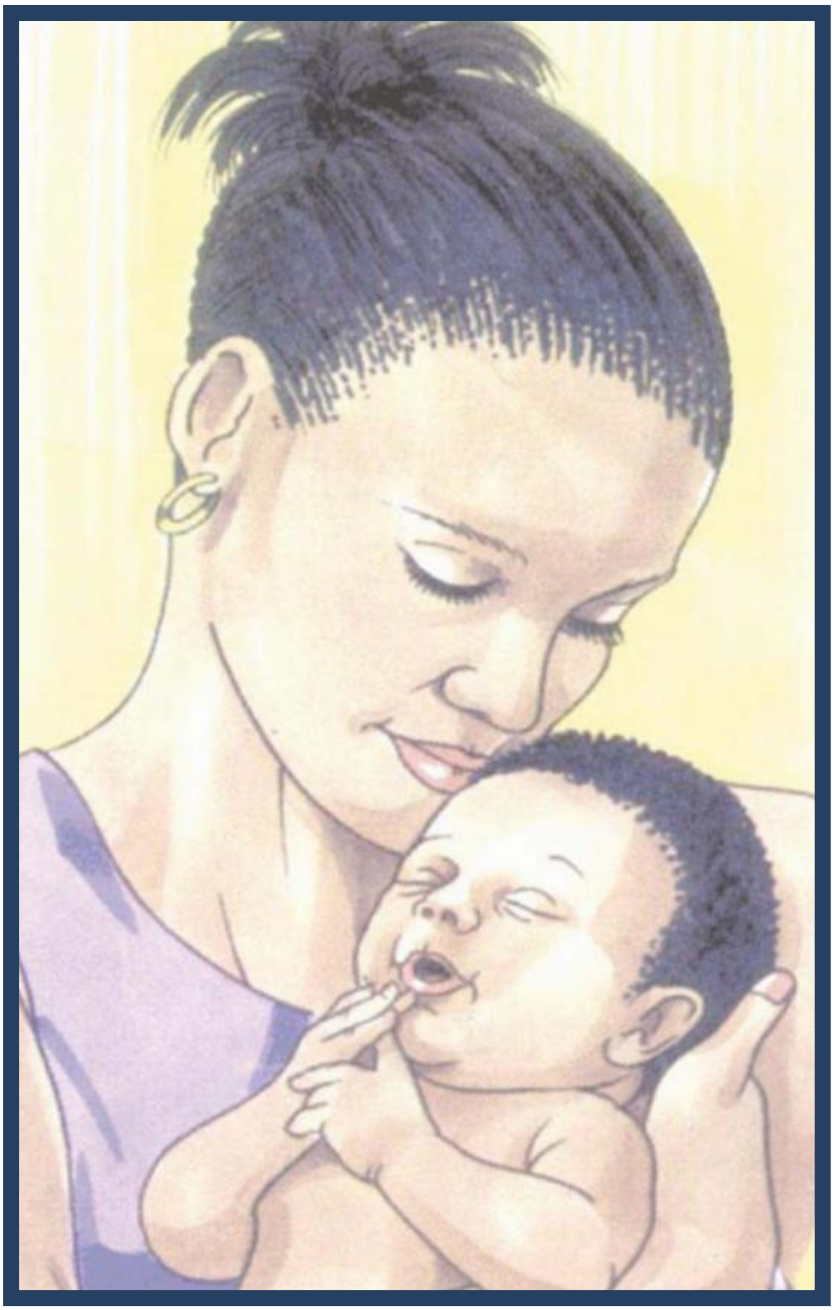
SAVING BABIES

2014-2016

Triennial report on perinatal mortality in South Africa



COMPILED BY THE NATIONAL PERINATAL MORBIDITY AND MORTALITY COMMITTEE

CONTENTS

LIST OF ABBREVIATIONS

ANS	Antenatal Corticosteroids
APH	Antepartum Haemorrhage
CHC	Community Health Centre
CoMMiC	Committee on Mortality and Morbidity in Children in South Africa
DCST	District Clinical Specialist Teams
DHIS	District Health Information System
DHP	District Health Plan
DOH	Department of Health
ENNDR	Early Neonatal Death Rate
ENND	Early Neonatal Deaths
EPaC	Essential Package of Care
ESMOE	Essential Steps in Managing Obstetric Emergencies
FA	Fetal Abnormality
HBB	Help Babies Breath
HDP	Hypertensive Disorders of Pregnancy
HoD	Head of Department
IMCI	Integrated Management of Childhood Illness
Inf	Infection
IUD	Intra-Uterine Death
IUGR	Intra-Uterine Growth Restriction
KMC	Kangaroo Mother Care
LBWR	Low Birth Weight Rate
LB	Live Birth
LNNDR	Late Neonatal Death Rate
MDis	Maternal Disease
Misc	Miscellaneous
MNCH	Maternal Neonatal and Child Health
MNCWH	Maternal Neonatal, Child and Women's Health
MSSN	Management of the Small and Sick Neonate
NaPeMMCo	National Perinatal Mortality and Morbidity Committee
NBC	Newborn Care
NCCEMD	National Committee for the Confidential Enquiry into Maternal Deaths

NDOH	National Department of Health
NMR	Neonatal Mortality Rate
NSF	Neonatal Signal Functions
PCI	Perinatal Care INdex
PNMR	Perinatal Mortality Rate
PPIP	Perinatal Problem Identification Program
RTC	Regional Training Centres
SB	Still Birth
SBR	Still Birth Rate
SDG	Sustainable Development Goals
SPTL	Spontaneous Preterm Labour
TB	Total births
U5MR	Under-5 Mortality Rate

Provinces:

EC	Eastern Cape
FS	Free State
GP	Gauteng
KZN	KwaZulu-Natal
LP	Limpopo
MP	Mpumalanga
NC	Northern Cape
NW	North West
WC	Western Cape

DEFINITIONS OF NEONATAL AND MATERNAL INDICATORS

- A viable live born baby from birth to 28 days is called a neonate.
- Neonatal deaths are subdivided into:
    a. early (day zero to day six completed)
    b. late (day seven to day 27 completed)
- A still birth is a viable baby born dead.
- Functional PPIP is a facility that captures all deliveries, births and perinatal deaths, enters and identifies the causes of deaths at regular minuted mortality and morbidity meetings; institutes management change and policies as a result of the facility data and provides feedback to the facility.

ABBREVIATION	EXPLANATION	CALCULATION	INDICATOR FOR:
NMR	neonatal mortality rate	total number of neonatal deaths / Total number of LIVE births X 1 000	overall neonatal care developed countries <6 developing countries >10
ENMR	early neonatal mortality rate	total number of neonatal deaths in first week / Total number of LIVE births X1 000	intrapartum care, and the quality of neonatal care in the facility where baby is born
LNMR	late neonatal mortality rate	total number of neonatal deaths from day seven up to day 27/ total number of LIVE births X1 000	neonatal care in hospital, community or at home
LBWR	Low birth weight rate	total number of births <2,5 kg / total number of births X 100	socio-economic status of an area
SBR	Stillbirth rate	total number of stillbirths /total number of births X 1 000	quality of intrapartum obstetric care
PNMR	perinatal mortality rate	total number of perinatal deaths (SB+END)/ total number of births X1 000	indicator of obstetric care
SB:NND	still births to neonatal deaths ratio	no of stillbirths for every neonatal death	perinatal environment care
PCI	perinatal care index	Overall PNMR / percentage low birth weight babies high PCI= poor care	used to compare hospitals with similar circumstances

EXECUTIVE SUMMARY

Stefan Gebhardt

INTRODUCTION TO TRIENNIAL REPORT

This is the third triennial report produced by NaPeMMCo and covers data from the years 2014-216. The previous NaPeMMCo reports had a summary on the perinatal data from the MRC unit as a first chapter. The full data was published separately and in more detail as the Saving Babies reports, available on the PPIP webpage (www.ppip.co.za). This is the first time that the two reports are combined and the triennial report is therefor also called the Saving Babies report.

Chapter 1 therefor produces a full set of data which is summarised in the executive summary. The CS rate continues to increase in every province and the national population rate is now at 25.3%, much higher than the WHO recommendation of 10-15% (WHO statement on caesarean section rates 2015, (available at http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/cs-statement/en/). There is no decrease in mortality (neonatal or maternal) when rates go above 10-15% but there is a significant risk of maternal morbidity and death- bleeding during and after CS is a major concern for the NCCEMD (Saving Mother's ministerial advisory group) and there is a joint effort by the two committees to address safety during CS.

On a positive note, there is a small but persistent decrease in perinatal mortality rates, mostly due to a decrease in stillbirths. The biggest decrease in the number of stillbirths was seen in Gauteng. The neonatal mortality rate stays at about 10/1000, which was the 2015 target. The aim is to decrease the NMR to 8/1000 and to decrease the overall PNMR by 10% by 2020 (target of PNMR overall of 27/1000 and for babies >1000g a target of 20/1000). This is a realistic target, as the decrease in rates from 2002 to 2014 was ~10% per triennium. The main patient avoidable factor remains inappropriate response to fetal movements and NaPeMMCo will launch an effort to increase fetal movement awareness during antenatal care in conjunction with NCCEMD and the revision of the national maternity case records and guidelines.

One of the main recommendation from the previous reports was the establishment of a neonatal inpatient register to improve the data collection and counting of every newborn. This is an essential tool in reducing newborn deaths and **Chapter 2** reports on the progress thus far. It describes the proposed process of neonatal flow for a sick neonate. NaPeMMCo has given extensive input into the register and has signed off on the final register. A task team is now finalising the process and will start with pilots in several hospitals during 2018. Once the pilots and final fine-tuning are done, the process will be rolled out nationally.

There are a number of neonates admitted (or re-admitted after discharge) to children's wards rather than nurseries or neonatal wards and there may be an underreporting of deaths within 28 days of birth if these deaths are not counted. The Child PPIP group has counted these deaths and **Chapter 3** reports that many of these babies die within 24 hours of admission, often due to complications of HIV disease and sepsis. Almost a 1000 deaths was potentially avoidable and this report recommends that neonates admitted to children's wards should be regarded as high risk and receive appropriate care.

The previous NaPeMMCo report highlighted the lack of new-born care leadership at all levels of care and recommended ways to improve leadership via the DCST paediatric teams. It further advised that standardised provincial indicators across the country should be aligned with the global Every New-born Action Plan indicators. The three pillars in the strategy were knowledgeable and skilled health care providers, appropriate resources facilities and rapid emergency transport. **Chapter 4** is a very interesting report on visits conducted by the National New-born Care team to 17 facilities identified as those with the worst neonatal care indices. It also gives feedback on the improvements that were in place at follow-up visits. It also highlights the continued challenges with leadership in new-born care.

Therapeutic hypothermia in an effort to reduce morbidity from perinatal asphyxia is an established mode of management at most tertiary hospitals in SA. However, most of the perinatal asphyxia deaths are reported at district level and NaPeMMCo appointed a small task group to investigate cheaper alternatives for head cooling at district level. As reported in **Chapter 5**, the group reported that there is not enough evidence yet to recommend head cooling at district level and for now it should be restricted to specialist hospitals. A simplified protocol will be developed and it is hoped that head cooling can be offered at larger regional and district hospitals in future.

Limpopo has long led the way in effective neonatal care and the Limpopo Initiative for Neonatal Care was adopted into the SA Initiative for Neonatal Care (SAINC). Management of the Small and Sick Neonate (MSSN) training is a key concept of SAINC. KZN obtained external funding and conducted MSSN training in all 39 health districts. This was accompanied by a rigorous data collection and analyses. The full KZN Initiative for Neonatal Care (KINC) report was presented to NaPeMMCo and it showed the improvements in neonatal care and leadership (reported in **Chapter 6**). Although the improvements did not lead to a reduction in numbers of deaths yet, it showed how quality can be improved using existing packages.

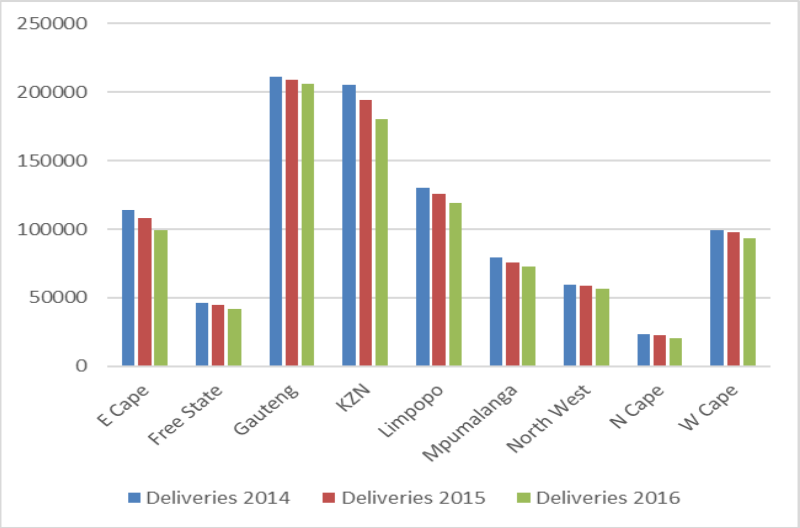
One of the key role players in maternal and new-born care is community health workers (CHW), using programs such as the integrated community case management (IMCI) from the WHO. **Chapter 7** provides evidence of the rapid and positive impact that CHW in sufficient numbers can make on reducing maternal and neonatal deaths. **Chapter 8** is a short summary on an essential package of care (EPAC) and ways that this framework can be used as a tool to improve neonatal health. The EPAC is, one of the main recommendations from the Committee on Mortality and Morbidity in Children in South Africa (CoMMiC). It is still in the pilot phase and NaPeMMCo will play a key role in monitoring progress.

A summary of the main recommendations based on the data presented in Chapter 1 as well as the recommendations form the various chapters is presented as **Chapter 9**.

KEY FINDINGS

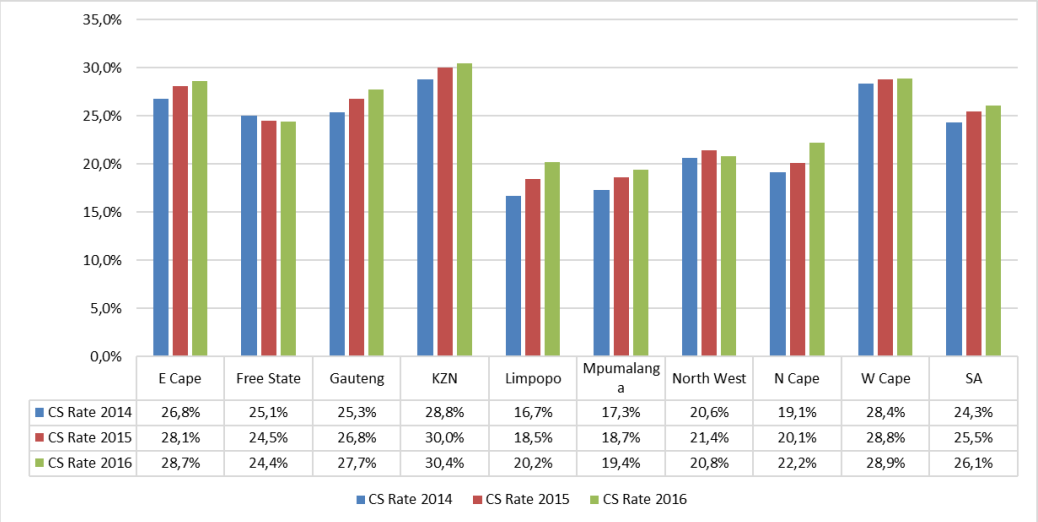
1. Reduction in delivery numbers

There was a year on year decrease in the total number of deliveries in South Africa since 2012. This decrease occurred in every province. Gauteng and KwaZulu-Natal (KZN) have the largest numbers deliveries - 43 per cent of all deliveries occur in these two provinces. Inaccurate or incomplete data from these two provinces may therefore influence the national averages.



2. Increase in the total number and rate of caesarean section

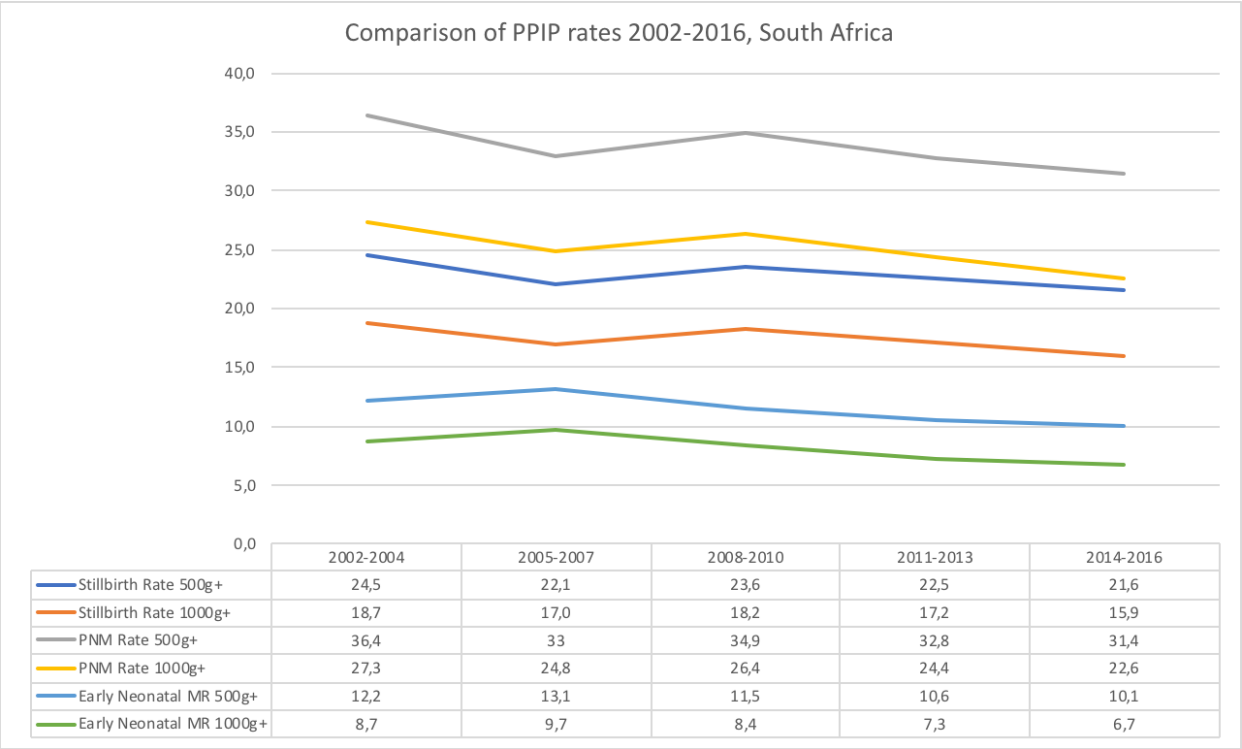
There were 712 298 caesarean deliveries recorded for the triennium, which is 56 612 more than the 655 686 recorded in the previous triennium. The national caesarean section (CS) rate is now 25.3 per cent (up from 23.1 per cent from the previous triennium). Four provinces (Western Cape, KwaZulu-Natal, Gauteng and Eastern Cape) all had rates above the national average. The CS rate increased in almost every province over the last three years.



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
CS Rate 2014	26,8%	25,1%	25,3%	28,8%	16,7%	17,3%	20,6%	19,1%	28,4%	24,3%
CS Rate 2015	28,1%	24,5%	26,8%	30,0%	18,5%	18,7%	21,4%	20,1%	28,8%	25,5%
CS Rate 2016	28,7%	24,4%	27,7%	30,4%	20,2%	19,4%	20,8%	22,2%	28,9%	26,1%

3. Reduction in mortality rates

PPIP data shows a slow but sustained decrease in all important mortality rates over the past three triennia. Off all the births recorded on PPIP in South Africa, 98.1 per cent of babies were born alive and of these 98.9 per cent survived until discharge from hospital.



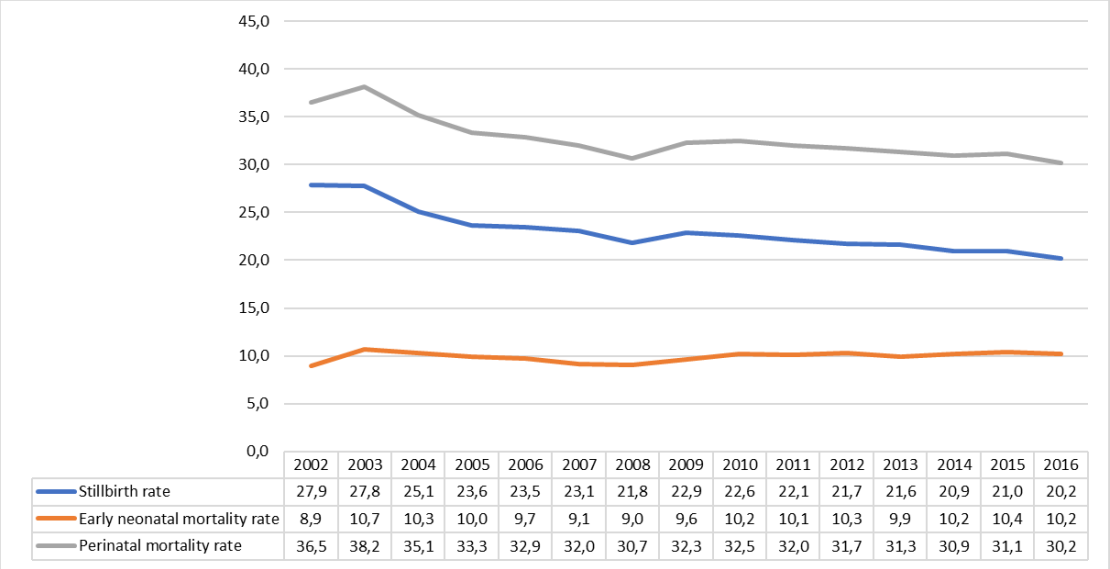
	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
Stillbirth Rate 500g+	24,5	22,1	23,6	22,5	21,6
Stillbirth Rate 1000g+	18,7	17,0	18,2	17,2	15,9
PNM Rate 500g+	36,4	33	34,9	32,8	31,4
PNM Rate 1000g+	27,3	24,8	26,4	24,4	22,6
Early Neonatal MR 500g+	12,2	13,1	11,5	10,6	10,1
Early Neonatal MR 1000g+	8,7	9,7	8,4	7,3	6,7

4. Marked provincial variation in data collection for PPIP

There were 451 170 deliveries recorded in DHIS but not in PPIP, of these 212 471 are from KwaZulu-Natal (47 per cent) and 165 693 (37 per cent) are from Gauteng. Any interpretation of PPIP data should bear this in mind, as these are also the two provinces with the highest number of deliveries.

5. Decrease in the number of recorded stillbirths

The decrease seen in the perinatal mortality rate is mostly due to a decrease in the number of recorded stillbirths. There were 62 602 stillbirths recorded in DHIS in 2011-2013 (49 667 in PPIP) versus. 58 200 stillbirths in 2014-2016 on DHIS (43 997 on PPIP). Of the stillbirths, 11.3 per cent were still alive at the time of maternal admission to the labour ward and death occurred just before or during labour.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Stillbirth rate	27,9	27,8	25,1	23,6	23,5	23,1	21,8	22,9	22,6	22,1	21,7	21,6	20,9	21,0	20,2
Early neonatal mortality rate	8,9	10,7	10,3	10,0	9,7	9,1	9,0	9,6	10,2	10,1	10,3	9,9	10,2	10,4	10,2
Perinatal mortality rate	36,5	38,2	35,1	33,3	32,9	32,0	30,7	32,3	32,5	32,0	31,7	31,3	30,9	31,1	30,2

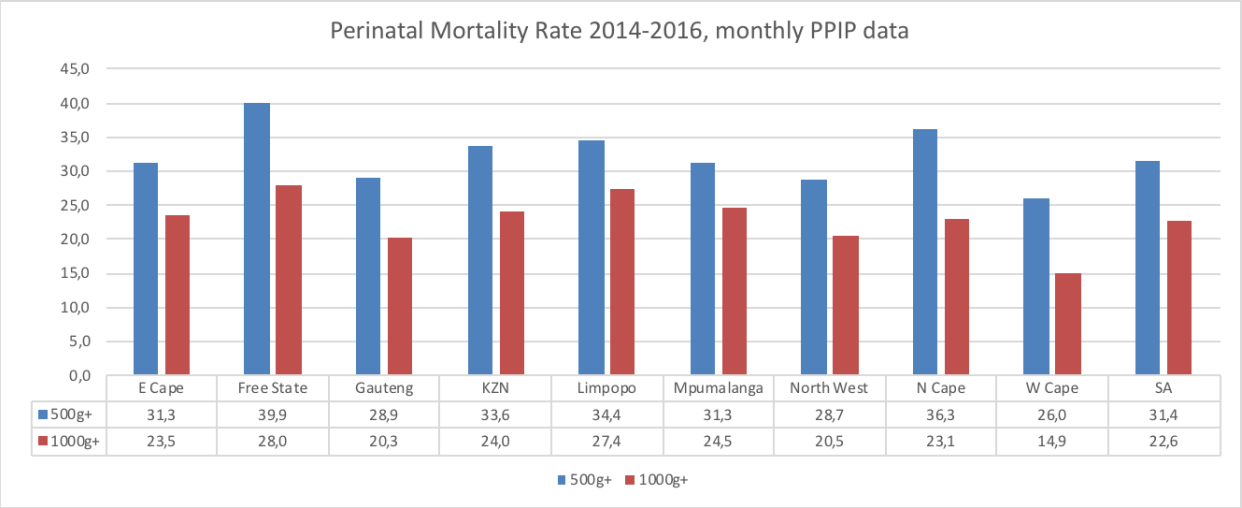
6. Unexplained intra-uterine death remains the main primary (obstetric) cause of death of babies >1000g (24.4 per cent of all deaths)

Of these babies, 33 per cent had a normal birth weight (>2500g) and therefore most likely term gestation and 48 per cent of unexplained intra-uterine deaths occurred in women with no obstetric complications.

7. Intra-partum asphyxia remains a major preventable cause of death

There was no decrease in the percentage of babies dying from intra-partum asphyxia. In the weight group >1000g, 18 per cent of babies died due to intra-partum asphyxia. This is also the main cause of death for term babies that was still alive intra-uterine on admission to the labour ward (>2500g; 66.3 per cent of all deaths in this group). Of these term pregnancies, 72 per cent of deaths occurred in mothers with no obstetric condition. An individual breakdown of modifiable factors shows that 53.4 per cent of avoidable factors were medical personnel related, with the top three: foetal distress not detected (foetus monitored); foetal distress not detected (foetus not monitored) and prolonged second stage. Hypoxia was also coded as the main neonatal cause of death of babies born alive. When analysing the deaths of term babies (>2500g) only, hypoxia is the cause of deaths in 64.9 per cent of neonates.

8. There is provincial variation in the perinatal mortality rate



The rate in Gauteng and KZN should be interpreted with caution due to the challenges with complete PPIP data.

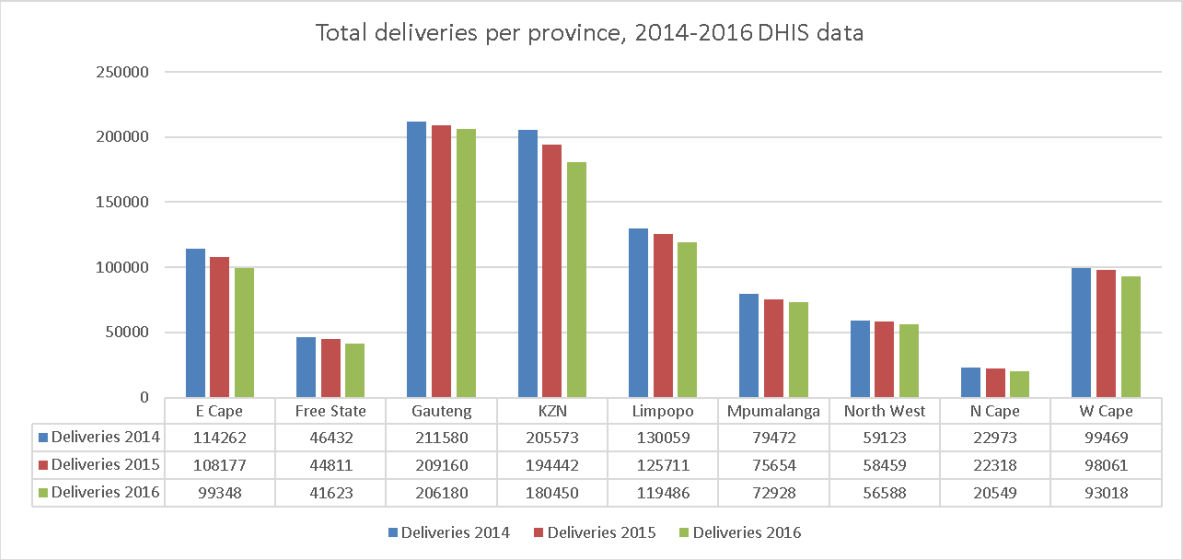
CHAPTER 1: DHIS AND PPIP DATA ANALYSIS 2014-2016

Stefan Gebhardt & committee members

DHIS DATA PER PROVINCE

There were 2 801 951 deliveries recorded on DHIS for 2014-2016. This is slightly less than the 2 831 066 deliveries recorded in the previous triennium (2011-2013). The delivery numbers per province is shown below. There was a decrease in deliveries in every province over the three years. The DHIS does not use 500g as its lower cut-off; in practice they use all babies born in the labour ward. The DHIS does not use birth weights or gestational ages as is done with PPIP.

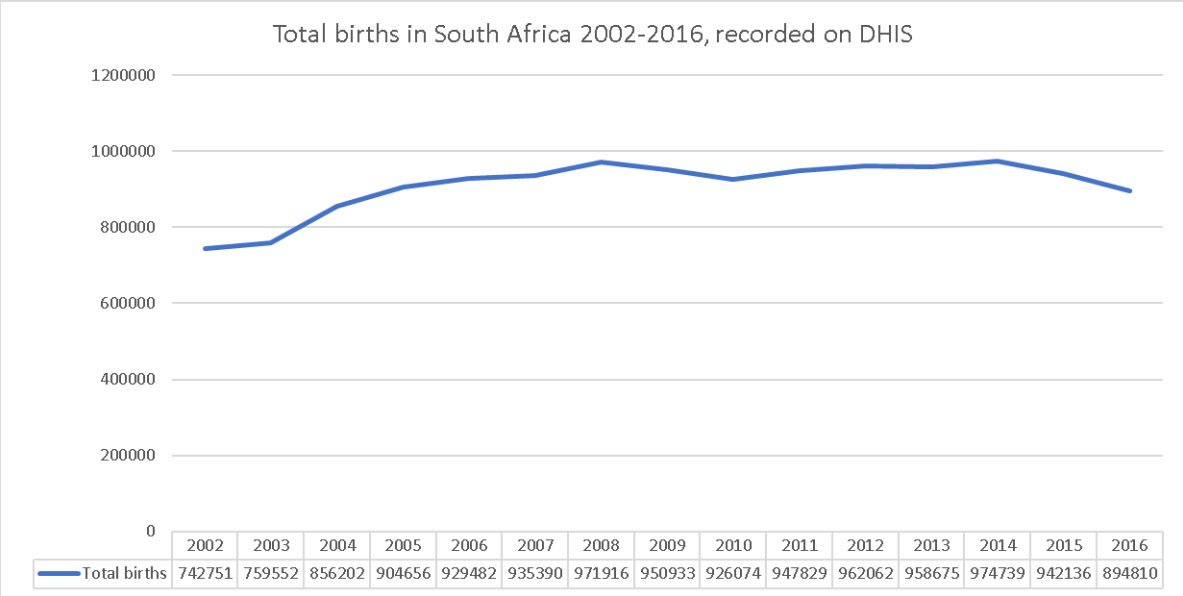
FIGURE 1.1 TOTAL DELIVERIES PER PROVINCE, 2014-2016 DHIS DATA



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape
Deliveries 2014	114262	46432	211580	205573	130059	79472	59123	22973	99469
Deliveries 2015	108177	44811	209160	194442	125711	75654	58459	22318	98061
Deliveries 2016	99348	41623	206180	180450	119486	72928	56588	20549	93018

The overall number of births in South Africa, as recorded on DHIS, declined after reaching a peak in 2012.

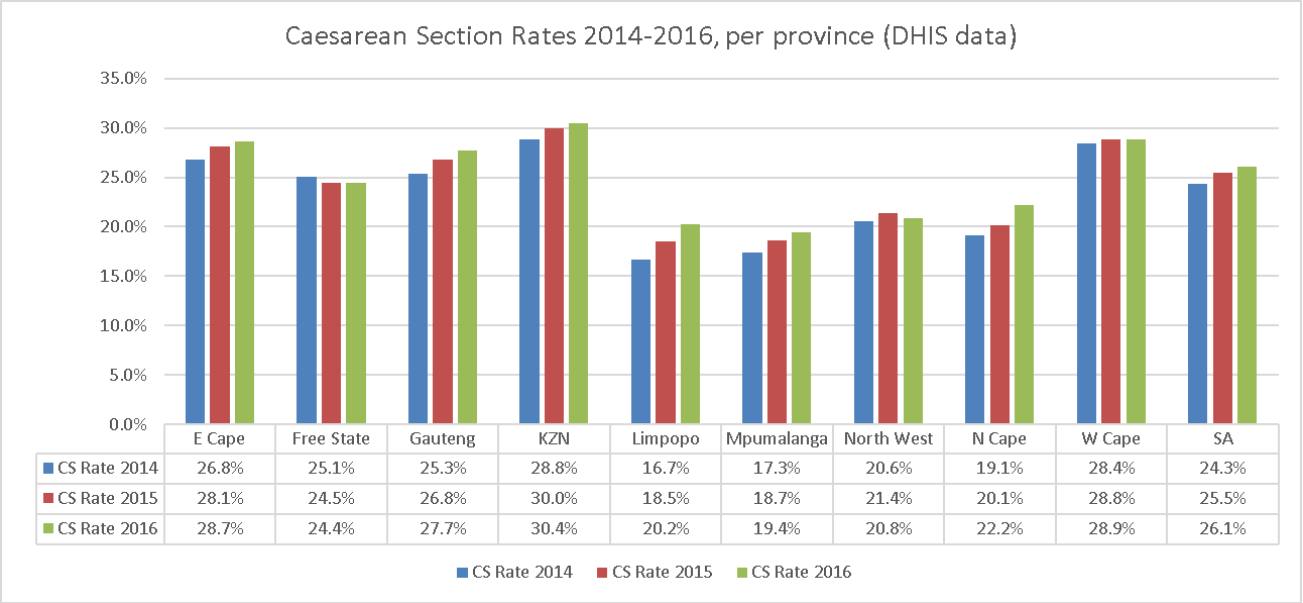
FIGURE 1.2 TOTAL BIRTHS IN SA 2002-2016



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total births	742751	759552	856202	904656	929482	935390	971916	950933	926074	947829	962062	958675	974739	942136	894810

There were 712 298 caesarean deliveries recorded for the triennium, which is 56 612 more than the 655 686 recorded in the previous triennium. The caesarean section rate for every province is given below. The national CS rate is now 25.3 per cent (up from 23.1 per cent in previous triennium). Four provinces (Western Cape, KwaZulu-Natal, Gauteng and Eastern Cape) all had rates above the national average. The CS rate increased in almost every province over the last three years.

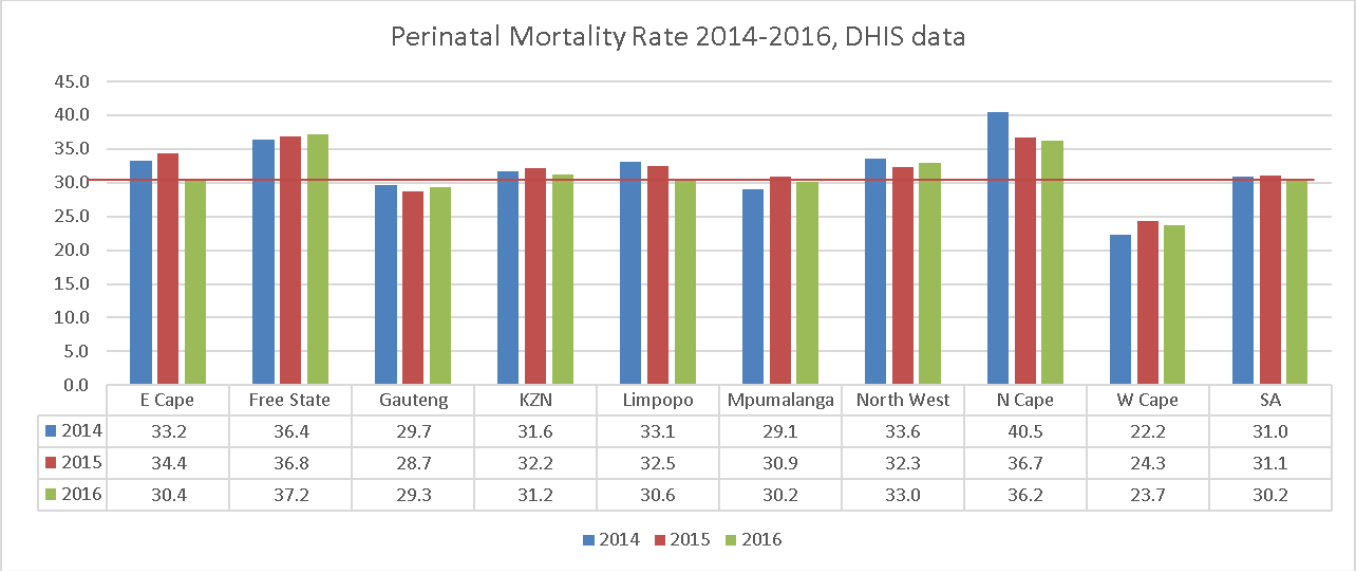
FIGURE 1.3 CAESAREAN SECTION RATES 2014-2016 PER PROVINCE



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
CS Rate 2014	26.8%	25.1%	25.3%	28.8%	16.7%	17.3%	20.6%	19.1%	28.4%	24.3%
CS Rate 2015	28.1%	24.5%	26.8%	30.0%	18.5%	18.7%	21.4%	20.1%	28.8%	25.5%
CS Rate 2016	28.7%	24.4%	27.7%	30.4%	20.2%	19.4%	20.8%	22.2%	28.9%	26.1%

The perinatal mortality rate (PNMR) for South Africa, as recorded on the DHIS, was 30.6 per 1 000 deliveries. Free State, Northern Cape and North West remains above this national average, while Eastern Cape and Limpopo has decreased to the national average by 2016.

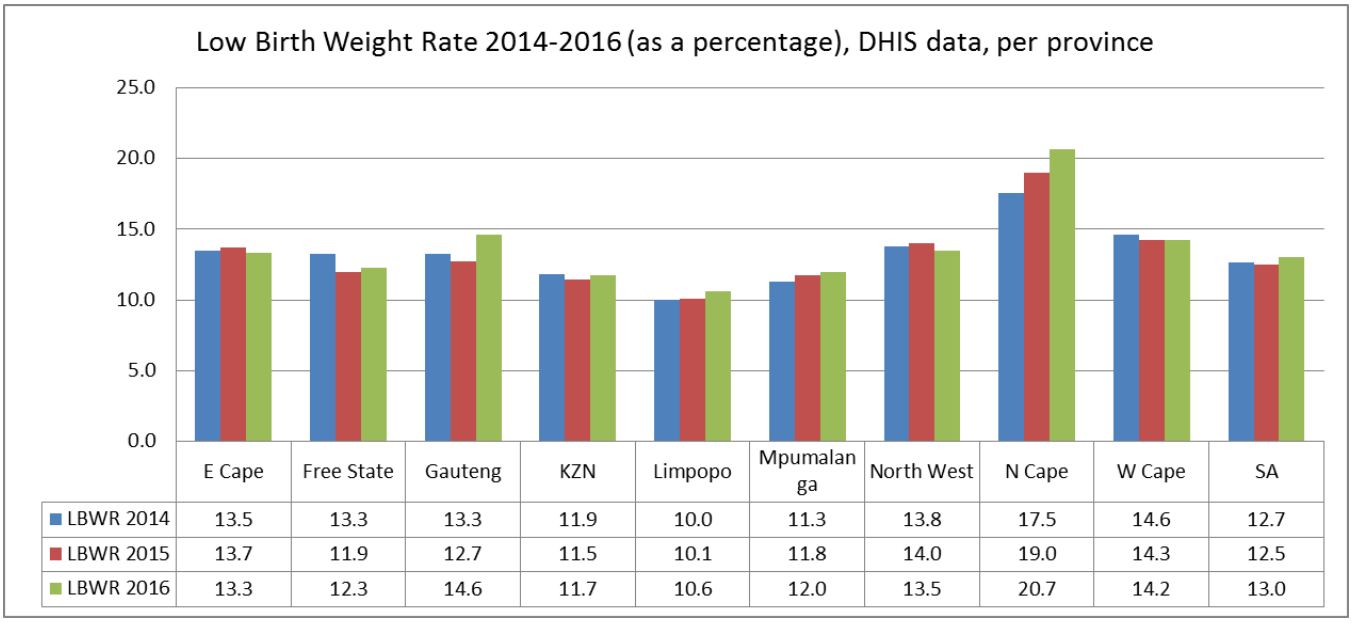
FIGURE 1.4 PERINATAL MORTALITY RATE 2014-2016



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
2014	33.2	36.4	29.7	31.6	33.1	29.1	33.6	40.5	22.2	31.0
2015	34.4	36.8	28.7	32.2	32.5	30.9	32.3	36.7	24.3	31.1
2016	30.4	37.2	29.3	31.2	30.6	30.2	33.0	36.2	23.7	30.2

The low birth weight rate (LBWR) is an indicator of the social determinants and socio-economic status of a region. The Northern Cape has the highest percentage of low birth weight babies.

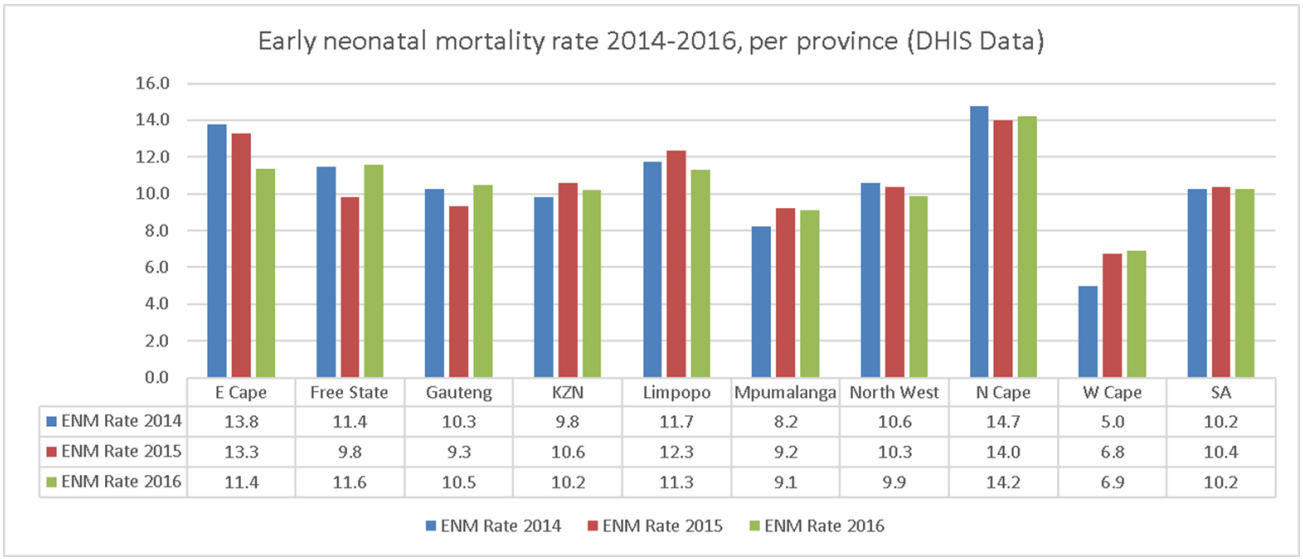
FIGURE 1.5 LOW BIRTH WEIGHT RATE 2014-2016



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
LBWR 2014	13.5	13.3	13.3	11.9	10.0	11.3	13.8	17.5	14.6	12.7
LBWR 2015	13.7	11.9	12.7	11.5	10.1	11.8	14.0	19.0	14.3	12.5
LBWR 2016	13.3	12.3	14.6	11.7	10.6	12.0	13.5	20.7	14.2	13.0

The high percentage of LBWR babies in the Northern Cape may also be the reason for the high early neonatal mortality rate (ENMR) in that province. The ENMR is calculated as the Total number of neonatal deaths in first week / total number of live births X1 000 and is an indicator of intrapartum and neonatal care. This number (10 deaths per 1 000 deliveries for South Africa) is much lower than the UNICEF and South Africa Demographic Health Survey estimate of 21/1 000 for Southern Africa. It is possible that some of the deaths were not recorded on the DHIS. DHIS also only report on deaths within hospitals and clinics; it is not known exactly how many deaths occur outside of facilities or at home during the neonatal period.

FIGURE 1.6 EARLY NEONATAL MORTALITY RATE 2014-2016

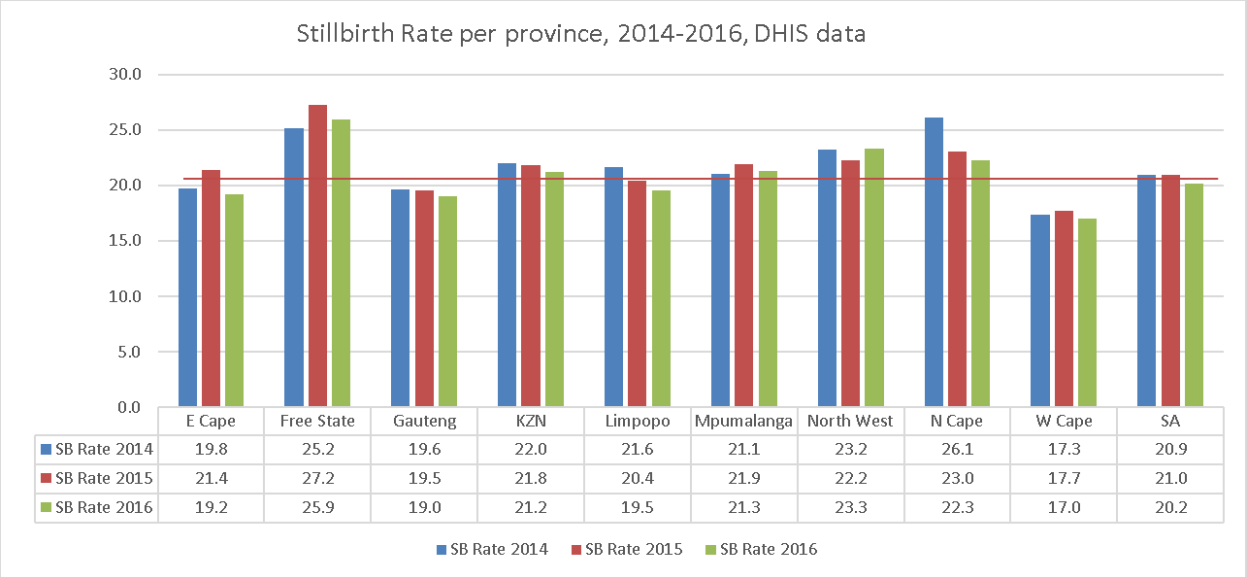


	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
ENM Rate 2014	13.8	11.4	10.3	9.8	11.7	8.2	10.6	14.7	5.0	10.2
ENM Rate 2015	13.3	9.8	9.3	10.6	12.3	9.2	10.3	14.0	6.8	10.4
ENM Rate 2016	11.4	11.6	10.5	10.2	11.3	9.1	9.9	14.2	6.9	10.2

There were 63 968 stillbirths recorded on DHIS in the triennium. The stillbirth rate (SBR) for every province is given below. This is calculated as the Total number of stillbirths /total number of births X1

000 and is an indicator of antenatal as well as intra-partum care. The highest rate is in Free State and Northern Cape.

FIGURE 1.7 STILLBIRTH RATE PER PROVINCE 2014-2016



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
SB Rate 2014	19.8	25.2	19.6	22.0	21.6	21.1	23.2	26.1	17.3	20.9
SB Rate 2015	21.4	27.2	19.5	21.8	20.4	21.9	22.2	23.0	17.7	21.0
SB Rate 2016	19.2	25.9	19.0	21.2	19.5	21.3	23.3	22.3	17.0	20.2

DHIS DATA PER DISTRICT

For reference and for comparison, the same data is now presented per district/metro.

FIGURE 1.8 TOTAL DELIVERIES PER DISTRICT

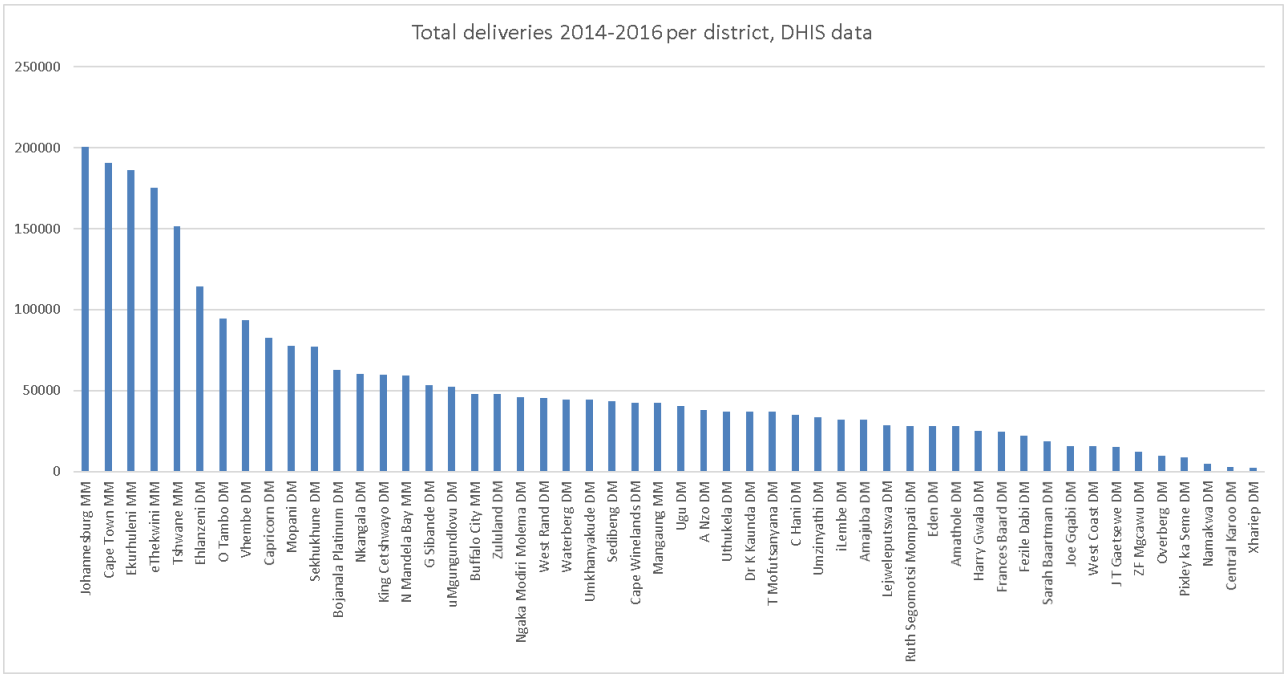


FIGURE 1.9 CAESAREAN SECTION RATE PER DISTRICT

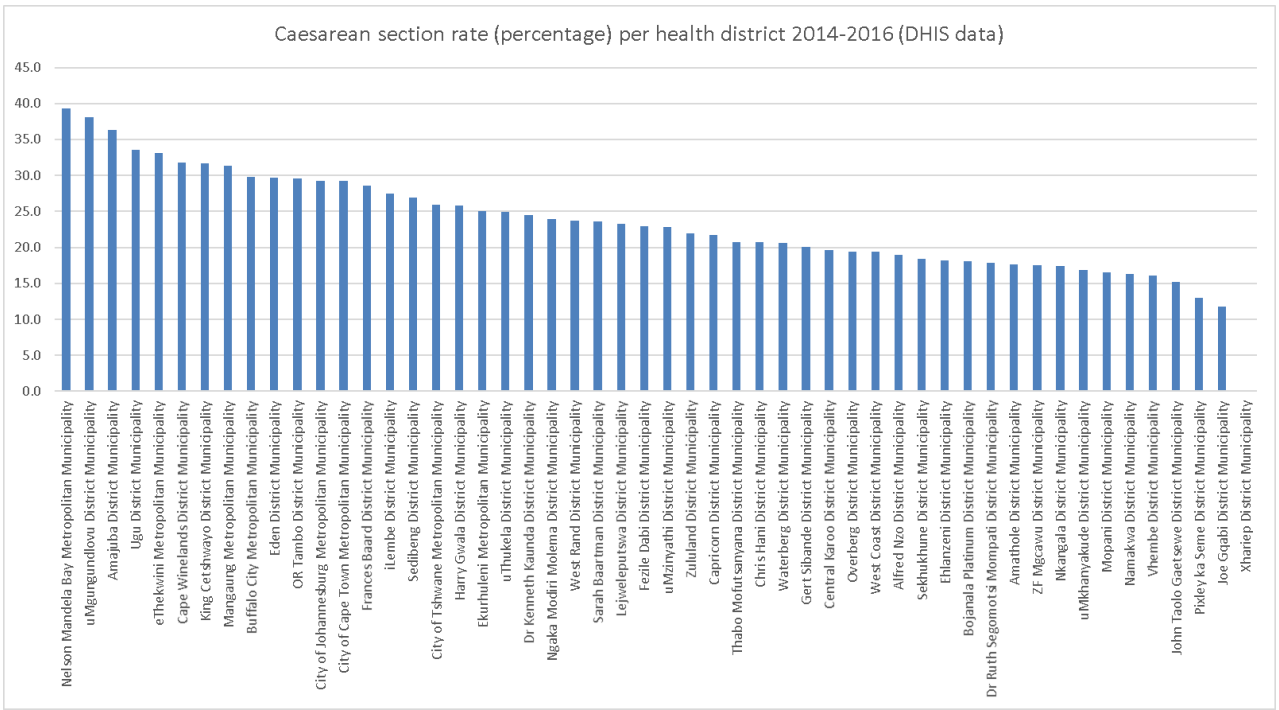


FIGURE 1.10 PERINATAL MORTALITY RATE PER DISTRICT

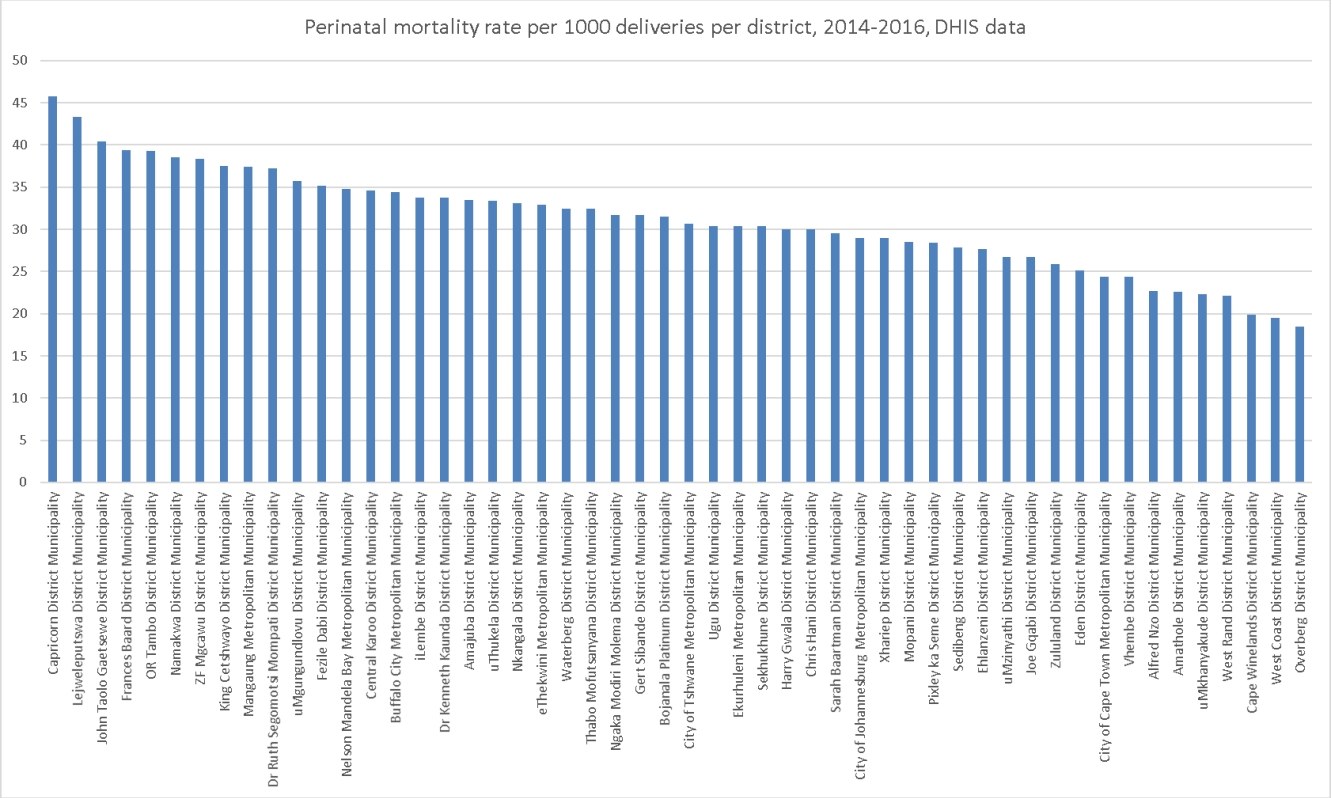


FIGURE 1.11 LOW BIRTH WEIGHT RATE PER DISTRICT

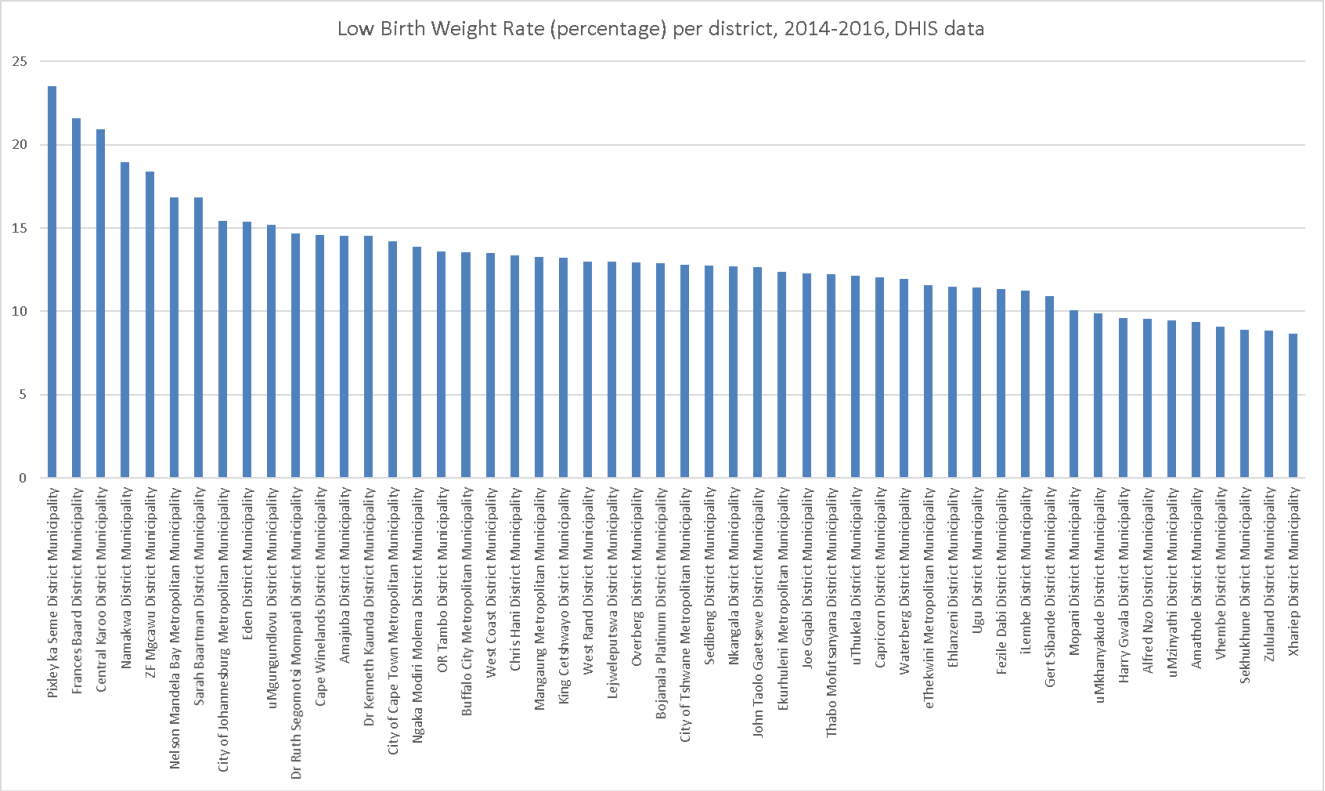


FIGURE 1.12 EARLY NEONATAL MORTALITY RATE PER DISTRICT

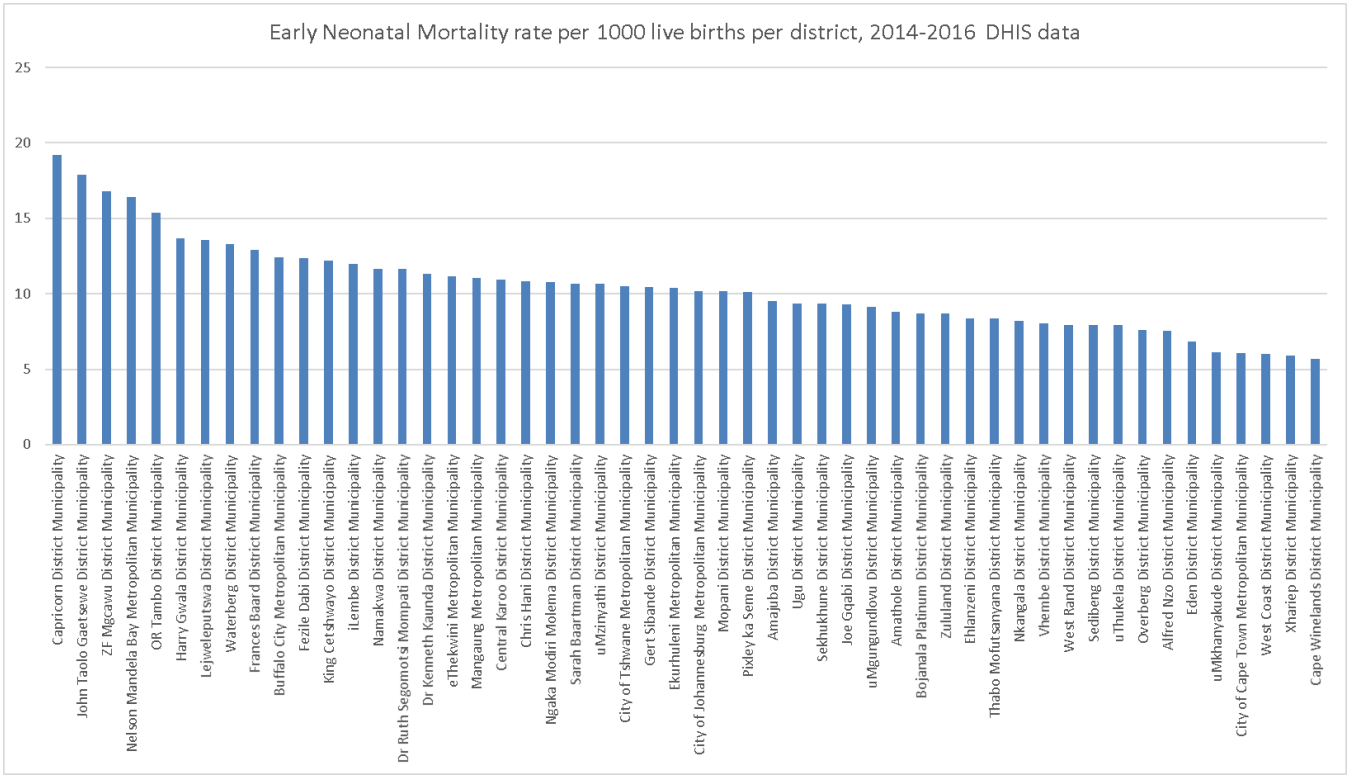
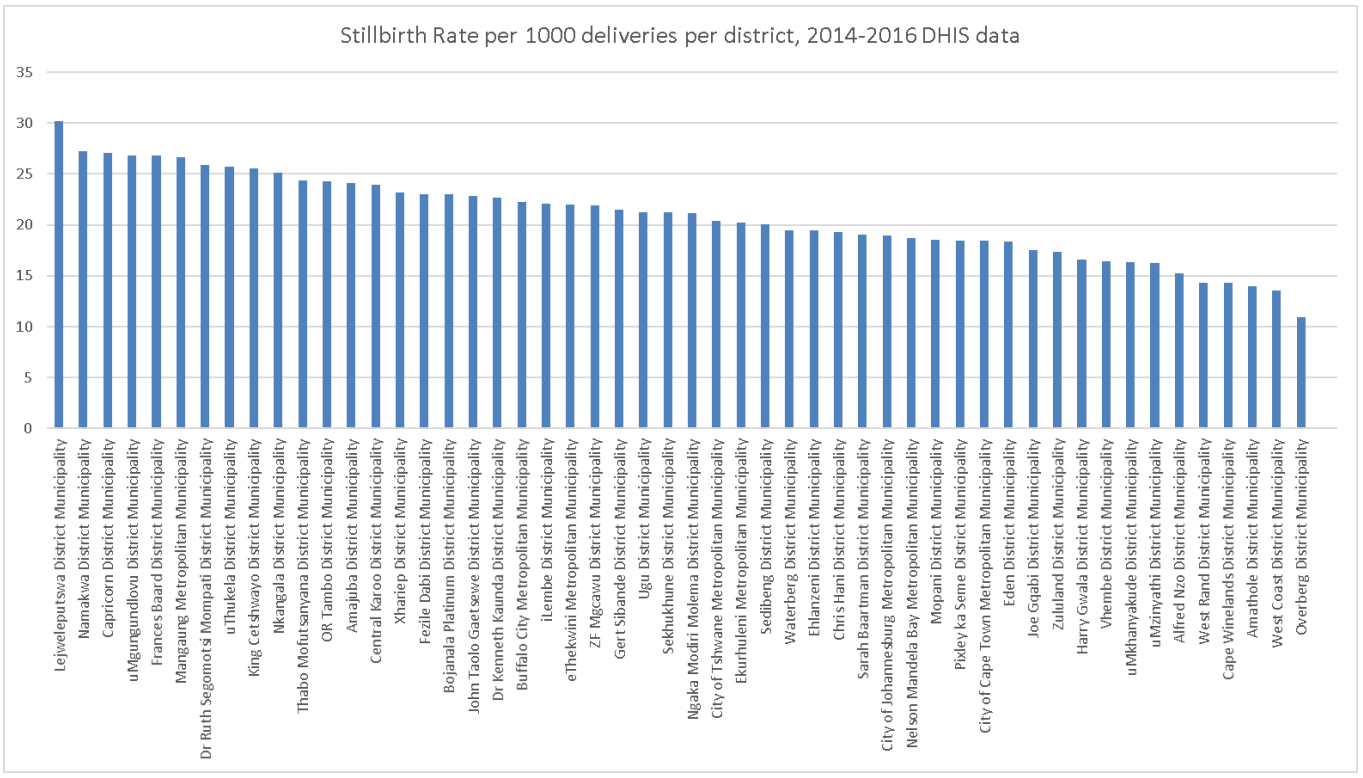
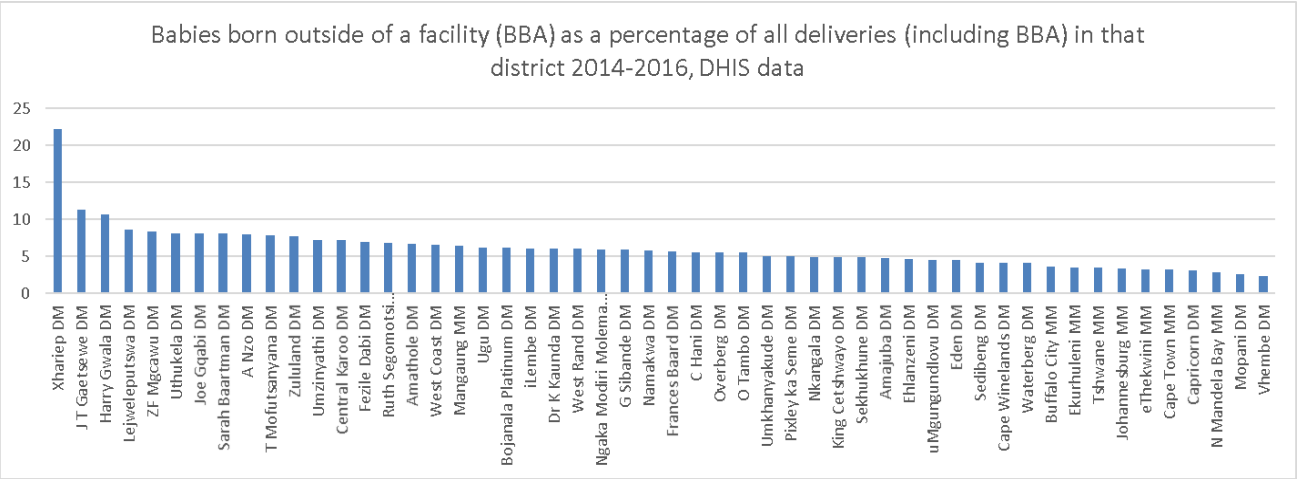


FIGURE 1.13 STILLBIRTH RATE PER DISTRICT



In addition to these deliveries, a further 138 756 babies were born outside of facilities or on their way to a facility (BBA or born before arrival). These numbers are given per district as a percentage of all deliveries including BBA babies. Although the delivery numbers in Xhariep are low, almost 25 per cent of babies are BBA. This is an indicator of lack of access to services or lack of transport.

FIGURE 1.14 BABIES BORN BEFORE ARRIVAL (BBA) PER DISTRICT



NATIONAL PPIP DATA

There were 2 350 781 deliveries recorded on PPIP for the triennium 2014-2016, which is 451 170 less than that recorded on DHIS (83.9 per cent of DHIS data). The monthly PPIP data will be used to calculate mortality rates (PNMR, SBR, NNDR). A projected number of deaths can then be deducted using these PPIP rates with the DHIS denominator data.

TABLE 1.1 NUMBER OF DELIVERIES 2014-2016 (PPIP DATA)

Birth weight category	Number of deliveries (recorded in PPIP)	Percentage of		
		all deliveries	Low birth weight (<2500g)	Very low birth weight (<1500g)
500 - 999g	29 432	1.3	8.5	41.8
1,000 - 1,499g	41 056	1.7	11.9	58.2
1,500 - 1,999g	70 641	3.0	20.5	
2,000 - 2,499g	204 156	8.7	59.1	
2,500g+	2 005 496	85.3		
Total	2 350 781			

Of these deliveries, 98.1 per cent were born alive and of these 98.9 per cent survived.

TABLE 1.2 NUMBER OF DEATHS 2014-2016 (PPIP DATA)

	Number	Percentage of	
		all deliveries	Live births
Born alive	2 306 628	98.1%	
Survive	2 281 723	97.1%	98.9%
Early neonatal death	21 441	0.9%	0.9%
Late neonatal death	3 488	0.1%	0.2%

Of the stillbirths, 11.3 per cent were still alive at the time of maternal admission to the labour ward.

TABLE 1.3 STILLBIRTH DATA (PPIP)

	Number	Percentage of	
		all deliveries	Stillbirths
Stillborn (total) of which:	4 4153	1.9%	
Alive on maternal admission	4 984	0.2%	11.3%
Dead on maternal admission	10 759	0.5%	24.4%
Admission status unknown	945	0.0%	2.1%
Macerated	27 465	1.2%	62.2%

The mortality rates for South Africa are given below. PPIP can calculate data in two ways - using detailed perinatal death data (e.g. every death has been verified by a clinician, usually after a death review meeting) or using the total monthly data**. The PPIP table below uses the detailed data.** When calculating the PNMR using the monthly PPIP data, the same rate (31/1 000) as for DHIS is obtained. This indicates that there are some deaths recorded as monthly data (also in DHIS) but not discussed or entered as detail data in PPIP.

TABLE 1.4 MORTALITY RATES FOR SOUTH AFRICA (DETAILED PPIP DATA)

	Perinatal mortality rate	Neonatal mortality rate	Early neonatal mortality rate	Late neonatal mortality rate	Stillbirth rate
All deliveries	28.0 / 1 000	10.9 / 1 000	9.4 / 1 000	1.5 / 1 000	18.8 / 1 000
All 1 000g+	20.3 / 1 000	7.5 / 1 000	6.3 / 1 000	1.1 / 1 000	14.0 / 1 000
500 - 999g	641.5 / 1 000	456.2 / 1 000	403.1 / 1 000	53.2 / 1 000	399.5 / 1 000
1 000 – 1 499g	305.0 / 1 000	171.6 / 1 000	132.6 / 1 000	38.9 / 1 000	198.7 / 1 000
1 500 – 1 999g	131.3 / 1 000	41.5 / 1 000	34.3 / 1 000	7.2 / 1 000	100.4 / 1 000
2 000 – 2 499g	38.8 / 1 000	10.3 / 1 000	8.9 / 1 000	1.4 / 1 000	30.1 / 1 000
2 500g+	8.6 / 1 000	3.4 / 1 000	3.1 / 1 000	0.3 / 1 000	5.6 / 1 000

As comparison, the PPIP data using **only the monthly calculations are shown below**. Note that these values are almost the same as the DHIS data (PNMR 31/1 000) shown earlier.

TABLE 1.5 MORTALITY RATES FOR SOUTH AFRICA (MONTHLY PPIP DATA)

	Perinatal mortality rate	Neonatal mortality rate	Early neonatal mortality rate	Late neonatal mortality rate	Stillbirth rate
All deliveries	31.0 / 1 000	12.1 / 1 000	9.9 / 1 000	2.2 / 1 000	21.3 / 1 000
All 1 000g+	22.3 / 1 000	8.4 / 1 000	6.6 / 1 000	1.7 / 1 000	15.8 / 1 000
500 - 999g	721.7 / 1 000	547.9 / 1 000	483.6 / 1 000	64.4 / 1 000	461.0 / 1 000
1 000 - 1 499g	332.0 / 1 000	180.1 / 1 000	141.4 / 1 000	38.7 / 1 000	221.9 / 1 000
1 500 - 1 999g	145.3 / 1 000	46.0 / 1 000	37.7 / 1 000	8.3 / 1 000	111.8 / 1 000
2 000 - 2 499g	43.4 / 1 000	12.6 / 1 000	10.0 / 1 000	2.7 / 1 000	33.8 / 1 000
2 500g+	9.5 / 1 000	4.0 / 1 000	3.2 / 1 000	0.9 / 1 000	6.3 / 1 000

The value of PPIP lies in the detailed data, as these are the deaths that provide information on modifiable factors. For the calculation of rates, the monthly data were used as not all recorded deaths were discussed at mortality meetings nor detail data entered.

Primary (obstetric) cause of death: the main obstetric cause of death in babies >500g was spontaneous preterm labour and in the >1 000g category the main cause of death was unexplained intra-uterine death.

TABLE 1.6 PRIMARY CAUSE OF DEATH: ALL BABIES >500G (PPIP DATA)

Description	Number	% of total
Spontaneous preterm labour	15 912	22.9
Unexplained intrauterine death	15 798	22.8
Hypertensive disorders	10 317	14.9
Intrapartum asphyxia	9 316	13.4
Antepartum haemorrhage	7 357	10.6
Foetal abnormality	3 336	4.8
Infections (excluding maternal HIV disease)	2 035	2.9
Intrauterine growth restriction (IUGR)	1 600	2.3
No obstetric cause	1 473	2.1
Maternal disease	1 115	1.6
Miscellaneous	889	1.3
Trauma	272	0.4

TABLE 1.7 PRIMARY CAUSE OF DEATH: ALL BABIES >1000G (PPIP DATA)

Description	Number	% of total
Unexplained intrauterine death	12 096	24.4
Intrapartum asphyxia	9 029	18.2
Spontaneous preterm labour	7 287	14.7
Hypertensive disorders	6 447	13
Antepartum haemorrhage	5 916	11.9
Foetal abnormality	2 831	5.7
Infections	1 624	3.3
No obstetric cause / not applicable	1 319	2.7
Intrauterine growth restriction (IUGR)	1 213	2.4
Maternal disease	946	1.9
Miscellaneous	671	1.4
Trauma	220	0.4

In the group >1000g, 18 per cent died due to intra-partum asphyxia, which is an indicator of poor intra-partum care. This is also the main cause of death for babies >2500g (30.8 per cent of all deaths). The modifiable factors will be described later, but an individual breakdown of modifiable factors in this last group (deaths due to intrapartum asphyxia in term babies) shows that 53.4 per cent of avoidable factors were medical personnel related, with the top three: foetal distress not detected (foetus monitored); foetal distress not detected (foetus not monitored) and prolonged second stage. The corresponding percentage in 2011-2013 was 56 per cent.

TABLE 1.8 FINAL (NEONATAL) CAUSE FOR ALL DEATHS >500G (PPIP DATA)

Description	Number	% of total
Immaturity related	12 075	48.1
Hypoxia	6 066	24.2
Infection	2 808	11.2
Congenital abnormalities	2 274	9.1
Miscellaneous	1 331	5.3
Unknown cause of death	456	1.8
Trauma	75	0.3

Note that most obstetric causes in this category are spontaneous preterm labour and therefore it is not surprising that most deaths are due to severe immaturity.

The final (neonatal) cause of death in the category >1000g is shown below. Hypoxia is now the main cause of deaths of (34.9 per cent) in this category

TABLE 1.9 FINAL (NEONATAL) CAUSE FOR ALL DEATHS >1 000G (PPIP DATA)

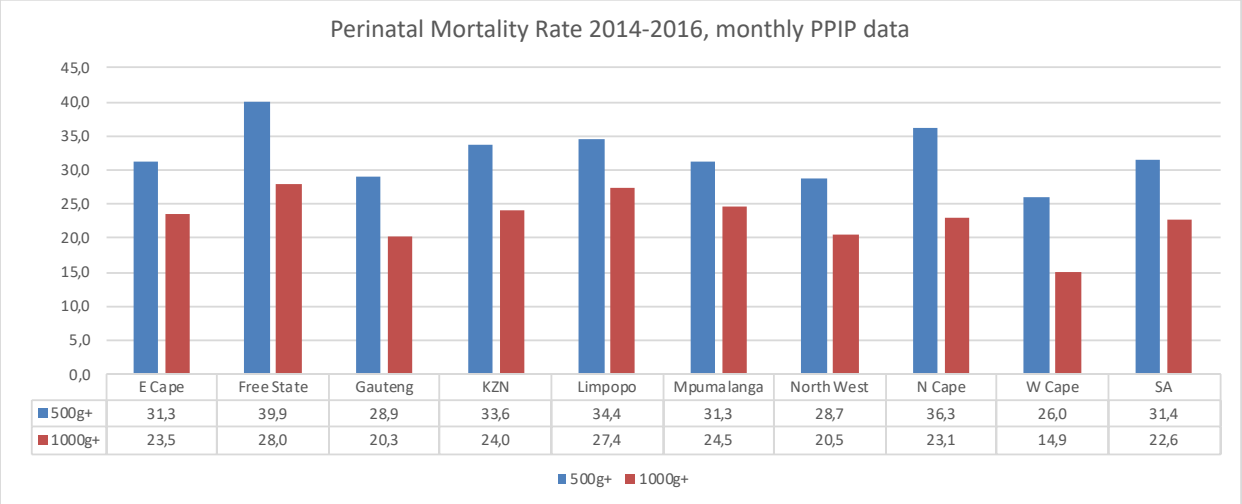
Description	Number	% of total
Hypoxia	5 939	34.9
Immaturity related	4 984	29.3
Infection	2 279	13.4
Congenital abnormalities	2 151	12.6
Miscellaneous	1 188	7
Unknown cause of death	411	2.4
Trauma	73	0.4

When analysing the deaths of term babies (>2 500g) only, hypoxia remains the leading cause of neonatal deaths (64.9 per cent).

An analysis by province follows

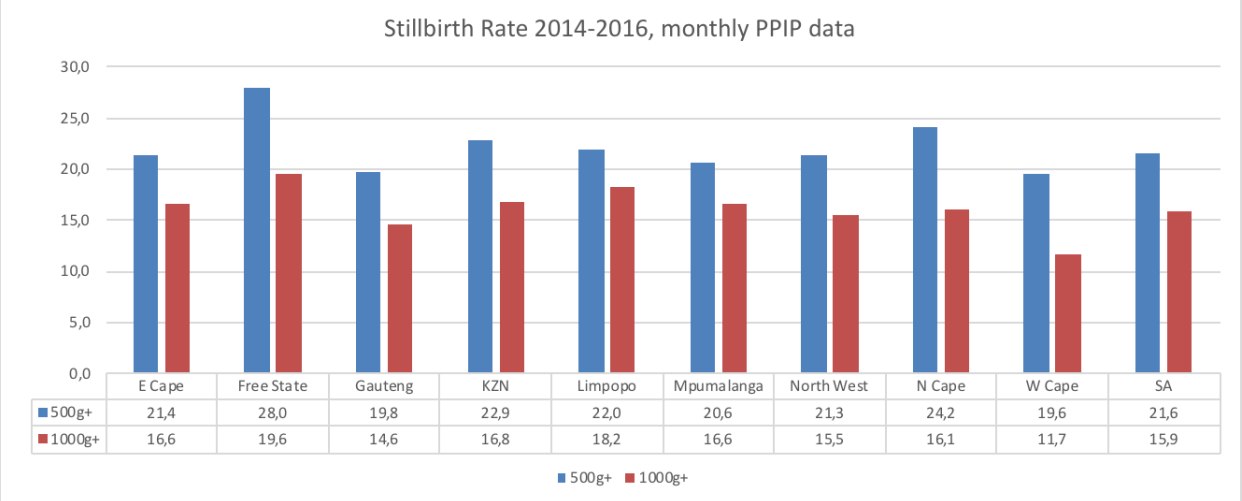
PPIP DATA PER PROVINCE

FIGURE 1.15 PNMR PER PROVINCE FOR 2014-2016 (PPIP DATA)



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
500g+	31,3	39,9	28,9	33,6	34,4	31,3	28,7	36,3	26,0	31,4
1000g+	23,5	28,0	20,3	24,0	27,4	24,5	20,5	23,1	14,9	22,6

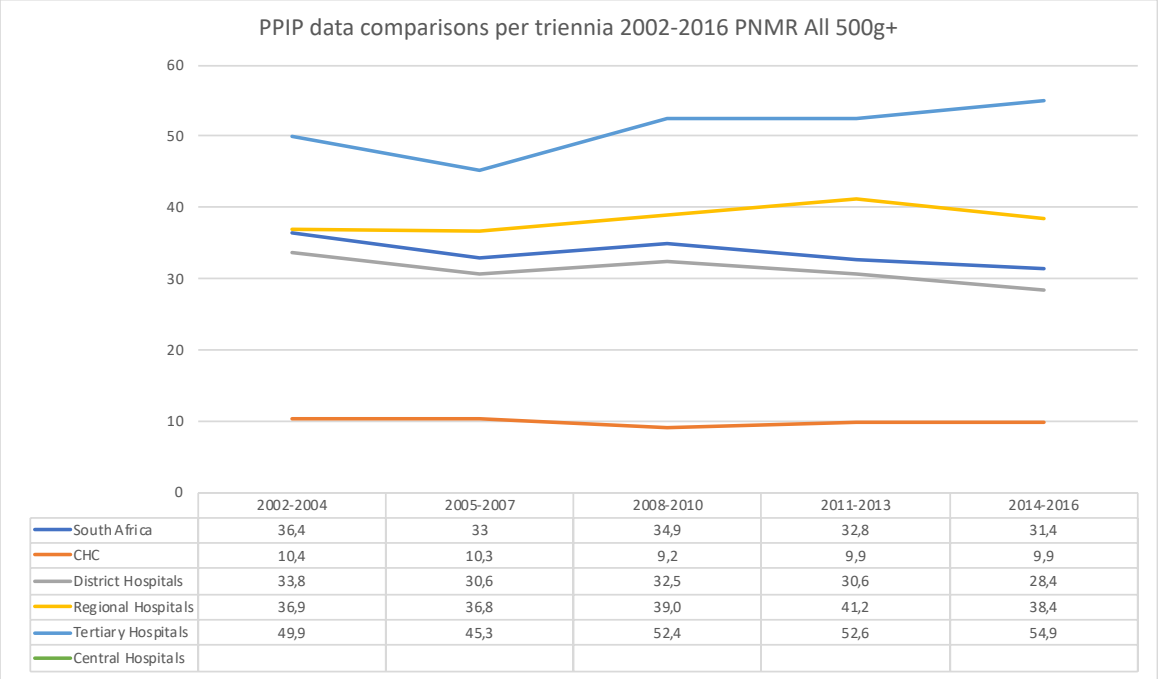
FIGURE 1.16 SBR PER PROVINCE FOR 2014-2016 (PPIP DATA)



	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
500g+	21,4	28,0	19,8	22,9	22,0	20,6	21,3	24,2	19,6	21,6
1000g+	16,6	19,6	14,6	16,8	18,2	16,6	15,5	16,1	11,7	15,9

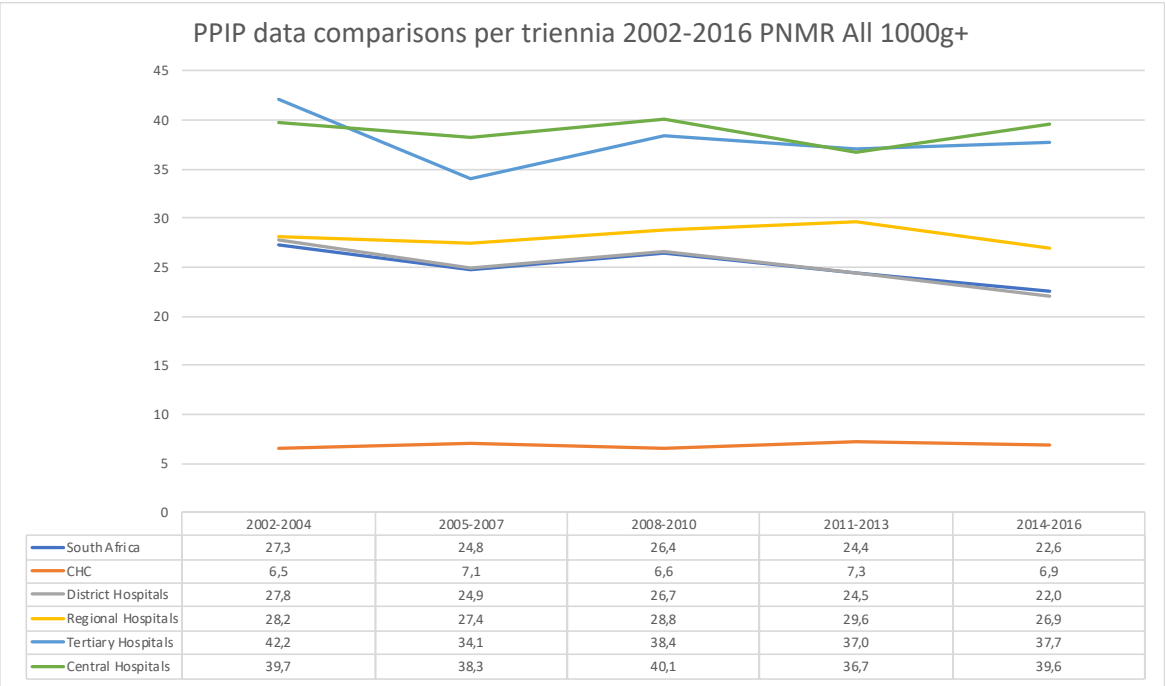
COMPARISONS WITH PREVIOUS TRIENNIA (DATA FROM PPIP)

FIGURE 1.17 PNMR 2002-2016 FOR ALL DELIVERIES >500G; DATA FROM PPIP, ACCORDING TO LEVEL OF CARE



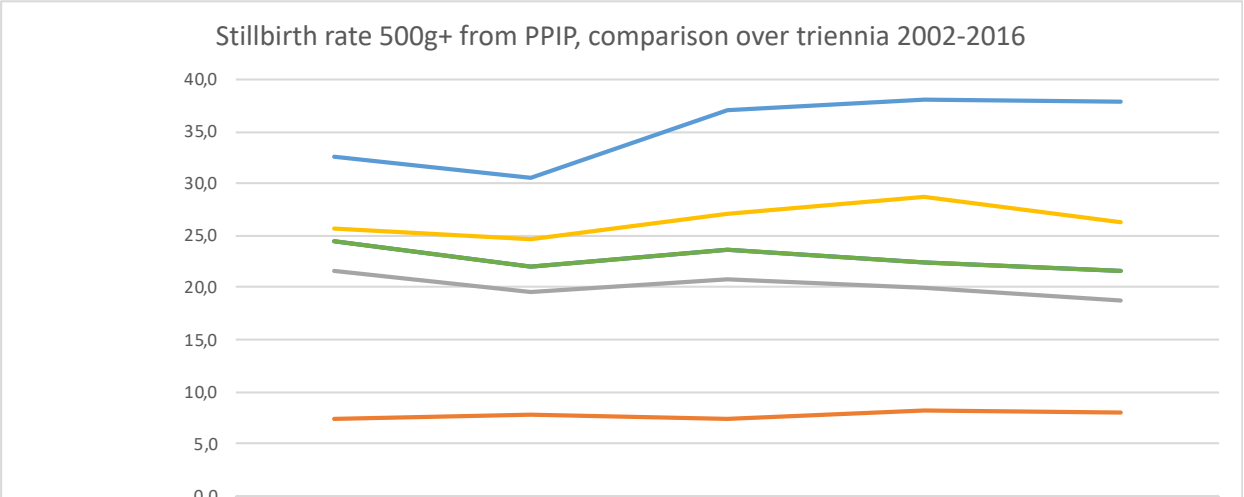
	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
South Africa	36,4	33	34,9	32,8	31,4
CHC	10,4	10,3	9,2	9,9	9,9
District Hospitals	33,8	30,6	32,5	30,6	28,4
Regional Hospitals	36,9	36,8	39,0	41,2	38,4
Tertiary Hospitals	49,9	45,3	52,4	52,6	54,9
Central Hospitals					

FIGURE 1.18 PNMR 2002-2016 FOR ALL DELIVERIES >1000G; DATA FROM PPIP ACCORDING TO LEVEL OF CARE



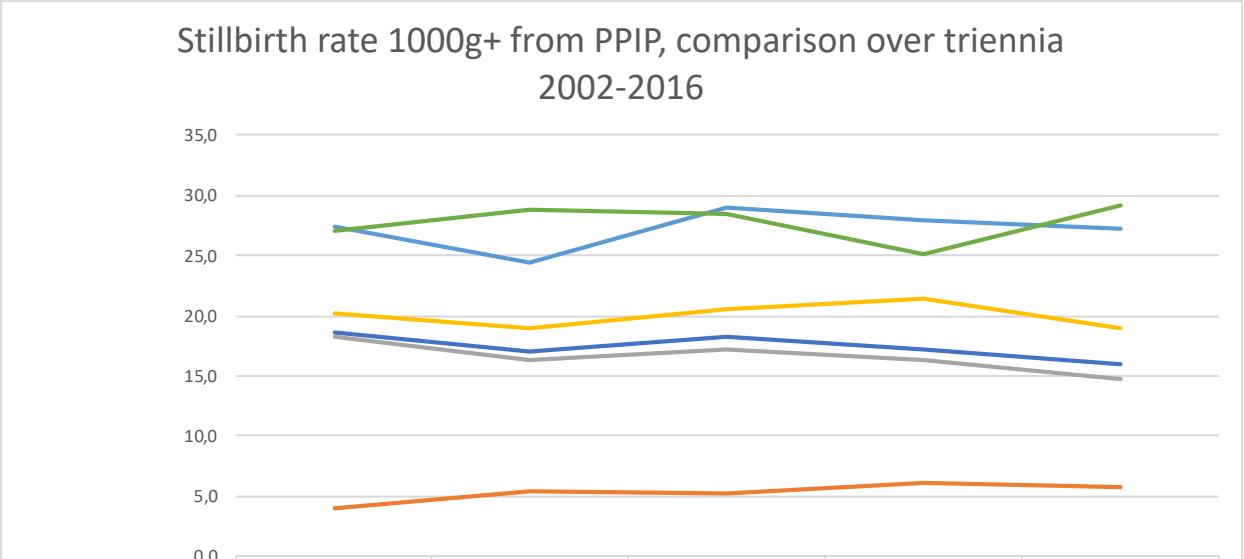
	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
South Africa	27,3	24,8	26,4	24,4	22,6
CHC	6,5	7,1	6,6	7,3	6,9
District Hospitals	27,8	24,9	26,7	24,5	22,0
Regional Hospitals	28,2	27,4	28,8	29,6	26,9
Tertiary Hospitals	42,2	34,1	38,4	37,0	37,7
Central Hospitals	39,7	38,3	40,1	36,7	39,6

FIGURE 1.19 STILLBIRTH RATE FROM PPIP, COMPARISON OVER TRIENNIA 2002-2016. ALL BABIES >500G



	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
South Africa	24,5	22,1	23,6	22,5	21,6
CHC	7,5	7,9	7,5	8,3	8,1
District Hospitals	21,7	19,6	20,8	20,0	18,7
Regional Hospitals	25,6	24,6	27,0	28,7	26,2
Tertiary Hospitals	32,6	30,6	37,1	38,0	37,9
Central Hospitals	24,5	22,1	23,6	22,5	21,6

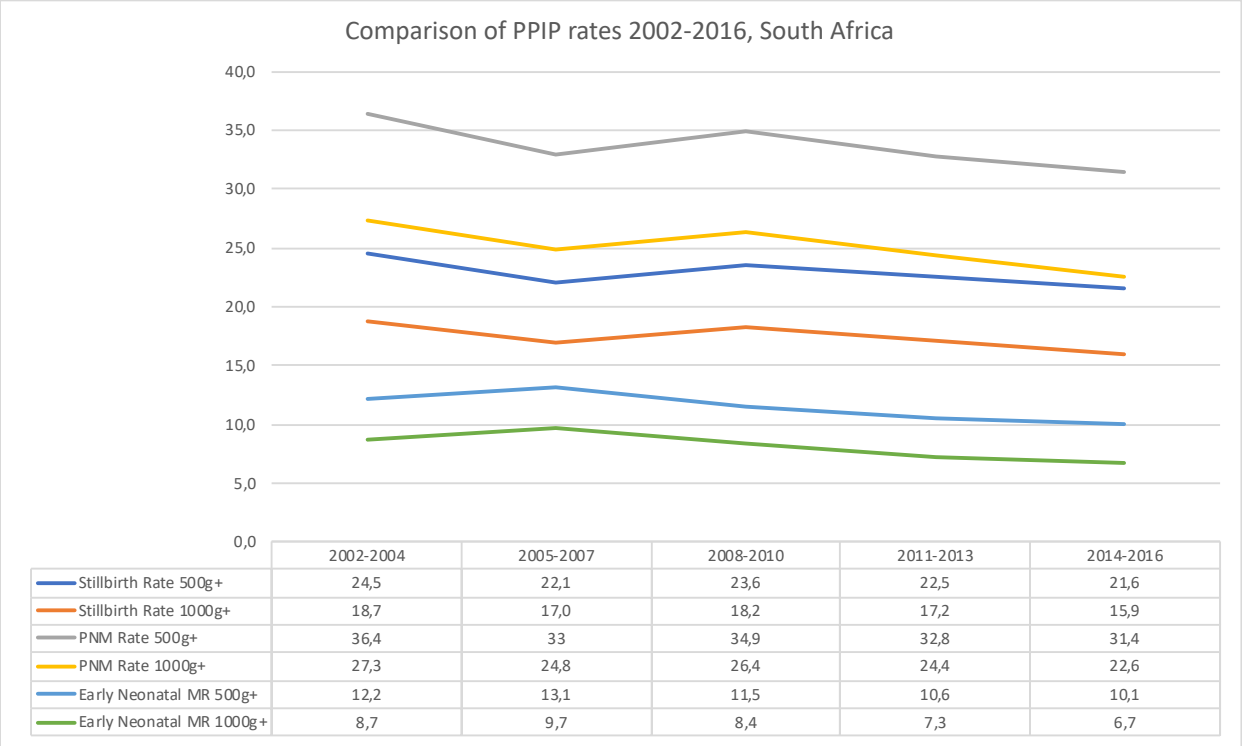
FIGURE 1.20 STILLBIRTH RATE FROM PPIP, COMPARISON OVER TRIENNIA 2002-2016. ALL BABIES >1 000G



	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
South Africa	18,7	17,0	18,2	17,2	15,9
CHC	4,0	5,5	5,3	6,2	5,7
District Hospitals	18,2	16,3	17,3	16,4	14,8
Regional Hospitals	20,2	19,0	20,5	21,5	18,9
Tertiary Hospitals	27,5	24,5	29,0	27,9	27,3
Central Hospitals	27,0	28,8	28,4	25,1	29,2

As there was a re-classification of hospitals over the years, the overall South African rates are shown below.

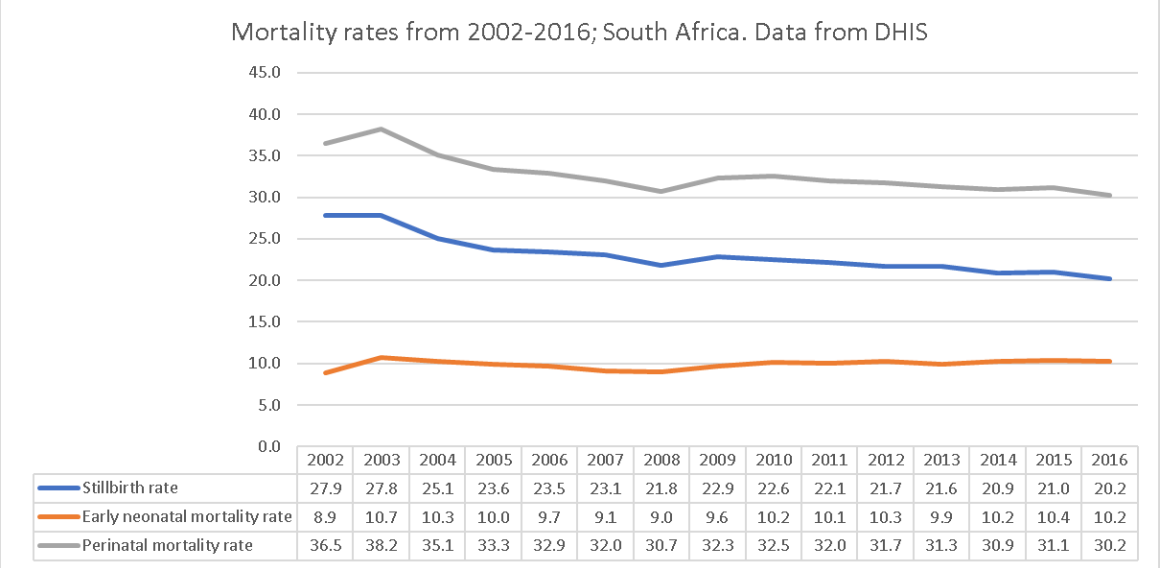
FIGURE 1.21 COMPARISON OF PPIP RATES 2002-2016



	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
Stillbirth Rate 500g+	24,5	22,1	23,6	22,5	21,6
Stillbirth Rate 1000g+	18,7	17,0	18,2	17,2	15,9
PNM Rate 500g+	36,4	33	34,9	32,8	31,4
PNM Rate 1000g+	27,3	24,8	26,4	24,4	22,6
Early Neonatal MR 500g+	12,2	13,1	11,5	10,6	10,1
Early Neonatal MR 1000g+	8,7	9,7	8,4	7,3	6,7

A similar downward trend is seen in the corresponding data from DHIS 2002-2016. The early neonatal mortality rate has stayed the same. The decrease in the perinatal mortality rate is due to a decrease in the number of reported stillbirths. The biggest decrease in the number of reported stillbirths was in Gauteng and may be an under-reporting challenge.

FIGURE 1.22 COMPARISON OF MORTALITY RATES 2002-2016 (DHIS DATA)

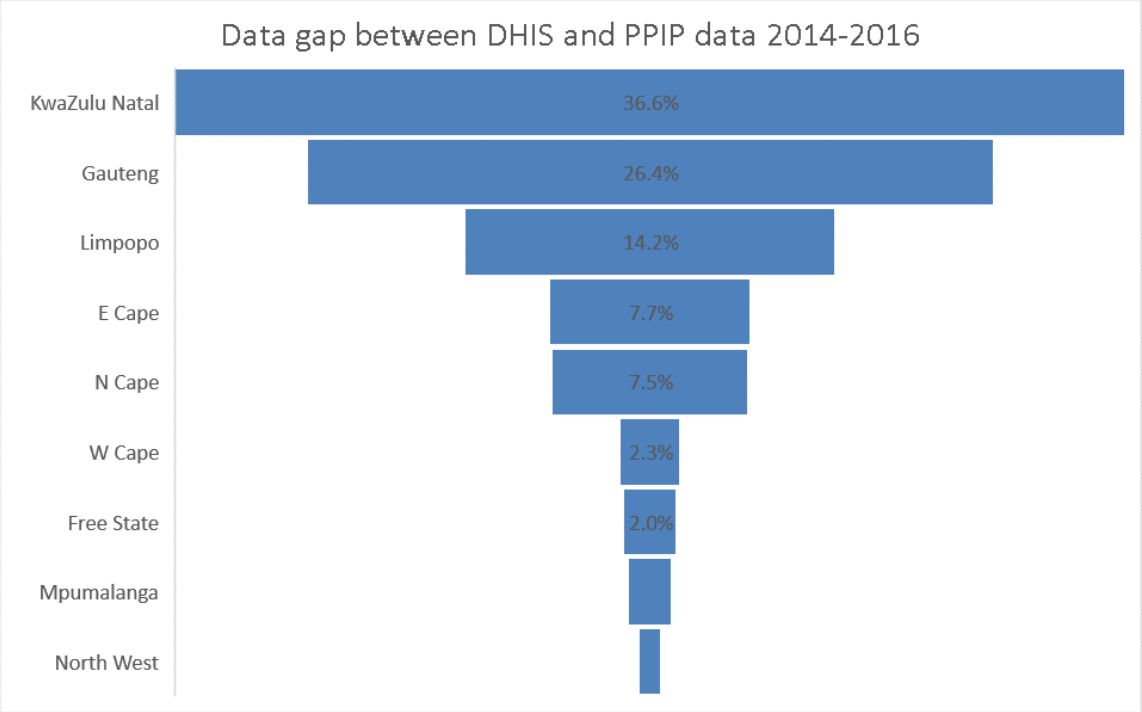


	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Stillbirth rate	27.9	27.8	25.1	23.6	23.5	23.1	21.8	22.9	22.6	22.1	21.7	21.6	20.9	21.0	20.2
Early neonatal mortality rate	8.9	10.7	10.3	10.0	9.7	9.1	9.0	9.6	10.2	10.1	10.3	9.9	10.2	10.4	10.2
Perinatal mortality rate	36.5	38.2	35.1	33.3	32.9	32.0	30.7	32.3	32.5	32.0	31.7	31.3	30.9	31.1	30.2

The difference between provincial PPIP data and DHIS data is shown below (using total delivery numbers). Of the overall 451 170 deliveries recorded in DHIS but not in PPIP, 212 471 are from KwaZulu-Natal (47 per cent) and 165 693 (37 per cent) are from Gauteng. Any interpretation of data should bear this in mind, as these are also the two provinces with the highest number of deliveries.

Provincial data gaps (calculated as difference between delivery numbers recorded on DHIS and delivery numbers in PPIP using the provincial DHIS delivery data as denominator). In three provinces (Mpumalanga, Northern Cape, Western Cape) the data recorded in PPIP is higher than in DHIS.

FIGURE 1.23 DATA GAPS



MODIFIABLE FACTORS

TABLE 1.10 PATIENT ASSOCIATED AVOIDABLE FACTORS, AS RECORDED IN PPIP

PATIENT ASSOCIATED	Number	% of group
Inappropriate response to poor foetal movements	12 871	25.9
Never initiated antenatal care	8 638	17.4
Booked late in pregnancy	8 506	17.1
Delay in seeking medical attention during labour	8 101	16.3
Infrequent visits to antenatal clinic	1 829	3.7
Other patient associated factors	1 804	3.6
Failed to return on the prescribed date	1 792	3.6
Inappropriate response to antepartum haemorrhage	1 550	3.1
Smoking	999	2
Inappropriate response to rupture of membranes	826	1.7
Alcohol abuse	619	1.2
Declines admission/treatment for personal/social reasons	589	1.2
Attempted termination of pregnancy	493	1
Delay in seeking help when baby ill	441	0.9
Illegal drug use	287	0.6
Assault	89	0.2
Partner/family declines admission/treatment	54	0.1
Infanticide	31	0.1

TABLE 1.11 MEDICAL PERSONNEL ASSOCIATED AVOIDABLE FACTORS, AS RECORDED IN PPIP FOR 2014-2016

MEDICAL PERSONNEL ASSOCIATED	Number	% of group
Delay in referring patient for secondary/tertiary treatment	2 118	8
No response to maternal hypertension	1 996	7.6
Other medical personnel associated factors	1 930	7.3
Foetal distress not detected intrapartum; foetus monitored	1 504	5.7
Nosocomial infection	1 101	4.2
Incorrect management of hypertensive disease	1 056	4
Antenatal steroids not given	915	3.5
Delay in medical personnel calling for expert assistance	879	3.3
Inadequate / No advice given to mother	841	3.2
Physical examination of patient at clinic incomplete	800	3
Neonatal care: management plan inadequate	795	3
Foetal distress not detected intrapartum; foetus not monitored	776	2.9
No response to poor uterine fungal growth	723	2.7
Medical personnel underestimated foetal size	720	2.7
No response to history of stillbirths, abruption etc.	697	2.6
Neonatal care: inadequate monitoring	694	2.6
Foetal distress not detected antepartum; foetus monitored	665	2.5
No response to history of poor foetal movement	608	2.3

Multiple pregnancy not diagnosed antenatally	605	2.3
Management of second stage: prolonged with no intervention	545	2.1
Neonatal resuscitation inadequate	521	2
Poor progress in labour, but partogram not used correctly	472	1.8
Delay in doctor responding to call	446	1.7

TABLE 1.12 ADMINISTRATIVE AVOIDABLE FACTORS, AS RECORDED IN PPIP FOR 2014-2016

ADMINISTRATIVE PROBLEMS	Number	% of group
Inadequate facilities/equipment in neonatal unit/nursery	1 567	14.7
Lack of transport - home to institution	1 269	11.9
No accessible neonatal ICU bed with ventilator	949	8.9
Lack of transport - institution to institution	885	8.3
Other administrative problems	786	7.4
Personnel not sufficiently trained to manage the patient	686	6.4
Insufficient nurses on duty to manage the patient adequately	657	6.2
Insufficient doctors available to manage the patient	488	4.6
Personnel too junior to manage the patient	419	3.9
Anaesthetic delay	406	3.8
Lack of adequate neonatal transport	316	3
Inadequate resuscitation equipment	312	2.9
No syphilis screening performed at hospital / clinic	309	2.9
Congenital abnormality not diagnosed: No ultrasound service available	308	2.9
Result of syphilis screening not returned to hospital/clinic	242	2.3
Theatre delay: All theatres occupied	225	2.1
Inadequate theatre facilities	207	1.9
No dedicated high risk clinic at referral hospital	204	1.9

CHAPTER 2: INPATIENT NEONATAL REGISTER: KEEPING TRACK OF INPATIENT NEONATAL FLOW, RECORDING, AND REPORTING EVERY SICK INPATIENT NEONATE

Kobie Snyman, Shuaib Kauchali, Joyce Mahuntsi, Natasha Rhoda, Lolly Mashao

ABSTRACT

South Africa uses different data collection and reporting tools and systems for reporting neonatal deaths, resulting in data discrepancies between these systems. Data collected through different systems such as the Perinatal Problem Identification Programme (PPIP) and the DHIS should correlate as it is collected from the same source. Counting all newborns is critical to monitor progress towards achievement of the Sustainable Development Goals and the successful implementation of the Every Newborn Action Plan strategy. Reliable health information is essential for the planning and management of locally responsive health services.

Sub-optimal quality of neonatal data can be linked to practices existing for data collection, capturing, and reporting. These include amongst other, use of non-standardised records across different facilities in South Africa and the unique neonatal flow and movement in a health facility. Mapping the neonatal flow in a facility supports the understanding of the data management processes, inclusive of the challenges in counting every newborn for reporting the disease burden. Keeping track of newborn movement for coverage through the neonatal admissions and separations register at the point of care, is proposed to monitor outcomes for improved data quality; and resultant description of the disease burden.

The purpose of this chapter is to describe the process of neonatal flow for the sick neonate applying the Neonatal register as a tool to support the process of accurately counting sick newborns at facility level.

INTRODUCTION

The ultimate purpose of a Health Information System (HIS) is to improve health services management through optimal information support. Information support is required for all levels of health management for planning, policy making, operational management and continuous quality improvement, including patient care. Therefore, for a HIS to be effective in supporting management decision-making, the information it generates must be relevant, complete, accurate (correct) (reliable), consistent, timely and accessible (available)[1].

Data quality is dependent on effective data collection and capturing processes for which well-designed standardised data collection tools are essential. Studies show that information is used significantly more if decision makers are convinced of its quality[2]. Counting newborns and monitoring of quality of care to neonates has been a critical challenge in all countries across the world[3]. One of the five strategic objectives of the Every Newborn Action Plan[4]is to count every newborn for measurement, programme tracking and accountability. Health system managers and clinicians are committed to reduce the perinatal death rate in South Africa and thus the accurate counting of every sick newborn.

A process was embarked on to review the data collection and reporting systems currently in use; to identify the gaps in reporting on data flow and patient flow; and to propose the neonatal register to address these identified gaps. Improvements include linking the birth register with the neonatal register, linking the register with the PPIP death audit system and linking the register to the current DHIS data elements, and to identify proposed new indicators for NIDS. The improved picture on inpatient neonatal throughput statistics (length of stay, efficiency, cost-drivers, inpatient days, separations) will support management planning and financing towards reduction of neonatal deaths.

The purpose of this chapter is to describe the process of neonatal flow for the sick neonate applying the neonatal register as a tool to support the process of accurately counting sick newborns at facility level.

1. BACKGROUND

South Africa uses different data collection and reporting tools and systems for reporting neonatal deaths, resulting in data discrepancies between these systems. Too few neonatal deaths are reported in the National Population Registry (NPR) to produce reliable estimates, therefore the District Health

[1]Lippeveld,T. Saurborn,R. Bodart,C.Editors. Design and implementation of health information systems. WHO publication 2000

[2] Lippeveld et al P50

[3] WHO 2014. UNICEF. Early Neonatal Action Plan An Action Plan to End Preventable Deaths. http://www.healthynewbornnetwork.org/hnn-content/uploads/2017ENAP-country-report-eng.pdf

[4] WHO 2014. UNICEF. Every Newborn Action Plan. An Action plan to end Preventable Deaths. June 2014. Printed South Africa.

Information System (DHIS) is used to calculate the number of neonatal deaths that occur in public hospitals to produce a more recent estimate[5]. Effort is needed to track neonatal deaths in DHIS with accuracy for quality of data.

Two key reflections from Lippeveld on the use of HIS are firstly that the expansion of information technology is unstoppable and has a tremendous potential in increasing the performance of the systems. This may require the necessary investments for improving connectivity to internet and maintenance. Secondly focus must not be lost to promote the use of information for evidence-based decision making at all levels. The crucial role of routine health information systems in improving health service delivery cannot be overstated. As we look at the new era of the Sustainable Development Goals, having reliable, routine data will be critical to understanding where gaps in coverage, access, or equity exist and can be improved with the right investments[6].

Sub-optimal quality of neonatal data can be linked to existing practices for data collection, capturing, and reporting. These include amongst other, use of non-standardised records and data collection tools across different facilities in South Africa and the unique neonatal patient flow and movement in a health facility.

All neonates born in the facility are recorded as a birth in the birth (maternity) register. The birth register serves as the source for the denominator data for neonatal indicators. Consideration of the flow of the neonate illustrates well that neonates admitted or transferred in, does not contribute to the denominator. A neonate born in the facility is admitted when he becomes ill or the mother is too ill to care for the baby. Poor implementation of quality interventions and low coverage of these interventions at a time of birth until first week of life account for high rates of neonatal mortality. Keeping track of coverage through the neonatal admissions and separations register where the neonate is cared for, is critical to measure outcomes.

Different health information systems in use may include:

- perinatal problem identification programme (PPIP[7]), focussing on perinatal deaths; routinely managed by clinicians still as voluntary system, not integrated into DHIS and underestimates late neonatal deaths
- routine health information system with selected NIDS data captured in the District Health Information System (DHIS) for each public health facility in South Africa. The data collection tools vary from hospital to hospital and may include:
    - ward register completed by clinician or ward clerk to record admissions and separations
    - midnight census compiled by nursing staff at midnight and aggregated by administration staff
    - in some instances, self-designed death registers

[5] Dorrington R BD, Laubscher R, Nannan N. Rapid Mortality Surveillance Report, South African Medical Research Council, Burden of Disease Research Unit 2016.

[6] Lippeveldt,T; https://www.measureevaluation.org accessed 29July2017

[7] www.PPIP.co.za

    - additional tools designed by individual hospitals to meet additional needs for example a discharge book
- patient administrative systems, e.g. Medicom, Clinicom, Delta9, PAAB; routinely controlled by administrative staff not validated by clinicians requiring oversight for quality and accuracy.

The DHIS is managed by information systems staff whereas PPIP is routinely managed by clinicians at facility level, with data analysed either by committees of clinical volunteers or formal Ministerial Committees with support from the MCWH programme managers at all levels. The turnaround time for data for all the above systems is long; making it difficult to monitor deaths and put immediate preventative measures in place. The current turnaround time for PPIP at provincial level is two to three months if data is validated for quality.

Summary of gaps in the data collection and information management systems related to neonate care services:

- unlike paediatric (older children) patients, there is no national standardised register for sick inpatient neonates (there is a birth /maternity register for all births/deliveries)
- sick neonates admitted and separated from the neonatal units are not counted for description of disease burden
- there is no national standardised daily throughput statistical table to tally up the daily admissions and separations (deaths, transfers out, discharges, abscondment), or do a midnight census of sick neonates, thus standard inpatient hospital statistics cannot be derived on service utilisation, morbidity caseloads/mix or burden of disease; hospitals developed varied ways to fulfil this requirement with non-standardised tools requiring the hospital information section to collate the data
- vital data collected by the DHIS (NIDS) includes: live births, live births under 2 500gm, still birth in facility, and neonatal deaths (by post-natal age: zero to seven days or eight to 28 days) and stillbirth totals (No differentiation between fresh and macerated). Data collected by PPIP includes the weight banding in 500gm cohorts up to 2 500 and then >2 500;

Based on a rapid assessment of 19 facilities across seven provinces conducted between February and May 2017 by the National Newborn Care Team, a report on Newborn Care Services in South Africa was produced. The report noted poor reporting flow from districts and provinces to national; and managers do not analyse and interpret and plan interventions according to data evidence[8].

2. RECOMMENDED PROCESSES TO IMPROVE NEONATAL DATA REPORTING

[8] NDOH. 2017. Matela,S.; Kauchali,S.; and Mahuntsi,J. Newborn Care Services in South Africa. Recommendations to Improve the Quality of Newborn care services and Reduce Inpatient Neonatal Mortality.

The Every Newborn Action Plan[9] (ENAP) proposes a strategy of counting every neonate through measurement, programme tracking and accountability. NaPeMMCo recommendations to address the above includes implementation of a standardised single solution / single source of data wherever possible, with common definitions and reconciliation signed off by all relevant parties including medical/clinical personnel. The data source should capture the neonatal flow in the facility, integrate the PPIP data elements, integrate ENAP elements, allow for tracking selected disease patterns and support the midnight census. Linkages between the neonatal register as single source document, should be seamless with the birth and paediatric register.

Processes to achieve a standardised source of data collection and reporting would involve:

- to map the neonatal flow/movement of the neonate in a hospital
- to standardise a neonatal register to capture the neonatal flow following admission of sick neonate
- to develop support documents for example, *Inpatient Admissions-Separation Case Sheet*
- to integrate the required PPIP data elements into the neonatal register
- to make recommendations to NHISA for inclusion of new data elements to track ENAP indicators
- to integrate the midnight census into the neonatal register

A process started in 2014 with the development of a draft neonatal register. Provinces further developed their own reporting and patient documentation tools to meet the need for improved data quality. The focus here is on mapping the neonatal flow for accurate capturing of the admissions and separations with the neonatal register as supporting document.

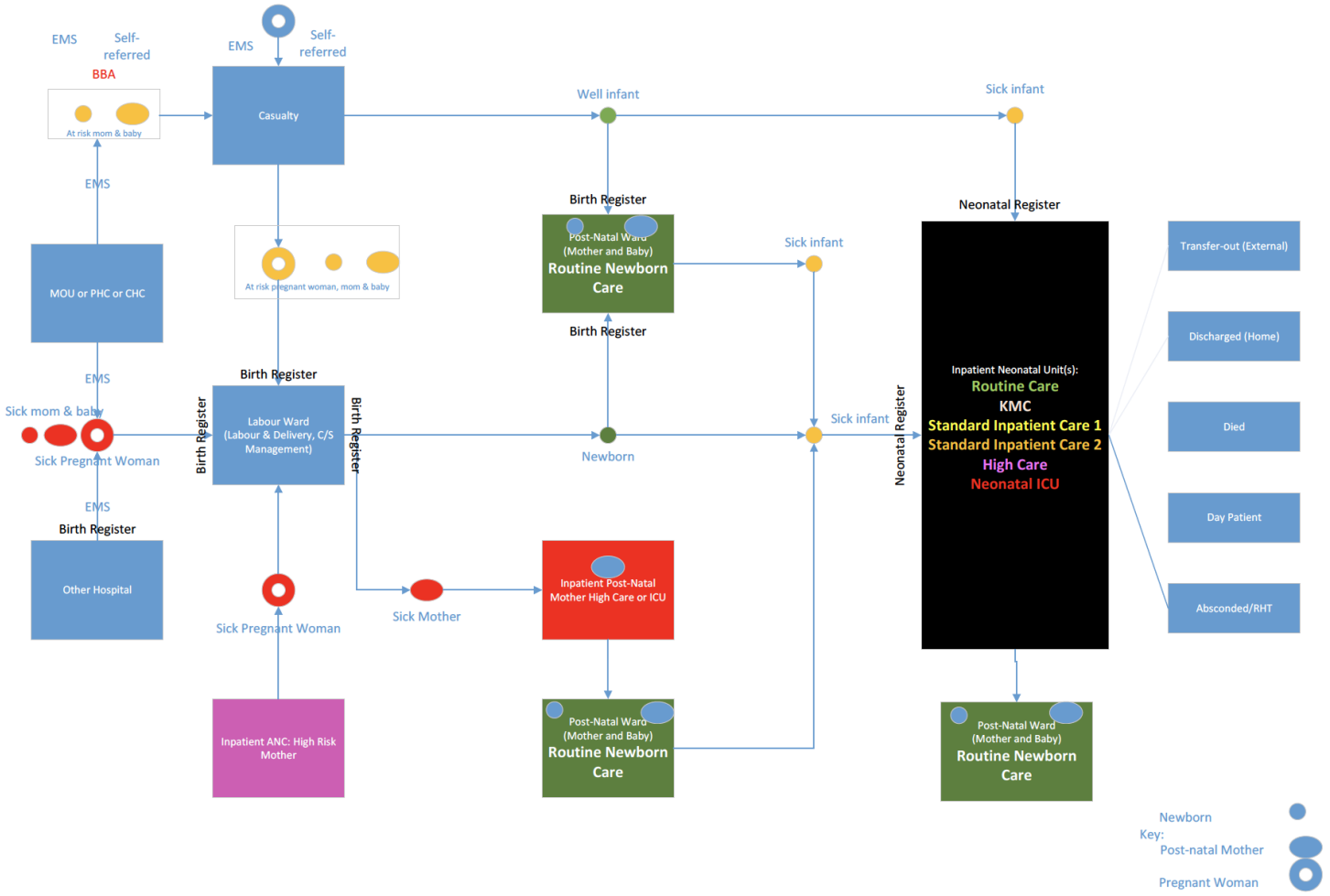
3. NEONATAL INPATIENT CASE FLOW AND REPORTING

An understanding of the neonatal case flow (Figure 2.1) in a facility is essential to determine recording and reporting needs and will contribute to the development of a neonatal register. Three entry points exist for a neonate namely the Labour ward (recorded in the birth register but not considered an admission) and admission of sick/unwell neonate via Accident and Emergency Department as well as well neonates who get unwell from postnatal wards and get admitted to neonatal unit. The level of care will dictate the movement of the unwell/sick neonate. Movement here is mapped considering all possible neonate services/units available.

The unwell neonate may move from the entry point to one or in-between several of the following units: Kangaroo mother care, high care, or ICU; and admission for Routine care where the mother cannot care for the neonate. Double counting with over estimation could happen with the same neonate moving through several units.

[9] WHO 2014. UNICEF. Every Newborn Action Plan. An Action plan to end Preventable Deaths. June 2014. Printed South Africa.

FIGURE 2.1: NEONATAL FLOW THROUGH ADMISSION TO SEPARATION



4. CURRENT AND PROPOSED DATA ELEMENTS AND INDICATORS

The aim of the neonatal admissions and separations register content is to make provision for current and proposed data elements. The register content (Figure 2.2) includes demographic data for the neonate, admission detail, reason for admission, and HIV status. The separation information (Figure 2.5) includes final diagnosis according to ICD10 codes[10], treatment categories, discharge detail, age at separation and category of patient.

The neonatal admissions and separation register attempts to report detailed data required for indicators in NIDS (DHIS) (Table 2.1), PPIP data elements (Figure 2.4) and the midnight census (Figure 2.3).

TABLE 2.1: RELEVANT CURRENT NIDS NEONATAL DATA ELEMENTS AND INDICATORS IN DHIS

NIDS indicator (DHIS2)	DHIS numerator	DHIS denominator
Delivery in facility rate (population based) Deliveries in health facilities as proportion of expected deliveries in the population. Expected deliveries are estimated as population under one year multiplied by 1 025 to compensate for still births and infant mortality.	Sum of live births in facility; still births in facility;	Female under one year + Male under one year * 1.07
Live birth under 2 500g in facility rate	infant born alive in health facility who weighs less than 2 500g	Live birth in facility
Still birth in facility rate	Still born infants delivered in a health facility	Total births in facility
Early neonatal death in facility rate	A death to a live born infant within seven completed days after birth is known as an early neonatal death	Live birth in facility

[10]WHO 2016. The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM.

Neonatal death in facility rate	Neonatal zero to 28 days death in facility	Live birth in facility
Perinatal mortality in facility rate	Still birth plus death zero to seven days in facility	Still birth in facility + live birth in facility
Born alive before arrival at facility rate	Live infant born to a woman who had intended/booked a facility delivery but delivered before arrival and reached a health facility within 72 hours for normal post-delivery care (BBAs)	Live birth in facility plus born alive before arrival at facility
Mother postnatal care within six days rate	Postnatal visits by a mother within six days after delivery	Delivery in facility - total
Infant given NVP within 72 hours after birth uptake rate	Infant born to HIV positive woman who received Nevirapine within 72 hours after birth	Live birth to HIV positive woman
Infant initiated on CPT around six weeks uptake rate	Infants born to HIV positive women who were initiated on Co-Trimoxazole around six weeks after birth to prevent opportunistic infections	Live birth to HIV positive woman

Data elements and indicators that will be derived from new register:

- Neonate zero to seven days - separated (discharged, died, transferred out)
- Neonate eight to 28 days - separated (discharged, died, transferred out)
- Infant 29 days -11 months-separated (discharged, died, transferred out)
- Weight-banding (PPIP categories) according to 500gm cohorts up to 2 500 and then >2 500gm separated (discharged, died, transferred out)
- Separations by Treatment: HIV risk management, KMC, ventilation, CPAP, phototherapy, antibiotics.
- Midnight census figures – Number of inpatient days (general OR sub-classes as ICU, high care, standard inpatient care, KMC, etc)

Table 2.2 below shows the possible alignment of the neonatal NIDS (DHIS) and ENAP indicators with the neonatal register. Recording of the disease burden on neonatal separation from the facility may contribute to the reporting of the ENAP required indicators.

TABLE 1.2: DHIS INDICATORS AND CORRELATION WITH ENAP

Type of indicator	Core ENAP indicators (source)	Additional indicators (source)	Not available yet, no data source	Proposed: Neonatal Register Proposed: DHIS Captured in DHIS;
Impact (3)	1. Maternal mortality ratio, replaced *by early NNDR (DHIS)**			ENND per weight banding
	2. Stillbirth rate (DHIS)	Intrapartum Stillbirth Rate (PPIP: FSB 2,5kg)*		SB rate per weight banding
	3. Neonatal mortality rate (DHIS)	Low birth weight rate (DHIS)		LBWR per weight banding
			Preterm birth rate	Preterm birth rate
			Small for gestational age	Small for gestational age rate
		Neonatal morbidity rates* ,i.e. disease specific rates egg infection (PPIP)		Disease specific rates according to ICD 10 coding Age specific: seven to seven days; eight to 28 days 29 days -11 months
			Rates of long term disability after neonatal conditions	Resuscitation: CPAP, Ventilation

Coverage: Care for all mothers and neonates (3)	4. Skilled attendant at birth, HBB coverage # / district (RMCH database)			DHIS: Delivery in facility rate
	5. Early postnatal care for mothers and babies, WBOTS day six visits (DHIS)			DHIS: Mother postnatal visit within 6 days after delivery
	6. Exclusive breast feeding to six months (DHIS 14 weeks)			DHIS: Infant reported to be exclusively breastfed at DTaP-IPV-Hip-Hib (Hexavalent) third dose immunisation (preferably 14 weeks after birth).
Coverage: Complications and extra care (4)	7. Antenatal corticosteroid, replace by ENNDR 1 000 -1 499 kg *)	Caesarean section rate, remove	Antenatal corticosteroid use (no source yet)	Antenatal corticosteroid use
	8. Neonate resuscitation (PPIP: ENNDR 2.5kg *)			Resuscitation: CPAP, ventilation
	9. Kangaroo mother care and feeding support		KMC survey money currently sought by NDOH	KMC
	10. Treatment of neonatal sepsis *			Final diagnosis disease specific ICD10 coding

*Entries in italics added to original indicators

5. RECOMMENDED IMPLEMENTATION PROCESS

The prototype of the neonatal register was adjusted for input from NaPeMMCo. It is recommended that implementation starts with the introduction of the paper based register to institute change management processes at facility level. This provides the opportunity to test the fields required and will support the development of formulations in the electronic register. A computer at ward level and availability of a data capturer for a portion of the day will support the transition to electronic capturing. Available internet connectivity will ensure aggregated data access in the facility (service delivery, management, and informatics) once captured. The use of an Inpatient Admissions-Separation Case Sheet (Figure 5) is recommended to capture the movement of the neonate. On admission, a copy is attached to the inside of the patient care document. The movement of the neonate is captured as the movement happens, and serves as a communication document between departments.

CONCLUSION

A pilot implementation is required to test if the content provides the necessary data to comply with the NIDS (DHIS), PPIP and midnight census requirements. The implementation of the paper register is sufficient to adapt the e-register and finalise all formulations to ensure correct calculations of required totals.

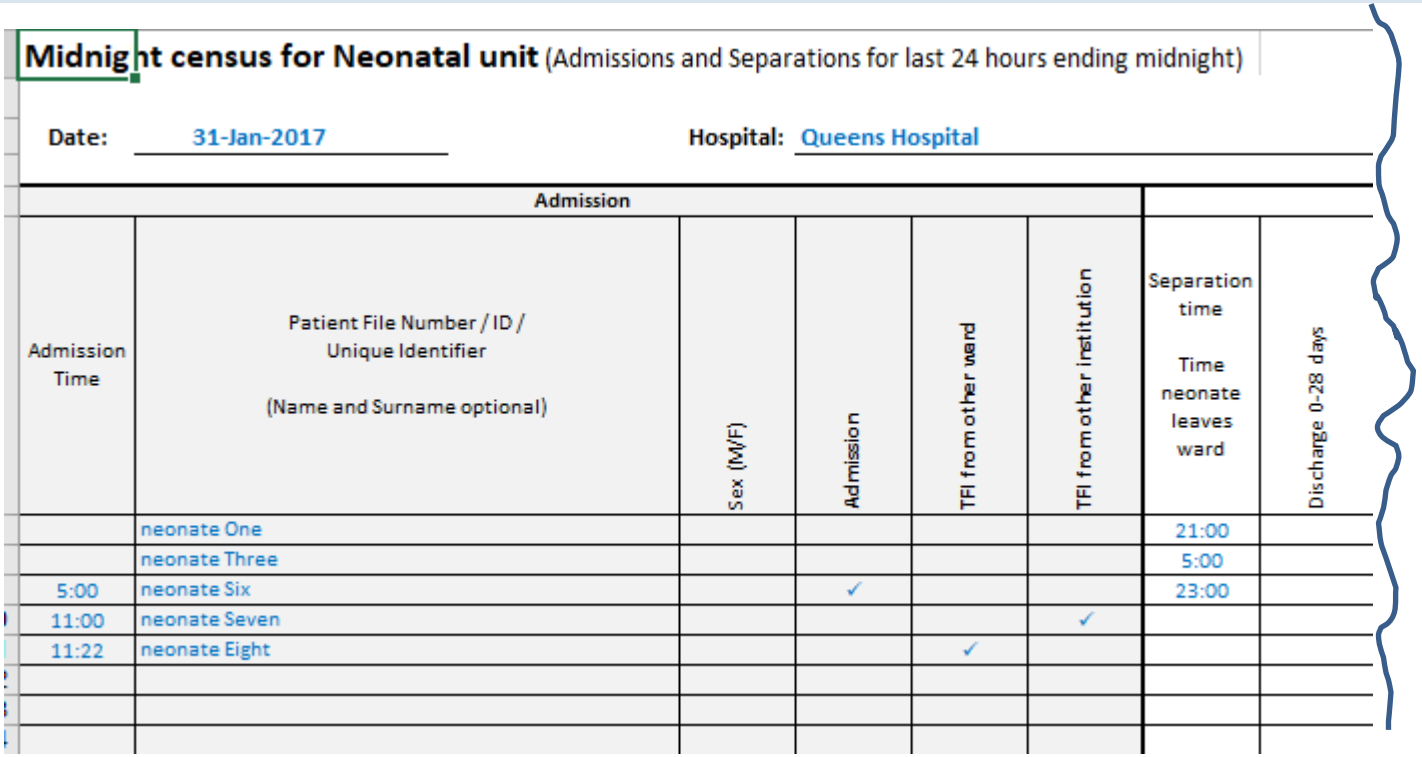
FIGURE 2.2: PROPOSED NEONATAL REGISTER (1)

NEONATAL REGISTER: MONTH :																												HIV Exposure
		Admission							Admission from				Birth Weight Category										Reason for Admission			HIV	
Date (e.g.. 1 July 2017)	Carry over midnight	Name of baby:	File number	Admission Number	Mother's name	Mother's File number	Date of Birth dd/mm/yy	Place of Birth	Admission born in facility (specify labour/theatre/postnatal)	Admission from home	Transfer in from other hospital or MOU (specify hospital/MOU)	Transfer in from other ward (specify ward within hospital)	Birth Weight in gram	<1000gram	1000 - 1499gram	1500 - 1999gram	2000 - 2499 gram	≥2500 gram	Admission weight in g	Temperature on Admission	ANC Steroids (Y-yes,N=No, NA=Not applicable)	(RDS, NNJ. Prem, Infection , Neonatal encephalopathy, Asphyxia, Cong Abn, other)			infant HIV exposure (Y=yes; N=No; U=unknown)	Total Admissions
Totals																												
1																												
2																												
3																												
4																												

Proposed neonatal register (2)

Final diagnosis											Treatment on discharge																		Discharge Age				Follow up			
N1: Congenital malformations,deformations	N2:Disorders related to foetal growth	N3:Birth trauma	N4:Complications of intrapartum events	N5:Convulsions and disorders of cerebral status	N6: Infection	N7:Respiratory and cardiovascular disorders	N8: Other neonatal conditions	N9: Low birthweight and prematurity	N10: Miscellaneous	N11: Neonatal death of unspecified cause	Neonatal HAART	Dual Prophylaxis	Single ART prophylaxis	KMC	CPAP	Ventilation	Phototherapy	Antibiotics	Separation weight	Total Separations	Midnight total	Date dd/mm/yy of Discharge/ Death / Transfer	Cause of Death (follow ICD10/WHO definition)	Discharge (including RHT/abscondment)	Transfer out (Internal) to ward	Transfer out (external) to hospital _____	Death	Length of stay	0-7 days	8-28 days	29 days - 11 mths	12-59 mths	Referral to -------	Follow up date _____	Follow up place _____	

FIGURE 2.3: PROPOSED MIDNIGHT CENSUS FORM FOR NEONATES

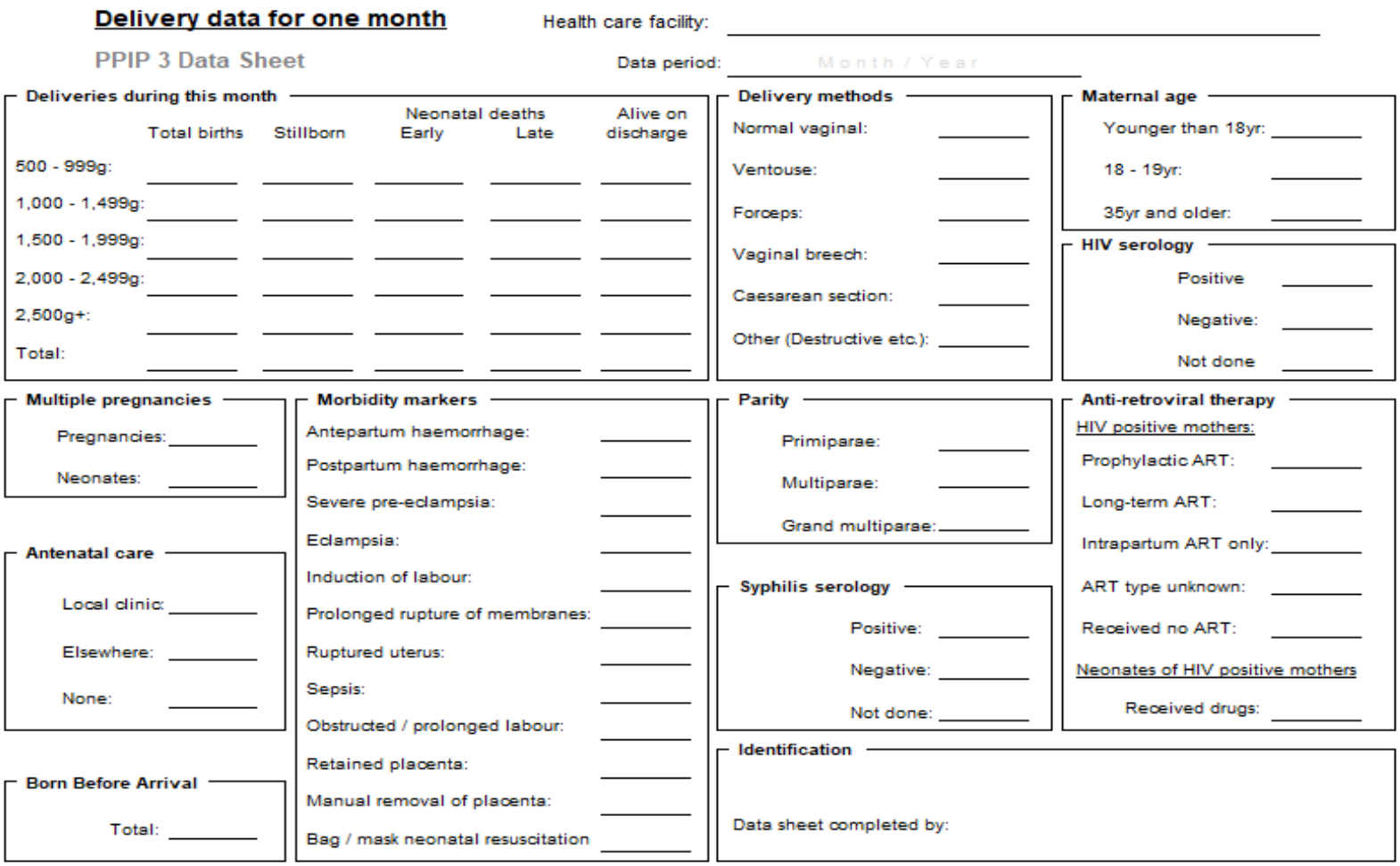


Midnight census for Neonatal unit (Admissions and Separations for last 24 hours ending midnight)

Date: 31-Jan-2017 **Hospital:** Queens Hospital

Admission							
Admission Time	Patient File Number / ID / Unique Identifier (Name and Surname optional)	Sex (M/F)	Admission	TFI from other ward	TFI from other institution	Separation time Time neonate leaves ward	Discharge 0-28 days
	neonate One					21:00	
	neonate Three					5:00	
5:00	neonate Six		✓			23:00	
11:00	neonate Seven				✓		
11:22	neonate Eight			✓			

FIGURE 2.4: PPIP DATA ELEMENTS



Delivery data for one month

Health care facility: _____

PPIP 3 Data Sheet

Data period: Month / Year

Deliveries during this month

	Total births	Stillborn	Neonatal deaths Early	Neonatal deaths Late	Alive on discharge
500 - 999g:					
1,000 - 1,499g:					
1,500 - 1,999g:					
2,000 - 2,499g:					
2,500g+:					
Total:					

Delivery methods

Normal vaginal: _____

Ventouse: _____

Forceps: _____

Vaginal breech: _____

Caesarean section: _____

Other (Destructive etc.): _____

Maternal age

Younger than 18yr: _____

18 - 19yr: _____

35yr and older: _____

HIV serology

Positive _____

Negative: _____

Not done _____

Multiple pregnancies

Pregnancies: _____

Neonates: _____

Antenatal care

Local clinic: _____

Elsewhere: _____

None: _____

Born Before Arrival

Total: _____

Morbidity markers

Antepartum haemorrhage: _____

Postpartum haemorrhage: _____

Severe pre-eclampsia: _____

Eclampsia: _____

Induction of labour: _____

Prolonged rupture of membranes: _____

Ruptured uterus: _____

Sepsis: _____

Obstructed / prolonged labour: _____

Retained placenta: _____

Manual removal of placenta: _____

Bag / mask neonatal resuscitation _____

Parity

Primiparae: _____

Multiparae: _____

Grand multiparae: _____

Syphilis serology

Positive: _____

Negative: _____

Not done: _____

Anti-retroviral therapy

HIV positive mothers:

Prophylactic ART: _____

Long-term ART: _____

Intrapartum ART only: _____

ART type unknown: _____

Received no ART: _____

Neonates of HIV positive mothers

Received drugs: _____

Identification

Data sheet completed by:

FIGURE 2.5: PROPOSED INPATIENT ADMISSIONS-SEPARATION CASE SHEET

			Inpatient Admissions-Separation Case Sheet Neonate and Infant								
			Attach this to the inside of the patient folder								
Child details	Name:									Admission folder Nr	
	Date of admission			Time of admission					Sex	Male	Female
Mother/carer d	Name:						Contact Nr1:	Contact Nr2:		Folder Nr:	
Admission det	Date of Birth			Age:		0-7days	7-28days	29d-1yr	1-<5yrs	5-12 yrs	>13yrs
	Weight on admission:			Birthweight		B/W category	<1000gram	1000 - 1499gram	1500 - 1999gram	2000 - 2499 gram	≥2500 gram
	Admitted from:			Admission born in facility (specify labour/theatre/postnatal)		Admission from home		Transfer in from other hospital or MOU (Specify name)		Transfer in from other ward (specify ward within hospital)	
			Reason for Admission&Diagnosis								
Reason for Admission:											
Diagnosis:		Asphyxia (WHO?PPIP definition)	Prematurity	Infection	Cong Abnormality	Trauma	Other				
ICD Code:	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11
HIV Exposed:		Risk:					PCR				
Treatment		Neonatal HAART	Dual Prophylaxis	Single Prophylaxis	KMC	CPAP	Phototherapy	Antibiotics	Other:		
Feeding:		Excl breastfeed	Mixed feeding	Formula			Solids introduced				
Immunisation status		Up to date	Not up to date	Unknown	Date of next immunisation:						
			Discharge Summary/Referral								
Discharge det	Date dd/mm/yy of Discharge/ Death / Transfer			Discharge (including RHT/abscondment)		Transfer out (Internal) to ward		Transfer out (external) to hospital		Death	
	Discharge weight			Discharge Age:		0-7days	7-28days	29d-1yr	1-<5yrs	5-12 yrs	>13yrs
Discharge											
Signature											

6. REFERENCES

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www.PPIP.co.za

CHAPTER 3: NEONATAL DEATHS IN CHILDREN'S WARDS IN SOUTH AFRICA: 2014-2016

DATA FROM THE CHILD HEALTHCARE PROBLEM IDENTIFICATION PROGRAMME (CHILD PIP)

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INTRODUCTION

For the third triennial ministerial report, the Child Healthcare Problem Identification Programme (Child PIP), using derived hospital-based mortality data for neonates (aged zero to 28 days) admitted to children's wards rather than to nurseries, provides a profile of this particular group of neonatal deaths occurring in South Africa.

This follow-on report covers the current triennial reporting period (2014-2016), with comparisons to the previous triennial reporting periods (2008-2010 and 2011-2014).

SETTING

In the triennial period ending 2016 there were 250 hospitals that have used Child PIP and contributed data to the national database, covering 49 South African health districts.

NEONATAL DEATHS IN CHILDREN'S WARDS (TABLE 3.1)

During the triennial period there were 63 216 admissions of neonates to children's wards, seven per cent of all admissions. There were 1 404 audited neonatal deaths, nine per cent of all child deaths. The in-hospital mortality rate for neonates remained substantially higher than for children. However, there was a reduction in the in-hospital mortality rate for neonates from 5.4 per 100 admissions in the first period, to 3.7 in the second, to 3.2 in this triennium.

TABLE 3.1: CORE DATA

Period	First triennial period	Second triennial period	Third triennial period
	(2008-2010)	(2011-2013)	(2014-2016)
Hospitals	121	177	250
Districts	40	49	49
All admissions	418 189	626 505	870 020
All deaths (Tallied)	17 880	16 299	17 637
All in hospital mortality rate	4.4	2.6	2.0
All deaths (audited)	17 994	16 776	16 692
Neonatal admissions	27 066	41 894	63 216
Neonatal deaths (tallied)	1 447	1 542	1 994
Neonatal in hospital mortality rate	5.4	3.7	3.2
Neonatal deaths (audited)	1 221	1 532	1 404
Child admissions	391 123	584 611	806 804
Child deaths (tallied)	16 433	14 757	15 643
Child IHMR	4.3	2.5	1.9
Child deaths (audited)	16 775	15 244	15 244
Neonatal deaths/all deaths (tallied)	8%	9%	8%
Neonatal admissions/all admissions (tallied)	6%	7%	7%
Neonatal deaths/all deaths (audited)	7%	9%	9%

PROFILE OF THE NEONATES WHO DIE IN CHILDREN'S WARDS (TABLE 3.2)

Thirty nine percent of the neonates died within 24 hours of arrival in hospital. This is down from the 45 per cent of the second triennial period, and now similar to the proportion in children (32 per cent)

Severe acute malnutrition remains far less common in neonates who die, occurring in six per cent, compared with the 33 per cent occurrence in children. Seven percent of neonates die without their weight being known.

Thirty six percent of neonates who die are HIV exposed, reflecting prevalence in pregnancy, which has not declined. A quarter still die with an unknown HIV laboratory status.

There has been a further increase in the mothers known to be negative at delivery (31 -38 per cent), with a corresponding decrease to 20 per cent who were 'unknown'.

The septicaemia rate appears to have come down a little to 29 per cent.

Sixty eight percent of the neonatal deaths were regarded as either avoidable or there was uncertainty about its avoidability.

TABLE 3.2: PROFILE OF NEONATAL DEATHS IN CHILDREN'S WARDS

Period	First triennial period (2008-2010) Audited NND=1221			Second triennial period (2011-2013) Audited NND=1532			Third triennial period (2011-2013) Audited NND=1404		
Length of stay	Number	Percent	Child	Number	Percent	Child	Number	Percent	Child
Death within 24 hours	595	49%	34%	695	45%	34%	546	39%	32%
Nutrition									
Severe acute malnutrition	80	7%	36%	81	5%	33%	79	6%	33%
Unknown	88	7%	7%	95	6%	6%	97	7%	6%
HIV									
Exposed	427	35%	24%	602	39%	23%	518	36%	19%
Infected	40	3%	28%	36	2%	21%	28	2%	17%
Unknown	553	45%	34%	510	33%	28%	360	26%	23%
PMTCT									
Mother negative at delivery	279	23%	20%	480	31%	31%	535	38%	37%
Unknown	399	33%	49%	397	26%	38%	282	20%	31%
Burden of disease									
Septicaemia	325	33%	23%	380	32%	24%	406	29%	17%
Was death avoidable?									
Yes	308	25%	30%	318	21%	34%	380	27%	32%
Not Sure	514	42%	41%	717	47%	38%	575	41%	34%
Total (Yes and unsure)	822	67%	71%	1035	68%	72%	955	68%	66%

CONCLUSION

The overall reduction in the neonatal in-hospital mortality continues. However, the vulnerability of the neonatal population is again emphasised by:

- the in-hospital mortality rate for neonates being higher than that for children
- neonates being more likely to die within 24 hours of arrival in hospital than children
- the HIV pandemic remaining significantly present, and efforts to decrease HIV infection in women of child-bearing age should be addressed
- sepsis being a major contributor to neonatal mortality

Neonates admitted to children's wards should be targeted as high risk, and efforts to identify and treat septicaemia early need to be intensified. Previous recommendations that neonates should be admitted to nurseries (specifically designed and staffed to serve their health needs) need to be revisited and implemented.

If 68 per cent of the 1 404 deaths were regarded as potentially avoidable, 954 lives in this population of neonates might have been saved.

TABLE 3.3 NEONATAL DEATHS IN CHILDREN'S WARDS BY DISTRICT

	First triennium (2008-2010)			Second triennium (2011-2013)			Third triennium (2014-2016)		
District	ENND	LNND	NND Total	ENND	LNND	NND Total	ENND	LNND	Total
Eastern Cape									
Alfred Nzo DM	-	-	-	0	2	2	-	4	4
Amathole DM	10	7	17	4	9	13	12	11	23
Cacadu DM	-	-	-	0	3	3	2	3	5
Chris Hani DM	0	0	0	0	2	2	4	11	15
Nelson Mandela MM	1	8	9	3	8	11	1	-	1
Oliver Tambo DM	2	10	12	0	7	7	3	17	20
Ukhahlamba District Municipality							1	2	3
EC Total	13	25	38	7	31	38	23	48	71
Freestate									
Fezile Dabi DM	1	4	5	4	3	7	1	3	4
Lejweleputswa DM	-	-	-	3	17	20	5	11	16
Motheo DM	11	13	24	8	13	21	4	25	29
Thabo Mofutsanyane DM	2	2	4	4	30	34	6	18	24
FS Total	14	19	33	19	63	82	16	57	73
Gauteng									
City of Johannesburg MM	18	33	51	75	90	165	89	76	165
City of Tshwane MM	0	2	2	19	39	58	19	34	53
Ekurhuleni DM	-	-	-	-	-	-	29	61	90
Sedibeng DM	-	-	-	-	-	-	-	3	3
West Rand DM	3	2	5	20	6	26	10	42	52
GP Total	21	37	58	114	135	249	147	216	363
KwaZulu-Natal									
Amajuba DM	6	10	16	1	5	6	9	19	28
eThekwini MM	48	57	105	32	47	79	30	64	94
iLembe DM	7	15	22	8	12	20	11	17	28
Sisonke DM	4	26	30	5	12	17	2	4	6
Ugu DM	14	45	59	3	15	18	19	21	40
uMgungundlovu DM	4	22	26	6	16	22	8	16	24
Umkhanyakude DM	0	3	3	4	15	19	16	10	26
Umzinyathi DM	9	11	20	6	9	15	3	2	5
Uthukela DM	0	8	8	5	6	11	5	6	11
Uthungulu DM	10	21	31	2	31	33	5	16	21
Zululand DM	7	19	26	9	33	42	5	12	17
KZN Total	109	237	346	81	201	282	113	187	300
Limpopo									
Capricorn DM	0	2	2	0	0	0	3	5	8
Greater Sekhukhune DM	0	0	0	0	1	1	-	-	-
Mopani DM	-	-	-	0	0	0	1	-	1
Vhembe DM	1	1	2	7	2	9	1	1	2
Waterberg DM	41	7	48	29	6	35	4	2	6
LP Total	42	10	52	36	9	45	9	8	17
Mpumalanga									
Ehlanzeni DM	59	95	154	86	136	222	51	119	170
Gert Sibande DM	176	87	263	157	91	248	95	49	144
Nkangala DM	45	42	87	43	45	88	34	36	70
MP Total	280	224	504	286	272	558	180	204	384
Northern Cape									
Frances Baard DM	2	7	9	9	16	25	14	10	24
JT Gaetsewe	-	-	-	0	0	0	5	1	6
Namakwa DM	0	0	0	1	1	2	-	-	-

Pixley ka Seme DM	2	2	4	6	7	13	1	-	1
Siyanda DM	0	2	2	1	7	8	3	9	12
NC Total	4	11	15	17	31	48	23	20	43
North West									
Bojanala Platinum DM	0	1	1	10	30	40	25	18	43
Dr Kenneth Kaunda DM	4	8	12	6	15	21	5	11	16
Dr Ruth Segomotsi Mompati DM	6	7	13	6	17	23	7	14	21
Ngaka Modiri Molema DM	15	23	38	6	6	12	5	3	8
NW Total	25	39	64	28	68	96	42	46	88
Western Cape									
Cape Winelands DM	2	1	3	6	6	12	1	2	3
Central Karoo DM	-	-	-	2	1	3	1	2	3
City of Cape Town MM	20	82	102	30	75	105	16	36	52
Eden DM	2	0	2	5	3	8	-	1	1
Overberg DM	0	1	1	0	0	0	-	-	-
West Coast DM	0	3	3	3	3	6	1	6	7
WC Total	24	87	111	46	88	134	19	47	66
Grand Total	**532**	**689**	**1 221**	**634**	**898**	**1 532**	**572**	**833**	**1405**

CHAPTER 4: SUMMARY OF A REPORT ON VISITS FOR ASSESMENT OF STATUS OF NEWBORN CARE SERVICES AT POORLY PERFORMING FACILITIES

S Matela, J Mahuntsi

PURPOSE

To provide a report on visits conducted by the National Newborn Care Team at 17 poorly performing hospitals as selected according to evidence on DHIS, to do assessment of status of newborn care services. The aim of the visit was to assess the status of the newborn care services, as well as the implementation of key recommended interventions in the selected poorly performing facilities, as observed from the performance of the Neonatal-in-Facility death rate indicator from the 2016/12017 financial year and DHIS Data. The outcome was to develop a Quality Improvement Plan so as to improve the status on services and thus to reduce neonatal mortality.

The district performances for 2016/2017 is shown in Table 4.1 below

TABLE 4.1 DISTRICT PERFORMANCE 2016-2017

District	Province	SB in facility	Deaths	Deaths	Total number of deaths	Live Births in Facility	Total Births in Facility	iNMR
			0-7days	8-28 days				
CoJ	GP	383	169	87	256	17815	18198	14.4
CoE	GP	348	174	43	217	16142	16490	13.4
CoT	GP	227	149	41	190	12670	12897	15.0
CoCT	WC	331	134	30	164	15695	16026	10.4
eThekwini	KZN	359	116	37	153	14417	14776	10.6
Capricorn	LP	151	112	16	128	5681	5832	22.5
OR Tambo	EC	141	101	15	116	6316	6457	18.4
Ehlanzeni	MP	190	65	9	74	10551	10741	7.0
Vhembe	LP	135	55	13	68	7294	7429	9.3
Mopani	LP	129	62	5	67	6266	6395	10.7
Sekhukhune	LP	148	58	8	66	6274	6422	10.5
Nkangala	MP	123	57	4	61	4857	4980	12.6
Buffalo City	EC	70	40	13	53	3178	3248	16.7
Sedibeng	GP	73	36	17	53	3718	3791	14.3

King Cetshwayo	KZN	127	41	12	53	4582	4709	11.6
Nelson Mandela Bay	EC	69	46	6	52	4726	4795	11.0
Bojanala	NW	102	40	12	52	5514	5616	9.4
West Rand	GP	46	40	11	51	3945	3991	12.9
Thabo Mofutsanyana	FS	78	46	4	50	3011	3089	16.6
Gert Sibande	MP	83	46	4	50	4275	4358	11.7
Dr Kenneth Kaunda	NW	66	40	9	49	3406	3472	14.4
uMkhanyakude	KZN	53	44	4	48	3706	3759	13.0
Mangaung	FS	104	37	10	47	3776	3880	12.4
iLembe	KZN	79	38	4	42	2831	2910	14.8
Lejweleputswa	FS	60	39	2	41	2304	2364	17.8
Waterberg	LP	78	38	3	41	3606	3684	11.4
Dr RSM	NW	53	36	2	38	1565	1618	24.3
Ugu	KZN	74	34	4	38	3276	3350	11.6
uMgungundlovu	KZN	116	29	9	38	4027	4143	9.4
Uthukela	KZN	74	30	6	36	2820	2894	12.8
Zululand	KZN	80	34	1	35	4319	4399	8.1
Alfred Nzo	EC	30	30	2	32	2809	2839	11.4
Chris Hani	EC	40	25	3	28	2582	2622	10.8
Harry Gwala	KZN	43	20	7	27	1945	1988	13.9
Umzinyathi	KZN	32	23	2	25	2574	2606	9.7
Cape Winelands	WC	52	22	3	25	3652	3704	6.8
Frances Baard	NC	44	14	8	22	2025	2069	10.9
Eden	WC	44	15	6	21	2299	2343	9.1
Amathole	EC	23	18	2	20	1870	1893	10.7
Sarah Baartman	EC	43	17	2	19	1439	1482	13.2
JTG	NC	27	16	1	17	1098	1125	15.5
Fezile Dabi	FS	50	15	2	17	1709	1759	9.9
Amajuba	KZN	46	14	3	17	1974	2020	8.6

Ngaka Modiri Molema	NW	104	17	0	17	3051	3155	5.6
West Coast	WC	15	12	0	12	947	962	12.7
Central Karoo	WC	4	7	0	7	241	245	29.0

FACILITIES VISITED

FS: Pelonomi Tertiary Hospital

Bongani Regional Hospital

EC: Nelson Mandela Central Academic Hospital

Mthatha Regional Hospital

KZN: Lower Umfolozi War Memorial Regional Hospital

Bethesda District Hospital

Limpopo: Voortrekker District Hospital

Mokopane Regional Hospital

Mankweng Tertiary Hospital

Polokwane Tertiary Hospital

Mpumalanga: Themba Regional Hospital

Rob Ferreira Tertiary Hospital

Nelspruit CHC

Northern Cape: Kimberley Provincial Hospital

Tshwaragano District Hospital

North West: Mahikeng Provincial Hospital

Gelukspan District Hospital

OBJECTIVES

- Presentation of PPIP, DHIS data by the province and facility.
- Assessments of institutionalization of reporting systems (PPIP, CHIPP, DHIS).
- Understanding of value chain systems, referrals, relationships of facilities, district and province with feeder and catchment facilities.

- Assessment of utilization of enabling systems in place such as DCSTs as health system analysts, clinicians and disease specialists.
- Assessment Reporting systems and levels of responsibilities, provincial engagement.
- Walkabout through the obstetric and neonatal units by the team
- Development of Quality Improvement Plans for province, district as well as for facilities visited.
- Development of regionalisation or catchment facilities plans.

MAIN CHALLENGES IDENTIFIED

- Leadership:
    - Non integrated approach to New-born Care at all levels within the health system
- Management:
    - Varied levels of insight by management around New-born Care agenda, especially the disjuncture between clinical management of New-borns by clinicians and Administrative management and creation of enabling environment by managers
- Governance:
    - Non-uniformity of presence and functionality of governance structures for New-born Care in the system; within provinces, districts and facilities (and between various levels of care)
- Attrition of DCST posts in some provinces, non-filling of some critical positions and lack of budgeting for such, coupled with non-recognition of the role of DCSTs in some provinces leads to ineffectiveness of clinical governance for new-borns
- Human Resources:
    - Poor HR efficiencies across the board
    - Insufficient skills and competencies.
- Infrastructure:
    - Not-fit-for-purpose infrastructure in most provinces.
- Health Technology:
    - Poor investment in Health Technology
    - Poor maintenance of existing equipment in some provinces
- Supply Chain Management:
    - Challenges persist in some provinces but on the whole most provinces have improved in availing consumables
- Financial Management: Lack of a ring fenced MNCWH budget is a challenge for all provinces especially in the climate of severe financial constraint
- Emergency Transport:
    - Most provinces are not investing adequately in budgets for this programme both for ground and air transport
    - Contract management challenges exist in provinces that are contracted with a private service provider e.g. FS and NW
- Referral Pathways:
    - A total revision of referral pathways (in light of the anticipated consolidation of Caesarean Section sites and provision of basic versus comprehensive emergency obstetric and neonatal services) is needed.

MAIN LESSONS LEARNED

- Better performing facilities were premised on a capable facility leadership, supported by a capable and committed district leadership, and communication and responsiveness from provincial management.
- Almost all provinces that had challenges were unaware of budget processes and sources of funding available to the facilities, particularly grant funding from infrastructure and HIV/TB grants.
- Where there is provincial leadership of the MNCWH program, particularly in the form of a provincial specialist, there is better strategic direction and coordination of functions, norms and standards.
- Constant monitoring and evaluation of progress is critical in making sustainable gains; lack of sustainable progress is due to persistent leadership challenges and lack of stability in most provinces and facilities.
- Human Resource Management is the most devastating feature of failures in the Health system, impacting most negatively on neonates. Both in terms of non-investment in attrition of personnel; non- recruitment and retention of skilled personnel; and most worrying, lack of clinical governance, accountability and consequence management processes in facilities.

PROGRESS MADE IN THE 17 FACILITIES

- Quality Improvement Plans (QIPs) have been drawn up by all facilities, districts and provinces visited (February- May 2017).
- Letters and reports to 7 HoDs were written, highlighting findings and recommendations emanating out of the visits by DDG: MNCWH/HIV/TB.
- HoDs to report on quarterly basis the progress on QIPs to NDOH: DDG
- Meeting with Infrastructure and Health Technology Cluster has resulted in 9 Chief Directors of the provinces being engaged on Maternal and Neonatal needs in their respective provinces, Funds were redirected from the Infrastructure Grant in 2 provinces (EC & NC) successfully to address the findings in this F/Y 17/18; other provinces have pledged to budget appropriately in F/Y 18/19. To be followed up by NDoH Chief Director : Infrastructure.
- HoD Integrated Plan meetings held in almost all provinces (except GP and NW).
- Health System workshops held in 34 districts to address Safe Caesarean Section concept implementation.

17 FACILITY VISIT UPDATES BY 31 JANUARY 2018

EC:

- All medical equipment procured for Uitenhage Provincial and Mthatha Regional Hospital has been delivered; outstanding equipment orders for Dora Nginza and NMCH; funds exhausted; to be rolled over to next financial year.
- 500 Professional Nurses have been employed for the facilities in EC after HR efficiency audit was completed.
- Infrastructure challenges at NMCH Neonatal Unit still NOT corrected, babies have been returned to the facility from Mthatha Regional Hospital.
- All delivery facilities in EC now capture PPIP data and have institutionalised Mortality Audits.

- Plan for consolidation of comprehensive Maternity/Neonatal services in 16 identified hospitals in place, approved by HoD; to monitor progress on implementation in the next financial year.

FS:

- Project completion of Pelonomi Maternity/Neonatal Unit at 60% now, already at roof level.
- Submissions for appointment of nurses not approved by Treasury, however professional nurses from Trompsburg deployed to Pelonomi currently to assist and gain skills.
- Head Clinical Unit: Neonatology appointed at Pelonomi in July 2017.
- Bongani appointed 2 Medical Officers in O&G and 1 MO in Anaesthesia.
- Decanting of Bongani now done effectively to Katleho and Thusanong Hospitals.
- Brain cooling apparatus to be procured for all 5 regional hospitals in FS for management of Asphyxia.

KZN

- Funding identified under Health Facility Revitalization Grant for procurement of 23 Air Compressors for district hospitals without medical air; for procurement of medical equipment and maintenance of equipment at LUWMRH and Bethesda.
- Re-organisation of patients at LUWMRH to address challenges of overcrowding, hypothermia and lack of resuscitation facilities like oxygen in KMC unit done.
- Eshowe District Hospital identified as Decant facility for LUWMRH, to be equipped accordingly with help of Provincial Infrastructure.

LP

- Funding to be identified under Health Facility Revitalization Grant for Health Technology of facilities visited.
- Project to build new facility at Polokwane for Maternal and Child Services not off the ground and as such, overcrowding challenges at Mankweng persist.

MP

- Water challenges improved with procurement of Water Tanks at Themba hospital.
- Nelspruit CHC personnel now rotating at Rob Ferreira to address decanting challenges.
- Challenges remain with infrastructure for both Themba Maternity and Rob Ferreira ICU facilities. There are no approved plans in the medium term to cater for these desperately needed facilities.
- NDOH Infrastructure engaged to assist these two facilities as a matter of urgency.

NC:

- Establishment of Maternity Waiting Home done in JTG district at Tshwaragano district hospital.
- Establishment of a Neonatal Resuscitation Area in Paediatric Ward done.
- Infrastructure officials engaging with CEO to provide funding for Equipment and new-build of a maternity Unit; funds available and approval given. Construction to commence in new financial year.
- Training of nursing personnel in MSSN done by FS Master Trainer.

- In-reach by Medical Officers to Kimberley Provincial hospital ongoing.

NW

- 15 Cleaners employed for Gelukspan District Hospital.
- Paediatrician from Regional Hospital does outreach to train personnel in Gelukspan.
- KMC protocols now in place.
- Decanting of patients from Regional Hospital to surrounding district hospitals now done due to consultant outreach visits.

RECOMMENDATIONS FOR QUALITY IMPROVEMENT FOR FACILITIES (PROVINCE AND DISTRICT ASSISTANCE)

- Leveraging of HIV/TB CONDITIONAL GRANT, HEALTH FACILITY REVITALISATION GRANT and NATIONAL TERTIARY SERVICES GRANT for Maternal and New-born Health issues within the 2017/2018 financial year and beyond.
- HoDs to be rigorously held accountable on a quarterly basis for QUALITY IMPROVEMENT PLANS they have committed.
- HoDs to monitor their own provincial data on Maternal and Neonatal mortality, including adverse events related to mothers and new-borns (e.g. PATSIS - patient surveillance information system).
- Intensify Community Health Worker involvement in New-born Care especially in the 6 days Postnatal visit at household level, linkages of CHWs with discharging and delivery facilities must be enforced.
- Intensification of existing programmes: CCMT, PMTCT, Supplemental Nutrition for Pregnant and Lactating Mothers, ESMOE and HBB training, MSSN training and family planning

Intensification of efforts in the districts shown below (based on 2016/17 and 2017/18 data), using lessons learnt from the 17 facilities assessment tour:

District		iNMR
Dr Ruth Segomotsi Mompati	(NW)	24.3/1000
Capricorn	(LP)	22.5/1000
OR Tambo	(EC)	18.4/1000
Lejweleputswa	(FS)	17.8/1000
Buffalo City	(EC)	16.7/1000
Thabo Mofutsanyana	(FS)	16.6/1000
John Taolo Gaetsewe	(NC)	15.5/1000
City of Tshwane	(GP)	15.0/1000
iLembe	(KZN)	14.8/1000
City of Johannesburg	(GP)	14.4/1000
Dr Kenneth Kaunda	(NW)	14.4/1000
Sedibeng	(GP)	14.3/1000
Harry Gwala	(KZN)	13.9/1000
City of Ekurhuleni	(GP)	13.4/1000
Sarah Baartman	(EC)	13.2/1000
Umkhanyakude	(KZN)	13.0/1000

CHAPTER 5: THERAPEUTIC HYPOTHERMIA – RECOMMENDATIONS

Prof S Velaphi and Dr N Rhoda

The burden of asphyxial deaths in South Africa is discussed in detail under the analysis section in this interim report of 2016. The worrying factor is that in 88 per cent an avoidable factor has been identified and of these, 60 per cent are probably avoidable. That means that in the calendar year 2015 *1000 deaths due to asphyxia could have been saved.*

The consequence of newborns born with asphyxia is neonatal encephalopathy and this is a growing litigation concern especially as deaths due to asphyxia are the top cause of neonatal mortality in babies weighing >1kg. Provinces are spending a large sum of finances on settling these cases. On average the state spends between R10 - R 20 million per case.

NaPeMMCo have made many recommendations in the last few years to address the upstream causes (better intrapartum care/ neonatal resuscitation) and this year have asked that all provinces focus on reducing the asphyxial deaths. The majority of asphyxial deaths however are occurring at district level and at the August 2016 NaPeMMCo meeting, Prof Alan Horn presented "therapeutic cooling – feasibility at district level" to the forum.

The resources – both financial and human - required to provide therapeutic hypothermia in public hospitals is quite exorbitant. Across the provinces therapeutic cooling implementation varies according to protocols and methods use. In the majority of provinces cooling is only happening at tertiary and regional hospitals and very few district hospitals.

Recommendations from the meeting were as follows:

- The country should focus more on prevention of asphyxia- upstream factors e.g. identification of at-risk fetus before delivery, safe caesarian section, effective intra-partum care, etc.
- Conservative management in severe encephalopathy when using the recommended Thompson score.
- For now, therapeutic hypothermia should only be practiced under strict evidence-based protocols or in a research environment.
- The various methods of low cost cooling have not been fully evaluated with long term follow-up.
- A task team led by Dr Firdose Nakwa will review the literature and write a simplified cooling protocol for use in regional and large district hospitals.

CHAPTER 6: KINC MODEL OF FUNDING FOR NEWBORN CARE

Dr Horwood and Dr Rhoda

BACKGROUND

In 2012 South Africa adopted the Limpopo Initiative for Neonatal Care (LINC) guidelines as the South African Initiative for Neonatal Care (SAINC). The SAINC package was given to the DCSTs on their induction, to be used as a comprehensive guideline to assess and manage newborns at district level.

The management of the small and sick (MSSN) was included in the package as the essential guidelines for the care of newborns at district level. It was based on the IMCI principles but also included routine care for all newborns, breastfeeding and postnatal care follow up. The national department of health between 2013 and 2015 trained master trainers for each province. It was the duty of the master trainers to link with the provincial Regional training centres (RTCs) to roll out training to the districts. Since many RTC were no functional MSSN roll out was halted.

In KZN funding was acquired ELMA philanthropies with administrative support from Centre for Rural Health. In conjunction with the provincial department of Health including the DCST and provincial paediatrician, KINC was to conduct MSSN training, monitoring and evaluation at all 39 district level. Thus the KZN Initiative for Newborn Care (KINC) aimed to improve the quality of newborn care in district hospitals. This was achieved over a three-year period and the midpoint evaluation have shown measurable improvements in aspects of quality of care provided in district hospitals over the 18 month period of initial implementation of the KINC programme.

KEY FINDINGS OF THE KINC EVALUATION AT MIDPOINT

The facility review conducted in all KZN district hospital nurseries at baseline and midpoint of the three year KINC project showed overall improvements in the aspects of quality of care that were measured during the facility survey. The report is available at http://www.kznhealth.gov.za/kinc.htm.

- Improvements in the resources available in most hospitals from baseline to midpoint, including staffing, capital equipment, consumables and drugs, and the availability of KINC guidelines.
- No improvements in functioning of high care beds from baseline to midpoint including readiness of high care beds, availability of portable oxygen and suction, as well as infrastructure like wall oxygen points, suction points and electrical points.
- An increase in the number of facilities complying with Department of Health admission policies for newborns.
- An increase in the number of district hospitals able to provide evidence of PPIP implementation and minutes of perinatal review meetings.
- An improvement in the number of facilities complying with recommendations for care in the KMC unit and in the postnatal ward.
- A small improvement in the demonstrable skills of staff at the time of the midpoint assessment compared to baseline but many skills remained poor.
- Improvements in the resuscitation equipment, available; however, there continued to be important gaps in compliance with many requirements for resuscitation equipment, particularly in labour ward and theatre.
- There was a notable improvement in the average scores for most facilities from baseline to midpoint across all three domains (resources, care practises and resuscitation equipment). A small number of facilities deteriorated.

- Composite scores for performance at baseline and midpoint **improved by over 20 per cent** with 34/38 hospitals showing an improved score from baseline to midpoint.
- Knowledge of health workers improved after KINC training.

KINC attributes it early success to:

- Skilled and respected facilitators
- High level effective support from the DoH
- Logistical support from the DoH
- DSCT support
- ELMA funding: supportive and flexible
- Active and supportive task team
- Ability to pro-actively address challenges
- Strong admin support

CONCLUSION:

KINC were able to show improvements in many of the components that contribute to provision of a quality service.

NAPEMMCO RECOMMENDATIONS:

A core group consisting of the NaPeMMCo chair Prof Gebhardt, KINC funders Elma Philanthropies, LINC team led by Dr Anne Robertson and the KINC lead Dr Horwood convened a meeting to discuss the merits of this model of funding a newborn care training ie: provincial MCWH support, and a local NGO to partner with funders.

It is clear that the KINC training model has improved the **quality of care** within the district hospitals by increasing knowledge, upskilling health workers and improvements in infrastructure and equipment. These have all been identified as previous barriers to improving neonatal care in the midterm review of the Maternal, Newborn, Child and Women's health and Nutrition Strategy 2012-2016.

NaPeMMCo makes a strong recommendation that provinces use the KINC model of funding and training (modified as SAINC) as one method to scale up neonatal training in the rest of the country.

The Newborn Care Toolkit from the department of Health should be used for the implementation of newborn services.

CHAPTER 7: COMMUNITY NEONATAL IMCI

Dr Tanya Doherty

EXPANDING THE ROLE OF COMMUNITY HEALTH WORKERS IN SOUTH AFRICA

South Africa has emerged from the Millennium Development Goal (MDG) era with a mixture of success and failure. South Africa's MDG baseline of 60 under-five deaths per 1 000 live births meant a target of 20.[1] Estimates from rapid mortality surveillance placed the U5MR in 2014 at 39.[2] Much of this reduction has been due to the successful national scale-up of prevention of mother-to-child transmission (PMTCT) of HIV services with increasingly efficacious antiretroviral regimens reducing the mother-to-child transmission rate at –four to eight weeks to around 2.6 per cent.[3] As a result, HIV/AIDS is no longer the leading cause of under-5 mortality – it has been surpassed by neonatal deaths (27 per cent), gastroenteritis (nine per cent) and suspected pneumonia (15 per cent).

Although no current data are available, over the past few decades – including during the height of the HIV/AIDS epidemic – there appears to have been no progress in coverage of high-impact interventions for pneumonia and diarrhoea (Figure 7.1):

- The proportion of children <5 years old with symptoms of pneumonia taken to an appropriate healthcare provider declined from 75 per cent in 1998 to 65 per cent in 2003 (the most recent Demographic and Health Survey)
- Coverage of oral rehydration solution (ORS) for children with diarrhoea declined from 51 per cent in 1998 to 40 per cent in 2003[4]
- Exclusive breastfeeding rates remain low around eight per cent under six months

This is reflected in the trends in under-five mortality due to pneumonia and diarrhoea (Figure 7.2).

A recent review[5] of child deaths in two medicolegal mortuaries in Cape Town and Durban found that lower respiratory tract infections (LRTIs) and diarrhoea were the most common causes of sudden, unexpected natural deaths among children under-five at both sites. Of the natural deaths, LRTIs accounted for 65 per cent of infant deaths and 56 per cent of –one to four-year-old deaths, respectively. Deaths due to diarrhoea accounted for 12 per cent of infant and 26 per cent of –one to four-year-old natural deaths, respectively. Importantly, the majority of these deaths occurred outside of healthcare facilities. Almost half (44 per cent) of the LRTI deaths were among infants born prematurely, with many of these deaths occurring soon after babies were discharged from hospital.

As a strategy to complement facility-based integrated management of childhood illness (IMCI) and in conjunction with broader efforts to address the major causes of child mortality, integrated community case management (iCCM)was endorsed by the World Health Organization (WHO) and the United

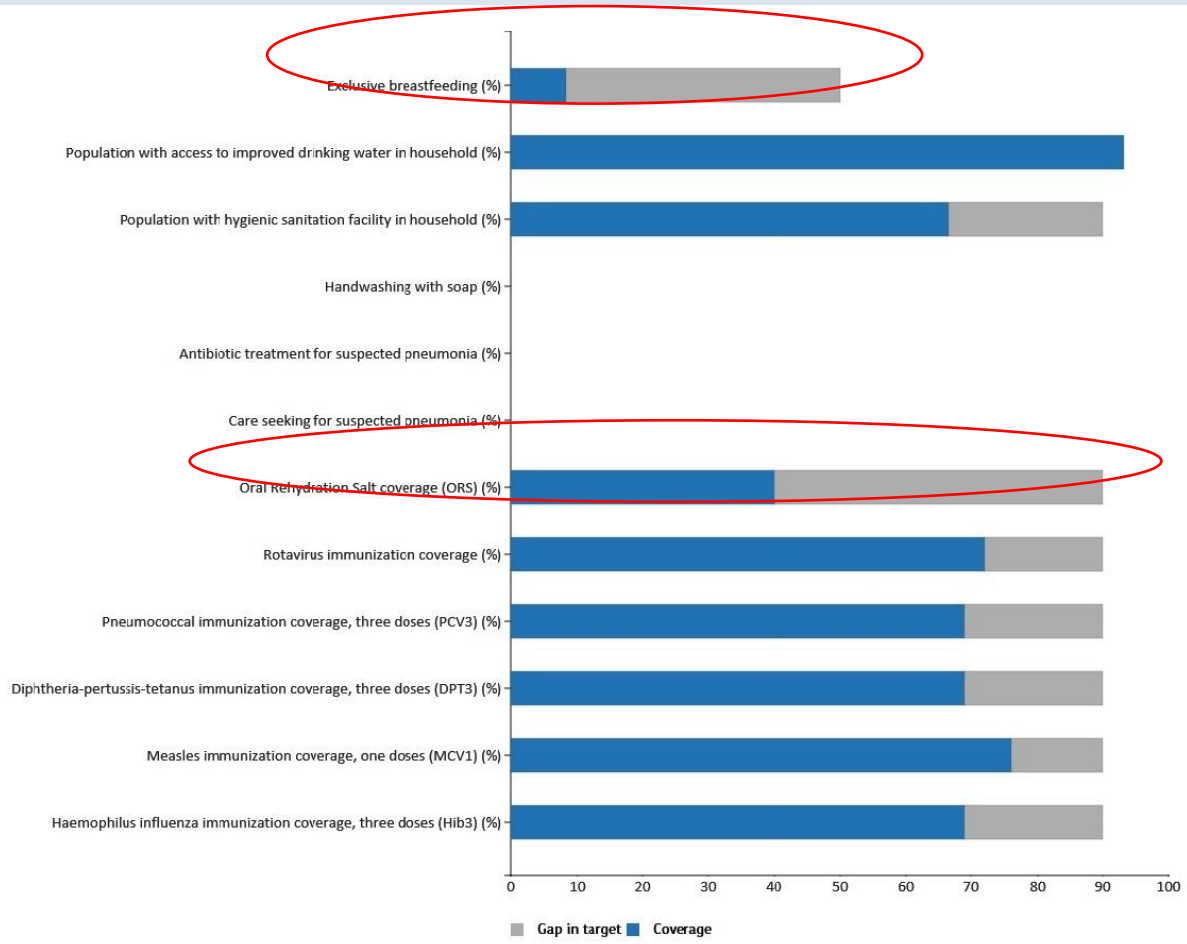
Nations Children's Fund (UNICEF) in 2012 as an equity-focused strategy to train, supply and supervise community health workers (CHWs) to diagnose and treat diarrhoea, malaria and pneumonia among children under-five years in communities where access to health services is poor.[6] In some settings, the package of treatment services includes severe acute malnutrition and antibiotics for neonatal sepsis. The joint statement by the WHO and UNICEF was based on accumulated evidence of the effectiveness of CHWs in increasing uptake of high-impact child survival interventions, most notably breastfeeding,[7] reducing child mortality[8] and reducing both early and late neonatal mortality[9] through a package of community-based interventions including treatment.

The uptake of iCCM by national governments in Africa has been rapid, increasing from a total of seven countries with iCCM policies in 2005 to 28 countries by 2013.[10] The scale-up of community-based delivery platforms, including treatment of the common causes of child deaths, has contributed to the achievement of MDG4 in several countries in Africa, including Malawi, Ethiopia and Niger.[11,12]

In South Africa currently, the proposed role for CHWs is extremely narrow, focusing primarily on counselling around prevention activities and adherence support. There are no curative functions included in their scope of work. Closing the existing coverage gaps in order to sustain child mortality reduction is unlikely unless the prevention and treatment of the current leading causes of child deaths – most notably pneumonia, diarrhoea and neonatal deaths – are tackled in an integrated equity-focused manner, including increasing access to care through community-based delivery.

Evidence and experience amply demonstrate that CHWs in sufficient density can have a rapid and positive impact on neonatal and young child mortality, especially when allowed to treat common acute conditions.

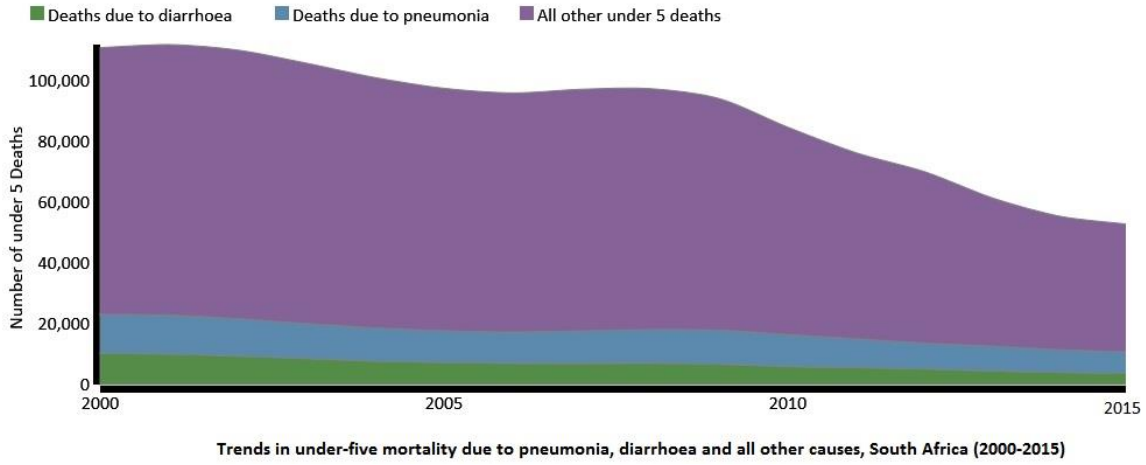
FIGURE 7.1: GAPS IN SELECTED INDICATORS FOR REACHING TARGETS, SOUTH AFRICA



Source WHO, GAPPD Visualisation Monitoring Tool

http://www.who.int/maternal_child_adolescent/epidemiology/gappd-monitoring/en/

FIGURE 7.2 TRENDS IN UNDER 5 MORTALITY



Trends in under-five mortality due to pneumonia, diarrhoea and all other causes, South Africa (2000-2015)

Source WHO, GAPPD Visualisation Monitoring Tool

http://www.who.int/maternal_child_adolescent/epidemiology/gappd-monitoring/en/

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CHAPTER 8: ESSENTIAL PACKAGE OF CARE (EPAC)

The scope of an essential package of care (EPaC) for children's health for South Africa

Prof Anthony Westwood and Dr Natasha Rhoda

An EPaC for children is the second of the eight recommendations of the Committee on Mortality and Morbidity in Children in South Africa (CoMMiC) in its first triennial report (page 103) which was accepted by the Minister of Health, Dr Aaron Motsoaledi in 2011.

While the emphasis of this EPaC is to be on the "main causes of mortality in young children" (the main focus of the committee's work), the committee's recommendation to develop a set of "core norms and standards" takes the scope of the package beyond a disease-based package to a package that provides a standard of healthcare for children within which the "main causes of mortality" are addressed.

THE SCOPE OF THE EPAC INCLUDES:

1) Essential content areas within child health

The essential content areas enable prioritisation of essential sets of interventions to address children's health in South Africa. Prioritisation can then take place both within and between content areas. The essential content areas also enable an analysis of existing service content and its re-definition within the content areas framework and their incorporation into the EPaC where appropriate. The proposed essential content areas are set out in the attached framework document.

2) The description and detailing of comprehensive care pathways, stratification of care by levels of health care and their linkages

Comprehensive care pathways include essential aspects of healthcare delivery such as clinical protocols and standard operating procedures, staff competencies and skills, supplies such as equipment and consumables, necessary stationery, and monitoring and evaluation tools. In describing comprehensive care pathways within the content areas, the EPaC process can identify gaps within existing resources and tools along those care pathways within the levels of care in the health services, both private and public. This approach promotes strengthening of generic healthcare for children at each of these levels, improving the ability of these services to implement the detailed content of the EPaC as it relates to specific priority health conditions at all levels. It also facilitates the process of harnessing existing resources and tools and filling any identified gaps along pathways of care for specific priority conditions in the content areas.

Thus the proposed scope of the EPaC emphasises comprehensive integrated **horizontal** (i.e. at a particular level of care) and **vertical** (i.e. across the levels) service delivery. It covers what is important both in terms of the delivery vehicles within the health systems in South Africa and also enables

prioritisation of specific content areas based on established child health needs in the country. This approach is set out in more detail in the EPaC Framework document.

THE NEONATAL INPUT TO EPAC

Phase 1: On 11-13 May 2016, COMMiC ran a workshop in Brooklyn, Pretoria where the Napemmco chairperson was invited to the present and provide the neonatal input to the working group. The EpaC framework which was discussed and finalised during the workshop allowed the neonatal component to be populated into the framework.

Since neonatal care was the closest to completion within EpaC, it was decided to use neonatal care as the practical example of how the framework could be used by managers and clinical staff as a tool to improve neonatal care – holistically. This was then to be presented to the DDG.

Phase 2 would be to develop a three-year plan to finalise and pilot EPaC.. A three-day planning meeting resolved to:

- realign EPaC framework/template based on inputs from DDG and NHI
- identify key milestones/deliverables to finalise the EPaC (e.g. acute paediatric care package, cardiology package, research/evidence repository, costing, etc.)
- identify resources required to finalise and pilot EPaC (e.g. technical/content experts, project manager/secretariat, health economist, researcher, web/app developer, website host, etc.)
- identify potential partners and funders to provide required resources
- compile a three-year costed EPaC finalisation and pilot implementation plan
- compile funding proposals for identified funders (ELMA, NHI, Melinda and Bill Gates, Newton Foundation, Discovery Foundation, Atlantic Philanthropies, etc.)

Timelines:

December 2016 –completion of phase 2

Phase 3: to finalise and pilot EpaC in KZN, Limpopo and WC with a three-year implementation plan (2017-2020).

NAPEMMCO MEMBERS 2017

Chairperson
Prof. Stefan Gebhardt

Vice Chairperson
Dr N R Rhoda

Provincial members

Dr Adejayan Olubunmi (North West)
Prof. Stefan Gebhardt (Western Cape)
Dr Kim Harper (Eastern Cape)
Dr Aldrige Jassen (Northern Cape)
Theresa Makatane (Free State)
Dr Maphosa (Mpumalanga)
Lolly Mashao (Limpopo)
Prof. Dineo Mawela (Gauteng)
Thobekile Mpembe (KwaZulu-Natal)

Other
Dr Karl Le Roux (RUDASA)
Prof. Debbie Bradshaw (MRC)
Dr Mark Patrick (Child PIP)
Prof. Pattinson (NCCEMD)
Prof. S Velaphi (Gauteng)

CHAPTER 9 RECOMMENDATIONS

1. Reduce the number of unnecessary CS by training health care workers to correctly do and interpret fetal monitoring and fetal growth.
2. Continue to provincialise the use of PPIP as a tool for capturing mortality.
3. Reduce the data gaps (under-reporting of deaths on PPIP) in Gauteng and KZN
4. Decrease the NMR to 8/1000 by 2020
5. Decrease the overall PNMR by 10% by 2020 2020 (target of PNMR overall of 27/1000 and for babies >1000g a target of 20/1000)
6. Pilot and monitor the introduction of the neonatal register in SA
7. Train health care workers in the risk assessment and management of re-admitted neonates in children's wards
8. Continue to focus on ways to reduce deaths due to prematurity and intra-partum asphyxia
    - The HHAPI-NeSS interventions from the previous triennial report all still apply
    - Continue with scale-up of Helping Babies Breathe (HBB) and Managing Small and Sick Neonates (MSSN) programmes and roll-out of CPAP
    - Focus on improving intra-partum care with EMSOE and the safe CS package
9. Reduce deaths due to unexplained stillbirths, especially in the third trimester
    - Continue roll-out and scale up of BANC plus:
        - increase patient awareness of fetal movements
        - emphasis on monitoring fetal growth
        - early detection and management of hypertensive disease
    - Further investigation of the role of Umbiflow™, with a view to scaling it up in the country.
10. Develop a simplified protocol for therapeutic hypothermia at district level
11. Work with the DCSTs to improve newborn leadership at all levels
12. Provide guidelines to CHWs to improve maternal and neonatal care at community level.

FACT SHEETS PER PROVINCE

Ranking of district's Low Birth Weight Rate per 1000 deliveries

District	LBWR
Pixley ka Seme	23.5
Frances Baard	21.6
Central Karoo	20.9
Namakwa	19.0
ZF Mgcawu	18.4
Nelson Mandela Bay	16.9
Sarah Baartman	16.8
City of Johannesburg	15.4
Eden	15.4
uMgungundlovu	15.2
Dr Ruth Segomotsi Mompati	14.7
Cape Winelands	14.6
Amajuba	14.5
Dr Kenneth Kaunda	14.5
City of Cape Town	14.2
Ngaka Modiri Molema	13.9
OR Tambo	13.6
Buffalo City	13.5
West Coast	13.5
Chris Hani	13.3
Mangaung	13.3
King Cetshwayo	13.2
West Rand	13.0
Lejweleputswa	13.0
Overberg	12.9
Bojanala Platinum	12.9
City of Tshwane	12.8
Sedibeng	12.7
Nkangala	12.7
John Taolo Gaetsewe	12.6
Ekurhuleni	12.4
Joe Gqabi	12.3
Thabo Mofutsanyana	12.2
uThukela	12.1
Capricorn	12.0
Waterberg	12.0
eThekwini	11.6
Ehlanzeni	11.5
Ugu	11.4
Fezile Dabi	11.3
iLembe	11.2
Gert Sibande	10.9
Mopani	10.0
uMkhanyakude	9.9
Harry Gwala	9.6
Alfred Nzo	9.6
uMzinyathi	9.4
Amathole	9.3
Vhembe	9.1
Sekhukhune	8.9
Zululand	8.8
Xhariep	8.6

Ranking of district's Perinatal Mortality Rates per 1000 deliveries

District	PNMR
Capricorn	45.8
Lejweleputswa	43.3
John Taolo Gaetsewe	40.4
Frances Baard	39.4
OR Tambo	39.2
Namakwa	38.5
ZF Mgcawu	38.4
King Cetshwayo	37.5
Mangaung	37.4
Dr Ruth Segomotsi Mompati	37.3
uMgungundlovu	35.7
Fezile Dabi	35.1
Nelson Mandela Bay	34.8
Central Karoo	34.6
Buffalo City	34.4
iLembe	33.8
Dr Kenneth Kaunda	33.8
Amajuba	33.5
uThukela	33.4
Nkangala	33.1
eThekwini	32.9
Waterberg	32.5
Thabo Mofutsanyana	32.5
Ngaka Modiri Molema	31.7
Gert Sibande	31.7
Bojanala Platinum	31.5
City of Tshwane	30.6
Ugu	30.4
Ekurhuleni	30.4
Sekhukhune	30.3
Harry Gwala	30.0
Chris Hani	30.0
Sarah Baartman	29.5
City of Johannesburg	29.0
Xhariep	28.9
Mopani	28.5
Pixley ka Seme	28.4
Sedibeng	27.8
Ehlanzeni	27.7
uMzinyathi	26.7
Joe Gqabi	26.7
Zululand	25.9
Eden	25.1
City of Cape Town	24.4
Vhembe	24.3
Alfred Nzo	22.7
Amathole	22.6
uMkhanyakude	22.4
West Rand	22.2
Cape Winelands	19.9
West Coast	19.5
Overberg	18.4

Ranking of district's stillbirth rate per 1000 deliveries

District	SBR
Lejweleputswa	30.2
Namakwa	27.2
Capricorn	27.1
uMgungundlovu	26.9
Frances Baard	26.8
Mangaung	26.7
Dr Ruth Segomotsi Mompati	25.9
uThukela	25.7
King Cetshwayo	25.6
Nkangala	25.1
Thabo Mofutsanyana	24.3
OR Tambo	24.3
Amajuba	24.1
Central Karoo	23.9
Xhariep	23.1
Fezile Dabi	23.0
Bojanala Platinum	23.0
John Taolo Gaetsewe	22.9
Dr Kenneth Kaunda	22.7
Buffalo City	22.2
iLembe	22.1
eThekwini	22.0
ZF Mgcawu	21.9
Gert Sibande	21.5
Ugu	21.3
Sekhukhune	21.2
Ngaka Modiri Molema	21.2
City of Tshwane	20.4
Ekurhuleni	20.2
Sedibeng	20.1
Waterberg	19.5
Ehlanzeni	19.5
Chris Hani	19.3
Sarah Baartman	19.1
City of Johannesburg	19.0
Nelson Mandela Bay	18.7
Mopani	18.5
Pixley ka Seme	18.4
City of Cape Town	18.4
Eden	18.4
Joe Gqabi	17.6
Zululand	17.4
Harry Gwala	16.6
Vhembe	16.4
uMkhanyakude	16.3
uMzinyathi	16.2
Alfred Nzo	15.3
West Rand	14.3
Cape Winelands	14.3
Amathole	13.9
West Coast	13.6
Overberg	10.9

Ranking of district's PNMR per 1000 deliveries for spontaneous preterm labour

District	SPTL
Ngaka Modiri Molema	9,9
King Cetshwayo	7,2
Lejweleputswa	6,4
Capricorn	6,4
Bojanala Platinum	6,4
Frances Baard	5,0
Fezile Dabi	4,9
Mopani	4,6
Pixley ka Seme	4,5
Sedibeng	4,5
uMzinyathi	4,4
Xhariep	4,4
Nelson Mandela Bay	4,3
Dr Kenneth Kaunda	4,3
uMgungundlovu	4,1
Chris Hani	4,0
Amathole /Buffalo City	3,9
Sekhukhune	3,9
Mangaung	3,9
Waterberg	3,8
Thabo Mofutsanyana	3,7
Zululand	3,7
John Taolo Gaetsewe	3,7
Harry Gwala	3,5
Ugu	3,4
Vhembe	3,4
OR Tambo	3,2
Ehlanzeni	3,1
Ekurhuleni	3,1
Eden	3,1
Namakwa	3,0
Gert Sibande	2,9
Joe Gqabi	2,9
Sarah Baartman	2,9
Tshwane	2,6
Nkangala	2,5
Central Karoo	2,5
uThukela	2,4
Johannesburg	2,2
iLembe	2,2
Dr Ruth Segomotsi Mompati	2,1
Cape Winelands	2,0
Overberg	2,0
West Coast	2,0
eThekwini	1,9
Amajuba	1,9
Alfred Nzo	1,8
uMkhanyakude	1,3
Cape Town	1,1
West Rand	0,7
ZF Mgcawu	0,0

Ranking of district's PNMR per 1000 deliveries for hypertensive disorders

District	Hypertensive disorders
Capricorn	7,9
OR Tambo	6,5
King Cetshwayo	6,4
Ngaka Modiri Molema	6,3
Sekhukhune	5,1
Bojanala Platinum	4,9
Gert Sibande	4,8
Ehlanzeni	4,8
Nkangala	4,6
Chris Hani	4,3
Thabo Mofutsanyana	4,2
Mopani	4,0
Mangaung	3,6
uMgungundlovu	3,4
iLembe	3,1
uThukela	3,0
Lejweleputswa	3,0
Zululand	2,9
Vhembe	2,9
Frances Baard	2,9
Dr Kenneth Kaunda	2,8
Waterberg	2,7
Fezile Dabi	2,3
Ugu	2,3
Sedibeng	2,0
Johannesburg	2,0
Harry Gwala	1,9
Amajuba	1,9
Joe Gqabi	1,8
eThekwini	1,8
Ekurhuleni	1,5
uMkhanyakude	1,4
Sarah Baartman	1,4
Eden	1,4
Namakwa	1,4
Cape Town	1,4
Tshwane	1,3
Central Karoo	1,2
Nelson Mandela Bay	1,2
West Rand	1,1
Dr Ruth Segomotsi Mompati	1,1
uMzinyathi	1,1
Alfred Nzo	0,9
John Taolo Gaetsewe	0,8
Cape Winelands	0,7
Xhariep	0,7
Overberg	0,5
West Coast	0,5
Amathole /Buffalo City	0,0
Pixley ka Seme	0,0
ZF Mgcawu	0,0

Ranking of district's PNMR per 1000 deliveries for intra-partum asphyxia

District	Intra-partum asphyxia
King Cetshwayo	10,5
Ngaka Modiri Molema	9,3
Capricorn	6,9
Chris Hani	6,7
Mopani	6,7
Gert Sibande	6,6
Sekhukhune	6,4
Alfred Nzo	6,3
Nkangala	6,1
Vhembe	6,0
Bojanala Platinum	5,9
Ehlanzeni	5,8
Lejweleputswa	5,6
Thabo Mofutsanyana	5,5
Waterberg	5,5
Fezile Dabi	5,3
OR Tambo	5,2
Harry Gwala	4,7
iLembe	4,5
uThukela	4,4
Zululand	4,2
uMzinyathi	4,2
Ugu	4,1
John Taolo Gaetsewe	4,1
Amathole /Buffalo City	3,9
Amajuba	3,7
Pixley ka Seme	3,6
Nelson Mandela Bay	3,3
uMkhanyakude	3,2
Namakwa	3,2
Frances Baard	3,1
uMgungundlovu	3,1
Dr Kenneth Kaunda	3,0
Sedibeng	2,9
Mangaung	2,7
Xhariep	2,7
Sarah Baartman	2,7
Overberg	2,6
eThekwini	2,5
West Coast	2,4
Johannesburg	2,3
Ekurhuleni	2,3
Dr Ruth Segomotsi Mompati	2,3
Joe Gqabi	2,2
Cape Winelands	2,1
West Rand	1,8
Tshwane	1,7
Eden	1,5
Cape Town	1,4
Central Karoo	1,2
ZF Mgcawu	0,0

Number of deaths (stillbirths and neonatal deaths) per district per obstetric cause of death (adjusted with rates from PPIP and delivery data from DHIS)

Primary obstetric cause 1000g+	SPTL	IUD	HDP	IA	APH	FA	Inf	IUGR	MDis	None	Misc	Trauma	Totals
Alfred Nzo	66	297	33	234	35	46	18	0	4	20	8	3	765
Amathole /Buffalo City	293	318	0	290	286	101	52	67	43	46	43	15	1553
Chris Hani	137	161	146	231	71	32	24	26	22	23	18	15	907
Joe Gqabi	54	20	34	41	0	7	27	0	0	0	20	0	203
Nelson Mandela Bay	252	147	70	190	105	84	38	45	25	46	13	6	1019
OR Tambo	296	498	600	482	222	65	104	13	42	32	25	11	2389
Sarah Baartman	44	63	22	41	32	5	13	13	3	4	5	2	249
Eastern Cape	**1138**	**1578**	**874**	**1545**	**796**	**345**	**264**	**176**	**144**	**177**	**122**	**57**	**7218**
Fezile Dabi	105	237	50	114	57	20	8	5	9	12	2	3	621
Lejweleputswa	180	361	84	157	66	24	16	7	5	17	8	7	930
Mangaung	161	190	149	114	142	158	40	21	20	29	22	1	1046
Thabo Mofutsanyana	135	282	150	200	92	33	38	26	6	26	1	6	997
Xhariep	10	10	2	6	0	0	1	0	0	0	0	0	29
Free State	**599**	**1102**	**431**	**599**	**353**	**223**	**100**	**58**	**38**	**83**	**32**	**17**	**3635**
Ekurhuleni	568	601	269	423	238	97	72	128	58	59	27	18	2558
Johannesburg	433	1065	387	460	428	184	82	29	73	44	17	0	3201
Sedibeng	192	320	87	123	96	55	0	14	14	14	0	0	915
Tshwane	384	645	186	252	264	211	76	51	58	86	27	18	2259
West Rand	32	378	50	83	55	18	11	3	19	4	6	4	662
Gauteng	**1588**	**2822**	**909**	**1300**	**990**	**526**	**251**	**262**	**221**	**217**	**87**	**51**	**9224**
Amajuba	58	58	58	116	29	29	0	0	0	0	0	0	349
eThekwini	331	878	305	430	674	249	61	158	69	120	31	20	3326
Harry Gwala	86	173	47	115	30	32	8	18	10	25	12	0	554
iLembe	69	159	97	141	136	54	16	22	10	28	12	1	748
King Cetshwayo	422	1000	373	610	615	266	68	151	70	146	51	14	3786
Ugu	138	236	91	165	161	78	42	28	10	18	7	6	979
uMgungundlovu	211	324	175	156	295	138	37	39	35	48	17	5	1479
uMkhanyakude	56	148	62	141	47	30	28	33	11	24	8	1	589
uMzinyathi	147	269	36	138	25	16	28	18	12	4	5	2	701
uThukela	88	285	110	161	162	46	41	12	11	17	28	2	964
Zululand	176	191	136	198	68	37	33	28	18	12	16	3	915

KwaZulu-Natal	**1926**	**3947**	**1547**	**2462**	**2270**	**1003**	**412**	**505**	**269**	**456**	**209**	**55**	**15062**
Primary obstetric cause 1000g+	**SPTL**	**IUD**	**HDP**	**IA**	**APH**	**FA**	**Inf**	**IUGR**	**MDis**	**None**	**Misc**	**Trauma**	**Totals**
Capricorn	515	518	636	554	266	135	45	18	63	210	53	9	3023
Mopani	350	434	299	504	152	130	115	33	31	46	68	5	2169
Sekhukhune	298	557	387	490	146	102	93	17	53	41	46	2	2231
Vhembe	310	659	264	555	127	119	49	30	41	34	39	8	2234
Waterberg	167	312	120	241	108	63	36	17	13	29	20	2	1128
Limpopo	**1634**	**2494**	**1716**	**2342**	**798**	**545**	**335**	**113**	**204**	**361**	**222**	**27**	**10791**
Ehlanzeni	350	648	532	646	315	144	30	39	30	12	28	2	2775
Gert Sibande	154	332	251	343	159	73	18	19	22	11	6	0	1387
Nkangala	145	409	272	359	188	91	18	21	22	13	16	4	1558
Mpumalanga	**648**	**1390**	**1056**	**1348**	**663**	**308**	**66**	**79**	**74**	**37**	**50**	**6**	**5724**
Bojanala Platinum	391	441	298	359	182	69	50	23	40	11	24	16	1905
Dr Kenneth Kaunda	157	208	103	108	145	41	53	4	21	64	12	6	922
Dr Ruth Segomotsi Mompati	58	87	31	63	26	11	14	4	10	11	4	7	326
Ngaka Modiri Molema	445	516	284	418	178	79	50	17	25	64	8	12	2096
North West	849	1043	569	778	437	163	148	42	88	127	45	41	4328
Frances Baard	121	107	69	75	138	43	37	14	19	65	3	3	695
John Taolo Gaetsewe	55	94	12	61	12	9	0	1	1	1	0	0	246
Namakwa	13	12	6	15	16	10	7	3	2	10	2	2	100
Pixley ka Seme	40	58	0	32	6	9	1	3	3	5	2	1	160
ZF Mgcawu	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cape	**218**	**256**	**78**	**170**	**161**	**69**	**42**	**22**	**25**	**78**	**8**	**6**	**1134**
Cape Winelands	86	95	29	89	166	35	56	73	18	18	7	0	672
Central Karoo	7	14	4	4	10	1	2	2	0	9	1	0	54
Cape Town	204	423	255	264	630	278	213	188	92	84	62	9	2703
Eden	86	140	39	43	97	18	18	9	12	39	9	4	515
Overberg	19	25	5	26	33	9	11	12	4	4	1	0	151
West Coast	30	50	7	38	33	10	15	26	5	9	14	0	238
Western Cape	**415**	**730**	**338**	**468**	**958**	**361**	**316**	**307**	**133**	**156**	**95**	**13**	**4290**

Perinatal mortality rate per district per obstetric cause of death >1000g

Primary obstetric cause 1000g+	SPTL	IUD	HDP	IA	APH	FA	Inf	IUGR	MDis	None	Misc	Trauma	Totals
Alfred Nzo	1,8	8,0	0,9	6,3	1,0	1,2	0,5	0,0	0,1	0,5	0,2	0,1	20,5
Amathole /Buffalo City	3,9	4,2	0,0	3,9	3,8	1,4	0,7	0,9	0,6	0,6	0,6	0,2	20,8
Chris Hani	4,0	4,7	4,3	6,7	2,1	0,9	0,7	0,8	0,6	0,7	0,5	0,4	26,4
Joe Gqabi	2,9	1,1	1,8	2,2	0,0	0,4	1,5	0,0	0,0	0,0	1,1	0,0	11,0
Nelson Mandela Bay	4,3	2,5	1,2	3,3	1,8	1,4	0,7	0,8	0,4	0,8	0,2	0,1	17,6
OR Tambo	3,2	5,4	6,5	5,2	2,4	0,7	1,1	0,1	0,5	0,3	0,3	0,1	25,9
Sarah Baartman	2,9	4,1	1,4	2,7	2,1	0,3	0,9	0,8	0,2	0,3	0,3	0,2	16,0
Eastern Cape	**3,4**	**4,8**	**2,6**	**4,7**	**2,4**	**1,0**	**0,8**	**0,5**	**0,4**	**0,5**	**0,4**	**0,2**	**21,8**
Fezile Dabi	4,9	10,9	2,3	5,3	2,6	0,9	0,4	0,2	0,4	0,5	0,1	0,1	28,7
Lejweleputswa	6,4	12,9	3,0	5,6	2,4	0,9	0,6	0,2	0,2	0,6	0,3	0,2	33,3
Mangaung	3,9	4,6	3,6	2,7	3,4	3,8	1,0	0,5	0,5	0,7	0,5	0,0	25,3
Thabo Mofutsanyana	3,7	7,8	4,2	5,5	2,6	0,9	1,0	0,7	0,2	0,7	0,0	0,2	27,6
Xhariep	4,4	4,0	0,7	2,7	0,0	0,0	0,3	0,0	0,0	0,0	0,0	0,0	12,1
Free State	**4,6**	**8,5**	**3,3**	**4,6**	**2,7**	**1,7**	**0,8**	**0,4**	**0,3**	**0,6**	**0,2**	**0,1**	**28,1**
Ekurhuleni	3,1	3,3	1,5	2,3	1,3	0,5	0,4	0,7	0,3	0,3	0,1	0,1	14,0
Johannesburg	2,2	5,4	2,0	2,3	2,2	0,9	0,4	0,1	0,4	0,2	0,1	0,0	16,3
Sedibeng	4,5	7,5	2,0	2,9	2,3	1,3	0,0	0,3	0,3	0,3	0,0	0,0	21,5
Tshwane	2,6	4,4	1,3	1,7	1,8	1,4	0,5	0,3	0,4	0,6	0,2	0,1	15,2
West Rand	0,7	8,4	1,1	1,8	1,2	0,4	0,2	0,1	0,4	0,1	0,1	0,1	14,7
Gauteng	**2,6**	**4,6**	**1,5**	**2,1**	**1,6**	**0,9**	**0,4**	**0,4**	**0,4**	**0,4**	**0,1**	**0,1**	**15,0**
Amajuba	1,9	1,9	1,9	3,7	0,9	0,9	0,0	0,0	0,0	0,0	0,0	0,0	11,2
eThekwini	1,9	5,2	1,8	2,5	4,0	1,5	0,4	0,9	0,4	0,7	0,2	0,1	19,6
Harry Gwala	3,5	7,1	1,9	4,7	1,2	1,3	0,3	0,7	0,4	1,0	0,5	0,0	22,6
iLembe	2,2	5,0	3,1	4,5	4,3	1,7	0,5	0,7	0,3	0,9	0,4	0,0	23,7
King Cetshwayo	7,2	17,2	6,4	10,5	10,6	4,6	1,2	2,6	1,2	2,5	0,9	0,2	65,1
Ugu	3,4	5,9	2,3	4,1	4,0	2,0	1,1	0,7	0,3	0,5	0,2	0,1	24,5
uMgungundlovu	4,1	6,4	3,4	3,1	5,8	2,7	0,7	0,8	0,7	0,9	0,3	0,1	29,0
uMkhanyakude	1,3	3,4	1,4	3,2	1,1	0,7	0,7	0,7	0,2	0,6	0,2	0,0	13,5
uMzinyathi	4,4	8,1	1,1	4,2	0,8	0,5	0,9	0,6	0,4	0,1	0,2	0,1	21,2
uThukela	2,4	7,8	3,0	4,4	4,5	1,3	1,1	0,3	0,3	0,5	0,8	0,1	26,5
Zululand	3,7	4,1	2,9	4,2	1,4	0,8	0,7	0,6	0,4	0,3	0,3	0,1	19,5

KwaZulu-Natal	**3,4**	**7,0**	**2,7**	**4,3**	**4,0**	**1,8**	**0,7**	**0,9**	**0,5**	**0,8**	**0,4**	**0,1**	**26,6**
Primary obstetric cause 1000g+	**SPTL**	**IUD**	**HDP**	**IA**	**APH**	**FA**	**Inf**	**IUGR**	**MDis**	**None**	**Misc**	**Trauma**	**Totals**
Capricorn	6,4	6,4	7,9	6,9	3,3	1,7	0,6	0,2	0,8	2,6	0,7	0,1	37,7
Mopani	4,6	5,7	4,0	6,7	2,0	1,7	1,5	0,4	0,4	0,6	0,9	0,1	28,7
Sekhukhune	3,9	7,3	5,1	6,4	1,9	1,3	1,2	0,2	0,7	0,5	0,6	0,0	29,4
Vhembe	3,4	7,2	2,9	6,0	1,4	1,3	0,5	0,3	0,4	0,4	0,4	0,1	24,3
Waterberg	3,8	7,1	2,7	5,5	2,5	1,4	0,8	0,4	0,3	0,7	0,5	0,1	25,8
Limpopo	**4,4**	**6,8**	**4,7**	**6,4**	**2,2**	**1,5**	**0,9**	**0,3**	**0,6**	**1,0**	**0,6**	**0,1**	**29,4**
Ehlanzeni	3,1	5,8	4,8	5,8	2,8	1,3	0,3	0,3	0,3	0,1	0,2	0,0	24,8
Gert Sibande	2,9	6,3	4,8	6,6	3,0	1,4	0,3	0,4	0,4	0,2	0,1	0,0	26,5
Nkangala	2,5	6,9	4,6	6,1	3,2	1,5	0,3	0,4	0,4	0,2	0,3	0,1	26,4
Mpumalanga	**2,9**	**6,2**	**4,7**	**6,0**	**3,0**	**1,4**	**0,3**	**0,4**	**0,3**	**0,2**	**0,2**	**0,0**	**25,6**
Bojanala Platinum	6,4	7,2	4,9	5,9	3,0	1,1	0,8	0,4	0,7	0,2	0,4	0,3	31,1
Dr Kenneth Kaunda	4,3	5,7	2,8	3,0	4,0	1,1	1,5	0,1	0,6	1,7	0,3	0,2	25,4
Dr Ruth Segomotsi Mompati	2,1	3,1	1,1	2,3	0,9	0,4	0,5	0,2	0,4	0,4	0,2	0,2	11,8
Ngaka Modiri Molema	9,9	11,4	6,3	9,3	4,0	1,7	1,1	0,4	0,6	1,4	0,2	0,3	46,5
North West	5,0	6,1	3,3	4,6	2,6	1,0	0,9	0,2	0,5	0,7	0,3	0,2	25,4
Frances Baard	5,0	4,5	2,9	3,1	5,7	1,8	1,5	0,6	0,8	2,7	0,1	0,1	28,9
John Taolo Gaetsewe	3,7	6,4	0,8	4,1	0,8	0,6	0,0	0,1	0,1	0,1	0,0	0,0	16,7
Namakwa	3,0	2,7	1,4	3,2	3,4	2,3	1,6	0,7	0,5	2,3	0,5	0,5	21,9
Pixley ka Seme	4,5	6,6	0,0	3,6	0,7	1,1	0,1	0,4	0,4	0,5	0,3	0,1	18,2
ZF Mgcawu	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Northern Cape	**3,4**	**4,0**	**1,2**	**2,6**	**2,5**	**1,1**	**0,7**	**0,3**	**0,4**	**1,2**	**0,1**	**0,1**	**17,6**
Cape Winelands	2,0	2,2	0,7	2,1	3,9	0,8	1,3	1,7	0,4	0,4	0,2	0,0	16,0
Central Karoo	2,5	4,5	1,2	1,2	3,3	0,4	0,8	0,8	0,0	2,9	0,4	0,0	18,0
Cape Town	1,1	2,3	1,4	1,4	3,4	1,5	1,1	1,0	0,5	0,5	0,3	0,0	14,4
Eden	3,1	5,0	1,4	1,5	3,5	0,6	0,6	0,3	0,4	1,4	0,3	0,1	18,5
Overberg	2,0	2,5	0,5	2,6	3,4	0,9	1,1	1,2	0,4	0,4	0,1	0,0	15,3
West Coast	2,0	3,2	0,5	2,4	2,2	0,7	1,0	1,7	0,3	0,6	0,9	0,0	15,4
Western Cape	**1,5**	**2,6**	**1,2**	**1,6**	**3,4**	**1,3**	**1,1**	**1,1**	**0,5**	**0,5**	**0,3**	**0,0**	**15,0**