcomings in care. Thus it takes enthusiasts to run it, and at present cannot be introduced at all sites where births occur.

Definitions

The definition of the perinatal care indicators and their significance is described below:

1. **Neonatal death rate (NNDR)** $\frac{\text{Total number of neonatal deaths} \times 1000}{\text{Total number of live births}}$

A viable live born baby from birth to 28 days is called a neonate. Neonatal deaths are subdivided into early (first 7 days of life) and late (8 – 28 days) where early neonatal death (ENND) is an indicator of intrapartum care and partly the quality of neonatal facilities.

2. **Stillbirth rate (SBR)** $\frac{\text{Total number of stillbirths} \times 1000}{\text{Total number of births}}$

A viable baby born dead is called a stillbirth. The stillbirth rate is an indicator of the quality of obstetric care in general. Stillbirths can be further subdivided into fresh stillbirths and macerated stillbirths where fresh stillbirths would usually reflect the quality of intrapartum care and macerated stillbirths the quality of antenatal care.

3. **Perinatal mortality rate (PNMR)** $\frac{\text{Total number of perinatal deaths} \times 1000}{\text{Total number of births}}$

The WHO defines the perinatal period starts at the beginning of fetal viability (24 weeks gestation or 500g) and ends at the end of the 7th day after delivery. A perinatal death is one that occurs during this time period and is the sum of stillbirths plus early neonatal deaths.

The PNMR is the most sensitive indicator of obstetric care. For developed countries the PNMR for babies of 500g or more is usually less than 10/1000 births whereas for developing countries PNMR ranges from 30 – 200/1000 births.

4. **Low birth weight rate (LBWR)** $\frac{\text{Total number of births} < 2500 \text{ g} \times 100}{\text{Total number of births}}$

Low birth weight rate is an indicator of the socio-economic status and health of the community in general. If deliveries are categorized by weight, this will give an indication of low birth weight as a cause of perinatal mortality as well as an indication at what weight babies survive. The LBWR for births in developed countries is around 7%, whereas in developing countries it is much higher, around 15%.

For all the indicators mentioned above, 500g is used as a cut off. Birth weight is used instead of gestational period as in a significant number of women gestational age is not known. Data for babies 1000g and above are given as appendices.

5. Stillborn:neonatal death (SB:NND) ratio.

If the data on perinatal deaths is collected by separating stillbirths and neonatal deaths, the SB:NND ratio can be calculated and is another indicator of the perinatal environment. A developed country usually has a SB:NND ratio of around one. In developing countries where there is almost no care the ratio is also around one with as many stillbirths as neonatal deaths. As care improves, i.e. more births take place in institutions and labour, delivery and immediate care of the neonate is supervised, the NNDR declines and the SB:NND ratio increases. Finally as antenatal care improves, the number of stillbirths decline and the ratio decreases again to one.

6. Perinatal Care Index (PCI) $\frac{\text{Overall PNMR}}{\text{Percentage low birth weight babies}}$

This was first described by Theron *et al.*² in 1985. It can be used to compare the standard of care of various areas. It takes into account the environmental factors so that the comparison can be more valid. The LBWR of an area is an indication of the socio-economic status of that area. It is not dependent on the care received in the clinic or hospital, but more dependent on environmental factors. Most deaths occur in babies weighing less than 2500 g. If the LBWR is high, it is to be expected that the PNMR will be high. If the PNMR is low in this set of circumstances, then good care is present. However, in areas with a low LBWR that have a high PNMR, then the care must be poor. A low PCI indicates good care whereas a high PCI indicates poor care. A low PCI indicates good care because the PNMR is relatively low in relation to the LBWR. A high PCI indicates poor care because the PNMR is relatively high in relation to the LBWR. It is only appropriate to use this index to compare hospitals with similar circumstances or the same hospital over a period of time.

7. Caesarean section (C/S) rate $\frac{\text{Number of C/Ss} \times 100}{\text{Total number of births}}$

8. Assisted delivery rate $\frac{\text{Number of assisted births} \times 100}{\text{Total number of births}}$

9. Booked status rate: $\frac{\text{Number of booked women (who have given birth)} \times 100}{\text{Total number of births}}$

This is a proportion of women booked for antenatal care and reflects the utilisation of health facilities. A pregnant woman is regarded as booked if she has had a single visit to a general practitioner or the clinic prior to labour or developing a complication. In modern obstetrics, with the availability of on-site testing, a patient can be fully risk classified at the first visit and the antenatal care planned. The term 'booked' is unfortunate. It is derived from a pregnant woman booking a bed for the

birth of her baby. That has come to mean someone who attended antenatal care. The term still gives rise to confusion, especially among pregnant women. It would be better to use the term 'attended antenatal care'. This would emphasise the right action.

10. Maternal mortality ratio (MMR): $\frac{\text{Total number of maternal deaths} \times 100\,000}{\text{Total number of live births}}$

The MMR is not discussed in this report, but it is useful to record the number of maternal deaths on the same form as perinatal deaths.

The classification system used in PPIP to describe the causes of perinatal death was first used in Aberdeen by Sir Dugald Baird and his colleagues from the 1940s and is clearly defined in *Perinatal Problems: The second report of the 1958 British Perinatal Mortality Survey*³. The chief purpose of the classification system was to assist in the prevention of perinatal deaths, and therefore the aim of the Aberdeen classification system is to identify 'the factor which probably initiated the train of events leading to death'. This system clearly points to where prevention can be targeted. The classification system was modified by Whitfield *et al*⁴ in 1986 to bring it into line with modern obstetrics and this forms one of the systems used in CESDI. The Aberdeen classification was adapted again by Pattinson *et al*⁵ in 1989 for use in developing countries and again in 1995¹ to include the concept of avoidable factors, missed opportunities and substandard care.

References

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2. Theron GB, Pattinson RC, Engelbrecht BHJ. Kaaplandse plattelandse perinatale sterftes Januarie-Desember 1985. *S Afr Med J* 1988;73:211-213.
3. Baird D, Thompson AM. The survey perinatal deaths re-classified by special clinico-pathological assessment. In *Perinatal Problems: the Second Report of the 1958 British Perinatal Mortality Survey* (Butler NR, Alberman ED eds), Churchill Livingstone, Edinburgh, 1969, 200-210.
4. Whitfield CR, Smith NC, Cockburn F, Gibson AAM. Perinatally related wastage – a proposed classification of primary obstetric factors. *Br J Obstet Gynaecol* 1986;93:694-703.
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South Africa PNMR, SBR, NNMR (1000g+)

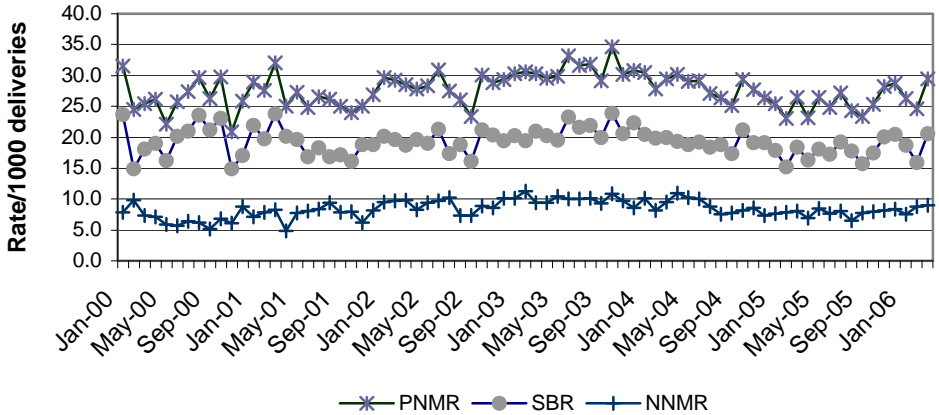


Table Primary causes of perinatal deaths in metropolitan areas

Metro 500g+	Number	% of total	Rate/1000
Intrauterine death	1474	23.5	8.75
Spontaneous preterm labour	1559	24.9	9.25
Intrapartum asphyxia	642	10.2	3.81
Trauma	77	1.2	0.46
Hypertensive disorders	707	11.3	4.20
Antepartum haemorrhage	670	10.7	3.98
Infections	369	5.9	2.19
Fetal abnormality	282	4.5	1.67
Intrauterine growth retardation	208	3.3	1.23
No obstetric cause / Not applicable	141	2.2	0.84
Maternal disease	89	1.4	0.53
Other	49	0.8	0.29
Total births 500g+	251092		37.19

Table Primary causes of perinatal deaths in city and towns

C&T 500g+	Number	% of total	Rate/1000
Intrauterine death	1183	22.2	8.47
Spontaneous preterm labour	1298	24.3	9.30
Intrapartum asphyxia	740	13.9	5.30
Trauma	115	2.2	0.82
Hypertensive disorders	628	11.8	4.50
Antepartum haemorrhage	627	11.7	4.49
Infections	284	5.3	2.03
Fetal abnormality	207	3.9	1.48
Intrauterine growth retardation	94	1.8	0.67
No obstetric cause / Not applicable	77	1.4	0.55
Maternal disease	69	1.3	0.49
Other	18	0.3	0.13

Table Primary causes of perinatal deaths in rural areas

Rural 500g+	Number	% of total	Rate/1000
Intrauterine death	1109	30.1	9.63
Spontaneous preterm labour	893	24.2	7.76
Intrapartum asphyxia	680	18.4	5.91
Trauma	80	2.2	0.69
Hypertensive disorders	312	8.5	2.71
Antepartum haemorrhage	238	6.5	2.07
Infections	132	3.6	1.15
Fetal abnormality	103	2.8	0.89
Intrauterine growth retardation	36	1	0.31
No obstetric cause / Not applicable	50	1.4	0.43
Maternal disease	35	0.9	0.30
Other	19	0.5	0.17

Table Final causes of neonatal deaths in metropolitan areas

Metro 500g+	Number	% of total	Rate/1000
Immaturity	1058	51.7	6.65
Hypoxia	459	22.4	2.89
Infection	239	11.7	1.50
Cong. Abn.	183	8.9	1.15
Other	46	2.2	0.29
Unknown	33	1.6	0.21
Trauma	14	0.7	0.09

Table Final causes of neonatal deaths in city and towns

C&T 500g+	Number	% of total	Rate/1000
Immaturity	970	51.1	7.12
Hypoxia	480	25.3	3.52
Infection	195	10.3	1.43
Cong. Abn.	139	7.3	1.02
Other	56	3	0.41
Unknown	36	1.9	0.26
Trauma	16	0.8	0.12

Table Final causes of neonatal deaths in rural areas

Rural 500g+	Number	% of total	Rate/1000
Immaturity	678	48.1	7.02
Hypoxia	436	30.9	4.52
Infection	94	6.7	0.97
Cong. Abn.	77	5.5	0.80
Other	72	5.1	0.75
Unknown	30	2.1	0.31
Trauma	21	1.5	0.22

Data for 1000g+

SA Primary causes 1000g+	Number	% of total	Rate/1000	Corrected
Unexplained intrauterine death	2971	26.4	5.23	7.37
Spontaneous preterm labour	1658	14.7	2.92	4.11
Intrapartum asphyxia	2033	18.1	3.58	5.04
Trauma	255	2.3	0.45	0.63
Hypertensive disorders	1143	10.2	2.01	2.84
Antepartum haemorrhage	1290	11.5	2.27	3.20
Infections	615	5.5	1.08	1.53
Fetal abnormality	521	4.6	0.92	1.29
Intrauterine growth restriction	291	2.6	0.51	0.72
No obstetric cause / Not applicable	242	2.2	0.43	0.60
Maternal disease	160	1.4	0.28	0.40
Other	66	0.6	0.12	0.16
Total births 1000g+	568322			27.90

Metro 1000g+	Number	% of total	Rate/1000	Corrected
Intrauterine death	1053	26	4.27	6.41
Spontaneous preterm labour	462	11.4	1.87	2.81
Intrapartum asphyxia	626	15.4	2.54	3.81
Trauma	68	1.7	0.28	0.41
Hypertensive disorders	399	9.8	1.62	2.43
Antepartum haemorrhage	543	13.4	2.20	3.31
Infections	272	6.7	1.10	1.66
Fetal abnormality	237	5.8	0.96	1.44
Intrauterine growth retardation	170	4.2	0.69	1.03
No obstetric cause / Not applicable	122	3	0.50	0.74
Maternal disease	70	1.7	0.28	0.43
Other	34	0.8	0.14	0.21
Total births 1000g+	246433			24.69

C&T 1000g+	Number	% of total	Rate/1000	Corrected
Intrauterine death	956	23.1	5.40	6.97
Spontaneous preterm labour	673	16.3	3.80	4.91
Intrapartum asphyxia	732	17.7	4.14	5.34
Trauma	108	2.6	0.61	0.79
Hypertensive disorders	479	11.6	2.71	3.49
Antepartum haemorrhage	535	12.9	3.02	3.90
Infections	232	5.6	1.31	1.69
Fetal abnormality	187	4.5	1.06	1.36
Intrauterine growth retardation	87	2.1	0.49	0.63
No obstetric cause / Not applicable	74	1.8	0.42	0.54
Maternal disease	59	1.4	0.33	0.43
Other	14	0.3	0.08	0.10
Total births 1000g+	176884			

Rural 1000+	Number	% of total	Rate/1000	Corrected
Intrauterine death	962	31.5	6.63	9.62
Spontaneous preterm labour	523	17.1	3.61	5.23
Intrapartum asphyxia	675	22.1	4.66	6.75
Trauma	79	2.6	0.54	0.79
Hypertensive disorders	265	8.7	1.83	2.65
Antepartum haemorrhage	212	6.9	1.46	2.12
Infections	111	3.6	0.77	1.11
Fetal abnormality	97	3.2	0.67	0.97
Intrauterine growth retardation	34	1.1	0.23	0.34
No obstetric cause / Not applicable	46	1.5	0.32	0.46
Maternal disease	31	1	0.21	0.31
Other	18	0.6	0.12	0.18
Total births 1000	145005			

Stillbirths

SA Primary causes SB 1000g+	Number	% of total	Rate/1000	Corrected
Unexpl. SB	2958	39.2	5.20	7.34
APH	1143	15.1	2.01	2.84
HT	983	13	1.73	2.44
IPA+T	1084	14.3	1.91	2.69
Inf.	393	5.2	0.69	0.98
S PTB	312	4.1	0.55	0.77
IUGR	244	3.2	0.43	0.61
Fet. Abn.	238	3.2	0.42	0.59
MD	131	1.7	0.23	0.33
Other	68	0.9	0.12	0.17
	7554			

Total births 1000g+ 568322

SA (Alive admission or fresh SB)
1000g+

	Number	% of total	Rate/1000	Corrected
IPA+T	902	29.9	1.59	2.24
APH	767	25.4	1.35	1.90
Unexpl. SB	549	18.2	0.97	1.36
HT	282	9.3	0.50	0.70
S PTB	179	5.9	0.31	0.44
Fet. Abn.	121	4	0.21	0.30
Inf.	109	3.6	0.19	0.27
IUGR	52	1.7	0.09	0.13
MD	33	1.1	0.06	0.08
Other	30	1	0.05	0.07

Neonatal deaths: Primary causes

SA NND 1000g+	Number	% of total	Rate/1000	Corrected
S PTB	1346	36.5	2.41	3.43
IPA+T	1204	32.6	2.16	3.07
Fet. Abn.	283	7.7	0.51	0.72
Inf.	222	6	0.40	0.57
HT	160	4.3	0.29	0.41
APH	147	4	0.26	0.37
IUGR	47	1.3	0.08	0.12
MD	29	0.8	0.05	0.07
Other	253	6.9	0.45	0.64

Final causes

SA Final causes NND 1000g+	Number	% of total	Rate/1000	Corrected
Immaturity	1192	32.3	2.14	3.03
Hypoxia	1350	36.6	2.42	3.44
Infection	452	12.2	0.81	1.15
Cong. Abn.	376	10.2	0.67	0.96
Other	163	4.4	0.29	0.41
Unknown	93	2.5	0.17	0.24
Trauma	50	1.4	0.09	0.13
Total born alive 1000g+	557764			

Metro 1000g+	Number	% of total	Rate/1000	
Immaturity	282	23.8	1.16	1.90
Hypoxia	445	37.6	1.84	2.99
Infection	191	16.1	0.79	1.29
Cong. Abn.	172	14.5	0.71	1.16
Other	40	3.4	0.17	0.27
Unknown	30	2.5	0.12	0.20
Trauma	14	1.2	0.06	0.09
Total born alive 1000g+	242260			

C&T 1000g+	Number	% of total	Rate/1000	
Immaturity	514	36.6	2.97	3.74
Hypoxia	471	33.5	2.72	3.42
Infection	178	12.7	1.03	1.29
Cong. Abn.	132	9.4	0.76	0.96
Other	54	3.8	0.31	0.39
Unknown	36	2.6	0.21	0.26
Trauma	15	1.1	0.09	0.11
Total born alive 1000+	173316			

Rural 1000g	Number	% of total	Rate/1000	
Immaturity	396	35.9	2.79	4.09
Hypoxia	434	39.3	3.05	4.49
Infection	83	7.5	0.58	0.86
Cong. Abn.	72	6.5	0.51	0.74
Other	69	6.3	0.49	0.71
Unknown	27	2.4	0.19	0.28
Trauma	21	1.9	0.15	0.22
Total born alive 1000	142188			

Deaths per weight categories

NND 500-999g	Number	% of total
Spontaneous preterm labour	1374	82.8
Hypertensive disorders	89	5.4
Antepartum haemorrhage	67	4
Infections	53	3.2
No obstetric cause / Not applicable	17	1
Fetal abnormality	13	0.8
Intrapartum asphyxia	12	0.7
Maternal disease	8	0.5
Other	8	0.5
Trauma	7	0.4
Unexplained intrauterine death	6	0.4
Intrauterine growth retardation	6	0.4

NND 1000-1499g	Number	% of total
Spontaneous preterm labour	894	74.2
Antepartum haemorrhage	63	5.2
Hypertensive disorders	54	4.5
Infections	54	4.5
Fetal abnormality	44	3.7
Intrapartum asphyxia	35	2.9
No obstetric cause / Not applicable	19	1.6
Trauma	12	1
Intrauterine growth retardation	11	0.9
Other	10	0.8
Maternal disease	6	0.5
Unexplained intrauterine death	3	0.2

NND 1500-1999g	Number	% of total
Spontaneous preterm labour	350	55.9
Infections	51	8.1
Fetal abnormality	41	6.5
Intrapartum asphyxia	41	6.5
Antepartum haemorrhage	40	6.4
Hypertensive disorders	39	6.2
No obstetric cause / Not applicable	26	4.2
Intrauterine growth retardation	17	2.7
Maternal disease	8	1.3
Other	6	1
Trauma	6	1
Unexplained intrauterine death	1	0.2

NND 2000-2499g	Number	% of total
Intrapartum asphyxia	141	33.1
Spontaneous preterm labour	64	15
Fetal abnormality	59	13.8
No obstetric cause / Not applicable	49	11.5
Infections	45	10.6
Hypertensive disorders	26	6.1
Antepartum haemorrhage	15	3.5
Trauma	9	2.1
Intrauterine growth retardation	8	1.9
Unexplained intrauterine death	4	0.9
Maternal disease	3	0.7
Other	3	0.7

NND 2500+	Number	% of total
Intrapartum asphyxia	892	62.2
Fetal abnormality	139	9.7
No obstetric cause / Not applicable	117	8.2
Infections	72	5
Trauma	68	4.7
Hypertensive disorders	41	2.9
Spontaneous preterm labour	38	2.6
Antepartum haemorrhage	29	2
Maternal disease	12	0.8
Intrauterine growth retardation	11	0.8
Other	10	0.7
Unexplained intrauterine death	5	0.3

Mac SB 500-999g	Number	% of total
Unexplained intrauterine death	580	51.1
Hypertensive disorders	235	20.7
Spontaneous preterm labour	120	10.6
Infections	63	5.5
Antepartum haemorrhage	53	4.7
Intrauterine growth retardation	25	2.2
Fetal abnormality	24	2.1
Maternal disease	18	1.6
Other	8	0.7
Intrapartum asphyxia	4	0.4
No obstetric cause / Not applicable	3	0.3
Trauma	3	0.3

Mac SB 1000-1499g	Number	% of total
Unexplained intrauterine death	641	54.2
Hypertensive disorders	223	18.9
Antepartum haemorrhage	89	7.5
Infections	77	6.5
Spontaneous preterm labour	48	4.1
Intrauterine growth retardation	43	3.6
Fetal abnormality	29	2.5
Maternal disease	15	1.3
Intrapartum asphyxia	10	0.8
Other	5	0.4
No obstetric cause / Not applicable	2	0.2
Trauma	1	0.1

Mac SB 1500-1499g	Number	% of total
Unexplained intrauterine death	455	46.8
Hypertensive disorders	206	21.2
Antepartum haemorrhage	80	8.2
Infections	77	7.9
Intrauterine growth retardation	57	5.9
Spontaneous preterm labour	35	3.6
Fetal abnormality	24	2.5
Intrapartum asphyxia	13	1.3
Maternal disease	13	1.3
No obstetric cause / Not applicable	6	0.6
Trauma	4	0.4
Other	2	0.2

Mac SB 2000-2499g	Number	% of total
Unexplained intrauterine death	480	54.8
Hypertensive disorders	135	15.4
Antepartum haemorrhage	80	9.1
Infections	53	6.1
Intrauterine growth retardation	35	4
Fetal abnormality	24	2.7
Intrapartum asphyxia	23	2.6
Spontaneous preterm labour	22	2.5
Maternal disease	10	1.1
Trauma	8	0.9
No obstetric cause / Not applicable	3	0.3
Other	3	0.3

	Number	% of total
Mac SB 2500g+		
Unexplained intrauterine death	735	60.1
Hypertensive disorders	124	10.1
Antepartum haemorrhage	85	7
Infections	65	5.3
Maternal disease	58	4.7
Intrapartum asphyxia	57	4.7
Intrauterine growth retardation	49	4
Fetal abnormality	25	2
Spontaneous preterm labour	7	0.6
Trauma	7	0.6
No obstetric cause / Not applicable	6	0.5
Other	5	0.4

Fresh SB 500-999g	Number	% of total
Spontaneous preterm labour	373	40.5
Unexplained intrauterine death	166	18
Hypertensive disorders	162	17.6
Antepartum haemorrhage	105	11.4
Infections	38	4.1
Fetal abnormality	27	2.9
Intrauterine growth retardation	14	1.5
Intrapartum asphyxia	13	1.4
Maternal disease	7	0.8
Trauma	7	0.8
No obstetric cause / Not applicable	6	0.7
Other	4	0.4

Fresh SB 1000-1499g	Number	% of total
Antepartum haemorrhage	198	32
Unexplained intrauterine death	126	20.4
Spontaneous preterm labour	117	18.9
Hypertensive disorders	77	12.4
Fetal abnormality	36	5.8
Intrapartum asphyxia	26	4.2
Infections	18	2.9
Trauma	8	1.3
Intrauterine growth retardation	6	1
Maternal disease	3	0.5
Other	3	0.5
No obstetric cause / Not applicable	1	0.2

Fresh SB 1500-1999g	Number	% of total
Antepartum haemorrhage	193	37.3
Unexplained intrauterine death	84	16.2
Hypertensive disorders	70	13.5
Spontaneous preterm labour	50	9.7
Intrapartum asphyxia	42	8.1
Infections	23	4.4
Fetal abnormality	22	4.2
Trauma	14	2.7
Intrauterine growth retardation	12	2.3
Maternal disease	5	1
Other	2	0.4
No obstetric cause / Not applicable	1	0.2

Fresh SB 2000-2499g	Number	% of total
Antepartum haemorrhage	173	32.5
Intrapartum asphyxia	119	22.3
Unexplained intrauterine death	80	15
Hypertensive disorders	54	10.1
Infections	34	6.4
Fetal abnormality	21	3.9
Trauma	21	3.9
Intrauterine growth retardation	13	2.4
Spontaneous preterm labour	8	1.5
Maternal disease	5	0.9
Other	4	0.8
No obstetric cause / Not applicable	1	0.2

	Number	% of total
Fresh SB 2500g+		
Intrapartum asphyxia	582	43
Unexplained intrauterine death	259	19.1
Antepartum haemorrhage	203	15
Trauma	90	6.6
Hypertensive disorders	81	6
Fetal abnormality	42	3.1
Infections	34	2.5
Intrauterine growth retardation	21	1.6
Maternal disease	20	1.5
Other	10	0.7
No obstetric cause / Not applicable	8	0.6
Spontaneous preterm labour	4	0.3

Appendix 3 – Intrapartum asphyxia and birth trauma

Probable avoidable factors

Description	Number	% of total
Intrapartum asphyxia		
Fetal distress not detected intrapartum; fetus monitored	165	8
Fetal distress not detected intrapartum; fetus not monitored	111	5.4
Delay in seeking medical attention during labour	106	5.1
Management of 2nd stage: prolonged with no intervention	102	4.9
Delay in medical personnel calling for expert assistance	52	2.5
Poor progress in labour - partogram interpreted incorrectly	44	2.1
Poor progress in labour, but partogram not used	41	2
Poor progress in labour, but partogram not used correctly	41	2
Delay in doctor responding to call	36	1.7
Insufficient nurses on duty to manage the patient adequately	35	1.7
Lack of transport - Institution to institution	31	1.5
Delay in referring patient for secondary/tertiary treatment	28	1.4
Medical personnel underestimated fetal size	27	1.3
Personnel not sufficiently trained to manage the patient	27	1.3
Neonatal resuscitation inadequate	26	1.3
Inappropriate response to poor fetal movements	25	1.2
Never initiated antenatal care	25	1.2
Inadequate facilities/equipment in neonatal unit/nursery	24	1.2
Lack of transport - Home to institution	22	1.1
Insufficient doctors available to manage the patient	21	1
Trauma		
Delay in seeking medical attention during labour	25	9.2
Breech presentation not diagnosed until late in labour	18	6.6
Personnel not sufficiently trained to manage the patient	13	4.8
Medical personnel underestimated fetal size	12	4.4
Delay in medical personnel calling for expert assistance	9	3.3
Other	8	2.9
Lack of transport - Home to institution	7	2.6
Management of 2nd stage: inappropriate use of vacuum	6	2.2
Never initiated antenatal care	6	2.2
Booked late in pregnancy	5	1.8
Insufficient doctors available to manage the patient	5	1.8

Appendix 4 – Spontaneous preterm birth: common probable avoidable factors

Description	Number	% of total
Delay in seeking medical attention during labour	219	5.8
Inadequate facilities/equipment in neonatal unit/nursery	175	4.7
Never initiated antenatal care	151	4
Booked late in pregnancy	62	1.7
No accessible neonatal ICU bed with ventilator	50	1.3
Neonatal care: management plan inadequate	47	1.3
Lack of transport - Home to institution	32	0.9
Delay in referring patient for secondary/tertiary treatment	30	0.8
Inappropriate response to poor fetal movements	29	0.8
Inappropriate response to rupture of membranes	29	0.8
Multiple pregnancy not diagnosed antenatally	23	0.6
Neonatal resuscitation inadequate	21	0.6
No response to history of stillbirths, abruptio etc.	21	0.6
Infrequent visits to antenatal clinic	20	0.5
Antenatal steroids not given	18	0.5
Medical personnel overestimated fetal size	18	0.5
Fetal distress not detected intrapartum; fetus monitored	15	0.4
Multiple pregnancy not diagnosed intrapartum	15	0.4
Neonatal care: inadequate monitoring	15	0.4
Delay in medical personnel calling for expert assistance	14	0.4
Inadequate resuscitation equipment	14	0.4
Incorrect management of premature labour	12	0.3
Baby managed incorrectly at Hospital/Clinic	11	0.3
Personnel not sufficiently trained to manage the patient	11	0.3
Attempted termination of pregnancy	10	0.3

Appendix 5 – Antepartum haemorrhage common probable avoidable factors

Description	Number	% of total
Never initiated antenatal care	58	3.8
No response to maternal hypertension	51	3.3
Inappropriate response to antepartum haemorrhage	45	2.9
Inappropriate response to poor fetal movements	31	2
Delay in seeking medical attention during labour	25	1.6
Lack of transport - Home to institution	25	1.6
Booked late in pregnancy	22	1.4
Delay in referring patient for secondary/tertiary treatment	19	1.2
Fetal distress not detected intrapartum; fetus monitored	15	1
Incorrect management of antepartum haemorrhage	15	1
No response to history of stillbirths, abruptio etc.	13	0.8
Personnel not sufficiently trained to manage the patient	13	0.8
Infrequent visits to antenatal clinic	10	0.7
Insufficient doctors available to manage the patient	9	0.6
Lack of transport - Institution to institution	8	0.5

Appendix 6 – IUGR common probable avoidable factors

Description	Number	% of total
No response to poor uterine fundal growth	35	10.4
No response to apparent postterm pregnancy	30	8.9
Inappropriate response to poor fetal movements	13	3.8
Medical personnel overestimated fetal size	12	3.6
Booked late in pregnancy	10	3
Delay in referring patient for secondary/tertiary treatment	9	2.7
Never initiated antenatal care	9	2.7
Fetal distress not detected intrapartum; fetus monitored	7	2.1
Medical personnel underestimated fetal size	6	1.8

Appendix 7 – Hypertension common probable avoidable factors

Description	Number	% of total
No response to maternal hypertension	134	8.1
Never initiated antenatal care	86	5.2
Inappropriate response to poor fetal movements	70	4.3
Booked late in pregnancy	65	3.9
Delay in referring patient for secondary/tertiary treatment	56	3.4
Fetal distress not detected intrapartum; fetus monitored	23	1.4
Infrequent visits to antenatal clinic	22	1.3
Delay in seeking medical attention during labour	18	1.1
Failed to return on prescribed date	17	1
Fetal distress not detected intrapartum; fetus not monitored	17	1
No response to poor uterine fundal growth	14	0.9
Declines admission/treatment for personal/social reasons	13	0.8
Other	13	0.8
Personnel not sufficiently trained to manage the patient	12	0.7
Lack of transport - Institution to institution	10	0.6
Antenatal steroids not given	8	0.5
Fetal distress not detected antenatally; fetus monitored	8	0.5

Appendix 8 – Congenital abnormalities common probable avoidable factors

Description	Number	% of total
Never initiated antenatal care	10	1.7
Booked late in pregnancy	8	1.4

Appendix 9 – Pre-existing medical conditions common probable avoidable factors

Description	Number	% of total
Inappropriate response to poor fetal movements	10	5.2
Never initiated antenatal care	9	4.7
No response to maternal glycosuria	8	4.1
Booked late in pregnancy	7	3.6
Infrequent visits to antenatal clinic	4	2.1
Delay in referring patient for secondary/tertiary treatment	3	1.6
Delay in seeking medical attention during labour	3	1.6

Appendix 10 – Infections common probable avoidable factors

Description	Number	% of total
Never initiated antenatal care	81	10.3
Booked late in pregnancy	35	4.5
No response to positive syphilis serology test	23	2.9
Inappropriate response to poor fetal movements	18	2.3
Infrequent visits to antenatal clinic	13	1.7
Delay in seeking medical attention during labour	12	1.5
No on-site syphilis testing available	12	1.5
Delay in referring patient for secondary/tertiary treatment	8	1
Failed to return on prescribed date	7	0.9
No syphilis screening performed at hospital / clinic	7	0.9
Other	7	0.9
Other	6	0.8
Result of syphilis screening not returned to hospital/clinic	6	0.8

Appendix 11 – Unexplained stillbirths common probable avoidable factors

Description	Number	% of total
Inappropriate response to poor fetal movements	385	10.2
Never initiated antenatal care	116	3.1
Delay in seeking medical attention during labour	70	1.9
Booked late in pregnancy	67	1.8
Infrequent visits to antenatal clinic	26	0.7
No response to maternal hypertension	17	0.5
File missing	15	0.4
No response to poor uterine fundal growth	15	0.4
Other	13	0.3
Physical examination of patient at clinic incomplete	11	0.3
Delay in referring patient for secondary/tertiary treatment	10	0.3
Insufficient notes	10	0.3
Other	10	0.3
No response to history of stillbirths, abruptio etc.	9	0.2
Result of syphilis screening not returned to hospital/clinic	9	0.2