

Saving Babies 2006-2007

Sixth report on perinatal care in South Africa

Compiled by

MRC Research Unit for Maternal and Infant Health Care Strategies,
PIIP Users and the Saving Babies Technical Task Team

The report can be viewed on www.ppip.co.za

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Chapters

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Foreword

Saving babies does not only save the parents and relatives colossal grief and pain, but also makes sense. There is now overwhelming evidence that the healthier the baby, the healthier the child, the adolescent and the adult.

We know that babies die because, great and all as nature is, she watches over many born too early and too late. While other branches of medicine wrestle with the search for new cures, we who are involved in maternal and newborn care KNOW most of the answers. Our problem lies simply in implementing them in the right place at the right time.

How often have we stood by the bedside and said “If only”. This book clearly identifies how and when these many opportunities to say this arise. The challenge is to take those two words out of our daily vocabulary.

We have spent decades encouraging our women folk to come to our institutions for antenatal care and for delivery, in the high expectation of a good outcome for all concerned. This book clearly illustrates where we have been successful, and where we have disappointed. These women have entrusted the lives of themselves and their offspring to us. We must honour and remember this fact.

If a woman goes to the bother of arriving at the front door of our place of work, in the third trimester, with a heart beating in the chest of her fetus, we owe it to her to make as sure as possible that she leaves with a baby in her arms that is warm, and whose heart is still beating.

Of course we must continue to strive to detect the antenatal stillbirth before its demise. Of course we must look at new ways of preventing the IUGR that is associated with this tragedy. Of course we must continue to try and prevent, or at least lessen the effects of, premature birth. But this book most of all suggests that we really must reduce the loss of babies on the final strait, when the mum is in labour and expects the best from our team.

Our well proven successful methods of intrapartum surveillance must be implemented in every case, by institutional improved training of proven skills and the performance of appropriate drills.

We need to hear less, “If only”.

Professor Jim Dornan
International Executive Board RCOG
& Chair Fetal Medicine
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Preface

The national PPIP database administered by the MRC Maternal and Infant Health Care Strategies Research Unit was set up on 1 October 1999 and up until 30 March 2008 had recorded over 1.8 million births. This sixth report on perinatal care in South Africa analyses data submitted to the national database from the 1st January 2006 until 31st December 2007. During this period 244 sites from throughout the country have submitted data and just fewer than 660,000 births have been entered. This comprises approximately 40% of all births in health institutions in South Africa during this time period.

The large number of sites and access to the DHIS data has enabled us for the first time to analyse the data on a level of care basis. This report deviates from our previous classification of metropolitan, city and town and rural areas and concentrates rather on the disease profile and health system problems per specific level of care. The report also deals in more detail with the District Hospitals, the area identified with the biggest need, the gap in reporting late neonatal deaths, and three examples of how care can be improved. These three examples give a clear direction forward and if the projects can be replicated, the quality of perinatal care will improve.

Since the publication of the last report in 2006, the Minister of Health has established two new committees in addition to the National Committee for Confidential Enquiries into Maternal Deaths. These are the National Perinatal Morbidity and Mortality Committee (NPNMMC) and the National Child Morbidity and Mortality Committee. The Saving Babies Technical Task Team was fortunate to be able to discuss the recommendations made in this report with the NPNMMC. It is hoped that the input provide by the Saving Babies Technical Task Team will be used by the NPNMMC in their submission to the Minister of Health. In this way we believe that all the hard work that has gone into collecting the data by the 244 PPIP sites, the analysis, and the discussion and finally the recommendations we have produced will result in better care for the pregnant women and their babies in South Africa.

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Chapter 1: Overview

Bob Pattinson, Sithembiso Velaphi, Bill Hardy, Neil Moran and Wilhelm Steyn for the Saving Babies Technical Task Team

1.1. Abstract

During the period 1st January 2006 to 31st December 2007, 659,809 births and 25060 perinatal deaths were recorded on the national Perinatal Problem Identification Programme (PIIP) database from 244 PIIP sites. This represents 39.5% of all births in institutions using the District Health Information System (DHIS) for the denominator. All levels of care (Community Health Centres - CHCs, District, Regional, Provincial Tertiary and National Central hospitals) were well represented, although more CHCs participating would be useful. The neonatal deaths reported are mainly early neonatal deaths, and late neonatal deaths were under reported. Efforts will need to be made to fill in this gap in data on late neonatal deaths.

Findings

1. Pregnant women 17 years old or less and pregnant women 35 years old or more had significantly higher perinatal mortality rates than women between the ages of 20 and 34 years. Contraceptive use should be promoted in these groups.
2. The top causes of perinatal deaths are:
 - a. Labour related complications (namely intrapartum asphyxia and birth trauma) – 17%
 - b. Spontaneous preterm birth – 23%.
 - c. Placental disease (namely pre-eclampsia and placental abruption) – 23%.
3. Unexplained stillbirths (24%) formed a large group death. The majority of these were macerated stillbirths and dead on admission to the health institution. Funding and research resources must be directed to identifying the causes of deaths in this group.
4. The majority of births (59%) occur in CHCs or district hospitals, as do the majority of perinatal deaths. The major causes of perinatal death were due to intrapartum asphyxia and birth trauma and immature neonates born due to spontaneous preterm labour. The perinatal mortality rates (PNMR) were highest in district hospitals for both conditions.
5. The on-site PIIP reviewers felt that 44% of the deaths due to labour related complications were probably avoidable had the health care provider acted appropriately. The majority of these occurred in the district hospitals and the “probable” PNMR for labour related problems was highest in the district hospitals. This indicated the quality of intrapartum care was poorest at the district.
6. Administrative problems were also highest in district hospitals and the avoidable mortality rate was mostly due to lack of facilities to resuscitate hypoxic or immature neonates.

Conclusion

This perinatal care survey has concentrated on identifying the disease categories in which most deaths are thought to be preventable and identifying the levels of care where the most impact can be made with respect to reducing perinatal mortality. Problems of the quality of care during childbirth and for the immature or hypoxic neonates are the areas where most preventable deaths occur. The poorest quality of care and most of the perinatal deaths occur in district hospitals. This is the level of care where improvement is most urgently needed.

1.2. Introduction

The Perinatal Problem Identification Programme (PPIP), an audit tool for evaluating perinatal care, has been in use nationally since 2000. Five Saving Babies reports have been published since 2000, the last dealing with the years 2003-2005. This is the latest in the series and deals with the years 2006-2007.

The report is different from previous years in that the groupings of health institutions has changed to coincide with that used in the DHIS classification of institutions. Thus, instead of having areas classified as rural, city and town and metropolitan, the institutions have been classified as Community Health Centres – CHCs (including Midwife Obstetric Units), District, Regional, Provincial-Tertiary and National-Central Hospitals.

The spread of PPIP sites from which data was obtained is shown in Table 1.1.

Table 1.1. Spread of PPIP sites in South Africa

Sites	SA	PPIP sites	% of Total
Community Health Centres	327	51	15.6
District Hospitals	257	137	53.3
Regional Hospitals	65	46	70.8
Provincial Tertiary	6	5	83.3
National Central	9	5	55.6

Table 1.2 illustrates the number of births covered by the PPIP sites as a proportion of the births recorded in the DHIS data. PPIP sites covered almost 40% of the institutional births in South Africa. The sites represent all types of institutions and the sample is large for each site.

Table 1.2. Distribution of births in PPIP sites as a proportion of DHIS births (2006-2007)

Birth weight	CHC	District hospitals	Regional Hospitals	Provincial tertiary Hospitals	National Central Hospitals	SA Total
500 - 999g	419	2,678	3,184	645	1,379	8,305
1000 - 1499g	485	4,239	5,181	1,229	1,645	12,779
1500 - 1999g	1,282	8,137	8,792	1,714	2,148	22,073
2000 - 2499g	4,932	24,099	22,326	3,683	3,492	58,532
2500g+	66,428	249,396	196,516	24,729	21,051	558,120
All weight groups (PPIP)	73,546	288,549	235,999	32,000	29,715	659,809
Total births (DHIS)	262570	719508	494614	93401	101298	1671391
PPIP births as percent of DHIS births	28%	40.1%	47.7%	34.3%	29.3%	39.5%

The distribution of deaths from the PPIP sites is shown in Table 1.3.

Table 1.3. Distribution of deaths from PPIP sites

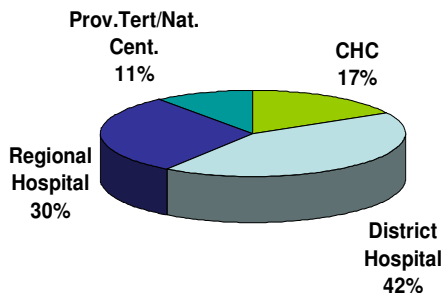
	CHC	District hospitals	Regional Hospitals	Provincia I tertiary	National Central Hospitals
Stillbirths	743	5919	6300	1176	1555
Early NND	219	3533	2962	475	500
Late NND	23	601	835	128	91

Thus the sample from which the findings are made is large and representative of the whole countries institutional births.

1.3. Comparison of the Perinatal Care Indices

Figure 1.1 illustrates the distribution of institutional births in South Africa from the DHIS database. Roughly 60% of births occur in level 1 institutions (CHCs and District Hospitals), 30% in level 2 institutions (regional hospitals) and 10% in level 3 institutions (provincial tertiary and national central hospitals).

Figure 1.1. Distribution of deliveries in South African public institutions (DHIS data)



If the data from the PPIP sites is extrapolated to all the institutional births, then the Perinatal Mortality Rate (PNMR) for babies more than 500g is approximately 38/1000 births in South Africa.

Table 1.4 illustrates gives the perinatal care indices for each category of health institution. As expected the mortality rates increase as the level of care increases. Community Health Centres are only supposed to care for pregnant women with no risk factors. It is expected that the rates would be low. The tertiary hospitals (Provincial Tertiary and National Central hospitals) see the most complicated cases and the highest mortality rates should be at those sites. The fresh stillbirth plus early deaths of neonates within 24 hours is a new quality of care index and is aimed at determining the intrapartum quality of care. It is unclear why the rate is so high in the National Central hospitals.

Table 1.4. Comparison of perinatal care indices

	CHC	DH	RH	PT	NC
PNMR >1000g	9.0	28.9	33.3	41.2	41.6
PNMR (all)	13.4	34.8	42.8	55.6	72.2
FSB+ENND (1d) rate	7.0	16.2	14.0	13.1	25.2
ENND All	3.0	12.5	12.9	15.4	17.8
ENND > 1000g	1.9	9.9	8.9	10.0	9.0
LBWR (all births)	9.7	13.6	16.7	22.7	29.2
LBWR (live births)	9.0	12.5	15.3	20.7	26.2
PCI	0.9	2.1	2.0	1.8	1.4
SB:NND ratio	3.1	1.4	1.7	2	2.6

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals; LBWR – Low birth weight rate; PNMR – Perinatal Mortality Rate; FSB+ENND (1d) rate – Fresh stillbirth plus early neonatal death (within in the first 24 hours of birth) rate; ENND – Early neonatal death rate; PCI – Perinatal Care Index; SB:NND ratio – Stillbirth to Early neonatal death ratio.

The Perinatal Care Index is a quality of care index that has been validated as a true measure of the quality of care, the higher the index the poorer the care. Ideally it should be used to compare like hospitals, i.e. hospitals within the category to identify outliers. Traditionally however, the values should be below 1 for CHCs and below 2 for all hospitals. It is concerning that the average for both the District and Regional Hospitals is 2 or above.

The mortality rates for the birth weight categories per institutional category are given in Tables 1.5 to 1.7.

Table 1.5. Perinatal mortality rates per birth weight category

Weight category	CHC	DH	RH	PT	NC
All > 1000g	9	28.9	33.3	41.2	41.6
All	13.4	34.8	42.8	55.6	72.2
500 - 999g	782.8	666.5	737.8	756.6	700.5
1000 - 1499g	385.6	446.3	371.4	321.4	217
1500 - 1999g	103.7	183.2	156.3	152.3	127.6
2000 - 2499g	20.9	54.7	55.7	59.5	56.4
2500g+	3.5	14.3	16.3	16.8	16.7

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals;

Table 1.6. Early neonatal death rates per birth weight category

Weight category	CHC	DH	RH	PT	NC
All	3	12.5	12.9	15.4	17.8
All > 1000g	1.9	9.9	8.9	10	9
500 - 999g	443.2	451	502.7	489.9	364
1000 - 1499g	108.8	242.7	146.6	112.7	60.5
1500 - 1999g	19.6	64.9	37.8	34.1	24.8
2000 - 2499g	4.1	14.1	10.2	9.7	10.8
2500g+	0.9	4.9	4.8	4.5	3.8

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals;

Table 1.7. Stillbirth rates per birth weight category

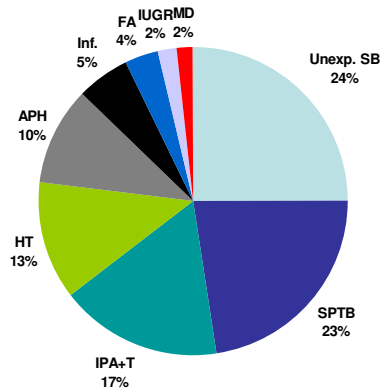
Weight category	CHC	DH	RH	PT	NC
All	10.1	20.5	26.7	36.8	52.3
All > 1000g	6.8	17.2	21.4	27.9	30.7
500 - 999g	580.0	375.7	413.9	465.1	496
1000 - 1499g	299.0	245.6	227	198.5	146.5
1500 - 1999g	82.7	119.1	114.6	109.1	99.2
2000 - 2499g	16.4	38.8	42.4	47.2	45.2
2500g+	2.5	7.9	9.4	11	12.3

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals;

1.4. Primary obstetric causes of perinatal deaths

The primary obstetric causes of perinatal death are shown in Figure 2.

Figure 1.2. Primary causes of perinatal death

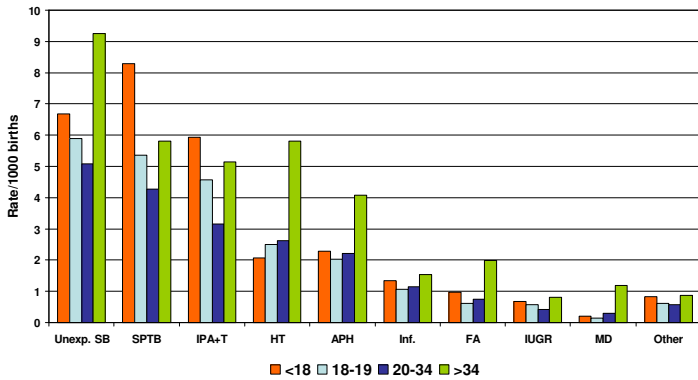


Unexp. SB – Unexplained stillbirth; SPTB – spontaneous preterm birth; IPA+T – Intrapartum asphyxia and birth trauma; HT – Hypertension; APH – Antepartum haemorrhage; Inf. – Infections; FA – Fetal abnormalities; IUGR – unexplained intrauterine growth restriction; MD – Pre-existing medical conditions

Primary obstetric causes of perinatal death and maternal age

Figure 1.3 illustrates the PNMR per age categories <18 years, 18 and 19 years, 20-24 years and more than 34 years. Teenagers less than 18 years had a significantly higher PMNR for unexplained stillbirths, spontaneous preterm birth and intrapartum asphyxia than women between the ages of 20 and 34 years. Women more than 34 years had significantly higher PNMR for unexplained stillbirths, spontaneous preterm birth, intrapartum asphyxia, complications of hypertension, antepartum haemorrhage, fetal abnormality and pre-existing medical conditions.

Figure 1.3. Comparison maternal age and primary obstetric causes of death



Primary obstetric causes of perinatal death and birth weight category

Table 1.8 shows the primary obstetric causes of death per number of deaths per birth weight category. The total deaths is less than that recorded in PPIP as some institutions only complete the first section of PPIP, i.e. the number of births and deaths per birth weight category and do not complete the causes of death or avoidable factors sections.

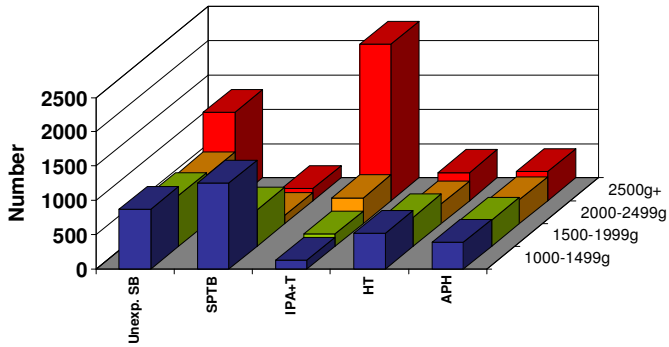
Table 1.8. Comparison of primary obstetric cause of death per number of deaths per birth weight category (PPIP data per recorded cause of perinatal death)

Primary obstetric cause	500-999g	1000-1499g	1500-1999g	2000-2499g	2500g+	TOTAL
Unexp. SB	819	875	742	703	1287	4426
SPTB	1933	1254	531	112	174	4004
IPA	38	108	148	323	2081	2698
T	11	25	26	49	198	309
HT	618	520	423	284	411	2256
APH	291	391	379	349	424	1834
Inf.	148	183	161	135	327	954
FA	81	101	149	115	228	674
IUGR	76	62	67	69	82	356
MD	31	46	32	31	137	277
Other	32	31	20	17	45	145
NOC	25	39	37	76	195	372
Total	4103	3635	2715	2263	5589	18305

Unexp. SB – Unexplained stillbirth; SPTB – spontaneous preterm birth; IPA – Intrapartum asphyxia; T – birth trauma; HT – Hypertension; APH – Antepartum haemorrhage; Inf. – Infections; FA – Fetal abnormalities; IUGR – unexplained intrauterine growth restriction; MD – Pre-existing medical conditions; NOC – No obstetric cause

Figure 1.4 illustrates the common causes of death per number of deaths in birth weight categories from 1000g. One thousand grams was chosen as realistically South Africa will not have the resources to deal with all neonates born under 1000g in the near future.

Figure 1.4. Common primary obstetric causes per birth weight category (1000g+)



Intrapartum asphyxia and birth trauma are by far the most common causes of perinatal death, followed by spontaneous preterm birth.

Table 1.9 give the primary obstetric causes per perinatal mortality rates for each birth weight category. The mortality rates were corrected for the missing data.

Table 1.9. Comparison of primary obstetric cause of death per corrected perinatal mortality rate per birth weight category

Primary obstetric cause	500-999g	1000-1499g	1500-1999g	2000-2499g	2500g+	TOTAL
Unexp. SB	134.51	93.40	45.85	16.38	3.15	9.15
SPTB	317.47	133.85	32.81	2.61	0.43	8.28
IPA	6.24	11.53	9.15	7.53	5.09	5.58
T	1.81	2.67	1.61	1.14	0.48	0.64
HT	101.50	55.50	26.14	6.62	1.00	4.66
APH	47.79	41.73	23.42	8.13	1.04	3.79
Inf.	24.31	19.53	9.95	3.15	0.80	1.97
FA	13.30	10.78	9.21	2.68	0.56	1.39
IUGR	12.48	6.62	4.14	1.61	0.20	0.74
MD	5.09	4.91	1.98	0.72	0.33	0.57
Other	5.26	3.31	1.24	0.40	0.11	0.30
NOC	4.11	4.16	2.29	1.77	0.48	0.77
Total	673.87	387.99	167.77	52.74	13.66	37.84

Unexp. SB – Unexplained stillbirth; SPTB – spontaneous preterm birth; IPA – Intrapartum asphyxia; T – birth trauma; HT – Hypertension; APH – Antepartum haemorrhage; Inf. – Infections; FA – Fetal abnormalities; IUGR – unexplained intrauterine growth restriction; MD – Pre-existing medical conditions; NOC – No obstetric cause

The highest rates of death are in the lowest birth weight categories, with spontaneous preterm birth, complications of hypertension and antepartum haemorrhage being the most common categories.

Primary obstetric causes of perinatal death per level of care

Figure 1.5 illustrates the percentages of the primary obstetric causes of death per category of institution.

Unexplained stillbirths, spontaneous preterm birth and intrapartum asphyxia and birth trauma are the most common cause of death in the lower levels of care, whereas complications of hypertension and antepartum haemorrhage are more common in the tertiary levels of care.

Figure 1.5. Comparison of causes of death per level of care

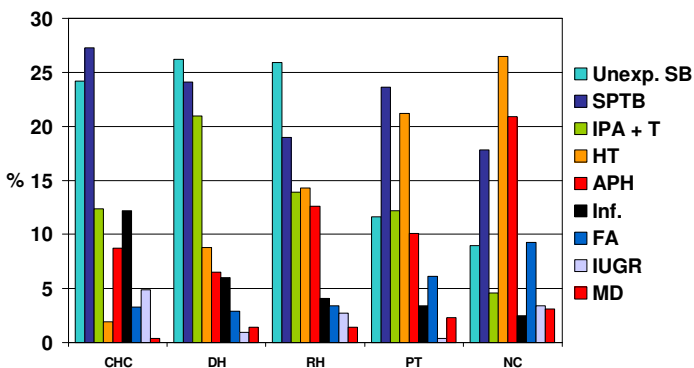


Table 1.10 gives the primary obstetric cause of death per perinatal mortality rate per level of care. The rates are extrapolated from the mortality rates per disease category for all births in institutions according to the DHIS distribution of births. Thus the mortality rates are slightly different from those taken just from the PPIP data.

Table 1.10. Comparison of the primary obstetric causes per perinatal mortality rates and level of care and extrapolated to all institutional births

Primary obstetric cause	CHC	DH	RH	PT	NC	Total
Unexp. SB	3.16	8.59	10.16	5.98	6.21	9.18
SPTB	3.57	7.91	7.45	12.18	12.29	8.31
IPA	1.54	6.24	4.82	5.66	2.55	5.60
T	0.09	0.67	0.62	0.64	0.62	0.64
HT	0.25	2.88	5.61	10.95	18.32	4.68
APH	1.13	2.11	4.96	5.23	14.47	3.81
Inf.	1.60	1.97	1.61	1.76	1.74	1.98
FA	0.43	0.94	1.35	3.15	6.46	1.40
IUGR	0.64	0.31	1.08	0.21	2.36	0.74
MD	0.05	0.46	0.57	1.17	2.11	0.57
Other	0.09	0.22	0.32	0.64	0.87	0.30
NOC	0.53	0.46	0.70	4.01	1.18	0.77
Total	13.08	32.76	39.25	51.59	69.17	37.98

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals; Unexp. SB – Unexplained stillbirth; SPTB – spontaneous preterm birth; IPA – Intrapartum asphyxia; T – birth trauma; HT – Hypertension; APH – Antepartum haemorrhage; Inf. – Infections; FA – Fetal abnormalities; IUGR – unexplained intrauterine growth restriction; MD – Pre-existing medical conditions; NOC – No obstetric cause

Table 1.11 takes the extrapolation further by calculating the number of death in each of the levels of care.

Table 1.11. Total perinatal deaths in SA per level of care (extrapolated from PPIP data)

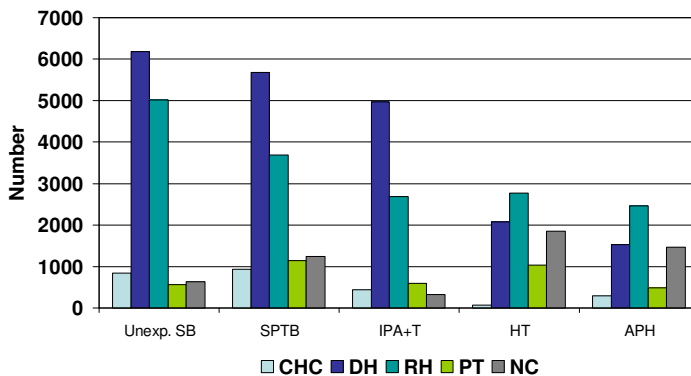
	CHC	DH	RH	PT	NC	Total
Unexp. SB	831	6184	5024	559	629	13226
SPTB	937	5688	3685	1137	1245	12692
IPA	403	4490	2384	529	258	8064
T	24	482	305	60	63	934
HT	65	2071	2774	1023	1855	7788
APH	297	1521	2456	489	1465	6228
Inf.	420	1416	797	165	176	2974
FA	114	680	668	294	654	2411
IUGR	167	224	533	20	239	1183
MD	12	329	280	110	214	945
Other	24	156	159	60	88	488
NOC	139	334	346	374	120	1313
Total	3434	23573	19413	4819	7007	58246

CHC – Community Health Centre; DH – District Hospital; RH – Regional Hospital; PT – Provincial Tertiary Hospitals; NC – National Central Hospitals; Unexp. SB – Unexplained stillbirth; SPTB – spontaneous preterm birth; IPA – Intrapartum asphyxia; T – birth trauma; HT – Hypertension; APH – Antepartum haemorrhage; Inf.

– Infections; FA – Fetal abnormalities; IUGR – unexplained intrauterine growth restriction; MD – Pre-existing medical conditions; NOC – No obstetric cause

Figure 1.6 illustrates the estimated number of deaths per category per level of care. Clearly the majority of deaths are occurring in the district hospitals and the main three categories of perinatal death are unexplained stillbirths, spontaneous preterm birth and intrapartum asphyxia and birth trauma.

Figure 1.6. Total number deaths per disease category in levels of care for South Africa (extrapolated from PPIP data)



5. Health system problems

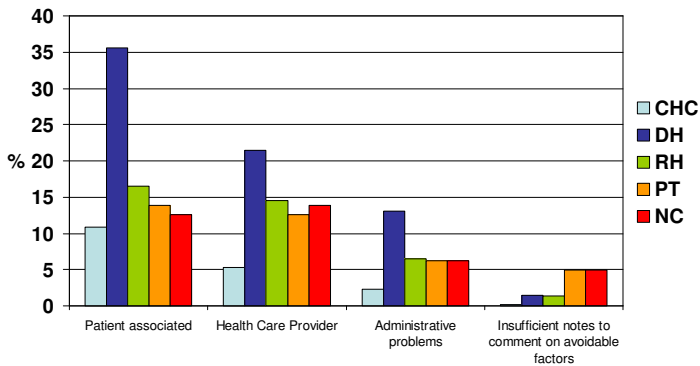
PPIP sites also examine each death to look for avoidable factors, missed opportunities and sub-standard care. These can be grouped as health system problems. The sites grade the deaths as those which were possibly avoidable or probably avoidable. The *probable avoidable factors* are cases where if they were not present the assessors consider that the baby would probably have survived. These are the health system causes that need to be tackled urgently. Only probable avoidable factors are reported in this document.

The health system problems are classified as those directly related to the patient, for example not attending antenatal care; administrative problems e.g. lack of neonatal ICU facilities; and health care provider problems e.g. misinterpreting fetal distress during heart rate monitoring. Administrative and health care provider problems are those that the health system can

directly influence. Health care promotion and constant health messages will impact on the patient orientated problems.

Figure 1.7 illustrates the distribution of probable avoidable factors per level of care. The district hospitals have the highest proportion of probable avoidable factors related to health care providers and administrative problems.

Figure 1.7. Percent probably avoidable per level of care



Health system problems and primary obstetric cause of perinatal death

Figure 1.8 illustrates the percentage of probably avoidable deaths in disease categories and related to health system problems. Deaths due to intrapartum asphyxia, birth trauma, intrauterine growth restriction and pre-existing medical conditions (such as diabetes mellitus) in the mother were the most common diseases where health care provider probable avoidable factors were found. Almost half of the deaths due to intrapartum asphyxia were thought to have probable avoidable factors.

Administrative avoidable factors were most common in birth trauma, intrapartum asphyxia and spontaneous preterm birth. The common health care provider and administrative problems for the primary obstetric causes of death are given in appendix 1.

Figure 1.8. Percent probably avoidable deaths per disease category in health system categories

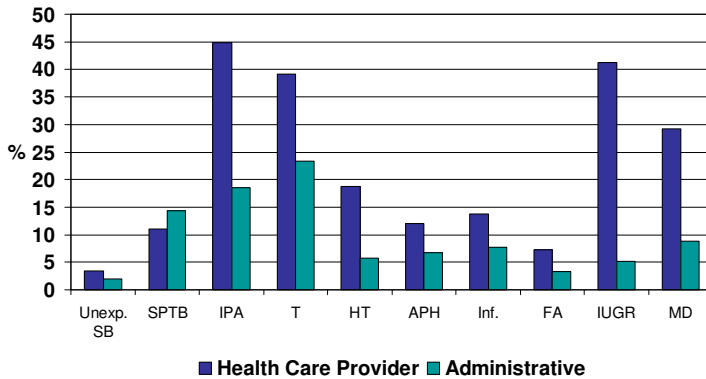


Figure 1.9 gives an estimated number of avoidable deaths related to health care providers and administrative problems per disease category. Although IUGR and pre-existing medical conditions have a significant proportion that are thought to be clearly avoidable, the actual number of cases is small in relation to the other causes of death.

Figure 1.9. Extrapolated total, health worker avoidable and administrative avoidable deaths per disease category

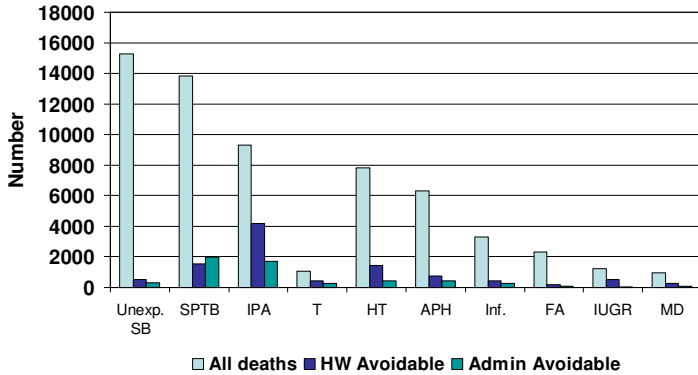
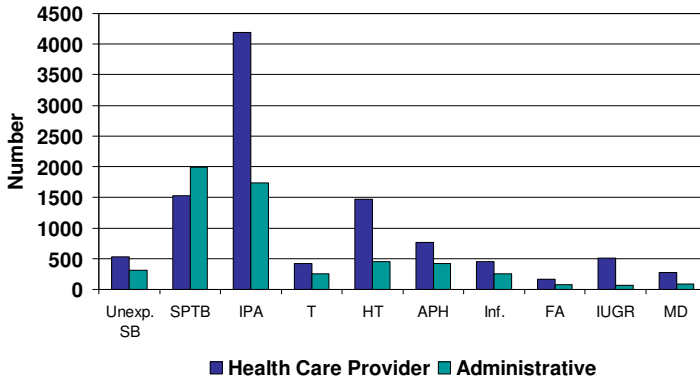


Figure 1.10 illustrates the estimated number of avoidable deaths per disease category for the whole country extrapolated from the PPIP data. Just over 4000 deaths due to intrapartum asphyxia were thought to be preventable if the health care provider had acted appropriately. This is more than twice as high as any other cause. Errors in managing spontaneous preterm birth and hypertension were the next two major contributors to health care provider avoidable deaths.

Administrative problems occurred most commonly in babies dying as a result of spontaneous preterm birth and intrapartum asphyxia. The most common problem in both diseases was a lack of adequate neonatal facilities.

Figure 1.10. Estimated number probably avoidable deaths per disease category



Health system problems and level of care

The estimated number of avoidable deaths within the health system (health care provider and administrative problems) has been extrapolated from the distribution of probable avoidable factors recorded in PPIP (figure 6) and the birth recorded per level of care on the DHIS. An *avoidable mortality rate* (avoidable deaths/total births x 1000 per level of care) can then be calculated and this will give a measure of the quality of care at the level of care which can be compared with other levels. The distribution of avoidable deaths throughout the health system has also been estimated. This is illustrated in Table 1.12. District hospitals have the highest number of avoidable deaths related to health care providers and administrative problems followed by regional hospitals.

Table 1.12. Health system avoidable deaths

	CHC	DH	RH	PT	NC
Estimated number					
Health Care Provider associated	182	5068	2815	607	273
Administrative problems	79	3088	1262	299	119
Avoidable Mortality Rate					
Health Care Provider associated	0.69	7.04	5.69	6.50	2.70
Administrative problems	0.30	4.29	2.55	3.20	1.18
Distribution avoidable deaths (%)					
Health Care Provider associated	2.0	56.7	31.5	6.8	3.1
Administrative problems	1.6	63.7	26.0	6.2	2.5

However, most births occur in district hospitals followed by regional hospitals, hence to measure the quality of care a rate needs to be calculated so that the number of births is taken into consideration. The avoidable mortality rate is still highest in district hospitals, followed by provincial tertiary hospitals and regional hospitals. The quality of care is poorest in these three levels. The national central hospitals have a relatively low avoidable mortality rate. These hospitals are academic hospitals and should have a low avoidable mortality rate.

Figure 1.11 illustrates the number of probably avoidable deaths per disease category and per level of care for the data extrapolated from PPIP and the DHIS. By far the most common avoidable deaths were due to intrapartum asphyxia at district hospitals and regional hospitals. Approximately forty percent of births occur in district hospitals and 30% in regional hospitals, thus to assess the quality of care per level of care the avoidable mortality rate per 1000 births was calculated (Table 1.13). This is illustrated in figure 1.12.

Figure 1.11. Estimated total health care provider avoidable deaths per level of care and disease category

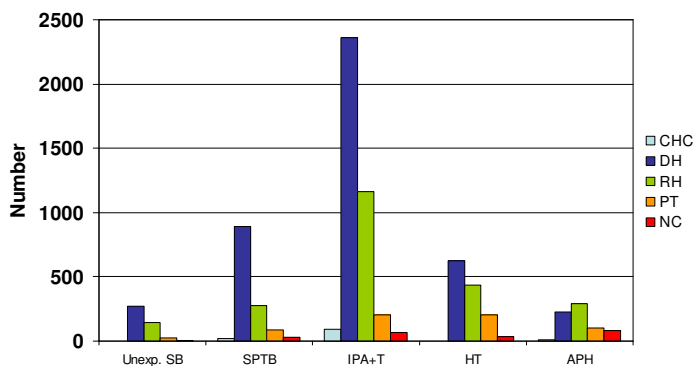
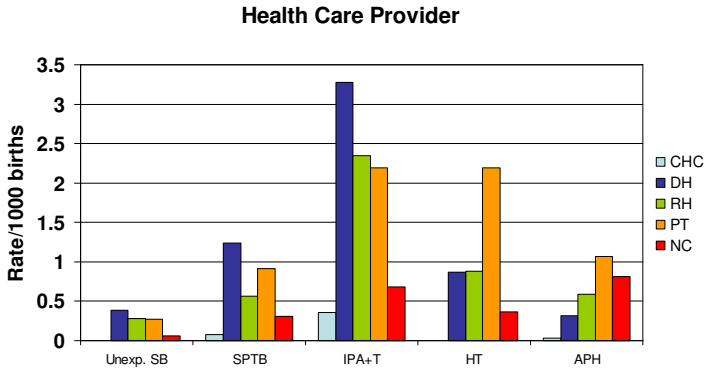


Table 1.13. Mortality rates of health care provider related avoidable deaths per level of care and disease category

	CHC	DH	RH	PT	NC
Unexp. SB	0.00	0.38	0.28	0.27	0.06
SPTB	0.08	1.24	0.56	0.91	0.31
IPA+T	0.36	3.28	2.35	2.19	0.68
HT	0.00	0.87	0.88	2.19	0.37
APH	0.03	0.32	0.59	1.07	0.81

Figure 1.12. Estimated rate/1000 births of avoidable deaths per level of care and disease category



The quality of care was clearly poorest for intrapartum asphyxia and birth trauma at district hospitals followed by regional and provincial tertiary hospitals. Provincial tertiary hospitals surprisingly fared worse in managing cases of hypertension and antepartum haemorrhage.

Table 1.14 illustrates at what level of care the most avoidable deaths related to health care providers occur. In most cases they occur in district hospitals followed by regional hospitals.

Table 1.14. Percent health care provider related avoidable deaths per level of care and disease category

	CHC	DH	RH	PT	NC	total
Unexp. SB	0.0	61.3	31.7	5.7	1.4	100.0
SPTB	1.6	68.4	21.2	6.5	2.4	100.0
IPA+T	2.4	60.6	29.9	5.3	1.8	100.0
HT	0.0	48.1	33.3	15.7	2.9	100.0
APH	1.1	32.0	41.2	14.1	11.6	100.0

Figure 1.13 illustrates the number of avoidable deaths occurring as a result of administrative problems. Again district hospitals fare worst followed by regional hospitals. Administrative problems occurred most frequently in spontaneous preterm labour and intrapartum asphyxia and birth trauma.

Figure 1.13. Estimated total administrative avoidable deaths per level of care and disease category

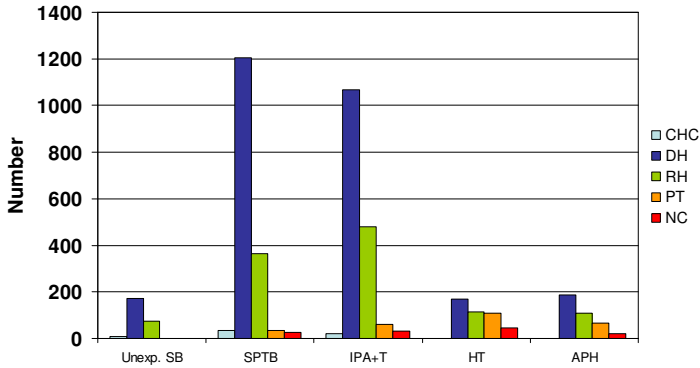


Table 1.15 compares the avoidable mortality rate for administrative problems with levels of care and primary obstetric cause. This is illustrated in figure 1.14. Again it is the district hospitals that show the poorest administration.

Figure 1.14. Estimated rate/1000 births of avoidable deaths per level of care and disease category

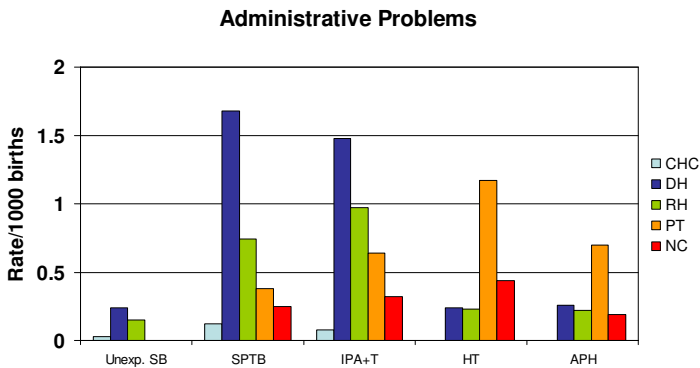


Table 1.15. Avoidable mortality rate administrative related avoidable deaths per level of care and disease category

	CHC	DH	RH	PT	NC
Unexp. SB	0.03	0.24	0.15	0.00	0.00
SPTB	0.12	1.68	0.74	0.38	0.25
IPA+T	0.08	1.48	0.97	0.64	0.32
HT	0.00	0.24	0.23	1.17	0.44
APH	0.00	0.26	0.22	0.70	0.19

Table 1.16 give the percent of administrative related avoidable deaths per level of care and primary obstetric cause of death. Most deaths related to administration occur in district hospitals.

Table 1.16. Percent administrative related avoidable deaths per level of care and disease category

	CHC	DH	RH	PT	NC	total
Unexp. SB	3.2	67.4	29.3	0.0	0.0	100.0
SPTB	2.0	72.5	21.9	2.1	1.5	100.0
IPA+T	1.2	64.3	28.9	3.6	1.9	100.0
HT	0.0	38.8	26.0	25.0	10.2	100.0
APH	0.0	49.0	29.0	17.0	5.0	100.0

Appendix 2 lists the common health system problems per level of care.

1.6. Neonatal deaths

The common primary obstetric causes of neonatal deaths were spontaneous preterm births and, intrapartum asphyxia combined with trauma (Figure 1.15) and these two conditions accounted for 70.1% of all neonatal deaths. The spontaneous preterm labour remains the most common obstetric cause of neonatal deaths in all the different categories of hospitals (Figure 1.16).

Figure 1.15. Primary causes of neonatal death

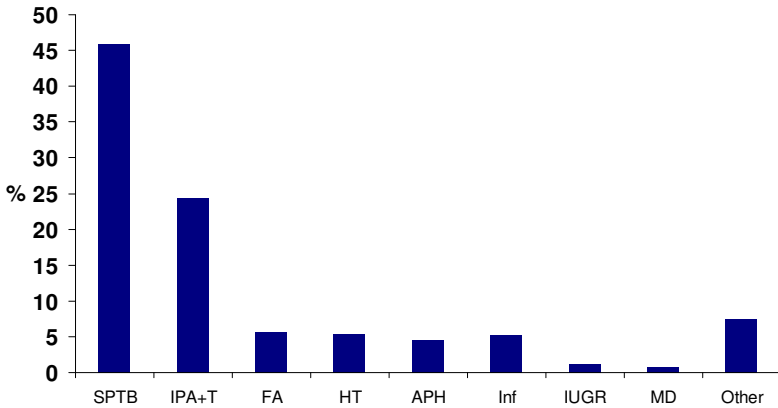
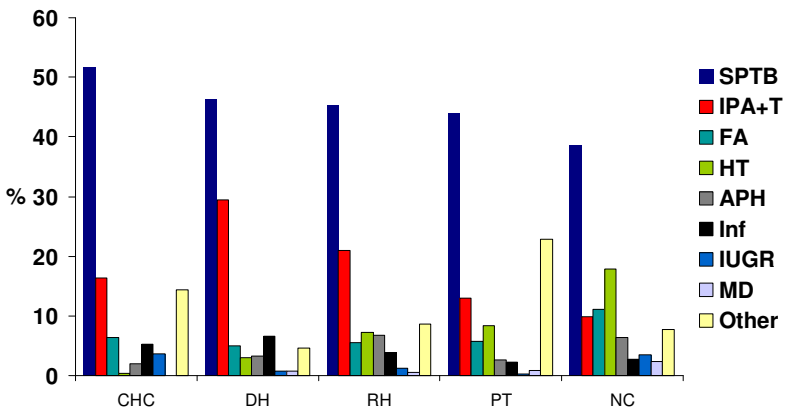


Figure 1.16. Primary causes of neonatal death per level of care



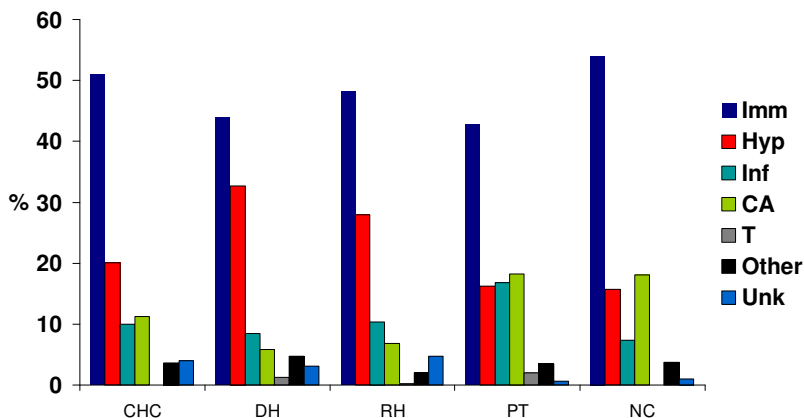
The common final causes of death in neonatal deaths are shown on Table 1.17. The common diagnoses in neonatal deaths were immaturity and hypoxia related conditions. Immaturity related conditions were the most common causes of neonatal deaths in all the groups of hospitals, and hypoxia was the second common cause in Community Health Centres,

District and Regional hospitals whereas congenital abnormalities were the second common cause in Provincial Tertiary hospitals and National Central hospitals (Figure 1.17).

Table 1.17. Final Causes of Neonatal Deaths

	Number	Percent
Immaturity related	3020	46.0
Hypoxia	1897	28.9
Infection	628	9.6
Congenital abnormalities	500	7.6
Other	236	3.6
Unknown	229	3.5
Trauma	52	0.8

Figure 1.17. Final causes of neonatal death per level of care



Among the neonatal deaths whose final neonatal cause of death was immaturity related the common diagnoses were extreme immaturity and hyaline membrane disease (Table 1.18). And among those with the final

neonatal cause being hypoxia the common diagnosis was hypoxic ischaemic encephalopathy and meconium aspiration (Table 1.19).

Table 1.18. Diagnoses in immaturity-related deaths

	Number	Percent
Extreme immaturity	1355	44.9
Hyaline membrane disease	1075	35.6
Necrotising enterocolitis	87	2.9
Intraventricular haemorrhage	50	1.7
Pulmonary Haemorrhage	47	1.6

Table 1.19. Diagnoses in hypoxia-related deaths

	Numbers	Percent
Hypoxic ischaemic encephalopathy	962	50.7
Meconium aspiration syndrome	536	28.3
Persistent fetal circulation	34	1.8

In about forty three percent (43%) of neonatal deaths, probable avoidable factors were identified (Table 1.20). These factors were almost equally distributed amongst the healthcare workers (16%), patients (15%) and administrators (12%). Delay in seeking medical care during labour and not initiating antenatal care or booking late in pregnancy were the common avoidable factors that were patient-related. Inadequate facilities or equipment in the neonatal unit/ nursery and inadequate management plan were the common avoidable factors that were health systems- related (Table 1.21).

Table 1.20. Top 5 avoidable factors for each category

	Number	Percent
Medical Personnel Associated	1449	16% of all deaths
Neonatal care: management plan inadequate	169	11.7
Fetal distress not detected intrapartum; fetus monitored	166	11.5
Prolonged 2nd stage with no monitoring	97	6.7
Fetal distress not detected intrapartum; fetus not monitored	95	6.6
Neonatal Resuscitation inadequate	87	6
Patient associated	1368	15% of all deaths
Delay in seeking medical attention during labour	480	35.1
Never initiated antenatal care	346	25.2
Booked late in pregnancy	190	13.9
Infrequent visits to antenatal clinic	54	3.9
Inappropriate response to poor fetal movements	45	3.3
Administrator associated	1103	12% of all deaths
Inadequate facilities/ equipment in neonatal unit	417	37.8
Inadequate resuscitation equipment	121	11
Lack of transport: Home to institution	96	8.7
Insufficient nurses on duty	70	6.3
No accessible neonatal ICU bed	61	5.5
Insufficient notes or file missing	120	1% of all deaths

Table 1.21. Top 10 probable avoidable factors in neonatal deaths

	Number	Percent
Delay in seeking medical attention during labour	480	7.3
Inadequate facilities/equipment in neonatal unit/nursery	417	6.4
Never initiated antenatal care	346	5.3
Booked late in pregnancy	190	2.9
Neonatal care: management plan inadequate	169	2.6
Fetal distress not detected intrapartum; fetus monitored	166	2.5
Inadequate resuscitation equipment	121	1.8
Management of 2nd stage: prolonged with no intervention	97	1.5
Lack of transport - Home to institution	96	1.5
Fetal distress not detected intrapartum; fetus not monitored	95	1.4

1.7. Stillbirths

There were 11742 stillbirths recorded in on the PPIP database for the two years 2006-2007. This extrapolates to approximately 8000 stillbirths occurring in health care institutions **annually** in South Africa. Sixty percent of the stillbirths were macerated stillbirths and 40% were fresh stillbirths.

Table 1.22. Comparison of causes of stillbirths

Rate/1000 births	All	FSB	MSB
APH	3.18	2.06	1.12
HT	3.96	1.16	2.80
IPA+T	2.93	2.37	0.55
Inf	1.27	0.36	0.91
IUGR	0.59	0.15	0.44
Cong Abn	0.64	0.36	0.28
MD	0.48	0.12	0.35
SPTB	2.07	1.20	0.88
Unexp SB	8.92	1.78	7.14
Other	0.31	0.11	0.21
Total	24.36	9.67	14.69

Table 1.22 give the primary obstetric causes of stillbirths as rates per 1000 births and figure 1.18 illustrates the distribution of the causes of fresh and macerated stillbirths. Unexplained stillbirths account almost half of the macerated stillbirths and a third of all stillbirths. Intrapartum asphyxia and antepartum haemorrhage account for 45.8% of fresh stillbirths.

Figure 1.18. Distribution of the primary obstetric causes of fresh and macerated stillbirths

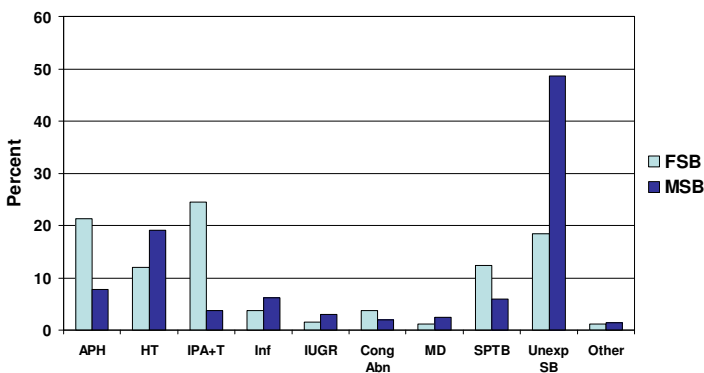


Figure 1.19 demonstrates the distribution of number of fresh stillbirths according to birth weight categories. Deaths due to intrapartum asphyxia and birth trauma in the birth weight category 2.5kg or more is the largest category by far. Most of the babies in this birth weight category die due to intrapartum asphyxia and birth trauma (40.8%, see table 1.4). This group of babies has the highest probably avoidable death rate. In other words, these babies are the normal term babies that should have had a normal life.

Figure 1.20 demonstrates the distribution of fresh stillbirths per level of care. Almost 1800 fresh stillbirths occur in district hospitals per year. This is the level of care where improving the quality of intrapartum care will have its biggest impact. Antepartum haemorrhage and complications of hypertension are the other two major causes of fresh stillbirths. These occurred mainly in regional and national central hospitals.

The most common probable avoidable factors are shown in Table 1.23. The top four are patient orientated problems, but the next four all relate to health system problems.

Figure 1.19. Distribution of fresh stillbirths in weight categories

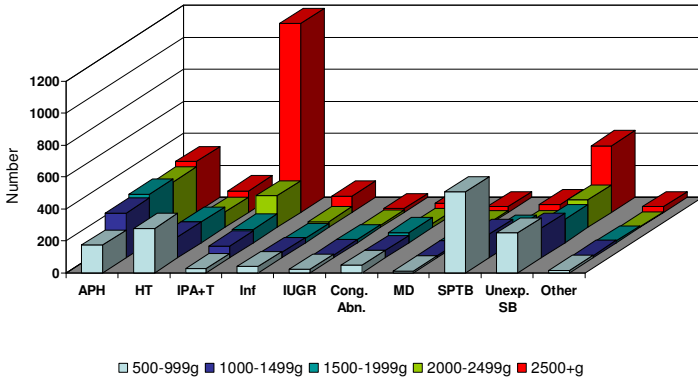


Figure 1.20. Comparison of causes of fresh stillbirths per level of care

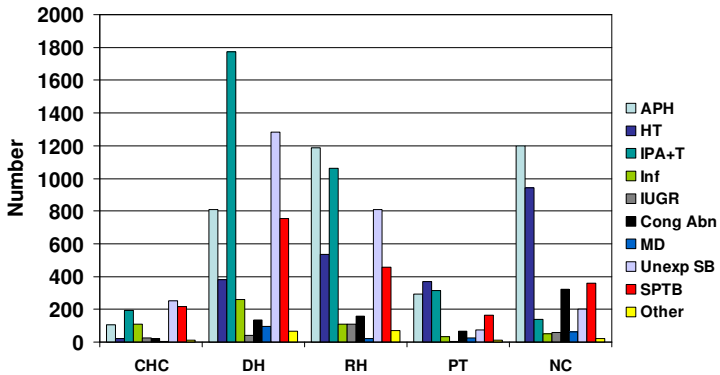


Table 1.23. Top 10 avoidable factors related to fresh stillbirths

Description	N	% FSB
Never initiated antenatal care	611	13.1
Delay in seeking medical attention during labour	566	12.1
Booked late in pregnancy	289	6.2
Inappropriate response to poor fetal movements	247	5.3
Fetal distress not detected intrapartum; fetus monitored	191	4.1
Lack of transport - Home to institution	155	3.3
Fetal distress not detected intrapartum; fetus not monitored	141	3.0
Delay in referring patient for secondary/tertiary treatment	122	2.6
No response to maternal hypertension	111	2.4
Infrequent visits to antenatal clinic	109	2.3

Figures 1.21 and 1.22 illustrate the distribution in birth weight and level of care of macerated stillbirths. Unexplained stillbirths occur across all weight categories in more or less equal numbers, but the rate varies from 104.34/1000 births for babies of babies 500-999g to 2.28/1000 births for babies 2500g and above. Most of these births occur in district and regional hospitals. The most common avoidable factor is related to no response to poor fetal movements (Table 1.24).

Figure 1.21. Distribution of macerated stillbirths in weight categories

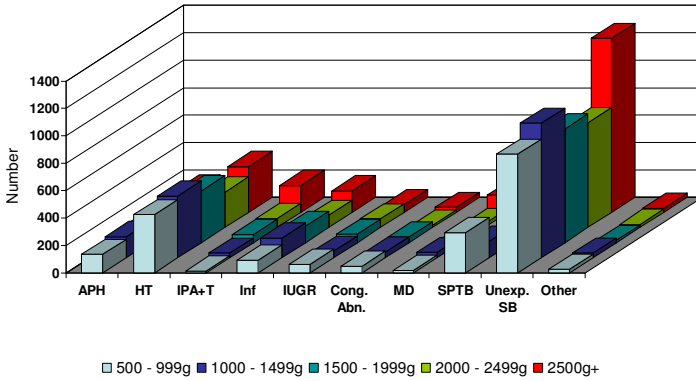


Figure 1.22. Comparison of causes of macerated stillbirths per level of care

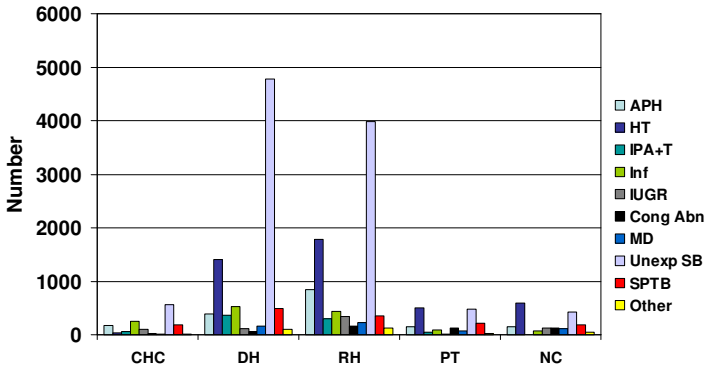


Table 1.24. Top 10 macerated avoidable factors related to stillbirths

Description	N	% MSB
Inappropriate response to poor fetal movements	1881	26.6
Never initiated antenatal care	876	12.4
Booked late in pregnancy	535	7.6
Delay in seeking medical attention during labour	286	4.0
Infrequent visits to antenatal clinic	261	3.7
No response to maternal hypertension	224	3.2
Delay in referring patient for secondary/tertiary treatment	168	2.4
Failed to return on prescribed date	90	1.3
No response to poor uterine fundal growth	84	1.2
Fetal distress not detected antepartum; fetus not monitored	79	1.1

Unexplained stillbirths continue to cause a problem. The most common avoidable factor recorded was “inappropriate response to poor fetal movements”. The relationship between poor fetal movements and perinatal deaths is examined below.

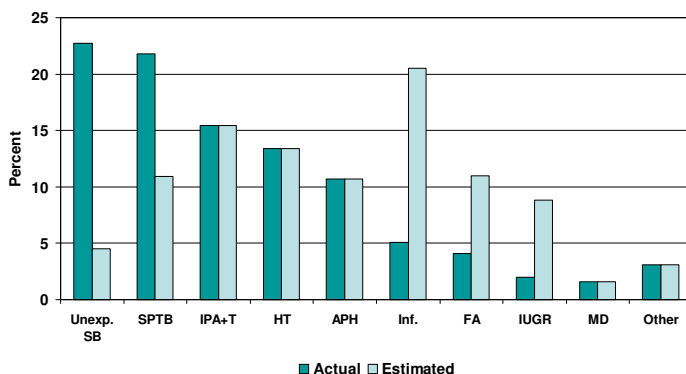
Table 1.25. Top 10 avoidable factors unexplained stillbirths

Description	N	% of Unexplained SB
Inappropriate response to poor fetal movements	1236	35.9
Never initiated antenatal care	443	12.9
Booked late in pregnancy	258	7.5
Infrequent visits to antenatal clinic	126	3.7
Delay in seeking medical attention during labour	122	3.5
Lack of transport - Home to institution	34	1.0
No response to history of poor fetal movement	30	0.9
Failed to return on prescribed date	29	0.8
Antenatal card lost	24	0.7
No syphilis screening performed at hospital / clinic	24	0.7

The large proportion of deaths that are recorded as unexplained is disappointing. Pathological services need to be expanded so more of these unexplained stillbirths can be explained. Research has shown that the most common causes of unexplained stillbirths are infections, congenital

abnormalities and IUGR. Infections are also the underlying about half of spontaneous preterm birth. If this information is extrapolated to general population, the disease patterns would be very different as demonstrated in Figure 1.23. Infection becomes the major cause of perinatal deaths. This would re-orientate our approach and more energy would be spent on identifying and treating infections. This coupled with improving intrapartum care could theoretically reduce perinatal deaths by a third.

Figure 1.23. Comparison of actual primary obstetric causes of deaths and estimated causes if better pathological services were available



Relationship between no response to poor fetal movements and perinatal deaths

The avoidable factor “*inappropriate response to poor fetal movements*” was analysed on the PPIP national database with respect to the number of cases in which it was recorded and the cause of the perinatal death associated with it. The number of deaths associated with poor fetal movements was calculated by extrapolating the data from the national PPIP database to the number of deaths per level of care for South Africa.

A total of 3097 perinatal deaths were associated with poor fetal movements. This represents 4.9% of all perinatal deaths. The majority were related to unexplained stillbirths (62.8%) followed by hypertension (13.6%), antepartum haemorrhage (5.1%) and infection (4.9%), see Table 1.26. 12.7% of all unexplained stillbirths had poor fetal movements recorded as an avoidable factor, intrauterine growth restriction had 7.8%, hypertension had 5.4% and infections had 4.6% recorded as avoidable factors.

Table 1.26. Association of poor fetal movements and primary obstetric cause of death

Description	Number	% of deaths associated with no response poor fetal movements
Unexplained stillbirth	1944	62.8
Hypertensive disorders	422	13.6
Antepartum haemorrhage	159	5.1
Infections	153	5.0
Spontaneous preterm labour	140	4.5
Intrauterine growth retardation	96	3.1
Intrapartum asphyxia	90	2.9
Maternal disease	38	1.2
Fetal abnormality	19	0.6
Other	36	1.1
Total	3097	100.0

If the association of poor fetal movements was directly related to the death and **if** by acting on the information resulted in all perinatal deaths being prevented, then the perinatal mortality could be reduced by 12.4%. The monitoring of fetal movements by pregnant women has the potential to significantly reduce perinatal deaths. This should be tested in a large randomised trial to see if this inexpensive intervention is warranted.

1.8. Patient related avoidable factors

Table 1.27 gives the common patient related avoidable factors. There are three major areas that are highlighted here.

1. Delay in seeking medical attention during labour
2. Lack, delay or insufficient antenatal care
3. Poor message giving at antenatal care related to fetal movements, antepartum haemorrhage and rupture of membranes.

All three problems can be addresses if there was constant messages to he pregnant woman about when to attend antenatal care, that transport should be planned for when she goes into labour and what she should do when her baby moves less than normal, if she bleeds vaginally or if her membranes rupture.

Table 1.27. Common patient related avoidable factors

Description	Number	% all deaths
Patient associated		
Inappropriate response to poor fetal movements	1043	5.7
Delay in seeking medical attention during labour	904	4.9
Never initiated antenatal care	924	5.0
Booked late in pregnancy	649	3.5
Infrequent visits to antenatal clinic	225	1.2
Inappropriate response to antepartum haemorrhage	88	0.5
Inappropriate response to rupture of membranes	85	0.5
Failed to return on prescribed date	66	0.4
Declines admission/treatment for personal/social reasons	55	0.3
Attempted termination of pregnancy	24	0.1
Delay in seeking help when baby ill	21	0.1
Alcohol abuse	18	0.1
Smoking	16	0.1
Assault	13	0.1
Infanticide	6	0.0
Partner/Family declines admission/treatment	6	0.0
Abandoned baby	4	0.0

1.9. Summary of findings

1. The national PNMR was approximately 38/1000 births (500g and above)
2. Nationally about 17% births occur in Community Health Centres, 42% in District hospitals, 30% in regional hospitals and 11% in tertiary hospitals.
3. The top 5 categories of perinatal deaths were unexplained stillbirths (24%), spontaneous preterm birth (23%), intrapartum asphyxia and birth trauma (17%), complications of hypertension in pregnancy (13%) and antepartum haemorrhage (10%). These 5 causes account for 89% of perinatal deaths.
4. Seventy percent of early neonatal deaths were classified as being due to spontaneous preterm birth and labour related problems. Three out of four neonates died either due to immaturity or hypoxia.
5. Perinatal mortality rates for intrapartum asphyxia and birth trauma were highest in district hospitals at 8.29/1000 births, followed by regional hospitals at 5.65/1000 births. This was 46.7% higher than regional hospitals.

6. Intrapartum asphyxia and birth trauma were the most common health care provider probably avoidable deaths (43%) and administrative probably avoidable deaths (18%).
7. Most health care provider probably avoidable deaths occur in district hospitals (57%) and most were due to intrapartum asphyxia and birth trauma (47% of 57%).
8. The avoidable mortality rate for health care providers is highest in district hospitals (7.04/1000 births) and intrapartum asphyxia and birth trauma is the most common cause.
9. The avoidable mortality rate of administrative problems is highest in district hospitals (4.29/1000 births) and relate mostly to intrapartum asphyxia and birth trauma and spontaneous preterm birth.
10. Regional hospitals are the second worst in relation to quality of care and the pattern of disease is similar to district hospitals.
 - a. Large numbers of avoidable deaths due to intrapartum hypoxia: need to focus on management of labour
 - b. Avoidable factors: indicate that Antenatal care also needs attention. As most ANC occurs at Level 1, Outreach required.
 - c. Largest single category of deaths remains unexplained IUD, but few found to be avoidable within health system: closer scrutiny of these deaths for avoidable factors required; potential for reduction by addressing patient factors (early booking, fetal movements)
 - d. Most common cause of avoidable death due to administrative problems is SPTB: need for appropriate neonatal facilities at all regional hospitals (CPAP, KMC)
 - e. Relatively few Neonatal care-related health-care worker avoidable factors documented: closer scrutiny required
11. Summary of important aspects regarding National Central Hospitals (NCH)
 - a. The main causes of perinatal mortality at NCH are complications of hypertension and antepartum haemorrhage, which differ from those in district and regional hospitals.
 - b. The perinatal mortality is higher in NCH, which reflects of the concentration of complicated cases managed at these units.
 - c. The avoidable mortality rate is lowest at NCH, which indicates a reasonable quality of care. However, 2.7 deaths per 1000 births (a total of 273 deaths) are still considered to avoidable if health care workers acted differently. The perinatal care index of 1.4 also indicates good care.
 - d. The proportion of births covered by PPIP as a proportion of those recorded in DHIS in NCH (29%) is lower than the national average (40%), while only five of the nine NCH

participate in PPIP. This should be improved.

1.10. Conclusion

This perinatal care survey has concentrated on identifying the disease categories in which most deaths are thought to be preventable and identifying the levels of care where the most impact can be made with respect to reducing perinatal mortality. As a measure of quality of care the avoidable mortality rate for health care provider probably avoidable deaths and the avoidable mortality rate for administrative probably avoidable deaths were used as primary indicators for assessing the quality of care within the health system. The mortality rates were calculated by extrapolating the data to all births at each level of care (from PPIP and DHIS data) so approximations of the number of deaths that can be prevented could be calculated.

Caring appropriately for a woman in labour is the core business of midwives and doctors dealing with pregnancy. Almost half of the deaths due to intrapartum asphyxia and birth trauma were thought to be probably avoidable had the health care provider acted in a different way. This category provided the most avoidable deaths. The data implies that the health system is failing in one of its most basic functions. Most intrapartum asphyxia deaths occurred in district hospitals and the avoidable mortality rate was highest for both health care provider and administrative problems in these hospitals. This indicates the quality of care was poorest in this category of hospital. Quality of care is determined by having adequate equipment and drugs, staff, and skills and a caring attitude of health care providers. Most births occur in district hospitals; hence it is imperative that attention be given to the proper functioning of these hospitals. Regional hospitals had the second worst quality of care measure. They also need urgent attention in performing their functions effectively.

The District hospitals' challenges and potential solutions are discussed in Chapter 2.

1.11. Recommendations

The next section deals with the recommendations derived from the analysis of the PPIP data. There is an overriding summary of recommendations, followed by recommendations specific to each section of care; community involvement, antenatal care, intrapartum care, neonatal care, and quality of care improvement.

The recommendations have been phrased as follows:

1. The action (recommendation) – what must be done
2. The Level – at which level the implementation should occur
 - Policy
 - Administration
 - Clinical practice
 - Education

The task group hoped that phrasing the recommendations in this way will assist health workers and administrators to know what they as individuals can do. Responsible persons in each case may then be clearly identified. Indicators and targets have been included so the implementation of the recommendations can be monitored.

There were some threads that were general to most recommendations and these are highlighted here.

1. Staffing norms should be established for maternity and neonatal units (or nurseries).
2. Recommendations that apply to health care managers at all levels should be included in their Key Performance Areas (KPA).
3. Outreach should be on-site and face-to-face preferably by a community obstetrician/paediatrician or midwife. Outreach should be part of their job descriptions. Provincial Departments of Health should create such posts for each district or region, perhaps in conjunction with medical schools.
4. Postnatal care needs to be improved.

11.1 Summary of cross-cutting recommendations

Saving Babies Technical Task Team

1. Normalisation of HIV infection as a chronic disease

- a. HIV Testing for all pregnant women (opt-out methodology)
- b. No coding of HIV status on health documents as this leads to confusion and disastrous errors. Health documents are the patients', they are responsible for keeping them confidential.
- c. All health care providers to do counselling,
 - i. No special certification required
 - ii. No restrictions to who does the counselling
- d. All HIV infected women must get either timeous dual therapy or HAART. HAART must be started within 2 weeks of HIV diagnosis in appropriate cases

2. Clinical skills improvement

- a. Interns skills in emergency care must be improved
 - i. By using Essential Steps in Managing Obstetric Emergencies (ESMOE)
 - ii. Health Professionals Councils of South Africa (HPCSA) to certify completion of course before registering as a doctor
- b. Midwives and nurses
 - i. 6 month orientation of newly qualified in labour wards. (Nurses who have completed comprehensive training feel inadequate and are inadequate trained to go into the periphery)
- c. In-service training (doctors and midwives)
 - i. Programmes such as BANC, PEP,
 - ii. Fire-drills e.g. neonatal resuscitation
 - iii. Recertification?
- d. Postnatal care training for doctors, midwives and nurses

3. Training/education

- a. Undergraduate
 - i. Maternal and "Neonatal" Guidelines to be part of and emphasised in the curricula and taught
 - ii. Health promotion and constant messages must be taught
 - iii. Training must be clinical
 - iv. Promote training enrolled nurses for two year post basic training and work as midwives

- v. Promote training “green epaulets”: 2 year training course

4. Implementation of national maternal and neonatal guidelines

- a. All guidelines must be available
- b. Guidelines must be implemented
 - i. Maternal guidelines
 - ii. Neonatal guidelines

5. Postnatal care

- a. Ensure examination of mother and neonates within 6 hours, within 6 days, 6 weeks, 6 months
- b. Communication between site of delivery and clinic to be improved so that relevant information is transferred between health institutions
- c. Patient carried card to be used as communication method
- d. Where possible consider keeping all women and babies in for 24 hours unless they can be seen the next day by a health care provider

6. Regional clinicians appointed to establish, run and monitor and evaluate outreach programmes for maternal and neonatal health

- a. Outreach posts must be dedicated posts and have specific job descriptions (doctors and midwives)

7. Auditing, monitoring and evaluation

- a. Ensure M&M review meetings are held and documented (Medical managers to attend the meetings)
- b. Involve the regional clinicians
- c. Use available tools PPIP, ChIP
- d. Process audits of antenatal cards, partograms, neonatal care
 - i. Involve
 - 1. quality assurance personnel from the hospitals
 - 2. Unit managers
- e. Improve data quality and communication with DHIS
- f. Indicators from DHIS must be used to improve quality of care
- g. Standard birth registers and death registers must be established and used throughout the country
- h. Sites should be accredited for their quality of care

- 8. Constant health messages must be conveyed to all and understood by all**
 - a. Community
 - b. Patient/client
 - c. Health Care Provider

- 9. Staffing, equipment and facilities**
 - a. Norms specified (Saving babies) must be followed in labour ward, maternity units and neonatal care
 - b. Staff must be used in the most efficient way. Must be economy of scale
 - c. Systems must put in place to attract and retain staff
 - d. Equipment lists adhered to
 - e. Facilities sited at appropriate places

- 10. Transport and referral routes**
 - a. Women in labour and sick neonates must be treated as emergency patients
 - b. Referral routes must be established and adhered to.

11.2 Specific recommendations per health care activity

1. Community-based recommendations

The recommendations that follow from the PPIP data include:

1a. Every pregnant woman must be able to confirm pregnancy and initiate antenatal care early.

- Community members must be educated that this important responsibility rests with them.
- Policies within the district health systems must be developed to ensure that sufficient clinic facilities are available.
- Facilities for antenatal care must have appropriately trained staff to manage peri-natal care effectively. (See antenatal recommendations)

1b. Every pregnant woman, family and community member needs to have a basic knowledge of, and access to, the following:

- A wide range of contraceptives in order to prevent unwanted pregnancies
- The signs of pregnancy and the danger signs of pregnancy, as well as the facilities available for pregnant women.
- Normal signs of onset of labour and the importance of planning intrapartum care i.e. which facility to use, and the necessary transport arrangements.
- The effects of HIV on the pregnancy, the mother and the baby. The HIV testing policy should be provider initiated counselling and testing (opt out). Communities (and pregnant woman) must be informed that HIV testing is an integrated part of antenatal care and contraceptive services. (??The role of male circumcision should be explored.)
- Correct infant feeding choices, contraceptive decisions, as well as neonatal and child care.

Action

Community education in partnership with community organisations needs to be strengthened.

- Communication between the health service provider and recipient needs to be enhanced.
- Programs such as BANC; BBI and BHFI need to be embraced by communities and used to spread important health knowledge to all community members.
- Community health workers can play an important part in this partnership

Level of responsibility:

Policy:

The services outlined in the standing policies and guidelines for district health services with respect to the provision of maternity services⁴ must be provided in each district.

Responsibility: Facility manager and district managers as well as local political and community leaders.

Administration:

- District Health administrations need to ensure that clinic staff are empowered to provide reproductive health services: such as contraceptive services, TOP, antenatal, labour and postnatal care, STD's and HIV counselling and testing.
- Clinic staff need sufficient resources (physical and emotional) to implement provider initiated HIV testing (opt out).
- Mechanisms and responsibilities of transporting woman in labour to the relevant facilities must be clearly defined. Creative systems should be made available to ensure timeous arrival at health facilities, e.g. coupon system, antenatal hostels.
- Seamless integration of the services within communities needs to be encouraged.
- KPA's for the above-mentioned responsibilities must be introduced for CEO's.

Responsibility: The District Health Manager, Facility managers and hospital boards.

Clinical:

- Continuous updating of the clinicians' knowledge and skills in caring for the pregnant woman
- Clinical staff should be encouraged and empowered in patient education. KPA's of clinical staff to include the above-mentioned responsibilities.

Responsibility: Unit and facility managers.

Education:

- Key messages about maternal and child care to be distributed amongst the community. Local media and community organisations to be used to impart basic messages. (Ref to key messages)

- Educational structures, such as schools, adult education and religious structures, community organisations, NGO's and FBO's to be used to transmit knowledge about perinatal care.
- Key messages must dovetail with the content of the curriculum at training institutions for healthcare workers in the perinatal field

Responsibility:

National and provincial departments of health

District managers in co-operation with NGO's and community media

Tertiary education units such as universities and nursing colleges

Constant messages: Topics

- Responsible reproductive health decision: every women in South Africa needs to be able to make her own informed responsible reproductive health decision
- Message on early confirmation of pregnancy and initiation of antenatal care.
- Constant message on danger signs: HT, Bleeding, BANC; neonatal illnesses
- Signs of labour, planning for labour,
- Community; neonatal IMCI for newborn care messages
- Neonatal feeding, how to recognise a sick neonate
- PMTCT message and education (soul-city messages)

Constant Messages: Pregnancy

- ✓ Book before the fourth month for a healthy pregnancy and safe delivery.
- ✓ Keep your appointments to monitor your health and the growth of your unborn baby
- ✓ Always carry your antenatal card with you. It contains important health information about.
- ✓ Arrange your own transport such as car or taxi, at least one month before your due date.
- ✓ When pains are 15 min apart or your water breaks go to the maternity unit
- ✓ Checklist of what to take with you to the MOU and hospitals:
For Yourself:

Two packs of large sanitary towels

1 roll of toilet paper

One face cloth and 1 towel

Toothbrush and toothbrush

One bar of soap

3 to 4 pairs of panties

2 night gowns
Something to eat and drink
Coins and card for public telephone
Your antenatal card

For Baby:

1 pack of disposable
1 face cloth
1 bar of soap for the baby
2 baby blankets
Baby clothes
cotton wool

If you are not intending to breastfeed, then also take: 2
feeding cups, one cleaning solutions

Constant messages: Community IMCI Component (Baby)

Key messages

1. Growth promotion and development

- 1.1. Breastfeed infants exclusively for about 6months
- 1.2. Provide children with adequate amounts of micronutrients (Vitamin A and Iron in particular)
- 1.3. Infection prevention practices through proper disposal including children's faeces, safety and hand washing after defecation and before preparing meals and feeding children
- 1.4. In malaria – endemic areas, ensure children sleep under recommended insecticide treated mosquito nets
- 1.5. Prevent child abuse/neglect and take appropriate action when it occurred
- 1.6. Adopt and sustain appropriate behaviors regarding HIV/AIDS prevention and care for the sick and orphan

2. Home Management

- 2.1. When your child is sick:
 - 2.1.1. Continue to feed and offer more fluids
 - 2.1.2. Give appropriate home treatment for infections
 - 2.1.3. Take appropriate action to prevent abuse and accidents

3. Care seeking and compliance to treatment advice

- 3.1. Recognizing that the child is sick and can no longer be managed at home
- 3.2. Seeking further help outside home
- 3.3. Going outside home to seek any medical services including preventive services:

- 3.3.1. Take children for a full immunization
- 3.3.2. Recognize when sick children need medical help
- 3.3.3. Follow-up recommendations given by health workers in relation to treatment follow-up and referral
- 3.3.4. Ensure that all pregnant women receives recommended ANC visits and doses of tetanus toxoid
- 3.3.5. Ensure that men actively participate in provision child care and are actively involved in reproductive initiatives

Empowerment:

- Health promotion as above: Messages needs to penetrate high school curricular
- Traditional leaders (CBO's, civic organisations, Community health workers
- Constant messages should penetrate, be distributed through existing community /civic forums. Relevant stake holders.; Faith based organisations
- Radio stations can also be used
- Services to be ready for the patients: e.g. cannot say come early for antenatal care and then send them away i.e. health workers also need constant message
- Involve community health workers to maternal health

11.2. Antenatal care recommendations

Information

The most common category of perinatal death in all geographical areas is unexplained stillbirth. Compared to other developed and less developed countries, South Africa has a higher stillbirth to neonatal death ratio. Of these unexplained stillbirths, 87.4% were macerated. Many of these deaths are likely to be due to unrecognized IUGR, postmaturity and perinatal infections including syphilis and amniotic fluid infections. Most of these conditions are preventable if good antenatal care is provided.

Deaths resulting from hypertension and abruptio placentae with hypertension together make up the fourth largest category of perinatal death. Common avoidable factors related to these deaths include failure to act on antenatal hypertension and failure to refer appropriately. Therefore many of the deaths could be prevented with good antenatal care.

Better antenatal care would also prevent some perinatal deaths due to maternal diabetes and traumatic breech delivery.

Data from ChIP has shown us that the most important factor associated with under-5 childhood deaths in South Africa is paediatric HIV-disease. Good antenatal care incorporating effective PMTCT programmes has great potential for reducing childhood mortality.

Recommendation

Ensure that a standardized evidence-based model for antenatal care is used at all centres providing antenatal care

Targets

1. At least 90% of women delivering at health facilities should have HIV test results documented by the time of delivery. For HIV infected women, 75% should be on an appropriate ARV regimen by time of delivery. Target date: end of 2009. Indicator: PPIP data from PPIP sites, DHIS data.
2. At least one outreach post per regional hospital for obstetrics. Indicator: Number of established posts. Target date: end 2009

Implementation strategy

Policy

Antenatal care (ANC) model should comprise:

- First ANC visit at the time of confirmation of pregnancy (irrespective of site where pregnancy confirmed – e.g. private GP or public health facility)
- Standardised patient-held ANC record, which should be made available to all potential antenatal care providers (private or public)
- Education for women on pregnancy danger signs (Including the importance of fetal movement count), HIV, breastfeeding, and family planning, personal transport arrangements for labour.
- On-site testing at first visit for Rh, syphilis, Hb, HIV, protein / glucose in urine
- WHO schedule of visits
- Checklist for risk classification and flow-chart for referral to high risk clinic and management
- Integration of PMTCT into ANC including voluntary HIV testing on a provider-initiated (opt-out) basis, CD4 counts on diagnosis of HIV, and availability of HAART during pregnancy for all who meet the criteria for HAART

Note: Public-private partnerships for ANC should be encouraged in situations where this will improve quality or continuity of care (e.g. allowing private GPs access to free ANC screening tests at a public facilities for their pregnant patients).

Responsibility:

National and Provincial DOH

Administration

- Antenatal care must be implemented according to the policy, with unit-specific protocols
- BANC, a quality improvement package for basic ANC, should be promoted as an implementation aid for the primary care level
- Adequate numbers of appropriately trained staff must be allocated to antenatal clinics to allow full implementation of the policy (suggested minimum for ANC at primary health care level: 2 midwives/100 new bookings/month)¹
- Appropriate equipment must be available at all antenatal clinics – see appendix

Responsibility:

District managers, Institutional managers at clinics and hospitals
Human Resource Departments should provide staffing norms for ANC

Clinical practice

- All PHC nurses, midwives and doctors responsible for antenatal care must provide standardised evidence-based antenatal care, according to the policy.
- There must be a system of quality assurance of antenatal care at all antenatal sites.

Responsibility:

Unit managers (nursing and medical) supervising the antenatal clinics

Education

- A standardised evidence-based ANC model must be incorporated into midwifery training and medical training
- For those already in service, workshops, and in-service education must be used to introduce the evidence-based ANC model
- There must be regular obstetric outreach from regional hospitals to institutions. Dedicated posts must be created for this purpose.

Responsibility:

Universities, nursing colleges, provincial MCWH directors
HPCSA, SA Nursing Council.
Provincial Department

References

1. Greenfield DH. Midwifery Staffing Needs in a Maternity Ward. Proceedings of the 25th Conference on Priorities in Perinatal Care in South Africa, Champagne Sports Resort, March 2006.

11.3. Intrapartum care recommendations

To reduce deaths from labour related hypoxia, it is necessary to make provision for rapid diagnosis and treatment of fetal distress and other intrapartum emergencies which arise unpredictably even in low-risk pregnant women.

Facility related issues (Administrative)

1. Siting of Midwife Obstetric Units

The following must be taken into account

- Efficient use of scarce human resources. In metropolitan areas there need to be at least 100 deliveries / month.
- Rapid response to intrapartum emergencies. Where possible, the unit should be attached or adjacent to an obstetric unit with caesarean section facilities.

2. Maternity waiting areas

In areas where transport from home is difficult, provision must be made for expectant mothers to be accommodated close to an obstetric unit in the last weeks of pregnancy.

Problem

Intrapartum hypoxia is the commonest cause of death in infants with a birth weight of 2500g or more, and is worst in the level 1 (District) Hospitals. The quality of care is also worst in these facilities.

Recommendation

The incidence of labour related fetal hypoxia must be reduced

Policy

1. Guidelines

National intrapartum guidelines must be kept updated and distributed to all institutions doing deliveries.

Indicator: Guidelines available in labour ward

Target: Every Hospital / delivery centre

Date: 31/03/2009

2. Clear staffing norms for Maternity units must be made available by the National Department of Health for each level of care
Indicator: The norms must be available
Date: 31/03/2009
3. A woman in labour must always be classified as an emergency for transport
Indicator: The policy has been written
Target: A directive has been sent out by the National Department of Health to all Provincial Departments
Date: 31/03/2009

Responsibility: National Department of Health

1. There must be a doctor and midwife appointed at regional level to take responsibility for Maternal and Child Health outreach, monitoring and evaluation.
Indicator: The policy has been written and is available
Target: A directive has been sent to each Provincial Department of Health. Funds must be made available to the Provincial Departments of Health
Date: 31/03/2009

Responsibility: National Department of Health

Administration

Protocols

1. The National Guidelines for Maternal Care must be implemented in all institutions where babies are born.
Indicator: The guidelines are available in the antenatal, labour and postnatal wards of all institutions doing deliveries. Perinatal and maternal mortality must be discussed in the context of avoidability according to the guidelines laid out in the Maternal Guidelines book
Target: 30% decrease in the avoidable factors due to non compliance with the guidelines.
Date: 31/03/2010

Responsibility: Head of the institution

2. Protocols must be written for each institution based on the National Guidelines. These must be readily available for all staff working in the labour ward at each facility.
Indicator: Protocols written, available and displayed
Target: Available in 75% of delivery centres
Date: 31/12/2009

Responsibility:

Implementation: Head of the institution

Monitoring and evaluation: Provincial MCWH
Coordinator

Staffing

1. Progress must be made towards meeting staffing norms.

The recommended number of midwives is: *16 per 100 deliveries per month for level 1 maternity units.* This number will need to be increased at institutions providing a higher level of care. *In the labour ward, there should be at least 1 midwife caring for every 2 women in labour.* **NB: Labour ward is a high care area.** These midwives should be experienced and interested in the management of labour.

Referral institutions at all levels of care must have doctors available 24 hours per day. These doctors must be able to perform a caesarean section.

Indicator: Improvement in the Number of midwives on the establishment of delivery units.

Target: 10% increase in the number of midwives on the unit's establishment in 50% of the units.

Date: 31/12/2009

Responsibility: Head of the institution

2. Regional doctors and midwives must be appointed for outreach, monitoring and evaluation
Indicator: Post are created and have been filled
Target: All regions to have posts created. 50% of the posts filled
Date: 31/12/2009

Responsibility: Provincial Departments of Health

Equipment

Essential equipment for Maternity services, especially labour ward must be available and working. This list is in the Maternal Services Guidelines for Maternal Care in South Africa, 2007.

Indicator: Equipment in the maternity ward complies with the essential equipment list.

Target: All units have all the relevant equipment

Date: 31/12/2009

Responsibility: Head of institution

Transport and Referral

There must be clear referral criteria. Doctors and midwives must be trained in the criteria.

Indicator: There are written referral criteria in each institution

Target: All delivery centres (level 1 and 2) to have these available and displayed

Date: 31/3/2009

There must be clear referral routes.

Indicator: There is a written document describing the correct referral routes

Target: All delivery centres

Date: 31/3/2009

Responsibility: Head of institution

Emergency transport of patients in labour (code red) must be implemented

Indicator: A decrease in avoidable morbidity and mortality due to transport delays

Target: 75% of all ambulance control centres complying

Date: 21/12/2009

Responsibility: EMS

Training

Training which takes place must be documented.

Indicator: Training register available and up to date

Target: 75% of institutions doing deliveries

Date: 31/12/2009

Responsibility: Head of institution

Clinical Practice

1. Skills for management of labour and its complications must be taught to all midwives and doctors working in labour wards. This must cover the topics in the Maternal Care Guidelines document. This must be onsite / face to face training, and include “fire-drills”.

Indicator: Documented training on topics set out in the Maternal Guidelines, both formal and “Fire drills”.

Target: 75% of Maternity ward staff have attended training

Date: 31/12/2009

Responsibility: Head of institution, to see that it happens
Regional doctor / midwife to do the training

2. Perinatal audit

- *Morbidity and mortality meetings* must be held regularly at all facilities where deliveries take place. Ref. Maternal guidelines – appendix 2
- *PPIP* should be used as the perinatal audit tool.
- The *facility quality assurance officer* should attend perinatal review meetings and be responsible for process auditing, eg monitoring partograms

Indicators: Minutes, with attendance register, of all perinatal review meetings.

Avoidable factors recorded

Action plans recorded

Outcome of previous month’s action plans recorded

Reduction in avoidable factors from not complying with the recommendations in the Maternal Guidelines

Target: 75% of facilities are having meetings with appropriate documentation

30% reduction in avoidable factors for conditions in the Maternal Guidelines

Date: 31/12/2009

Responsibility: Head of institution

Education

Undergraduate: Curriculum must include the Maternal Guidelines for both nursing and medical students

Indicator: The curricula contain the Maternal Guidelines

Target: All curricula must cover the material contained in the Maternal Guidelines as key areas

Date: 31/12/2008

Responsibility: Implementation: Deans and College Principals
Quality: HPCSA and Nursing Council

Interns: Specific skills training – essential steps in managing obstetric emergencies

Indicator: Interns must have documented evidence that they have undergone the skills training and practice needed to manage obstetric emergencies.

Target: All interns must have this before being registered with HPCSA.

Date: Start with those commencing their internship at the begin of January 2009

Responsibility: HPCSA
Head of institution

Summary of intrapartum recommendations targets and dates

Recommendation	Indicator	Target	Date	Resp.
Siting of Midwife Obstetric Units Attached or adjacent to an obstetric unit with caesarean section facilities when possible	Policy statement on facility-based MOU's disseminated to Provinces	Within 6 months	June 2009	NDOH
	Implementation of facility-based MOU's	Within 12 months	Dec 2009	Prov DOH
Maternity waiting areas	Policy statement on maternity waiting areas disseminated to Provinces	Within 6 Months	June 2009	NDOH
	Maternity waiting areas implemented	Within 12 months	Dec 2009	Prov DOH
National intrapartum guidelines	Kept updated and distributed to all institutions doing deliveries	Annual distribution Triennial updating	June 2009 June 2011	NDOH
	Guidelines implemented in all institutions where babies are born	Within 1 year	Dec 2009	Heads of institutions
	Protocols written for each institution based on the National Guidelines. These must be readily available for all staff working in the labour ward at each facility.	Within 1 year	Dec 2009	Heads of institutions
	Protocols monitored and evaluated	Within 18 months and ongoing	June 2010	Provincial MCWH Coordinator
Staffing norms	Clear staffing norms for Maternity units available	Within 6 months	June 2009	NDOH
	16 midwives per 100 deliveries per month	Progress within 1 year	Dec 2009	Heads of institutions
	Referral institutions: doctors available 24 hours per day, able to perform a caesarean section	Progress within 1 year	Dec 2009	Heads of institutions
Transport	Communicated to ambulance services that women in labour classified as an emergency for transport	Within 6 months	June 2009	Prov DOH
	Emergency transport of patients in labour (code red) implemented	Within 1 year	Dec 2009	EMS
Referrals	Clear referral criteria and routes	Within 1 year	Dec 2009	Heads of institutions
	Doctors and midwives trained in the criteria.	Within 18 months	June 2010	Heads of institutions

Summary of intrapartum recommendations targets and dates (cont.)

Recommendation	Indicator	Target	Date	Resp.
Regional MCH Doctor and midwife to take responsibility for Maternal and Child Health outreach, monitoring and evaluation	Policy communicated to Provinces	Within 6 months	June 2009	NDOH
	Doctor and midwife appointed	Within 12 months	Dec 2009	Prov DOH
Equipment	Essential equipment in Guidelines for Maternal Care in South Africa, 2007 available and working	Within 1 year	Dec 2009	Heads of institutions
Skills for management of labour and its complications	Skills taught to all midwives and doctors working in labour wards covering the topics in the Maternal Care Guidelines document. Face to face training, including “fire-drills”.	Within 1 year	Dec 2009	Heads of institutions Regional doctor / midwife
Recommendation	Morbidity and mortality meetings using <i>PPIP</i> held regularly at all facilities where deliveries take place	Within 1 year	Dec 2009	Head of institution
	Regular process auditing, eg monitoring partograms	Within 1 year	Dec 2009	facility quality assurance officer
Undergraduate Education	Curriculum includes the Maternal Guidelines for both nursing and medical students	Within 1 year	Dec 2009	Deans and College Principals; HPCSA; Nursing Council
Intern Education	Specific skills training implemented: Essential Steps in Managing Obstetric Emergencies	Within 1 year	Dec 2009	HPCSA; Head of institution

11.4. Neonatal care recommendations

Recommendation A:

Neonatal morbidity and mortality due to perinatal hypoxia, infection, and in low birth weight infants, must be reduced

Action: The quality of neonatal resuscitation, the prevention, diagnosis and treatment of neonatal infections and quality of care for low birth weight infants must be improved

Implementation strategy

Policy

- A country standard (i.e. national guidelines) for newborn care must be developed and disseminated to provinces, with special emphasis on
 - a) the SAPA Guidelines for Neonatal Resuscitation as the minimum standard for neonatal resuscitation in South Africa,
 - b) early identification and treatment of neonatal infections,
 - c) Kangaroo Mother Care as standard policy, and
 - d) provision of nasal CPAP at Level 1 hospitals
- All provinces should appoint a specialist neonatologist to oversee neonatal services for the province, as well as regional paediatricians
- All institutions must provide the necessary infrastructure, equipment and staffing necessary to implement these guidelines

Responsibility: National and provincial DOH

Administration

- All health facilities conducting deliveries must have the necessary infrastructure, equipment and staffing necessary to implement the national guidelines (as set out as the minimum standard by KwaZulu-Natal in “Norms and Standards 30/09/2005, Health Technology Unit”)
- All health facilities conducting deliveries must distribute the national guidelines to health workers involved in delivering babies
- At least 70% of nursing staff in maternity units and nurseries should be permanently allocated to that unit and must not be rotated
- Referral hospital specialists (doctors and nurses) must undertake 3-monthly outreach visits to Level 1 hospitals to conduct training and review clinical practices

Responsibility: Regional paediatricians, facility managers and district managers, with support from the provincial DOH

Clinical Practice

- All doctors and nurses involved with the delivery of babies must use the national guidelines for neonatal care
- All doctors and nurses working in labour wards and doing deliveries must be competent in neonatal resuscitation
- Regular “fire drills” to practice resuscitation skills should be conducted at 3-monthly intervals
- All doctors and nurses must be familiar with, and follow, the national PMTCT guidelines, ensuring that all neonates receive effective prevention of the transmission of HIV
- KMC must be practiced universally
- Nasal CPAP must be provided to preterm neonates with respiratory distress over 28 weeks gestation or 1000g birth mass at all hospitals
- Quality of care must be reviewed regularly through clinical mortality audits such as PPIP (and Child PIP)

Responsibility: Regional specialist (neonatal or paediatric services), medical managers, doctors and nurses in charge of labour wards and nurseries

Education

- All nursing colleges and medical schools must include the national neonatal care guidelines in undergraduate training, and ensure that all newly qualified nurses and doctors are proficient to this standard

Responsibility: Nursing Council, HPCSA, and heads of nursing colleges and medical schools

Recommendation B:

The quality of postnatal care for neonates must be improved so that morbidity and mortality in the post-discharge neonatal period is reduced

Action: Surveillance of neonates discharged from health facilities must be established to identify neonates with major health risks

Implementation strategy

Policy

- A national routine postnatal care policy, for early identification and referral of illness as well as preventive care, must be developed and implemented
- All neonates must be reviewed by a healthcare worker within 6 days of discharge from the delivery unit (preferably on day 3)

Responsibility: National and provincial DOH

Administration

- Maternity facilities must implement the national postnatal care policy to ensure that neonates are reviewed at a health facility within 6 days of birth
- Maternity facilities must distribute educational materials to ensure that mothers are able to identify danger signs in neonates
- District Offices must ensure that all clinic, CHC, and hospital staff are aware of and facilitate postnatal care visits in accordance with IMCI practice

Responsibility: Regional paediatricians, facility managers and district managers, with support from the provincial DOH

Clinical Practice

- All healthcare workers discharging neonates must ensure that mothers are informed of the need to have their neonates reviewed within 6 days of discharge
- Healthcare workers discharging neonates must explain danger signs of serious illness in neonates to caregivers, and these must be written in the Road to Health Chart
- Healthcare workers at clinics and CHC's must be able to evaluate neonates for signs of infection and ensure that PMTCT policies are implemented, according to IMCI
- All neonates with danger signs of infection must be referred immediately to hospital for further management

Responsibility: Regional specialist (neonatal or paediatric services), MCWH coordinators, medical managers, doctors and nurses in charge of labour wards and nurseries, as well as clinics

Education

- Undergraduate medical and nursing curricula to be revised to include warning signs of neonatal infection, and management algorithms (IMCI)

Responsibility: Nursing Council, HPCSA, and heads of nursing colleges and medical schools

Indicators and targets

Indicator 1:

Neonatal mortality rate to be reduced by 50% between 2000 and 2015 (see Opportunities for Africa's Newborns)

Use DHIS and PPIP data

Indicator 2:

National guidelines for newborn care must be developed and disseminated to all provinces by June 2009

Indicator 3:

Each province must appoint a specialist neonatologist to oversee the development of neonatal services in the entire province by December 2009

Indicator 4:

KMC to be used in 100% of hospitals by December 2009

Use MCWH reports

Indicator 5:

All hospitals (including level 1) to be providing nasal CPAP to preterm neonates by December 2009

Use MCWH reports

Indicator 6:

National policy for routine postnatal care, including review by a healthcare worker within 6 days of childbirth to be developed and implemented by December 2009

Indicator 7:

Early and late neonatal data from PPIP and Child PIP sites to be compared annually with Home Affairs data to check on data quality

Use respective data sources

11.5. Quality of care

The need for improving the quality of care is implicit in the findings of this report. One of the most important ways of improving the quality of care is by performing reviews of perinatal deaths. This section deals with the recommendation, an implementation strategy and gives principles and guidelines for performing perinatal death reviews.

Recommendation

All sites involved in the care of pregnant women must be involved in perinatal review

Implementation strategy

Policy

- All sites conducting births should submit the minimum perinatal data set to their provincial Health Information System
- All sites conducting births should be involved in maternal, perinatal and child mortality and morbidity reviews

Responsibility

National and Provincial Departments of Health

Administration

- The minimum perinatal data set must be submitted to the provincial Health Information System (HIS)
- Maternal, perinatal and child morbidity and mortality review meetings must be held at all institutions conducting births. Minutes must be kept of the decisions made at such meetings
- Holding such meetings must be part of the relevant administrators' KPAs
- The relevant administrators must attend at least half of the morbidity and mortality review meetings
- Time must be allocated to such meetings
- At least two meetings must be held per year with the whole district and relevant information must be presented

- Data from these meetings should be used to decide on priorities for resource allocation within the district and institution
- Appropriate action must be taken when substandard care is being provided
- There must be feedback to the review meeting on the success or otherwise of the implementation of decisions taken at review meetings
- Information from the morbidity and mortality meetings must be linked with other quality assurance activities with the institution, such as adverse events committees. Key areas must be monitored and reported on.

Responsibility

District managers and institutional CEOs

Clinical Practice

- All clinicians involved (midwives, nurses and doctors, including sessional staff) should attend these morbidity and mortality review meetings. If it is not possible for sessional staff to be present at the meetings, they should receive feedback from the meetings.
- A standardised format should be used to report at the review meetings based on the minimal data set. The Maternal Death Notification Form, Maternal Death Assessors form, the Perinatal Problem Identification Programme and the Child Health-Care Problem Identification Programme are tools that can facilitate such meetings. The Perinatal Education Programme Manual 5 – Saving Mothers and Babies and the WHO publication “Beyond the numbers” are useful training manuals to implement and manage the meetings.
- A standardised “minute tool” related to decisions made at the meetings should be developed and used
- Staff should be informed of a debriefing service available to them such as the Employee Well-being Programme provided by the Department of Health.
- A community obstetrician, paediatrician, or midwife would be the ideal person to manage these processes, and these aspects should be written into their job descriptions

Responsibility

Unit managers and nursing managers, clinical manager

Education

- Nursing colleges and medical schools must incorporate audit, data interpretation, and morbidity and mortality review meetings into the relevant curricula
- Tools for quality improvement must be taught by the relevant educational bodies

Responsibility

Deans of nursing colleges and medical schools

Chapter 2

District Hospitals: Challenges and solutions

Dr Bill Hardy, Murchison Hospital, Port Shepstone

In South Africa there are 257 district hospitals, in which approximately 719508 births occurred during the period under review. This accounts for 43% of all institutional births in South Africa. One hundred and thirty seven (53%) of these hospitals provided Perinatal mortality data as registered PPIP sites. This group of hospitals forms a large and representative sample (40%) from which to assess perinatal outcomes within the district health system.

District Hospitals typically serve a number of primary health care clinics, and are staffed by midwives and generalist medical practitioners. Levels of experience and infrastructure capacity may vary widely between institutions. Eighty six percent of deliveries at district hospitals are of infants weighing over 2500g. Of the remaining deliveries, most (8%) are between 2000g and 2500g.

District hospital PPIP indicators for the reporting period may be summarized in Table 2.1 as follows:

Table 2.1. Perinatal care indices for District and Regional hospitals

Indicator	2006-2007	
	District Hospitals N=288549 births	Regional Hospitals N=235999 births
Number of infants born <2500g	39153	39483
Low birth Weight Rate	13.6%	16.7%
Number of Stillbirths	5919	6300
Number of Early Neonatal Deaths	3533	2962
Number of Late Neonatal Deaths	601	835
Stillbirth/neonatal death ratio	1.4	1.7
Perinatal mortality rate (>1000g)	28.9/1000	33.3/1000
Perinatal mortality rate (>500g)	34.8/1000	42.8/1000
Perinatal Care index	2.1	2.0
Fresh stillbirth Early neonatal deaths (day 1) rate	16.2	14.0

Whilst the indicators for district and regional hospitals may appear similar, small differences become significant when extrapolating from the PPIP sample to the district population as reflected in the DHIS dataset. Thus for example, although rates of avoidable deaths are similar (8.28 vs 6.22), twice as many infants die in District Hospitals from intrapartum asphyxia

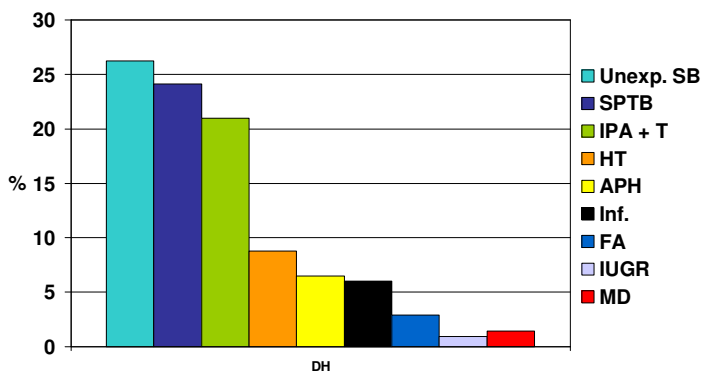
as compared with Regional hospitals. In general, by far the largest **number** of infant deaths occurs in District hospitals in South Africa. This suggests the need to prioritize District Hospital care in order to address the common causes of infant death as highlighted below. *It should be noted that data for late neonatal deaths is incomplete as PPIP does not generally capture deaths occurring outside the neonatal nursery.* A uniform neonatal deaths register in each institution may assist in the collection of mortality data for these neonates. Whilst all hospitals show high mortality rates for infants under 1000g, it is notable that district hospitals have by far the highest mortality rates in the weight bands between 1000g and 2000g. This suggests that these hospitals are poorly equipped to manage small infants. Strategies to address this situation should include (at the very least) transfer of infants below 1500g to higher levels of care, and improved local management of the others.

The FSB/ENND ratio, at 16.2/1000, is highest at the district Hospital level. As a measure of intrapartum care, this indicates a need to critically assess the quality of intrapartum care in district hospitals. At the same time, the high rates of stillbirths at both district and regional hospitals reflect poor antenatal screening, risk detection, referral and overall antenatal care (including client access and utilization of this care). Most stillbirths at the district hospital are unexplained, and most are under 1500g. On the other hand, relatively few deliveries over 2500g are stillborn (0.8% of deliveries). This again points to the quality (or lack thereof) of antenatal care.

In district hospitals, most deaths are due to unexplained stillbirths (26%), premature births (24%), Intrapartum asphyxia (21%), hypertension (9%) and APH (6.5%). See Table 2.1. Note also that infection rates are highest in the district hospital (1.73/1000 vs 1.23 and 1.03 for Regional hospitals and Provincial hospitals respectively).

When looking at perinatal deaths as a whole, unexplained stillbirth and spontaneous premature delivery account for 47% of all deaths. This reinforces the need for a community based intervention, and for better primary care of low birth weight infants at the District Hospital. 38% of all deaths in infants over 2500g are due to intrapartum asphyxia. Considering that most full term deliveries occur at the district hospital, and that 20% of deaths at the district hospital are due to IPA and trauma, this indicates a very important target for intervention to improve perinatal outcomes in South Africa.

Figure 2.1. Comparison of causes of death for district hospitals



Avoidable factors

The top five avoidable factors in perinatal deaths at District hospitals may be grouped as follows:

1. Late booking, poor clinic attendance, delay seeking help in labour (21.5%)
2. Inappropriate response to poor foetal movements (9%)
3. Poor neonatal care or resuscitation, lack of equipment (7%)
4. Foetal distress not detected in labour (3.8%)
5. Lack of transport, delay in referral (3.3%)

Overall, 45% of deaths due to Intrapartum asphyxia, and 39% of birth trauma deaths were regarded as avoidable if the healthcare worker had acted differently. The largest number of avoidable deaths in South Africa are due to intrapartum asphyxia (~4000 deaths/annum), and most of these occur in the district hospitals, as noted above. Of all avoidable deaths, most also occur in the district hospitals; it is evident that most avoidable factors at the CHC and DH level are regarded as “patient related” (36.5% of deaths). These relate to non/poor ANC attendance or delay seeking help in labour. However, it is important to consider the administrative factors hidden within this class, including lack of access to facilities, poor communications and transport etc. As one progresses up the level of care ladder, the ratio of patient/medical personnel factors decreases steadily.

This may suggest an under reporting of patient factors at higher levels of care due to lack of available patient information in these centres.

Regarding administrative factors, twice as many avoidable deaths occur in District Hospitals as in Regional hospitals. This suggests that resource allocation (equipment, staffing) to district hospitals should be reviewed to address this inequity.

Key Recommendations for District Hospitals

The key recommendations relate to antenatal care, intrapartum care and neonatal care.

Antenatal care services

Access to antenatal is often limited by lack of transport, limited clinic opening times and poor telephone services. Local staff shortages may dictate that patients are transported out of their areas for care- especially when 24 hour PHC care is not available. These constraints, coupled with competing work or schooling commitments and a lack of family support, as well as traditional birthing practices such as home delivery and the use of traditional remedies combine to frustrate the best efforts of community midwives.

As consumers, antenatal clients may have a poor perception of the benefits offered by routine antenatal care. This perception is shaped by long waiting times, lack of privacy at facilities, staff attitudes and poor quality of care, lack of structured education and counselling, fear of HIV disclosure and prior experience of poor service.

Most importantly, one must also consider the missed opportunities for effective care that exist due to poor screening and risk assessment, poor follow up and referral.

Strategies to address these antenatal factors include the following:

1. Improve access to antenatal services

- a. Community based care. Options here include recruiting community health workers to do home visits in each clinic catchments' area. Coupled with this would be a clinic based register of antenatal clients with a follow up programme to trace defaulters.
- b. Mobile clinics should be equipped to provide basic antenatal monitoring in remote areas.

- c. Traditional birth attendants should be recruited and trained to collaborate with PHC staff, especially in terms of risk detection and referral of high risk clients (e.g. Suspected CPD or multiple pregnancies etc.)
- d. More controversially, but potentially much more effective would be a strategy to provide antenatal screening and family planning at schools. This is clearly demanded by the high rate of teenage pregnancies seen in the districts.

2. Improve the quality of care at antenatal clinics

- a. The “Basic Antenatal Care” programme (or a suitable equivalent) should be aggressively implemented in all district clinics. This will assist in providing standardised monitoring and risk assessment to address the high mortality due to stillbirths. This programme must be integrated with the PMTCT programme to address both maternal morbidity due to HIV and also congenital HIV transmission.
- b. Each district must develop clear referral patterns with agreed referral criteria covering all the major causes of morbidity. This seemingly obvious recommendation requires a high degree of integration of PHC, hospital and emergency transport services. The District Manager should appoint a senior medical practitioner to oversee and monitor this process on an ongoing basis.
- c. Each District hospital should develop a high risk clinic as a way of supporting and monitoring the quality of care at their feeder clinics. Ideally these clinics should be run by an experienced medical officer together with an advanced midwife. An ultrasound machine should be utilized for this purpose, together with the necessary basic training required. Even when operated at a fairly basic level this service will assist in the early detection of a variety of problems including multiple pregnancies, placenta praevia, oligo/polyhydramnios, hydrocephalus, IUGR etc.
- d. Antenatal care should be fully integrated with antiretroviral care at the district hospital level. Together with dual therapy, clear targets should be agreed for the initiation of ARV therapy in pregnancy. This care should form a continuum from the local clinic to the delivery room. Every maternity unit should have a well trained PMTCT staff complement.
- e. District hospital medical officers should be allocated to support antenatal care in their respective clinics. This support should include visits for training, auditing of care, staff feedback, and equipment audits and monitoring. PPIP sites should include PHC data in the audit profile.

- f. Specific measures should be directed at addressing the high rate of intrauterine deaths/stillbirths at the District hospital level. These measures should include better screening for maternal hypertension, lower genital tract infection and UTI's, intrauterine growth restriction and medical conditions such as diabetes and HIV.
- g. The HIV-era tendency to devolve patient education to lay counsellors should be reviewed. Patient education should be re-established as a key component of routine antenatal care by all midwives. Each visit should be used as an opportunity to reinforce teaching about foetal movements, self care and the danger signs of pregnancy.

Intrapartum Care

Key adverse outcomes identified by the PPIP audit include Intrapartum asphyxia and birth trauma. This remains the most important cause of perinatal death in District hospitals. Clearly large gaps exist in the vital areas of monitoring, supervision and decision making.

Strategies to improve intrapartum care

- a. The starting point should be the rigorous use of the partograph throughout labour by all medical personnel, and the regular audit thereof.
- b. Junior medical officers and midwives should be trained more thoroughly in the progress of labour and the detection of abnormal labour and foetal distress. Internship training should be evaluated to address this glaring deficiency in the current undergraduate medical curriculum. Medical Managers should be challenged to ensure that junior staff are adequately supported and mentored in terms of maternal care.
- c. Essential monitoring devices such as Doppler FHR monitors and CTG units should be available in every delivery room.
- d. District Managers and Medical Managers should ensure that written guidelines and teaching aids exist to guide the active management of labour, the monitoring of the foeto-maternal unit, the management of the second stage and associated complications. "Fire drills" should be developed to improve the management of key complications such as cord prolapse, severe foetal distress and haemorrhage.
- e. Structured Perinatal audit should be mandatory in all district hospitals. Audit meetings should be attended by all key personnel, including district supervisors. Quality assessment officers should oversee the implementation of

recommendations. Specific goals should be set for the improvement of care. These targets should be well publicised within the institution, and periodically reviewed.

- f. **All maternity supervisors (midwives and doctors) should collaborate to establish pathways to better decision making.** Such pathways include telephonic access to consultants, structured ward rounds at regular intervals, outreach visits by specialists, better documentation tools etc.
- g. Minimum equipment standards must be developed and audited in each district.
- h. Staffing levels for doctors and midwives must be agreed and implemented.

Neonatal Care

Deficiencies in neonatal care include poor management protocols, poor resuscitation, poor monitoring, and delays in accessing tertiary care. The following constraints are common at District hospitals:

- a. Staffing: Hospital nurseries require nurses trained in neonatal care at all times. Often staff allocated to the nursery are not adequately trained. Trained staff are rotated out or deployed elsewhere in the unit.
- b. Medical staff have little experience in neonatal care at the District hospital level.
- c. Critical equipment items (CPAP devices, phototherapy units, incubators, fluid delivery devices) are often not available.
- d. Outreach in neonatal care from the Regional Hospital is often limited by similar staffing constraints at the Regional hospital level. Critical in-service training in neonatal resuscitation, feeding and fluid therapy, and the management of common neonatal conditions is lacking.
- e. Inefficient transport services to the secondary and tertiary hospital level results in long delays in transferring ill neonates – where time is often critical. This is exacerbated by lack of intensive care resources in regional and tertiary hospitals.

Strategies to improve neonatal care:

- a. Nurses should be trained in basic neonatal care and allocated specifically to nurseries. This is no different from allocating midwives to the labour ward. Critical periods of deficient care include night times and weekends, where staffing levels are generally lower.
- b. Medical Officers should be trained using standardized protocols covering the critical areas of neonatal resuscitation, feeding, and

- the management of the common neonatal emergencies (sepsis, RDS etc.).
- c. Essential equipment and drugs should be provided, together with the skills to use these effectively. CPAP should be standardized at L1 hospitals.
 - d. 1500g-2000g infants should be prioritized for special care as these salvageable infants have a high mortality in district hospitals.
 - e. The emergency medical rescue service should be equipped and resourced to provide early safe neonatal transport.
 - f. **Steps should be taken to avoid delivering very small infants in district hospitals.** Screening programmes should detect and manage high risk pregnancies, including multiple pregnancies. Premature labour should be aggressively managed, with early transfer to higher levels of care.
 - g. A neonatal deaths register should be maintained in all institutions to detect and audit all neonatal deaths occurring outside the nursery. These deaths currently “fall through the cracks” between PPIP and CHIP.
 - h. In terms of administrative factors relating to neonatal morbidity, the key elements, vis. training, equipment, staffing and outreach have been mentioned. **However, in addition, mothers and infants should be prioritized for effective transfer between all levels of care.**

Chapter 3: Late Neonatal Deaths

Improving neonatal care through PPIP and Child PIP

Mark Patrick, Cindy Stephen

Introduction

The neonatal population forms the largest age group in any country's population pyramid. Despite this, demographic and health information for neonates is scanty, especially about the late neonatal group. Neonates are vulnerable and in order to provide them with optimal care, it is vital to know their health profile and the current quality of care they receive.

The World Health Organisation (WHO) estimates that there are 22 000 neonatal deaths in South Africa per year. The Perinatal Problem Identification Programme (PPIP) and the Child Healthcare Problem Identification Programme (Child PIP) together audit about 5 000 neonatal deaths per year, and detailed information is available for these deaths. Yet little is known about the remaining 17 000 neonatal deaths occurring each year.

This chapter, by looking at the PPIP and Child PIP databases, draws together for the first time information on late neonatal deaths with particular regard to:

1. Information on the health profile of the late neonatal population;
2. Information on the quality of care received by the late neonatal population; and
3. Quality of data for the late neonatal population.

PPIP has been functioning in South Africa since 1996 and Child PIP since 2004. Table 3.1 shows the coverage of PPIP and Child PIP during 2007 in health facilities at the different levels of care.

Table 3.1. Coverage of PPIP and Child PIP in 2007

	District (257)		Regional (65)		Tertiary (6)		Central (9)		Total (337)	
	No.	%	No.	%	No.	%	No.	%	No.	%
PPIP	137	53	46	71	5	83	5	56	193	57
PPIP & Child PIP	16	6	13	20	2	33	0	0	31	18

Methods

This chapter examines neonatal care in South Africa using PPIP data on late neonatal deaths, and all Child PIP data on neonatal deaths, from January 2006 to December 2007.

Child PIP cannot differentiate between early and late neonatal deaths (NNDs). However, most neonates will have spent some time at home before being admitted to children's wards and so it is reasonable to surmise that information arising from Child PIP will be representative of the late neonatal population, rather than the early neonatal population, as early neonatal deaths usually occur in nurseries.

There are important differences between the ways PPIP and Child PIP look at neonatal deaths. These are summarised in the Table 3.2.

Table 3.2. Differences between PPIP and Child PIP data

PPIP provides	Child PIP provides
Perinatal mortality rate (excludes late NNDs)	In-hospital mortality rate
Neonatal mortality rate (includes early and late NNDs)	Age specific in-hospital mortality rate (age 0-1 month)
Cause of neonatal death (obstetric and neonatal causes)	Cause of death (diagnoses at time of death)
Quality of perinatal care (avoidable factors)	Quality of paediatric care (modifiable factors)

Findings

Tallies and rates, causes of neonatal deaths and quality of care data are presented, comparing PPIP and Child PIP data where both were available for similar parameters. Child PIP provided some extra information on neonatal deaths describing where and when neonatal deaths occurred, the perinatal profile, and HIV care, which is also included.

1. Tallies and mortality rates

The basic tally and mortality rate findings for 2006 and 2007 are presented in Table 3.3. It is notable that over 400 late neonatal deaths were collected in the Child PIP data that would have been missing previously which reflects the importance of analysing the PPIP and Child PIP data together.

Table 3. Basic neonatal data from PPIP and Child PIP

PPIP (2006-2007)		Child PIP (2006-2007)	
Births	659 809	Admissions	7 274
Early NNDs	6 065	Tally deaths	319
Late NNDs	594	Audited deaths	429
Total NNDs	6 659		
NMR	10.1/1000 births		
Late NMR	0.9/1000 births	IHMR	4.4/100 admissions
Avoidable factors (AFs)	580	Modifiable factors (MFs)	717
AFs per death	1	MFs per death	1.7
Total audited late NNDs (PPIP and Child PIP)		1 023	
Estimated NNDs (2006-2007) in South Africa		44 000 ¹	
Estimated NMR in South Africa		21/1000 births ²	

2. Causes of neonatal death

The following figures show the comparative late neonatal cause of death data from PPIP and Child PIP in 2006-2007.

Figure 1. PPIP: Late NNDs (n = 594)

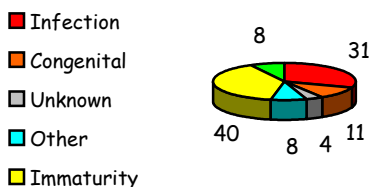
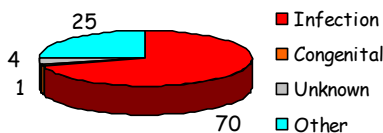


Figure 2. Child PIP: deaths under 1 month (n = 429)



It is clear that infections account for the majority of late neonatal deaths (31% in PPIP data and 71% in Child PIP). The very high proportion of infection-related deaths in the Child PIP data complements the lower-than-expected proportion of deaths due to infection in the PPIP late neonatal death data.

3. Avoidable/modifiable factors in neonatal deaths

Both PPIP and Child PIP assessed all deaths for the presence of avoidable factors (PPIP) or modifiable factors (Child PIP) and these were grouped by where they occurred in the health system and by who was responsible.

Where they occur?

In Figures 3 and 4 the avoidable/modifiable factors occurring in homes, clinics, emergency wards (labour or casualty) and the in-patient wards are

recorded. It is clear that much can be improved within health facilities to improve neonatal care.

Figure 3.3. PPIP AFs: Where? (n = 594)

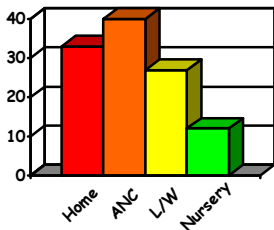
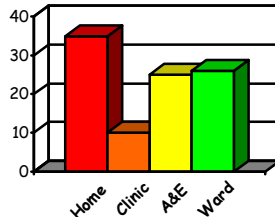


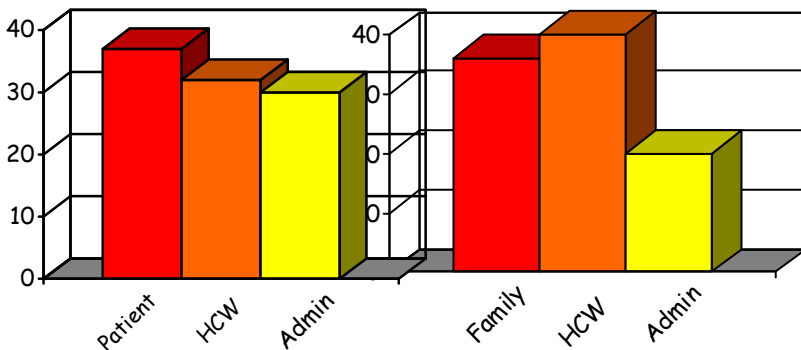
Figure 3.4. Child PIP MFs: Where? (n = 429)



Who is responsible?

PPIP data shows an even spread of responsibility shared between the mother, healthcare worker (HCW) and administrator, as shown in Figure 5. Child PIP data shows the greatest responsibility for modifiable factors lying with healthcare workers, closely followed by the family (Figure 3.6).

Figure 3.5. PPIP AFs: Who? (n = 594): Figure 3.6. Child PIP MFs: Who? (n = 429)



The most frequent avoidable/modifiable factors related to the people responsible in PPIP and Child PIP is listed in Table 3.4.

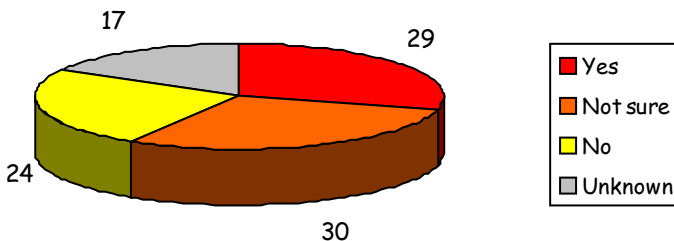
Table 3.4. Avoidable/Modifiable factors in PPIP and Child PIP

PPIP	Child PIP
Patient <ul style="list-style-type: none"> • Delay in seeking care (22%) • Never initiated ANC (20%) • Booked late (19%) 	Family <ul style="list-style-type: none"> • Delay in seeking care (36%) • Severity of illness not recognised (23%) • Home Rx with negative effect (11%)
HCW <ul style="list-style-type: none"> • Neonatal management plan inadequate (21%) • Nosocomial infection (20%) • Delay in referring (14%) 	HCW <ul style="list-style-type: none"> • Clinic: case management inadequate (7%) • A&E: case assessment inadequate (21%) • Ward: monitoring inadequate (18%)
Administrator <ul style="list-style-type: none"> • Inadequate facilities (50%) • Inadequate resuscitation equipment (14%) 	Administrator <ol style="list-style-type: none"> 1. Lack of personnel (21%) 2. Lack of beds at all levels (21%) 3. Communication (16%)

4. Were the neonatal deaths avoidable?

In Child PIP each death was assessed as to whether it was avoidable or not. Almost one-third of late neonatal deaths were considered definitely avoidable and only one-quarter as unavoidable, as shown in Figure 3.7.

Figure 3.7: Child PIP “Was the death avoidable?”



5. Where in hospital, and when?

Child PIP provided added information about where neonatal deaths occurred within health facilities and how soon after admission the deaths occurred (see Table 5). Over half the neonatal deaths occurred within 24 hours of admission.

Table 3.5. Child PIP data: where and when neonatal deaths occurred in health facilities

Where deaths occurred?		When deaths occurred?	
Ward	% of deaths	Length of stay	% of deaths
Medical	28	< 24 Hours	55
Mixed	33	1-3 Days	25
High care	18	> 3 Days	22
NICU	4		
POPD	9		
Other	8		

6. Perinatal profile

Additional information about the wellbeing of mothers and the nutritional status of neonates is collected in Child PIP and this further describes the perinatal profile of neonates in South Africa. For the 429 neonatal deaths reviewed, 10 mothers had died, 21 were sick and 296 (69%) were alive and well. Only 39% of neonates were of normal weight, 29% were under-weight-for-age and 18% were severely malnourished. These categories probably reflect birth weight rather than post-natal nutrition.

7. HIV care

Child PIP gathers detailed information about a number of aspects of HIV care and these are shown in Figures 3.8 and 3.9.

Over half of all neonates dying in hospital were not tested for HIV or had no information about their HIV laboratory status recorded, and over one-third were HIV infected or exposed, reflecting a struggling PMTCT programme.

The PMTCT programme is essential in preventing new HIV infections yet the Child PIP data in Figure 9 shows that whether babies received NVP and how they were fed was unknown in half of the deaths. Also only one in two babies eligible for NVP actually received it.

Figure 3.8: HIV Laboratory category (n=429)

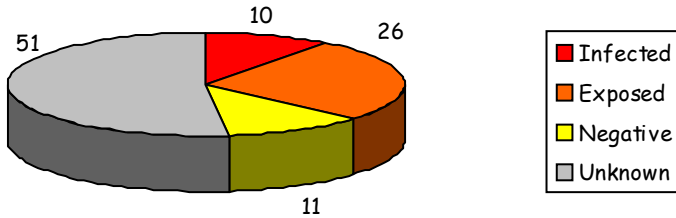
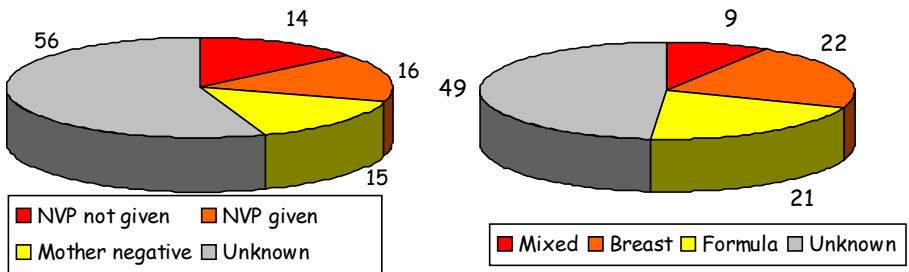


Figure 3.9: PMTCT: Nevirapine (NVP) administration and Feeding choice (n=429)



Discussion

1. The health profile of the late neonatal population

Child PIP data shows that many babies die fast, i.e. within the first 24 hours of admission, and many die in children's wards. Both Child PIP and PPIP data indicate that the most significant cause of death is infections.

2. The quality of care profile of the late neonatal population

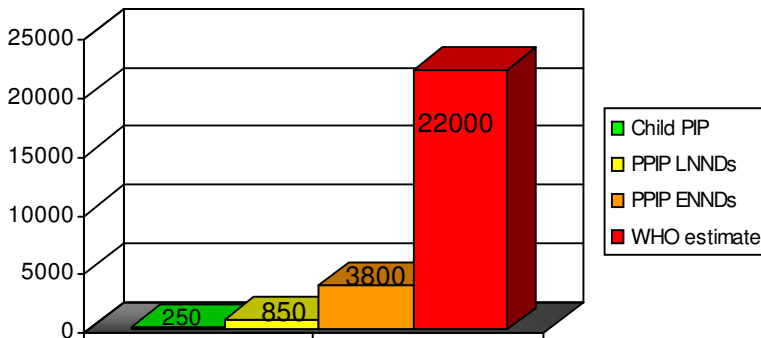
The quality of care received by neonates is described by the avoidable/modifiable factors in PPIP and Child PIP. A review of these indicates that

- Caregivers often do not take their babies to health facilities timeously;
- Clinical personnel do not adequately assess, manage and monitor neonates, and Child PIP data further shows that neonates are not given meticulous HIV care; and
- Administrators do not ensure adequate facilities, staff and equipment for newborns.

3. Quality of late neonatal death data

Figure 10 illustrates the annual neonatal death data for South Africa comparing the deaths captured in PPIP and Child PIP to the WHO estimate, and highlights again the seriousness of data gaps.

Figure 3.10: Neonatal mortality data in South Africa – 17 000 missing deaths



Neonatal deaths are not recorded properly at country level, both inside the health system and in the community, where deaths at home or in transit to a health facility may not be registered.

Within the health system deaths may not be recorded at all by Home Affairs, or in either PPIP or Child PIP. Missing deaths in PPIP and Child PIP are mainly due to system challenges. These include a lack of computers and computer skills, neonatal deaths in children's wards NOT being entered into PPIP and patchy facility coverage of both programmes, as they are mainly dependent on committed enthusiasts.

Recommendations

PPIP and Child PIP data provide clear evidence for the recommendations that need to be implemented to improve quality of care for neonates and these are covered elsewhere in the Saving Babies reports.

The following recommendations suggest ways to improve quality of neonatal mortality data which will, in time, impact significantly on quality of care.

To improve the quality of data at *country level*, the following parameters need to be accurately determined:

- Country neonatal mortality rate:
 - Death notification by Home Affairs and Statistics SA

- Department of Health Information Systems (DHIS), as well as PPIP and Child PIP as these programmes expand nationally
- Country cause of death data
 - Expand and tighten PPIP and Child PIP
 - Death notification form should become compatible with PIP and Child PIP forms
- Country quality of perinatal care data
 - EVERY neonatal death in health institutions should be entered in PPIP (and Child PIP if in a children's ward)
- Home deaths remain a big gap

To improve the quality of data in *PPIP and Child PIP*:

- ALL deaths <28 days must be included in PPIP regardless of where they occur
 - if not, important NMR information AND quality of perinatal care information is lost
- ALL deaths occurring in children's/paediatric wards must be included in Child PIP
 - if not, important quality-of-care information is lost
- Child PIP and PPIP should be expanded to all hospitals in South Africa
 - there are only 31 sites doing both PPIP and Child PIP
- Ensure the PPIP structure is able to include ALL neonatal deaths occurring at a participating site
- A decision must be made on how and where to capture deaths in 'elderly' (>28 days) neonates occurring in nurseries

Conclusion

Together PPIP and Child PIP provide detailed information of the health profile of and the quality of care received by the neonatal population not previously described, enabling focussed recommendations for this age group.

For South Africa, improving quality of neonatal mortality data will allow greater accuracy of the current status of neonatal health and healthcare, and will enable more accurate monitoring and evaluation of trends over time.

References

1. World Health Organisation estimate
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Chapter 4

The BANC Experience: Nelson Mandela Bay Metro

J S Snyman and A Goosen

Introduction

Unexplained stillbirths are the most common recorded category of perinatal death with the most likely causes of these deaths, reported in the Saving Babies Report 2003 (Pattinson, 2004:4), as intrauterine growth restriction (IUGR), post-maturity, congenital abnormalities and uro-genital infections in the mother. All of these conditions can be detected during good antenatal care. If the woman attends antenatal care, according to Moran & Mangate (2004:23-37), deaths resulting from IUGR, post-maturity and syphilis can be avoided. Although poor or no attendance at antenatal care was recorded as an avoidable factor in one in five cases of unexplained stillbirths in the Saving Babies Report 2003 (Pattinson, 2004:22-36), the majority of women did attend antenatal care. Furthermore the South African Health Review indicates that 95% of women countrywide attend antenatal care when pregnant (Ijumba, Ntuli & Barron, 2002:94). Therefore the high proportion of unexplained stillbirths is probably a good indication that the quality of antenatal care is poor (Pattinson, 2004:4-22).

The principles of quality antenatal care are known (Chalmers et al. 2001:203) but despite the knowledge about these principles the maternal and perinatal mortality remains high. The Basic Antenatal Care quality improvement package is designed to assist clinical management and decision making in antenatal care. The implementation of the BANC package may influence the quality of antenatal care positively, which in turn may impact on the outcome of the pregnancy mother and baby.

A study to evaluate the effectiveness of the Basic antenatal care (BANC) package to improve the quality of antenatal care at primary health care clinics was conducted in the Nelson Mandela Bay Metro. The study design selected was a mixed method with a quantitative and a qualitative section. The objectives were:

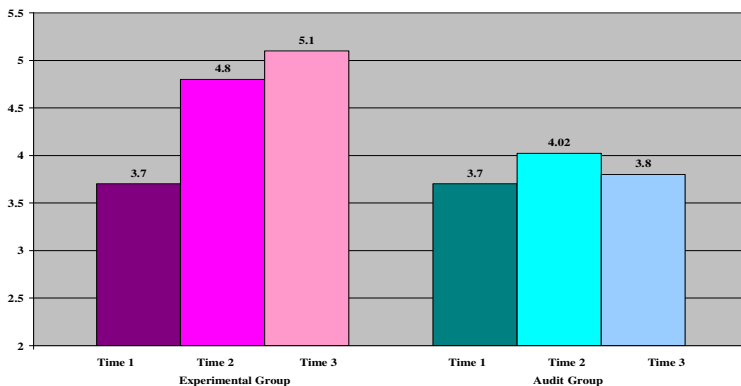
- To assess the quality of antenatal care delivered by primary health care professional nurses in primary health care clinics
- To facilitate the implementation of the Basic Antenatal Care package in five selected experimental clinics
- To evaluate the effectiveness of the Basic Antenatal Care package by determining the quality of antenatal care by an audit of antenatal records

- To determine experiences of individuals of the training and implementation of the Basic Antenatal Care package through individual interviews and a focus group discussion with trainers and professional nurses involved with the implementation of the BANC package.
- To make recommendations and develop guidelines for training and implementation of the BANC package

Results indicated that with the implementation of the BANC package:

- Organizational changes required at clinic level for improvement of antenatal care is facilitated with tools like the integrated flow charts for client management, management and referral protocols, and the checklist. It also supports the change to the new WHO schedule of visits for low risk pregnant women
- Women are provided the opportunity for antenatal care early in pregnancy illustrated in the graph below by the reduction in gestational age at first visit from 26.9 weeks to 23 weeks. Providing women the opportunity of antenatal care services early in pregnancy improves access to the health service and provides an opportunity to screen women for HIV AIDS, nutrition status, tuberculosis and malaria, as well as an opportunity to provide pregnant women information related to the pregnancy and to develop a birth plan. The birth plan included discussion of future contraception and transport arrangements to a health facility when labour starts or when danger signs are present.
- The improvement of quality of antenatal care was small as measured in the experimental and the audit and feedback groups. However the significant continuous quality improvement in the experimental group measured in the ‘interpretation and decision’ section of the audit tool is a positive finding as it could impact on the outcome of pregnancy. The graph below illustrates the results of the audit in the experimental and audit and feedback groups over time.

Figure 4.1. Comparison of total mean scores for interpretation and decisions for the experimental and control clinics over time.



This section reflects combined criteria related to the interpretation of previously collected information and the decisions taken on the interpretation of this information. This section is critical as it impacts on the way the pregnant woman is managed. The total possible score is 7. The mean baseline score for the experimental and audit and feedback groups were the same at 3.7. The mean score improved significantly in the experimental group from 3.73 (Time 1) to 4.77 (Time 2) ($p=0.000$) and again to 5.11 (Time 3) ($p=0.000$). In the audit and feedback group the score increased from a mean of 3.7 (Time 1) to 4.02 (Time 2) ($p=0.000$) and then remained constant at 3.8 (Time 3). For the 'Interpretation and decision' section the baseline scores for the experimental and audit and feedback group was the same, indicating no differences in management of the pregnant women between the groups at the onset of the study. A significant sustained improvement in the experimental group can be seen as a behaviour change in the professional nurses with better management and referral of the pregnant woman.

With the analysis of data generated by doing the focus group and individual interviews the following conclusions were drawn:

- Primary health care professional nurses found the BANC package useful and liked the BANC tools to provide antenatal care at clinic level.
- The training material and the training approach supported learning transfer of new evidence and developments in antenatal care. The dilution effect of cascade training need to be managed and requires the support from supervisors and managers.
- The trainers of trainees experienced their role as difficult to fulfil in the context of current primary health care setting, particularly

the implementation of changes which differ from the original training and how to ensure effective learning transfer. They needed specific preparation for the changes which had to be implemented to deal with change management at clinic level. The importance of supportive supervision is documented, but evidence of such support was lacking from the interviews with managers.

- The support from managers was critical to facilitate and sustain changes implemented with the BANC package. Although addressing the basic component of care for pregnant women, training and implementation of the BANC package is rooted in principles of quality assurance and change management
- The effect of the BANC package on the maternal and perinatal mortality and in particular on stillbirth rate, cannot yet be assessed. Before a difference is expected more clinics in the Nelson Mandela Bay Metropole need to be involved over a longer period of time.

Recommendations for clinical nursing from the study included the following:

- The BANC package should be implemented in all the clinics in the Nelson Mandela Metropole. District hospitals (and the regional referral hospital) receiving referrals from these clinics should also be orientated on the principles of the BANC package.
- Protocol development should be a combined exercise between the clinics and referral hospitals to assure agreement and support.
- The BANC handbook, integrated flowcharts and protocols for referral and treatment should be available at each consulting room where pregnant women receive care.
- Standardised equipment as suggested in the BANC package should be available at all centres where women receive antenatal care.
- Monitoring of the perinatal mortality over time in the quarterly perinatal audit meetings, based on the perinatal problem identification programme and DHIS to assess changes in mortality rates, is recommended

Implementation of some of the recommendations of the study followed after completion of the study. The BANC package was implemented or rolled out to all clinics in the Nelson Mandela Metropole through the following activities.

- Training sessions for all clinics were completed during March 2007. The BANC package was made available to each clinic and one trainer per clinic was trained.
- Follow-up meetings with the trainers/service providers consisted of discussing indicators from the DHIS which would show BANC

implementation and/or improvement in antenatal care eg. Antenatal care coverage, First visit rate before 20 weeks gestation, VCT coverage and RPR testing coverage.

- A representative from the clinics were encouraged to attend the monthly perinatal audit meetings and quarterly district perinatal audit meetings
- Regular one on one communication was encouraged between the clinic and referral hospital when faced with patient management issues
- Monthly MOU meetings (combined meeting for MOU managers) were started providing the platform for discussion of mutual problems, audit and record review.
- The supervisory checklist was introduced and a quarterly BANC report requested from clinics for the attention of the MCWH programme manager at district level.

Monitoring of still birth rate

An improved outcome resulting from an improved quality of antenatal care could be reflected in the reduction of still birth rate. Tracking a change in stillbirth rate proves a challenge as few institutions have accurate perinatal death data for an extended period of time. Uitenhage Hospital, serving the Uitenhage/Despatch sub-district in the Nelson Mandela Bay Metropole, has PPIP data available from 1998 to date. The maternity services manager from Uitenhage Provincial Hospital (UPH) provides supportive supervision to Leticia Bam MOU (LBam MOU) and Sundays Valley Hospital(SVH). Perinatal Review meetings were started at UPH in 1995. It was named MOM (Multidisciplinary Obstetric Meetings) and meetings were held quarterly.

Through the years MOM has developed and improved, it now meets almost all the criteria described by Prof Philpot in the 2007 version of the Maternity Guidelines. Monthly meetings are held and the emphasis is on the first M: Multidisciplinary. All ANC clinics and their supervisors in the drainage area as well as LBam MOU and SVH are invited. When they do not attend, a copy of the minutes is send with a note reading:”Missed you at MOM, next meeting is on.../...” These two institutions data is a standing item on the agenda. An annual Program with dates for planned MOM, who should attend, what is discussed, etc. is distributed from November each year.

Perinatal Audits are done and UPH is a PPIP sentinel site since 1996. All Maternal deaths are audited and notified to CCEMD. All Maternal deaths are presented at MOM. Selected Perinatal deaths are also presented. When avoidable factors involving health personnel are identified, feedback is

given to the relative staff member or MOU Manager. This feedback is in the format of an Incident report compiled by the Area Manager, following the 24hour meeting. A copy of the relevant documentation is attached and in certain cases a copy is also send to the MCWH Program Manager at the District Office. The correct procedures are identified and if needed copied protocols are attached, alternatively, reference to the Maternity Guidelines is made. Identified substandard care is never used as to embarrass or punish anyone in the MOM. By the time the case is presented to the larger audience, the problems identified are already addressed. Referrals from these two institutions are monitored. Not only the number of referrals but also the reason for referral is monitored.

HIGH RISK ANC AT UPH:

All Primary ANC is provided at the various clinics. The clinic at UPH is only for referred cases. The attendance at this clinic has increased during the past year from an average of 150 to 230 per month. The reason for this increase is directly related to the implementation of BANC. More patients now attend for post maturity, which leads to more IOL, which often fail, and therefore the C/S rate has increased.

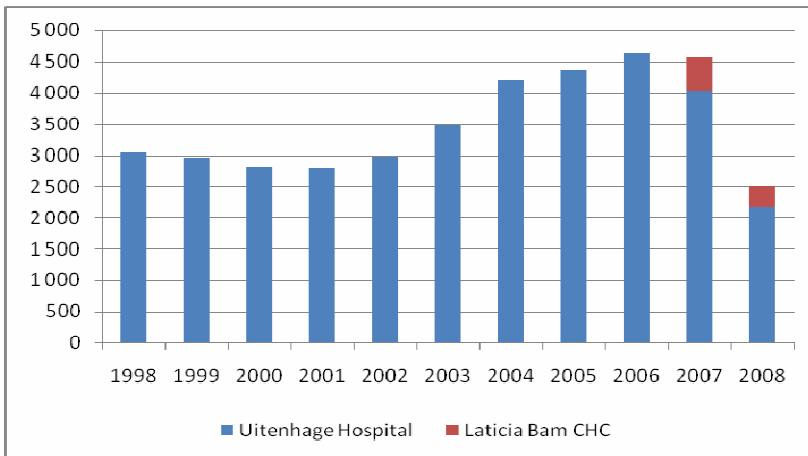
Increased C/S Rate:

The Hospital C/S rate is now 27%. The overall C/S rate is further inflated by Elective C/S done on the private patients (15-20 per month). UPH is the only public hospital in the Metro where this service is offered. The overall C/S rate is therefore:

Jan-Oct 2008 28%
Jan-Dec 2007 30%,
Jan-Dec 2006 22%
Jan-Dec 2005 20%

A bar chart of he total deliveries is shown in figure 4.2

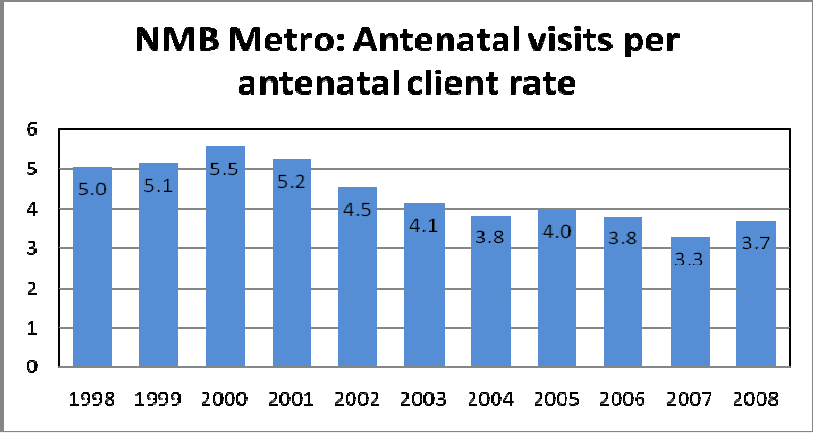
Figure 4.2. Total deliveries at Uitenhage Hospital and Leticia Bam CHC MOU



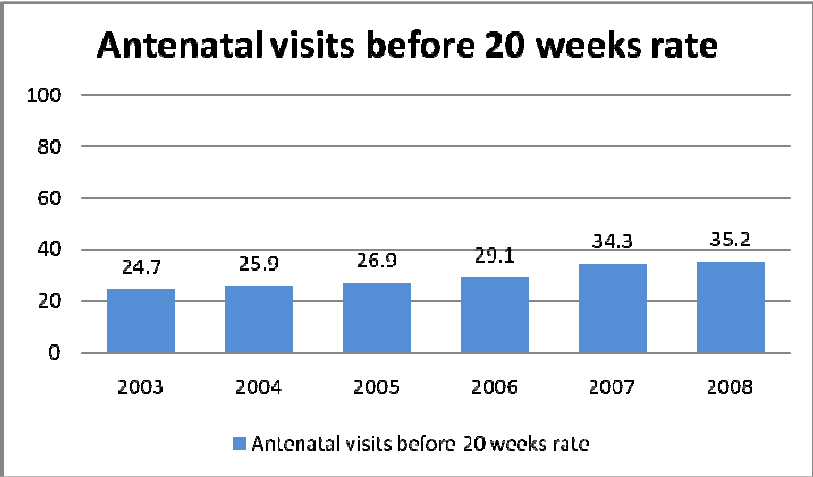
Note: 2008 deliveries are incomplete and only give data till September

The midwife obstetric unit (MOU) at Leticia Bam was opened in March 2007. Up to this date only an antenatal clinic service was provided. The reduction in deliveries at Uitenhage Hospital was now done at this MOU. The total number of deliveries for the area remained constant.

Indicators from the District Health Information System (DHIS) monitored to track the quality of care included amongst other the total number of visits per antenatal client, the ANC coverage and First visit before 20 weeks gestation. The PPIP programme was introduced at Leticia Bam MOU at the opening of the unit. The total number of antenatal visits per client would show that clients are seen at six week intervals that is fewer visits per client as proposed in the BANC package rather than the schedule proposed in the SANC regulations. A reduction in total number of visits is noted in the graph below from 5 visits per client in 1998 to 3.7 clients in 2008.

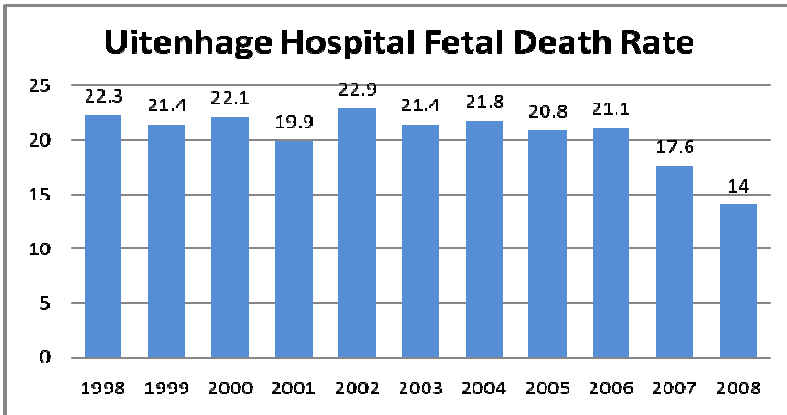


The antenatal visits before 20 weeks gestation rate is a measure of clients being seen earlier in pregnancy or at pregnancy confirmation. This rate illustrated in the graph below has increased from 24.7 in 2003 to 35.2 in 2008. It appears as if women in the Nelson Mandela Bay Metro are seen earlier in pregnancy affording the opportunity to provide care and information to the pregnant woman.



An increase in referral rate is expected where the BANC package is implemented. This results from an improved identification of risk factors followed by improved interpretation and decision making using the checklist. The increase in referral rate is illustrated in the graph below.

The bar chart below illustrates the fetal death rate at Uitenhage Hospital for 10 full years and data for 2008 up to September. A reduction in fetal death rate is noted in 2007 to 17.6 and again to 14 in 2008. This reduction coincides with the implementation of the BANC package. Supportive supervision was available from the Maternity Unit Manager at Uitenhage Hospital and the MCWH programme manager at district level.



Conclusion

From the information reflected it appears that the sustainability of the BANC package can be insured through supportive supervision. This involves support of a district hospital to the surrounding MOU and clinics, as well as the monitoring from the MCWH Manager at district level. Sustained implementation of the BANC package appears to reduce the still birth rate over time.

Chapter 5

The Limpopo Initiative for Newborn Care (LINC)

BA Robertson, AF Malan, PL Mashao, NC Mzolo, DH Greenfield

Background

This was a joint venture of the Sub-directorate Maternal, Child and Women's Health, (MCWH) Limpopo Province; Department of Paediatrics, Polokwane Campus, University of Limpopo; and the Centre for Rural Health, University of KwaZulu – Natal. The initiative arose out of an obstetric outreach called Toward Unity in Reproductive Care (TURC). A need was identified for improving newborn care along with maternal care. The pediatricians in the Province also recognised that little attention was given to newborn care in the rural hospitals, and that there was an urgent need to improve the quality of newborn care throughout the Province. The data available showed that the early neonatal mortality rate was 12 / 1000 live births, but that this was probably an underestimate of the real rate. The main causes of death were: Immaturity (40%), Hypoxia (35%) and infection (9%). The initiative was funded from the National Health Profession Development Grant. It started in early 2003, the initial plan was to run for 2 years. After an independent assessment by the Health Systems Trust, the initiative has run for a further 3 years.

Objectives

1. To conduct situational assessments of neonatal care, in the individual hospitals, focusing on the facilities, equipment, staffing, and policies relating to the care of newborns.
2. These findings were then presented at workshops where action plans were developed to deal with the problems identified.
3. To identify the knowledge and skills deficiencies in newborn care.
4. To run training sessions for the staff responsible for caring for newborns.
5. To identify key people who could provide ongoing leadership, training and support (sustainability).
6. To develop training materials and courses for those needing them, suitable records, clinical guidelines, protocols.
7. To develop a system of support, audit and evaluation of the quality of care.
8. To develop a process of accreditation for quality newborn care for hospitals.

Process

1. Health professionals were identified who would be available to do hospital visits and training. The team consisted of a paediatrician from the Polokwane – Mankweng academic complex, who oversaw the initiative, with two retired neonatologists and two advanced midwives. One of the midwives was based in Polokwane, and coordinated the initiative. This coordinator was key to the whole initiative.
2. Workshops The following workshops were held ;
 - Key people from each hospital were asked to attend. They went back to do a situational analysis of their own newborn service, and to report back to a second workshop where action plans were developed.
 - Hospital Managers, so that they could understand the role of newborn care.
 - Supervisors / unit managers. The emphasis was on management of issues around newborn care.
 - District clinic staff. The emphasis in these workshops was on what the clinic nurses needed to know about newborn care, and was very basic: The transport of sick babies, temperature control, monitoring and maintaining a normal blood sugar level in a baby needing transfer, identifying potential problems at antenatal clinic, and Knararoo Mother Care.
 - Perinatal Problem Identification Programme (PPIP) – the programme which was used for monitoring perinatal mortality. These workshops were attended by one or two key professional staff members in the Maternity wards and sometimes clerical staff who would be involved in data capture.
3. Hospital Visits
 - These were done by a doctor and midwife together.
 - The purpose was to assess:
 - the physical facilities, equipment, staffing, support services, policies and practices, and mortality data.
 - Do on site clinical training
 - Make recommendations about improvements, if needed.
 - Contact was made with the hospital management to explain the purpose of the visit and to enlist their support for improving the service.

- These visits were followed up with written reports to the hospital management as well as to the manager of MCWH in the Province
4. Clinical training
 - This was done mainly at the Provincial tertiary neonatal unit at Mankweng Hospital in order to have sufficient clinical material.
 - Training was provided for all categories of clinical staff – Enrolled Nurses and Nursing Assistants, Midwives, and Doctors.
 5. Tools were developed
 - Provincial Guidelines for Newborn Care
 - Norms and Standards needed for Newborn Care
 - Training materials: handouts, a problem based chart book, and training modules.
 - A standard Newborn Admission Record
 - Updated newborn charts for the Maternity record.
 - Audit tools for supervisors and for PPIP
 6. Accreditation
 - The accreditation process was established
 - Appropriate tools were developed

Successes

1. Facilities
 - In several hospitals, minor structural changes were made. These greatly improved the space and user – friendliness of the nurseries.
 - Kangaroo Mother Care (KMC) areas were identified and refurbished in all but 2 of the hospitals in the Province. Some of these units are among the best in South Africa.
2. Equipment
 - Almost all the hospitals now have all the basic and essential equipment for the appropriate level of care.
 - Continuous positive Airways Pressure (CPAP) is available in all the level 2, and some of the level 1, hospitals.
3. Staffing
 - Rotation of staff has stopped
 - Staff have been allocated specifically for newborn care.
 - Enrolled Nurses and Enrolled Nursing Assistants have been assigned to the newborn care areas. This has resulted in much improved observation of the sick infants.

- Staff attitudes towards newborns have improved, with an awareness that newborn requires specialised care.
4. Support services
 - All essential drugs for newborns are now available
 - In most hospitals the laboratory services have improved, particularly the speed with which results become available.
 5. Training
 - 299 midwives have received basic training in newborn care
 - 213 Enrolled Nurses / Enrolled Nursing Assistants have been trained
 - 333 doctors have received basic training
 - During hospital visits, it was clear that this had made a difference to the clinical management of the newborns.
 6. Tools
 - A standard admission document is now used in all hospitals in the Province
 - New and improved charts for newborns have been included in the Provincial Maternity Record.
 - Provincial guidelines for Newborn Care have been published and are now widely used.
 - Problem based training materials are in the final stages of development.
 - Suitable tools for use in the accreditation for quality newborn care have been developed.
 7. Policies
 - The routine admission of some normal infants (eg post caesarean section) has stopped.
 - The admission or readmission of older neonates is usually to the newborn care facility and not to the paediatric ward in most hospitals.
 - Routine bathing of infants has almost stopped.
 8. Accreditation for quality newborn care
 - This has been finalised and 13 hospitals have been accredited.
 - The tools have been found to be suitable
 9. Mortality audit
 - The Perinatal Problem Identification Programme (PPIP) is used in most hospitals for monitoring the perinatal and neonatal mortality.
 10. Neonatal mortality rates
 - There was an initial decline in the neonatal mortality rates in the Province.

Constraints and challenges

1. Putting knowledge into practice
 - Even when observations are diligently done, a problem may not be recognized eg a low blood sugar, and therefore action is not taken
 - Even when a problem is recognized there are often delays in taking action. The problem seems to be at the decision making level.
2. There have been difficulties in acquiring equipment
 - Some of these have been blocks at hospital management level
 - Some have been blocks at the stores level
 - Some have been delays in taking action, for no obvious reason.
 - Some have been a lack of consultation between the stores staff, who do the ordering, and the clinical staff.
3. Interpretation of mortality data
 - The important issue seems to be the identification of the problems and applying this knowledge to clinical practice.
4. The initial decrease in neonatal mortality rates was not generally sustained.

Key Issues

A person is needed to coordinate the programme, no matter how big or small it is.

This person needs to have patience, commitment, enthusiasm and to be a champion for the project.

It is important to ensure that the hospital and unit managers are “on board” early in the process.

Essential equipment and drugs must be available.

All categories of staff need to have at least basic training in newborn care.

The ongoing support and personal visits are probably the most important actions to ensure success.

Chapter 6

Essential steps in Managing Obstetric Emergencies: A practical way of improving obstetric and neonatal skills

ESMOE Working group

ESMOE is an emergency obstetric care training course aimed at improving the quality of emergency obstetric care in sub-district, district and regional hospitals in South Africa.

Background

The third Saving Mothers report dealing with the years 2002-2004 reported that 37.3% of maternal deaths were thought by the assessors to be clearly avoidable within the health service.

Figure 6.1 illustrates where the majority of maternal deaths are occurring

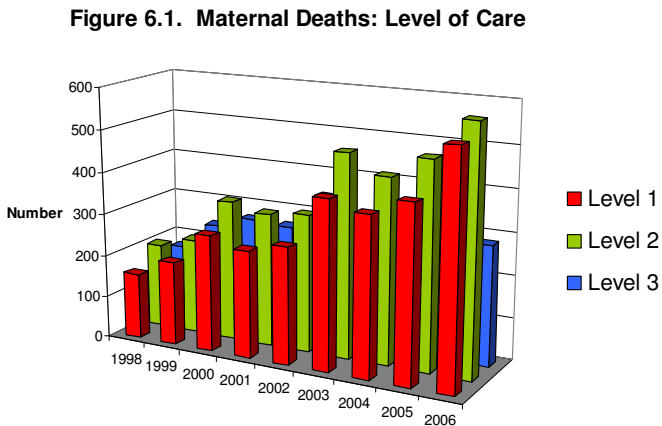
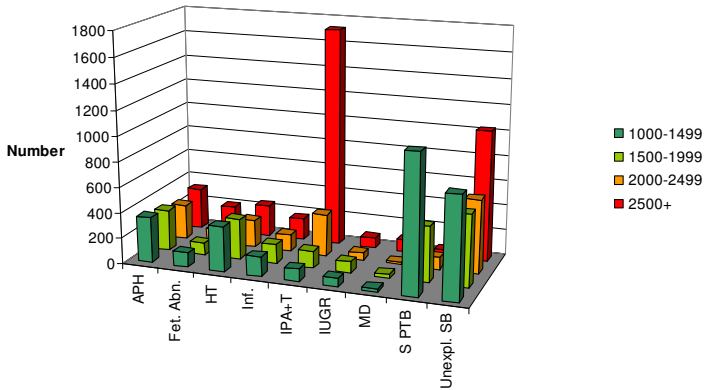


Figure 6.2 illustrates the impact of intrapartum asphyxia and birth trauma and spontaneous preterm labour has on perinatal deaths

Figure 6.2. Primary causes of perinatal death per weight category



From the Saving Mothers and Saving Babies reports it is clear that:

- Poor management of obstetric emergencies is a major contributor to maternal deaths
- There is an increase in deaths in level 1 and level 2 hospitals
- Level 1 and 2 are major areas of maternal deaths
- Community service doctors contribute a significant proportion of the human resources at these hospitals

Therefore it is essential to improve emergency obstetric care throughout South Africa

The **vision** of the ESMOE training course is:

To improve the emergency management of pregnant women and their infants by using a training package for emergency obstetric care that is:

- taught to undergraduate students, both medical and nursing,
- taught to all interns and which must be signed off prior to registration as a doctor,
- serves as a basis for fire-drills for both doctors and midwives in all institutions performing deliveries
- these training exercises are documented and that they occur is part of the institutions CEOs key performance areas.

The **constraints** of designing the course are:

- Limited number of interns per institution
 - Cannot be removed from the service for an extended period
- Limited number of skilled staff
 - Cannot be removed from the service for an extended period
- Programme must :
 - be run on-site,
 - repeatable,
 - maximum time of 4 months (e.g. 12 weeks, 12 weekly courses of approximately 1 hour each)

Thus the course was designed with the following **prerequisites** in mind:

1. Effectively trains interns, medical officers, midwives and appropriate nurses in emergency obstetric care (EOC).
2. The course must be able to be repeated regularly
3. Must be able to be used on-site by the relevant institution by an appropriate instructor/s.
4. Must highlight the important condition in South Africa as stipulated in Recommendation 1 of the Saving Mothers 2002-2004 report.

There are a number of **opportunities** in South Africa that make the time right to develop and implement the course

- **Saving Mothers 2002-4 recommendations:**
 - **Recommendation 1.**
 - Protocols on the management of important conditions causing maternal deaths must be available and utilised appropriately in all institutions where women deliver. All midwives and doctors *must be trained on the use of these protocols*.
 - The following are key conditions of which relevant protocols must be available:
 - Hypertensive disorders in pregnancy
 - Obstetric haemorrhage,
 - Septic abortion,
 - Puerperal Infections,
 - Communicable Diseases: STI's including HIV and AIDS, TB and Malaria
 - Resuscitation: Maternal and Neonatal.

- Non-communicable diseases: Diabetes mellitus and cardiac disease in pregnancy
- Indicators
 - Availability of relevant written protocols in the form of posters, individual booklets or tool kits in relevant sections of health facilities
 - Availability of a functioning training programme for all institutions at district level
 - Availability of the functioning program on quality assurance for proper use of guidelines by midwives and doctors at district level
- Targets
 - All institutions must have relevant written protocols in the form of posters, individual booklet or tool kit in relevant sections of these facilities
 - All districts must have a written functioning training programme in all institutions
 - All districts must have a written functioning program on quality assurance for proper use of guidelines by all health professionals including midwives and doctors
- Life Saving Skills (RCOG)
 - ‘No need to re-invent the wheel’
- “Essential steps in the management of common conditions associated with maternal and neonatal mortality” guidelines and “Guidelines for Maternity Care in South Africa” second edition have been published and supported by the National Department of Health.
- NCCEMD meetings with the HPCSA
 - Suggestions to improve intern training
 - Intern logbook
 - Every intern to be given a set of guidelines (“Essential Steps”)
 - Checklist for hospital inspections

With the help of the International Office of the RCOG and WHO internationally, and the South African Society of Obstetricians and

Gynaecologists (SASOG), the College of Obstetricians and Gynaecologists, the South African chapter of the RCOG, the national Department of Health, the National Committee for the Confidential Enquiries into Maternal Deaths and facilitated by the MRC Maternal and Infant Health Care Strategies Research Unit a training package was adapted for South African conditions, namely ESMOE.

Contents of Essential Steps in Managing Obstetric Emergencies training package are:

- Life Saving Skills manual (RCOG)
- “Essential steps in the management of common conditions associated with maternal and neonatal mortality” guideline and “Guidelines for Maternity Care in South Africa” second edition.
- Facilitators guide (Adapted RCOG guide)
- Mannequins (Figure 3)
- Posters
- CD/DVDs

Figure 6.3: Mannequins used in ESMOE training



ESMOE consists of 12 modules, namely:

1. Resuscitation Maternal
2. Resuscitation Neonatal
3. Shock and unconscious patient

4. Eclampsia and pre-eclampsia
5. Haemorrhage
6. Sepsis
7. Assisted delivery
8. Obstructed labour
9. Obstetric complications
10. Surgical skills
11. Complications of abortion
12. HIV in pregnancy

All the guidelines taught in the training package are derived from the “Essential steps in the management of common conditions associated with maternal and neonatal mortality” guideline and “Guidelines for Maternity Care in South Africa” second edition.

The ESMOE training package was tested in 2008. The results are given below.

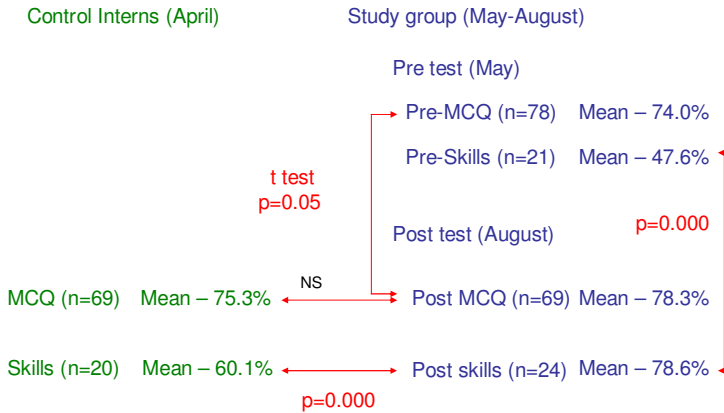
Results of pilot trial on testing ESMOE package

A total of 69 interns completing their Obstetrics and Gynaecology rotation in April wrote the Multiple Choice Question (MCQ) paper from 8 hospitals. Twenty of these of these were randomly chosen to do the skills test. This group served as the control for the study group that underwent the training. Seventy-eight of the new group of Obstetrics and Gynaecology interns starting in May wrote the MCQ paper as a pre-test and 21 were randomly chosen to do the skills test. The ESMOE training was then conducted. In August this group re-wrote the MCQ paper as a post-test and 24 were randomly selected to do the skills test. Table 6.1 illustrates the participating centres with the numbers of interns per institution and Figure 1 illustrates the results.

Table 6.1. Participating centres

Hospital	Controls	Study (pre)	Study (post)
Chris Hani/Baragwanath	16	22	15
Kalafong	6	7	7
Mowbray Maternity	6	6	8
Nelson Mandela	8	8	8
Pelanomi/Universitas	13	15	12
Pretoria Academic	10	10	9
Tygerberg	10	10	10
Total	69	78	69

Figure 6.3. Results of ESMOE pilot training



The study group completed a participant satisfaction questionnaire at the end of their training to evaluate the course (see Table 6.2). Marks were given using a score with 1 being definitely not agree to 10 being extremely happy.

All the participants were very happy with the course and its contents.

The pilot study shows that the knowledge increased slightly but more significantly the skills were greatly improved, 30% increase when compared with interns completing their O&G internship and 65% when compared with the start of their internship. Also the interns found the course and content very good.

The ESMOE programme is available and can be used for improving skills. Fire-drills have been written and can be used in maternity units to improve skills of the whole maternity unit.

Table 6.2: Participant participation questionnaire results

Question	Mean mark
Was the course enjoyable?	8.6
Was it easy to make the most of the course?	7.8
Was it easy to join in the interactive sessions?	8.2
Did you feel comfortable and at ease during the course?	8.6
Was the course a good use of your time?	8.5
How good was the venue?	8.5
How good was the equipment provided for learning?	8.3
Assessment of modules	
Lecture on ABCDs and the systemic approach	8.4
Module on Resuscitation of mother	8.3
Module on Resuscitation of the newborn	8.2
Module on Shock	8.3
Module on pre-eclampsia and eclampsia	8.4
Module on Haemorrhage	8.4
Module on obstetric complications	8.5
Module on obstetric labour	8.0
Module on assisted delivery	8.3
Module on Sepsis	8.1
Module on HIV/AIDS	8.0
Module on complication of abortion	8.0
Module on surgical skills	8.2

Appendices

Appendix 1

Common health system probable avoidable factors per primary obstetric cause

Table 1. Intrapartum asphyxia

Description	Number
Health care provider associated	1211
Fetal distress not detected intrapartum; fetus monitored	229
Fetal distress not detected intrapartum; fetus not monitored	161
Management of 2nd stage: prolonged with no intervention	133
Delay in medical personnel calling for expert assistance	73
Poor progress in labour, but partogram not used correctly	72
Poor progress in labour - partogram interpreted incorrectly	56
Delay in referring patient for secondary/tertiary treatment	51
Delay in doctor responding to call	48
Neonatal resuscitation inadequate	45
Poor progress in labour, but partogram not used	41
Medical personnel underestimated fetal size	40
Administrative problems	501
Inadequate facilities/equipment in neonatal unit/nursery	87
Insufficient nurses on duty to manage the patient adequately	67
Anaesthetic delay	54
Personnel not sufficiently trained to manage the patient	48
Insufficient doctors available to manage the patient	44
Lack of transport - Home to institution	44
Lack of transport - Institution to institution	35
Inadequate resuscitation equipment	32
Inadequate theatre facilities	21
Personnel too junior to manage the patient	16

Table 2. Birth trauma

Description	Number
Health care provider associated	121
Medical personnel underestimated fetal size	17
Breech presentation not diagnosed until late in labour	13
Management of 2nd stage: inappropriate use of vacuum	11
Delay in doctor responding to call	9
Fetal distress not detected intrapartum; fetus monitored	9
Neonatal resuscitation inadequate	8
Delay in medical personnel calling for expert assistance	6
Management of 2nd stage: prolonged with no intervention	6
No antenatal response to abnormal fetal lie	5
Administrative problems	72
Insufficient doctors available to manage the patient	14
Personnel not sufficiently trained to manage the patient	10
Anaesthetic delay	8
Inadequate resuscitation equipment	8
Inadequate facilities/equipment in neonatal unit/nursery	7
Lack of transport - Home to institution	7
Insufficient nurses on duty to manage the patient adequately	6
Personnel too junior to manage the patient	4

Table 3. Spontaneous preterm birth

Description	Number
Administrative problems	578
Inadequate facilities/equipment in neonatal unit/nursery	265
Inadequate resuscitation equipment	79
Lack of transport - Home to institution	73
No accessible neonatal ICU bed with ventilator	40
Insufficient nurses on duty to manage the patient adequately	23
Personnel not sufficiently trained to manage the patient	18
Insufficient doctors available to manage the patient	10
Lack of adequate neonatal transport	10
Personnel too junior to manage the patient	10
Lack of transport - Institution to institution	9
Health care provider associated	442
Neonatal care: management plan inadequate	104
Delay in referring patient for secondary/tertiary treatment	38
Antenatal steroids not given	33
Neonatal care: inadequate monitoring	33
Neonatal resuscitation inadequate	25
Incorrect management of premature labour	23
Multiple pregnancy not diagnosed antenatally	21
No response to history of stillbirths, abruptio etc.	21
Nosocomial infection	18
Medical personnel underestimated fetal size	13
Multiple pregnancy not diagnosed intrapartum	13
Baby managed incorrectly at Hospital/Clinic	11
Delay in medical personnel calling for expert assistance	10

Table 4. Hypertension

Description	Number
Health care provider associated	425
No response to maternal hypertension	163
Delay in referring patient for secondary/tertiary treatment	67
Fetal distress not detected antepartum; fetus not monitored	18
Fetal distress not detected intrapartum; fetus monitored	15
Delay in medical personnel calling for expert assistance	12
Neonatal care: management plan inadequate	11
No response to history of stillbirths, abruptio etc.	10
Fetal distress not detected antenatally; fetus monitored	9
Medical personnel underestimated fetal size	9
No response to poor uterine fundal growth	9
Physical examination of patient at clinic incomplete	9
Administrative problems	130
Inadequate facilities/equipment in neonatal unit/nursery	23
Lack of transport - Home to institution	17
Lack of transport - Institution to institution	15
Personnel not sufficiently trained to manage the patient	15
Insufficient nurses on duty to manage the patient adequately	10
No accessible neonatal ICU bed with ventilator	7
Inadequate resuscitation equipment	5
No dedicated high risk ANC at referral hospital	5

Table 5. Antepartum haemorrhage

Description	Number
Health care provider associated	221
No response to maternal hypertension	49
Delay in referring patient for secondary/tertiary treatment	23
Incorrect management of antepartum haemorrhage	21
Fetal distress not detected intrapartum; fetus monitored	13
No response to history of stillbirths, abruptio etc.	12
Delay in medical personnel calling for expert assistance	9
Physical examination of patient at clinic incomplete	7
Fetal distress not detected antenatally; fetus monitored	6
No response to poor uterine fundal growth	6
Fetal distress not detected intrapartum; fetus not monitored	5
Administrative problems	122
Inadequate facilities/equipment in neonatal unit/nursery	21
Lack of transport - Home to institution	20
Lack of transport - Institution to institution	13
Inadequate theatre facilities	12
Anaesthetic delay	10
Insufficient doctors available to manage the patient	7
Personnel not sufficiently trained to manage the patient	7
Personnel too junior to manage the patient	6
No accessible neonatal ICU bed with ventilator	5

Table 6. Unexplained stillbirths

Description	Number
Health care provider associated	154
Delay in referring patient for secondary/tertiary treatment	12
Fetal distress not detected antepartum; fetus not monitored	12
No response to history of poor fetal movement	11
No response to maternal hypertension	11
Fetal distress not detected intrapartum; fetus not monitored	10
Fetal distress not detected antenatally; fetus monitored	9
Multiple pregnancy not diagnosed antenatally	9
Physical examination of patient at clinic incomplete	9
Fetal distress not detected intrapartum; fetus monitored	8
No response to history of stillbirths, abruptio etc.	8
Administrative problems	90
Lack of transport - Home to institution	34
No syphilis screening performed at hospital / clinic	11
Insufficient nurses on duty to manage the patient adequately	6
Lack of transport - Institution to institution	6
Personnel not sufficiently trained to manage the patient	5
Result of syphilis screening not returned to hospital/clinic	5

Table 7. Intrauterine growth restriction

Description	Number
Health care provider associated	147
No response to poor uterine fundal growth	41
No response to apparent postterm pregnancy	30
Fetal distress not detected antepartum; fetus not monitored	21
Medical personnel overestimated fetal size	8
Medical personnel underestimated fetal size	8
Fetal distress not detected antenatally; fetus monitored	7
Fetal distress not detected intrapartum; fetus monitored	6
Delay in referring patient for secondary/tertiary treatment	3
Fetal distress not detected intrapartum; fetus not monitored	3
Neonatal care: management plan inadequate	3
No response to maternal hypertension	3
Administrative problems	18
Inadequate facilities/equipment in neonatal unit/nursery	6
Insufficient nurses on duty to manage the patient adequately	4
Insufficient doctors available to manage the patient	2
Lack of transport - Home to institution	2

Table 8. Diabetes mellitus

Description	Number
Health care provider associated	40
No response to maternal glycosuria	20
Delay in referring patient for secondary/tertiary treatment	4
Medical personnel underestimated fetal size	3
Doctor did not respond to call	2
No response to maternal hypertension	2
Physical examination of patient at clinic incomplete	2
Antenatal steroids not given	1
Fetal distress not detected intrapartum; fetus not monitored	1
GP did not give card/letter about antenatal care	1
Iatrogenic delivery for no real reason	1
Medical personnel overestimated fetal size	1
Neonatal care: management plan inadequate	1
Neonatal resuscitation inadequate	1
Administrative problems	12
Personnel too junior to manage the patient	6
Personnel not sufficiently trained to manage the patient	3
Inadequate facilities/equipment in neonatal unit/nursery	1
No dedicated high risk ANC at referral hospital	1

Appendix 2

Common health system avoidable factors per level of care

Table 1. Community Health Centre

Description	Number
Health Care Provider associated	45
Fetal distress not detected intrapartum; fetus monitored	7
Delay in referring patient for secondary/tertiary treatment	4
Fetal distress not detected intrapartum; fetus not monitored	4
Neonatal resuscitation inadequate	4
Delay in medical personnel calling for expert assistance	3
No response to apparent postterm pregnancy	3
Administrative problems	19
Lack of transport - Home to institution	7
Lack of transport - Institution to institution	5

Table 2. District Hospitals

Description	Number
Health Care Provider associated	1789
Fetal distress not detected intrapartum; fetus monitored	189
Neonatal care: management plan inadequate	138
Delay in referring patient for secondary/tertiary treatment	137
Fetal distress not detected intrapartum; fetus not monitored	128
No response to maternal hypertension	118
Management of 2nd stage: prolonged with no intervention	93
Delay in medical personnel calling for expert assistance	74
Medical personnel underestimated fetal size	70
Neonatal resuscitation inadequate	69
Neonatal care: inadequate monitoring	64
Poor progress in labour, but partogram not used correctly	49
Delay in doctor responding to call	44
Poor progress in labour - partogram interpreted incorrectly	43
Antenatal steroids not given	37
Poor progress in labour, but partogram not used	36
Multiple pregnancy not diagnosed antenatally	32
No response to history of stillbirths, abruptio etc.	31
Multiple pregnancy not diagnosed intrapartum	29
Breech presentation not diagnosed until late in labour	28
Incorrect management of premature labour	26
Physical examination of patient at clinic incomplete	26
Fetal distress not detected antenatally; fetus monitored	24
Baby managed incorrectly at Hospital/Clinic	23
Inadequate / No advice given to mother	19
Medical personnel overestimated fetal size	18
No response to maternal glycosuria	18
No response to positive syphilis serology test	18
No response to history of poor fetal movement	17
Management of 2nd stage: inappropriate use of vacuum	15
Fetal distress not detected antepartum; fetus not monitored	14
Incorrect management of antepartum haemorrhage	14
No response to apparent postterm pregnancy	14
No response to poor uterine fundal growth	12
Doctor did not respond to call	10

Table 2. District Hospitals (Cont.)

Description	Number
Administrative problems	1092
Inadequate facilities/equipment in neonatal unit/nursery	333
Lack of transport - Home to institution	142
Inadequate resuscitation equipment	116
Personnel not sufficiently trained to manage the patient	80
Insufficient nurses on duty to manage the patient adequately	77
Anaesthetic delay	53
No accessible neonatal ICU bed with ventilator	44
Insufficient doctors available to manage the patient	38
Personnel too junior to manage the patient	36
No syphilis screening performed at hospital / clinic	28
Lack of transport - Institution to institution	24
Result of syphilis screening not returned to hospital/clinic	21
Inadequate theatre facilities	18
Lack of adequate neonatal transport	16
No dedicated high risk ANC at referral hospital	13
No on-site syphilis testing available	7
Staff rotation too rapid	7

Table 3. Regional Hospitals

Description	Number
Health Care Provider associated	1023
Fetal distress not detected intrapartum; fetus monitored	90
Delay in referring patient for secondary/tertiary treatment	76
No response to maternal hypertension	74
Fetal distress not detected intrapartum; fetus not monitored	65
Fetal distress not detected antepartum; fetus not monitored	55
Management of 2nd stage: prolonged with no intervention	48
No response to poor uterine fundal growth	48
Delay in medical personnel calling for expert assistance	41
Delay in doctor responding to call	37
Medical personnel underestimated fetal size	34
Neonatal care: management plan inadequate	30
No response to apparent postterm pregnancy	26
Poor progress in labour, but partogram not used correctly	26
No response to history of stillbirths, abruptio etc.	23
Physical examination of patient at clinic incomplete	22
Multiple pregnancy not diagnosed antenatally	21
Poor progress in labour - partogram interpreted incorrectly	21
Fetal distress not detected antenatally; fetus monitored	20
Baby managed incorrectly at Hospital/Clinic	19
Nosocomial infection	18
Breech presentation not diagnosed until late in labour	16
Multiple pregnancy not diagnosed intrapartum	16
Neonatal resuscitation inadequate	16
Neonatal care: inadequate monitoring	14
Poor progress in labour, but partogram not used	14
Medical personnel overestimated fetal size	13
Management of 2nd stage: inappropriate use of vacuum	9
Doctor did not respond to call	8
No antenatal response to abnormal fetal lie	8
No response to history of poor fetal movement	8
Administrative problems	461
Inadequate facilities/equipment in neonatal unit/nursery	100
Insufficient nurses on duty to manage the patient adequately	50
Lack of transport - Home to institution	49
Insufficient doctors available to manage the patient	37
Lack of transport - Institution to institution	37
Inadequate theatre facilities	29
Personnel not sufficiently trained to manage the patient	29
No accessible neonatal ICU bed with ventilator	26
Anaesthetic delay	23
Inadequate resuscitation equipment	17
No on-site syphilis testing available	8
Personnel too junior to manage the patient	8

Table 4. Provincial Tertiary Hospitals

	Number
Health Care Provider I associated	134
No response to maternal hypertension	39
Other	16
Fetal distress not detected intrapartum; fetus monitored	13
Management of 2nd stage: prolonged with no intervention	9
Delay in medical personnel calling for expert assistance	6
Poor progress in labour, but partogram not used correctly	5
Delay in referring patient for secondary/tertiary treatment	4
No response to history of stillbirths, abruptio etc.	4
Administrative problems	60
Lack of transport - Institution to institution	14
Lack of transport - Home to institution	9
Anaesthetic delay	6
Insufficient doctors available to manage the patient	6
Personnel too junior to manage the patient	5
Insufficient nurses on duty to manage the patient adequately	4

Table 5. National Central Hospitals

	Number
Health Care Provider associated	44
Fetal distress not detected intrapartum; fetus monitored	7
Neonatal resuscitation inadequate	4
Delay in referring patient for secondary/tertiary treatment	3
Fetal distress not detected antenatally; fetus monitored	3
Fetal distress not detected intrapartum; fetus not monitored	3
Incorrect management of antepartum haemorrhage	3
No response to maternal hypertension	3
Administrative problems	19
Lack of transport - Institution to institution	4
Inadequate facilities/equipment in neonatal unit/nursery	2
Insufficient doctors available to manage the patient	2
Personnel not sufficiently trained to manage the patient	2
Personnel too junior to manage the patient	2

Appendix 3

Common patient related avoidable factors

Description	Number	% all deaths
Patient associated		
Inappropriate response to poor fetal movements	1043	5.7
Delay in seeking medical attention during labour	904	4.9
Never initiated antenatal care	924	5.0
Booked late in pregnancy	649	3.5
Infrequent visits to antenatal clinic	225	1.2
Inappropriate response to antepartum haemorrhage	88	0.5
Inappropriate response to rupture of membranes	85	0.5
Failed to return on prescribed date	66	0.4
Declines admission/treatment for personal/social reasons	55	0.3
Attempted termination of pregnancy	24	0.1
Delay in seeking help when baby ill	21	0.1
Alcohol abuse	18	0.1
Smoking	16	0.1
Assault	13	0.1
Infanticide	6	0.0
Partner/Family declines admission/treatment	6	0.0
Abandoned baby	4	0.0

Appendix 4

Probable avoidable factors per period of care

Antenatal factors in probably avoidable deaths

Description	Number	% all perinatal deaths
Inappropriate response to poor fetal movements	1052	5.7
Never initiated antenatal care	933	5.1
Booked late in pregnancy	657	3.6
Infrequent visits to antenatal clinic	226	1.2
Failed to return on prescribed date	67	0.4
No response to poor uterine fundal growth	64	0.3
No response to history of stillbirths, abruptio etc.	60	0.3
Multiple pregnancy not diagnosed antenatally	54	0.3
Physical examination of patient at clinic incomplete	51	0.3
Antenatal steroids not given	44	0.2
No syphilis screening performed at hospital / clinic	36	0.2
No response to positive syphilis serology test	30	0.2
No response to maternal glycosuria	26	0.1
Result of syphilis screening not returned to hospital/clinic	26	0.1
Inadequate / No advice given to mother	25	0.1
Alcohol abuse	19	0.1
No on-site syphilis testing available	17	0.1
No dedicated high risk ANC at referral hospital	16	0.1
Smoking	16	0.1
GP did not give card/letter about antenatal care	9	0.0
No Motherhood card issued	9	0.0
Antenatal card lost	26	0.1
Delay in seeking help when baby ill	22	0.1
No response to apparent post-term pregnancy	44	0.2
No response to history of poor fetal movement	27	0.1
Attempted termination of pregnancy	25	0.1
No antenatal response to abnormal fetal lie	19	0.1
Iatrogenic delivery for no real reason	5	0.0
Declines admission/treatment for personal/social reasons	55	0.3
Multiple pregnancy not diagnosed intrapartum	46	0.3
Number all perinatal deaths	18305	

Intrapartum factors in probably avoidable deaths

Description	Number	% all SB alive on admission and neonatal deaths
Multiple pregnancy not diagnosed intrapartum	46	0.6
Fetal distress not detected intrapartum; fetus monitored	306	3.7
No response to maternal hypertension	234	2.9
Fetal distress not detected intrapartum; fetus not monitored	203	2.5
Management of 2nd stage: prolonged with no intervention	151	1.8
Insufficient nurses on duty to manage the patient adequately	132	1.6
Delay in medical personnel calling for expert assistance	127	1.6
Personnel not sufficiently trained to manage the patient	116	1.4
Medical personnel underestimated fetal size	110	1.3
Inappropriate response to antepartum haemorrhage	88	1.1
Inappropriate response to rupture of membranes	86	1.1
Delay in doctor responding to call	84	1.0
Insufficient doctors available to manage the patient	83	1.0
Poor progress in labour, but partogram not used correctly	81	1.0
Fetal distress not detected antepartum; fetus not monitored	71	0.9
Poor progress in labour - partogram interpreted incorrectly	67	0.8
Poor progress in labour, but partogram not used	55	0.7
Personnel too junior to manage the patient	51	0.6
Fetal distress not detected antenatally; fetus monitored	49	0.6
Breech presentation not diagnosed until late in labour	45	0.6
Medical personnel overestimated fetal size	37	0.5
Incorrect management of premature labour	34	0.4
Incorrect management of antepartum haemorrhage	27	0.3
Management of 2nd stage: inappropriate use of vacuum	25	0.3
Incorrect management of cord prolapse	12	0.1
Staff rotation too rapid	8	0.1
Management of 2nd stage: inappropriate use of forceps	7	0.1
Anaesthetic delay	83	1.0
No response to apparent postterm pregnancy	44	0.5
No response to history of poor fetal movement	27	0.3
Attempted termination of pregnancy	25	0.3
All SB Alive on admission and neonatal deaths	8164	

Neonatal factors in probably avoidable deaths

Description	Number	% all neonatal deaths
Inadequate facilities/equipment in neonatal unit/nursery	436	6.6
Neonatal care: management plan inadequate	170	2.6
Inadequate resuscitation equipment	135	2.1
Neonatal resuscitation inadequate	95	1.4
Neonatal care: inadequate monitoring	80	1.2
No accessible neonatal ICU bed with ventilator	75	1.1
Baby managed incorrectly at Hospital/Clinic	44	0.7
Nosocomial infection	30	0.5
Baby sent home inappropriately	3	0.0
Lack of adequate neonatal transport	20	0.3
All Neonatal deaths	6562	

Delays in probably avoidable deaths

Description	Number	% all deaths
Delay in seeking help when baby ill	22	0.1
Delay in seeking medical attention during labour	914	5.0
Delay in referring patient for secondary/tertiary treatment	225	1.2
Lack of transport - Home to institution	210	1.1
Lack of transport - Institution to institution	84	0.5
Inadequate theatre facilities	48	0.3
Doctor did not respond to call	18	0.1
Declines admission/treatment for personal/social reasons	55	0.3
Anaesthetic delay	83	0.5
All perinatal deaths	18305	