Saving Babies 2008-2009

Seventh report on perinatal care in South Africa

Compiled by

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

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

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- Mrs Roz Prinsloo who has coordinated PPIP, organised the multiple workshops all national meetings since the first in 2000 and compiled the book.
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Foreword

It is likely that we need to introduce ourselves as we left full time work in the universities many years ago. We were both in full time academic teaching for many years and after our first retirements at age 65; we have been doing Outreach Support for maternal and newborn services in a number of provinces. If we were to add up the number of active years since each of us retired for the first time, it would come to 32 years of the most rewarding years of our careers. We certainly recommend this activity for those of you approaching 'retirement'. Many of the role models in rural practice have passed on and there is now an enormous need for mentors with experience in leadership as well as the ability to pass on skills in management and clinical practice. It becomes particularly exciting when we meet some of our students, now in responsible positions, and we are able to walk alongside them as they face new challenges in the wider world. In this foreword we would like to share some of our experiences in Outreach Support as a contribution to the very valuable insights presented in this Saving Babies Report.

We share a concern at the figures quoted in the report, showing that the major causes of probable avoidable perinatal death in South Africa remain the same and that the Perinatal Mortality Rate does not seem to have improved. The report identifies areas of potential intervention, with recommendations for implementation of the same kind of solutions that we also have been following in our Outreach Support. Our national failure has been an inability to fully implement these valid recommendations. So, where do we go from here?

The Importance of Quality Leadership

Where perinatal outcomes remain without improvement, we have identified the need for innovative and creative leadership and supportive supervision at all levels of the health system. What are needed are quality leaders who lead by example, identify the needs of their junior members, and give support and encouragement to their teams. Leaders who are there, foremost, to serve the needs of their patients and to be responsive to the everyday problems that plague the health system.

We believe, because we have seen it happen, that the mentorship of quality leaders is vital to any improvement in perinatal outcomes, let alone to the development of top flight emerging professionals. The development of effective leaders does not happen through lectures or workshops alone, though these are needed for presenting the road map for leadership skill development. The ultimate learning ground is in the Clinic, the Labour Ward, the Newborn Nursery and the Manager's Office, where the mentor shows by the application of knowledge and skills, and the exercise of high quality character in practice, how to solve problems and create the conditions necessary for the very best healthcare provision. There are no short cuts to the mentoring of good leaders: it can only happen by example over time.

Regional and District Outreach Mentorship Teams

We have shown, both in Limpopo, the Eastern Cape and in parts of KwaZulu Natal, that visits to rural hospitals and their satellite Clinics are beneficial, certainly in terms of training, improvement of facilities, documentation, audit, patient management and some improvement in mortality rates. Support for the critical role

of dedicated and suitably trained nurses cannot be over-emphasised. Tools have been developed and produced for the audit of the quality of care, protocols of management and accreditation of services. The care of the mother antenatally, intrapartum, postnatally, and of the newborn infant have been shown to be mutually complementary and should be dealt with together as a continuum in any intervention.

For the future, the Regional Hospitals are seen to be the key facilities to develop an Outreach programme to Districts and Sub-districts in their region/area. This would mean upgrading the Regional Hospitals, and especially their staffing , to accept this new responsibility.

A FIRST PRIORITY FOR ACTION must be the appointment of Regional Consultants (Obstetric, Paediatric and Midwifery) with the specific portfolio of Outreach to support and improve clinical care in District Hospitals and their satellite Clinics and Community Health Centres.

Regional Teams will each be responsible for visiting and mentoring District Mentor Teams, which in turn will mentor their Sub-district teams. A model of leadership effectiveness is being proposed that should result in improved quality of care, which in turn should contribute to health outcomes. The model is based on the premise that effective leadership is influenced by personal effectiveness, effectiveness of the team and responsiveness of the health system.

The following are some of the outreach activities and interventions that we would propose for the future, based on our experiences of the past.

Midwife-led District Hospital Maternity Units

A good maternity unit at District Hospital level calls for a team of health workers who will provide continuity of experienced care over a number of years. The modern trend is for doctors to move on after a relatively short period of time, for many different reasons. We wish to recommend that the maternity units in District Hospitals be managed entirely by midwives, with a quality Advanced Midwife in charge of every shift and a doctor on call, available in the hospital for consultations and caesarean sections. It is time for us to accept that experienced midwives working in District Hospitals provide a better clinical service than doctors with limited obstetric and neonatal experience, and even more so than sessional doctors. In preparation for this change in management, new orientation training needs to be given for midwives (as proposed in this Report) and particularly for the Advanced Midwives, who have never been empowered to practice as was originally intended. New protocols of management must be written for the labour wards of the future at District level and practice has to be monitored and corrected by strict Perinatal Audit processes. We need a new name for this category of midwife-run unit to differentiate it from a Midwife Obstetric Unit that caters only for normal deliveries.

The LINC Programme

The LINC programme was initiated to improve newborn care in all 40 of the hospitals in Limpopo. It involved monthly visits of one week from two doctors and two midwives, one being based in Limpopo. The programme was coordinated

through the Department of Paediatrics at Polokwane. The LINC team wrote a newborn handbook and protocols suitable to the local needs. A comprehensive admission record was devised to capture clinical information. Printed by the Province it is a great help in patient management and allows for evaluation of patient care.

The single most crucial activity was regular hospital visitations by the LINC team. These visits provided encouragement to the staff, advice on facilities and equipment, and on-site review of clinical care. A lot of attention was paid to setting up Kangaroo Mother Care units. The findings and recommendations were recorded in a standard format and sent to both the Limpopo Department of Health and the hospitals concerned.

An evaluation tool based on the requirements for good newborn care was designed and used for formal accreditation. Nearly half of the hospitals in the Province have achieved the required standards.

An expanded approach to the HIV/AIDS pandemic

We have become accustomed to practicing the best possible casualty-type management of the seriously ill patient admitted with advanced AIDS in pregnancy, and even with our ability to run a fairly good PMTCT programme. If we continue only with this approach to HIV and AIDS, we in South Africa will have to live with the frighteningly high HIV rate that is crippling our country. Again, where do we go from here? Most certainly we must practice the best care for the women with advanced AIDS and we must have a PMTCT programme that aims for a transmission rate of less than 2%, but there must be more to preventing HIV than we have aimed at in the past.

We, in our retirement years, have also been giving support to programmes in schools that teach the fundamentals of quality family life and human sexuality, and how to make good choices at the right time. We are also giving thought to going one step further and planning to run some pilot Well Woman Clinics where women, among other things, can come for consultation on how to prepare for a planned, really successful pregnancy, whether HIV positive or not. There are certainly better ways to live than is the norm in South Africa today.

The implementation of agreed upon norms

Previous editions of Saving Babies Reports have stated clearly the acceptable norms for staffing a maternity and newborn unit at District level. If equity of maternal and newborn care is ever to be achieved in South Africa these norms have to be endorsed and implemented by Provincial and National Departments of Health. The same applies to the design and space allocation for maternity and nursery accommodation. The high-sounding Mission Statements and declarations of Values and promises to the public need to be backed up by adherence to these norms, if the statements are to have meaning.

The Servicing of Equipment

We have experienced, elsewhere in Africa, the training of technicians (by a South African biomedical engineer) at District level who are able to maintain, service and

repair hospital equipment speedily, thus saving enormous amounts of money, but more often we have seen store rooms full of broken equipment and resulting in serious equipment shortages. Creative solutions need to be implemented for a similar service to our District Hospitals.

Outreach Training Centres

Elsewhere in the world there are models of very effective training centres for outreach programmes. Regional Outreach consultants in one of our Provinces are planning a similar Centre and deserve support for this venture. It is proposed that the Centre will provide accommodation and orientation training at the Regional Hospital for midwives and doctors prior to taking up posts in rural hospitals in the Region and also run short courses on ultrasound, fetal monitoring, endoscopy etc. The various courses will be followed up with on-site training and supervision. It is intended that the Centre will also manage the Outreach programme for the Region.

In Conclusion

Our outreach endeavours are attempting to support the many recommendations for improving the quality of maternal and newborn care presented in this and previous editions of Saving Babies. We believe that this will happen by finding ways of ensuring active and effective **implementation** of those recommendations through promoting quality leadership and supportive supervision in well planned Outreach programmes. We are convinced that an exciting consequence will be that midwives and doctors will queue up to come to our District Hospitals for training in the important specialty of Rural Health Care, and that equity of care will have a new meaning.

We wish to acknowledge those midwives, nurses, Public Health practitioners, medical colleagues and researchers who have worked with us and inspired us in this exciting field of maternal and neonatal service outreach.

Professor Atties F. Malan, Department of Neonatal Medicine, Groote Schuur Hospital, Cape Town.

Professor Hugh Philpott, Emeritus Professor of Obstetrics and Gynaecology, University of KwaZulu Natal, Durban.

Preface

This report marks a decade of the national perinatal care surveys carried out by dedicated health care professionals using the Perinatal Problem Identification Programme (PPIP) and the production of the *Saving Babies: Perinatal care surveys of South Africa* manuscripts. This report provides an ideal time to reflect on what has happened in the last decade with perinatal care and to look forward to the next decade.

The national PPIP database administered by the MRC Maternal and Infant Health Care Strategies Research Unit was set up on 1 October 1999. The network has now been in operation for more than a decade. It is a tribute to all the sites commitment that the audits have been sustained for this period of time. This seventh report will distil the messages learnt from a decade of collecting and analysing the data, as well as providing detail of the 2008-2009 data. Data submitted to the national database from the 1st January 2008 until 31st December 2009 is analysed. During this period 275 sites from throughout the country have submitted data and just fewer than 963,000 births have been entered. This comprises approximately 52.4% of all births in health institutions recorded by DHIS (October 2010) in South Africa during this time period. This is significant progress compared with the 27 sites and 123 508 births in the first report in 2000.

The large number of sites and access to the DHIS data has enabled us to continue to analyse the data on a level of care basis. The report also deals in more detail with the District Hospitals, the area identified with the biggest need, and the gap in reporting late neonatal deaths.

The Minister of Health established two new committees in 2008 in addition to the National Committee for Confidential Enquiries into Maternal Deaths. These are the National Perinatal Morbidity and Mortality Committee (NaPeMMCo) and the National Child Morbidity and Mortality Committee (COMMIC). The Saving Babies Technical Task Team was fortunate to be able to discuss the recommendations made in this report with the NaPeMMCo. It is hoped that the input provided by the Saving Babies Technical Task Team will be used by the NaPeMMCo in their submission to the Minister of Health. In this way we believe that all the hard work that has gone into collecting the data by the 275 PPIP sites, the analysis, and the discussion and finally the recommendations we have produced will result in better care for the pregnant women and their babies in South Africa.

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Abbreviations

APH	Antepartum haemorrhage
CA	Congenital abnormalities
CHC	Community Health Centres
DH	District Hospitals
DHIS	District Health Information System
ENND	Early neonatal death
ENNDR	Early neonatal death rate
FA	Fetal abnormalities
HT	Hypertension
Imm.	Immaturity
Inf.	Infections
IPA+T	Intrapartum asphyxia and birth trauma
IUGR	Unexplained intrauterine growth restriction
LBWR	Low birth weight rate
MD	Pre-existing medical conditions
NC	National Central
NOC	No obstetric cause
PCI	Perinatal Care Index
PND	Perinatal death
PNMR	Perinatal mortality rate
PPIP	Perinatal Problem Identification Programme
PT	Provincial Tertiary
RH	Regional Hospitals
SB	Stillbirth
SBR	Stillbirth rate
SPTB	Spontaneous preterm birth
T	Birth Trauma
Unexp. SB	Unexplained stillbirth
Unk.	Unknown

Key Messages

Family planning services

Some key findings from the 2008-2009 National PPIP data suggest that improvements in access to and quality of family planning services can make a major contribution to reducing perinatal deaths (apart from having more widespread social benefits).

- 7.5% of births occurred in girls under 18 years old. It can be assumed that almost all pregnancies in this age group are unplanned. It is unlikely that these girls ever came into contact with family planning services until they were already pregnant.
- Perinatal deaths are disproportionately common in pregnancies where the mother is under 18 years old. 12.7% of perinatal deaths occurred in under-18s while only 7.5% of births occurred in over-18s. The rate of perinatal deaths in under-18s is higher compared to those aged 18-34 for all the main causes of death, including unexplained IUD, spontaneous preterm labour, intrapartum asphyxia, and hypertensive disorders.
- The rate of perinatal deaths in the over 34 year-old group is also higher than in the 18-34 year-old group, particularly for deaths due to hypertension, although overall the difference is less marked than with the under-18s. 12.8% of perinatal deaths occurred in over 34s, with 10% of births occurring in this age category.

Based on these key findings, the following are recommendations related to family planning services.

- New family planning strategies are required to address the high levels of teenage pregnancy, as, with current strategies, the teenagers are a group who are unlikely to ever come into contact with family planning services, unless they have already become pregnant.
- Communities must be educated and mobilized to address family planning issues in the home environment, including family planning for teenagers.
- Practical family planning education should be included in the curriculum for High School students.
- Family planning services should be available at High Schools (e.g. through mobile clinics).
- Antenatal care must include family planning education
- Family planning services must be available at all sites conducting deliveries including regional and tertiary centres. The full range of contraceptive options should be available at all family planning sites, including the intra-uterine contraceptive device
- Post-partum sterilization must be accessible to all women who want it, both at caesarean section and post normal vaginal delivery.

Antenatal care

The key findings related to antenatal care from the 2008-2009 National PPIP / CHIP data suggest that improvements in access to and quality of antenatal care services can make a major contribution to reducing perinatal and child deaths.

- Unexplained IUD is overall the most common category of perinatal death in South Africa and specifically at District and Regional Hospitals. Likely causes of these deaths include (amongst other causes) IUGR, post-maturity, and syphilis, all of which are preventable if women book early and appropriate antenatal care is provided. The most common probable avoidable factors related to unexplained IUDs are: inappropriate response to poor fetal movements; and never initiated antenatal care.
- Hypertension in pregnancy, (including abruptio placentae with hypertension), is the most common cause of perinatal death at tertiary level, and the 3rd most common overall in South Africa. The most common probable avoidable factors in these cases are antenatal care-related, either patient factors (unbooked or poor attendance, inappropriate response to poor fetal movements), or medical personnel factors (no response to hypertension, delay in referral)
- HIV exposure is a significant factor contributing to late neonatal deaths, and the most important factor related to child deaths. These deaths could largely be prevented by effective PMTCT programmes initiated during antenatal care.
- There are still many perinatal deaths from syphilis in South Africa (1.1% of all perinatal deaths), and many others where syphilis serology results were not available. The most common probable avoidable factors related to the deaths from syphilis are patient-related (unbooked, or late booking), but medical personnel factors (no response to positive syphilis serology test) and administrative factors related to the lack of on-site syphilis testing at facilities, also feature prominently.

Based on these key findings, the following are recommendations related to antenatal care, which, if implemented, should lead to a decrease in perinatal and child mortality.

- Health facilities must encourage early antenatal booking by ensuring that the woman's first contact with health services during her pregnancy leads to prompt initiation of formal antenatal care (e.g. when she presents to confirm the pregnancy or for an unrelated medical problem). Communities must be educated and mobilised to encourage early antenatal booking amongst their members.
- Antenatal care should include education on the importance of women monitoring their fetal movements from 28 weeks' gestation, and reporting decreased fetal movements promptly.
- PMTCT strategies should be integrated into routine antenatal care, including HIV testing for all at the booking visit, and CD4 count testing at the booking visit for those that test HIV positive. This should be followed

by prompt initiation of HAART during pregnancy for all who meet the criteria for HAART.

- Antenatal care should include education about HIV, PMTCT and infant feeding, and community education on these subjects should be intensified.
- There must be on-site testing available at all antenatal care sites, for all routine booking blood tests, including HIV, syphilis, Rh and Hb.
- Calcium supplementation (at least 1g daily of elemental calcium) should be routinely implemented for all pregnant women from the booking visit for the prevention of pre-eclampsia, unless there is clear evidence that the woman already takes a high calcium diet.
- Antenatal care at primary health care level should include checklists for risk classification and flow-charts for management, including appropriate referral to the high-risk clinic.
- There should be an Outreach service for all District hospitals and primary health care facilities offering antenatal care, to provide support, guidance and feedback in implementing high quality evidence- based antenatal care. For this to occur, there should be designated Outreach posts created (doctors and midwives).
- BANC, a quality improvement package for basic antenatal care, should be promoted as an aid to implementation of standardized high quality antenatal care at the primary care level.

Intrapartum care

The combined category of intrapartum asphyxia and birth trauma (IPA & T) was the leading cause of neonatal deaths and, excluding unexplained deaths, was the leading cause of perinatal deaths for babies ≥1000 g. Fresh stillbirths were frequent, and about one-quarter of fresh stillbirths had been alive when their mothers were admitted before delivery. Deaths from IPA & T occurred substantially at all levels of care, but were most frequent at district hospitals. Maternal age <18 years was associated with higher rates of death from IPA & T than other age groups.

For deaths from IPA & T, district hospitals had the highest rates of patient-associated and healthcare provider-associated avoidable factors. Administrative-associated avoidable factors were most frequent at provincial tertiary hospitals, which also had the second-highest rate of healthcare provider-associated avoidable factors. From the lists of avoidable factors, problem areas in intrapartum care could be identified as follows:

Administrative:

- Insufficient or poorly trained medical and nursing staff
- Inadequate transport for patients from home to institutions or between institutions
- Poor access to emergency caesarean sections, because of inadequate facilities or anaesthetic delays
- Inadequate neonatal resuscitation equipment and neonatal care facilities

Healthcare provider:

- No or inadequate monitoring of the fetal heart rate during labour
- Inappropriate management of poor progress during the first stage of labour
- Poor management of prolonged second stage of labour, including inappropriate use of instrumental delivery
- Failure to recognize breech presentation and difficulties with breech delivery
- Inadequate neonatal management plan
- Generally, failure to call for senior assistance, or delay in arrival of senior

Recommendations to reduce perinatal deaths from IPA & T:

Systems and structures:

- Staffing and equipment norms, including operating facilities, must be established for all levels of care, with targets reached at all institutions, especially at provincial tertiary hospitals
- Training in obstetrics and midwifery must include interactive and practical modules on fetal monitoring, progress in the first and second stage of labour, breech delivery, and neonatal resuscitation
- Dedicated emergency transport services for women in labour must be available around the clock in all health districts

Clinical protocols must be available in all labour wards and include:

- Indications for electronic fetal monitoring, and guidelines on detection and management of fetal distress
- Management of the first stage of labour using a partogram
- Management of prolonged second stage of labour, including rules on use of equipment for instrumental delivery
- Recognition and management of breech presentation at term, before and during labour
- Neonatal resuscitation and early management of asphyxiated newborns
- Rules on when to consult with, or transfer patients to, higher levels of care
- Rules on when to call for assistance, and availability of senior staff to supervise or manage difficult cases in labour

Early Neonatal Deaths

Only deaths in infants with a birth weight of 1000g or more are considered here.

How many?

In 2008 – 2009 there were 8 234 early neonatal deaths of infants with a birth weight of 1000g or more. This is 0.9% of all live births.

- 43.4 % of these deaths were in infants weighing 2500g or more.
- 28.2% of the deaths were in infants weighing 1000 – 1499g.

Where?
The mortality rate for infants with a birth weight of 1000 – 1499g was highest (250.4 / 1000 live births) in *District Hospitals*. The early neonatal mortality rate for infants with a birth weight of 2500g or more was also highest in *District Hospitals*.

Why did the infants die?
The final neonatal cause of death was:

- Hypoxia (42.1%)
- Immaturity related (29.6%)

Action needed

1. Efforts must be concentrated on ***District Hospitals***
2. The ***"things"*** (adequate facility, equipment, protocols, policies, support services, patient records) need to be in place.
3. There must be ***sufficient staff***. In most District Hospitals the staffing of neonatal units is extemely bad, eg **no nurse** to care for newborns during the night.
4. The staff must have at least ***basic newborn training***. Sufficient staff must be trained to have a "critical mass" of staff to be able to provide cover for the neonatal unit 24 hours per day.
5. Regular (at least monthly) ***visits from the regional paediatric consultant*** who must do clinical ward rounds and ***assess clinical practice***. Substandard practice must be dealt with appropriately.
6. ***Every*** staff member who works in the labour ward must be ***trained in basic newborn resuscitation***.
7. All staff working in the labour ward must be trained in the ***recognition and management of fetal distress***.
8. The visiting ***regional obstetric consultant*** (at least monthly) must do labour ward teaching rounds and ***assess clinical practice***. Where there is substandard care, it must be dealt with immediately and consistently.

First priority for action:
Appointment of Regional Consultants (Paediatric, Obstetric and Midwife) with the specific portfolio of outreach to support and improve clinical care in District Hospitals.

Late Neonatal Deaths

Large numbers of neonates (7% of all admissions) are still admitted to children's wards which are, by definition, not designed to adequately accommodate them, and their In-hospital Mortality Rate (IHMR) has increased over the 5 year period. A modifiable factor rate of 2.5 events per death was recorded for the neonatal deaths.

In late neonatal deaths only 42% had a nutritional status of normal (10% unknown), leaving the majority of neonates that died after 7 days as being malnourished. However, no underlying condition was recorded in 79% of these neonates, possibly indicating they had no antenatal or intrapartum complication and were originally discharged as normal term infants. The problem of infant feeding might be much more acute that thought. Forty-one percent of the neonates that died after 7 days were known to be either HIV exposed or infected, but disturbingly in 49% of cases the HIV status was unknown. Analysing only cases where the HIV status was known, HIV infection was associated with 80% of late neonatal deaths. The majority of late neonatal deaths occurring in children's wards were caused by infection; septicaemia was the most common cause, followed by pneumonia, acute diarrhoeal disease, PCP and meningitis.

Almost half (45%) of all neonates dying in children's wards, died within 24 hours compared with 29% of all child deaths. Further, proportionally almost twice as many neonates than children present as dead on arrival. In the home and community, there is the ongoing serious problem of delay in seeking care. The reasons for this are not clear.

Having reviewed all the modifiable factors, health workers considered that only one quarter of the neonatal deaths occurring in children's wards were unavoidable! If the overall care was according to protocol a very significant number of deaths, mostly due to infections, could have survived. Overall, basic, simple clinical care processes are often not followed in hospitals, and at clinic level IMCI approaches are not used. Major resource allocation problems with regard to both neonatal high and intensive care facilities have been identified in this survey, as well as deficiencies in the allocation of skilled clinical personnel.

Recommendations

1. Neonates must be admitted to facilities specifically designed, equipped and staffed according to their special needs. General children's wards cannot adequately provide the warmth, air/oxygen, food, and infection prevention and control that neonates need and neonates should NOT be admitted into them.

2. All South African hospitals caring for neonates should, as a matter of priority, provide proper facilities for neonates, building them from scratch, or modifying current inadequate nurseries.

3. Perinatal HIV care continues to need improvement notwithstanding the launch of the new national ART Guidelines.

4. Posts for regional neonatologists (supported by academic Departments of Neonatology), whose primary responsibility is the improvement of neonatal care throughout their geographic areas, must be created country-wide, and neonatologists should be actively head-hunted for these posts.

5. 'Resource-Allocation-to-Neonates' policies must be examined to ensure that resources are appropriately and equitably allocated to the neonatal population.

6. Neonatal guidelines using an IMCI approach (such as the Limpopo Newborn Care Charts on the Management of Sick and Small Newborns in Hospital) should be implemented immediately at clinics and hospitals.

7. Quality data is essential and communication with the DHIS must be improved.

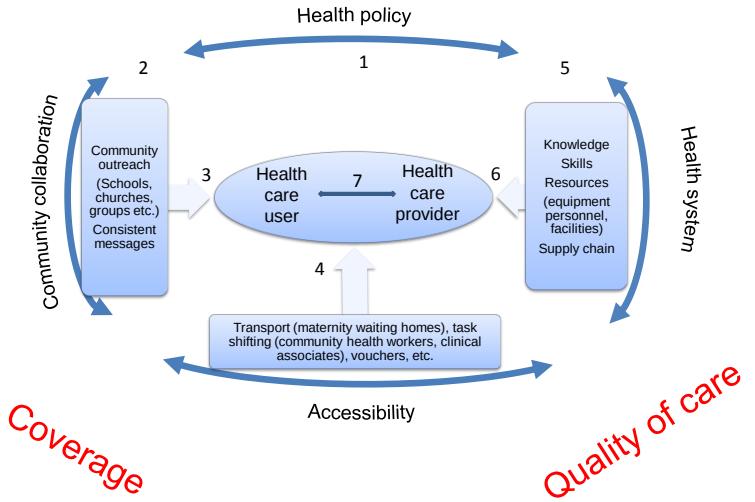
Implementing effective interventions

A health system is not a machine where the ouptput can be predicted from the input. The health system is rather a complex adaptive system where the output is mostly not predicatble from the input, and in different hospitals the same inputs might have completely different outputs. Hence changing the health system so that the quality of care can be improved is a complex intervention.

There are seven main interfaces where interaction can bring about change in behavior (see Table 1 and Figure 1: the numbers refer to the interface and are also given in the text). Concerted efforts involving all the interfaces working towards the same agreed goals are the most likely to achieve improved quality of care. The interface that has the most effect is the health care user-health care provider interface [7]. It is this interaction which will make the user decide to use the medication prescribed or follow the management plan discussed with her. To make this interface more effective, the user should have a basic understanding of her condition so that the discussion with the health care providers is understood. This basic understanding the user should have from the health messages given by her environment [2,3], e.g. clinic, school, church etc. These consistent messages should be dictated by the health promotion departments of the various departments of health [3]. The messages should be decided on by the heads of health in conjunction with the policy makers [1,2]. Further the health care must be accessible to the patient and for this there needs to be an interaction between the community and the health care managers to facilitate this [4]. The health care provider on the other hand must have the knowledge and skills to manage the health care user before him/her [6]. For this the health care providers needs to interact between the

health care managers to ensure there are guidelines and resources availabe to manage the patients and the health care provider must ensure they have the knowledge and skills to implement the guidelines. The health care managers have to interact with the heads of health so that they get sufficient resources to be able to allow the health care provider to do their work [5]. Finally the heads of health have to interact with the policy makers so that the allocation of resources falls within the policy laid out [1].

Figure 1. Key interfaces that affect and effect change



Legend: Interfaces

1. **Policy makers – heads of health:** decide on and convey policy
2. **Heads of health – health care managers:** convey policy, decide strategy and messages for the community
3. **Health promotion managers –community:** provide constant messages
4. **Health care managers – community:** ensure community has access to health care to enable policy to be implemented
5. **Heads of health – health care managers:** convey policy, and decide allocation of resources necessary to implement policy
6. **Health care managers – health care providers:** convey policy, provide resources and knowledge and skills necessary to implement policy
7. **Health care providers – patient:** provider implements knowledge and skills and uses resources to provide care to the patient within policy guidelines including adequate information to enable discussion and appropriate decisions by the patient.

To have the most chance of success all these interfaces need to be addressed. With respect to improving perinatal care a number of these interfaces have already been addressed.

Table 1: Health system agent's interfaces and strategies likely to be successful

Interfaces:	Examples of strategies likely to be successful
1: Policy makers-heads of health: decide on and convey policy	Variable: Burden of disease, cost effectiveness, availability of effective solutions, political decisions, actors power, etc.
2: Heads of health-health promotion managers: convey policy, decide strategy and messages for the community	Diagonal approach (creating demand providing resources to fulfilled it)
3: Health promotion managers-community: provide constant messages	Patient mediated interventions; Mass media; Participatory interventions
4: Health care managers-community: ensure community has access to health care to enable policy to be implemented	Community mobilization; Financing strategies; Communication and transport system; Antenatal risk screening by community health workers; Maternity waiting homes
5: Heads of health-health care managers: convey policy, and decide allocation of resources necessary to implement policy	Formal integration of services; Improving office systems; Structural interventions; Provider incentives
6: Health care managers-health care providers: convey policy, provide resources and knowledge and skills necessary to implement policy	Distribution of educational material; Audit and feedback; Reminders; Educational meetings; Local consensus processes; Problem based learning in continuing medical education; Educational outreach visits; Local opinion leader; Multifaceted interventions; Tailored interventions to overcome identified barriers to change.
7: Health care providers-patients: provider implements knowledge and skills and uses of resources to provide care to the patient within policy guidelines including adequate information to enable discussion and appropriate decisions by the patient.	Motivational interviews; Patient education programmes such as Informed patient choice, Shared decision making between patients and providers, Patient decision aids

There is a policy clearly stipulated by the Department of Health that South Africa must try to achieve the millennium development goals and with respect to maternal and perinatal care goals 4 and 5 are especially important. The Department has made somes resources available to the health care managers to achieve these goals. The health messages are becoming more clear and consistent, especially with respect to the HIV epidemic. Health care is readily accessible to most women in South Africa, although the rural areas fare worst. Programmes proven to improve the knowledge and skills of health care providers are available and are increasingly

being utilised. The major and most important aspect lacking in the system is an effective health care provider-health care user interaction. This should be considerably improved. However, with a concerted effort and leadership at every level, it is within our grasp to significantly improve perinatal care in a very short period of time.

Chapter 1: Overview 2008-9

RC Pattinson for PPIP users

1.1. Abstract

During the period 1st January 2008 to 31st December 2009, 962746 births and 23547 stillbirths and 11404 early neonatal deaths were recorded on the national Perinatal Problem Identification Programme (PPIP) database from 275 PPIP sites. This represents 52.4% of all births in institutions using the District Health Information System (DHIS) for the denominator (October 2010). All levels of care (Community Health Centres - CHCs, District, Regional, Provincial Tertiary, and National Central hospitals) were well represented. Late neonatal deaths were under reported and are dealt with separately.

Findings

1. Pregnant women 17 years old or less and pregnant women 35 years old or more had significantly higher perinatal mortality rates than women between the ages of 20 and 34 years. Contraceptive use should be promoted in these groups.
2. The top causes of perinatal deaths are:
    a. Labour related complications (namely intrapartum asphyxia and birth trauma) – 16%
    b. Spontaneous preterm birth – 21%.
    c. Placenta/placental bed disease (namely pre-eclampsia/eclampsia and abruptio placenta) – 23%.
3. Unexplained stillbirths (22%) formed a large group death. The majority of these were macerated stillbirths and dead on admission to the health institution. Funding and research resources must be directed to identifying the causes of deaths in this group.
4. The majority of births (59%) occur in CHCs or district hospitals, as do the majority of perinatal deaths. The major causes of perinatal death were due to intrapartum asphyxia and birth trauma and immature neonates born due to spontaneous preterm labour. The perinatal mortality rates (PNMR) were highest in district hospitals for both conditions.
5. The on-site PPIP reviewers felt that 46% of the deaths due to labour related complications were probably avoidable had the health care provider acted appropriately. The majority of these occurred in the district hospitals and the "probable" PNMR for labour related problems was highest in the district hospitals, followed by provincial tertiary hospitals. This indicated the quality of intrapartum care was poorest at the district followed by provincial tertiary hospitals.
6. Administrative problems were highest in provincial tertiary hospitals and the avoidable mortality rate was mostly due to lack of appropriate facilities, transport and staff.

Conclusion

This perinatal care survey has concentrated on identifying the disease categories in which most deaths are thought to be preventable and identifying the levels of care where the most impact can be made with respect to reducing perinatal mortality. Placenta/placental bed disease has been recognised for the first time as the major contributor to perinatal death. Potentially these deaths can be prevented by introducing calcium supplementation to all pregnant women. Problems of the quality of care during childbirth and for the immature or hypoxic neonates are the areas where most preventable deaths occur. The poorest quality of care and most of the perinatal deaths occur in district hospitals. This is the level of care where improvement is most urgently needed.

1.2. Introduction

The Perinatal Problem Identification Programme (PPIP), an audit tool for evaluating perinatal care, has been in used nationally since 2000 and this report marks a decade of it use. This seventh report deals the years 2008-2009.

The report continues with classifying the institutions the same way at the DHIS. Thus, the institutions have been classified as Community Health Centres – CHCs (including Midwife Obstetric Units), District, Regional, Provincial-Tertiary and National-Central Hospitals.

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

Table 1.1. Spread of PPIP sites in South Africa

	Register-ed	Data	Total	% Register-ed	% data
Community Health Centres	74	45	327	22.6	13.8
District Hospitals	198	170	257	77.0	66.1
Regional Hospitals	43	50	65	66.2	76.9
Provincial Tertiary	5	5	6	83.3	83.3
National Central	6	5	9	66.7	55.6
Total	326	275	664	49.1	41.4

Table 1.2 illustrates the number of births covered by the PPIP sites in each level of care, the distribution of perinatal deaths and the perinatal mortality rates (PNMR) for each level. The PPIP sites represent all types of institutions and the sample is large for each site.

The according to the DHIS 15.7% of births occur in the CHCs, 43.0% in the District Hospitals, 29.5% in the Regional Hospitals and 5.6% in the Provincial Tertiary Hospitals and 6.1% National Central Hospitals. Using this distribution it is possible to estimate a national PNMR which for 2008-9 was approximately 35.3/1000 births ≥500g.

Table 1.2. Distribution of births and deaths per level of care on PPIP database

≥500g	CHC	DH	RH	PT	NC
All births	96 472	482129	286783	44058	53304
Live births	95673	471878	278607	42486	50402

≥1000g	CHC	DH	RH	PT	NC
All births	95992	478485	282541	43150	50811
Live births	95464	469958	276264	41991	49139

≥500g	CHC	DH	RH	PT	NC
Macerated	436	6409	5245	825	1148
Fresh	363	3848	2936	591	1746
Total SB	799	10257	8181	1415	2894
ENND	205	5815	3770	701	913
All PND	1004	16072	11951	2116	3807

≥1000g	CHC	DH	RH	PT	NC
Macerated	291	5266	4137	585	485
Fresh	237	3257	2138	426	672
Total SB	528	8524	6275	1011	1157
ENND	134	4703	2520	478	521
All PND	662	13227	8795	1489	1678

Rate ≥500g	CHC	DH	RH	PT	NC
Macerated	4.52	13.29	18.29	18.72	21.54
Fresh	3.76	7.98	10.24	13.41	32.76
Total SB	8.28	21.27	28.53	32.13	54.30
ENND	2.14	12.32	13.53	16.50	18.11
All PND	10.41	33.33	41.67	48.04	71.42

Rate ≥1000g	CHC	DH	RH	PT	NC
Macerated	3.03	11.01	14.64	13.55	9.55
Fresh	2.47	6.81	7.57	9.88	13.23
Total SB	5.50	17.81	22.21	23.43	22.78
ENND	1.40	10.01	9.12	11.38	10.60
All PND	6.89	27.64	31.13	34.51	33.03

Table 1.3. Extrapolation of PPIP data to estimate the Perinatal Mortality Rate (PNMR) and number of deaths per level of care per year

	CHC	DH	RH	PT	NC	Total
Births DHIS[#]	288498	790559	543457	102624	111301	1836439
Distribution of births (%)	15.7	43.0	29.6	5.6	6.1	100
Births PPIP	96 472	482129	286783	44058	53304	962746
% of PPIP births on DHIS database	33.4	61.0	52.8	42.9	47.9	52.4
PNMR ≥ (500g)	10.41	33.33	41.67	48.04	71.42	35.33
Total Deaths	3003	26353	22647	4930	7949	64883
Deaths per year	1502	13177	11324	2465	3975	32441

[#]- DHIS data October 2010

Table 1.4 compares estimates from 2006-7 and 2008-9. This is only an estimate and trends should not be assumed as there was about a third more births and deaths registered on PPIP in 2008-9 compared with 2006-7.

Table 1.4. Comparison births and deaths for SA extrapolated from PPIP data

	2006-7	**2008-9**
Births	1671391	1836439[#]
Deaths[*]	62234	64883
PNMR/1000 births	37.2	35.3
Per year		
Births	835696	918220
Deaths	31117	32441

[#]- DHIS data October 2010

[*]- Extrapolated from PPIP database

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

1.3. Comparison of the Perinatal Care Indices

Table 1.5 illustrates gives the perinatal care indices for each category of health institution. As expected the mortality rates increase as the level of care increases. Community Health Centres are only supposed to care for pregnant women with no risk factors. It is expected that the rates would be low. The tertiary hospitals (Provincial Tertiary and National Central hospitals) see the most complicated cases and the highest mortality rates

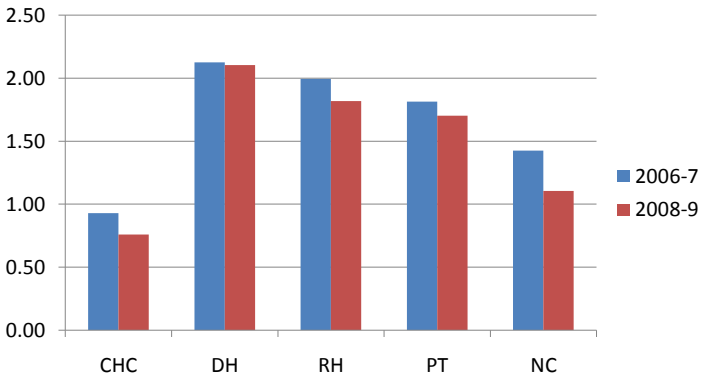
should be at those sites. This is evidenced by the increasing low birth weight rate as the level of care rises.

Table 1.5. Comparison of perinatal care indices

	CHC	DH	RH	PT	NC
PNMR (≥500g)	10.41	33.33	41.67	48.04	71.42
SBR (≥500g)	8.28	21.27	28.53	32.13	54.30
ENNDR (≥500g)	2.14	12.32	13.53	16.50	18.11
PNMR (≥1000g)	6.89	27.64	31.13	34.51	33.03
SBR (≥1000g)	5.50	17.81	22.21	23.43	22.78
ENNDR (≥1000g)	1.40	10.01	9.12	11.38	10.60
LBWR (all births ≥500g)	9.1	13.1	17.1	20.3	29.9
LBWR (live births)	8.5	12.0	15.5	18.2	26.6
LBWR (all births ≥1000g)	8.6	12.5	15.9	18.6	26.4
LBWR (Live births)	8.3	11.7	14.7	17.3	24.8
PCI ≥500g	1.15	2.54	2.43	2.37	2.39
PCI ≥1000g	0.80	2.22	1.96	1.86	1.25
SB:NND ratio ≥500g	3.90	1.76	2.17	2.02	3.17
SB:NND ratio ≥1000g	3.94	1.81	2.49	2.12	2.22

The Perinatal Care Index is a quality of care index that has been validated as a true measure of the quality of care, the higher the index the poorer the care. Ideally it should be used to compare like hospitals, i.e. hospitals within the category to identify outliers. Traditionally however, the values should be below 1 for CHCs and below 2 for all hospitals. It is concerning that the average for both the District Hospitals for ≥1000g is above 2. Figure 1.1 compares the Perinatal Care index per level of care with the 2006-7 rates.

Figure 1.1 Comparison of Perinatal Care Index between 2006-7 and 2008-7



The mortality rates for the birth weight categories per institutional category are given in Tables 1.6 to 1.8.

Table 1.6. Perinatal mortality rates per birth weight category

Weight category	CHC	DH	RH	PT	NC
500 - 999g	712.50	777.72	742.34	689.43	649.82
1000 - 1499g	312.80	417.77	365.35	312.50	230.84
1500 - 1999g	100.15	178.60	151.67	138.73	122.96
2000 - 2499g	17.20	55.88	56.94	55.69	62.51
2500g+	2.59	14.03	13.21	14.41	15.54

Table 1.7. Stillbirth rates per birth weight category

Weight category	CHC	DH	RH	PT	NC
500 - 999g	792.40	608.33	603.05	659.74	759.26
1000 - 1499g	251.22	242.93	241.17	223.01	172.89
1500 - 1999g	83.58	57.81	115.17	121.21	102.13
2000 - 2499g	14.36	41.77	45.84	46.37	49.31
2500g+	1.95	8.73	9.03	10.82	10.94

Table 1.8. Early neonatal death rates per birth weight category

Weight category	CHC	DH	RH	PT	NC
500 - 999g	339.71	578.13	533.50	430.30	308.79
1000 - 1499g	82.25	230.94	163.64	115.17	70.06
1500 - 1999g	18.08	137.38	41.25	19.94	23.20
2000 - 2499g	2.88	14.73	11.63	9.77	13.89
2500g+	0.64	5.34	4.21	3.63	6.38

The early neonatal death rates for district hospitals between 1-2kg is unacceptably high, as is the early death rate for neonates ≥2.5kg. The rates do not differ significantly from the 2006-7 data.

Figure 1.2. Percent fresh stillbirths alive on admission

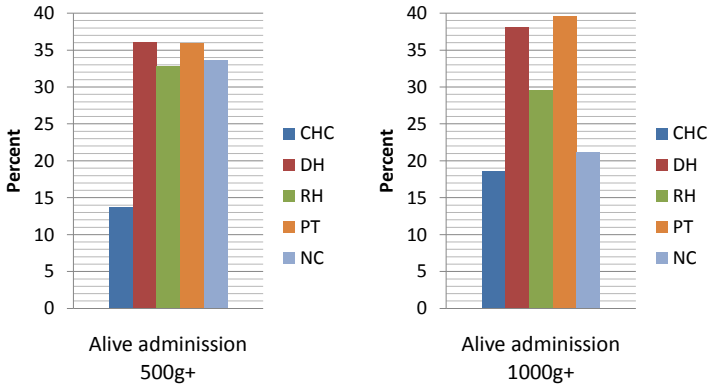
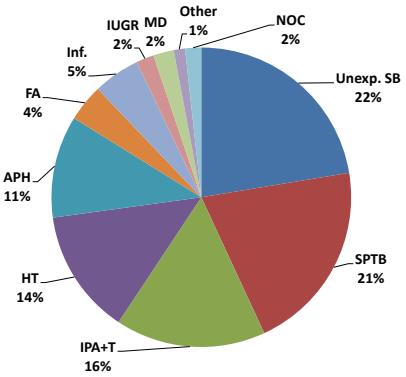


Figure 1.2 illustrates the percentage of fresh stillbirths alive on admission. As expected the number of fresh stillbirths presenting alive on admission to CHC is low, but it is surprising that about a third of fresh stillbirths' ≥500g were alive on admission indicating an opportunity to intervene. For babies ≥1000g where one would expect to be able to save the babies lives, close to 40% were alive on admission in District Hospitals and Provincial Tertiary Hospitals. This would indicate that there was considerable opportunity for intervention in hospital in two of the five fresh stillbirths, perhaps indicating a delay in treatment. The greater proportion of fresh stillbirths dead on admission perhaps points to a problem in getting to a health institution because of either lack of recognition of a problem or lack of transport.

1.4. Primary obstetric causes of perinatal deaths

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

Figure 1.3. Distribution of primary cause of perinatal death ≥500g



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

There are three major primary obstetric causes identified: spontaneous preterm birth, intrapartum asphyxia and birth trauma and placenta/placental bed disease (pre-eclampsia/eclampsia and abruptio placenta). Unexplained stillbirths are mostly macerated stillbirths and their causes are most likely to be undiagnosed infection, intrauterine growth restriction and fetal abnormalities. Thus these three categories are under-represented. Placenta/placental bed disease is a new category and is based on a better understanding of the causes of pre-eclampsia and abruptio placenta. Abruptio placenta causes 80% of antepartum haemorrhages, this new category accounts for about 23% of all perinatal deaths, the largest single category. The importance of this condition has been under-estimated in the past in perinatal deaths but is well recognised as causes of maternal deaths.

Primary obstetric causes of perinatal death and maternal age

Figure 1.3 illustrates the PNMR per age categories <18 years, 18 and 19 years, 20-24 years and more than 34 years. Clearly at the extremes of age,

the mortality rates are significantly higher. Teenagers less than 18 years had a significantly higher PMNR for unexplained stillbirths, spontaneous preterm birth and intrapartum asphyxia than women between the ages of 20 and 34 years. Women more than 34 years had significantly higher PNMR for unexplained stillbirths, spontaneous preterm birth, intrapartum asphyxia, complications of hypertension, antepartum haemorrhage, fetal abnormality and pre-existing medical conditions.

Figure 1.4. Perinatal mortality rates in age categories

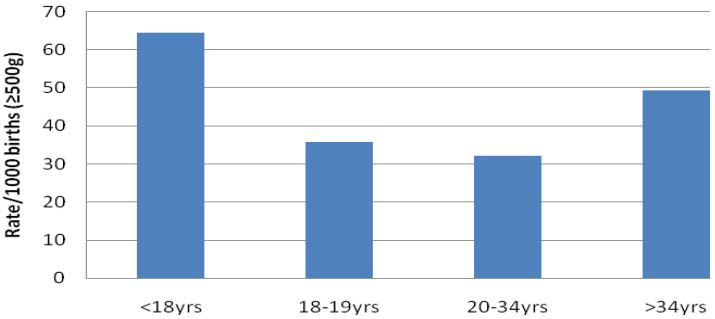
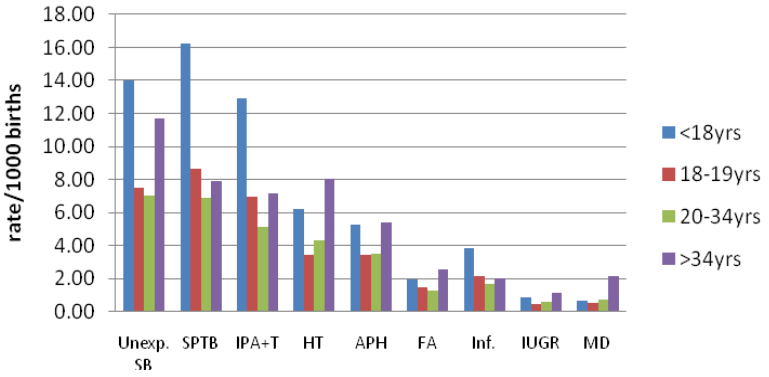


Figure 1.5. Comparison of primary obstetric causes of death and maternal age categories



Primary obstetric causes of perinatal death and birth weight category

Some institutions only complete the first section of PPIP, i.e. the number of births and deaths per birth weight category and do not complete the causes of death or avoidable factors sections, for this reason, a correction factor has been introduced so that the mortality rates are not underestimated. In all 85.4% of stillbirths had a primary obstetric cause allocated and 89.8% of early neonatal deaths had a primary obstetric and final neonatal cause allocated. Table 1.9 shows the primary obstetric causes of death per number of deaths per birth weight category.

Table 1.9. Comparison of primary obstetric cause of death per number of deaths per birth weight category (corrected PPIP data)

Primary obstetric cause	500-999g	1000-1499g	1500-1999g	2000-2499g	2500g+	TOTAL
Unexp. SB	1495	1459	1328	1327	2474	8083
SPTB	3895	2113	959	187	163	7317
IPA	123	210	301	701	4057	5393
T	46	54	69	71	381	621
HT	1444	1086	781	543	771	4624
APH	630	759	730	716	906	3743
Inf.	214	236	232	257	434	1373
FA	270	323	268	293	665	1819
IUGR	121	118	113	105	192	649
MD	110	120	106	104	353	794
Other	83	77	68	61	147	436
NOC	61	75	54	93	315	597
Total	8491	6631	5010	4459	10858	35449

Figure 1.6 illustrates the common causes of death per number of deaths in birth weight categories from 500g extrapolated to the whole of South Africa. Most perinatal deaths in South Africa fall into the category unexplained stillbirths (22%). The second most common primary obstetric cause of death is spontaneous preterm birth with 53% being less than 1000g. The third most common cause is intrapartum asphyxia and birth trauma with an estimated 5504 babies per year and the vast majority (4064, 74%) have a birth weight of ≥2500g. Complications of hypertension and antepartum haemorrhage are the next two categories. Eighty percent of the antepartum haemorrhages were classified as abruptio, the rest being due to placenta praevia (7%), antepartum haemorrhage of unknown origin (9%) and the remained as unspecified antepartum haemorrhage (4%). Both pre-eclampsia/eclampsia and abruptio placenta are probably placenta/placental bed diseases. If these two are combined the proportion of perinatal deaths is 22.8%, becoming the most common cause of perinatal death. This is

important as calcium supplementation has been shown to reduce the complications of pre-eclampsia/eclampsia and given the high number of deaths due to this per year in South Africa, including maternal deaths, calcium supplementation should be introduced as a prevention strategy.

Figure 1.6. Distribution of all perinatal deaths per cause of death and birth weight category: Estimated all deaths per year in SA

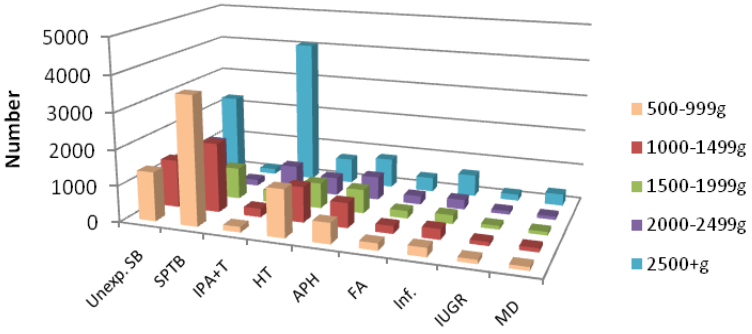


Table 1.10-1.12 gives the distribution of macerated stillbirths, fresh stillbirths and early neonatal deaths in birth weight categories for each primary obstetric cause of death**.**

Table 1.10. Distribution of macerated stillbirths in birth weight categories for each primary obstetric cause of death

	500g-999g	1000g-1499	1500g-1999g	2000g-2499g	2500g+	Total
Unexp. SB	18.1	18.7	17.0	17.0	29.1	100.0
SPTB	56.2	23.1	11.7	4.7	4.4	100.0
IPA	5.8	9.9	13.6	18.7	52.1	100.0
T	12.1	12.1	18.7	15.9	41.1	100.0
HT	24.9	25.2	19.1	14.3	16.4	100.0
APH	16.0	20.1	20.8	18.5	24.7	100.0
FA	20.8	20.4	18.6	17.1	23.0	100.0
Inf.	16.7	23.1	18.2	18.1	23.9	100.0
IUGR	20.2	22.3	18.2	16.4	22.9	100.0
MD	12.7	15.4	13.6	13.4	44.8	100.0
Other	20.8	22.2	20.1	11.8	25.0	100.0
NOC	13.0	20.4	13.0	17.6	36.1	100.0
All	21.3	20.2	17.2	15.6	25.7	100.0

Table 1.11. Distribution of fresh stillbirths in birth weight categories for each primary obstetric cause of death

	500g-999g	1000g-1499	1500g-1999g	2000g-2499g	2500g+	Total
Unexp. SB	21.6	15.1	13.5	13.7	36.1	100.0
SPTB	67.9	18.4	8.8	2.6	2.3	100.0
IPA	2.0	3.8	5.4	12.5	76.2	100.0
T	6.6	5.5	10.0	11.1	66.8	100.0
HT	39.9	17.8	15.5	10.2	16.5	100.0
APH	14.9	18.5	20.1	20.9	25.5	100.0
FA	26.9	22.9	15.3	9.9	24.9	100.0
Inf.	18.5	13.6	13.3	14.2	40.4	100.0
IUGR	18.2	11.8	15.5	14.5	40.0	100.0
MD	21.2	10.6	14.2	11.5	42.5	100.0
Other	27.3	13.1	9.1	16.2	34.3	100.0
NOC	20.0	4.4	6.7	6.7	62.2	100.0
All	25.0	14.2	12.9	12.7	35.2	100.0

Table 1.12. Distribution early neonatal deaths in birth weight categories for each primary obstetric cause of death

	500g-999g	**1000g-1499**	**1500g-1999g**	**2000g-2499g**	**2500g+**	**Total**
Unexp. SB	18.7	18.0	16.4	16.4	30.4	100.0
SPTB	62.8	20.4	10.1	3.5	3.2	100.0
IPA	2.9	5.2	7.3	14.0	70.6	100.0
T	8.2	7.4	12.4	12.4	59.5	100.0
HT	30.0	22.8	17.9	13.0	16.4	100.0
APH	15.3	19.1	20.4	20.0	25.2	100.0
FA	24.3	21.9	16.7	13.0	24.1	100.0
Inf.	17.4	19.7	16.5	16.7	29.7	100.0
IUGR	19.7	19.7	17.5	15.9	27.1	100.0
MD	14.4	14.4	13.7	13.0	44.4	100.0
Other	23.5	18.5	15.6	13.6	28.8	100.0
NOC	15.0	15.7	11.1	14.4	43.8	100.0
All	22.8	17.8	15.5	14.5	29.5	100.0

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

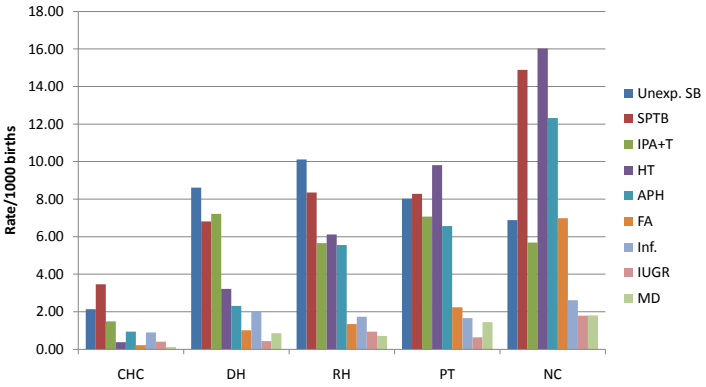
Primary obstetric causes of perinatal death per level of care

Table 1.13 gives the perinatal mortality rate per disease category per level of care for babies ≥500g. Data for deaths ≥1000g is given in the appendix.

Table 1.13. Perinatal mortality rate per disease category per level of care for babies ≥500g

	CHC	DH	RH	PT	NC
Unexp. SB	2.14	8.62	10.11	8.03	6.88
SPTB	3.46	6.81	8.35	8.29	14.88
IPA+T	1.49	7.21	5.65	7.07	5.68
HT	0.38	3.22	6.11	9.81	16.03
APH	0.94	2.30	5.56	6.57	12.32
FA	0.22	1.01	1.34	2.24	6.98
Inf.	0.90	2.03	1.74	1.66	2.61
IUGR	0.40	0.44	0.94	0.64	1.79
MD	0.12	0.85	0.71	1.44	1.80
Other	0.05	0.42	0.47	0.42	1.32
NOC	0.31	0.43	0.69	1.90	1.13
Total	10.41	33.33	41.67	48.04	71.42

Figure 1. 7. Perinatal mortality rate per primary cause of death and level of care



Tables 1.14-1.17 give the stillbirths and neonatal death rate per primary obstetric cause at each level of care.

Table 1.14. Stillbirth rate per disease category per level of care for babies ≥500g

	CHC	DH	RH	PT	NC
Unexp. SB	2.12	8.46	9.73	8.00	6.88
SPTB	2.48	1.85	2.43	2.41	8.49
IPA	0.76	2.91	2.23	3.19	2.57
T	0.24	0.45	0.43	0.92	0.68
HT	0.36	2.85	5.00	7.81	12.76
APH	0.81	1.89	4.81	5.57	11.46
FA	0.13	0.42	0.67	1.18	5.15
Inf.	0.77	1.11	1.12	0.84	1.93
IUGR	0.36	0.30	0.84	0.50	1.50
MD	0.11	0.69	0.62	1.12	1.70
Other	0.04	0.25	0.33	0.28	1.00
NOC	0.12	0.11	0.32	0.31	0.18
Total	8.28	21.27	28.53	32.13	54.30

Figure 1.8. Stillbirth rate per primary cause of death and level of care

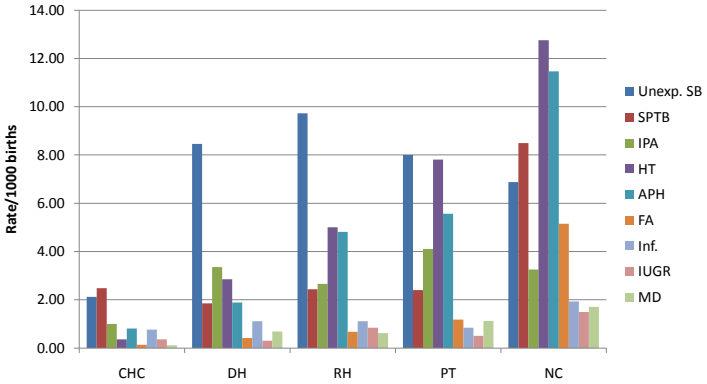
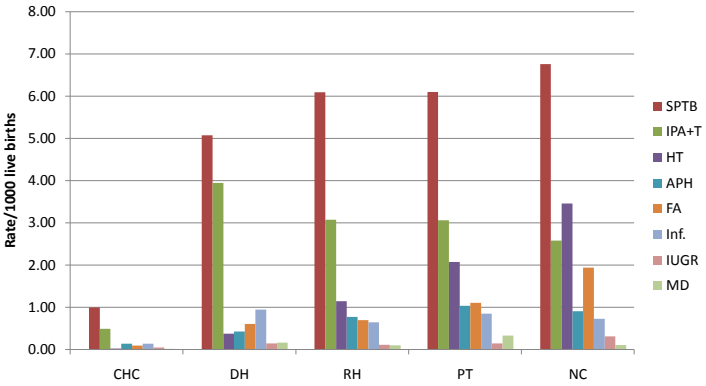


Table 1.16. Early neonatal death rate per disease category per level of care for babies ≥500g

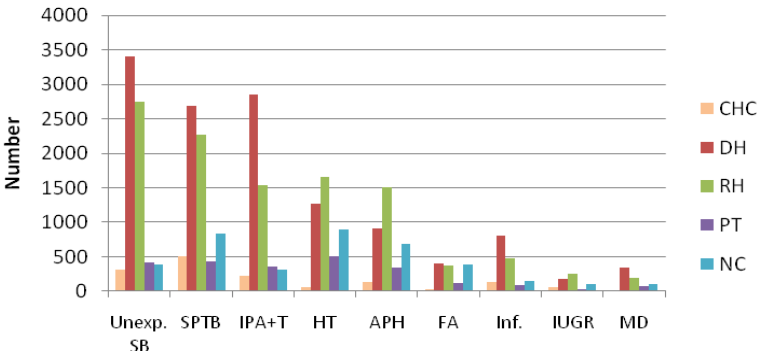
	CHC	DH	RH	PT	NC
SPTB	0.99	5.07	6.09	6.10	6.76
IPA	0.46	3.72	2.87	2.90	2.50
T	0.03	0.22	0.20	0.16	0.08
HT	0.02	0.37	1.14	2.07	3.46
APH	0.13	0.43	0.77	1.04	0.90
FA	0.09	0.60	0.69	1.11	1.93
Inf.	0.13	0.94	0.64	0.85	0.72
IUGR	0.04	0.14	0.11	0.14	0.31
MD	0.01	0.16	0.10	0.33	0.10
Other	0.01	0.17	0.15	0.14	0.34
NOC	0.19	0.33	0.38	1.65	1.01
Total	2.14	12.32	13.53	16.50	18.11

Figure 1. 9 Early neonatal death rate per primary cause of death and level of care



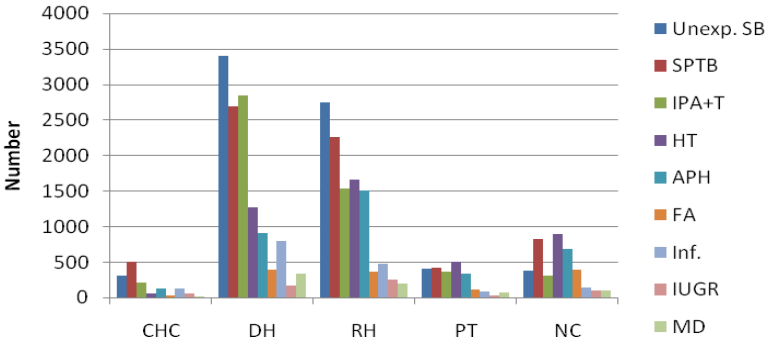
Figures 1.7 and 1.8 illustrate the extrapolated number of deaths per primary obstetric causes for South Africa per level of care. The two bar graphs clearly demonstrate that the major causes of perinatal death are spontaneous preterm birth and intrapartum asphyxia and birth trauma and placenta/placental bed diseases (pre-eclampsia/eclampsia and abruptio placenta). In spontaneous preterm birth, intrapartum asphyxia and birth trauma the district hospitals have the greatest number of deaths and the highest perinatal mortality rates, followed by regional hospitals.

Figure 1.7. Extrapolated number of deaths per primary obstetric causes per level of care for South Africa



Placenta/placental bed disease is most common in regional hospitals followed by district hospitals.

Figure 1.8. Extrapolated number of deaths per primary obstetric cause per level of care for South Africa



Figures 1.9 and 1.10 give the early neonatal death rates in birth weight categories and level of care. The early neonatal death rate for all birth weight categories is highest for district hospitals, followed by regional hospitals in the 1-2kg categories, but the national central hospitals have the second highest rates in the ≥2kg and more category. It is not at all clear why this is the case, but referrals probably play an important role.

Figure 1.9. Early neonatal death rates in birth weight categories and levels of care

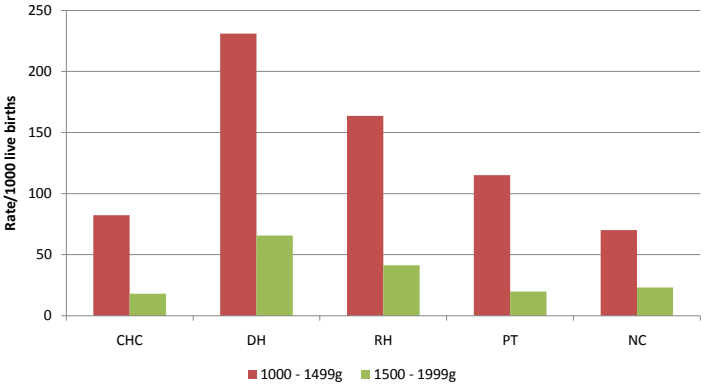


Figure 1.10. Early neonatal death rates in birth weight categories and levels of care

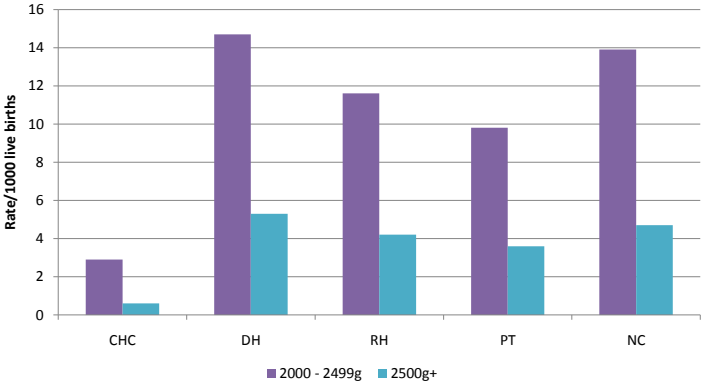
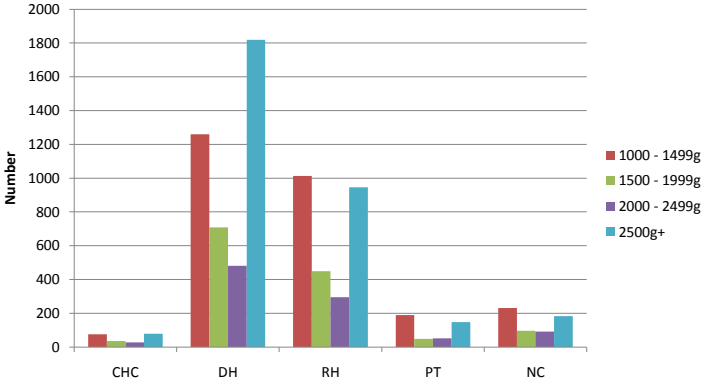


Figure 1.11 extrapolates the early neonatal death rates to the whole population of South Africa to give an estimate as to which level of care has the highest number of deaths. Clearly most deaths in all neonates are in the

district hospitals and they include both immature and mature infants. This figure clearly highlights the area where intrapartum and neonatal care must be improved.

Figure 1.11 Estimated numbers of early neonatal deaths in SA per birth weight category and level of care



1. 5. Health system problems

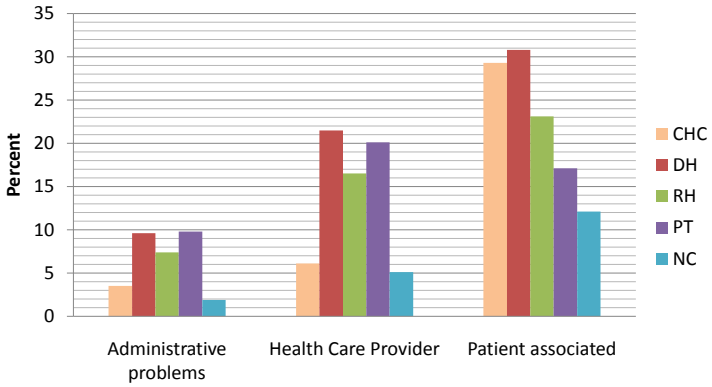
PPIP sites also examine each death to look for avoidable factors, missed opportunities and sub-standard care. These can be grouped as health system problems. The sites grade the deaths as those which were possibly avoidable or probably avoidable. The *probable avoidable factors* are cases where if they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

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

Figure 1.12 illustrates the distribution of probable avoidable factors per level of care. The district hospitals have the highest proportion of probable

avoidable factors related to health care providers and administrative problems.

Figure 1.12. Distribution of avoidable factors that probably resulted in death of baby



District hospital and provincial tertiary hospitals recorded around 1 in 5 of the deaths as being probably avoidable with regional hospitals recording 1 in 6 deaths as being probably avoidable. These three sectors again recorded the highest percentages of avoidable deaths due to administrative factors, all being close to 1 in 13 deaths.

The estimated number of avoidable deaths within the health system (health care provider and administrative problems) has been extrapolated from the distribution of probable avoidable factors recorded in PPIP and the birth recorded per level of care on the DHIS. An *avoidable mortality rate* (avoidable deaths/total births x 1000 per level of care) can then be calculated and this will give a measure of the quality of care at the level of care which can be compared with other levels. The distribution of avoidable deaths through out the health system has also been estimated.

Table1.17. Avoidable mortality rate per level of care

Rate of probable avoidable deaths	CHC	DH	RH	PT	NC
Patient associated	2.73	9.43	8.43	7.79	7.45
Health care provider associated	0.57	6.57	6.02	9.15	3.11
Administrative problems	0.32	2.93	2.70	4.45	1.16

Table 1.17 gives the avoidable mortality rate per level of care. Surprisingly in both health care provider and administrative problems provincial tertiary hospitals had the highest rates, (9.15/1000 births and 4.45/1000 births respectively). This indicates the poorest quality of care. However, when extrapolated to the number of avoidable deaths throughout the country this translates into estimated avoidable deaths per year of 459 and 223 respectively because provincial tertiary hospital only conduct 5% of births. The avoidable mortality rate for health care providers in district hospitals (6.57/1000 births) and the avoidable mortality rate of administrative problems in district hospitals (2.29/1000 births) were the second highest. This translates into estimated avoidable deaths per year of 2576 and 898 perinatal deaths respectively, indicating a much bigger problem.

Patient related avoidable factors

Over the years patient associated factors have been the most common avoidable factors recorded, but this might be an example of victim blaming rather than actual wilful misbehaviour by the women. This section also includes the first delay (lack of recognition of the problems) and the second delay (lack of access to health facilities due to lack of transport) (Table 1.18). Lack of recognition of the problem includes inappropriate response to poor fetal movements, rupture of membranes, and antepartum haemorrhage and accounts for 28% of the patient related avoidable factors. Lack of access includes not initiating or infrequent antenatal care visits, delay in seeking medical attention during labour or when the baby was ill, and accounted for 64% of patient related avoidable factors.

Table 1.18. Patient associated probable avoidable factors

Description	Number	% of group
Patient associated (per patient)	7969	
Inappropriate response to poor fetal movements	1931	24.2
Never initiated antenatal care	1591	20.0
Delay in seeking medical attention during labour	1548	19.4
Booked late in pregnancy	1201	15.1
Infrequent visits to antenatal clinic	452	5.7
Failed to return on prescribed date	215	2.7
Inappropriate response to rupture of membranes	155	1.9
Inappropriate response to antepartum haemorrhage	126	1.6
Declines admission/treatment for personal/social reasons	116	1.5
Delay in seeking help when baby ill	66	0.8
Smoking	55	0.7
Attempted termination of pregnancy	47	0.6
Alcohol abuse	34	0.4
Assault	30	0.4
Partner/Family declines admission/treatment	10	0.1
Infanticide	6	0.1
Abandoned baby	4	0.1

Health system problems and primary obstetric cause of perinatal death

Figure 1.13 illustrates the percentage of probably avoidable deaths in disease categories and level of care. Just over half of the perinatal deaths due to intrapartum asphyxia and birth trauma were thought to be probably avoidable in district hospitals, just under half in regional hospitals and just over forty percent in provincial tertiary hospitals. Surprisingly, perinatal deaths due to complications of hypertension were also considered probably avoidable in between 25-30% of cases in these three sectors. The relatively low proportion of deaths due to spontaneous preterm birth is mostly due to the cut-off of ≥1000g used for this section; however it was the most common condition where administrative factors were concerned (Figure 1.14) with 1 in 5 deaths due to spontaneous preterm labour being recorded as being administratively avoidable.

Figure 1.13. Percent health worker related probably avoidable deaths per disease category and level of care ≥1000g

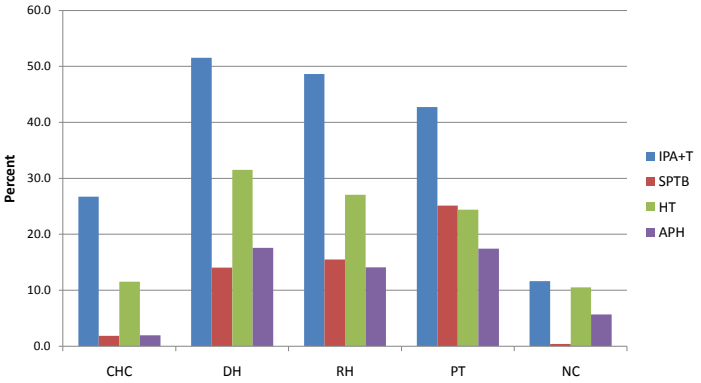


Figure 1.14. Percent administrative related probably avoidable deaths per disease category and level of care ≥1000g

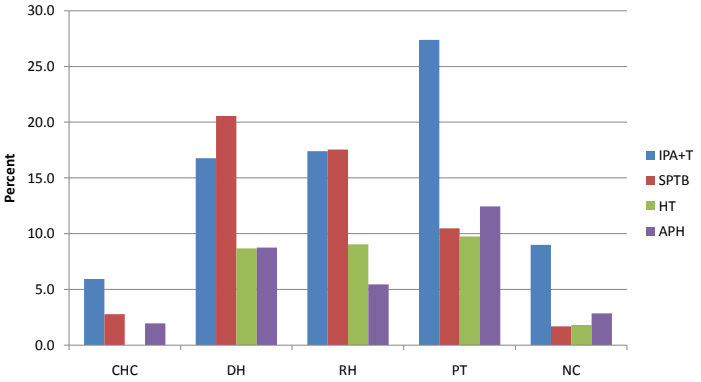


Figure 1.15 illustrates the probably avoidable perinatal death rate per disease category and level of care. The highest rate occurred in district hospitals and was due to intrapartum asphyxia and birth trauma. However, avoidable deaths in the hypertension category are also significant.

Figure 1.15. Health care provider related probably avoidable deaths rate per disease category and level of care ≥1000g

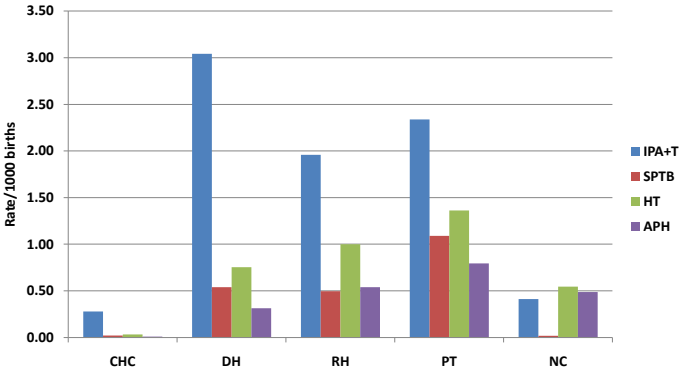


Figure 1.16. Estimated number of health care provider related probably avoidable deaths rate per disease category and level of care in South Africa ≥1000g per year

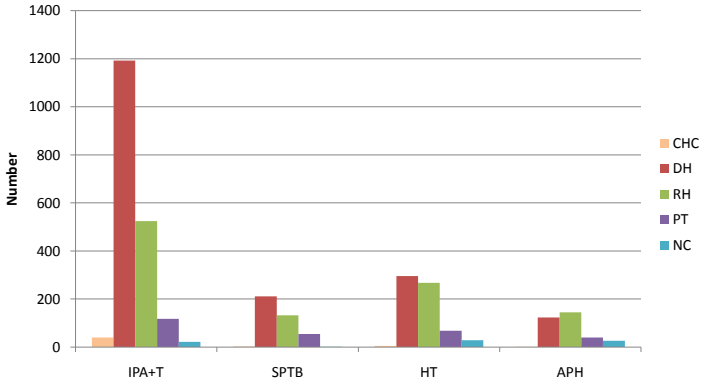


Figure 1.16 estimated the health care provider number of probably avoidable deaths there are per year due to the common primary obstetric causes of death at the various levels of care for babies ≥1000g. Almost 2000 babies probably died unnecessarily per year had the health care provider acted differently, with 1200 being in district hospitals and just

over 500 avoidable perinatal deaths occurred in regional hospitals. Although the rates were very high in provincial tertiary hospitals, the numbers delivering at those hospitals is low, hence the number of avoidable perinatal deaths is low with respect to district and regional hospitals. Just fewer than 1,900 babies were estimated to have died probably avoidable deaths due to intrapartum asphyxia and birth trauma. Placenta/placental bed disease accounted for 1000 avoidable perinatal deaths. Spontaneous preterm birth accounted for 400 avoidable perinatal deaths. This relatively low number is due to the birth weight cut-off for these calculations being ≥1000g.

Tables 1.18- 1.21 details the health care provider avoidable factors that occur most commonly in the major primary obstetric causes of death.

Table 1.18 Health care provider avoidable factors related to intrapartum asphyxia and birth trauma

	Number	% of group
Intrapartum asphyxia	2130	
Fetal distress not detected intrapartum; fetus monitored	453	21.3
Fetal distress not detected intrapartum; fetus not monitored	212	10.0
Management of 2nd stage: prolonged with no intervention	196	9.2
Delay in medical personnel calling for expert assistance	114	5.4
Poor progress in labour, but partogram not used correctly	113	5.3
Delay in referring patient for secondary/tertiary treatment	110	5.2
Medical personnel underestimated fetal size	105	4.9
Poor progress in labour - partogram interpreted incorrectly	97	4.6
Delay in doctor responding to call	67	3.1
Neonatal care: management plan inadequate	59	2.8
Birth Trauma	189	
Medical personnel underestimated fetal size	24	12.7
Breech presentation not diagnosed until late in labour	22	11.6
Delay in referring patient for secondary/tertiary treatment	18	9.5
Delay in medical personnel calling for expert assistance	13	6.9
Delay in doctor responding to call	12	6.3
Management of 2nd stage: prolonged with no intervention	12	6.3

Table 1.19. Health care provider avoidable factors related to spontaneous preterm birth

	Number	% of group
Spontaneous preterm birth	**453**	
Neonatal care: management plan inadequate	62	13.7
Neonatal care: inadequate monitoring	47	10.4
Delay in referring patient for secondary/tertiary treatment	46	10.2
Nosocomial infection	44	9.7
Antenatal steroids not given	33	7.3
Baby managed incorrectly at Hospital/Clinic	21	4.6
Neonatal resuscitation inadequate	21	4.6
Incorrect management of premature labour	15	3.3
Inadequate / No advice given to mother	13	2.9
Delay in medical personnel calling for expert assistance	11	2.4
Medical personnel underestimated fetal size	8	1.8

Table 1.20. Health care provider avoidable factors related to complications of hypertension

	Number	% of group
Complications of hypertension	**742**	
No response to maternal hypertension	244	32.9
Delay in referring patient for secondary/tertiary treatment	98	13.2
Inadequate / No advice given to mother	40	5.4
Fetal distress not detected antenatally; fetus monitored	38	5.1
Fetal distress not detected intrapartum; fetus monitored	26	3.5
No response to poor uterine fundal growth	23	3.1
Fetal distress not detected antepartum; fetus not monitored	20	2.7
Fetal distress not detected intrapartum; fetus not monitored	19	2.6
No response to history of stillbirths, abruptio etc.	18	2.4
Medical personnel underestimated fetal size	15	2.0

Table 1.21 Health care provider avoidable factors related to antepartum haemorrhage

	Number	% of group
Antepartum haemorrhage	**368**	
No response to maternal hypertension	64	17.4
Delay in referring patient for secondary/tertiary treatment	47	12.8
Incorrect management of antepartum haemorrhage	35	9.5
Inadequate / No advice given to mother	31	8.4
No response to history of stillbirths, abruptio etc.	18	4.9
Fetal distress not detected intrapartum; fetus monitored	17	4.6
Delay in medical personnel calling for expert assistance	12	3.3
Fetal distress not detected intrapartum; fetus not monitored	11	3
No response to poor uterine fundal growth	11	3
Physical examination of patient at clinic incomplete	10	2.7

Provincial tertiary hospitals had the highest probably avoidable perinatal death rate due to administrative factors than any other level of care. This was related to intrapartum asphyxia and birth trauma and was most due to delays around performing caesarean sections. The administrative factors mostly occurring in district hospitals were lack of facilities and lack of trained staff. Similar problems were experienced in regional hospitals.

Figure 1.17. Administrative related probably avoidable deaths rate per disease category and level of care ≥1000g

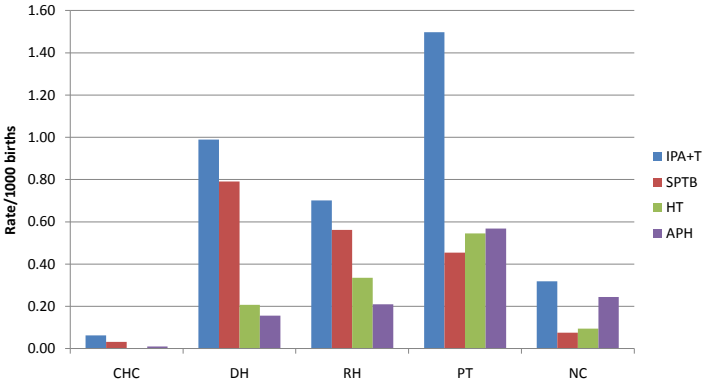
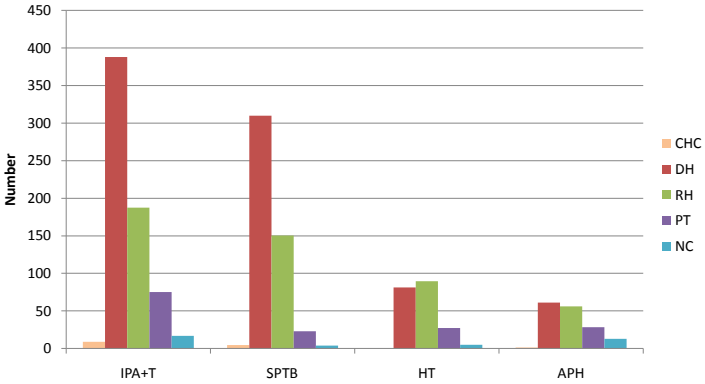


Figure 1.18. Estimated number of administrative related probably avoidable deaths rate per disease category and level of care in South Africa ≥1000g per year



Administrative avoidable factors were most common in birth trauma, intrapartum asphyxia and spontaneous preterm birth. Tables 1.22-1.25 detail the administrative avoidable factors in common causes of perinatal death.

Table 1.22 Administrative avoidable factors related intrapartum asphyxia and birth trauma

	Number	% of group
Intrapartum asphyxia	**755**	
Inadequate facilities/equipment in neonatal unit/nursery	151	20
Anaesthetic delay	76	10.1
Insufficient nurses on duty to manage the patient adequately	76	10.1
Lack of transport - Home to institution	73	9.7
Inadequate theatre facilities	62	8.2
Personnel not sufficiently trained to manage the patient	58	7.7
Lack of transport - Institution to institution	47	6.2
Insufficient doctors available to manage the patient	46	6.1
No accessible neonatal ICU bed with ventilator	39	5.2
Inadequate resuscitation equipment	32	4.2
Birth trauma	**76**	
Personnel not sufficiently trained to manage the patient	15	19.7
Lack of transport - Home to institution	12	15.8
Anaesthetic delay	11	14.5
Inadequate facilities/equipment in neonatal unit/nursery	6	7.9
Inadequate theatre facilities	6	7.9

Table 1.23 Administrative avoidable factors related spontaneous preterm birth

	Number	% of group
Spontaneous preterm birth	**569**	
Inadequate facilities/equipment in neonatal unit/nursery	285	50.1
No accessible neonatal ICU bed with ventilator	81	14.2
Lack of transport - Home to institution	39	6.9
Personnel not sufficiently trained to manage the patient	33	5.8
Insufficient nurses on duty to manage the patient adequately	23	4
Lack of adequate neonatal transport	19	3.3
Lack of transport - Institution to institution	16	2.8
Inadequate resuscitation equipment	12	2.1
Insufficient doctors available to manage the patient	5	0.9
Personnel too junior to manage the patient	3	0.5

Table 1.24 Administrative avoidable factors related complications of hypertension

	Number	% of group
Complications of hypertension	**225**	
Inadequate facilities/equipment in neonatal unit/nursery	47	20.9
No accessible neonatal ICU bed with ventilator	29	12.9
Lack of transport - Institution to institution	16	7.1
Personnel not sufficiently trained to manage the patient	14	6.2
Anaesthetic delay	13	5.8
Lack of transport - Home to institution	12	5.3
Inadequate theatre facilities	11	4.9
Insufficient doctors available to manage the patient	10	4.4
Insufficient nurses on duty to manage the patient adequately	10	4.4
Personnel too junior to manage the patient	10	4.4

Table 1.25 Administrative avoidable factors related antepartum haemorrhage

	Number	% of group
Antepartum haemorrhage	**174**	
Inadequate facilities/equipment in neonatal unit/nursery	26	14.9
Lack of transport - Home to institution	25	14.4
Inadequate theatre facilities	22	12.6
Lack of transport - Institution to institution	19	10.9
Insufficient doctors available to manage the patient	15	8.6
Anaesthetic delay	13	7.5
No accessible neonatal ICU bed with ventilator	13	7.5
Personnel not sufficiently trained to manage the patient	11	6.3
Insufficient nurses on duty to manage the patient adequately	5	2.9
Insufficient blood / blood products available	3	1.7

1.6. Neonatal deaths

The most common primary obstetric causes of neonatal deaths were spontaneous preterm births and intrapartum asphyxia combined with trauma (Figure 1.19), and these two conditions accounted for the vast majority of all neonatal deaths. The relative importance of the two varies depending on the birth weight cut-off used.

Figure 1.19. Comparison of distribution of primary obstetric causes of early neonatal death between ≥500g and ≥1000g

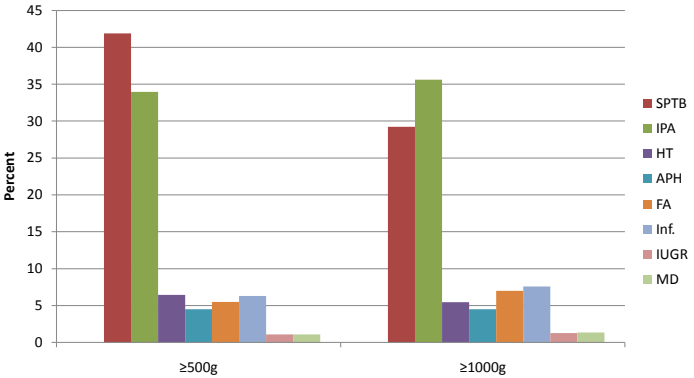


Figure 1.20. Comparison of final early neonatal causes of death ≥500g and level of care

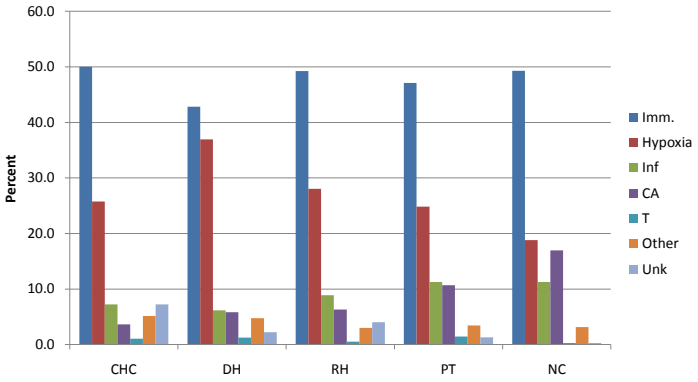
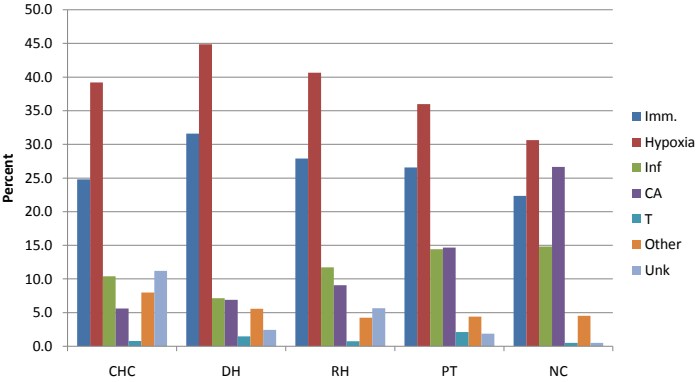


Figure 1. 21. Comparison of final early neonatal causes of death ≥1000g and level of care



Figures 1.20 and 1.21 give the final neonatal causes of death at the two cut-off points, again illustrating the dominance of immaturity and hypoxia as the major final causes at all levels of care except National Central hospitals, where congenital abnormalities have prominence. This probably reflects the referral of cases to these hospitals.

Details of the final causes of death in neonatal deaths are shown on Table 1.26.

Table 1.26. Detail of the final causes of neonatal death ≥500g

Description	Number	% of group
Immaturity related	**5031**	
Extreme multi-organ immaturity	2304	45.8
Hyaline membrane disease	1594	31.7
Necrotizing enterocolitis	179	3.6
Pulmonary haemorrhage	166	3.3
Other	140	2.8
Intraventricular haemorrhage	105	2.1
Not specified	543	10.8
Hypoxia	**3314**	
Hypoxic ischaemic encephalopathy	1764	53.2
Meconium aspiration	824	24.9
Other	245	7.4
Persistent fetal circulation	82	2.5
Not specified	399	12.0
Infection	**1152**	
Septicaemia	429	37.2
Pneumonia	172	14.9
HIV infection	148	12.8
Nosocomial infection	122	10.6
Congenital infection	91	7.9
Other	71	6.2
Congenital syphilis	36	3.1
Meningitis	25	2.2
Group B streptococcal infection	8	0.7
Tetanus	5	0.4
Not specified	45	3.9
Congenital abnormalities	**829**	
Other (incl. multiple & skeletal)	193	23.3
Chromosomal abnormality	126	15.2
Respiratory (incl. diaphragmatic hernia)	107	12.9
Central nervous system	99	11.9
Cardiovascular system	91	11
Alimentary (excl. diaphragmatic hernia)	47	5.7
Renal system	28	3.4
Biochemical abnormality	12	1.4
Not specified	126	15.2

Table 1.26. Detail of the final causes of neonatal death ≥500g (Cont.)

Description	Number	% of group
Other	**472**	**0**
Other	95	20.1
Sudden Infant Death Syndrome (SIDS)	87	18.4
Aspiration pneumonia	85	18
Hypothermia	74	15.7
Haemorrhagic disease of the newborn	29	6.1
Hydrops - non-immune	22	4.7
Isoimmunisation	20	4.2
Hypovolaemic shock	14	3
Not specified	46	9.7
Unknown cause of death	**282**	
Trauma	**98**	
Other	65	51
Subaponeurotic haemorrhage	33	33.7

Among the neonatal deaths whose final neonatal cause of death was immaturity related, the most common diagnoses were extreme immaturity and hyaline membrane disease and among those with hypoxia the common diagnosis was hypoxic ischaemic encephalopathy and meconium aspiration (Table 1.26).

Tables 1.27-1.29 detail the probable avoidable factors related to early neonatal deaths. In early neonatal deaths due to immaturity, administrative factors were the most common with lack of facilities, transport and staff featuring prominently (Table 1.27). In early neonatal deaths due to hypoxia, the health care providers recorded highest numbers, almost three times those of health care provider related deaths due to immaturity (Table 1.28). Lack of skills seems the major problem associated with these deaths.

Table 1.27. Avoidable factors directly associated with early neonatal deaths due to immaturity

Immaturity	Number	% of group
Administrative problems	**704**	
Inadequate facilities/equipment in neonatal unit/nursery	356	50.6
No accessible neonatal ICU bed with ventilator	125	17.8
Lack of transport - Home to institution	44	6.3
Personnel not sufficiently trained to manage the patient	34	4.8
No syphilis screening performed at hospital / clinic	24	3.4
Result of syphilis screening not returned to hospital/clinic	22	3.1
Lack of adequate neonatal transport	20	2.8
Inadequate resuscitation equipment	18	2.6
Insufficient nurses on duty to manage the patient adequately	15	2.1
Lack of transport - Institution to institution	11	1.6
Insufficient doctors available to manage the patient	6	0.9
Personnel too junior to manage the patient	4	0.6
Health care provider associated	**510**	
Neonatal care: management plan inadequate	81	15.9
Delay in referring patient for secondary/tertiary treatment	53	10.4
Antenatal steroids not given	48	9.4
Neonatal care: inadequate monitoring	34	6.7
Neonatal resuscitation inadequate	31	6.1
Multiple pregnancy not diagnosed antenatally	22	4.3
No response to history of stillbirths, abruptio etc.	18	3.5
Delay in medical personnel calling for expert assistance	16	3.1
Nosocomial infection	16	3.1
Baby managed incorrectly at Hospital/Clinic	15	2.9
Incorrect management of premature labour	15	2.9
Multiple pregnancy not diagnosed intrapartum	15	2.9
Medical personnel overestimated fetal size	14	2.7
No response to maternal hypertension	14	2.7

Table 1.28. Avoidable factors directly associated with early neonatal deaths due to hypoxia

Hypoxia	Number	% of group
Administrative problems	**588**	
Inadequate facilities/equipment in neonatal unit/nursery	165	28.1
Insufficient nurses on duty to manage the patient adequately	60	10.2
No accessible neonatal ICU bed with ventilator	49	8.3
Anaesthetic delay	42	7.1
Lack of transport - Home to institution	42	7.1
Personnel not sufficiently trained to manage the patient	42	7.1
Inadequate resuscitation equipment	32	5.4
Insufficient doctors available to manage the patient	32	5.4
Inadequate theatre facilities	27	4.6
Lack of transport - Institution to institution	26	4.4
Other	24	4.1
Personnel too junior to manage the patient	21	3.6
Health care provider associated	**1409**	
Fetal distress not detected intrapartum; fetus monitored	294	20.9
Management of 2nd stage: prolonged with no intervention	136	9.7
Fetal distress not detected intrapartum; fetus not monitored	120	8.5
Delay in referring patient for secondary/tertiary treatment	88	6.2
Poor progress in labour, but partogram not used correctly	75	5.3
Delay in medical personnel calling for expert assistance	71	5
Neonatal care: management plan inadequate	62	4.4
Poor progress in labour - partogram interpreted incorrectly	59	4.2
Medical personnel underestimated fetal size	58	4.1
Neonatal resuscitation inadequate	55	3.9
Delay in doctor responding to call	42	3
Neonatal care: inadequate monitoring	38	2.7
Management of 2nd stage: inappropriate use of vacuum	27	1.9
Poor progress in labour, but partogram not used	27	1.9

Overall, lack of facilities, lack of skills and personnel and poor transport were the main avoidable factors in early neonatal deaths (Table 1.29). Not surprisingly the lack of skills was mostly related to managing the labour.

Table 1.29. Common administrative and health care provider avoidable factors directly associated with early neonatal deaths

Description	Number	% of ENND
Inadequate facilities/equipment in neonatal unit/nursery	534	5.3
Fetal distress not detected intrapartum; fetus monitored	306	3.0
No accessible neonatal ICU bed with ventilator	194	1.9
Neonatal care: management plan inadequate	190	1.9
Delay in referring patient for secondary/tertiary treatment	182	1.8
Management of 2nd stage: prolonged with no intervention	142	1.4
Fetal distress not detected intrapartum; fetus not monitored	131	1.3
Neonatal care: inadequate monitoring	112	1.1
Lack of transport - Home to institution	101	1.0
Delay in medical personnel calling for expert assistance	96	1.0
Neonatal resuscitation inadequate	92	0.9
Personnel not sufficiently trained to manage the patient	85	0.8
Insufficient nurses on duty to manage the patient adequately	84	0.8
Medical personnel underestimated fetal size	83	0.8
Poor progress in labour, but partogram not used correctly	81	0.8
Inappropriate response to rupture of membranes	70	0.7
Poor progress in labour - partogram interpreted incorrectly	64	0.6
Inadequate resuscitation equipment	55	0.5
Antenatal steroids not given	53	0.5
Delay in doctor responding to call	52	0.5
Lack of transport - Institution to institution	50	0.5

1.7. Stillbirths

There were 23547 stillbirths recorded on the PPIP database for the two years 2008-2009 and 40.3% were fresh stillbirths. Overall stillbirths accounted for 67.4% of all perinatal deaths. This extrapolates to approximately 21856 stillbirths occurring in health care institutions **annually** in South Africa.

Figure 1.22. Comparison of distribution of macerated and fresh stillbirths per disease categories

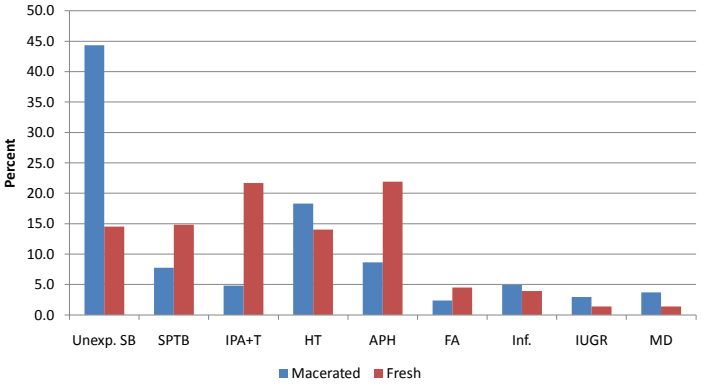


Figure 1.22 illustrates the distribution of the causes of fresh and macerated stillbirths. Unexplained stillbirths account almost half of the macerated stillbirths. Intrapartum asphyxia and birth trauma and antepartum haemorrhage account for 20% each of fresh stillbirths. Complications of hypertension were common in both groups and account for 16.6% of stillbirths, second only to unexplained stillbirths. Macerated stillbirths occur antenatally and fresh still usually occur intrapartum. By examining each group the quality of antenatal and intrapartum care is examined.

Table 1.30 lists the common avoidable factors thought to be directly related to the death in macerated stillbirths. The most common avoidable factor was inappropriate response to poor fetal movements, followed by problems associated with attending antenatal care and transport problems. The major health care providers' avoidable factors were not adhering to basic antenatal care protocols. Administrative problems related to transport, syphilis screening and skilled personnel.

Table 1.30. Probable avoidable factors related to macerated (antepartum) stillbirths

Macerated stillbirths	Number	% of group
Patient associated	**3916**	
Inappropriate response to poor fetal movements	1706	43.6
Booked late in pregnancy	619	15.8
Never initiated antenatal care	611	15.6
Delay in seeking medical attention during labour	289	7.4
Infrequent visits to antenatal clinic	240	6.1
Failed to return on prescribed date	131	3.3
Declines admission/treatment for personal/social reasons	57	1.5
Health care provider associated	**1367**	
No response to maternal hypertension	260	19
Delay in referring patient for secondary/tertiary treatment	156	11.4
Inadequate / No advice given to mother	142	10.4
No response to poor uterine fundal growth	106	7.8
Fetal distress not detected antenatally; fetus monitored	56	4.1
No response to history of stillbirths, abruptio etc.	56	4.1
No response to history of poor fetal movement	49	3.6
Physical examination of patient at clinic incomplete	49	3.6
No response to maternal glycosuria	42	3.1
No response to apparent postterm pregnancy	33	2.4
Administrative problems	**316**	
Lack of transport - Home to institution	49	15.5
Result of syphilis screening not returned to hospital/clinic	45	14.2
No syphilis screening performed at hospital / clinic	42	13.3
Personnel not sufficiently trained to manage the patient	34	10.8
No dedicated high risk ANC at referral hospital	26	8.2
Inadequate theatre facilities	18	5.7
No on-site syphilis testing available	16	5.1
Lack of transport - Institution to institution	13	4.1

Table 1.31 gives the probable avoidable factors associated with fresh stillbirths. Health care provide problems dominated and were mostly related to intrapartum care skills. Transport and accessibility were the major patient related problems whereas lack of transport, lack of staff and lack of facilities were the common administrative related avoidable factors.

Table 1.31. Probable avoidable factors related to fresh (intrapartum) stillbirths

Fresh stillbirths	Number	% of group
Patient associated	**1889**	
Delay in seeking medical attention during labour	504	26.7
Never initiated antenatal care	440	23.3
Booked late in pregnancy	271	14.3
Inappropriate response to poor fetal movements	203	10.7
Infrequent visits to antenatal clinic	109	5.8
Inappropriate response to antepartum haemorrhage	67	3.5
Failed to return on prescribed date	52	2.8
Inappropriate response to rupture of membranes	41	2.2
Declines admission/treatment for personal/social reasons	34	1.8
Attempted termination of pregnancy	17	0.9
Health care provider associated	**1692**	
Fetal distress not detected intrapartum; fetus monitored	236	13.9
Delay in referring patient for secondary/tertiary treatment	144	8.5
Fetal distress not detected intrapartum; fetus not monitored	135	8.0
No response to maternal hypertension	109	6.4
Medical personnel underestimated fetal size	86	5.1
Management of 2nd stage: prolonged with no intervention	84	5.0
Delay in medical personnel calling for expert assistance	75	4.4
Delay in doctor responding to call	58	3.4
Inadequate / No advice given to mother	56	3.3
Breech presentation not diagnosed until late in labour	45	2.7
Poor progress in labour - partogram interpreted incorrectly	45	2.7
Fetal distress not detected antenatally; fetus monitored	43	2.5
Poor progress in labour, but partogram not used correctly	43	2.5
Fetal distress not detected antepartum; fetus not monitored	39	2.3
Poor progress in labour, but partogram not used	35	2.1
Administrative problems	**578**	
Lack of transport - Home to institution	93	16.1
Inadequate theatre facilities	80	13.8
Anaesthetic delay	65	11.2
Lack of transport - Institution to institution	64	11.1
Personnel not sufficiently trained to manage the patient	47	8.1
Insufficient doctors available to manage the patient	45	7.8
Insufficient nurses on duty to manage the patient adequately	36	6.2
Inadequate facilities/equipment in neonatal unit/nursery	26	4.5
No accessible neonatal ICU bed with ventilator	24	4.2
Personnel too junior to manage the patient	16	2.8

1.9. Summary of findings

1. The national PNMR was approximately 35/1000 births (≥500g).
2. The PNMR increased from 10.41/1000 births in CHCs to 33.33/1000 births in district hospitals, 31.67/1000 births in regional hospitals, 48.04/1000 births in provincial tertiary hospitals and 71.42/1000 births in national central hospitals.
3. Extrapolating the data for South Africa approximately 1,500 perinatal deaths occurred in CHCs; 13,200 in district hospitals; 11,300 in regional hospitals; 2,400 in provincial tertiary hospitals; and 4,000 in national central hospitals per year.
4. The PNMR was highest for pregnant women less than 18 years old (64.5/1000 births) followed by pregnant women more than 34 years (49.4/1000 births). Avoiding pregnancy at the extremes of reproductive age is an important way of reducing the PNMR.
5. In district hospitals, 38% of the fresh stillbirths were alive on admission to the institution, indicating a clear window of opportunity where deaths can be prevented. Delay in accessing the correct treatment was the major avoidable factor in this group.
6. The top 5 categories of perinatal deaths were unexplained stillbirths (22%), spontaneous preterm birth (21%), intrapartum asphyxia and birth trauma (16%), complications of hypertension in pregnancy (14%) and antepartum haemorrhage (11%). These 5 causes account for 84% of perinatal deaths. Abruptio placenta accounted for 80% of the antepartum haemorrhages. Pre-eclampsia/eclampsia and abruptio placenta are considered placenta/placental bed diseases and if combined make 22.8% of perinatal deaths, becoming the most common category of perinatal deaths.
7. Placenta/placental bed disease is recognised for the first time as being the most important contributor to perinatal death. These deaths can be reduced by introducing calcium supplementation to all pregnant women. This will not only prevent perinatal deaths but also maternal deaths.
8. Two-thirds of early neonatal deaths were classified as being due to spontaneous preterm birth and labour related problems. Three out of four neonates died either due to immaturity or hypoxia.
9. Perinatal mortality rates for intrapartum asphyxia and birth trauma were highest in district hospitals at 7.21/1000 births approximately 2,850 perinatal deaths in South Africa per year. This was followed by provincial tertiary hospitals at 7.07/1000 births (360 perinatal deaths per year in SA).
10. District hospitals had the highest early neonatal death rate per birth weight category and extrapolating this data to the population of South Africa, district hospitals have about 2,200 early neonatal death 2kg and

over and 2000 early neonatal deaths between 1-2kg. Regional hospitals had approximately 1,100 and 1,500 early neonatal deaths in the same birth weight categories. All the other sites had less than 400 early neonatal deaths for the same categories.

11. Intrapartum asphyxia and birth trauma were the most common health care provider probably avoidable deaths (51%) and provincial tertiary hospitals had the highest administrative probably avoidable deaths (27%).
12. Most health care provider probably avoidable deaths occur in district hospitals (55%) and most were due to intrapartum asphyxia and birth trauma (63% of 55%).
13. Provincial tertiary hospitals had the highest avoidable mortality rates of 9.14 for health care provider and 4.44 for administrative. This translates into estimated avoidable deaths per year of 459 and 223 respectively.
14. The avoidable mortality rate for health care providers in district hospitals (6.57/1000 births) and intrapartum asphyxia and birth trauma is the most common cause and the avoidable mortality rate of administrative problems in district hospitals (2.29/1000 births) and relate mostly to intrapartum asphyxia and birth trauma and spontaneous preterm birth. This translates into estimated avoidable deaths per year of 2576 and 898 perinatal deaths respectively.

1.10. Conclusion

This perinatal care survey has concentrated on identifying the disease categories in which most deaths are thought to be preventable and identifying the levels of care where the most impact can be made with respect to reducing perinatal mortality. Placenta/placental bed disease has been recognised for the first time as the major contributor to perinatal death. Potentially these deaths can be prevented by introducing calcium supplementation to all pregnant women.

As a measure of quality of care the avoidable mortality rate for health care provider probably avoidable deaths and the avoidable mortality rate for administrative probably avoidable deaths were used as primary indicators for assessing the quality of care within the health system. The mortality rates were calculated by extrapolating the data to all births at each level of care (from PPIP and DHIS data) so approximations of the number of deaths that can be prevented could be calculated.

Caring appropriately for a woman in labour is the core business of midwives and doctors dealing with pregnancy. Almost half of the deaths due to intrapartum asphyxia and birth trauma were thought to be probably

avoidable had the health care provider acted in a different way. This category provided the most avoidable deaths. The data implies that the health system is failing in one of its most basic functions. Most intrapartum asphyxia deaths occurred in district hospitals and the avoidable mortality rate was highest for both health care provider and administrative problems in these hospitals. This indicates the quality of care was poorest in this category of hospital. Quality of care is determined by having adequate equipment and drugs, staff, and skills and a caring attitude of health care providers. Most births occur in district hospitals; hence it is imperative that attention be given to the proper functioning of these hospitals. Provincial tertiary hospitals had the second worst quality of care measure. They also need urgent attention in performing their functions effectively.

Chapter 2: Ten years of the National Perinatal Care Surveys

D Greenfield, N Rhoda, RC Pattinson

Introduction

The Perinatal Problem Identification Programme (PPIP) has been used as a National data base for monitoring the quality of care and perinatal mortality for 10 years. Data is sent from sentinel sites – hospitals or community health centres where deliveries are conducted – on a voluntary basis. The sites were not chosen, but staff working there decided that they wanted to monitor their own perinatal mortality data and also submitted their data to the national data base. The facilities from which data has been submitted have changed over time: some facilities have dropped out, while others have joined.

The data is entered into and analysed by a computer programme which was designed for this purpose. The information obtained is helpful in assessing problems and planning solutions at facility, District, Provincial and National level, so that patient care can be improved.

Currently, the Programme has been adopted by some Provinces as a key programme for monitoring their own perinatal mortality data, so that all facilities where deliveries are conducted are required to use PPIP and to submit their perinatal mortality data as PPIP files to the Provincial office, from where it is forwarded to the National data base.

The National Perinatal Mortality and Morbidity Committee (NaPeMMCo), ministerially created, has recommended that PPIP be supported by all public hospitals. To date it represents 52.4% of these facilities and this comprises the National database which is reviewed here.

Methods

The data is analysed by birth weight category using 500g differences from 500g to 2500g or more and level of care. The mortality rates for each birth weight category are reviewed. The primary obstetric cause of death, final neonatal cause of death and avoidable factors are assessed for each of these levels of care and birth weight categories.

The data from the National data base has been used for this analysis. It is a retrospective evaluation of the data entered into the Programme over the last 10 years. The data is all facility based, and only a small proportion of the facilities have submitted data for the full 10 years.

The data was looked at using 3 year time periods for comparing change over time, if any. The time periods were: 2000 – 2002, 2003 – 2005, 2006 – 2008. Data from the year 2009 was assessed on its own.

Results

The data base contains information on just under 3,000,000 births over the 10 year period.

The data is facility based. Not all facilities in South Africa participate, and some facilities have submitted data for variable periods during the 10 years. The data was submitted from facilities at all levels of care from Community Health Centres to Tertiary Hospitals.

Figure 1: Proportion of deliveries by level of care (% of total)

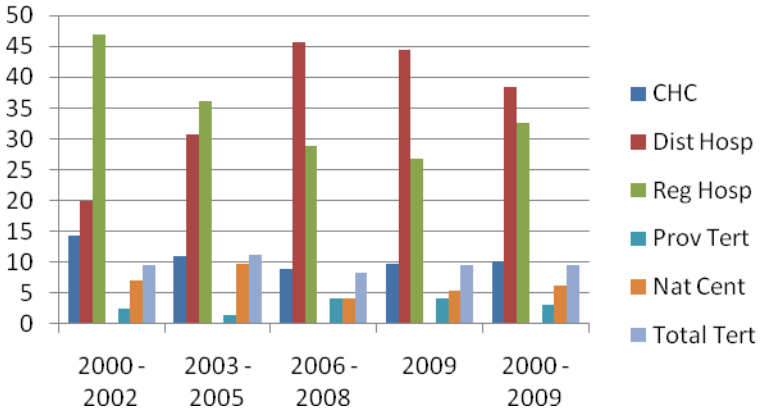


Figure 1 below illustrates the proportion of the data by level of care. Initially most of the data was from regional hospitals. The proportions have changed over the 10 years so that the majority of the data is now from District Hospitals. One of the factors which has resulted in this change is that some provinces have now made the collection and submission of PPIP data compulsory as it is now part of their monitoring of the quality of care process. Most of the delivery services and immediate newborn care in South Africa are provided in District Hospitals.

- These figures illustrate the proportions of total deliveries from each level of care, not absolute numbers.

- There has been an increase in the number of District Hospitals participating in the data collection. This is partly because some Provinces are requiring hospitals to submit the data, and others because the staff realise the benefit of using the data to improve the quality of care which is provided.
- Overall, about 60 – 70% of the data has been submitted from District and Regional hospitals.

Birth weight analysis

Figure 2: Proportion of deliveries by birth weight (% of total deliveries)

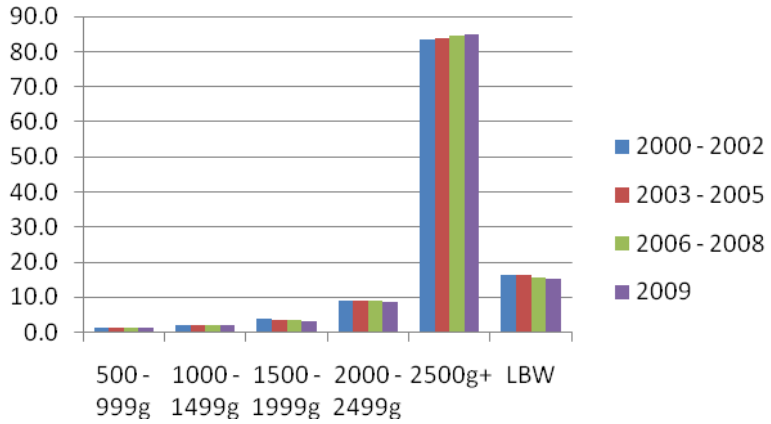


Figure 2 illustrates the distribution of births by birth weight. The important aspects are:

- The percentages for each birth weight category are: 500 – 999g are < 2%; 1000 – 1499g are < 2%; 1500 – 1999g are ± 4%; 2000 – 2499g are ± 8%; and 2500g + are ±84%.
- The low birth weight rate is ±16%.
- The proportions have remained very constant despite the changes in data sources

Figure 3: Perinatal Mortality Rate (per 1000 births): Birth weight ≥500g

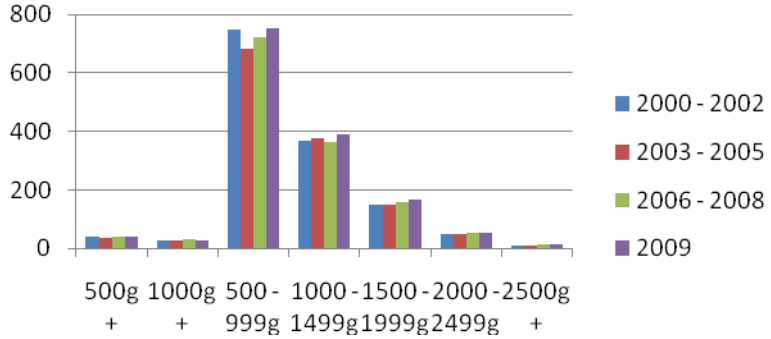
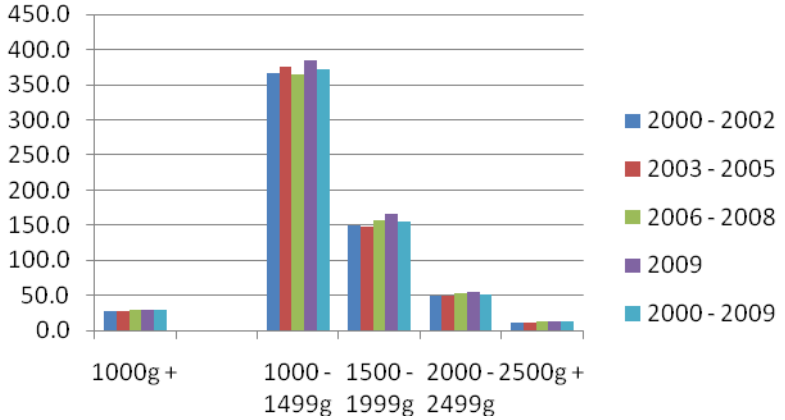


Figure 4: Perinatal Mortality Rate (per 1000 births): Birth weight ≥1000g



Figures 3 and 4 give the perinatal mortality rates (PNMR) for different birth weight categories:

- The overall PNMR for birth weight ≥500g is 38/1000 births
- The overall PNMR for birth weight ≥1000g is 28/1000 births
- The highest rates are for the smallest babies, especially those with a birth weight of less than 1500g
- The mortality rates have not changed over the 10 year period

Figure 5: Early Neonatal Mortality Rate (per 1000 live births): Birth weight ≥500g

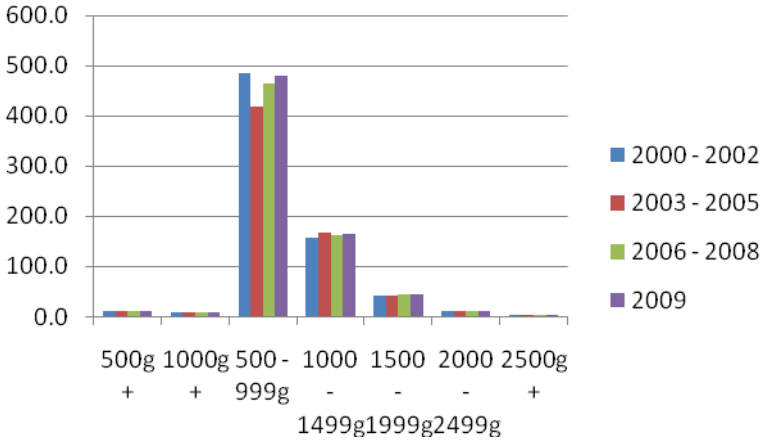


Figure 6: Early Neonatal Mortality Rate (per 1000 live births): Birth weight ≥1000g

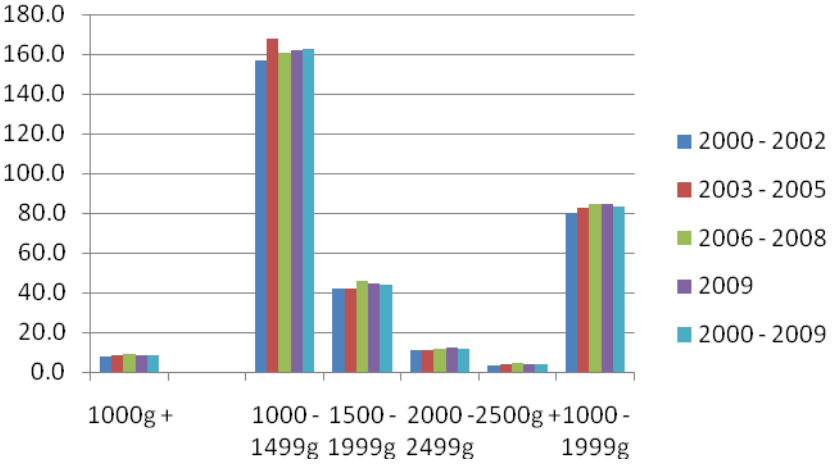


Figure 5 and 6 give the early neonatal mortality rate (ENNMR):

- A significant factor in the very high mortality rate in infants with a birth weight of 500 – 999g is that these infants are not usually offered intensive ventilatory support.

- The overall rate for all infants with a birth weight of ≥500g is 12/1000 live births.
- The overall rate for all infants with a birth weight of ≥1000g is 8.5/1000 live births.
- There have been no changes of note over the 10 year period.

Figure 7: Primary Obstetric Cause of Death (birth weight ≥500g)

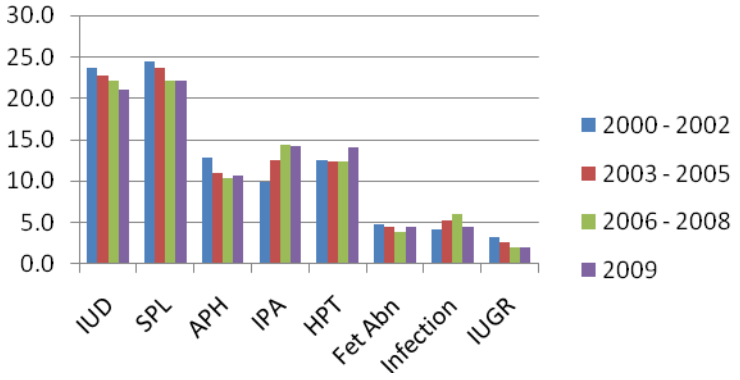


Figure 8: Primary Obstetric Cause of Death (birth weight ≥1000g)

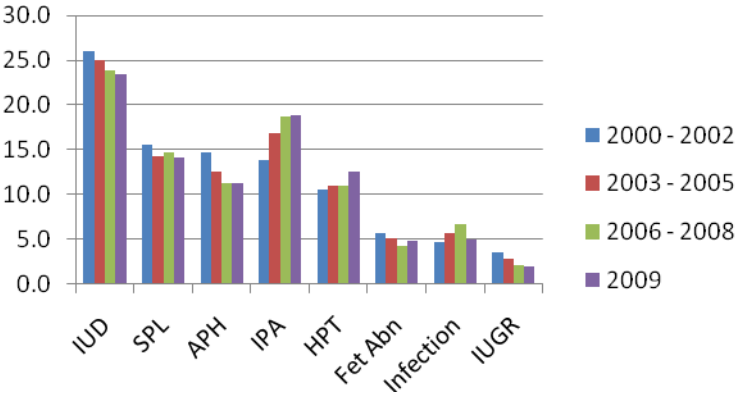


Figure 7 and 8 give the distribution of primary obstetric cause of death:

- The only real difference between the data for babies with a birth weight of ≥500g and those with a birth weight of ≥1000g is the

increased proportion of deaths from spontaneous preterm labour in the ≥500g group.

- Unexplained intrauterine death is the commonest recorded category of death in infants weighing ≥1000g at birth.
- Intrapartum hypoxia is the next commonest recorded cause of death. This is of great concern because it is potentially avoidable.
- The high numbers of deaths resulting from maternal hypertension and antepartum haemorrhage are noteworthy. A significant number of the deaths related to antepartum haemorrhage are also related to hypertension (see figure 9, below)
- The pattern of disease has not really changed over the 10 years although the proportion of deaths due to intrapartum asphyxia seems to be increasing. This might be due to the increasing numbers of district hospitals submitting data to the database

Figure 9: Primary Obstetric Cause of Death: 2000 - 2009 (% of all deaths)

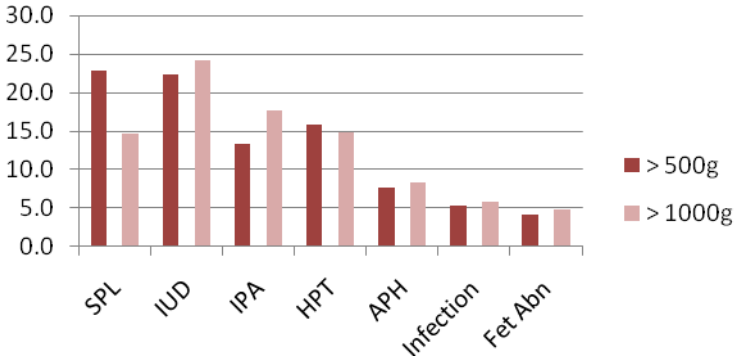


Figure 9 illustrates the causes of death;

- In this graph, the cause of death "abruptio placenta with hypertension" has been included with hypertension and not with antepartum haemorrhage.
- It is clear that, apart from unexplained intrauterine death, spontaneous preterm labour, intrapartum hypoxia and hypertension are the 3 most important primary obstetric causes of death. These 3 conditions are the primary obstetric causes of death in about 45% of all the deaths. For

all of these conditions there are interventions which can improve the outcome for the baby.

Figure 10: Final neonatal Cause of Death (Birth weight ≥500g)

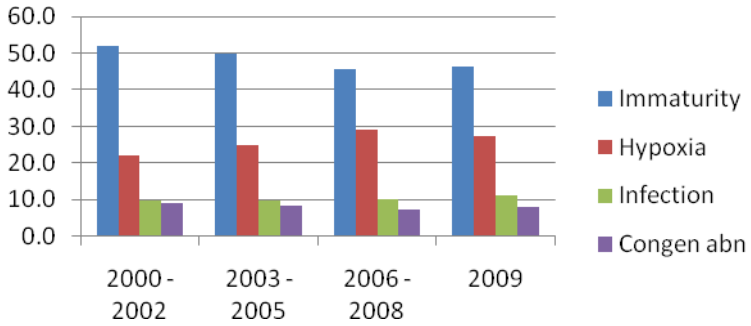


Figure 10 illustrates the final neonatal cause of death in babies ≥500g:

- As expected, the dominant cause of death is "Immaturity related".

Figure 11: Final Neonatal Cause of Death (Birth weight ≥1000g) (% of total)

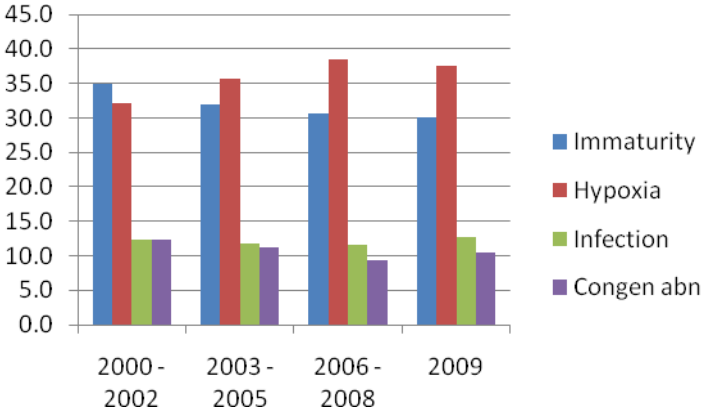


Figure 11 give the final neonatal causes of death for neonates ≥1000g:

- Clearly the main causes of death are "Immaturity related" and "Hypoxia". These 2 together make up about 2/3 of all the neonatal deaths in infants with a birth weight of 1000g or more.

- Immaturity related causes are in the low birth weight babies, especially those with a birth weight of less than 1500g. These deaths are a marker of the quality of newborn care.
- Hypoxia is a problem which usually arises during labour. It is an indicator that fetal distress is not being recognised and/or not being managed actively during labour.

Figure 12: Probable avoidable factors (% of deaths with an avoidable factor recorded)

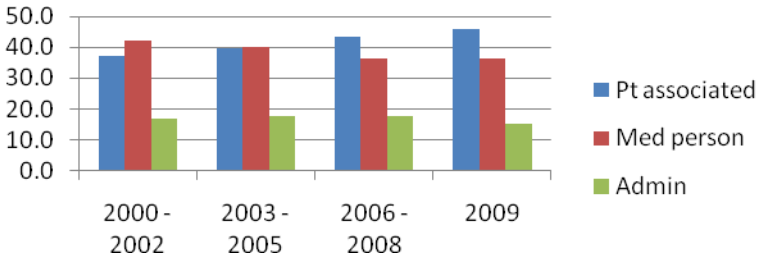


Figure 12 illustrates the distribution of the deaths where there were avoidable factors that probably resulted in the death of the baby:

- Only the avoidable factors recorded as "probable" have been included in the above graph.
- The greatest percentage of avoidable factors is in the 2 categories of "Patient associated problems" and "Medical personnel related" factors.
- These factors have not really changed over the 10 years.

Table 1: Probable avoidable factors: (% of total deaths)

Patient associated factors		Health care provider associated		Administrative factors	
Delays in attending for care	9.4	Antenatal care problems	5.0	Facilities inadequate	3.0
No antenatal Clinic attendance	8.5	Labour care problems	4.9	Personnel related	2.1
		Delays in attending or transferring	2.3	Transport problems	1.5
		Neonatal care	1.3		

Table 1 give the common causes of the avoidable factors that probably resulted in the death of the baby:

- Many of the patient related factors may be related to the ability to access care
- Administrative problems:
  - Facilities inadequate: Many of these are related to inadequate neonatal facilities.
  - Personnel related: There were either insufficient personnel available or they are not sufficiently experienced or trained to be able to deal with the problems
- Health care provider related problems
  - These were present in 13,5% of the total deaths
  - This is something which can be addressed and needs attention.
- It is likely that the health care provider and administrative avoidable factors may be under recorded.

Level of care analysis

Figure 13: Perinatal Mortality Rate (/1000 births) by level of care: Birth weight ≥500g

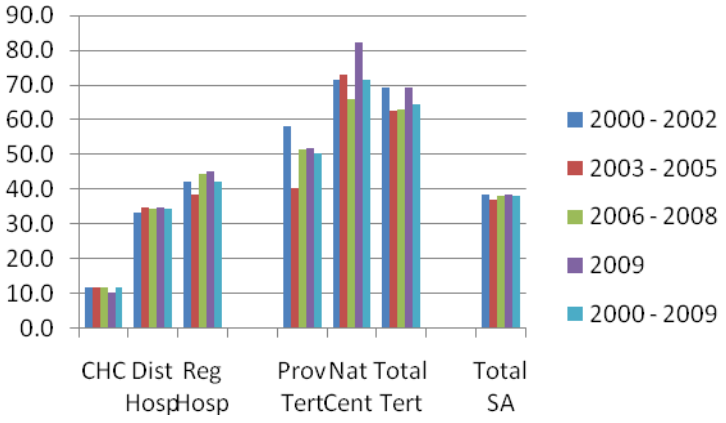
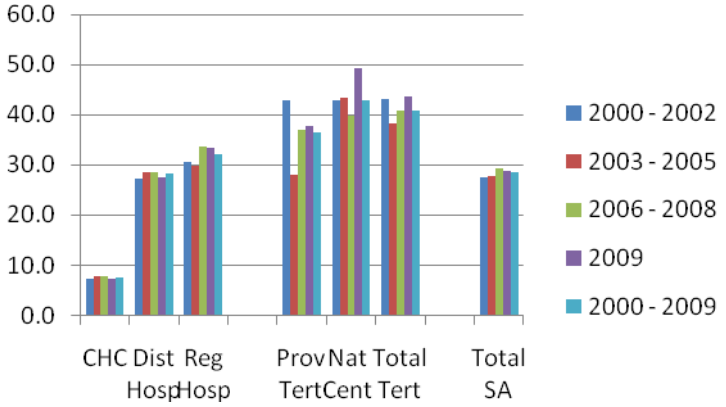


Figure 14: Perinatal Mortality Rate (/1000 births) by level of care: Birth weight ≥1000g



Figures 13 and 14 give the PNMR per level of care in birth weight categories ≥500g and ≥1000g:

- The PNMR for the various levels of care have not really changed over the 10 years
- The PNMR are low in the Community Health Centres (CHC), which suggests that the referral system is working reasonably well.
- The high rates at the tertiary hospitals may be because the sickest patients end up there. Some of these hospitals are also functioning as regional hospitals when there is not a regional hospital in the area.
- The rates in the District and Regional hospitals are rather higher than expected and the differentiation between the mortality rates is much smaller than expected. Visits to District hospitals have shown that the standard of the facility itself (equipment, protocols, etc) and the knowledge and skills of the staff working there are not what they should be.

Figure 15: Early Neonatal Mortality Rate by level of care (/1000 live births): Birth weight ≥500g

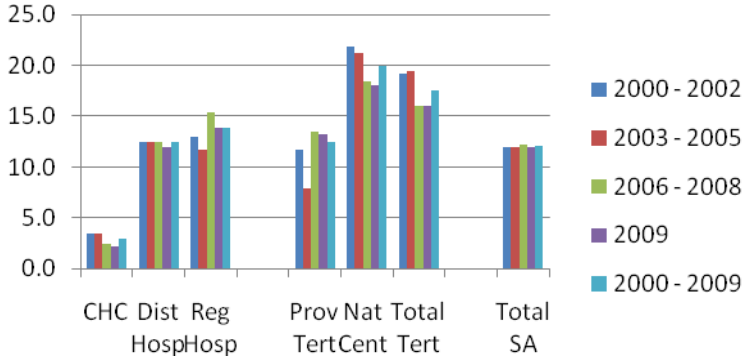
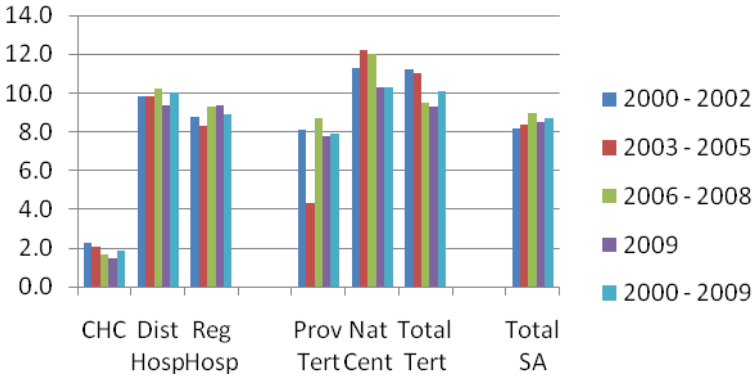


Figure 16: Early Neonatal Mortality Rate by level of care (/1000 live births): Birth weight ≥1000g



Figures 15 and 16 illustrate the ENNDR per level of care in birth weight categories:

- The comment relating to perinatal mortality (above) can also apply here.
- The pattern is the same for all babies (birth weight of ≥500g and those weighing ≥1000g.)
- The mortality rates are highest at the tertiary hospitals and lowest at the Community Health Centres. This may be the result of appropriate referral patterns.

- The high ENNMRs in District hospitals (higher than Regional hospitals) are of concern. This indicates either the referral system is not working, the care is poor for various reasons in district hospital or both.
- There has not been any real change in the rates over the 10 years.

Figure 17: Early Neonatal Mortality Rate Birth weight 1000 – 1499g by level of care

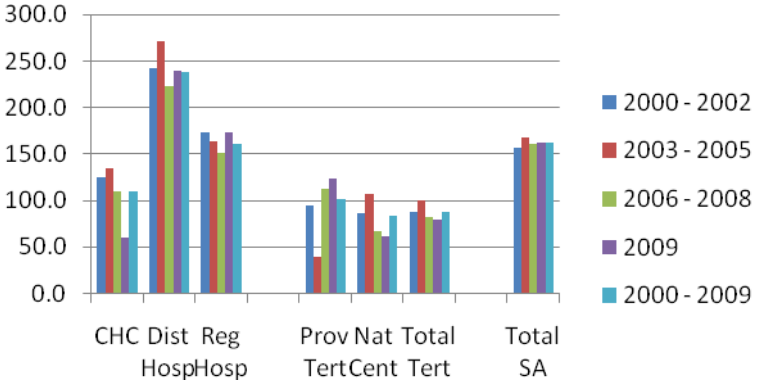


Figure 17 illustrates the ENNMR in neonates between 1000-1499g:

- The rates have not changed over time
- The rates are particularly high in District Hospitals. They are well above the national average.
- The ENNMR in this birth weight category reflects the quality of newborn care. The high rates in the District Hospitals suggest that there is generally sub-standard newborn care in these hospitals due to various reasons.

Figure 18: Early Neonatal Mortality Rate: Birth weight ≥2500g per level of care

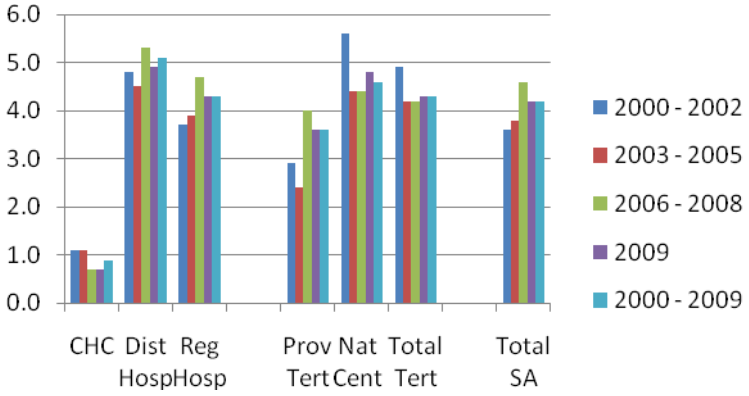


Figure 18 illustrates the ENNMR of neonates' ≥2500g per level of care:

- The rates have not changed over the 10 years
- The highest rate is in the District Hospitals.
- The rate is generally high in all levels of care except for the Community Health Centres.

Table 2: Total perinatal deaths per birth weight category (2000 – 2009)

Birth weight	500 – 999g	1000 – 1499g	1500 – 1999g	2000 – 2500g	2500g +	Total
Number of perinatal deaths	27859	20801	15519	13602	30688	108469

Table 2 clearly shows that the greatest number of perinatal deaths is in the birth weight category ≥2500g. The only other category which is close is that of <1000g, where, for logistic reasons, a high level of care cannot be offered.

The primary obstetric causes of death for fresh stillbirths and neonatal deaths in babies with a birth weight of≥ 2500g are:

- Intrapartum hypoxia 48.9%
- Unexplained intrauterine death 6.2% *(These are most likely to have been due to intrapartum hypoxia)*
- Trauma 4.8%
- **Total** **59.9%**

The main cause of neonatal death in babies with a birth weight of 2500g + is:

- **Hypoxia** **65.2%**

Intrapartum hypoxia is therefore a very important cause of death. This is something which can be reduced by improving the quality of intrapartum care.

Serial data

There were 35 PPIP sites that had five years or more serial data: six Midwife Obstetric Units (MOUs), 24 district hospitals and five regional hospitals (Figure 19). In these sites four had a significant reduction in perinatal mortality rate - three were regional hospitals and one was an MOU. Five sites showed a significant increase in PNMR - two were district hospitals, two were CHCs and one was a regional hospital. The remaining 26 sites showed no measurable change in PNMR and the PCI. The sites that showed a decrease did not appear to be different from the other sites, they did not have high PNMRs to start off with, nor did those that increased have low PNMRs to start with. The variation of the PNMR in the groups that remained unchanged is large from PNMRs of 6/1000 births to 40/1000 births because of the different types of institutions involved (CHCs to regional hospitals).

Figure 19: Serial PPIP data and perinatal mortality rates

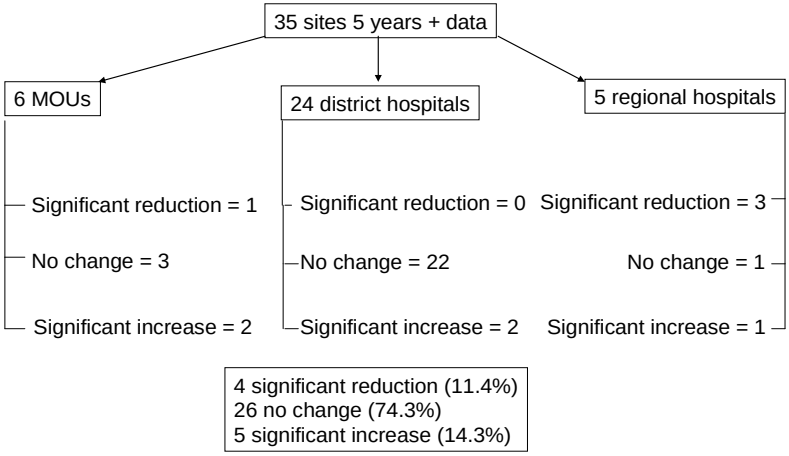


Table 3. Amalgamated Serial PPIP data for types of institutions (≥1000g)

	Year	Total	Total deaths	Live births	PNMR	SBR	NNMR
CHC (n=6)							
	2000	7605	71	7563	9.3	5.5	3.8
	2001	7250	84	7200	11.6	6.9	4.7
	2002	8084	82	8026	10.1	7.2	3.0
	2003	8594	98	8537	11.4	6.6	4.8
	2004	10107	135	10011	13.4	9.5	3.9
	2005	11189	125	11100	11.2	8.0	3.2
	2006	11880	121	11794	10.2	7.2	3.0
	2007	10567	123	10477	11.6	8.5	3.1
DH (N=24)							
	2003	26581	838	25959	31.5	23.4	8.3
	2004	40348	1459	39413	36.2	23.2	13.3
	2005	34163	1028	33523	30.1	18.7	11.6
	2006	35327	1135	34578	32.1	21.2	11.2
	2007	36876	1167	36108	31.6	20.8	11.1
RH (n=5)							
	2002	11736	428	11454	36.5	24.0	12.7
	2003	13849	476	13557	34.4	21.1	13.6
	2004	15780	444	15466	28.1	19.9	8.4
	2005	15055	393	14750	26.1	20.3	6.0
	2006	18714	498	18354	26.6	19.2	7.5
	2007	18392	581	17953	31.6	23.9	7.9

Summary

1. There has not been a decrease in perinatal or neonatal mortality over the 10 year period 2000 – 2009 in any of the levels of care. Although the institutions supplying the data varied for the different time periods, the serial data for sites with 5 or more years continuous data confirms the lack of change. This is in spite of several reports with clear guidelines and recommendations having been produced. (Saving Babies Reports, 2003, 2005, 2007)

2. The greatest numbers of perinatal deaths are in babies with a birth weight of ≥2500g. These are effectively term or near term babies in whom there should be a good outcome.

3. Problems for which there are interventions which can improve the outcome for the babies are:
    - The recognition and management of preterm labour, hypertension, and intrapartum hypoxia.
    - For newborn babies, the major interventions which can improve the outcomes are: the care of the small and sick baby, and resuscitation of the newborn.

4. Avoidable factors show that there is a problem in the care given by medical personnel in all aspects of care from the antenatal clinic to postnatal and newborn care. In some instances it has been identified that there are insufficient staff on duty, and that they are not adequately trained to manage the patients.

5. There is a problem in District hospitals, and to some extent in Regional hospitals. The mortality rates for babies with very low birth weights and birth weights of ≥2500g in these hospitals are high.

6. Priorities for improving the quality of care.
    - The recognition and management of hypertension in pregnancy
    - The management of preterm labour
    - The recognition and management of hypoxia/fetal distress in labour
    - Resuscitation of the newborn
    - The management of the small and sick newborn

7. Target mortality rates
   The following are suggested. They apply mainly to District hospitals.

   Perinatal mortality rates:

• Birth weight:	≥1000g	25 / 1000
•	1000 – 1499g	200 / 1000
•	1500 – 1999g	120 / 1000
•	2000 – 2499g	30 / 1000
•	≥2500g	7 / 1000

Neonatal mortality rates:

- Birth weight: ≥1000g 8 / 1000
- 1000 – 1499g 150 / 1000
- 1500 – 1999g 50 / 1000
- 1000 – 1999g 100 / 1000
- 2000 – 2499g 8 / 1000
- ≥2500g 4 / 1000

These are initial targets. Once they have been achieved, the target rate must be lowered.

Chapter 3: Late Neonatal Deaths in Children's Wards: Child PIP 2005-2009

Cindy Stephen, Mark Patrick for Child PIP Project

Introduction

The Child Healthcare Problem Identification Programme (Child PIP), which uses the hospital-based mortality review process to assess quality of care children receive in the South African health system, enables the systematic review of all deaths occurring in children's wards. Despite modern recommendations and accepted standards for neonatal care, which designate that newborns should be cared for in nurseries, many newborns are still admitted to children's wards. This is due to outdated policies which state that any newborn that leaves a nursery to go home should never be allowed in a nursery again. The quality of care newborns receive in children's wards, wards not designed for providing newborn care, is not well described. In this chapter Child PIP begins to describe the health profile and quality of care that these newborns receive in South African hospitals.

Setting

Currently there are over 100 hospitals using Child PIP and 95 have contributed data to the national database for 2009. One fifth of South African hospitals using Child PIP are distributed in 32 out of the 52 districts in South Africa. Over half of the participating sites are district hospitals. About 40% of all regional hospitals and half of all provincial tertiary hospitals are using the Child PIP mortality review process.

Methods

Included in this survey are all neonates (0-28 days) admitted to the children's wards of hospitals participating in the Child PIP project, between 2005 and 2009. This group was further divided into early neonates (0-7 days) and late neonates (8-28 days). For this population of children, the Child PIP audit process was used to determine the in-hospital mortality rate (IHMR) and, for those who died, their social, nutritional and HIV context, causes of death, and modifiable factors in the care they received.

Ward admission and discharge registers were used for monthly tallies, from which IHMRs were derived. Each death was analysed using the structured Child PIP mortality review process with information being captured on the standardised death data capture sheet.

Results

During the study period, altogether 95 hospitals participated in Child PIP for varying periods of time, during which there were 22 778 admissions of neonates 0-28 days, and 1 284 tallied deaths, giving an in-hospital mortality rate of 5.6 per 100 admissions.

From 2005 to 2009, the IHMR rate for children of all ages has dropped. However the IHMR for neonates has been rising from a rate of 5.6 in 2005 to almost 7 per 100 admissions in 2009 (Table 1).

Table 1: Core data 2005-2009

Year	2005	2006	2007	2008	2009	Total
Sites (cumulative)	19	30	51	75	95	
All NN admissions	1355	2769	4534	7867	6253	**22778**
All NN deaths	76	150	192	440	426	**1284**
Neonatal IHMR	5.6	5.4	4.2	5.6	6.8	**5.6**
Admissions / site	71	92	89	105	66	**85**
All child admissions	23653	40665	63378	106860	107544	**342100**
All child deaths	1543	2393	3190	5376	5329	**17831**
Paediatric IHMR	6.5	5.9	5.0	5.0	5.0	**5.2**
NN proportion of all admissions	6%	7%	7%	7%	6%	**7%**

Table 2: Audited deaths 2005-2009

Year	2005	2006	2007	2008	2009	
Sites (cumulative)	19	30	51	75	95	Totals
Early neonatal deaths	8	35	84	122	182	**431**
Late neonatal deaths	23	87	124	204	191	**629**
All neonatal deaths	31	122	208	326	373	**1060**
All deaths	1537	2871	3837	5530	5448	**19223**
NN proportion of audited deaths	2%	4%	5%	6%	7%	**6%**
Neonatal MFs	52	206	386	804	1183	**2631**
MF rate (per death)	1.7	1.7	1.9	2.5	3.2	**2.5**

A total of 1 060 deaths (83% of neonatal deaths) were audited in detail, of which 431 were early neonates and 629 were late neonates. The modifiable factor rate of 2.5 per death was very similar between the early and late neonatal groups and is therefore shown for all neonates in Table 2.

For the remainder of the chapter, the health profile of **late neonates** will be reviewed and analysed, whereas the experience of **all neonates** will be used to describe quality of care.

Health profile

Nutritional status

In Chart 1, it is immediately striking that the weight of 10% of late neonates dying in hospital was unknown. About one half were below normal weight for age (UWFA and severe malnutrition), which may reflect birth weight rather than poor nutrition.

However, when looking at the underlying condition for these babies as shown in Chart 2, 79% were classified as having no underlying problem and only 8% were classified as being preterm or having low birth weight. This seems to imply that either the recording of underlying conditions was inaccurate or that significant nutritional deprivation is happening in the first 28 days of life.

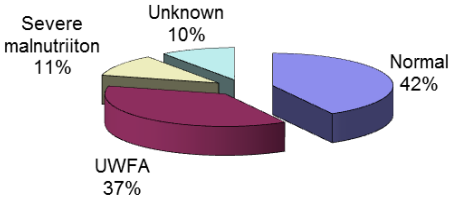


Chart 1. Nutritional Status

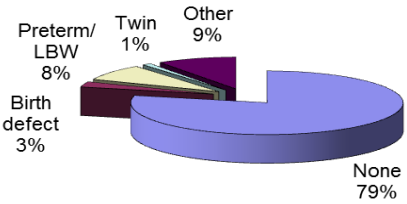
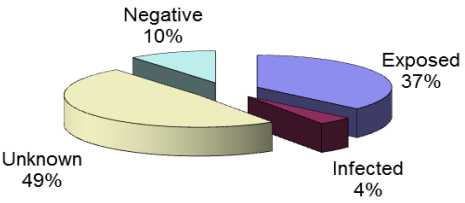


Chart 2. Underlying conditions

HIV context

Chart 3 shows that the HIV status for 49% of all late neonates dying in children's wards was unknown. This represents an enormous gap in care particularly as all pregnant women should be tested for HIV during pregnancy. About 41% of babies between 8-28 days of age dying in hospital were either HIV-exposed or already diagnosed as infected with HIV.

A similar picture emerges when looking at babies receiving nevirapine and/or AZT as part of prevention of mother-to-child transmission of HIV (PMTCT) shown in Chart 4, where, for almost half of the late neonates who died, it was unknown whether they received perinatal antiretrovirals (ARVs) or not. Furthermore, over one third of those known to have been eligible for perinatal ARVs did not receive them. At least one third of late neonates dying had mothers known to be HIV-infected.



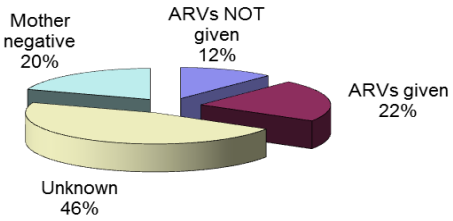


Chart 3: HIV status of late neonates **Chart 4: Perinatal ARVs in late neonates**

With regard to **feeding practice**, 29% of late neonates were fed exclusively on formula; 27% were exclusively breast-fed; 10% received mixed feeding and the feeding choice was unknown for 34%.

Cause of death

The majority of deaths in late neonates were caused by infections. Of the infections, septicaemia was the most common cause, followed by pneumonia, acute diarrhoeal disease, PCP, meningitis, and surprisingly perhaps in this age group, TB was the sixth most common cause of death.

As the Child PIP programme collects HIV data for every child, as well as their immediate cause of death, the data shows that 41% of neonates who died were either HIV-exposed or HIV-infected, making up over one-third of all the newborn deaths.

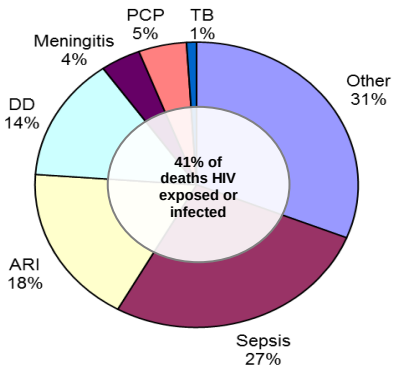


Chart 5: Cause of death in late neonates 2005-2009

Quality of care

For the first time, Child PIP data describing the quality of care received by neonates in children's wards in South Africa are presented, using length of stay and modifiable factor data.

Length of stay

Deaths occurring within 24 hours of admission to hospital may reflect a range of quality of care issues such as late presentation (caregiver, clinic or general practitioner, transport) and/or inadequate first-line assessment and management on admission to hospital.

Charts 6 and 7 show 'length of stay' data for neonates and all children respectively. Of significance is that 45% of all neonates dying in children's wards died within 24 hours of admission compared to 29% of all child deaths.

Proportionately, almost twice as many neonates than children present as dead on arrival (DOA).

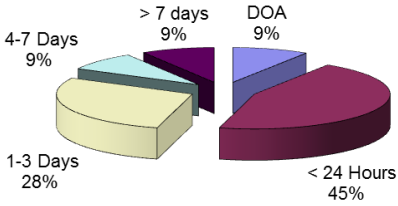


Chart 6: Length of stay: Neonates

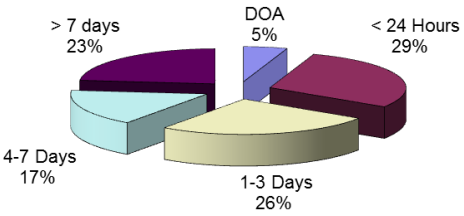


Chart 7: Length of stay: ALL ages

Modifiable factors

Modifiable factors (MFs) can be grouped by where they occurred in the health system, and by who was responsible. Chart 8 shows where they occurred, Chart 9 shows who was responsible and Table 3 lists the top MFs according to the place where they occurred.

Looking at where the MFs occurred, 59% were identified in hospitals, almost equally distributed between the emergency department and the wards, 9% in clinics, and 29% at home. For neonates, 52% of all MFs were attributed to clinical personnel, 20% to administrators, and the remainder to caregivers (Chart 9).

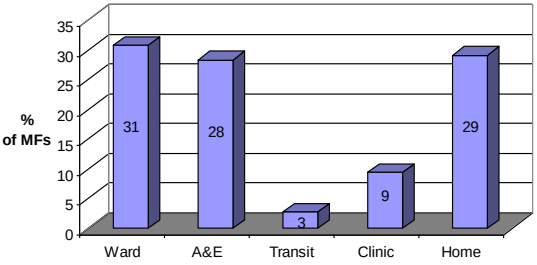


Chart 8: Modifiable factors: Where?

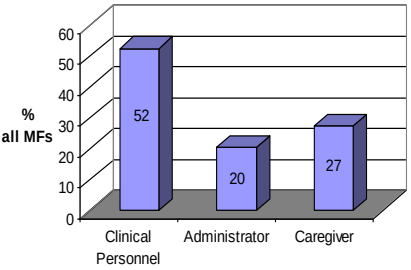


Chart 9: Modifiable factors: Who?

Discussion

Having reviewed all the modifiable factors, health workers considered that only one quarter of the neonatal deaths occurring in children's wards were unavoidable leaving a very significant number of deaths, many due to infections, where a difference in overall care could have changed the outcome for the baby.

Large numbers of neonates (7% of all admissions) are still admitted to children's wards which are, by definition, not designed to adequately accommodate them, and their IHMR has increased over the 5 year period.

Within the health system, HIV care is seriously suboptimal and the Child PIP data graphically and tragically illuminate the HIV experience of infants not surviving beyond their first month of life. HIV is rampant, and the quality of care provided in this context needs drastic and urgent attention.

Overall, basic, simple clinical care processes are often not followed in hospitals, and at clinic level IMCI approaches are not used.

Major resource allocation problems with regard to both neonatal high and intensive care facilities have been identified in this survey, as well as deficiencies in the allocation of skilled clinical personnel.

In the home and community, there is the ongoing serious problem of delay in seeking care, which has also been shown by the Perinatal Problem Identification Programme (PPIP) in the Saving Babies reports[i] and by the Confidential Enquiry into Maternal Deaths in the Saving Mothers reports[ii], and by Child PIP for older children in the Saving Children reports[iii]. As far as we know no-one has yet tackled the reasons for this.

Table 3: Modifiable factors according to where they occurred 2005-2009 (n=2631)

Care in the Ward	**No.**	**% of total**
Monitoring (e.g. RR, SATS, blood glucose)	185	7.0
Buildings/Beds (e.g. lack high care/ICU facilities)	119	4.5
Clinical management (e.g. IV fluids incorrect)	76	2.9
Staff (e.g. lack of professional nurse and experienced doctors)	74	2.8
Assessment (e.g. new danger signs not identified)	35	1.3
Communication (e.g. between peripheral and referral hospital)	34	1.3
Care in Admission and Emergency	**No.**	**% of total**
Monitoring (e.g. O_2 saturation, blood glucose)	118	4.5
Assessment (e.g. RR not taken, not classified as critically ill)	114	4.3
Clinical management (e.g. appropriate antibiotics not prescribed)	81	3.1
Investigations (inadequate bloods, x-ray etc)	74	2.8
Clinical methods (inadequate history taking in A&E)	67	2.5
Care in Clinics	**No.**	**% of total**
Assessment (e.g. IMCI not used, malnutrition not identified)	74	2.8
Clinical management (e.g. inadequate fluids in DD, delay in referring acute problems)	45	1.7
Notes (e.g. on clinical care)	26	1.0
Treatment (e.g. IMCI not used)	19	0.7
Care at Home	**No.**	**% of total**
Care seeking and Compliance (e.g. delay, recognition of danger signs)	495	18.8
Home treatment (e.g. inappropriate remedies)	84	3.2
Growth & Development (e.g. inadequate nutrition)	58	2.2
Notes (e.g. home circumstances, health history)	47	1.8

Recommendations

In general, neonates need warmth, air/oxygen, food, and infection prevention and control. These conditions can best be provided in facilities specifically designed, equipped and staffed according to the special needs of the neonatal population, as they are not found in general children's wards. All South African hospitals caring for neonates should, as a matter of priority, provide proper facilities for neonates, building them from scratch, or modifying current inadequate nurseries.

More specifically:

1. Perinatal HIV care continues to need improvement notwithstanding the launch of the new national ART Guidelines

2. Posts for regional neonatologists (supported by academic Departments of Neonatology), whose primary responsibility is the improvement of neonatal care throughout their geographic areas, must be created country-wide, and neonatologists should be actively head-hunted for these posts

3. 'Resource-Allocation-to-Neonates' policies must be examined to ensure that resources are appropriately and equitably allocated to the neonatal population

4. Neonatal guidelines using an IMCI approach (such as the Limpopo Newborn Care Charts on the Management of Sick and Small Newborns in Hospital) should be implemented immediately at clinics and hospitals

References

[i] Saving Babies, see www.ppip.co.za
[ii] Saving Mothers, see www.doh.gov.za/docs/reports/2004/savings.pdf
[iii1] Saving Children, see www.childpip.org.za

Chapter 4: Recommendations

The next section deals with the recommendations derived from the analysis of the PPIP data over the decade and highlight the areas where the Technical Task Team (TTT) feel that implementation of these recommendations would significantly reduce the perinatal mortality rates based on the findings in the various *Saving Babies* reports.

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

2. **Training/education**
    a. Undergraduate
        i. Maternal and "Neonatal" Guidelines to be part of, emphasised and taught in the curricula
        ii. Health promotion and constant messages must be taught
        iii. Training must be clinical
        iv. Promote training of enrolled nurses for two year post basic training and work as midwives
        v. Promote training "green epaulets": 2 year training course

3. **Implementation of national maternal and neonatal guidelines**
    a. All guidelines must be available
    b. Guidelines must be implemented
        i. Maternal guidelines
        ii. Neonatal guidelines

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

5. **Regional clinicians appointed to establish, run, monitor and evaluate outreach programmes for maternal and neonatal health**
    a. Outreach posts must be dedicated posts and have specific job descriptions (doctors and midwives)

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

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

8. **Staffing, equipment and facilities**
    a. Norms specified (Saving babies) must be followed in labour ward, maternity units and neonatal care

b. Staff must be used in the most efficient way. Must be economy of scale
c. Systems must put in place to attract and retain staff
d. Equipment lists adhered to
e. Facilities sited at appropriate places

9. Transport and referral routes

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

10. Normalisation of HIV infection as a chronic disease

The TTT recognises the enormous efforts by the Department of Health in this regard and wishes to support the programme where-ever possible.

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

Chapter 5: Implementing the Recommendations at District Level

Dave Greenfield, Lolly Mashao

Introduction

Newborn babies are dying from potentially preventable causes. These are mainly occurring at District Hospitals, and to some extent at Regional Hospitals. Reducing these deaths will go a long way towards getting closer to achieving the Millenium Development Goal (MDG) 4, as 30% of infant deaths in South Africa are in the first month of life, ie newborns.

The recommendations are made to assist in this process. However, recommendations do not bring about change. **They need to be implemented**. The strategies below are the practical ways to get the recommendations implemented at a District level – particularly in the District Hospital.

There are 2 areas of intervention which are critical to implementing the recommendations. These are:

- Who is responsible?
- What needs to be done?

A. Responsibility

1. Regional clinicians: Obstetrician, Paediatrician and Midwife
2. District MCWH Managers
3. Facility Managers, together with the Area and Unit Managers in the instiutions

These three groups need to work together to ensure that the actions are known and actually carried out.

4. Individual practitioners.

Specific responsibilities

1. Regional consultant

There must be an Obstetrician, a Paediatrician and a Midwife.

They must be based at the Regional Hospital with some clinical responsibilities there.

1.1 *Facility visits*

1.1.1 All District Hospitals must be visited at least monthly

1.1.2 They must attend perinatal audit meetings at the District Hospitals

1.1.3 They must do clinical teaching ward rounds with all the staff working in that unit
1.1.4 They must audit patient records
1.1.5 They need to assess perinatal and neonatal mortality data and assist with the interpretation of the data.

1.2 Guidelines, policies, protocols

1.2.1 Using the National Maternity and Neonatal Guidelines, and any Provincial guidelines, develop protocols for the institutions in the District. This needs to be done together with the District and facility Unit Managers.
1.2.2 Write, together with District and facility Unit Managers, the policies which are needed for the facilities.
1.2.3 Arrange with the District Managers for the printing and distribution of these policies and protocols
1.2.4 Monitor the use of these policies and protocols

1.3 Teaching

1.3.1 Arrange for, and participate in, inservice training
1.3.2 Do clinical bedside teaching on patients in the wards when visiting the District Hospitals
1.3.3 Use perinatal audit meetings as an opportunity to teach
1.3.4 All training must be consistent and be in line with the National Maternal and Neonatal Guidelines
1.3.5 Ensure that staff know how to use the guidelines

1.4 Audit the quality of care by:

1.4.1 Doing patient record reviews
1.4.2 Assessing the periantal and neonatal mortality rates

1.5 Motivate for, and assist with, the implementation of norms and standards

1.5.1 Number of beds and space needed
1.5.2 Equipment
1.5.3 Staffing

2. District MCWH Manager

2.1 *Facility visits*

- 2.1.1 Attend the perinatal audit meetings at the hospitals
- 2.1.2 Assist in the liaison between clinic, CHC and hospital staff, especially as it relates to patient (obstetric and newborn) care.
- 2.1.3 Assist with organisational / administrative problems
- 2.1.4 Conduct quarterly perinatal audit meetings for hospital and clinic staff
- 2.1.5 Check that the guidelines and protocols are being used to manage patients

2.2 Work with the Regional Consultants

- 2.1.1 To develop and distribute policies, protocols
- 2.1.2 Monitor the use of policies and protocols
- 2.1.3 Audit patient clinical records
- 2.1.4 Assess the perinatal and neonatal mortality rates and assist with the interpretation of the data.
- 2.1.5 Discuss the outcomes of audits with Facility, Area and Unit Managers

3. Facility, Area and Unit managers in the Hospitals

- 3.1 The key responsibiliy is to **implement** the policies, protocols
- 3.2 Make sure that they are readily available in the relevant clinical area
- 3.3 Monitor their use
- 3.4 Orientate all staff, especially new staff, on practices, policies and protocols, and show them where to find the printed copies of these documents.
- 3.5 Ensure that all staff in a clinical area have been appropriately trained
- 3.6 Arrange for staff to attend relevant inservice training
- 3.7 Do patient record audits to assess tha quality of clinical management
- 3.8 All training must be based on the National Maternity and Neonatal Guidelines
- 3.9 Assess the perianatal and neonatal mortality data. The results of this are to be presented at the perinatal review meetings.

4. Individual practitioners

4.1 Every health worker in perinatal care must take personal responsibiliy for implementing the policies, protocols and practices which are laid down.

4.2 They are expected to take responsibility for their own professional development by undertaking appropriate in-service training

Key Point
Regional Obstetricians, Paediatricians and Midwives must be appointed at all Regional Hospitals with the specific responsibility for outreach to the District Hospitals

Regional Consultants
Responsibility for their appointment

1. National Minister of Health and Provincial MECs
   They need to agree with the concept and insist on, and facilitate, the appointment of these clinicians
2. Superintendants General of Health – National and Provincial - must make this policy and ensure that it is implemented in all regions in the country.
3. Budgetary provision must be made for these posts to be filled.

B. Action

1. Normalisation of HIV as a chronic disease

1.1 HIV testing for all pregnant women (opt-out methodology)

1.1.1 Written policy / protocol

1.1.2 To be standard practice at first visit to the antenatal clinic, and on admission of all unbooked patients.

1.1.3 Group counselling of all new antenatal patients. The opt-out policy must be explained.

1.1.4 On-site rapid testing

1.1.5 Individual patient counselling with the results of the rapid test.

1.1.6 Take blood for CD4 count on all HIV positive patients.

1.2 Stop coding of HIV status on health documents

1.2.1 Clear indication of HIV status on the antenatal card

1.2.2 Clear indication of the CD4 count (if relevant) on the patients records

1.2.3 Clear indication of the medication (if any) which the patient is taking

Points 1.1 and 1.2 have been addressed in the gudelines for the management of HIV in pregnancy.

1.3. All health care providers to do counselling

1.3.1 The health care provider who sees the patient / gives the result of the HIV test is responsible for counselling the patient.

1.3.2 These health care providers may need some basic training in counselling

1.3.3 Doing the HIV test must be done as soon as the patient needs it, and must not wait for a "trained counsellor"

1.4 All HIV infected women must get either timeous dual therapy or HAART

1.4.1 Blood for the CD4 count must be taken on the day that the diagnosis is made

1.4.2 The results must be made available and recorded on the patients' records as soon as they become available. A person at each facility must be made responsible for doing this.

1.4.3 There must be clear communication between the facility and the laboratory

1.4.4 If possible the results of the CD4 counts should be 'phoned of faxed to the centre where the test was done as soon as they are available.

1.4.5 The results must be recorded on the patients antenatal card

1.4.6 The appropriate treatment (dual therapy or HAART) must be started immediately the result

is known (the next time that the patient attends the antenatal clinic)

2 Clinical skills improvement

2.1 Midwives and nurses

2.1.1 Orientation of newly qualified staff in labour wards. Concentrate on:

- Management of emergencies in labour ward (ESMOE)
- Recognition and management of fetal distress
- Basic neonatal resuscitation

2.1.2 Management of the small and sick newborn (basic newborn care)

- All staff who work in the newborn care unit must be orientated and trained in basic nebworn care, including newborn resuscitation

2.2 In-service training (doctors, midwives and nurses)

2.2.1 Specific programmes These programmes are:

- Training in the recognition and management of fetal distress.
- Basic Newborn Care using the Newborn Care Charts
- Basic Neonatal Resuscitation
- Perianatal Education Programme (PEP) – especially the Newborn Care Manual, and management of labour in the Maternal Care Manual.
- Basic Antenatal Care (BANC)
- Essential Steps in Managing Obsteric Emergencies (ESMOE)

2.3 Postnatal care training for doctors, midwives and nurses

2.3.1 Must include:

- Normal newborn
- Breast feeding

- Management of HIV positive mother and her baby
- Follow up of normal and high risk babies
- Hospital, clinic staff, and also community health workers, if relevant, must all be involved in this.

3. Implementation of National Maternal and Neonatal Guidelines.

3.1 The guidelines <u>are</u> available

3.1.1 They must be made available at every facility providing any maternity care in the places where they need to be used, eg antenatal clinic, labour ward, postnatal ward, neonatal unit

3.1.2 Staff need to be trained on them and to know that they must be referred to and used when there is a problem.

3.1.3 Some Provinces have developed their own guidelines / protocols. These are based on the National guidelines, and have been accepted as the standard for that Province. In these circumstances, the Provincial guidelines need to be followed.

3.1.4 See end of chapter for addresses from which the guidelines can be obtained

3.2 Guidelines must be implemented for patient management

3.2.1 Maternal

- The use of the guidelines in clinical practice must be audited
  - ➢ Patient record reviews.
    - Any problems in patient care must be identified
    - Action must be taken to rectify the problem with in-service training and follow up audits.
  - ➢ Perinatal review meetings
    - Any problems identified must be minuted with the action to be taken, the person responsible and the time frame.

- The outcomes must be followed up at the next meeting with the delegated person held responsible.
- The Clinical Manager must chair these meetings

3.2.2 Neonatal

- The use of the guidelines in clinical practice must be audited
  - Patient record reviews. Appropriate tools are available.
    - Any problems must be identified
    - Action must be taken to rectify the problem with in-service training and follow up audits.
  - Perinatal review meetings
    - Any problems identified must be minuted with the action to be taken, the person responsible and the time frame.
    - The outcomes must be followed up at the next meeting with the delegated person held responsible.

4. Postnatal Care

4.1 ***Ensure the examination of the mother and baby within 6 hours, within 6 days, at 6 weeks and at 6 months***.

4.1.1 There must be a written policy in which the above examinations are documented, and what is to be done ay each visit. This needs to be clear and available for each facility in each District

4.2 ***Communication between the delivery site and the clinic to be improved so that relevant imformation can be transferred***.

4.2.1 For babies, all relevant information must be written on the Road to Health Card: Clinical problems while in hospital, possible problems that need to looked for, special actions to be taken, dates to attend the clinic. Specifically any information about the HIV status of the mother

and specific treatment, if any, for both the mother and baby must be clearly documented.

4.2.2 Any important information about postnatal care for the mother will probably have to be written in a letter which the mother keeps and shows to relevant health workers.

4.3 Patient carried card to be used as a communication method

4.3.1 Antenatal card

4.3.2 Road to Health Card

These 2 cards are used universally, but the relevant information must be written on the cards.

4.4 Where possible, keep all delivered women and their babies for 24 hours

In many instances it is necessary to discharge mothers and their babies soon after delivery, often at about 6 hours after delivery. This is not ideal for the safety of the mother or baby.

5. Auditing, monitoring and evaluation

5.1 Ensure that morbidity and mortality meetings are held and minuted

5.1.1 These must be held in every health care facility where deliveries are conducted

5.1.2 Where a facility only provides antenatal care, the staff, or some of the staff, must attend the morbidity and mortality meeting at the District Hospital.

5.1.3 When problems are identified at a meeting, the minutes of the meetings must contain action plans with the responsible person's name recorded and a time frame documented for the action to have been taken. The person responsible must report back to the next meeting about progress made.

5.1.4 These meetings must be used as teaching opportunities especially by the regional clincians.

5.1.5 Use data form PPIP and DHIS to analyse outcomes

5.2 Involve the regional clinicians

5.2.1 The main role of the regional clinician is to support, teach and assess the quality of patient care

5.2.2 They also need to advise on staffing, equipment and the facilities which are available, and to make recommendations on improvements which need to be made.

5.2.3 Attend the morbidity and mortality (M & M) meetings

5.2.4 To coordinate the guidelines and protocols within the region

5.2.5 To interpret the findings of statistics and data presented at the M & M meetings

5.3 Use available tools, eg PPIP and ChIP

5.3.1 The important factor here is to interpret the data and help the facility staff to interpret it

5.4 Process audits of antenatal cards, partograms and neonatal care

5.4.1 Involve the quality control personnel from the facility, and the unit managers

5.4.2 Work with them to do the audits

5.4.3 Assist in giving feed back of the results of the audits

5.4.4 Assist with the setting up of action plans to address any problems which have been identified.

5.5 *Improve the quality of data collection*.

5.5.1 The PPIP and ChiP must correlate with the DHIS data. Setting up a single data collection tool will help this.

5.6 ***Data from the DHIS and PPIP / CHiP must be used to improve the quality of care***.

5.6.1 The data must be imterpreted, and the problems identified so that they can be addressed.

5.7 ***Standard birth and death registers are needed in the whole country***.

5.7.1 There is a need to design appropriate documents for the whole of South Africa. Regional consultants will be well placed to provide essential input into this

5.8 Facilities to be accredited for quality of care

5.8.1 The regional consultants will be ideally placed to set up the process, tools, and criteria for doing this, using materials which have been used

6. Constant health messages must be conveyed to all and understood by all

6.1 Community

6.1.1 The key topics which need to be known in the community must be identified

6.1.2 Brief pamphlets need to be written in indigenous languages on these topics.

6.1.3 This information then needs to be available to health workers and the community members

6.1.4 It would be helpful if such a project could be coordinated centrally, so that the same message is given out.

6.2 Patient

6.2.1 The key topics which need to be known by patients, for themselves and for their babies, need to be identified.

6.2.2 Appropriate pamphlets need to be written and be available to all health workers and patients.

6.2.3 Ideally this should be coordinated centrally so that the message is the same for the whole country.

6.3 Health care provider

6.3.1 Messages / teaching / advice needs to be based on the same information which is provided to the community and patients

6.3.2 It must be what is taught in guidelines / protocols

6.3.3 All undergraduate teaching / training must be based on the guidelines and protocols

6.3.4 All in-service training must be based on the guidelines / protocols

6.3.5 The essential relevant guidelines and protocols are available. All the major training material for maternal and newborn care in South Africa is based on, or has formed the basis of, the National Maternal and Newborn Care Guidelines. The impoertant materials are: BANC, ESMOE, Basic Newborn Care (Chart Book), PEP (Maternal and Newborn Care Manuals).

7. Staffing, equipment and facilities

7.1 Norms have been specified (Saving Babies V, 2003 – 2005.[1])

7.1.1 These norms have not yet been addressed. It is very difficult to improve the quality of care if these standards are not achieved.

7.1.2 The most important of the norms is that of nursing staff in the maternity and newborn units. It is of critical importance that this is addressed urgently.

- There are complicated appointment procedures for nursing staff
- It is extremely urgent to train more midwives

7.2 Staff must be used in the most efficient way

7.2.1 There needs to be efficient use of staff, both current and future. The role of Enrolled Nurses (EN) and Enrolled Nursing Assistants (ENA) needs to be defined and enlarged.

7.2.2 Much of the basic nursing care for both mothers and babies can be provided well by ENs and ENAs.

7.2.3 The facilities need to be arranged in such a way that the high care areas are close together so that when there are few staff on duty, the critical patients can be monitored more easily

7.2.4 Staff in the maternity and newborn care units must **not be rotated.**

7.2.5 Staff who have been trained must be used in the discipline for which they have been trained.

7.3 Systems must be in place to attract and retain staff

7.3.1 This is especilally important in the rural areas

7.3.2 Use local staff whenever possible

7.3.3 Posts must be "unfrozen" so that staff can be appointed.

7.3.4 Appointment proceedures must be simplified, where relevant.

7.3.5 Appropriate financial incentives are needed for certain facilities and categories of staff

7.3.6 Appropriate accommodation must be available for staff especially in the more remote facilities.

7.4 Equipment lists must be adhered to

7.4.1 Every facility must have a list of essential equipment

7.4.2 The exact numbers of each item needs to be decided for each facility

7.4.3 Procurement of equipment must be efficient

7.4.4 The equipment must be used appropriately

7.4.5 Broken equipment must be sent for repair as soon as possible and followed up so that it is returned quickly

7.5 Facilities sited at appropriate places

7.5.1 Access

- The facilities for maternity and newborn care need to be reasonably accessable to the people who are going to use them. This is

specifically important in planning new facilities.

- However, most of the facilities in South Africa are already there.

7.5.2 Mothers' waiting area

- This is needed where transport to the health care facility is not reliable or quick
- It is **essential at all** health care facilities providing care for high risk patients and doing deliveries.
- All that is needed is space to provide sleeping accommodation for an appropriate number of mothers, bathroom and toilet facilities, and adequate space for cooking.

7.5.3 Transport

- Transport to and from the facility needs to be available. This is mainly public transport
- Transport between facilities needs to be in place. It must be readily available and equipped for dealing with obstetric and neonatal emergencies.
- Regional Consultants, District MCWH Managers and regioanl and District EMS Managers must come to an agreement about the referrals of maternity and newborn patients to ensure that the delays are reducd.

8. Transport and referral routes

8.1 Women in labour and sick infants must be treated as emergency patients

8.1.1 Discussions must be held between Clinicians and EMS Management at a high level to ensure that this is an agreed policy

8.1.2 This policy must be written

8.1.3 The policy must be distributed to every station which receives calls for the transfer of women in labour and sick newborn babies

8.1.4 Serious attention must be given to the very long delays in getting ambulances to facilities when needed, especially in rural areas.

8.2 Referral routes must be established and adhered to.

8.2.1 Clear referral criteria must be written and distributed to all facilities – sending and receiving

8.2.2 Staff at referring facilities need to know to which facility the patients must be referred.

8.2.3 Staff at the referral hospital need to know which are their referring facilities

8.2.4 Staff at a referral hospital **may not refuse admission** to a patient who fulfills the referral criteria

8.2.5 If there is no bed for the patient who needs to be referred, then **it is the responsibility of the staff at the referral hospital to find a bed** for the patient, and to inform the referring facility of the arrangements that have been made.

8.2.6 These policies must be written and ditributed to all facilities and staff, working in the facilities, who are likely to make or receive calls relating to the transfer of patients.

9. Training / Education

9.1 Interns' skills in emergency care must be improved

9.1.1 By using the following:

- Essential Steps in Managing Obstetric Emergencies (ESMOE).
- Recognition and management of fetal distress in labour
- Basic resuscitation of the Newborn
- Basic Newborn Care using the Newborn Care Chart Book.

9.2 Undergraduate

9.2.1 The National Maternal and Neonatal Guidelines to be part of and emphasised and taught in the curriculum.

- HPCSA and Nursing Council must include these in the curriculum for the training of doctors and midwives.
- A letter requesting this, with motivation, must be sent to the Undergraduate Education Committee of the HPCSA
- A similar letter must be sent to the Nursing Council

9.2.2 Health promotion and same messages be taught. Use the protocols as the basis for all teaching.

9.2.3 Protocol driven management (with understanding!) should be taught at undergraduate level. The National Maternity and Neonatal Guidelines need to be used for this. This will ensure that students from different institutions do not get different messages.

9.2.4 Training must be clinical

- All training on clinical topics for all categories of health workers must be patient based and not classroom based.
- Tutors must take and teach their students in the wards on actual patients.
- There must be a written University / College policy stating that this is what must be done.
- All staff and students must have a copy of this policy.

9.3 Promote training "green epaulette" midwives: 2 year training course

9.4 Responsibility

9.4.1 Health Professions Council of South Africa (HPCSA)

- Interns
  - Basic newborn care must be an essential part of the training of **every** Intern.
  - This includes basic newborn resuscitation.

NB! *Currently, newborn care is included in "Obstetrics" in the "Handbook on Internship Training" and in the Internship Training Logbook of the HPCSA. It needs to be included in "Paediatrics" as obstetricians will not be able to teach newborn care.*

- Undergraduates
  - Advice on training should be that the training in periantal care must follow the National Maternal and Newborn Guidelines.

9.4.2 Nursing Council of South Africa

- The Council needs to advise the Colleges that all midwifery training needs to include the National Maternity and Newborn Guidelines, and that practice must be based on these guidelines.

9.5.3 Deans of Health Sciences and Principals of Colleges

- Need to ensure that these guidelines are included on the curricula of medical and midwifery student training

10. Regional clinicians (Obstetrician, Paediatrician and Midwife) must be appointed to establish, run, monitor and evaluate outreach programmes for maternal and neonatal health

10.1 Outreach posts must be dedicated posts and have specific job descriptions (doctors and midwives)

10.1.1 The person appointed must have a primary reponsibility for outreach.

10.1.2 Job description must include:

- Clinical responsibilities at the base (regional) hospital. This is important for the clinicians to maintain their own clinical skills
- Outreach visits to health care facilities in the region, particularly the District Hospitals, and Community Health Centres.

- Teaching and training of all of health care workers at all levels in the Region
- Arranging training courses as needed
- Doing teaching at these training courses
- Doing clinical teaching for doctors and nurses on ward rounds in the District Hospitals.
- Monitoring and evaluation of the quality of care at all instiutions in the District. This would include doing chart reviews of patient records and evaluation of the PPIP data from the facilities in the region.
- Work with the District and Facility Managers to ensure that protcols and guidelines are available and used.
- Arrange for other clinicians to do outreach to certain areas or hospitals if appropriate.

11. References

1. Pattinson RC (ed). Saving Babies 2003 – 2005: Fifth Perinatal Care Survey of South Africa. Pretoria: University of Pretoria, MRC, CDC; 2007

Appendix 1
Addresses from which guidelines can be obtained

- ***National Maternity and Newborn Guidelines*** National Department of Health, South Africa (www.doh.gov.za)
- ***BANC*** MRC Maternal and Infant Health Care Research Unit
- ***ESMOE*** MRC Maternal and Infant Health Care Research Unit

- ***Provincial Guidelines***

Western Cape Directorate: Maternal, Child and Women's Health, Cape Town
Limpopo Directorate: Maternal, Child and Women's Health and Nutrition, Polokwane
KwaZulu-Natal
Paediatric and Neonatal Guidelines from: Department of Paediatrics, Greys Hospital, Pietermaritzburg

- ***Basic Newborn Care (Chart Book)***

Save the Children, 11 South Way, Pinelands 7405
Phone: 021 532 3494
Fax:021 532 5140

- ***Perinatal Education Programme (PEP)***

Post: The Editor-in-chief,
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Appendix 2

1. **Messages which must get to the community**

- Healthy life style
- HIV prevention
- HIV management
- Planning a pregnancy
- Booking
- Antenatal care – what to expect
- Antenatal problems – what can be done
- Risk factors
- What to do when a risk factor occurs
- Labour when to attend a health care facility
- Labour companionship
- Newborn
    - What to look for
    - When to bring baby to clinic
- KMC
- Feeding a newborn NB breast feeding
- Immunisations
- Role of grandmother in maternity / newborn care
- Traditional medications

Responsibiliy: District MCWH & N Managers

2. **Messages which a patient must get**

- As above
- They must be based on guidelines / protocols

Essentials

- They need to be written simply and briefly
- They need to be available in the local language

Responsibility: National Department of Health

Chapter 6: Sustainability of Audit and Improvements in Maternal and Child Health Care

Anne-Marie Bergh

A workshop was held from 15-16 September 2009 in which 48 participants from all nine provinces in South Africa deliberated the audit cycle and its completion. The audit cycle includes six steps: problem identification; information collection; analysis of information; recommendation of solutions; implementation of recommendations; and evaluation of implementation and further refinement.

Results from the analysis of serial data from audits conducted with the Perinatal Problem Identification Programme (PPIP) and the Child Problem Identification Programme (Child PIP) were presented as a point of departure. Fifty-eight sites had been able to provide PPIP data for a period of at least five years or Child PPIP data for at least three years. These sites had therefore been successful with audit and feedback. However, only four PPIP sites (11%) and seven Child PIP sites (30%) showed a significant reduction in perinatal mortality and in-hospital case fatalities respectively. In 26 PPIP sites (74%) and 13 Child PIP sites (57%) there had been no change and in five PPIP sites (14%) and three Child PIP sites (13%) there had been a significant increase in mortality.

As part of the process of trying to understand the way in which audit and recommendations emanating from the feedback are implemented, four break-away sessions were held where participants shared their experiences with PPIP and Child PIP:

(1) Implementing an audit system.

PPIP and Child PIP were introduced into health care facilities through different avenues: by outreach coordinators working at the regional, provincial or national level; through conferences; as part of a research project; and as a result of a perceived need to audit mortality rates. The establishment of the two audit systems within health care facilities was facilitated in different ways: by the coordinator who sought buy-in from staff and management and or by an interested professional within the hospital who acted as a driver; through team work; by existing perinatal or mortality review meetings; and through networking and communication between different team players and between different levels in the health system. Training in the use of the programmes was also done.

(2) Sustaining an audit system.

Conditions that acted as facilitators in sustaining PPIP and Child PIP were: regular meetings with feedback; outreach visits and support; continuous efforts of the driver(s) and the team; management participation and support; staff stability; and formalization of audit duties as part of job descriptions. The availability of computers, user-friendly software, technical support and training also contributed towards sustainability. Potential barriers to the implementation and sustainability of PPIP of Child PIP that were mentioned included: individual and group issues (e.g. staff attitudes, absence of team work, poor interpersonal communication, computer literacy); health system issues (e.g. absence of a culture of audit and management support, staff shortages and turnovers, difficulties to institutionalize the programme); and information technology issues (data entry not done timeously, software problems, accessibility of computers).

(3) Using audit findings.

Audit findings are used differently in different steps of the audit cycle. Participants reported that during analysis they looked for results to: identify causes of perinatal, neonatal and child deaths at the different levels of care; characterize the deaths, in terms of developing patient profiles and identifying high risk groups; identify avoidable/ modifiable factors in order to correct these; generate 'statistics' illustrating variations in performance and trends; and identify possible causes for differences in performance. Data is analyzed daily or weekly and prepared for anonymous presentation and further interpretation and analysis at monthly review meetings attended by doctors, midwives/nurses, hospital management and other staff. At the monthly meetings solutions are also recommended and strategies discussed in the case of no progress on previous recommendations. Examples of solutions are: gathering further information; dealing with clinical mismanagement; addressing staffing issues; attending to health system issues; recommending policy changes; revising organization of care; giving feedback to clinics and the community; and informing the research agenda. Conditions similar to those present at the implementation of PPIP and Child PIP also act as facilitators or barriers in the case of implementing recommendations. Improvement or a lack of improvement in the quality of care and outcomes may also be attributed to health system factors (e.g. changing norms), in-hospital contextual factors (e.g. staffing, protocols and guidelines), appropriate

leadership and supervision at different levels, the broader socio-economic context, violence, and patient profiles.

(4) Implementing actions for quality care.

Two main themes emerged from the contribution of the workshop participants: change takes place in a context which includes an enabling and empowering environment, and to be able to change, there must be agents of change, with leaders leading the change. Conditions for an enabling environment include: identification of problems; willingness to change; mobilising the passive majority; having a vision; good planning, execution and follow-up; clarity about roles and responsibilities; role models at the coal face; a culture of accountability; and professional values. Two empowering factors for implementing actions for quality care are an efficient system and the empowerment of people. Components of an efficient system include policies, infrastructure, and staffing (job descriptions, placements and levels, rotations). Empowerment of people includes: sufficient time for clinical work and mentoring; acknowledgement and appreciation; and skills-based training. Further enabling conditions are management support at all levels and the integration of vertical programmes. In order to be able to act as change agents, leaders should be 'hands on', accountable and credible in the execution of their duties, which include: presenting audit results; training; doing outreach; supervision; and holding people accountable. One of the prerequisites for a leadership role is the ability to work with people, as a leader should mentor, motivate, build trust, relationships and teams, and promote ownership. The conclusion of this session pointed towards the need for a better understanding of the development of leadership. One possible vehicle is the identification of emerging, potential and future leaders at other sites as part of supervision and outreach activities and by putting pressure on management to act on this.

In the final plenary session on the way forward the dominant theme of discussion was the issue of the development of leadership – *"We have to develop the next set of leaders"*, because *"unless you populate hospitals with quality people, nothing is going to change."*

Chapter 7: The Way Forward

Sithembiso Velaphi and Eckhart Buchmann for the Saving Babies Technical Task Team*

Introduction

Born out of PPIP 11 years ago, the Saving Babies initiative has now achieved a measure of maturity, this being the seventh publication of the national PPIP findings. PPIP appears to be a story of countrywide co-coordinated success. More institutions send in PPIP data than ever before, and PPIP data collection is now compulsory in a number of provinces. However, while Saving Babies has been highly successful in reporting on numbers, causes and avoidable factors for perinatal deaths, and offering guidelines for improved perinatal care, mortality rates have remained essentially the same through the 11 years. We know the facts about these deaths, and we know how to prevent them, but we as health service providers still seem unable to deliver the quality of care that would prevent so many of these babies from dying. This frustration leads one to ask: what of the future of PIPP and Saving Babies? If we are not saving babies, what really is the point? The Saving Babies Technical Task Team, which met on 9 and 10 November 2010, considered these serious questions and concluded that much can still be done, using PPIP and from within Saving Babies, to reduce the unacceptable burden of avoidable perinatal deaths in our country. An expanded role is seen for PPIP and Saving Babies. The discussion that follows is a summary of the Technical Task Team's deliberations.

The problem with PPIP and Saving Babies

Is PPIP delivering to its maximum benefit?

PPIP is a tool that is used to audit numbers and causes (pathologies and systems) of perinatal deaths in health facilities that conduct births. This is done through collecting the number of births and deaths, and conducting mortality reviews to identify causes of death and modifiable factors associated with deaths in healthcare facilities. It is currently being used by 347 health facilities in the country. The aim of PPIP is to assist healthcare facilities to monitor their performance in terms of quality of care, to identify areas where they need to improve. One of the major benefits of PPIP is that it can be used to monitor quality improvement over time at a specific healthcare facility, or at district, provincial and national levels. So far, PPIP has been very effective at gathering data in terms of numbers and causes of death, but the audit loop is not being closed in terms of making changes in areas where deficiencies are identified after analyzing the data. Too many people see PPIP only as an information gathering tool, and are not using the information gathered by PPIP appropriately. Therefore PPIP

is not realizing its potential as a tool to improve quality of care, and is therefore not delivering to its maximum benefit.

Why is PPIP not delivering to its maximum benefit?
Currently, in most instances, the use of PPIP as a tool to collect data in healthcare facilities depends on interested and enthusiastic individuals rather than on the institutions themselves. Once such an individual leaves the institution or health region, data gathering using PPIP often falls away. In the long term, PPIP may not be sustainable if it depends mostly on enthusiasts for it to be used. Also, there has not been widespread and efficient implementation of recommendations based on PPIP data in the Saving Babies reports. Both national and provincial government should have the interest, and possess the resources, to ensure improvement in quality of health care. However, government has not been fully involved in PPIP data collection and in implementing the Saving Babies recommendations. The benefits of using PPIP cannot be fully realized if the government is not involved in supporting PPIP implementation and ensuring that the information gathered through using PPIP is used appropriately towards improving the quality of health care in the country. Therefore, as a way forward, a number of key areas need to be addressed. These include ownership of PPIP in terms of its implementation and co-ordination, amalgamation and analysis of data from PPIP, reporting of findings from PPIP, and implementation of the Saving Babies recommendations based on PPIP findings.

The way forward
Ownership and co-ordination of PPIP data collection
Data collected using PPIP is owned by the healthcare facilities and therefore by the government, since these facilities are public institutions. PPIP data collection should be made compulsory in all institutions that conduct births. A directive to do so must come from the national and provincial health departments. The healthcare facilities will continue to own the data, which must be collected according to the PPIP format using PPIP software by nurses or doctors in the healthcare facilities. Hospital chief executive officers (CEOs) or midwife-obstetric unit managers need to ensure that this happens. This responsibility should be listed as one of the key result areas in these managers' performance assessments. Since PPIP data requires information on causes of death and avoidable factors, all healthcare facilities must conduct mortality reviews on a daily, weekly or monthly basis depending on the size of the facilities. The local information from PPIP data collection will be owned by the facility, but can be shared with the district, and with the provincial and national governments.
The co-ordination of PPIP in terms of ensuring that data is collected should be done at provincial level under the maternal and child health (MCH)

directorates. In each province, there must be a PPIP co-coordinator who will co-ordinate training, implementation, support and follow-up of PPIP at all institutions. Provincial PPIP co-coordinators must be employed, housed and supported by the provincial MCH directorates, and work full-time on PPIP. These co-ordinators should be health workers who ideally have used and understand PPIP. On a monthly basis, the institutions must submit locally summarized PPIP data to the office of the provincial PPIP co-coordinator, and the co-coordinator must ensure that this happens. The PPIP co-ordinator must work closely with regional clinicians or departmental clinical heads to ensure that data is collected, and that mortality review meetings are held regularly. Special emphasis must be placed on facilities where resources are limited. Records or minutes of mortality review meetings must be kept at the facilities and should be available to the provincial MCH office, bearing in mind that these are confidential documents.

Amalgamation and analysis of data

An independent body should be contracted to national government to collate, co-ordinate and analyse PPIP data at a national level. Similar relationships currently exist between Stats SA and the Department of Home Affairs, and between Medical Research Council (MRC) Burden of Disease unit and the national Department of Health (NDOH). This independent body will provide mainly technical support including development and upgrading of the computerized PPIP program, and assist with training, analysis and writing of reports. It will receive PPIP data electronically from healthcare institutions, then amalgate and analyse the data for the provincial and national governments. It should respond to needs to refine or improve data collection, and also provide training in aspects related to PPIP, including data management, mortality review, and leadership. There will need to be good communication channels between this body and provincial co-coordinators. This body will submit the findings of its analysis regularly to the provincial co-ordinators, and publish a formal 'Saving Babies' report every three years. Currently, the MRC Unit for Maternal and Infant Health Care Strategies provides the function of the independent body. It offers training, technical support, data amalgamation and analysis, and produces the Saving Babies reports. The MRC unit may be able to continue with this function but should **be** contracted formally to government. Alternatively, an independent non-governmental organization, overseen by a board, may take on this function.

Reports on PPIP data

At a national level, the ministerial NaPeMMCo (National Perinatal Morbidity and Mortality Committee), currently considers the problem of perinatal deaths in South Africa. This committee gathers information from

all available databases on deaths in the country, including DHIS (District Health Information System), PPIP, DHS (Demographic Health Survey) and Stats SA (Statistics South Africa). It advises the NDOH (National Department of Health) on what needs to be done to reduce perinatal deaths. Therefore, information collected using PPIP will need to be submitted to this committee. The provincial PPIP co-coordinators should submit their PPIP summaries quarterly to this committee. NaPeMMCo will make recommendations to the Minister based on the PPIP reports that come from the provinces, and from amalgamated data in the Saving Babies reports. The amalgamated data can also be formalized also within NHIS/SA (National Health Information System for South Africa).
The published Saving Babies reports will go into the public domain for use by the scientific community, by national and international interested bodies, and by advocacy groups. For example, the 'Saving Newborn Lives' group may use PPIP-derived Saving Babies data to support advocacy for improved perinatal care in South Africa and around the world.

Implementation of findings from PPIP - closing the audit loop
At a local level, healthcare institutions need to ensure that they respond to findings from their mortality reviews, and from data collection conducted through PPIP. This needs to be supervised and supported by the institutional CEOs and clinical managers. Also, the NDOH must develop policies that will improve quality of care based on recommendations made by NaPeMMCo. Provincial governments must ensure that these policies are implemented by providing appropriate and efficient governance and resources in their districts. To ensure that this happens, NaPeMMCo working with the department on quality assurance, must form a body that monitors performance of health facilities and the implementation of policies developed through recommendations from NaPeMMCo.

Conclusion
The bottom line for the future is that PPIP must continue to function. PPIP needs to be supported by government to make sure that its functions are implemented in all facilities under its umbrella. Processes must be put in place to implement PPIP effectively, with data properly collected, analysed, and interpreted. Mortality review meetings are essential in PPIP implementation, and make up the key first step at local level towards reducing perinatal deaths. Technical PPIP functions such as training, data analysis, and report writing should be done by an independent body. Reporting on various indicators from PPIP should not be an end in itself. Solutions based on PPIP findings must be implemented so that quality of care improves and mortality rates come down. It must be emphasized that closing the audit loop or gap is not only the responsibility of one person, or

PPIP person, or government; it is everyone's business, including that of hospital managers.

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Appendix 1: Additional tables

Perinatal mortality rate per disease category per level of care for babies ≥1000g

	CHC	DH	RH	PT	NC
Unexp. SB	1.68	7.17	8.35	6.21	3.31
SPTB	1.21	3.92	3.31	3.41	3.98
IPA+T	1.41	7.09	5.54	6.79	4.51
HT	0.31	2.69	4.36	6.23	4.67
APH	0.62	2.01	4.58	5.19	7.66
FA	0.20	0.95	1.22	1.69	3.96
Inf.	0.65	1.88	1.38	1.25	1.50
IUGR	0.36	0.38	0.77	0.59	0.89
MD	0.08	0.78	0.60	1.10	0.95
Other	0.05	0.37	0.38	0.38	0.58
NOC	0.31	0.39	0.64	1.67	1.01
Total	6.89	27.64	31.13	34.51	33.03

Stillbirth rate per disease category per level of care for babies ≥1000g

	CHC	**DH**	**RH**	**PT**	**NC**
Unexp. SB	1.66	7.03	7.98	6.21	3.31
SPTB	0.82	0.91	0.74	0.79	1.64
IPA	0.74	2.85	2.18	2.96	1.77
T	0.18	0.43	0.41	0.85	0.34
HT	0.30	2.36	3.68	5.05	3.49
APH	0.54	1.66	4.06	4.54	6.99
FA	0.12	0.37	0.57	0.74	2.26
Inf.	0.57	1.02	0.84	0.55	0.98
IUGR	0.31	0.25	0.69	0.45	0.69
MD	0.08	0.64	0.53	0.82	0.85
Other	0.04	0.21	0.26	0.24	0.38
NOC	0.12	0.09	0.28	0.24	0.08
Total	5.50	17.81	22.21	23.43	22.78

Early neonatal death rate per disease category per level of care for babies ≥1000g

	CHC	DH	RH	PT	NC
SPTB	0.39	3.07	2.63	2.69	2.42
IPA	0.47	3.69	2.82	2.93	2.40
T	0.02	0.21	0.19	0.14	0.08
HT	0.01	0.34	0.70	1.21	1.23
APH	0.08	0.35	0.53	0.67	0.69
FA	0.08	0.59	0.67	0.98	1.76
Inf.	0.08	0.88	0.55	0.71	0.53
IUGR	0.04	0.13	0.08	0.14	0.21
MD	0.00	0.15	0.08	0.29	0.11
Other	0.01	0.17	0.12	0.14	0.21
NOC	0.19	0.30	0.36	1.48	0.96
Total	1.40	10.01	9.12	11.38	10.60

Macerated Stillbirths

> 500g Rate/1000	CHC	DH	RH	PT	NC
Unexp. SB	1.43	6.97	8.16	6.80	4.54
SPTB	1.08	0.89	0.98	0.95	3.40
IPA	0.17	0.63	0.56	0.48	1.11
T	0.11	0.11	0.12	0.28	0.27
HT	0.29	2.14	3.56	5.09	4.84
APH	0.46	0.61	2.21	2.07	1.97
FA	0.07	0.18	0.37	0.78	1.54
Inf.	0.47	0.72	0.75	0.48	1.18
IUGR	0.29	0.23	0.65	0.39	1.00
MD	0.10	0.58	0.48	0.92	1.16
Other	0.00	0.16	0.19	0.20	0.48
NOC	0.06	0.07	0.25	0.28	0.05
Total	4.52	13.29	18.29	18.72	21.54
>1000g Rate/1000					
Unexp. SB	1.11	5.81	6.76	5.39	2.21
SPTB	0.31	0.52	0.37	0.34	0.74
IPA	0.15	0.60	0.53	0.45	0.79
T	0.08	0.10	0.11	0.26	0.13
HT	0.24	1.74	2.75	3.30	1.74
APH	0.31	0.54	1.88	1.66	1.15
FA	0.06	0.16	0.32	0.42	0.77
Inf.	0.36	0.66	0.57	0.32	0.67
IUGR	0.24	0.18	0.55	0.34	0.46
MD	0.08	0.53	0.42	0.69	0.64
Other	0.00	0.13	0.16	0.16	0.23
NOC	0.06	0.06	0.23	0.21	0.03
Total	3.03	11.01	14.64	13.55	9.55

Fresh stillbirths

> 500g Rate/1000	CHC	DH	RH	PT	NC
Unexp. SB	0.69	1.48	1.58	1.20	2.34
SPTB	1.39	0.96	1.45	1.46	5.08
IPA	0.59	2.28	1.67	2.71	1.45
T	0.13	0.34	0.31	0.64	0.41
HT	0.07	0.71	1.44	2.71	7.92
APH	0.35	1.28	2.60	3.50	9.49
FA	0.06	0.24	0.30	0.39	3.61
Inf.	0.30	0.39	0.36	0.36	0.75
IUGR	0.07	0.07	0.19	0.11	0.50
MD	0.01	0.11	0.14	0.20	0.54
Other	0.04	0.09	0.13	0.08	0.52
NOC	0.06	0.04	0.07	0.03	0.14
Total	3.76	7.98	10.24	13.41	32.76
>1000g Rate/1000					
Unexp. SB	0.54	1.22	1.22	0.82	1.10
SPTB	0.51	0.39	0.37	0.45	0.90
IPA	0.59	2.25	1.65	2.51	0.98
T	0.10	0.33	0.30	0.58	0.21
HT	0.06	0.62	0.93	1.74	1.75
APH	0.23	1.13	2.18	2.88	5.85
FA	0.06	0.21	0.25	0.32	1.49
Inf.	0.21	0.36	0.27	0.24	0.31
IUGR	0.07	0.07	0.15	0.11	0.23
MD	0.00	0.11	0.10	0.13	0.21
Other	0.04	0.08	0.10	0.08	0.15
NOC	0.06	0.03	0.05	0.03	0.05
Total	2.47	6.81	7.57	9.88	13.23

PPIP SITES
(Past and presenting)

Addington, Alan Blyth, Aliwal North, Amajuba, Andries Vosloo, Barberton, Barkley, Baziya Health Centre, Beaufort West, Bedford, Bekkersdal, Belfast, Benedictine, Bernice Samuel, Bethal, Bisho, Bishop Lavis, Bloemhof, Boekenhout, Boipatong MOU, Bongani, Botlokwa, Botshabelo, Bredasdorp, Brits, Burgersfort, Butterworth, Cala, Caledon, Calvinia, Carltonville, Canzibe, Carolina, Catherine Booth, Cecilia Makiwane, Central MOU, Ceres, Ceza, Charles Johnson Memorial, CH Baragwanath, Charlotte Maxeke (Jhb), Christ the King, Church of Scotland, Citrusdal, Clanwilliam, Cloete Joubert (Barkly East), Colesburg, Comfimvaba, Coronation, Cradock, De Aar, Diamond, Dilokong, Donald Fraser, Dora Nginza, Dordrecht, Douglas, Dr CN Phatudi, Dr George Mukhari, Dr JS Moroka, Dr Malizo M Memorial, Dr Yusuf Dadoo, Duiwelskloof, Dundee, Eben Donges, Edendale, Edenvale, EG & Usher Memorial, Ekhuruleni, Ekuhlenhleni, Elim, Elliott, Ellisras, Elsie Ballot, Elsies River, Embekweni, Embhuleni, Emmaus, Empilisweni, Empilweni Gompo, Ermelo, Esangweni MOU, Eshowe, Estcourt, Evander, False Bay, Far East Rand, FH Odendaal, Fort Beaufort, Frere, Frontier, Galeshewe Day Hospital, Ganyesa, Gelukspan, Gen de la Rey, George Masebe, George Stegman, Germiston, GGS40-MOU, GJ Crookes, Glen Grey, Gordonia, Grabouw, Greenville, Greys, Greytown, Groblersdal, Groote Schuur, Guguletu, Gwaliweni, Haaswater, Hanover Park, HC Boshoff, Heidelberg Hospital, Helderberg, Helene Franz, Hermanus, Holy Cross, Hopetown, Hottentots Holland, Humansdorp, Impungwe, Isilimela, Itshelejuba, Jabulani Dumane, Jan Kempdorp, Jane Furse, Job Shimankane, Johan Heyns MOU, Joubertina, Jubilee, Indwe, Kagisho CHC, Kakamas, Kalafong, Karl Bremer, Katleho, Keimos, Kekanastad, Kgabo, Kgapane, Khayelitsha, Kimberley, King Edward, Klerksdorp/Tshepong, Knysna, Komga, Kopanong, Koster, Kraaifontein, Kuruman, KwaMagwaza, KwaMhlanga, KwaThema MOU, Kwambuzi, Kwazakhele MOU, Ladybrand, Lady Grey, Ladysmith, Laetitia Bam MOU, Laingsburg, Lapa Munnik, Laudium, Lebowakgomo, Lehurutshe, Leratong, Letaba, Levai Mbatha, Liesbeeck, Livingstone, Louis Trichardt, Lower Umfolozi War Memorial (Empangeni), Lydenburg, Macassar, Madadeni, Madwaleni, Madzikane, Mafikeng, Mahatma Gandhi Memorial, Malamulele, Mamelodi, Mankweng, Mantsopa,Manyseni, Maphutha L Malatji, Mapulaneng, Martie Venter Prov, Matibidi, Matikwana, Matlala, Mbadleni, Mbekweni, Mbongolwane, McCord, Mecklenburg, Messina, Mahatma Gandhi Memorial, Michael Mapongwana, Middelburg, Midlands, Mitchells Plain, Mmametlhake, Mohlakeng, Mokopane, Montagu, Montobello, Moreteletsi, Moroka, Mossel Bay, Mosvold, Motherwell, Mowbray, Mqanduli, Mseleni, Mt Ayliff, Murchison, Murraysburg, Musina,Natalspruit, National Hospital, Ndumo, Nelson Mandela Academic, Nessie Knight, Newcastle, Ngangelizwe, Ngcwangube, Nic Bodenstein, Niemeyer, Nkandla, Nkhensani, Nkonjeni, Nkungwini, Nokuthela Ngwenya, Nompumelelo, Nondabuya, Northdale, Nseleni CHC, Odi, Oudsthoorn, Ophondweni, Paarl, Pelonomi, Phalaborwa CHC, Phedisong 4, Philadelphia, Phillip Moyo, Phola, Phola Park, Pholosong, Piet Retief, Polokwane, Port Alfred, Port Shepstone, Potch Clinic, Potchefstroom, Prieska, Prince Albert, Prince Mshiyeni, Pretoria West, Radie Kotze, Ramokonopi, Refentse, Retreat, Riversdale, RK Khan, Rob Ferreira, Robertson, Rustenburg, Sabie, Schweizer Reinecke, Sebokeng, Sekororo, Seshego, Settlers, Sharpeville, Shemula, Shongwe, Siloam, Siphosensimbi, Sipetu, Somerset, Soshanguve Clinic 3, South Rand, Springbok, SS Gida, St Apollinaris, St Barnabas, St Elizabeths, St Lucys, St Marys, St Ritas, St Patricks, Standerton, Stanger, Stanza Bopape, Stellenbosch, Steve Biko (PAH), Stoffel Coetzee, Sundays Valley, Swartland, Swartruggens, Swellendam, Tafalofefe, Tambo Memorial, Taung, Taylor Bequest, Tayler Bequest – Matatiele, Temba Health Centre, Tembisa, Thabazimbi, Themba CHC, Themba, Thusanong, Thusong/Gen de la Rey Complex, Tintswalo, Tonga, Tshilidzini, Tshwane District, Tshwarangano, Tygerberg, Uitenhage, Umlamli, Umphumulo, Umtata Academic, Uniondale, Universitas, Untunjambili, Van Velden, Vanguard, Ventersdorp, Victoria, Voortrekker, Vredenburg, Vredendal, Vryburg, Vryheid, Warmbaths (Bela Bela), Warrenton, Waterval Boven, Westend MOU, Wesfleur, WF Knobel, Wilhelm Stahl, Witbank, Witpoort, Zebediela, Zeerust, Zithulele