



**Saving Babies 2002**  
**Third Perinatal Care Survey**  
**of South Africa**

Compiled by:  
The MRC Unit for Maternal and  
Infant Health Care Strategies,  
PPIP Users, and the  
National Department of Health



**Delegates at the Saving Babies 3: A Perinatal Care Survey of South Africa Workshop  
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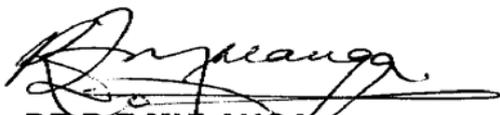
## Foreword

The past three years have seen a remarkable improvement of perinatal data collection as well as an increase in the number of Perinatal Problem Identification Programme sites in all provinces. All the provinces now have a reasonable understanding of their perinatal care indices. The Saving Babies report should be seen as a catalyst for establishing systems for identifying perinatal health care needs. A number of research questions have also been raised throughout the document.

It is not possible at this point to assess changing trends in perinatal care because the sites are not constant as new sites are established whilst others cease to exist. We look forward to the time when all facilities conducting deliveries can conduct audits of their performances, and share the data from their facilities for collation and analysis. This would facilitate monitoring trends in the quality of care and pattern of perinatal ill health.

It is also encouraging and pleasing to note that all the provinces have identified priority interventions that can be implemented within available resources to improve perinatal care. The Saving Babies 3 report has gone beyond identifying the challenges in provision of perinatal care. It provides solutions to some of the key challenges identified. The quality assurance tools will facilitate auditing of care provided.

The Department of Health hopes that the identified strategies will be implemented and the set targets achieved. Childbirth should, in the majority of women cared for by our services, bring joy and celebration to the expectant families. This can only be true if the long-term development of children is assured.



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This report will be available on the PPIP website: [www.ppip.co.za](http://www.ppip.co.za)

## **Strategies for reducing Perinatal Deaths**

### **Recommendations and Motivations from the Third Perinatal Care Survey Workshop**

#### **Reduction in perinatal mortality feasible without incurring major costs**

A third Perinatal Care Survey workshop was held at the Hammanskraal campus of the University of Pretoria, from the 18-20<sup>th</sup> November 2002. Like the previous two, this workshop brought together the users of the Perinatal Problem Identification Programme (PPIP), the national and provincial Maternal, Child and Women's Health (MCWH) units, the national and provincial Health Information and Epidemiology units, and the Medical Research Council (MRC) Research Unit for Maternal and Infant Health Care Strategies to discuss perinatal care based on an audit of perinatal deaths in South Africa.

It is not possible at this stage for South Africa to have confidential enquiries into all perinatal deaths like the one into maternal deaths because of the magnitude of the task. A solution however has been developed whereby the national basic perinatal data, (i.e. data from every site where babies are born) and data from sentinel sites around the country that have confidential enquiries into all the perinatal deaths in their areas, are combined. The basic perinatal data is a minimal data set that includes all births and deaths in their weight categories. The data from the sentinel sites adds descriptive data of causes and avoidable factors to the basic perinatal care indices. This gives a good reflection of the magnitude of the problem of perinatal care in the country, and also provides information on why the infants are dying by including details on pathology and health system failure. The combination of both sets of data gives a reliable picture of perinatal care in the country and can direct health workers to areas where the greatest improvements can be made. The reports published under the **“Saving Babies”** banner are available for 2000 and 2001 from the National Department of Health. The third report included 76 sentinel sites and every province and every geographical area was represented and combines the data for 2000-2002. (Details are in the Overview).

Considerable discussions took place at the workshops on prioritising interventions and on deciding which strategies to implement. The recommendations of the group (Appendix 2) are given below. Subsequent reports by this grouping will concentrate on identifying what strategies are most effective and provide case histories of how it was achieved. In this way this group hopes it will play a significant role in improving the care of pregnant women and their babies.

Five key strategies were decided upon and regarded as implementable solutions. The strategies are described in such a way that their implementation can be measured. Recommendations on improving the process were also discussed. The group also recognised it has extremely valuable information and all groups of society need to hear it. For this reason, strategies were developed to disseminate the information. Finally, it was recognised that there were some of the findings that need better investigation and research needs to be conducted in those priority areas. All these recommendations are aimed at health workers, health administrators, medical schools and nursing colleges. Specific recommendations for the public are not addressed in the report. These suggestions come from the workshop and are not government policy. They serve to initiate the process of discussing ways of decreasing perinatal mortality in South Africa.

## Five key strategies

1. *Ensure each site conducting births has the necessary equipment and protocols and that the health care providers are appropriately trained to manage labour and are especially trained in the use of the partogram. Introduce a quality assurance tool to assess the success of the training.*

Motivation: Intrapartum asphyxia and birth trauma was a significant contributor to perinatal deaths throughout the country, but especially in the rural areas where in babies over 2,5 kg it was responsible for more than 50% of deaths.

2. *Ensure each site conducting births has the necessary equipment and protocols and appropriately trained staff to manage asphyxiated neonates. See that training programmes in neonatal resuscitation are accessible to all staff involved with conducting childbirth.*

Motivation: The most common cause of neonatal death in babies over 2,5 kg was hypoxia. Adequate resuscitation of these infants could significantly reduce mortality and morbidity.

3. *Ensure each site caring for premature infants has the necessary equipment and protocols appropriate to the level of care and that the health care workers, including and especially those in cities, towns and rural areas, are appropriately trained in care for the premature infant including kangaroo mother care. See that implementation programmes are available to the staff.*

Motivation: For birth weights 1-2kg, the neonatal death rate in the city and towns and rural areas are almost twice as high as those for neonates in metropolitan areas. Little can be done to prevent the births of these infants. To reduce mortality improvements in the care of the premature infants in city and towns and rural areas will have to occur. Kangaroo mother care as a step down facility for neonatal care is a cost effective intervention for caring for stable premature infants and allows for better utilisation of scarce intensive and high care neonatal resources. It has also been proven to reduce neonatal mortality in rural settings.

4. *Ensure each site providing antenatal care has protocols in place for where to and when to refer patients and the health care providers are appropriately trained therein. Introduce a quality assurance tool to assess the success of the training.*

Motivation: A considerable number of missed opportunities occurred in the antenatal clinics where the health care workers did not take the appropriate actions.

5. *Move to a system where the time and point at which the woman confirms she is pregnant also becomes the woman's first antenatal visit where she can be classified according to risk and where her further antenatal care is specifically planned. If this is not practice, establish what the barriers are and overcome them.*

Motivation: The most common patient orientated avoidable factor was no or infrequent attendance at antenatal care. The problem is not lack of knowledge about antenatal care, but the complication occurring before the woman intended starting antenatal care. If antenatal care could be initiated when

the pregnancy was confirmed, then this problem would be greatly reduced, allowing adequate time to intervene in the pregnancy if necessary.

These recommendations, if implemented will also impact on the maternal mortality and are compatible with the “**Saving Mothers 1999-2001**”<sup>3</sup> recommendations.

The Department of Health has produced **Guidelines for Maternity Care in South Africa**<sup>4</sup> for clinics, community health centres and district hospitals. These guidelines are all that is needed for these institutions to develop their own protocols.

There are as yet no national guidelines for neonatal care that must be a priority. Getting information for example on implementing kangaroo mother care is not readily available. Training courses on neonatal resuscitation are commercially available but access to the majority of those caring for neonates is extremely limited. A new Perinatal Education Programme on basic neonatal care has been produced, but as yet has not been widely publicized and disseminated.

Methods of assessing the quality of care of women in the antenatal period and intrapartum were discussed. Workable examples for auditing antenatal and intrapartum care are available. These tools could be very influential in changing practice. (Examples of these tools are given in **Saving Babies 2001: Second perinatal care survey of South Africa**<sup>5</sup>. These reports are available from the National Department of Health, Private Bag X828, Pretoria, 0001).

The Better Births Initiative is available on the Internet and is a programme aimed at directly improving the standard and quality of care during labour ([www.liv.ac.uk/1stm/ehcap/bbimainpage.htm](http://www.liv.ac.uk/1stm/ehcap/bbimainpage.htm)).

A number of crucial questions crystallised during the workshop that the group felt it was necessary to answer urgently. They were:

- What is the primary pathology related to unexplained IUDs?
- What are the barriers to implementing on-site screening for syphilis?
- What are the barriers to implementation of initiation of antenatal care at the confirmation of pregnancy?
- What is the feasibility of introducing nasal continuous positive airways pressure (nCPAP) for the care of premature infants in cities and towns and rural areas?

## **Conclusion**

There are a few essential ingredients necessary to effect change<sup>6</sup>. The first phase is to identify the magnitude of the problem, and to realise that it is feasible to improve significantly upon the current state of affairs. The second phase is to have the knowledge available to improve the situation, to persuade the health workers to use that knowledge and to make the knowledge and facilities available to the vast majority of the population. For this, a political will must exist to push through the necessary changes.

South Africa is at the point where it can give a reliable estimate of its perinatal mortality rate, prioritise the common causes of perinatal death and list the major avoidable factors, missed opportunities and areas of substandard care that exist surrounding these perinatal deaths. Most importantly, South Africa now knows that these common causes and factors are remediable and are remediable without a massive increase in health spending.

Medical knowledge is available to prevent these deaths and the health system is in place to make that knowledge available to the vast majority of pregnant women. There is a strong political will to improve the care of pregnant women and their infants. Thus all the ingredients are available except that of persuading the health care providers to use the knowledge available and direct their energies in the most appropriate way. Should that occur, South Africa should see a sudden and major improvement in perinatal care.

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## Perinatal Care Surveys 2000-2002: An Overview of the Challenges

### Summary

**Aim:** To identify the major causes of perinatal mortality and the most common avoidable factors, missed opportunities and substandard care in perinatal care in South Africa.

**Setting:** Seventy-three state hospitals throughout South Africa representing metropolitan areas, cities and towns and rural areas.

**Method:** Users of the Perinatal Problem Identification Programme (PPIP) amalgamated their data to provide descriptive information on the causes of perinatal death and the avoidable factors, missed opportunities and substandard care in South Africa.

**Results:** A total of 8085 perinatal deaths of 1000g or more were reported from 232 718 births at the PPIP Users sites. The perinatal mortality rates for the metropolitan, city and town and rural groupings were 36.2, 38.6 and 26.7/1000 births, respectively. The neonatal death rate was highest in the city and town groups (14.5/1000 live births) followed by the rural and metropolitan groups (11.3 and 10.0/1000 live births respectively). The low birth weight rate was highest in the metropolitan group (19.6%), followed by the city and town group (16.5%) and the rural group (13.0%).

The most common primary cause of perinatal death in the rural group was intrapartum asphyxia and birth trauma (rate 6.92/1000 births) followed by spontaneous preterm delivery (5.37/1000 births). The most common primary cause of death in the city and town group was spontaneous preterm delivery (6.79/1000 births) followed by intrapartum asphyxia and birth trauma (6.21/1000 births) and antepartum haemorrhage (5.7/1000 births). The metropolitan group's most common primary causes were antepartum haemorrhage (7.14/1000 births), complications of hypertension in pregnancy (5.09/1000 births) and spontaneous preterm labour (4.01/1000 births). Unexplained intrauterine deaths were the most common recorded primary obstetric cause of death in all areas. Neonatal deaths due to complications of prematurity and hypoxia were the most common final neonatal causes of death in all groups.

Avoidable factors, missed opportunities and substandard care were reported to be patient related between 31.5% and 47.5% of deaths, administrative problems between 10.1% and 31.1% of deaths and health worker related problems between 28.4% and 36.0% of deaths in the metropolitan and rural areas respectively. The city and towns lay between these ranges. Deaths were thought to be clearly preventable within the health system in 63.1%, 34.4% and 35.7% of cases due to intrapartum asphyxia and birth trauma in the metropolitan, city and towns and rural areas respectively. Deaths due to hypertension and antepartum haemorrhage were thought to be clearly preventable within the health system in 18.7%, 15.4% and 20.0% of cases in the metropolitan, city and towns and rural areas respectively. Far fewer preventable deaths were recorded in the spontaneous preterm labour category.

**Conclusion:** Intrapartum asphyxia and birth trauma, antepartum haemorrhage and complications of hypertension in pregnancy and spontaneous preterm labour account for more than eighty percent of the primary obstetric causes of death. Concentration on the remedial priority problems identified (namely managing labour, resuscitation of the asphyxiated neonate, care of the premature neonate) makes the reduction of perinatal mortality in South Africa feasible and inexpensive.

## Introduction

Historically, where there has been a dramatic reduction in maternal mortality, it has been associated with two technical phases<sup>1</sup>. The first phase is a description of the magnitude of the problem (both in local and in comparative terms) and the realisation that it is feasible to do something about it. The second phase is the acquisition of new (scientific) knowledge, the teaching of this new knowledge to health workers, and finally making the knowledge and facilities available to the vast majority of the population. This coupled with a political will and pressure from the population to do something about it has resulted in dramatic drops in the maternal mortality ratio. The same principles exist for reducing perinatal mortality.

In South Africa, the ingredients for the second phase are in place. The scientific knowledge is available, the teaching systems are in place and a health system exists that can provide health care to the vast majority of the population. However, the perinatal mortality rate is not known nor is the most common causes of perinatal death. Hence the magnitude of the problem and the manageability of the problem have yet to be defined. This report fills this gap.

## Methods

Users of the Perinatal Problem Identification Programme (PPIP) amalgamated their data to provide descriptive information on the causes of perinatal death and the avoidable factors, missed opportunities and substandard care in South Africa. PPIP was developed in the 1990s by the MRC Research Unit for Maternal and Infant Health Care Strategies and been extensively field tested since 1996. PPIP is a simple, user friendly computer-based programme that, once simple perinatal data is entered, calculates various perinatal care indices, describes the medical conditions that led to the perinatal death and lists the avoidable factors, missed opportunities and substandard care that were associated with the deaths. The data from various sites can be collated, thus perinatal care indices, patterns of disease and avoidable factors can be analysed for various groupings of sites, e.g. provinces, or levels of care, or metropolitan, cities and towns and rural areas. Once this information is available, the priority problems are clearly identified and solutions can be sought. PPIP follows the ICA Solution Audit system, described in 1995<sup>2</sup>. This system, although not time consuming or labour intensive, relies on the presence of regular perinatal mortality meetings to discuss the various deaths and the possible shortcomings in care. The classification system used in PPIP to describe the causes of perinatal death was first used in Aberdeen by Sir Dugald Baird and his colleagues from the 1940s and is clearly defined in *Perinatal Problems: The second report of the 1958 British Perinatal Mortality Survey*<sup>3</sup>. The chief purpose of the classification system was to assist in the prevention of perinatal deaths, and therefore the aim of the Aberdeen classification system is to identify 'the factor which probably initiated the train of events leading to death'. This system clearly points to where prevention can be targeted. The classification system was modified by Whitfield *et al.*<sup>4</sup> in 1986 to bring it into line with modern obstetrics and this forms one of the systems used in CESDI. The Aberdeen classification was adapted again by Pattinson *et al.*<sup>5</sup> in 1989 for use in developing countries and again in 1995<sup>2</sup> to include the concept of avoidable factors, missed opportunities and substandard care.

The definition of avoidable factors, missed opportunities and substandard care used in PPIP was the same as that adopted by the United Kingdom for its confidential enquiries into maternal deaths in 1985<sup>6</sup>. The definition takes into

account not only failure in clinical care, but also some of the underlying factors which may have produced a low standard of care for the patient. This includes situations produced by the action of the woman herself, or her relatives, which may be outside the control of the clinicians. It also takes into account shortage of resources for staffing facilities, administrative failure in the maternity services and the back-up facilities such as ambulance, anaesthetic and neonatal services. The basic structure of the assessment of care system devised for PPIP is to analyse the woman and her environment (patient related); the administrative circumstances surrounding the care and the quality of health care (health worker related), each individually. Analysis in these three categories has the obvious advantage that information gained in these areas can be fed back immediately to the relevant sectors for action. The avoidable factors, missed opportunities and substandard care were recorded and classified as either being *possibly* related to or *probably* related to the death of the baby. Those factors classified as *probably* related to the death indicates that the omission or commission is directly related to the death of the baby, whereas those classified as *possibly* avoidable only indicate a possible association with the death.

The PPIP users were grouped into three categories, those from metropolitan areas, (as defined by the new mega-cities), cities and towns, and rural areas. This was chosen as it grouped the hospitals into natural comparable units and covered most of the institutional deliveries occurring in those areas. The grouping falls naturally into those areas with easy access to tertiary services (metropolitan group), those with easy access to secondary level care, regional and district hospitals (city and town group) and those where mainly primary level care is available, district and sub-district hospitals (rural group).

There were 73 PPIP sentinel sites that provided data and they are given below:

- Metropolitan:** Addington, Chris Hani Baragwanath, Grey's, Kalafong, King Edward VIII<sup>th</sup>, Mahatma Gandhi Memorial, Peninsular Maternity and Neonatal Services (Groote Schuur, Peninsular Maternity and Somerset Hospitals and their Midwife Obstetric Units) and Pretoria Academic Hospitals.
- City & Town:** Calvinia, De Aar, Eben Donges, Empangeni, Goldfields Regional, Jan Kempdorp, Kimberly, Klerksdorp, Kuruman, Ladysmith, Leratong, Louis Trichardt, Mafikeng, Madadeni, Mankweng, Middelburg, Potchefstroom, Rob Ferreira, Settlers, Springbok, Thabazimbi, Uitenhage, Virginia, Warmbaths, Witbank Hospitals, and Zeerust Hospitals.
- Rural:** Blouberg, Botlokwa, Ceres, CN Phatudi, Donald Fraser, Elim, Ellisras, FH Odendaal, Gelukspan, George Masebe, Grootboek, Helene Franz, Jane Furse, Kgapane, Letaba, Lydenburg, Mary Terese, Malamulele, Mapulaneng, Matlala, Mecklenburg, Mokopane, Nkhensani, Port Alfred, Robertson, Seshego, Shongwe, St Elizabeths, St Patricks, St Ritas, Tintswalo, Themba, Tshilidzini, van Velden, Voortrekker, WF Knobel and Witpoort Hospitals.

Other sites that have used or are using PPIP but for which electronic PPIP data was not available at the time of the analysis: All Saints, Barberton, Bethal, Carltonville, Dr Yusuf Dadoo, Eshowe, Far East Rand, HC Boshoff, Heidelberg, Itshelejuba, Johannesburg, Maphuta L Malatji, Matibidi, Matikwana, Polokwane, Rustenburg, Sabie, Sebokeng, Siloam, Standerton, Tembisa, Thusong and Upington Hospitals.

Each site submitted their data electronically to the PPIP coordinating centre where it was collated. Data was collected for the dates 1<sup>st</sup> October 1999 to 30<sup>th</sup> September 2002. Not all hospitals had been a PPIP site for the whole period, however the data that was submitted was used. Descriptive data is presented as proportions of the total (percentages) and rates per thousand births. The proportional data identifies the priority concerns for that grouping. The rate per thousand figures allows for comparison between the various groups. This enables one to judge the real magnitude of the problem at the various sites. The data is descriptive and only standard statistical methods were used.

## Results

Table 1 demonstrates the data from all the PPIP sentinel sites. The city and town grouping has the highest perinatal mortality rate (PNMR) at 38.3/1000 births and also the highest neonatal death rate (NNDR) at 14.5/1000 births. The NNDR was consistently higher in the city and towns and rural areas for all birth weight categories especially noticeable between one and two kilograms (See Figure 1). There is a high low birth weight rate (LBWR) in all groups, but especially in the metropolitan and city and town groups with the rates being 19.6% and 16.5% respectively. The stillbirth neonatal death ratio was highest in the metropolitan area (2.75:1).

**Table 1 Basic data and Perinatal Care Indices for PPIP sentinel sites: 2000-2002**

	<b>Metropolitan</b>	<b>City &amp; Town</b>	<b>Rural</b>
<b>Total deliveries ≥1000g</b>	<b>52668</b>	<b>117796</b>	<b>62254</b>
Live deliveries ≥1000g	51269	114951	61284
SB ≥1000g	1399	2845	970
NND ≥1000g	508	1670	693
<b>Total deaths ≥1000g</b>	<b>1907</b>	<b>4515</b>	<b>1663</b>
<b>PNMR (≥1000g) / 1000 del.</b>	<b>36.20</b>	<b>38.33</b>	<b>26.71</b>
<b>NNDR (≥1000g) / 1000 del.</b>	<b>9.91</b>	<b>14.52</b>	<b>11.31</b>
NNDR 1000-1499	117	238	224
NNDR 1500-1999	35	69	77
NNDR 2000-2499	10	14	14
NNDR 2500+	3	5	5
<b>LBWR</b>	<b>19.6</b>	<b>16.5</b>	<b>13.0</b>
<b>PCI (≥1000g)</b>	<b>1.85</b>	<b>2.32</b>	<b>2.06</b>
C-section rate (%)	25.1	17.5	11.7
<b>SB:NND Ratio</b>	<b>2.75:1</b>	<b>1.7:1</b>	<b>1.40:1</b>

SB – Stillbirth, NND – Neonatal death, PNMR - Perinatal mortality rate, NNDR – Neonatal death rate, LBWR – Low birth weight rate, C-section rate – Caesarean section rate, SB:NND Ratio – Stillbirth Neonatal death ratio

**Figure 1. Neonatal Mortality Rates in birthweight categories for metropolitan, city and town and rural areas – 2000-2002**

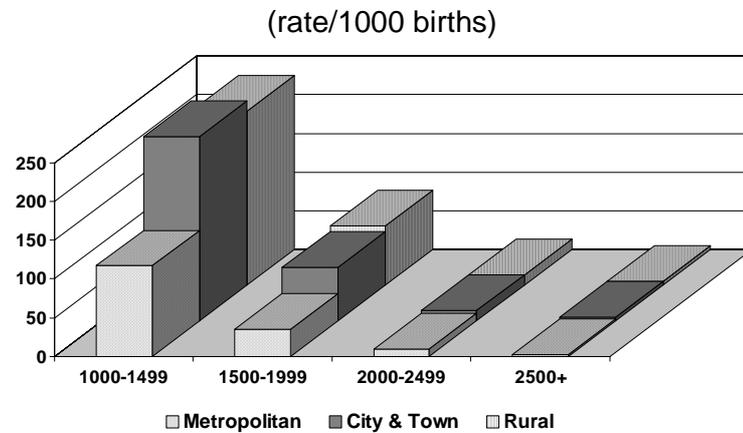


Table 2 describes the pattern of primary obstetric causes of death in the various areas and is expressed as percentages and rates per thousand births. Unexplained intrauterine deaths were a significant proportion of deaths in each group (metropolitan 28.2%, city and town 23.6%, and rural 27.5%). The majority of these deaths were macerated and there was insufficient information available to allocate specific causes. Deaths due to intrapartum asphyxia and birth trauma are the major causes of death in the rural group (25.9%) and second most common cause in city and towns. Deaths due to these causes were significantly higher in the rural and city and town groups compared to the metropolitan group  $p < 10^{-6}$ . The PNMR due to antepartum haemorrhage was 7.14 and 5.7/1000 births in the metropolitan and city and town groups respectively and occurred significantly more frequently than in the rural group ( $p < 10^{-6}$ ). Spontaneous preterm labour was the most common primary obstetric cause of death in the city and town group and occurred significantly more frequently than in metropolitan and rural groups ( $p < 10^{-6}$ ). Hypertension in pregnancy was the third most common primary obstetric cause of death in the metropolitan group and fifth most common in the city and town group. If cases in the sub-category abruptio placentae with hypertension were included in the hypertension in pregnancy group, then death due to hypertension would be the second most common primary obstetric cause of death in the metropolitan group. Deaths due to hypertension occurred significantly less frequently in the rural group compared to the metropolitan and city and town group ( $p < 10^{-6}$ ). Death due to infection was the sixth most common cause of death in the city and town group and occurred significantly more frequently than in the metropolitan and rural groups, ( $p < 10^{-6}$ ). Testing for syphilis in perinatal deaths varied considerably at the various sites with the unknown syphilis status being 35.4%, 35.3% and 54.3% in the metropolitan, city and town and rural areas respectively. There is clearly under-reporting on syphilis as a cause of death.

Deaths due to immaturity were the most common neonatal cause of death in the city and town group and had the highest rate of any condition. Deaths due to this cause occurred significantly more frequently than in the metropolitan and rural groups ( $p < 10^{-6}$ ). Death due to hypoxia was the most common cause of neonatal death in the rural areas. They occurred significantly more frequently than in the metropolitan group ( $p < 10^{-6}$ ) but not the

city and towns. Deaths due to infections were rarely reported in the rural group and syphilis testing was worst in this grouping. The metropolitan areas had the highest rate of death with respect to congenital abnormalities.

**Table 2 Pattern of disease in Metropolitan areas, Cities and Towns and Rural areas 2000-2002**

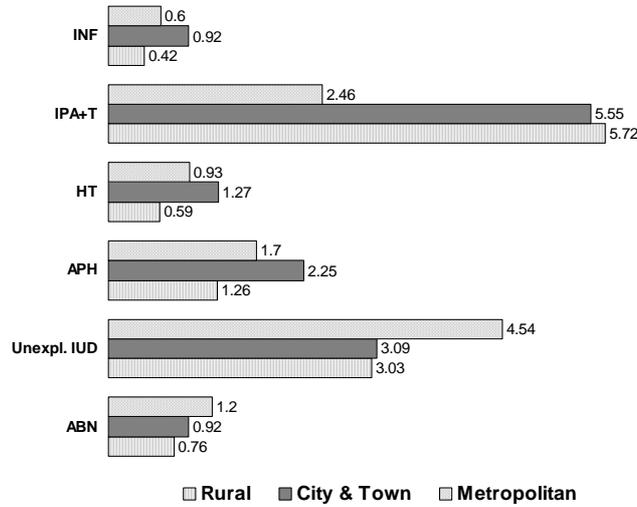
	Metropolitan		City & Town		Rural	
	%	rate/1000	%	rate/1000	%	rate/1000
<b>Primary causes ≥1000g</b>	<b>N=1907</b>	<b>52668</b>	<b>N=4515</b>	<b>117795</b>	<b>N=1663</b>	<b>62254</b>
Unexplained IUD	28.2	10.2	23.6	9.06	27.5	7.36
Spontaneous preterm lab.	11.1	4.01	17.7	6.79	20.1	5.37
Hypertensive Disorders	14.1	5.09	13.4	5.14	6.1	1.62
Antepartum haemorrhage	19.7	7.14	14.9	5.70	6.7	1.78
IUGR	3.0	1.10	1.8	0.69	0.6	0.16
Intrapartum asphyxia	8.7	3.15	14.4	5.50	22.9	6.12
Trauma	0.8	0.30	1.9	0.71	3.0	0.80
Infections	2.1	0.76	5.0	1.90	3.7	1.00
Fetal abnormalities	8.0	2.90	4.7	1.80	4.3	1.14
Maternal disease	3.2	1.16	1.7	0.65	1.5	0.40
Other	1.1	0.40	1.0	0.39	1.1	0.30
<b>Final causes ≥1000g</b>	<b>N=508</b>	<b>51269</b>	<b>N=1670</b>	<b>114951</b>	<b>N=693</b>	<b>61284</b>
Immaturity related	28.3	2.81	41.1	6.00	32.6	3.69
Hypoxia	28.0	2.77	29.8	4.32	38.7	4.37
Trauma	0.4	0.04	0.5	0.07	1.2	0.13
Infection	18.9	1.87	14.5	2.11	9.1	1.03
Congenital abnormalities	16.5	1.64	8.3	1.21	7.9	0.90
Other	2.8	0.27	2.8	0.12	3.8	0.42
Unknown	5.1	0.51	3.0	0.43	6.8	0.77

IUD – Intrauterine death, IUGR – Idiopathic intrauterine growth restriction

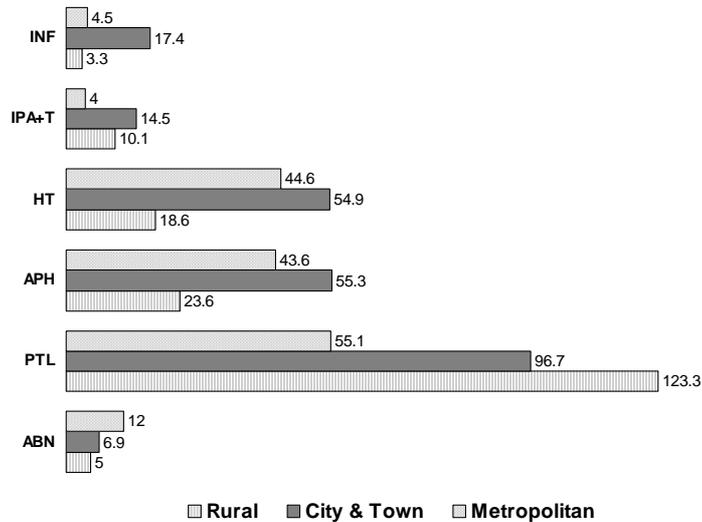
Figure 2 illustrates the rates per 1000 births of the primary obstetric causes of death of babies of birthweights of ≥2500g. Intrapartum asphyxia and birth trauma were the most common causes of perinatal death overall and being responsible for in metropolitan, cities and towns and rural areas for 20.4%, 35.8% and 45.3% of perinatal deaths respectively. If the unexplained intrauterine deaths are excluded then intrapartum asphyxia is by far the biggest problem in this birthweight category.

Spontaneous preterm labour is second to unexplained intrauterine death as the most common cause of perinatal death overall (Table 2). There is a marked difference between neonatal death rate (NNDR) in the metropolitan areas and the NNDR in the city and towns and in the rural areas. This difference is most apparent between the birthweights 1000g and 2000g (see Figure 3). It was responsible for 49.7% of perinatal deaths in rural areas, 29.4% in cities and towns and 22.2% in metropolitan areas.

**Figure 2. Comparison of the rates of primary obstetric causes of perinatal deaths (>2499g)- 2000-2002 (rate/1000 births)**



**Figure 3. Comparison of the rates of primary obstetric causes of perinatal deaths (>999 <2000g)- 2000-2002 (rate/1000 births)**



Key:

- INF – Infection
- IPA+T – Intrapartum asphyxia and trauma
- HT – Hypertension
- APH – Antepartum haemorrhage
- PTL – Spontaneous preterm labour
- ABN – Congenital abnormality

Table 3 gives the proportion of all and only the probable avoidable factors, missed opportunities and substandard care for the different areas. The most common category of avoidable factor was related to the pregnant woman’s behaviour in all areas, but when only those classified as probable were analysed, health worker related was the most common in the metropolitan area and city and towns. Between one in six and one in eight perinatal

deaths could have been avoided had the health workers reacted differently across the different areas. Administrative avoidable factors increased the further away from the metropolitan areas the death occurred.

**Table 3 A comparison between all and probable avoidable factors, missed opportunities and substandard care in perinatal deaths for the different areas**

Avoidable factors	Metropolitan %		City & Town %		Rural %	
	All	Probable	All	Probable	All	Probable
<b>Patient Related</b>	<b>31.5</b>	<b>6.5</b>	<b>40.6</b>	<b>14.7</b>	<b>47.5</b>	<b>16.2</b>
<b>Administrative Factors</b>	<b>10.1</b>	<b>4.3</b>	<b>12.1</b>	<b>4.4</b>	<b>31.1</b>	<b>8.1</b>
<b>Health Worker Related</b>	<b>28.6</b>	<b>16.0</b>	<b>28.4</b>	<b>12.1</b>	<b>36.0</b>	<b>13.5</b>

The patient related avoidable factors are shown in Table 4. No, infrequent or late attendance at antenatal care occurred in 23.3%, 26.4% and 16.0% of perinatal deaths in the metropolitan, city and town and rural areas respectively. An inappropriate response to poor fetal movement by the patient and delays in seeking medical attention during labour were other important factors associated with perinatal deaths.

Ambulance delays in transporting patients occurred in 4.3%, 4.8% and 2.9% of all perinatal deaths in the metropolitan, city and town and rural areas respectively. It was not possible to determine the correct denominator of those patients requiring ambulance transport so these figure are gross underestimates. Delays in referring patients or calling for assistance were reported in 6.1%, 7.6% and 4.0% of perinatal deaths in the metropolitan, city and towns and rural areas respectively. The reasons for the delay were not recorded.

**Table 4 Comparison of all patient related avoidable factors, missed opportunities and substandard care for the different areas**

<b>Patient related</b>	<b>Metro % PND</b>	<b>C&amp;T % PND</b>	<b>Rural % PND</b>
Never initiated antenatal care	11.6	15.7	10.4
Late initiation of antenatal care	7.9	7.1	4.3
Infrequent attendance at antenatal care	3.8	3.6	1.3
Delays in seeking medical attention during labour	4.0	7.5	9.6
Inappropriate response to decreased fetal movements	10.8	8.6	6.4
Inappropriate response to rupture of membranes	1.1	1.2	2.0
Inappropriate response to antepartum haemorrhage	0.5	1.2	1.4

Metro – Metropolitan area; C&T – City and towns; PND – Perinatal deaths

Table 5 lists the top ten avoidable factors, missed opportunities and substandard care that were classified as *probable* for the different areas within the health system. These exclude the patient related factors as they are outside the control of the health system. A problem with monitoring of the fetus during labour was in the top three in all areas. Problems in managing the second stage of labour and use of the partogram also feature prominently in all areas. Antenatal problems were most common in the metropolitan and cities and towns and were mainly related to hypertension and fetal growth. Administrative problems such as lack of neonatal care facilities were most common in the rural areas. Delays in referral were present in each area.

The most common primary obstetric causes of death for all the areas were intrapartum asphyxia and birth trauma, hypertension and antepartum haemorrhage and spontaneous preterm labour. Table 6 gives a comparison of the avoidable factors classified as *probable* for the various conditions and different sites. Almost two in three deaths due to intrapartum asphyxia were classified as being probably preventable within the health service for the metropolitan area, and one in three deaths for the other areas. Between one in five and one in six deaths due to hypertension and antepartum haemorrhage were thought to be preventable. Much fewer deaths due to spontaneous preterm labour were thought to be preventable except in the rural areas where 14.7% were thought to be preventable. This was mainly due to lack of facilities for the neonates in 8.7% of cases.

**Table 5 Top 10 probable avoidable factors within the health system in each area**

**Metropolitan**

1. Fetal distress misinterpreted intrapartum
2. Fetus not monitored during labour
3. Delay in referring to secondary or tertiary institution
4. No response to poor uterine fundal growth
5. No response to maternal hypertension
6. Inadequate theatre facilities
7. Insufficient doctors available to manage the patient
8. Second stage of labour prolonged without intervention
9. Insufficient nurses on duty to manage patient adequately
10. No response to apparent post-term pregnancy

**City and Town**

1. Delay in referring patient for secondary/tertiary care
2. Fetal distress misinterpreted intrapartum
3. Fetus not monitored intrapartum
4. No response to maternal hypertension
5. Delay in medical personnel calling for expert assistance
6. Inadequate facilities in neonatal unit/nursery
7. No response to poor uterine fundal growth
8. Lack of transport between institutions
9. Management of second stage of labour prolonged without intervention
10. Medical personnel underestimated fetal size

**Rural**

1. Inadequate facilities in neonatal unit/nursery
2. Fetus not monitored intrapartum
3. Fetal distress misinterpreted intrapartum
4. No syphilis screening performed at hospital/clinic
5. Delay in medical personnel calling for expert assistance
6. Partogram used incorrectly and poor progress not detected
7. No accessible neonatal ICU bed with a ventilator
8. Medical personnel underestimated fetal size
9. Partogram not used, poor progress in labour not detected
10. Delay in referring patient for secondary/tertiary treatment

**Table 6 Comparison of the proportion of probable avoidable factors, missed opportunities and substandard care within the health system for the most common primary obstetric causes of death in the different areas of South Africa**

<b>Primary obstetric cause</b>	<b>Metropolitan %</b>	<b>City &amp; Town %</b>	<b>Rural %</b>
<b>Intrapartum asphyxia and birth trauma</b>	<b>63.1</b>	<b>34.4</b>	<b>35.7</b>
<b>Hypertension and antepartum haemorrhage</b>	<b>18.7</b>	<b>15.4</b>	<b>20.0</b>
<b>Spontaneous preterm labour</b>	<b>6.1</b>	<b>7.5</b>	<b>14.7</b>

## **Discussion**

This data is unique because the majority input is from non-academic hospitals. This fact gives a truer reflection of real circumstances concerning perinatal care in South Africa. It must be remembered that those hospitals supplying PPIP data are more likely to be better than those not supplying data. Hence the information is biased and probably reflects a more favourable situation than reality. To achieve a true picture of perinatal mortality rates, the minimal data set concerning births in all sites in South Africa is required.

Another weakness of the data is that it is not population based. When the data is compared to population based PPIP data that is available from 5 sites, the patterns were the same, but the mortality rates were slightly lower<sup>7</sup>.

Finally, the data systematically excludes births occurring in private institutions. Inclusion of this data would probably decrease the PNMR and NNDR. These limitations must be kept in mind when interpreting the data.

A high LBWR has been found in all sites. This indicates a developing country where the majority of the population is poor. The LBWR is two to three times higher than in a developed country. A surprising finding that requires further investigation is the reported approximately one third lower LBWR in rural areas when compared to the metropolitan areas. There are various possible explanations. For example: the mothers with small fetuses are referred to the cities and towns; women who go into labour in rural areas prematurely deliver their babies at home and they are never recorded; and the lifestyle in the rural areas is very different from the urban and peri-urban areas. Any or all of these might explain the difference. It is a priority to establish whether the finding is correct and if so, why.

The stillbirth neonatal death (SB:NND) ratio is unexpectedly high in the metropolitan areas. This is probably a reflection of good neonatal care. In the rural areas and cities and towns the ratio is much lower and the NNDR much higher. Stillbirths reflect antenatal care and neonatal deaths reflect the care during labour and in the nursery. In a developed country, the SB:NND ratio is close to one. Where no care exists, the stillbirth rate and NNDR are both high, the ratio will also be close to one. As communities start using institutions for birth, the care during and after labour improves. Complications during labour and of the neonate are managed more effectively, hence the NNDR declines and so the SB:NND ratio rises. Finally as the provision of antenatal care improves and pregnant women attend the clinics, the SB:NND ratio will decline. In developing countries there are usually many more stillbirths to neonatal deaths and the ratio is high. Irrespective of this, it is clear that the

high number of stillbirths in the metropolitan areas suggest that much effort will need to go into improving the provision of antenatal care in the metropolitan areas. This is not to say the same problems do not exist in the rural areas and cities and towns, but improving care during labour and in the nursery might be a bigger priority in those areas.

Intrapartum asphyxia accounts for almost half of the perinatal deaths of babies born  $\geq 2500\text{g}$  in rural areas and just more than one in three in cities and towns. It would be expected that without the traumatic labour these babies would have been perfectly normal. The high rates of death due to intrapartum asphyxia and trauma at all sites, but especially in cities and towns and rural areas, are a cause for great concern. The one area where the health institutions should be able to provide good basic care is during labour. Between one and two thirds of the deaths were reported as being **probably** avoidable. In all areas, poor monitoring of the fetus during labour featured in the top three avoidable factors probably associated with the perinatal death, and poor management of the second stage and non or incorrect use of the partogram were also commonly listed. All these factors should be relatively simple to correct, provided that there are adequate staffing levels. Standard protocols are available for managing labour and are based on the correct use of the partogram. Perhaps the initial step would be to review the teaching of intrapartum care at nursing colleges and medical schools. It is an assumption that managing labour is taught using current knowledge and concentrating on the use of the partogram. Are midwives (who conduct the majority of births) properly qualified to manage labour? Has the integrated 4-year nursing course removed a level of training that is necessary for midwives to manage labour safely? In the past, nurses had to do an extra year's training to become midwives. Now a nurse is regarded as a midwife on completion of the 4-year nursing course and can be exposed to managing labour unsupervised in primary care settings. Similar comments can be made about doctors who with minimal or no training might be placed in charge of labour wards during their community service, again unsupervised.

Hypoxia of the neonate is one of the two most common final causes of neonatal death. Not quantified in the avoidable factors is the number of cases where poor or no neonatal resuscitation compounded the problem of an asphyxiated infant and was a major factor in the ultimate death of the infant. Can all midwives resuscitate an asphyxiated infant? Can all midwives provide effective mask ventilation? Is there equipment available in all sites where births occur? Answering all these questions might contribute significantly to salvaging asphyxiated infants.

Spontaneous preterm labour is another very common primary obstetric cause of perinatal death. The neonatal death rates of babies born between 1000g and 2000g are almost twice those of the metropolitan areas in the rural areas and cities and towns (Figure 1). Spontaneous preterm labour is by far the most common cause of perinatal deaths in babies born between 1 and 2 kg. However, relatively few of the deaths were recorded as being probably avoidable. The major avoidable factor was that of lack of adequate neonatal facilities in the rural areas. It appears that in cases of perinatal deaths due to spontaneous preterm labour, the women arrives at the institution in advanced labour and the fetus is delivered shortly thereafter. The opportunity for interventions for example suppressing labour or giving corticosteroids was low. This is supported by the previous experience at Kalafong Hospital<sup>8</sup>. It would seem the area where the major impact on this could be made is in preventing

neonatal deaths by improving the neonatal care of these infants. City and towns are rural areas have very high rates of perinatal death due to spontaneous preterm labour. The question would be why is the neonatal death rate so much higher than in the metropolitan areas? Is it because of lack of facilities, or lack of ability to refer patients or lack of knowledge on how to manage these small babies?

Nasal continuous positive airways pressure (nCPAP) and Kangaroo Mother Care (KMC) are interventions that have been shown to be an effective, inexpensive and user-friendly methods to decrease the neonatal death rate in this birthweight category in various settings<sup>9,10</sup>. They in combination would appear to be possible solutions for hospitals outside of the metropolitan areas caring for these neonates.

Perinatal deaths due to antepartum haemorrhage and hypertension occur significantly less frequently in rural areas than in the other areas. This is a real difference and not just a proportional difference. Again the reason for this is unknown and one could speculate on the influence of lifestyle, especially smoking and stress, in women from the urban areas of the cities and towns. This aspect will need to be investigated further.

Perinatal deaths due to hypertension and antepartum haemorrhage could potentially have been prevented in one in five cases. The most common avoidable factors were that of no response by the health worker to hypertension, no response to poor fundal growth or fetal monitoring problems. It would appear that clear protocols for referrals, and auditing systems to ensure that the policies are followed are necessary to improve this situation. In circumstances where no referral centre is available, this will need to be established.

There is a surprising variation in availability of syphilis serology status of women who have had a perinatal death. One would expect that the group where syphilis testing would be especially thorough would be in those women who have lost a baby. Hence it would be the best reflection of syphilis screening in the population served by the institution. That, in some areas the syphilis serology status of women who have had a perinatal death is not known in more than 80% of cases, demonstrates a serious lack of provision of the basic antenatal care in these areas. Simple, inexpensive on-site methods for screening for syphilis are available<sup>11</sup> and there is no excuse for the administrators not to ensure that screening is performed throughout. Deaths due to syphilis contributed significantly to the perinatal mortality and the number is clearly under-reported. Syphilis is a condition that can be effectively detected and treated. There can be no excuse for babies still to die from syphilis and certainly no babies that are alive when the mother enters the health service should die from syphilis.

There are a disturbing number of unexplained intrauterine deaths recorded in this survey. A number are recorded as such because of lack of information such as the unknown syphilis status of the patients. However, there is still a large group where there is adequate clinical information, but still no cause can be found. Also, the prevalence of these truly unexplained macerated intrauterine deaths appears to be rising (Kalafong Hospital PPIP data: all weight categories 1994 – 11/1000 births, 2000 – 17/1000 births, and for the Atteridgeville Community 1994 – 9/1000 births and 2000 14/1000 births). Previously, amniotic fluid infection syndrome (AFIS) has been found to be a common cause. The clinical diagnosis is difficult and is usually only made after the birth of the baby. AFIS is usually a sub-clinical chorioamnionitis, which occurs in malnourished or immune suppressed patients. Determining the actual cause of the unexplained macerated intrauterine deaths is important

and might change the relative importance of the various categories of primary obstetric causes of death. Concurrent with the rise in the unexplained macerated intrauterine deaths has been the rise of the HIV/AIDS epidemic. It is well described that a pregnant woman who is HIV infected has an almost four times greater chance of having a stillbirth and two times greater risk of preterm labour<sup>12</sup>. Perhaps there is a cause and effect relationship. If a major cause of unexplained intrauterine deaths are due to AFIS, a randomised trial on the role of prophylactic erythromycin in HIV infected pregnant women would be very useful. This is a priority for investigation. (This is further discussed in Chapter 3).

Overall about one in five deaths could have been probably prevented within the health system. However, that proportion is greatly increased when deaths due to intrapartum asphyxia and birth trauma were analysed, varying between 34.4% and 63.1% and decreased for spontaneous preterm labour. As expected deaths related to administrative factors were more common in the rural areas indicating the need for special attention for these areas.

The most common avoidable factor recorded was no, infrequent or late attendance for antenatal care. Ndiweni and Buchmann<sup>13</sup> have demonstrated that in most cases the “unbooked” mother that develops a complication has a lower risk than other women who develop complications in pregnancy, and that the vast majority intended to attend antenatal care but the complication occurred before they could attend. The Health and Demographic Survey of 1998<sup>14</sup> indicated that 95% of women attend antenatal care when they are pregnant. It appears the issue is not encouraging women to attend antenatal care, but encouraging pregnant women to attend early. Most women will confirm that they are pregnant either at a general practitioner or a clinic within 3 months of missing a period, but then initiate antenatal care some months later on the instruction of the general practitioner or clinic sister<sup>15</sup>. Hence we have the situation where the average age of confirming pregnancy is 12 weeks and that of starting antenatal care is 22 weeks<sup>15</sup>. Clearly a golden opportunity is being lost to intervene early in the pregnancy. If the paradigm could change such that women receive their first antenatal examination at the point when the pregnancy is confirmed many of the above problems would cease to exist, as demonstrated by Jeffery et al.<sup>16</sup>.

Most women confirm their pregnancies at general practitioners; hence part of the solution will be to bring the general practitioners into the circle of health care workers providing antenatal care for indigent women. At very least the general practitioners should be supplied with antenatal cards, by the health authorities, so that they can issue them to women who make their way initially to them to confirm that they are pregnant. Furthermore, the attitude of the general clinics will need to change such that they welcome women who come early for antenatal care and not tell them to come back when they are 5-6 months pregnant. Innovative ways will need to be sought to change the health service to this paradigm<sup>16</sup>.

Poor reporting of reduced fetal movements was frequently reported as a patient related avoidable factor. Whether this is realistic or a form of victim blaming is uncertain. Neldam<sup>17</sup> showed that formal scoring of fetal movements in a low risk population resulted in a significant reduction in perinatal mortality in Sweden in 1979. The large RCOG trial performed in England later in the 1980's could find no difference between formal

recording of fetal movements and no formal recording<sup>18</sup>. However, in the latter trial a similar number of women reported poor fetal movements in each group. Hence the importance of monitoring fetal movements is unclear. Furthermore, no randomised trial on fetal movements has been conducted in a developing country. There is clearly a need for a well-structured randomised trial to investigate the role of fetal movement recording or awareness and their effect on perinatal outcome.

Delay in seeking medical attention during labour was another frequently recorded avoidable factor, being most common in the rural areas. The reason for the delay is not known, but transport between the patients home and the health institution will be an important contributor to this. This coupled with the problems experienced by the ambulance services suggested that lodger facilities at hospitals for expectant mothers in rural areas should be investigated. In the other areas patients need to be informed to make clear plans on how they will get to hospital when they are in labour.

Delays in referring patients for secondary or tertiary was a frequent avoidable factor featuring in the top ten avoidable factors probably associated with the perinatal death in all areas. The actual magnitude of the problem could not be accurately determined as the denominator of patients referred is unknown. Why is this the case? Is it because the health workers did not know they should have referred the patient; or the hospital to which the patient was being referred refused to accept the patient; or are the tertiary level hospitals too overcrowded that they just do not have space for any referrals? These questions on the actual functioning of the health system need to be answered and the problems addressed.

An area almost not recorded as avoidable factors is the lack of staff. Is there enough staff or are the health workers so used to chronic shortages that they regard it as normal? Clearly staffing norms are urgently required and once available the institutions can measure themselves against the norms and be able to judge just how big their problem is.

## **Conclusion**

In South Africa we now have a good estimate the magnitude of the problem of perinatal death. Intrapartum asphyxia and birth trauma, antepartum haemorrhage and complications of hypertension in pregnancy and spontaneous preterm labour account for more than eighty percent of the primary obstetric causes of death.

By focussing on the remedial priority problems, (namely, intrapartum management, resuscitation of the asphyxiated neonate, care of the premature neonate and restructuring antenatal care), the perinatal mortality rate could be substantially reduced. This coupled with the current medical infrastructure, both regarding the profession and health systems and with clear political support should see dramatic drops in the perinatal mortality rate in South Africa, in near future.

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## **Chapter 1**

### **Monitoring and Improving the Quality of the Perinatal Audit**

#### **Introduction**

- If we do not audit the quality of our work on a regular basis, the quality of human endeavour deteriorates. If we do, and the relevant lessons are learned and the necessary adjustments to practice are made, then improvement in outcomes, and even the morale of the staff, should follow.
- This presentation provides the means to audit the audit process in a maternal health care service in a municipal (sub-district) health system.
- A municipal maternal health care service:
  - Is responsible for maternal health care for the entire population in the municipality, whether the clients deliver in hospital, health centre, clinic or at home.
  - Should be managed by a Reproductive (or Woman's) Health Management Team (RHMT) with a named coordinator of the Team.
  - Is accountable to the Hospital Management Team, the District Health Management Team (DHMT) and the District Council.
  - Must be monitored in a regular Perinatal Review Meeting (PRM).
- In the Zululand District of KwaZulu Natal and in Limpopo Province, quality check lists have been introduced to monitor and improve the quality of antenatal records and labour records. These exercises have proved to be very effective in improving the quality of antenatal care and labour management.
- More recently a questionnaire has been used to evaluate Perinatal Review Meetings. This paper focuses on the monitoring of the perinatal review process, recognising that the process is fundamental to the improvement of perinatal care and the knowledge, skills and attitudes of the participant health workers.

#### **Method**

A questionnaire was prepared (see Appendix A) to check on the most important components of the perinatal review process. This was given to the representatives of 34 level 1 and level 2 hospitals (with their satellite clinics) in Limpopo Province during workshops run for the municipal Reproductive Health Management Teams (RHMTs) in the Province in February, 2003. This followed twelve months of bi-monthly training workshops held for the RHMTs during which the Teams had received coaching in the running of the perinatal review process, plus other management topics.

#### **The check list looked at:**

- The first review of perinatal and maternal death records, held within 24 hours of a death
- The preparatory meeting held a few days before the Perinatal Review Meeting
- The Perinatal Review Meeting
- The use of the Perinatal Problem Identification Programme (PPIP).

#### **Results**

At the beginning of 2002, before the training workshops commenced, 5 (15%) hospitals were holding Perinatal Review Meetings (PRMs). In February 2003, 27 out of the 34 (79%) hospitals were holding regular, monthly PRMs. The scores for the items on the check lists for the 27 returns were added together.

**A First review of records**

**1. Was a meeting held within 24 hours of every maternal and perinatal death, with a doctor and senior midwife present plus those involved in the management of the patient, to ensure the completeness of the patient's records?** 13 hospitals out of the 27 (48%) did not hold this review. If this meeting is not held, essential information is often not available at the PRM and, in consequence, analysis of the problems and valuable decisions on future management of similar problems cannot be taken. The ideal time for this meeting is at 08h00 in the morning following the death.

**B The Preparatory Meeting**

**2. Was a Preparatory Meeting held between the doctor in maternity, the midwife in charge of maternity and the midwife in charge of the clinics a few days before the Perinatal Review Meeting?** 24 out of 27 (89%) held a preparatory meeting. Time must be taken to review all the statistics and all the deaths. This is the real audit meeting – there is insufficient time to complete this in the PRM. 89% is very good, but it needs to be 100% if the PRM is to be worth while.

**3. Were the patient's records sufficiently complete for an adequate review?** 15 out of 27 (55%) had complete records. This is a reflection on the low percentage of first review meetings (within 24 hours of the death). The use of the labour record check list is leading to an improvement in the completeness and quality of all labour records.

**4. Were the statistics for the month completed and reviewed?** 23 out of 27 (85%) did this completely. They reviewed the following:

- Number of 1<sup>st</sup> ANC visits before 20 weeks
- Number of 1<sup>st</sup> ANC visits after 20 weeks
- Number of subsequent ANC visits
- RPR results
- Number of deliveries
- Caesarean section rate
- Perinatal Mortality Rate
- Maternal deaths
- Low Birth Weight Rate

When population figures are available, the teams are calculating the caesarean section rates for the total population in addition to the rates for the institutions. The *total number of births* can be estimated for the denominator by multiplying the birth rate by the total population. Perinatal Mortality Rates include those for deliveries in the hospital, in clinics and at home. Information on home deliveries is available from the community Health Workers through the PHC Facilitators.

**5. Was the form summarising all deaths completed and reviewed?** This was completed by 24 out of 27 hospitals (89%). This information can be obtained from the PPIP statistics. It gives a valuable overview of all the deaths, for presentation at the PRM.

**6. Were all the deaths reviewed and causes discussed?** 22 out of 27 (81%).

7. **Were avoidable factors discussed for all deaths?** 22 out of 27 ((81%). Failure to discuss causes and avoidable factors is usually a result of inadequate information in the records. This is the opportunity for senior members of the Maternity Unit to discuss ways of improving the service.

8. **Was the relevant action considered and carried out?** 18 out of 27 (66%). This calls for attention, otherwise the perinatal audit is just an academic numbers game.

### **C The Perinatal Review Meeting**

9. **Was a Perinatal Review Meeting held at least once during the month?** 27 out of 34 hospitals are holding regular monthly PRMs. District obstetricians are encouraged to visit the PRMs in the hospitals in their district in order to provide an outside presence and also to encourage good quality critical thinking in the analyses of the statistics and deaths that are reviewed.

10. **Was at least one doctor present at the PRM?** 22 out of 27 hospitals (81%) had a doctor present at their PRM. This is encouraging as, in many institutions doctors are known to avoid meetings where midwives are present. Ideally, all doctors who do calls in maternity need to be at the PRM, including private and sessional doctors. Where doctors are not present, medical avoidable factors tend to be repeated.

11. **Were midwives from the hospital present?** 26 out of 27. This is to be expected but not taken for granted. The conduct of the meeting must ensure that these midwives are included in the discussions and decisions taken.

12. **Were midwives from the clinics present?** 19 out of 27 (70%). Their absence tends to mean that antenatal aspects of management are not discussed as most antenatal care takes place in the clinics. Major reasons for their absence include availability of transport, shortage of staff in the clinics and the traditional view of the District Health System that tends to separate thinking about the clinics from the issues in the hospital. Some progressive institutions are subsidising the cost of transport for the clinic midwives, or arranging that the PRM is held on the day that the clinic midwives come to the hospital for their in-service training.

**The following three items refer particularly to the educational values of the PRM:**

13. **Was at least one clinical management problem, arising from a maternal or perinatal death case study, discussed?** 23 out of 27 (85%). These represent the core of the teaching material in the PRM and serve as educational opportunities as well as for discussion on current practice in the Unit. It is here that the District obstetrician can play a crucial role. If there is insufficient experience in the group, educational topics can be highlighted and, if necessary, given to individuals to prepare in readiness for the next monthly meeting.

14. **Were 'lessons learned' listed?** 20 out of 27 (74%). This needs to be 100%. This gives valuable insight into the quality and amount of learning during the PRM, and is a good opportunity for reinforcement of learning.

15. **Were any research topics identified?** 12 out of 27 (44%). There are two types of research that can be identified. Firstly, questions raised during discussion at the PRM which call for further study and analysis and which can lead to improved management of maternal and neonatal health

problems. Some of these topics have provided research opportunities for midwives doing higher degrees. Research has not been a significant part of the culture of rural health practice, but more health workers are now looking for opportunities to explore ways of improving service provision. Then, secondly, items which call for further literary review and presentation at subsequent meetings.

16. **Were the minutes of the last monthly PRM circulated and discussed at this meeting.** 7 out of 27 (26%). This figure is very low and more needs to be done to document decisions and lessons learned during the analysis of maternal and perinatal deaths. This can be the opportunity to pass on to senior management decisions that they need to consider.

17. **Were the statistics, the form summarising all deaths, and the summaries of the case studies presented on overhead transparencies or handouts?** 25 out of 27 (93%). When these are well done, they add to the learning that takes place in the PRM. However, coaching is often needed.

18. **Did the majority (more than  $\frac{3}{4}$ ) participate in the discussion at the PRM?** 22 out of 27 (81%). This requires good facilitation skills. At a recent PRM, the facilitator arranged for the presentation of the case study and then, in small groups, the participants discussed the causes, avoidable factors and prepared protocols of management for the condition under consideration. These protocols were then placed on the wall of the maternity unit to guide future management.

#### **D Perinatal Problem Identification Programme (PIIP).**

19. **Were all the statistics for the month entered on the PIIP?** 27 out of 27 (100%). The PIIP has been very well taught in Limpopo Province and there is an excellent presentation each year at provincial level.. However it has not been employed to full advantage at municipal level. Usually it has been the responsibility of one or two individuals to capture the data without a full team analysis.

#### **Conclusions**

- Audit of a municipal perinatal service is absolutely essential. If there are not enough staff to have a PRM – there are not enough staff!
  - The audit has to be of high quality and the audit process has to be audited regularly.
  - The Perinatal Audit provides an excellent opportunity for teaching/learning that is relevant to the needs of the moment. However, this calls for a teacher with considerable educational skills in addition to knowledge and experience in obstetrics and neonatology.
  - Each District needs a good community obstetrician and a good MCWH Coordinator (with Advanced Midwifery training).
  - There is considerable value in having an outside resource person to be present at the PRM in order to ensure constructive critical comment.
-

**Appendix A**  
**Perinatal Review: Quality Check List**

It is recommended that this checklist be completed for each hospital, with its satellite clinics, each month. Give 1 mark for each 'Yes' answer.

Hospital.....Municipality.....District.....Month....Year.....

**A. First review of records**

1. Was a meeting held within 24-hours of every maternal and perinatal death, with a doctor and a senior midwife present, to ensure the completeness of the patient's records?

Y	N
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**B. The preparatory meeting**

2. Was a preparatory meeting held between the senior doctor and the senior midwife a few days before the Perinatal Review Meeting (PRM)?
3. Were the patient's records for each of the deaths sufficiently complete for review?

Y	N
---	---

Y	N
---	---

**At the preparatory meeting, were the following done?**

4. Were the statistics for the month completed and reviewed?

Y	N
---	---

**Did these statistics include data from all deliveries from:-**

5. The hospital
6. The health centres and clinics
7. Home deliveries

Y	N
---	---

Y	N
---	---

Y	N
---	---

8. Was the form summarising all deaths completed and reviewed?
9. Were all the deaths reviewed and causes discussed?
10. Were avoidable factors discussed for all deaths?
11. Was the relevant action considered and carried out?
12. Were case studies selected for discussion at the coming PRM?

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

**C. The perinatal review meeting (PRM)**

13. Was a PRM held at least once during the month?
14. Was at least one doctor present at the PRM?
15. Were midwives from the hospital present?
16. Were midwives from the clinics present?
17. Was the form summarising all the deaths presented and discussed?
18. Was at least one clinical management problem, arising from a maternal or perinatal mortality case study, discussed?
19. Were "lessons learned" listed at the end of the meeting?
20. Were any research topics identified?
21. Were the minutes of the previous PRM circulated, and discussed?
22. Were the statistics, the form summarising all deaths, and the summaries of the case studies presented on overhead transparencies or handouts?
23. Did the majority (more than  $\frac{3}{4}$ ) participate in the discussion?
24. Was a letter listing the recommendations from this meeting, plus the minutes of the meeting, sent to the CEO, Medical Manager and Nursing Service Manager?

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

Y	N
---	---

**D. PPIP**

25. Were the statistics for the month recorded in the PPIP?

Y	N
---	---

**Appendix B**

**Monthly summary of perinatal statistics**

**District:**..... **Municipality/sub-district:**.....  
**Institution:**..... **Level of care:** .....  
**Month:**..... **Year:**..... **Rural/peri-urban/urban:**.....

**Perinatal deaths:**

Weight category (gr)	Still born		Neonatal death		Alive on discharge	Total
	Fresh	Macerated	Early	Late		
500-999						
1000-1499						
1500 - 1999						
2000 - 2499						
2500+						
<b>Total</b>						

	Hospital	Clinic	Home	In transit from home	Total
<b>Total births</b>					
Woman less than 20 years					
Woman more than 34 years					

	Negative	Positive	Unknown
<b>Syphilis status</b>			

**Route of delivery**

Normal vaginal delivery			
	Vacuum	Forceps	Total
Assisted birth			
	Elective	Emergency	Total
Caesarean section			

Number of woman attended ANC	
------------------------------	--

	Hospital	Clinic	Home	Total
Maternal deaths				

Indicators	This month	Total previous year
<b>Perinatal Mortality Rate</b> (Total perinatal deaths/Total births X 1000)		
<b>SB : ENND ratio</b> (MSB + FSB/ENND)		
<b>Low birth weight rate</b> (Total birth weight < 2500gr/total births X 100)		
<b>Perinatal Care Index</b> (Perinatal mortality rate/low birth weight rate)		
<b>Casarean section rate</b> (Total Caesarean sections/total births X 100)		
<b>Assisted delivery rate</b> (Total assisted births/total births X 100)		

Compiled by:

Signature:

Date:

Tel/Fax:

### Appendix C

## Monthly summary of perinatal deaths

Hospital (inclusive of catchment area): .....					Municipality: .....					Month: .....	Year: .....
Case #	Age	Parity	Birth wght	FSB/MSB/ENND	Causes of death		Avoidable factors			Actions to be taken by management	
					Primary cause of death	Final cause of death	Health worker related	Admin related	Patient related		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

## **Chapter 2**

### **The Unexplained Intrauterine Death**

#### **Introduction**

Of all perinatal deaths recorded through the Perinatal Problem Identification Programme (PIIP) in the Saving Babies survey of the year 2000<sup>1</sup>, 24.7% were categorised as unexplained intra-uterine deaths (IUDs), the majority of which resulted in a macerated stillbirth. The equivalent figure for the 2001 survey had risen to 26.8%, ranging from 23.5% in the rural areas to 33.8% in the metropolitan areas<sup>2</sup>. The absolute rate of unexplained IUDs was 7.7 per 1000 births ( $\geq 1000\text{g}$ ) in 2000 and 10.4 per 1000 births in 2001. In other words, according to the Saving Babies surveys, about 1% of all births greater than 1000g in South Africa are unexplained stillbirths. Overall, there were more unexplained IUDs recorded than deaths due to any single recognised obstetric cause, such as preterm labour or antepartum haemorrhage.

During the process of perinatal death audit, there is sometimes a tendency to ignore this huge group of unexplained deaths, and rather to concentrate on trying to prevent those deaths with a known cause. However, it is surely unacceptable that a quarter of all perinatal deaths in this country remain unexplained. There is obviously some pathology which leads to each of these unexplained deaths, and it is likely that many of them are potentially avoidable. However, as long as these deaths remain unexplained, it is difficult to identify specific solutions for preventing them. Thus the Saving Babies 2001 report<sup>2</sup> highlighted, as a research priority the need to identify the primary pathology related to unexplained IUDs. This chapter investigates a few of the possible causes of unexplained IUDs, with special emphasis on intra-uterine growth restriction, and discusses how these causes could be better identified. Appropriate solutions to preventing these deaths can be suggested once the causes are identified.

#### **Possible causes of unexplained intra-uterine deaths**

##### **Intra-uterine growth restriction**

Chronic placental insufficiency results in intra-uterine growth restriction (IUGR) and if severe can eventually lead to IUD unless steps are taken to deliver the baby timeously and remove it from the unfavourable intra-uterine environment. The Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI)<sup>3</sup> from England and Wales has highlighted failure to detect or act upon poor fetal growth as being frequent avoidable factors related to so-called “unexplained“ stillbirths. This has led to the realisation that IUGR is a substantial contributor to IUDs<sup>3</sup>. Similarly, in the EuroNatal study, a perinatal mortality audit conducted across ten European countries, the most common avoidable factors related to stillbirths were found to be the failure to detect or act upon poor fetal growth<sup>4</sup>. The PIIP classification of obstetric causes of death, as used for the South African Saving Babies surveys, includes a specific category for IUGR, which is divided into two sub-categories, one for idiopathic IUGR and the other for post-maturity. However, the number of deaths classified as IUGR in South Africa made up only 2.6% of all perinatal deaths in 2000, and only 1.2% in 2001. It seems likely that a significant proportion of the unexplained IUDs recorded were in fact deaths due to IUGR which were not recognised as such by those recording the deaths. Evidence to support this theory comes from the prospective population-based perinatal mortality audit conducted in the North of Durban in 2001-2002, based at Mahatma Gandhi Memorial Hospital. In this particular audit, each death was initially summarised by a junior doctor or a midwife, who had to specify

the obstetric cause of death. A consultant obstetrician, referring to the patient's case-notes, and sometimes to the patient herself, then reviewed all summaries. When necessary, the initial conclusions about the cause of death were modified following the consultant's review.

Data from the first seven months of the audit, which started in July 2001, revealed a total of 6296 births, including 234 perinatal deaths<sup>5</sup>. Of these deaths 51 (21.8%) were initially classified as unexplained macerated stillbirths (MSB), while 8 (3.4%) were classified as IUGR. However, after consultant review, these figures changed to 31 (13.2%) for unexplained MSB, and 28 (12.0%) for IUGR. In other words, after careful assessment by an experienced obstetrician, 20 out of the 51 "unexplained" MSBs (39%) were in fact found to be deaths due to IUGR.

Another important finding of this Durban audit was that in 21 of the 28 cases (75%) of deaths due to IUGR, there were mistakes made by medical personnel (doctors and midwives) during antenatal care, which directly led to these deaths. In other words, if these mistakes had not been made, then in all likelihood, these 21 deaths would not have occurred. In particular, three types of mistake were repeatedly identified from these cases. In some cases more than one of the mistakes occurred in the same case:

**1. Incorrect assessment of the height of fundus, leading to overestimation of the size of the fetus.**

The antenatal care provider records what he or she thinks the height of fundus ought to be according to the gestational age, rather than recording the true measurement. The antenatal card therefore reveals no abnormality of growth, and no discrepancy between dates and height of fundus (HOF), whereas in fact the fetus is small for dates. IUGR is therefore missed. This mistake can be identified if the HOF measurements exactly mirror the gestational age in weeks all the way down the antenatal card (e.g. the HOF is 28 at 28 weeks, then 32 at 32 weeks, 34 at 34 weeks, 36 at 36 weeks and so on), but the final height of fundus measurement is inappropriately large for the birthweight.

**2. Ignoring dates according to last menstrual period (LMP).**

The dates according to the LMP are simply not calculated, or not recorded on the antenatal card. This leads to problems such as failure to recognize post-dates pregnancies. It also results in failure to correlate the fundal height measurement to the gestational age according to dates, so that a discrepancy between the two, or poor growth of the height of fundus is not recognized. A common reason for the dates being ignored is that the antenatal care provider prefers to rely on the gestational age estimate provided by a late ultrasound scan, which often grossly underestimates the true gestational age, particularly when there is IUGR. This mistake is particularly common in deaths due to post-maturity.

**3. Failure to act when there is poor growth of the height of fundus.**

In such cases, the problem is probably that poor HOF growth is not recognised by the provider as being a danger sign, rather than the provider deliberately ignoring the danger sign.

This data from Durban therefore not only offers a plausible explanation for a substantial proportion of our so-called “unexplained” IUDs, but also demonstrates that many of these IUDs could be avoided through more skilled or careful antenatal care, without the need for additional material resources.

Why should so many cases of IUGR be missed by the midwives and junior doctors initially reviewing the cases, and be wrongly classified as unexplained IUDs? It seems that there is a general lack of insight amongst antenatal care providers with regard to the diagnosis of IUGR and the role of the symphysis-to-fundal height (SFH) measurement as a screening tool for IUGR. In Durban, this situation is not helped by the fact that the standard maternity case record currently used in KwaZulu-Natal does not include a graph for charting the growth of the SFH against gestational age. The filling of such a graph is part of routine antenatal care in many other parts of the country, and facilitates the diagnosis of IUGR. The very same people who are failing to diagnose IUGR antenatally may be those who are reviewing the deaths and classifying them as unexplained IUDs rather than deaths due to IUGR. Given the large numbers of unexplained IUDs and the small numbers of IUGR deaths recorded in the first two Saving Babies surveys, it seems likely that this problem is not specific to Durban. Closer scrutiny of unexplained IUDs, looking for evidence of IUGR, is therefore recommended. Important information that should always be assessed when considering the diagnosis of IUGR includes the best estimate of gestational age, the birth weight, and the recordings made at each antenatal visit.

As many deaths due to IUGR are clearly avoidable, educating all antenatal care providers about the importance of IUGR and about how to detect it, should be seen as a priority. Important factors in improving IUGR detection would include ensuring that there is a standardised method which all antenatal care providers use to measure the SFH, and that there is a graph appropriate for the local population for plotting these measurements on. Quality assurance programmes should be put in place to ensure that measurements are being correctly plotted and that appropriate action is taken if there is poor growth of the SFH.

### **Syphilis**

In 2000, 1.9% of all perinatal deaths recorded in South Africa using PPIP were attributed to syphilis<sup>1</sup>. The equivalent figure for 2001 was 1.7%<sup>2</sup>. However, in 2001, no syphilis serology results were available for over 40% of all women who had a perinatal death<sup>2</sup>. It is likely that a similar proportion of women with unexplained IUDs had no syphilis results, although the precise figure is not presented in the report. It is also likely that a minority of these women without results would have been found to have syphilis had they been tested. If a woman with syphilis suffers an otherwise unexplained IUD, it would be reasonable to assume that the death is due to syphilis. Thus one can assume that some of the cases of unexplained IUDs are due to syphilis. It is important that all women with IUDs have their syphilis serology checked before being discharged. Those with negative syphilis serology earlier in the pregnancy should have it repeated to exclude new infection acquired since the previous testing.

### **HIV**

There is evidence from Pretoria that the prevalence of unexplained macerated IUDs is rising<sup>1</sup>, and it has been suggested that this might be due to the concurrent rise of the HIV/AIDS epidemic. A review of the worldwide literature has demonstrated a clear association between HIV infection and stillbirth, the latter being almost four times more likely in an HIV-infected pregnant woman than in one who is not<sup>6</sup>. The Saving Babies data has not

thus far been able to provide information about the HIV status of women suffering perinatal losses. However, with a rapidly increasing number of institutions in South Africa now routinely offering antenatal HIV testing, the information should soon be available. The HIV status of the mother can be recorded for each perinatal death when inputting data into the new version of PPIP. The HIV prevalence amongst women who suffer perinatal losses could then be compared to the overall HIV prevalence amongst all women giving birth. It will be no surprise if we find that HIV infection is positively associated with unexplained IUDs.

There are many possible reasons for an association between HIV infection and “unexplained” IUD. These include IUGR, which is slightly more common when the mother is HIV-infected<sup>6</sup>, and might be particularly likely in malnourished AIDS patients. Sub-clinical chorioamnionitis might also be relatively common in such patients. HIV positive pregnant women are also more likely to be infected by a variety of other organisms which are known to cause congenital infections and IUD. These include syphilis, toxoplasmosis, cytomegalovirus, and herpes simplex virus. HIV itself might be responsible for a lethal congenital infection in a minority of cases. As this is not a well-described cause of IUD, an otherwise unexplained IUD cannot routinely be attributed to HIV infection, just on the basis of the maternal HIV infection. Thus there is a need for research both to assess the extent of the association between HIV and IUD in South Africa, and to investigate the reasons for any such association.

### **The unbooked woman with an intra-uterine death**

Sometimes an unbooked woman presents to a health facility, perhaps because she is in labour, and is found to have an intra-uterine death (IUD). In such cases, finding a cause for the IUD may be particularly difficult. Assessment of gestational age is impossible unless the woman is sure of her dates, which makes it difficult to make a diagnosis of IUGR or post-maturity. Congenital abnormalities are difficult to recognize, as the fetus is already macerated. Maternal complications, such as pre-eclampsia and gestational diabetes, which could have led to the death, may have resolved subsequent to the IUD, and may no longer be apparent at the time the woman presents. If initial assessment and investigations, including syphilis serology and rhesus blood group, fail to identify an obvious cause of death, the death will be recorded as an unexplained IUD. When entering such a case onto the PPIP database, the fact that the woman was unbooked or booked late for antenatal care, can reasonably be put down as an avoidable factor which could possibly have led to the death. It would be wrong to say that being unbooked probably led to the death. For example, if the real cause of death was a chromosomal abnormality, then the death would have occurred irrespective of whether the woman had booked or not. On the other hand, if the death were due to post-maturity, then in all likelihood the death would have been prevented had she attended for antenatal care appropriately.

### **Investigating the cause of an intra-uterine death**

This process should begin as soon as the death is diagnosed, and should be completed while the woman who has suffered the loss is still under the care of the health facility in question. Discussions about the cause of death should not be left until a perinatal mortality meeting which occurs long after she has been discharged. This is because information which can only be obtained directly from the woman and her family might shed light on the cause of death. In addition, the woman needs as full an explanation as possible of the death, in order to cope with the loss, and because the cause of death may have implications for future pregnancies.

The investigation process should be conducted or overseen by someone with a clear understanding of the important aspects of antenatal care as well as of the possible causes of IUD. Each institution should have its own protocol for the management of an IUD, including how to investigate the cause of the IUD. The protocol should take into account what facilities for investigation are available at or accessible to the institution in question. The first step in the investigation, and probably most important, is a careful scrutiny of the woman's antenatal record, taking further history from her where gaps need to be filled. As mentioned above, previously unrecognised IUGR or post-maturity can often be picked up by doing this. A thorough physical examination is also essential. Relevant findings might include evidence of IUGR, polyhydramnios, and various infections including intra-uterine infection. As a an absolute minimum in South Africa, initial investigations should include syphilis serology, rhesus blood group testing, and a test to rule out overt diabetes. Subsequently, at the time of delivery, it is critical that fetus, cord, placenta and membranes are all examined carefully, looking specifically for possible causes of the IUD. Congenital anomalies, cord around the neck, and abruptio placentae could for example all be recognised at this stage if they had been missed earlier.

If this initial investigative process fails to reveal any obvious cause of death, several further investigations should ideally be conducted. The first of these is a full post-mortem examination of both fetus and placenta. This would be helpful in identifying many causes of IUD, including congenital anomalies, congenital infections, chorioamnionitis and IUGR. In most institutions in South Africa, it is unfortunately not possible to offer this investigation. This is because few institutions have access to a pathologist with the expertise or the time to conduct such post-mortems for macerated stillbirths.

Congenital infections which can cause IUD include toxoplasmosis, rubella, cytomegalovirus, herpes simplex 2 virus, and parvovirus. Serological tests from the mother can provide evidence of such infections, and should be conducted if the service is available.

Other potentially useful investigations include an antibody screen, looking for antibodies, such as anti-kell, which can cause iso-immunisation (even if the mother's rhesus blood group is positive), as well as the Kleihauer test, which can provide evidence that a large feto-maternal haemorrhage has caused the IUD. After the puerperium, testing for anti-phospholipid antibodies and other autoantibodies could also reveal the likely cause of death. As with the post-mortem and the viral studies, all these tests are available only at a small minority of institutions in South Africa. The way forward might be to conduct a study on all unexplained IUDs at sites where these investigations are available, in order to assess the relative yield of each of the investigations. This would shed light on the causes of unexplained IUDs, and might put emphasis on the need to make a particular investigation accessible to more institutions.

## **Conclusions**

There is little doubt that many of the "unexplained" IUDs recorded in the Saving Babies surveys could have been explained if the case details had been scrutinised more carefully, and if basic investigations such as syphilis serology had been conducted on all of them. This would have made an impact on the relative importance of the various categories of primary obstetric causes of death. In particular, it is likely that IUGR would have emerged as being a much more important cause of death than the surveys have suggested. Awareness about this is important as a large proportion of IUGR deaths result from simple mistakes made during antenatal care, and are clearly avoidable. Research is needed to further explore the association between HIV infection and IUDs, as well

as to assess the value of various investigations in determining the cause of unexplained IUDs in the South African setting.

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## **Chapter 3**

### **Implementation of kangaroo mother care: a successful case study in KwaZulu-Natal**

#### **Introduction**

About 200 000 infants are born in KwaZulu-Natal (KZN) each year. Of these, 14% or about 30 000 infants weigh less than 2500 grams at birth. The perinatal mortality for infants over 1000 grams is high at 36 per 1000 births, but that for low birth weight infants is considerably higher at 161 per 1000 births. The overall neonatal death rate is 14 per 1000<sup>1</sup> live births. When small infants need to be transferred to a higher level of care, there are often difficulties with pathways, transport systems and bed space. In some cases transport is not available, or babies cannot be accepted by the nearest referral hospital because of overcrowding.

KMC is accepted as an integral part of the continuum of neonatal care, particularly for low birthweight infants. Various studies have indicated the advantages of KMC for babies, mothers and hospitals elsewhere in the world, advantages that go beyond the mere survival of the infant.<sup>2-8</sup>

As part of its strategy to improve the care of neonates and relieve the pressure on neonatal services, the Sub-directorate: Maternal, Child and Women's Health of the Department of Health in KZN committed itself to the systematic implementation of KMC in all health care facilities managing low birthweight and premature infants in this province. It is, however, known to be very difficult to implement new health care interventions in a sustainable way. Comprehensive implementation programmes using face-to-face communication and continuous on-site support represent an expensive option. This Sub-directorate approached the MRC Research Unit for Maternal and Infant Health Care Strategies to help devise a more affordable alternative. The basis of the approach was to use available resources in the province and to provide all hospitals with a well-researched, low-cost implementation package.

#### **Aim**

The main aim of this study was to test the effectiveness of three different outreach strategies for implementation. A further aim was to apply the lessons learned to other implementation programmes in future.

#### **Approach**

Nowhere else in the world has there been a province-wide roll-out of KMC similar to that of the Ukugona Outreach. Some of the salient features of the programme were the following:

- A core team of six managed various facets of the implementation process and the study.
- Existing infrastructural, human and educational resources were used to implement a new health care intervention.
- A participative, structured approach was followed and only hospitals who volunteered were to take part in the study. In the end, virtually all hospitals joined the programme.

- Participants were encouraged to integrate KMC with existing programmes such as the Baby-Friendly Hospital Initiative (BFHI), the Better Birth Initiative (BBI), the Integrated Management of Childhood Illnesses (IMCI) and the Mother-to-Child Transmission Programme (MTCTP).
- Solutions were not provided for participants; instead they had to find a solution that suited their own context and situation.
- Ukugona is a development project in the field of health care provision that could be combined with research. It offered the opportunity to measure the effectiveness of different policy implementation strategies.
- Collaboration was an integral part of the programme and partners included the following institutions and organisations: Subdirector: Maternal, Child and Women’s Health, KwaZulu-Natal Department of Health (responsible for policy and for providing a programme coordinator); individual hospitals (identifying a group of people to drive the process of implementation and reallocating resources such as equipment and space); Department of Paediatrics, University of Natal (conceptualisation and planning of Ukugona); University of Cape Town (facilitator with vast experience in the implementation of KMC); Medical Research Council (MRC) Research Unit for Maternal and Infant Health Care Strategies (implementation package and technical support); Directorate: Health Informatics, KwaZulu-Natal Department of Health (technical support for the telefacilitation broadcasts); Italian Cooperation (sponsorship of posters and brochures, parts of the facilitation and progress monitoring)

## **Method**

### **Package**

The implementation package was developed by the MRC Research Unit for Maternal and Infant Health Care Strategies. Two principles guided this process:

- Health workers must find own solutions.
- Do not reinvent wheels – use already available resources.

A key component of this package is an implementation workbook <sup>9</sup> that went through a participatory process of development and testing. It is based on adult learning principles and participants are not provided with ready-made answers or ways of implementing KMC. The questions in the workbook cover all levels of health care provision, from the provincial or ministerial level to the maternity or neonatal department to the provision of KMC in a separate unit or ward. The workbook is accompanied by a reader with nine carefully selected articles that provide health workers with keys to finding their own solutions and developing their own plans of action. The reader includes two units from the Perinatal Education Programme.

During the pilot phase the need for an informative poster that could double as a teaching tool for groups was also identified and was included in larger poster format as well as in an A4 laminated format for individual bedside

teaching. The package also includes a number of examples of policy documents, guidelines, brochures and forms that are already in use at the Groote Schuur and Kalafong Hospitals.

### **Study sites**

All hospitals that care for low birthweight infants in the province were invited to take part in the programme. Those who volunteered for the research component completed a baseline description form with basic information such as the number of births per year and the bed occupancy. Thirty-seven (37) of forty-seven (47) hospitals responded positively. Three of the hospitals had telemedicine facilities and they wanted to use this equipment for in-service staff training. A pilot study on the use of telefacilitation for implementing KMC was performed at these hospitals. These hospitals were called Group C.

As finances and human resources did not permit the introduction of the package with face-to-face facilitation to the rest of the hospitals all at once, the remaining 34 hospitals were paired according to geographical location (urban or rural) and the number of births they had per year (which varied between 350 and 10 000 births per year). One hospital in each pair was randomly allocated to Group A and the other to Group B. Those allocated to Group A received the implementation package alone, whereas Group B received the package plus three visits by a facilitator. During the launch a further ten hospitals indicated that they wanted to participate. These hospitals were each given an implementation package and formed a fourth group (Group D, also known as the “additional group”).

Contact with all hospitals was maintained through occasional communications (e.g. a questionnaire regarding their use of the package and a reminder of the progress-monitoring visit). All hospitals were given a date for their progress-monitoring visit in September / October 2002.

### **Facilitation**

The hospitals in Group B were grouped into four geographical clusters (Durban, South Coast, Drakensberg and Northern Inland ). Each hospital in Group B attended two sessions of group facilitation with the other hospitals in the cluster. Group facilitation was applied in order to save on costs. Each hospital also received one on-site visit by the facilitator at the end.

The two group facilitation sessions lasted about three hours each, during which the facilitator helped the participants to go through the workbook and answered questions. The idea was specifically not to give formal lectures during these sessions, but to facilitate discussion on issues raised by the workbook. The last visit at each hospital took about two hours. Here specific questions were answered and advice was given on issues raised by the site. The first facilitation visit took place in March 2002, the second in May and the third in July.

Each of the three hospitals in Group C was to receive, on an individual basis, the same number of hours of telefacilitation as hours of face-to-face facilitation received by Group B. Each scheduled broadcast would last one hour, with two-week intervals between broadcasts. Seven broadcasts were planned and three to five actually took place. Technical problems were the cause of missed broadcasts.

## Outcome Measures

### Approach to monitoring and evaluation

The progress of the implementation was followed on a continual basis by the core team. The approach behind all monitoring and evaluation was to support hospitals to continue on the path towards institutionalised and sustainable KMC practice. Hospital visits are not seen as “inspections”, but rather as peer review visits.

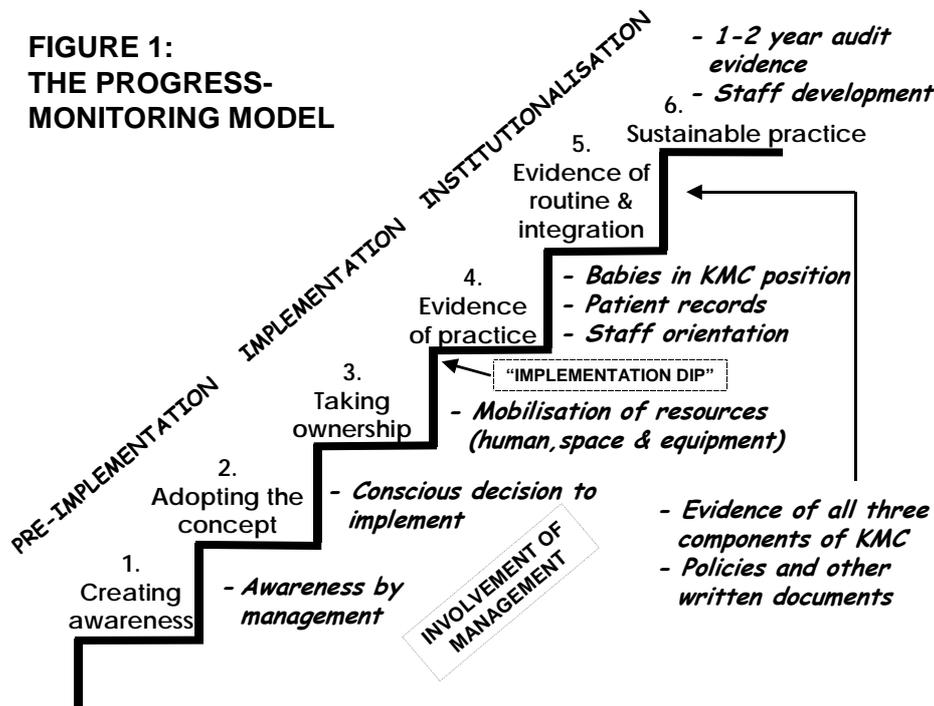
### The tool

A progress monitoring model with six benchmarks described by indicators or progress markers was developed for scoring hospitals (Figure 1).

### Provincial walk-through

All but one of the 47 hospitals received a site visit by the programme coordinator in September and October 2002, eight months after launching the process. The one hospital in Group D could not be reached on the appointed day because of washaways on the roads.

During the visit the progress-monitoring tool was completed and each hospital received a score out of 30. The score was then plotted on the progress-monitoring model to assess the level of implementation of each hospital.



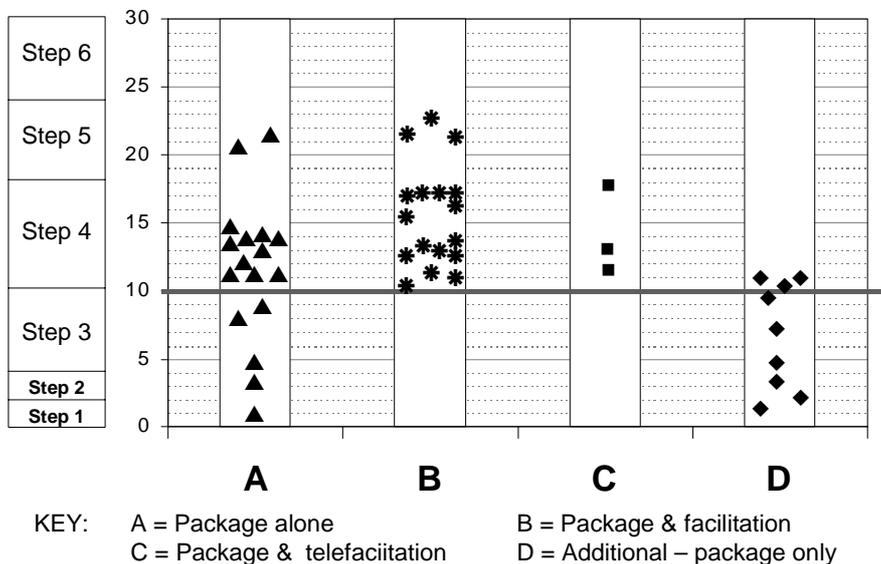
## Results

The four groups of hospitals scored as follows on the progress-monitoring model (see Figure 2 for a diagrammatic representation):

- **Group A** (package only): Twelve of the hospitals reached step 4 and demonstrated evidence of practice. Two of these hospitals reached step 5 and demonstrated evidence of routine and integration. The median score was 11.33 (range 1.08-21.13).
- **Group B** (package plus face-to-face, regional facilitation): All 17 hospitals reached at least step 4 and demonstrated evidence of practice. Seven of these hospitals reached step 5 and demonstrated evidence of routine and integration. The median score was 15.44 (range 10.29-22.94).
- **Group C** (package plus telefacilitation): All three hospitals reached at least step 4 and demonstrated evidence of practice. One of these hospitals reached step 5 and demonstrated evidence of routine and integration. The scores of these hospitals ranged between 11.60 and 17.33.
- **Group D** (additional participants): Three of the nine participants that were visited reached step 4 and demonstrated evidence of practice. The median score was 8.96 (range 1.63-13.54).

Hospitals that received face-to-face facilitation (Group B) fared significantly better than hospitals that only received an implementation package ( $p < 0.05$  for Wilcoxon paired ranked test).

**Figure 2: Comparison of the performance of the different study groups**



Four hospitals in Group A performed better than their counterparts in Group B. All three hospitals that received telefacilitation achieved evidence of practice.

Apart from the quantitative measurement of the implementation progress of hospitals, the study also generated a wealth of qualitative data. A few preliminary findings from this seem to indicate to the success of implementation could, inter alia be linked to:

- Good internal communication
- Strong management
- Teamwork between doctors and nurses
- Integration with other initiatives

Some of the barriers to successful implementation appear to be:

- High staff turnover
- Too much rotation of key staff
- Lack of proper record-keeping on KMC

## **Discussion**

In this case study the implementation of KMC, using different outreach strategies, was tested over a large geographical area in many hospitals. It was clearly demonstrated that the use an implementation package **in conjunction with facilitation** was more effective in getting hospitals to implement a new health care intervention than merely offering a package on its own.

There are major implications that result from this finding. First and most important, if it is decided to implement a new programme in an area, the best way to achieve this would be to incorporate on-site facilitation. This has major budget implications, as the facilitator and the process of facilitation must be funded. Furthermore it serves to confirm that the sending out of circulars or protocols from “Head-Office” without the back-up of on-site visits by an experienced facilitator is often a waste of time and money.

However, some hospitals in Group A achieved approximately the same score or better than facilitation hospitals in Group B. If the factors for this could be sufficiently elucidated by means of qualitative research, there is the potential of being able to identify some hospitals that may be able to implement new health care strategies without facilitation. Furthermore it might be possible to identify hospitals that would need more fundamental changes in, for example, management structures and approaches, before any change in practice could be attempted. This could allow for targeting specific types of hospitals with tailored implementation programmes, potentially achieving considerable cost reduction. With present knowledge however, outreach strategies for implementation of new health care strategies will be expensive.

Telefacilitation proved a useful facilitation medium and all three hospitals in this group achieved evidence of practice. However, there were major logistical problems that needed to be overcome at each site to allow the broadcasts to take place. The significant number of “failed” broadcasts indicates this method of facilitation is not ready yet for general application. Considerable work still needs to be done on the technical side of this development.

The lower scores of the additional participants who joined the programme late - and although not part of the trial - illustrates the value of buy-in and commitment by management. Participants in this group also did not submit the baseline description form that had to be signed by the hospital manager.

The sustainability of these programmes still remains a question and hopefully information on this will be forthcoming in the next few years.

## Conclusion

Implementation of a programme over a large geographical area is possible and is best achieved by facilitation using an on-site, face-to-face strategy, combined with a carefully designed educational package.

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Without the commitment of the hundreds of health care workers involved in Ukugona at all the sites this remarkable achievement could not have been reached. Permission was granted by the KwaZulu-Natal Department of Health to adapt their report *Giving life and love after birth - The story of the Ukugona Outreach* for this publication.

## How to obtain the implementation package

Health care facilities interested in using the KMC implementation package should contact the MRC Unit for Maternal and Infant Health Care Strategies, Kalafong Hospital, Private Bag X396, Pretoria 0001. Tel / Fax (012) 373-0825; e-mail: [matinfru@global.co.za](mailto:matinfru@global.co.za).

## Eastern Cape Provincial Chapter

### Introduction

*(From Primary Health Care in the Eastern Cape Province, 1997-2000, Equity Project & Eastern Cape DoH, 2001)*

The Eastern Cape Province has a population of approximately 6.8 million and is the poorest province in South Africa based on monthly household expenditure. Unemployment is 48.5% and the two poorest district councils and two poorest magisterial districts in South Africa are in the Eastern Cape. Only 46.9% of people live in formal housing, 31.3% have access to electricity, and 24.4% have tap water inside the dwelling. 63.4% of the population is rural.

53.8% of the population is women and the total fertility rate is 3.5 children, compared to the South African national rate of 2.9 children. The infant mortality rate is 61.2/1000 and the Under 5 Mortality rate is 80.5/1000.

Under the new district municipality boundaries, the Eastern Cape now has six district municipalities, plus one Metropolitan District (Nelson Mandela) in the Port Elizabeth metropole. Within these districts there are 702 clinics and health centres supported by 64 District Hospitals, 12 Regional Hospitals and 18 Specialised Hospitals. Only 30% of these clinics can conduct a pregnancy test and only 65% take blood for syphilis testing during antenatal care. 68% of women have at least 3 antenatal visits prior to delivery and trained assistance at delivery ranged from 60% in the poorest rural areas to 96% in the region including the metropolitan district. In 2000, the antenatal HIV prevalence was 24.5%.

### PPIP in the Eastern Cape Province

The Maternal Health Division in the Provincial Maternal, Child and Women's Health Programme coordinates PPIP in the Eastern Cape Province. At the start of 2001, there were three PPIP sites in the Eastern Cape, one rural (Port Alfred) and two peri-urban (Frontier and Settlers Hospitals). In May 2001, maternity staff from eight new hospitals were trained by Professor Pattinson in East London, four rural (Mary Terese, All Saints, St. Patricks, Glen-Gray and St. Elizabeths Hospitals), one peri-urban (Provincial Hospital Uitenhage), and two urban (Frere, Cecelia Makiwane). In 2002 the three hospitals in the Nelson Mandela Metropole Hospital Complex were also added to the PPIP hospital programme. One training and collaboration meeting was held for all participating hospitals in October 2002 and most of the hospitals participated in the November PPIP Users Meeting along with the Provincial MCWH Directorate (Mrs. G. Nchukana). In addition, on-site support for PPIP was provided to three most remote rural hospitals (Mary Terese, St. Patricks, and St. Elizabeths) by the Initiative for Sub-District Support from Health Systems Trust. Data is summarised below for the following hospitals.

- Reporting Hospitals using PPIP: Settlers, Port Alfred, St. Elizabeth's, St. Patrick's, Mary Terese, Uitenhage, Frere
- Reporting Hospitals using Hard Copy only: Glen Gray, Frontier, All Saints
- Programme Hospitals not reporting: Cecelia Makawane, Nelson Mandela Metropole Complex (3 hospitals)

**BASIC DATA - From PPIP Reporting Hospitals Only**

TIME PERIOD: January 2002 through September 2002

TOTAL NUMBER OF DELIVERIES: 9147

PNMR: 41/1000

NNDR: 17/1000

PCI: 2.32

LBWR: 15.0%

PNMR >1000g: 35/1000

NNDR >1000g: 14/1000

**TIME PERIOD:** from January 2002 to September 2002<sup>1</sup>

<sup>1</sup> Some hospitals reporting complete only through August 2002

Weight Category	Stillborn	Neonatal death	Alive on discharge	TOTAL
500-999g	30	29	27	86
1000-1499g	66	36	85	187
1500-1999g	47	20	271	338
2000-2499g	52	18	808	878
2500g +	87	81	9502	9670
<b>TOTAL</b>	<b>282</b>	<b>184</b>	<b>10693</b>	<b>11159</b>
<b>From Frontier (BW specific NA)</b>	<b>51</b>	<b>21</b>	<b>1804</b>	<b>1876</b>
<b>TOTAL</b>	<b>333</b>	<b>205</b>	<b>12497</b>	<b>13035</b>

Number of c-sections	1638
Number of born before arrivals (BBAs)	711
Number of patients who attended antenatal care	9864 (Not Including Frontier - did not report ANC)

**PATTERN OF DISEASE: - From PPIP Reporting Hospitals Only**

**TOP 5 PRIMARY OBSTETRIC CAUSES:**

Unexplained Intrauterine Death - Macerated = 20.1%

Idiopathic Preterm Labour = 14.2%

Labour Related Intrapartum Ashyxia = 11.8%

Protienuric Hypertension = 6.4

Abruptio Placentae = 5.4%

**TOP 3 FINAL NEONATAL CAUSES:**

Hypoxic Ischaemic Encephalopathy = 29.1%

Hyaline Membrane Diseases = 13.2%

Extreme multi-organ immaturity = 17%

**Proportion of deaths with avoidable factors present:**

From PPIP Reporting Hospitals Only

Patient-related: 45.1%

Administration-related: 21.8%

Health worker-related: 25.1%

No information/Could not be assessed: 8.0%

### **TOP 3 AVOIDABLE FACTORS:**

Delay in seeking medical attention = 17.9%

Never initiated antenatal care = 9.9%

Inappropriate response to poor foetal movement = 6.3%

### **Problems Related To Data Collection (Both Provincial And PPIP)**

Most of the new sites were still in the process of learning the system and the PPIP computer software. Limited computer access and lack of computer skills were cited as problems. Of the hospitals starting the programme in 2001 all were collecting data, but three had as yet been able to implement using the PPIP computer software to report data.

### **Discussion - Comparisons of 2001 and 2002 PPIP Data**

Overall, data for 2002 appears similar to 2001 with a few differences.

For Basic Data in 2001 in infants born with birthweight >1000g the NNDR of 14/1000 is identical to 2002 and the PNMR of 37/1000 is slightly higher than 2002. 2002 continues to be similar to the South African averages for PNMR (39/1000) and NNDR (15/1000). In all weight categories the 2001 NNDR of 18/1000 and PNMR of 47/1000 were both higher than in 2002. For other perinatal care indices the LBWR of 16.4% and PCI: 2.86 were also higher than in 2002.

For Primary Causes of Perinatal Death the first four reasons were identical in 2001 (Unexplained IUD – 22%, Spontaneous Preterm Labour - 19%, Labour-Related Ashypxia – 14% and Hypertensive Disorders – 11%) with slightly higher occurrences than in 2002. The fifth primary causes however changed from Infections & Antepartum Haemorrhage (tied) – 10% to Abruptio Placentae = 5.4%. Final causes of neonatal death appear in a different order in 2001 (Extreme Prematurity – 36%, Hypoxia – 21% and Infection – 13%). Hypoxia moved up to the leading cause of neonatal death in 2002.

Avoidable Factors saw a decrease in Patient-related factors and increases in Administrative-related and Health Worker-related factors in 2002 compared to 2001 (Patient related – 66%, Administrative – 8% and Health worker related – 8%). It was commented on by one of the original provincial PPIP sites at the October 2002 meeting that this type of pattern is common as sites begin there tends to more patient-related factors cited, but as sites become more experienced at completing mortality reviews more administrative and health related worker factors are recognised.

### **Future Plans**

The Chief Directorate on Quality Assurance and Research has tasked the subdirectorate on Maternal and Child Health with the expansion of PPIP. The expansion of PPIP will include all hospitals that conduct deliveries. Our target is that by the end of 2004 all public and state-funded hospitals will be implementing PPIP. A consultative meeting on PPIP is planned for early 2004 with private institutions that conduct deliveries.

## Free State Provincial Chapter

The perinatal data presented in this report is data collected from all the 30 Free State Provincial Hospitals (25 District Hospitals, 4 Regional Hospitals and one Tertiary Hospital), and CHC via the intra-net database, and is stratified per Health District (5 in the Free State). This data is “passively collected” data on a monthly basis with occasional spot-checks performed. Data from the Community Health Centers was collected via the Primary Health Care (PHC) basic Data set. Data from the private health facilities in the Free State has not been included in this report. The data presented here is that collected for the period October 2001 to September 2002.

Of the 46973 births registered in these public facilities over this period; 8323 (17.7%) were from CHC’s; 26657 (56.7%) were from level one hospital; 11446 (24.3%) from level two hospitals and 547 (1.2%) from the tertiary hospital.

### Perinatal Data: Free State Province; October 2001 to September 2002

	<b>Deliveries</b>	<b>C/S %</b>	<b>Ass Del %</b>	<b>PNMR /1000</b>	<b>NNMR /1000</b>	<b>LBW %</b>	<b>Teen/preg %</b>	<b>PCI</b>
Free State Total	46430	14.4	1.9	40.3	10.4	18.7	17.7	2.16
DC 16 Xhariep	1776	2.3	2.7	24.1	9	13.8	19.0	1.75
DC 17 Motheo	12695	19.7	3.3	38.5	5.8	19.9	15.1	1.95
DC 18 Lejweleputswa	10789	12.5	0.8	46.2	10.6	19.4	19.0	2.37
DC 19 Thabo Mofutsanyane	12835	12.9	1.3	42.5	13.5	15.9	20.7	2.68
DC 20 Northern Free State	8334	13.5	1.8	35.1	12.7	21.4	14.9	1.64

The high caesarean section rate and slightly higher PNMR in the Motheo district can be explained by the fact that two hospitals in this district act as referral hospitals, and that the majority of patients in the Xhariep district (DC 16) needing caesarian sections are referred to Motheo district. This, in turn explains the low caesarian section rate in Xhariep. The high neonatal mortality rate in Xhariep district reported last year has improved dramatically, largely through the efforts of staff in one hospital being more dedicated in the care of the prematurely born infants, and is in part also explained by the smaller numbers (volumes) managed in that district. The percentage of mothers delivering, being under the age of 20 yrs remains disturbingly high at 17.7%.

A PPIP site is established in one of the free state regions, DC 18 Lejweleputswa. It covers mainly the regional hospital in Welkom, Goldfields Regional Hospital, but has managed to reach out to referring sites in that Health District. Comparison is made between the regional Hospital and a district hospital within that PPIP site. It is hoped that this PPIP site will eventually cover the entire health district (DC 18). Efforts in starting site in a different region, in the Free State have not proved successful yet.

Comparison between Goldfields Hospital and Virginia Hospital as part of the PPIP site is made. Taking Goldfields Hospital to represent a more regional Hospital situation and Virginia Hospital to be representative of a district Hospital: The time frame covered by these figures is from the 1 January 2002 to 30 August 2002.

	<b>Deliveries</b>	<b>C/S %</b>	<b>Ass Del %</b>	<b>PNMR /1000</b>	<b>NNMR /1000</b>	<b>LBW %</b>	<b>Teen /preg %</b>
<b>Goldfields</b>	1942	28.8	1.3	57	13	20.3	17.3
<b>Virginia</b>	1059	2.5	0.6	44	18	21.4	27.2

The higher caesarean section rate and PNMR at Goldfields Hospital is explained by the fact that it is a regional hospital and the high risk patients are referred to that service. The assisted delivery rate is marginally higher at the regional Hospital, but overall remains very low. Low birth weight rates do not differ very much in the two hospitals. The teenage delivery rates differ by more than 30%.

The top five primary causes of perinatal deaths for this period for Goldfields Hospital were identified as, Hypertensive disorders (28.6%); Spontaneous pre-term labour (20.3%); Intrauterine deaths (20.3%); Antepartum Haemorrhage (12.8%); Intrapartum asphyxia (9%). The top five primary causes of perinatal deaths during the same period at Virginia Hospital were identified as, Spontaneous pre-term labour (31.3%); Intrauterine deaths (19.7%); Intrapartum asphyxia (16.4); Hypertensive disorders (14.8%); Antepartum Haemorrhage (4.9%).

The top 3 causes of neonatal deaths for this period at Goldfields Hospital were identified as, Immaturity related (70.3%); Hypoxia (21.6%) and Congenital abnormalities (5.4%). These are similar to the previous year. For Virginia Hospital these causes were measured as, Immaturity related (52.2%); Hypoxia (13.0%) and “unknown cause of death” (8.7%).

Of those deaths with avoidable factors, at Goldfields Hospital 46.5% were assessed to be due to patient related factors; 12.4% due to administrative factors; 40.1% due to health worker related factors and only 0.9% had no information. For Virginia Hospital these were assessed to be 50.5% patient related; 17.2% administrative; 31.2% health worker related with 1.1% not having information.

Certain improvements have been seen in the perinatal indicators in the Free State health districts if compared to those measured during the last year’s period. This is mainly due to the fact that the data of the PHC facilities have been added for this period, with clearly fewer additions to the numerator as compared to the denominator for each indicator.

Goldfields Hospital indices have improved significantly as compared to the previous period reported, however the proportion of causes of perinatal deaths has remained the same.

## Gauteng Provincial Chapter

### Introduction

Gauteng Province is geographically the smallest province in South Africa, but the second most populous province, and therefore the most densely populated. The province currently has three medical schools, four tertiary hospitals, and two level 2/3 complexes. The tertiary hospitals still serve as a referral area for Limpopo, Mpumalanga, and North West Provinces.

The province is divided into three health regions: A, B, and C.

- Region A consists of the City of Johannesburg Metropolitan Area and the West Rand District Council Area
- Region B consists of the Ekurhuleni Metropolitan Area and the Sedibeng District Council Area
- Region C consists of the City of Tshwane Metropolitan Area and the Metsweding District Council Area.

Each Regional Office is now responsible for hospital, district and emergency medical services.

Perinatal care surveillance is done through routine monthly collection of data at the hospitals and the MOUs, using a standardized data collection form. The following hospitals are implementing the Perinatal Problem Identification Programme (PPIP): Chris Hani Baragwanath, Johannesburg, Pretoria Academic, Leratong, Sebokeng, Tembisa, Kalafong, Carletonville, Far East Rand, Germiston, Heidelberg and Yusuf Dadoo. The number of PPIP sites therefore increased from 6 in 2000/2001 to 12 in 2001/2002

The data that has been provided is from all the public hospitals and MOUs in Gauteng. It covers the period August 2001 to July 2002. The data does not include births from Private Institutions.

**Table 1 Total Provincial Data (>1000g)**

<b>Institutions</b>	<b>Stillborn</b>	<b>Neonatal Death</b>	<b>Alive on Discharge</b>	<b>Total</b>
Hospitals	3733	1733	108 269	113 735
MOUs	0	0	25 657	25 657
<u>Total</u>	3733	1733	133 926	139 392

The data on stillbirths, neonatal deaths and weights of the babies from the MOUs, were not part of the reporting system for this time period.

**Table 2 Provincial Perinatal Care indices (>1000g) (August 2001 – July 2002)**

	<b>01 / 02</b>	<b>98 / 99</b>
PNMR	37 / 1000	32.1 / 1000
NNDR	12.1 / 1000	12.1 / 1000
SBR	31.6 / 1000	20.6 / 1000
SB: NND	2.8: 1	1.7: 1
PCI	1.9	1.7
LBWR	19.2%	18.4%
C/S Rate	20.4%	15%
Assisted Deliveries	1.2%	1.1%
Teenage Pregnancies	6.4%	6%
Syphilis Prevalence	5%	4%
Antenatal Clinic Attendance	94%	93.5%

A comparison was made with the indices of the period 98/99, as this time period also included the MOU data.

There was a marked increase in the stillbirth rate, which could be attributed to an unknown Syphilis Serology Rate of 18.9% in this province. The effect of HIV/AIDS on the stillbirth rate is also still to be determined.

### **Amalgamated Provincial PPIP Data (>1000g)**

#### **Primary Obstetric causes of death (Top 5)**

Unexplained intrauterine deaths	32%
Spontaneous preterm labour	18%
Intrapartum asphyxia	17%
Antepartum haemorrhage	16%
Hypertension	15%

#### **Final causes of neonatal deaths (Top 3)**

Prematurity	32%
Asphyxia	32%
Infection	20%

#### **Provincial Avoidable Factors**

Patient Related	44%
Health Worker Related	25%
Administrative	11%

#### **Provincial Individual Items in the Avoidable Factors (Top 5)**

Inappropriate response to poor foetal movements
Inadequate foetal monitoring
Never initiated antenatal care
Inadequate equipment / theatre facilities
Delayed arrival in Labour

### **Future plans**

In view of the above findings the provincial MCWH Unit in conjunction with the delegates from the PPIP sites felt that the following actions were needed in the next year.

1. Increase equipment at all institutions for improved foetal monitoring in all institutions
2. Setting of staffing norms, and auditing of staffing shortages in all institutions
3. Increasing Kangaroo Mother Care sites from 8 to 13
4. Increase PPIP sites from 12 to 16 in the next year
5. A quality improvement programme to be implemented in institutions on the use of the partogram and antenatal documents
6. Improvement of transport services between institutions

## KwaZulu Natal Provincial Chapter

### Introduction

The province of KwaZulu Natal is divided into 10 health districts with 52 government hospitals providing maternity care services. Data presented in this report were derived from all government hospitals. Data from clinics, home deliveries and private hospitals have not been included. It is not clear whether BBAs are included or not. The presentation is based on data collected from April –September 2002.

In 2001 KwaZulu Natal presented fragmented data from only 34 hospitals. Data were collected manually using the minimum data collection tool. At that stage data collected were inaccurate and inconsistent. Lack of co-ordination between Health Informatics and MCWH Sub directorates resulted in duplication of work. Delays and incomplete documentation when filling in the forms were major problems experienced.

This year a lot of effort was put into collaboration between Health Informatics and MCWH Sub directorates to ensure coordination in data collection and collation. Health Informatics implemented a new electronic system. Some problems were experienced which meant that data collected prior to April 2002 could not be utilised for this report. However, since April, about 70% of the hospitals submitted their data electronically. For the rest, data were collected manually enabling 100% coverage. At present data from the clinics are not available, but we hope this will change in the future. Placement of Facility, District and Provincial Information Coordinators has resulted in better data flow. The quality of data and coverage has improved when compared to the previous years.

### Total Provincial Data: April-September 2002 (Hospital based)

**Table 1: Total Births & Neonatal Deaths**

Weight category	SB's	Neonatal deaths		Live births	Total Births
		Early	Late		
500-999	425	121	12	518	943
1000-1499	393	125	28	1130	1523
1500-1499	297	79	18	2506	2803
2000-2499	378	72	25	6586	6964
2500+	720	234	77	53102	53822
TOTAL	2213	631	160	63842	66055

Data on babies in the 500-999gm-weight category need to be scrutinized. The number of neonatal deaths in this category is surprisingly low, given facilities available in our institutions, and it is possible that a significant number of deaths were missed when collecting the statistics.

**Table 2: Key Perinatal Indicators**

Total Births	66055
PNMR overall	43/1000
PNMR >1000g	35/1000
Still Birth rate >1000g	27.46/1000
Still Birth overall	33.50/1000
Neonatal Death Rate >1000g	10.4/1000
Neonatal death rate overall	12.4/1000
Low Birth weight rate	18.52%
SB: NND Ratio	2.8:1
Perinatal Care Index	2.32

**Table 3 Key Data Elements & Key Indicators**

Caesarean section rate	15054 (22.79%)
Assisted delivery rate	1120 (1.70%)
Mat. Mortalities	101 (153/100000)
Total BBAs	2625 (4%)
Total Women attending ANC at least once	26431 (40%)
Total: Teenage Pregnancies (17 and under)	6348 (10%)

The proportion of women who attended antenatal care at least once as well as the number of teenage pregnancies appears to be too low. This indicates a need for information officers to review how they collect these data in order to correct any flaws.

### **Challenges**

To sustain the collaboration between MCWH and Health Information.

To ensure continued improvement of data in the province.

To ensure improved communication between information coordinators and health workers in each hospital, so that hospital statistics are immediately fed back to the health workers for the purpose of internal audit, including PPIP usage. Currently there is still much duplication of statistics collection by health workers.

To increase PPIP sites in the province.

To ensure midwives and doctors are in touch with data collection, key perinatal indicators and use of data. If only health information officers are actively involved in data capturing, it is more likely for health workers to lose skills, knowledge and attitude essential for analysing perinatal data.

### **The Perinatal Problem Identification Programme (PPIP)**

PPIP data collected from all the functioning (2002) PPIP sites was amalgamated and presented by Dr Raymond from Lower Umfolozi District War Memorial hospital. The consolidated report was made up of data collected from sites listed under 2002 in Table 3, excluding Greys, Mseleni, KEH and Itshelejuba hospitals. Data from these 3 hospitals could not be consolidated in the report for presentation because their data were either too small or not available due to technical problems.

### **PPIP Sites in KZN: 2000-2002**

The table below shows the status of the PPIP in KZN. Of the hospitals listed under 2000 only Addington and Empangeni hospital continued collecting PPIP data. Data collection in King Edward VIII hospital has been inconsistent, whereas technical problems (Mseleni) and lack of dedicated PPIP users resulted in non-implementation of PPIP.

Area	2000	2001	2002
Metropolitan	Addington hosp KEH	Addington KEH	Addington KEH Greys Mahatma Ghandi
City & Town	Empangeni	Empangeni Madadeni Ladysmith	Empangeni Ladysmith Eshowe
Rural	Mseleni Bethesda Manguzi Mosvold		Mseleni Itshelejuba

PPIP Sites: Empangeni, Eshowe, Mahatma Gandhi, Addington, Ladysmith, Grey's, Itshelejuba

#### **Total Provincial Data**

Weight Category (g)	Stillborn	Neonatal death		Alive on discharge	Total
		Early	Late		
500 – 999	213	115	10	81	421
1000 – 1499	185	111	6	426	741
1500 – 1999	135	59	7	913	1116
2000 – 2499	134	35	5	2631	2807
2500 +	222	112	7	27082	27439
<b>TOTAL</b>	<b>889</b>	<b>432</b>	<b>35</b>	<b>31168</b>	<b>32524</b>

#### **Provincial Data (>1000g)**

SB Rate: 2.8% NNDR: 12/1000 PNMR: 33/1000

LBWR: 16.2% PCI: 2.05 SB:NND: 1.8:1

C/s rate: 24.3% Assisted delivery rate: 2.0%

Proportion teenage pregnancies: 21%

Syphilis prevalence: 3.0%

Maternal mortality rate: Not available

Proportion of women who attended antenatal care: N/A

#### **PPIP Sites** (For each PPIP site) Name of site: Empangeni

PNMR (> 1000g): 29/1000 NNDR (>1000g): 8/1000

LBWR: 15.9% PCI: 1.82 SB:NND: 2.1:1

#### **PPIP Sites** (For each PPIP site) Name of site: Eshowe

PNMR (> 1000g): 26/1000 NNDR (>1000g): 11/1000

LBWR: 12.2% PCI: 2.13 SB:NND: 1.5:1

#### **PPIP Sites** (For each PPIP site) Name of site: Mahatma Gandhi

PNMR (> 1000g): 33/1000 NNDR (>1000g): 14/1000

LBWR: 16.9% PCI: 1.96 SB:NND: 1.6:1

**PPIP Sites** (For each PPIP site) Name of site: Addington  
 PNMR (> 1000g): 19/1000 NNDR (>1000g): 3/1000  
 LBWR: 13.4% PCI: 1.39 SB:NND: 2.7:1

**PPIP Sites** (For each PPIP site) Name of site: Grey's  
 PNMR (> 1000g): 83/1000 NNDR (>1000g): 28/1000  
 LBWR: 39.6% PCI: 2.11 SB:NND: 2.1:1

**PPIP Sites** (For each PPIP site) Name of site: Ladysmith  
 PNMR (> 1000g): 44/1000 NNDR (>1000g): 20/1000  
 LBWR: 14.2% PCI: 3.12 SB:NND: 1.5:1

**PPIP Sites** (For each PPIP site) Name of site: Itshelejuba  
 PNMR (> 1000g): 28/1000 NNDR (>1000g): 15/1000  
 LBWR: 9.2% PCI: 3.04 SB:NND: 0.88:1

**Provincial (>1000g)**

**Primary Obstetric causes of death** (List top 5 and percentage of total):

1. Intra-uterine death 20.8%
2. Preterm labour 17.6%
3. Antepartum Haemorrhage 15.9%
4. Hypertensive disease 14.0%
5. Intrapartum asphyxia 12.6%

**Final causes of neonatal death** (List top 3 and percentage of total):

1. Immaturity related 37.1%
2. Hypoxia 33.6%
3. Infections 12.3%

<u>Avoidable factors</u>	<u>All %</u>	<u>Probable %</u>
Patient related	36.1%	6%
Administrative	14.4%	7.2%
Health worker related	41.0%	24.8%
Missing files	8.5%	1.2%

**Top 5 Individual Items in the Avoidable Factors** (Number and %)

1. Never initiated antenatal care 14%
2. Booked late in pregnancy 6.0%
3. Delay seeking attention in labour 5.5%
4. Fetal distress not detected intrapartum; fetus monitored 4.9%
5. Inappropriate response to poor fetal movements 4.6%

**Comments on problems related to data collection (both Provincial and PPIP):** So few of the hospitals are collecting data because the medical and nursing staff turn over rapidly. Computer users in some cases not familiar enough with file management to send data to central collection point.

**Future Plans:**

Visit to Northern hospitals is planned in week after workshop to reinstate the PPIP “culture” where it has died.

## Limpopo Provincial Chapter

### Introduction

Over the last year the Limpopo Province's PPIP team has made tremendous progress in the implementation of PPIP as well as in the achievement of the goals set by the province in the previous year. The Provincial management has accepted PPIP as a data collection tool as well as a means of identifying its shortfalls. The province has in this year successfully collected data from all state hospitals.

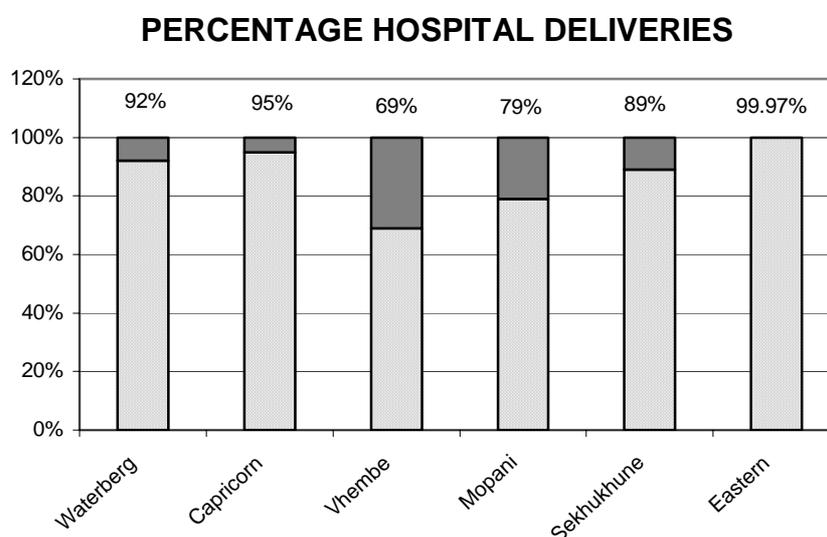
### Provincial Overview

The Limpopo Province is subdivided into 6 districts municipalities, which are formed by 27 sub district municipalities. The province has a total of 43 hospitals and 455 clinics and health centres. 40 hospitals and 281 clinics have functioning maternity units at which deliveries take place. Hence, 62% of the province's clinics have functioning maternity units where 20% of the institutional deliveries are carried out.

### Demographics

The province has a population of 5,5 million. The estimated births is 120 000, of which 64% occur at hospitals, 13% at clinics and it is estimated that 23% are deliveries that take place at home and at private facilities.

The rate of hospital versus clinic deliveries per district is demonstrated in Figure 1 below:



**Fig 1 Percentage of hospital versus clinic deliveries per district**

### Provincial data

The provincial data presented at the 2002 PPIP congress was from one tertiary hospital, 5 regional hospitals, 33 district hospitals and one semi-private hospital. Data excluded is home deliveries, private facilities and clinic and health centre deliveries.

Key Performance indicators of the province are tabulated in tables 1 & 2 below;

**Table 1 Key performance indicators**

Districts	Total Deliveries >1000g	PMR >1000g/ 1000	NNDR <sup>3</sup> >1000g/ 1000	LBWR	PCI	C/Section Rate	SB:NND Ratio
Limpopo Province	49.690	29	12	13.8%	2.12	13,1%	1.5:1
Capricorn	10.764	30	12	12.4%	2.43	10,7%	1.6:1
Vhembe	10,606	30	12	13.5%	2.25	21,2%	1.3:1
Waterburg	5,843	28	10	17.3%	1.59	11,3%	1.7:1
Mopani	7,649	27	11	13.3%	2.04	11.1%	1.6:1
Bohlabelo	7,684	27	12	12,4%	2.16	9,7%	1.1:1
Sekhukhune	7,144	32	11	15.4%	2.07	11.4%	2.1:1

**Table 2 Miscellaneous data**

Districts	VDRL results				Antenatal care				Born before arrival		
	Positive	Negative	Not done	Results not available	No ANC	Local clinic	Elsewhere	Unknown	In transit from home	Home	In transit from inyitit
Limpopo Province	2,2%	43,6%	27,0%	27,2%	4,0%	66,9%	13,2%	15,0%	36,1%	57,8%	6,1%
Capricorn District	0,8%	47,1%	29,1%	23,0%	4,6%	74,4%	10,8%	10,3%	37,9%	55,8%	6,4%
Vhembe District	1,6%	49,3%	28,3%	20,8%	2,7%	84,4%	10,8%	2,1%	24,3%	64,5%	11,2%
Waterburg District	5,0%	37,8%	18,9%	38,3%	5,7%	63,4%	10,5%	20,4%	32,3%	66,7%	1,1%
Mopani District	4,6%	65,1%	19,7%	10,6%	4,05%	40,9%	18,1%	40,5%	32,0%	48,0%	20,0%
Bohlabelo District	3,2%	24,8%	33,5%	38,5%	5,1%	52,5%	23,7%	18,7%	47,2%	51,9%	0,9%
Sekhukhune District	0,4%	31,0%	28,5%	40,2%	6,2%	75,9%	6,1%	11,8%	42,3%	50,3%	7,4%

### Primary Obstetric causes of death

The primary obstetric causes of perinatal death in babies greater than 1000g for the period Jan to August 2002 have been identified as follows:

- 31,4% were due to unexplained intrauterine death
- 21,6% were due to intrapartum asphyxia
- 20,3% were due to spontaneous preterm labour
- 5,5% were due to hypertensive disorders
- 5,2% were due to antepartum haemorrhage
- 4,1% were due to congenital fetal anomaly
- 2,5% were due to trauma

### **Final causes of neonatal death**

Final causes of neonatal death in babies greater than a 1000g are as follows;

- 39,6% were due to immaturity
- 34,6% were due to hypoxia
- 9,0% were due to infection
- 7,2% were due to congenital abnormalities
- 4,1% of cases the cause of death was unknown
- 2,7% the cause of death was recorded as other than those listed in PPIP
- 1,9% was due to intrauterine death
- 0,7% was due to trauma

### **Avoidable factors**

Avoidable factors were identified as follows;

- 39,9% were patient related
- 24,5% were medical personnel related
- 19,2% were due to insufficient notes
- 16,4% were due to administrative problems

*Patient related avoidable factors* were recorded as follows in order of frequency;

- Inappropriate response to poor fetal movement
- Never initiated antenatal care
- Delay in seeking medical attention
- Booked late in pregnancy
- Inappropriate response to PROM
- Inappropriate response to APH
- Infrequent ANC visits

*Medical personnel related avoidable factors* were recorded as follows;

- Fetal distress not detected intrapartum despite fetal monitoring
- Poor progress in labour, the partogram was used incorrectly
- Fetal distress not detected intrapartum, no fetal monitoring
- No response to maternal hypertension
- Delay in referring patient to secondary or tertiary care
- Medical personnel underestimate size of infant
- Prolonged second stage with no intervention

Avoidable factors related to *Administrative factors*

- Inadequate facilities /equipment in the nursery
- No syphilis screening performed at the hospital or clinic

- Lack of transport from home to institution
- Inadequate resuscitation equipment
- Syphilis screening results not returned to hospital or clinic
- Insufficient nurses to duty to manage the patient adequately
- Personnel not sufficiently trained to manage patient
- No accessible neonatal ICU bed with ventilator

### **Achievements**

The province has gone from disarray of data collection to organisation in the year 2002. This was made possible by the formation of the **saving babies committee**, which comprises of the MCWH representative, at least one midwife and a doctor from each district and a representative from the paediatric department. It has been the responsibility of this committee to form a network with the reproductive health committees at each hospital.

#### *Responsibilities of the committee*

- The standardisation and distribution of data collection books
- The standardisation of maternity registers
- Supporting and encouraging all maternity units to use the standardised national maternity case record and the antenatal cards
- The collection and collation of data manually as well as electronically
- Supporting and training of staff at hospitals not represented in the committee in use of PPIP and data collection
- the compilation and distribution of reports to all relevant persons
- Making recommendations for improving the reproductive health services with particular emphasis on perinatal mortality

#### *Achievements of the committee*

- All 40 hospitals with maternity units have standard data collection books and PPIP data is collected
- 30 of the 40 (75%) hospitals are able to collect the data on computer
- The committee has a small team of trainers, who have a fair understanding of PPIP, and who support other hospitals
- The provincial management has been involved and fully support the team
- A training program has been approved and launched by the provincial department of health
- The epidemiology department has approved and supports the program. They have agreed to assist with the installation of the program at all hospitals and e-mail connectivity for all PPIP users is being looked into by them

### **Challenges for 2003**

#### *1. Data Collection*

The challenges faced by the province are to improve the quality of the data collected as well as ensuring that all data is collected i.e. to include clinics, health centres and private facilities.

To improve the quality of care provided to patients and ultimately to improve the perinatal mortality rate in the province.

#### Strategies to improve data collection

It appears that not all users understand the PPIP codes, hence there is a need to intensify the training on PPIP as well as training PPIP users to code files in a uniform manner.

Data transmission is also a serious problem due to the distances between facilities and the poor quality of transport and communication. The implementation of e-mail connectivity should resolve this problem.

#### 2. *Quality of care at clinics and hospitals - nursing*

Some of the problems identified are *the number of nurses at clinics*, their qualification and the lack of knowledge and supervision. With regards to the number of nurses there are many questions that need answers. Is the staff establishment adequate, is the allocation according to the establishment, do the off duties and leave approvals suit the individual or the institute, is the rotation type and period appropriate? Are there sufficiently trained midwives? Is the work of junior nurses adequately supervised? It appears that the partogram is poorly understood and not used to its fullest potential. Birth asphyxia is one of the major causes of death in babies over 2500g. Emphasis on partogram usage is to be incorporated in the TURC (Towards Unity in Reproductive Health Care) program in 2003

#### Strategies to improve the quality of care

The implementation of the TURC program. This is a training program for reproductive health teams from all municipalities and it is aimed at improving all aspects of reproductive health care.

#### 3. *Shortage of medical staff at hospitals*

There is a serious shortage of medically trained personnel of all categories at all hospitals. The province needs to look into developing incentives to attract and retain medical staff. There is also a need to implement professional development programmes in reproductive health.

#### 4. *Poor neonatal care*

It appears that lack of equipment and adequate staff in the neonatal unit has been identified as a cause of neonatal death.

Managers of hospitals as well as maternity units have been urged to ensure that all equipment is properly maintained and replaced when necessary. There is currently no administrative block to purchasing or servicing equipment. The province has planned a neonatal training module for 2003 as part of the TURC program. It is believed that dedicated neonatal staff would be of benefit as well.

#### 5. *Syphilis serology*

Syphilis is diagnosed and treated easily. Strategies to improve transport are being looked into. On site syphilis testing is still being evaluated by WHO at pilot sites and its use is still controversial.

## Mpumalanga Provincial Chapter

### Introduction

Mpumalanga consists of 3 districts, Nkangala, Gert Sibande and Ehlanzeni and is mostly rural with all the problems associated with rural environment. In 2001, there were only 3 PPIP sites that presented. For 2002 we presented PPIP data from 10 sites and hope to increase for 2003.

The sites are:      Towns\Cities: Witbank, Middelburg, Themba, Bethal, Standerton, Barberton  
                          Rural: Matibidi, Lydenburg, Belfast, Waterval Boven, (Sabie Hospital is also a PPIP site but because of problems with their computer their data is not included)

**Table 1            Total data from PPIP sites**

Weight category	Stillborn	Neonatal death	Alive on discharge	TOTAL
500 – 999g	91	32	15	138
1000 – 1499g	86	50	168	304
1500 – 1999g	96	31	532	659
2000 – 2499g	80	24	1 742	1 846
> 2500g	133	45	14 340	14 518
<b>TOTAL</b>	<b>486</b>	<b>182</b>	<b>16 797</b>	<b>17 465</b>

Born Before Arrival:      480  
 C\sections:                    2 382

### PERINATAL CARE INDICES

Total number of deliveries: 17 465

PNMR: 36\1000

NNDR: 12\1000

PNMR>1000g: 30\1000

NNDR>1000g: 9\1000

LBWR: 14.1%

PCI: 2.30

**Table 2            Perinatal Care Indices of PPIP sentinel sites**

Hospital	Total deliveries	PNMR>1000g	NNDR>1000g	LBWR %	PCI
Witbank	4 687	25\1000	5\1000	18.6%	1.35
Middelburg	2 744	35\1000	12\1000	11.2%	3.15
Themba	4 157	24\1000	12\1000	16.9%	1.99
Standerton	1 646	33\1000	15\1000	13.6%	2.44
Baberton	1 066	22\1000	10\1000	13.2%	1.64
Bethal	1 446	28\1000	4\1000	16.3%	1.74
Lydenburg	967	39\1000	16\1000	13.4%	2.94
Belfast	249	28\1000	0\1000	12.0%	2.36
Waterval Boven	215	37\1000	14\1000	14.4%	2.58
Matibidi	288	31\1000	4\1000	11.5%	2.74
<b>TOTAL</b>	<b>17 465</b>	<b>30\1000</b>	<b>9\1000</b>	<b>14.1%</b>	<b>2.30</b>

**Table 3            Top 5 Primary Obstetrical Causes of deaths >1000g**

	%
1. Spontaneous preterm labour	30.8%
2. Intrauterine death	25.5%
3. Intrapartum Asphyxia	12.6%
4. Hypertensive disorders	13.3%
5. Infections	6.1%

	%
1. Immaturity related	35.0%
2. Hypoxia	31.3%
3. Infection	6.6%

Factor	%
Patient-related	15.2%
Administration-related	11.2%
Health worker-related	31.1%
No information\Could not be assessed	15.5%

Avoidable factor	%
1. Never initiated ANC	10.2%
2. File missing	7.0%
3. Inappropriate response to poor fetal movement	6.3%
4. Infrequent visits to ANC	3.4%

#### **Major problems identified**

- Rapid staff rotation
- Staff shortages
- Lacking in continued professional development activities
- Hypertensive conditions not referred in time
- Use of Herbal medicine
- Health education not reaching all patients
- Unbook and late booking of patients
- Inadequate infrastructure
- KMC no implemented in some institutions

#### **Solutions to these problems**

- Motivation to appoint more staff in institutions
- Maternity staff to be kept on a permanent basis
- To organize update and refresher courses for professionals
- High risk conditions to be detected in time and referred appropriately
- Ongoing education to the community and pregnant mothers to stress the importance of ANC attendance and fetal kick movements
- Implementation of KMC in all institutions
- Province to address the infrastructure deficiencies

## Northern Cape Provincial Chapter

### Introduction

The Northern Cape has 800 000 inhabitants with calculated births at approximately 20 000 per year.

During 2001 the PPIP program was introduced in Kimberley Hospital and Galeshewe Day Hospital (GDH). Uncomplicated deliveries take place at GDH and complicated deliveries and transfers from districts at Kimberley Hospital. These were grouped as one site (Kimberley).

During 2002 the program was expanded to 6 more sites: Upington, Kuruman, Jan Kempdorp, De Aar, Calvinia and Springbok representing all 5 health districts in the Province.

Data was collected for the period January to August 2002, for all 7 sites. Upington only provided weight categories with perinatal outcome. The other sites used the PPIP software to determine causes of death and avoidable factors.

There were 6959 births recorded at the 7 sites, over the 8 month period. If the births are extrapolated for 12 months these sites will deliver 10 439 births representing 50 % of the total births taking place in the province.

### Data according to PPIP site for all births 500g and more:

	Stillborns	Neonatal deaths	Live at discharge	Total
Kimberley/GDH	124	53	2978	3155
Upington	45	26	1157	1228
Kuruman	20	9	957	986
De Aar	13	10	590	613
Springbok	13	6	436	455
Jan Kempdorp	11	1	310	322
Calvinia	5	0	195	200
Total	231	105	6623	6959

Neonatal deaths include 10 late neonatal deaths.

### Data according to weight categories for all births 500g and more:

	Still borns	Neonatal deaths	Alive on discharge	Total
500-999g	72	35	12	119
1000-1499g	53	36	104	193
1500-1999g	41	12	328	381
2000-2499g	21	5	841	867
2500g+	44	17	5338	5399
Total	231	105	6623	6959

**Provincial indicators:**

Caesarean sections	19.6%
Born before arrival	6.5%
Ante natal care received	90%
RPR results not available/not done	32.3%

<b>Rates:</b>	/1000
PNMR500g+	47
PNMR1000g+	32
ENDR500g+	14.1
ENDR1000g+	9
NNDR500g+	15.6
NNDR1000g+	10.5

Still born: Neonatal death ratio	2.2:1
Low birth weight	22%
PCI	1.45

PNMR – Perinatal Mortality Rate  
 ENDR – Early Neonatal Death Rate  
 NNDR – Neonatal Death Rate

**Top 5 Obstetrical causes of death  $\geq$  1000g**

21.9%	Antepartum haemorrhage
20.2%	Intrapartum asphyxia
20.2%	Intrauterine death
17.5%	Spontaneous preterm labour
12.0%	Hypertensive disorders

**Top 3 neonatal (final) cause of death  $\geq$  1000g**

44.2%	Prematurity related
23.1%	Asphyxia and birth trauma
21.2%	Infection

**Avoidable factors  $\geq$  1000g identified**

39.5%	Health worker related
37.9%	Patient related
14.1%	Administrative problems
8.5%	Insufficient notes to comment

**Top 3 Probable causes for perinatal deaths  $\geq$  1000g:**

Number of cases indicated in brackets	
Delay in seeking medical attention during labour	(10)
Fetal distress not detected – signs interpreted incorrectly	(6)
Delay in referring patient to secondary/tertiary care	(6)

## **Conclusion**

Northern Cape Province's indicators compare favourably with national indicators for hospitals in cities and towns. Perinatal mortality (32 vs. 38.3), neonatal death rate (9 vs. 14.5) and perinatal care index (1.45 vs. 2.32) were lower than hospitals in other cities and towns using the PPIP program.

Unique problems for this province are a very high low birth weight rate (22% vs. 16.5%) and the high incidence of antepartum haemorrhage. (21.9% of obstetrical causes for perinatal deaths)

Challenges for 2003 would be to expand the PPIP sites and the provincial essential data set to get a total picture of all the births in the province, improving the availability of RPR results and setting up local reproductive health committees to address perinatal problems.

Plans to reduce perinatal mortality include training, neonatal care audit of health facilities, introducing Kangaroo Mother Care and Canulo-pap to administer oxygen to premature babies.

## North West Provincial Chapter

### Overview

- Mostly rural and Peri Urban;
- Population 3 355 295: 1996 Census;
- Divided into 4 Regions headed by Regional Managers;
- 18 Districts with 18 Level 1 Hospitals;
- 3 Level 2 Hospitals one in each Region;
- 14 state aided Community Hospitals;56 Community Health Centers;
- 153 Clinics;
- 100 Mobile Clinics.

**PIIP Sites:** PROVINCIAL HOSPITALS: KLERKSDORP and RUSTENBURG. DISTRICT HOSPITALS: POTCHEFSTOOM, ZEERUST, GELUKSPAN AND THUSONG

### Total Provincial Data: NOT CATEGORISED BY WEIGHT

#### Provincial Data (>1000g)

SB Rate: 31.87    NNDR: 11.47                  PNMR: 43.3  
LBWR: 14.4                  PCI: 3.0                  SB:NND: 2.77  
C/s rate: 6.8                  Assisted delivery rate: 1.87  
Proportion teenage pregnancies: No data  
Syphilis prevalence: No data  
Maternal mortality ratio: 172.3

#### Primary Obstetric causes of death (List top 5 and percentage of total):

1. IUD: 57.3
2. Spontaneous pre term labour: 39.3
3. Hypertensive Disorders: 18.7
4. Intrapartum Asphyxia: 17.61
5. Antepartum Haemorrhage: 12.3

#### Final causes of neonatal death (List top 3 and percentage of total):

1. Prematurity: 54.5
2. Hypoxia: 43.5
3. Infection: 13.5

<u>Avoidable factors</u>	<u>All %</u>
Patient related	58
Administrative	17
Health worker related	18
Missing files	11

#### Top 5 Individual Items in the Avoidable Factors (Number and %)

##### NO % FOR MOST PPIP SITES DATA (Estimations)

1. Never initiated Antenatal care: 29.2
2. Lack of transport: 25.7
3. Inappropriate management of hypertensive patients: 19
4. Delay in seeking medical attention: 14.3
5. Insufficient notes: 11.8

Comments on problems related to data collection (both Provincial and PPIP):

1. Data capturing a strenuous responsibility for one person (Dr / Nurse) at sites and even delays submission to Provincial office
2. Some PPIP sites not submitting their data to Provincial office for inclusion in the report
3. Provincial Perinatal & Maternal Mortality Committee not effective as a platform where the PPIP data is presented i.e. importance of the data not recognised. Committee not meeting regularly
4. Not all Districts have PPIP and difficult to compare data which is not the same or not having same quality

**Future Plans:**

1. Strengthen community awareness on importance of antenatal care
2. Awareness creation to pregnant women on warning signs and seeking medical attention early
3. Strengthen in service education for midwives and doctors on management of hypertensive patients and effective utilization of maternity guidelines
4. Introduce PPIP in all Districts
5. Inform PPIP Sites on importance of submitting data to Provincial office
6. Revive Provincial P&MM Committee

**PPIP Sites:**

Name of site: POTCHEFSTROOM

PNMR (> 1000g): 30                      NNDR (>1000g): 6.7  
LBWR: 17              PCI: 2.6              SB:NND: Not done

Name of site: GELUKSPAN

PNMR (> 1000g): 49                      NNDR (>1000g): 14  
LBWR: 22.3              PCI: 2.2              SB:NND: Not done

Name of site: ZEERUST

PNMR (> 1000g): 34                      NNDR (>1000g): 12  
LBWR: 15.8              PCI: 2.16              SB:NND: Not done

Name of site: THUSONG (3/12 months data)

PNMR (> 1000g): 31                      NNDR (>1000g): 14  
LBWR: 12              PCI: 2.9              SB:NND: Not done

Name of site: KLERKSDORP

PNMR (> 1000g): 49                      NNDR (>1000g): 25  
LBWR: 20              PCI: 2.9              SB:NND: Not done

Name of site: RUSTENBURG (9/12 months data)

PNMR (> 1000g): 53                      NNDR (>1000g): 27  
LBWR: 15              PCI: 2.2              SB:NND: Not done

## Western Cape Provincial Chapter

### Introduction

The Western Cape Province forms almost 10% of the total South African population and has a marginal predominance of women (51%). As seen in the table below about two thirds of the population of the Western Cape live in the Metropolitan area while the rest reside in the more rural areas of the province.

### Population and Geographic Area by Health Region

REGION	ESTIMATED POPULATION *		AREA *		
	Number	%	Km <sup>2</sup>	%	Density
<b>West Coast/ Winelands</b>	549 328	13	33 594	26	16
<b>Boland/ Overberg</b>	466 423	11	31 591	24	14
<b>South Cape/ Karoo</b>	462 417	11	62 173	48	7
<b>Metropole</b>	2 707 858	65	2 169	2	1 248
<b>Province</b>	4 187 035	100	129 527	100	32

\* rounded off to the nearest round number

Figures derived from 1996 census and projections based on methods developed by Statistics SA

The population in the Western Cape is growing both through a natural process as reflected in the number of births reported and through migration from other provinces. Areas where the most expansion has occurred are around the bigger towns and cities, mainly as informal settlements. Thus resulting in a greater demand on housing, education, jobs and provision of health services.

### Provincial Perinatal Data:

#### Facilities Providing Data:

Data was collected from the following public institutions in 2001:

<u>Institutions</u>	<u>No. of Facilities</u>
MOU's	11
Community Health Centres	2
District hospitals	27
Regional hospitals	6
Special hospitals	1 (MMH)
Academic hospitals	2 (GSH, TBH)

## Perinatal Indicators

Perinatal Indicators 2001	Boland Overberg	Cape Metropole	South Cape Karoo	West Coast Winelands	Province
Still Birth Rate	12.5	16.1	15.1	12.0	15.0
Low Birth Weight Rate	21.5	16.3	20.3	17.8	17.6
Neonatal Death Rate	4.0	5.0	7.7	3.5	5.0

## Reported Birth

Total Live Births	10 073	49 555	10 199	11 654	81 481
Total Still Births	127	813	156	141	1 237
Total Early Neonatal Deaths	40	247	79	41	407

## Delivery Indicators

Caesarean Section Rate	13.1	33.2	18.0	11.8	23.5
Assisted Delivery Rate	3.4	3.6	2.0	3.9	3.4
Rate of Deliveries to 35 years & older	12.3	13.0	10.7	9.7	11.9
Rate of Deliveries to < 18 years	9.4	8.2	9.9	12.6	9.5
Rate of Deliveries with parity > 4	6.5	5.0	5.4	6.1	5.5
Proportion Teenage Pregnancies (%)	9.4	8.2	9.9	12.6	9.5
Proportion Teenage TOP's (<= 18 yrs)	38.5	16.9	23.7	25.1	18.5
Proportion Female Pop (15 to 45 yrs)	10.4	66.0	10.3	13.2	100
Proportion of Deliveries	15.9	48.9	16.8	18.4	100
Proportion 35 years and older (%)	16.4	53.4	15.2	15.0	100
Proportion Parity over 4 (%)	19.0	44.4	16.4	20.3	100

Data compiled by the Provincial Health Information Directorate : E. Reynolds

## Peninsula Maternal and Neonatal Service January 2001 to December 2001

### Perinatal mortality by birthweight

Wt category	SB	NND	Alive at disch	Total
500 – 999g	272	124	118	514
1000 – 1499g	113	36	435	584
1500 – 1999g	71	16	878	1108
2000 – 2499g	60	18	2449	2527
2500+g	102	51	23278	23431
<b>Total</b>	<b>618</b>	<b>245</b>	<b>27158</b>	<b>28021</b>

## Hospital Data

	Groote Schuur	Mowbray Mat	Somerset	MOUs	Total
C – Section	2048	2439	1510	0	5997
BBA	45	29	28	886	989
Unbooked	317	209	197	889	1612

## Mortality Rates

2000	Perinatal		All	Neonatal	
	2001			2000	2001
33	30		10	9	
17	17	All 1000+ g	5	4	
756	767	500 – 999g	262	258	
253	251	1000 – 1499g	78	69	
117	87	1500 – 1999g	17	17	
35	31	2000 – 2499g	8	7	
7	6	2500+g	2	2	

## Primary Obstetric Cause of Death (Birth weight 1000+g)

### Top 7 causes

	Number	Mortality Rate (per 1000)
Antepartum Haemorrhage	102	3.7
Intrapartum Hypoxia	70	2.5
Unexplained IUD	66	2.4
Spontaneous Preterm Labour	54	2.0
Fetal Abnormality	39	1.4
Intrauterine Growth Restriction	37	1.3
Hypertension	35	1.3

## Final Neonatal Cause of Death (Birth weight 1000+g)

### Top 4 causes

	Number	Mortality Rate (per 1000)
Hypoxia	37	1.4
Congenital Abnormality	35	1.3
Immaturity Related	21	0.8
Infection	13	0.5

## Avoidable Factors (Birth weight 1000+g)

Avoidable factors present in X% of deaths

### Patient Associated 120 (50% of all avoidable factors)

No Booking/antenatal attendance	59
Delay in attending in labour	32
Delay in responding to decreased fetal movements	18
Other	11

### Medical personnel related 89

Problems in antenatal care	30
Problems in labour	40
Delays in referral	10
Inadequate care of the newborn	6

### Administrative problems 26

Transport delay	19
Other	7

## Comments – PMNS Data:

There has been a small decline in the perinatal and neonatal mortality in 2001 compared with 2000.

The main potential areas for reducing mortality are:

1. Intrapartum Hypoxia
2. Unexplained intrauterine deaths and intrauterine growth restriction
3. Caring for small and immature infants.

The medically related avoidable factors confirm that there are still deficiencies in antenatal, intrapartum care and the care of newborn infants.

An active programme for addressing the medical staff related problems has been introduced at all levels of the service. The priorities are:

1. Monitoring intrauterine growth
2. Monitoring during labour, particularly the condition of the fetus and the length of labour.
3. Resuscitation of the newborn
4. The care of the small infant, especially before and during transport to hospital.
5. The establishment of clear management protocols.

#### **Eben Donges Hospital (August 2001-September 2002)**

PNMR: 37      NNDR: 11      PCI: 0.67      LBWR: 27,1%      PNMR >1000g: 18  
NNDR >1000g: 4

#### **TOP 5 PRIMARY OBSTETRIC CAUSES:**

1. Antepartum Haemorrhage 22%
2. Intrapartum Asphyxia 14%
3. Intrauterine Death 14%
4. Infections 12%
5. Spontaneous Preterm Labour/Fetal abnormalities Each 10%

#### **TOP 3 FINAL NEONATAL CAUSES:**

1. Immaturity related 25%
2. Hypoxia 25%
3. Infections 16,7%

#### **PROPORTION OF DEATHS WITH AVOIDABLE FACTORS PRESENT:** All >1000g

Patient-related: 40%

Administration-related: 15%

Health worker-related: 45%

No information/Could not be assessed

#### **TOP 3 AVOIDABLE FACTORS:**

1. Never initiated antenatal care 17,5%
2. Booked late 10%

3. Fetal distress not detected, fetus monitored 10%

### **What do you perceive the major problems to be**

In the hospital, a significant problem is that very junior medical staff handle after hours obstetric care.

In the district, lack of or late booking, and follow up of cases is problematic. This is not helped by there being different authorities in charge of district, local and intrapartum care.

Preterm labour, antepartum haemorrhage and unexplained intrauterine death remain the main causes of perinatal death.

### **Solutions to these problems**

Compulsory attendance at PNM meetings by junior staff, with protocol booklets supplied to all make the transition to reasonable competence fairly rapid.

The local municipality staff are invited to and generally attend the PNM meetings. Occasional input given to the district nurses.

There is not very much that one can do to reduce preterm labour, APH or IUDs.

### **Future Plans for the Province**

- To strengthen and support the new PPIP sites established in the province.
- Provincial task group to develop clinical protocols and ensure staff are trained in using the protocols.
- Improved record keeping by instituting a system of quality checks. Regular quality checking of antenatal and labour records.
- Addressing the care of the low birth weight baby. Local workshops are planned to train health workers on implementation of the provincial policy on KMC.
- Ongoing in-service training of health care workers by using the PEP manuals. Special emphasis on neonatal resuscitation and the correct use of the partogram.

## APPENDIX 1 PROGRAMME

### Monday 18 November 2002

Time	Session	Chairperson
12h00	Lunch	
13h00	Local provincial team meetings (Provincial representatives and PPIP users)	
13h45	Welcome	
	<u>Session 1</u>	Dr L Mpuntsha
14h00 – 14h30	Limpopo provincial presentation	
14h45 – 15h15	Mpumalanga provincial presentation	
15h30	Tea	
	<u>Session 2</u>	Dr B Madolo
16h00 – 16h30	North West provincial presentation	
16h45 – 17h15	Northern Cape provincial presentation	
17h30	Dinner	
	<u>Session 3</u>	Ms N Nyathikazi
18h30 – 19h00	Western Cape provincial presentation	
19h15 – 19h45	Eastern Cape provincial presentation	
20h00 – 20h30	Free State provincial presentation	

### Tuesday, 19 November 2002

	<u>Session 4</u>	Ms L Mangate
08h15 – 08h45	KwaZulu Natal provincial presentation	
09h00 – 09h30	Gauteng provincial presentation	
09h45 – 10h30	Amalgamated data: National data PPIP data	
10h30	Tea	
	<u>Session 5</u>	Ms M Mabusela
11h00	PPIP matters Dr J Coetzee: New developments, Questions & answers	
12h30	Lunch	
	<u>Session 6</u>	Ms D Nyasulu
13h30	<u>Solutions &amp; Success stories</u> Dr N Moran: IUGR: A major cause of avoidable perinatal death in Durban Dr E Buchmann: Asphyxia Ms O Mthethwa: Sebokeng KMC Dr S Raymond: Intrapartum asphyxia Ms M Ngwenya: Reducing neonatal mortality rates at Piet Retief Hospital Dr A Ramos: Factors that have reduced the perinatal mortality rate in the Pongola municipality Sr S Mbambo: The role of the district MCWH Co-ordinator in reducing the perinatal and maternal mortality rates. Dr N Moran: Audit of maternal morbidity associated with hypertension.	
15h30	Tea	
	<u>Session 7</u>	Ms E Arends
16h00	Ms A Voce/Prof H Philpott: The use of essential indicators in monitoring the quality of maternal health care at subdistrict/municipal level	
17h00	Ms A Voce/Prof H Philpott: Perinatal mortality meetings	
17h30	Session ends	
18h00	Braai	

**Wednesday, 20 November 2002**

	<u>Session 8</u>	Dr P Tlebere
08h15	Dr A-M Bergh: KMC Implementation (Ukugona)	
09h00	Dr R Green-Thompson: Ukugona Results	
09h15	Ms M Mabusela: Are neural tube defects unavoidable?	
09h45	Dr A Mutungi: Evidence-based intrapartum care	
10h15	Tea	
	<u>Session 9</u>	Dr R Green-Thompson
10h45	Prof D Woods: Perinatal education in Saving Babies	
11h15	Health Systems Trust proposal	
11h30	The way forward	
12h00 – 13h00	Lunch	

**APPENDIX 2 SAVING BABIES WORKSHOP 2002 DELEGATES PER INSTITUTION**

<b>Surname, Initials, Title</b>	<b>Institution</b>
<u>PIIP users at workshop or whose data was presented</u>	
Baxen, Phyllis (Ms)	WC Provincial delegation
Botha, EJC (Ms)	Jan Kempdorp Hospital
Brito (Dr)	Thusong Hospital
Buchmann, E (Dr)	Obstetrics & Gynaecology , CH Baragwanath Hospital, Gauteng
Cordier, MJ (Mrs)	Kuruman Hospital
de Witt, W (Dr)	Pretoria Academic
Dlungwana, NC (Ms)	Sebokeng Hospital
Doubada, Catherine (Ms)	Limpopo Delegation
Dreyer, CH (Ms)	PE Provincial
du Plessis, RM (Ms)	Boland/Overberg Region
Ducasse, G (Dr)	Greys Hospital
Engelbrecht, M (Ms)	FS Provincial Delegation
Figueroa, V (Dr)	Gauteng Provincial Delegation
Frans, KE (Ms)	Thusong Hospital
Frerich, S (Dr)	Witbank Hospital
Fuentes, Raul (Dr)	Limpopo but not in prov del
Godi, NP (Dr)	Witbank Hospital
Goosen, A-M (Ms)	Uitenhage Provincial
Greenfield, D (Dr)	Peninsula Maternal & Neonatal Service
Gwexe, PN (Ms)	St Patricks
Jooste, P (Dr)	Kimberley Hospital
Kgosana, NE (Ms)	Warmbaths Hospital
Koopman, JM (Ms)	Ceres Hospital
Kwenane, KC (Ms)	Thabazimbi Hospital, Limpopo
Lakhana, S (Dr)	Elim Hospital
Langa, MM (Ms)	George Masebe Hospital
Limane, N (Ms)	Barberton Hospital, Mpumalanga
Maboho, TM (Ms)	Tshilidzini Hospital
Maestry, VK (Dr)	Zeerust Hospital
Maile, Maggy (Ms)	Mapuleng Hosp (Dept of Health)
Makuse, MG (Ms)	Witbank Hospital
Makhura, NM (Ms)	Botlokwa Hosp
Mangani, R (Mr)	Witpoort Hospital
Mashua MD (Ms)	Mapuleng Hosp (Dept of Health)
Matambo, JA (Dr)	Ladysmith Hospital, KwaZulu Natal
Matos, I (Dr)	WF Knobel
Mavuso YG (Dr)	Themba Hospital
Mbambo, WS (Ms)	Ceza Hospital
Mdluli, E (Ms)	Tshilidzini Hospital
Minors, Jill (Ms)	Addington Hospital
Mlalandle, P (Ms)	Mary Terese
Mnisi, G (Ms)	Tintswalo Hospital
Mnisi, G (Ms)	Rob Ferreira Hospital
Moabelo, E (Ms)	O & G, Baragwanath
Moran, N (Dr)	Mahatma Gandhi Hospital
Mpolokeng, EM (Ms)	Potchefstroom
Mqakanya, J (Ms)	All Saints Hospital
Muller, Marie (Ms)	Middelburg Hospital
Musonda, Joyce (Dr)	Thusong Hospital
Nash, J (Dr)	Mseleni Hospital

<b>Surname, Initials, Title</b>	<b>Institution</b>
Ncube, TAM (Ms)	Thabazimbi Hospital
Ngongoma, N (Ms)	Prince Mshiyeni Memorial Hosp
Nojaja, VN (Ms)	St Elizabeths Hospital
October, E (Ms)	Livingstone Hospital
Oettle, Charl (Dr)	Eben Donges
Patreni, MN (Ms)	Glen Grey
Patrick, M (Dr)	Edendale Hospital
Pule, K (Ms)	Zeerust Hospital
Oolohle, D (Dr)	ECRU, Tembisa
Quarshie, (Dr)	Mafikeng
Qwakanisa, C (Ms)	Settlers
Radipere, AK (Ms)	Seshego Hospital
Ramos (Dr)	Itshelejuba Hosp
Raymond, Steve (Dr)	Empangeni Hospital
Ricardo Escobar, R (Dr)	Warmbaths Hospital
Robinson, PA (Ms)	Dr M3/Groothoek Hospital
Roussot, D (Dr)	Johannesburg Hospital
Sambo, SB (MS)	Nkhensani Hospital
Sefoloko, CM (Ms)	Klerksdorp
Snyman, J (Ms)	Albany District
Somdaka, NB (Ms)	Cecilia Makiwane
Soodi, M (Mrs)	Lydenburg
Spenceley, (Sr) replaces Caldecott who replaced Moodley	Greys Hospital
Stephen, C (Dr)	Greys Hospital
Suliman (Dr)	Klerksdorp
Thoka, E (Matron)	WF Knobel
Tjebane, ME (Ms)	Jane Furse
Tom, VNL (Ms)	Frontier
Tshivhase, MO (Ms)	Tshilidzini Hospital
Voormolen, Emmerentia	Standerton Hospital
Wates, MA (Dr)	Karl Bremer Hospital
Xaluva, NK (Mrs)	Dora Nginza
<u>Health Systems Trust</u>	
Hall, Wendy (Dr)	Health Systems Trust
<u>MRC Unit</u>	
Bergh, Anne-Marie (Dr)	MRC Unit for Maternal and Infant Health
Bezuidenhout, Cathy	MRC Unit for Maternal and Infant Health
Coetzee, Johan (Dr)	PIIP developer
Pattinson, RC (Prof)	MRC Unit for Maternal and Infant Health
Prinsloo, Roz V	MRC Unit for Maternal and Infant Health
<u>National Dept of Health</u>	
Mabe, Miriam (Ms)	National Dept of Health
Mabusela, MRC (Ms)	National Dept of Health
Madolo, B (Dr)	National Dept of Health
Mangate, Lizbeth (Ms)	National Dept of Health
Mpuntsha, L (Dr)	National Dept of Health
Nyathikazi, N (Mrs)	National Dept of Health
Tlebere, Pulane (Dr)	NDept of Health

<u>Provincial Departments of Health</u>	
Arends, Edna (Mrs)	WC Provincial delegation
Bartlett, G (Dr)	KwaZulu Natal Dept of Health
Broomhead, SCS (Dr)	Dept of Health, Northern Cape
Gonin, P (Dr)	soon to be O & G Consultant in North West
Kambaran, Allen (Dr)	NC Dept of Health
Kula, NC (Ms)	Northern Cape Dept of Health
Likibi, ML (Dr)	Gauteng Provincial Delegation
Mabitsela, Essina (Ms)	Limpopo Dept of Health
Maboya, I (Ms)	Limpopo Delegation
Maleka, M (Ms)	Limpopo Delegation
Malgas, KM (Ms)	North West Dept of Health
Masinga, Sparara (Ms)	MCWH, Mpumalanga Dept of Health
Matafeni, GN (Ms)	Umtata
Matshavha, M (Ms)	Central Wits Health Region
Miranda, J (Dr)	Limpopo Delegation
Mkhosana, M (Mr)	Bisho Head Office
Mohlabi, Ray (Dr)	National Dept of Health
Mokgatlhe, Y (Ms)	Free State Provincial Delegation
Mokoena, MG (Ms)	Mpumalanga Dept of Health
Moloi, Flora (Ms)	Limpopo Dept of Health
Morewane, L (Ms)	North West Provincial Delegation
Motlolometsi, MWA (Ms)	Free State Dept of Health
Mthethwa, Olga (Ms)	Gauteng Provincial Delegation
Mustafa, KA (Dr)	Gauteng Provincial Delegation
Nchukana, NG (Ms)	Dept of Health, Eastern Cape
Ngwenya, ML (Ms)	Piet Retief Health Ward
Ntoto, A (Mr)	Bisho Head Office
Nyasulu, D (Ms)	KwaZulu Natal Dept of Health
Owens, S (Ms)	Western Cape Provincial delegation
Pityana, L (Ms)	MCWH, Northern Cape Dept of Health
Robertson, A (Dr)	Limpopo Delegation
Sabela, EZ (Ms)	Limpopo Provincial delegation
Sekgobela, R (Ms)	Limpopo Delegation
Shabangu, NA (Ms)	NST Provincial Office, Mpumalanga
Shivambo, S (Ms)	Limpopo Delegation
Steinberg, Hannes (Dr)	FS Provincial Delegation
Suarez, CM (Dr)	Limpopo Provincial delegation
Tlali, Portia (Ms)	FS Dept of Health
Van der Walt, Ria (Ms)	Gauteng Provincial Delegation
Verburgh, A (Dr)	North West Dept of Health
<u>Other Institutions represented</u>	
Avenant, Theuns (Dr)	Paediatrics, Kalafong Hospital
Lisse, E (Dr)	Namibia
Macdonald, AP (Dr)	Pretoria Academic
Philpott, H (Prof)	CHESS
Voce, Anna (Ms)	CHESS
Woods, DL (Prof)	UCT

**Group Photos: Provincial Delegations and other groups**



North West



Mpumalanga



Limpopo



Eastern Cape



KwaZulu Natal



Northern Cape



Free State



Gauteng



Western Cape



Dept of Health representatives





