

**Saving Mothers 2005-2007:  
Fourth Report on Confidential Enquiries  
into Maternal Deaths in South Africa**

**Expanded Executive Summary**

By  
NCCEMD

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### List of abbreviations

**Abbreviation    Meaning**

**Provinces**

EC	Eastern Cape
FS	Free State
Gau	Gauteng
KZN	KwaZulu-Natal
Lim	Limpopo
Mpu	Mpumalanga
NW	North West Province
NC	Northern Cape
WC	Western Cape

**Diseases**

AA	Anaesthetic related death
AB	Abortion
AC	Acute collapse and embolism
AIDS	Acquired Immune Deficiency Syndrome
APH	Antepartum haemorrhage
EC	Ectopic pregnancy
HT	Hypertensive conditions in pregnancy
MD	Pre-existing medical conditions
NPRI	Non-pregnancy related infections
PPH	Postpartum haemorrhage
PRS	Pregnancy related sepsis
TB	Tuberculosis
Unk	Unknown
UTI	Urinary tract infection

**Other**

CHC	Community Health Centre
NCCEMD	National Committee on Confidential Enquiries into Maternal Deaths
TOP	Termination of pregnancy

## 1. Summary of findings and recommendations

- Maternal deaths are defined as “deaths of women while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes”<sup>1</sup>.
- Confidential enquiries into maternal deaths are a “systematic multidisciplinary anonymous investigation of all or a representative sample of maternal deaths occurring at an area, region (state) or national level, which identifies the numbers, causes and avoidable or remediable factors, associated with them. Through the lessons learnt from each woman’s death, and through aggregating the data, confidential enquiries provide evidence of where the main problems in overcoming maternal mortality lie and an analysis of what can be done in practical terms, and highlight the key areas requiring recommendations for health sector and community action as well as guidelines for improving clinical outcomes”<sup>1</sup>.
- In this triennium (2005-2007) there has been a 20.1% increase in the number of deaths reported compared with the previous triennium (2002-2004).
- The “big five” causes of maternal death have remained the same, namely non-pregnancy related infections – mainly AIDS (43.7%), complications of hypertension (15.7%), obstetric haemorrhage (antepartum and postpartum haemorrhage; 12.4%), pregnancy-related sepsis (9.0%) and pre-existing maternal disease (6.0%).
- There has been a significant decrease (14%) in the *institutional* Maternal Mortality Ratio (MMR) for complications of hypertension. There was a significant increase (21%) in deaths due to non-pregnancy related infections. There were no other significant changes in the disease pattern.
- Women less than 20 years of age were at greater risk of dying due to complications of hypertension whereas women 35 years and older were at greater risk of dying of obstetric haemorrhage, ectopic pregnancies, embolism, acute collapse and pre-existing medical disease.
- Non-attendance and delayed attendance at the health institutions were the most common patient orientated problems.
- Poor transport facilities, lack of health care facilities and lack of appropriately trained staff were the major administrative problems.
- The most frequent health care provider avoidable factors were failure to follow standard protocols and poor problem recognition and initial assessment.
- Assessors thought 38.4% of the deaths were clearly avoidable within the health care system (patient orientated factors being excluded). Complications of hypertension, obstetric haemorrhage, pregnancy related sepsis and non-pregnancy related infections were responsible for 4 out of 5 of avoidable deaths.
- Recommendations concern four main areas (knowledge development, quality of care and coverage of reproductive health services, establishing norms and standards and community involvements):
  - Improving health care provider knowledge and skills in providing emergency care and ensuring adequate screening and treatment of the major causes of maternal death.
  - Improving quality and coverage of reproductive health services, namely contraceptive and termination of pregnancy services.
  - Management provision of staffing and equipment norms, transport and availability of blood for transfusion.
  - Community involvement and empowerment regarding maternal, neonatal and reproductive health in general.

## 2. Introduction

Confidential enquiries into maternal deaths (CEMD) can be defined as *a systematic multidisciplinary anonymous investigation of all or a representative sample of maternal deaths occurring at an area, region (state) or national level which identifies the numbers, causes and avoidable or remediable factors associated with them. Through the lessons learnt from each woman's death, and through aggregating the data, confidential enquiries provide evidence of where the main problems in overcoming maternal mortality lie and an analysis of what can be done in practical terms, and highlight the key areas requiring recommendations for health sector and community action as well as guidelines for improving clinical outcomes.*<sup>1</sup>

The Confidential Enquiries system of recording and analysing maternal deaths has been in operation in South Africa since 1 October 1997. The first comprehensive report into maternal deaths was published in October 1999, and dealt in detail with maternal deaths occurring during 1998<sup>2</sup>. The second comprehensive report covered the triennium 1999-2001<sup>3</sup>, and the third comprehensive report covered 2002-2004<sup>4</sup>. All have described the magnitude of the problem of maternal deaths, the pattern of disease causing maternal deaths, the avoidable factors, missed opportunities and substandard care related to these deaths and made recommendations concerning ways of decreasing the number of maternal deaths. This is the fourth comprehensive report in the series and deals with the triennium 2005-2007.

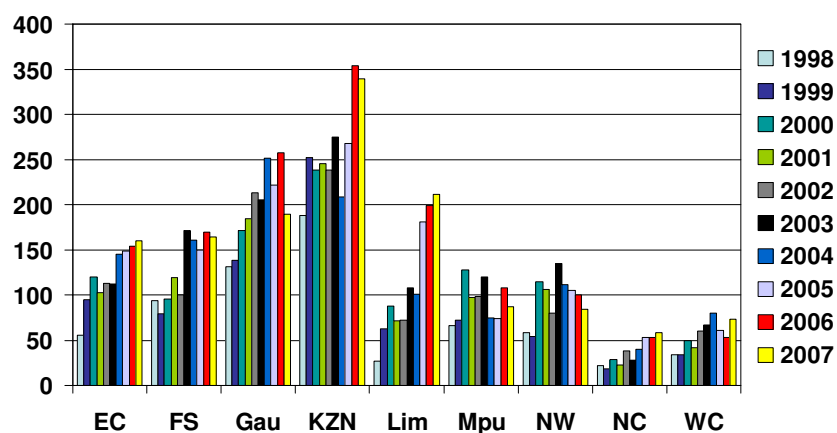
The definitions used in this report are the same as those used in all the "Saving Mothers" reports. Data used for this report consist of the maternal deaths that occurred from 1<sup>st</sup> January 2005 to 31<sup>st</sup> December 2007 and were reported to the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) secretariat before 30<sup>th</sup> April 2008. This cut-off date was selected to enable the report to be written and published in 2008. The data is compared with the data in the previous report.

During 2005-2007, a total of 4077 maternal deaths were reported (including coincidental deaths), up from the 3406 reported in the 2002-2004 triennium. Figure

1 illustrates the number of cases reported per province from 1998-2007. As expected the most populous provinces have the most maternal deaths.

In most provinces there has been an increase in the number of maternal deaths reported. The increase in deaths reported is probably due to a combination of better reporting and an actual increase in deaths.

**Figure 1. Number of maternal deaths reported per province 1998-2007**



Estimations of the population based MMR for South Africa vary between 150/100000 live births<sup>5</sup>; 181-382/100000 live births (Graham and Newell<sup>7</sup>); 240-400/100000 live births (UN estimates<sup>8</sup>); and 578/100000 live births (2001 Census estimates<sup>9</sup>). CEMD systems are not carefully designed epidemiological surveys like the Demographic and Health Surveys<sup>5</sup> or Burden of Disease Estimates<sup>6</sup> and cannot report an accurate maternal deaths ratio (MMR) for the country or province. Most maternal deaths occurring outside of health institutions are not reported to the NCCEMD. In rural areas it is estimated only between 20% and 66% of maternal deaths occur in health institutions<sup>7</sup>. This lack of reporting and therefore information on deaths outside of the health institutions can bias this report. However, the report does give accurate information on the causes of deaths and quality of care within the health institutions.

The National Health Information System collects data on births in institutions, via the District Health Information System (DHIS), but does not record births outside of the

health institutions. An *institutional* MMR can be calculated using the DHIS data for the number of births and the CEMD data for the number of deaths. This *institutional* MMR must always be treated with caution as increasing indices might be due to improved reporting or an actual increase in deaths, conversely reducing indices might be due to poor reporting or and an actual reduction in deaths. However, it is useful to compare trends over the years.

### 3. Demographic data

Table 1 illustrate the differences in the ages at which maternal deaths in various disease categories occur and compare it with the general pregnant population. The data for the general pregnant population was obtained from Statistics South Africa's Recorded Live Births reports.

**Table 1. Comparison of ages of maternal deaths and the general pregnant population**

Cause of death	< 20 y	20 – 24 y	25 – 29 y	30 – 34 y	35 – 39 y	40 – 44 y	45+ y
Gen. Pop	11.3	29	25.2	19.5	10.7	3.6	0.6
HT	17.4	23.3	19.3	20.4	13.3	5.3	0.8
PPH	7.0	11.7	19.6	30.0	21.1	8.1	1.8
APH	12.0	14.8	15.7	24.1	23.1	7.4	2.8
EC	3.6	10.9	23.6	27.3	23.6	9.1	1.8
Ab	5.1	18.4	31.6	21.3	17.6	5.1	0.7
PRS	12.6	22.9	30.5	17.5	11.2	4.5	0.0
AA	14.0	30.8	18.7	22.4	8.4	4.7	0.9
Em	3.5	22.8	15.8	26.3	17.5	14.0	0.0
AC	10.2	24.2	19.5	18.0	19.5	7.0	0.8
NPRI	4.3	21.3	35.0	25.7	10.9	2.5	0.1
AIDS	3.0	19.9	36.2	25.6	12.5	2.5	0.2
MD	8.9	18.6	29.5	24.1	14.8	3.0	0.8
Unk	12.1	16.1	28.2	19.5	13.8	7.5	0.0

(AIDS is a subset of NPRI)

There is an excess of maternal deaths due to complications of hypertension occurring in women less than 20 years when compared with the general pregnant population. The percentage of maternal deaths due to antepartum haemorrhage, postpartum haemorrhage, ectopic pregnancies, embolism, acute collapse and pre-existing medical conditions are higher than the general pregnant population in women older than 34 years. Deaths due to non-pregnancy related infections peak at 25-29 years and this peak is mirrored in deaths due to complications of abortion and pregnancy related sepsis following a viable pregnancy.

## Level of Care

Figure 2 illustrates the number of maternal deaths occurring at the various levels of care. The deaths occurring outside health facilities are reflected as home deaths are only those that were reported to health institutions or in some cases to state mortuaries.

There is an increase in the number of deaths at all level 1 and 2 institutions, with level 3 institutions declining over time.

**Figure 2. Distribution of deaths per level of care**

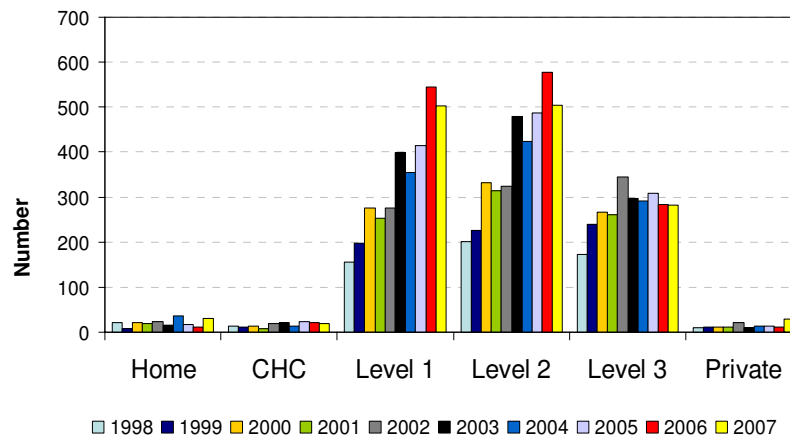


Figure 3 gives the distribution of births in the Community Health Centres (CHCs), District, Regional and Provincial Tertiary (Prov. Tert) and National Central (Nat. Cent.) Hospitals. CHCs and district hospitals are classified as level 1 institutions, regional hospitals level 2 institutions and provincial tertiary and national central hospitals as level 3 institutions. From the data below, 59% of all births occur in level 1 institutions, 30% in level 2 institutions and 11% at level 3 institutions.

**Figure 3. Distribution of deliveries in South African public institutions (DHIS data)**

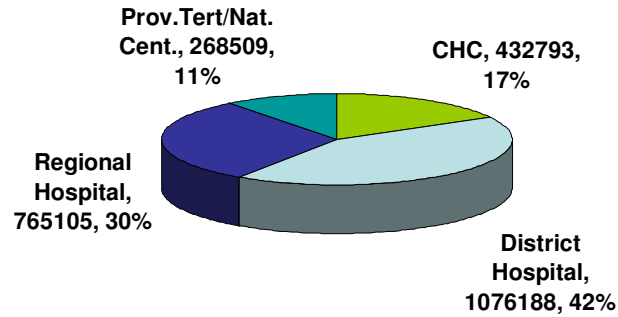
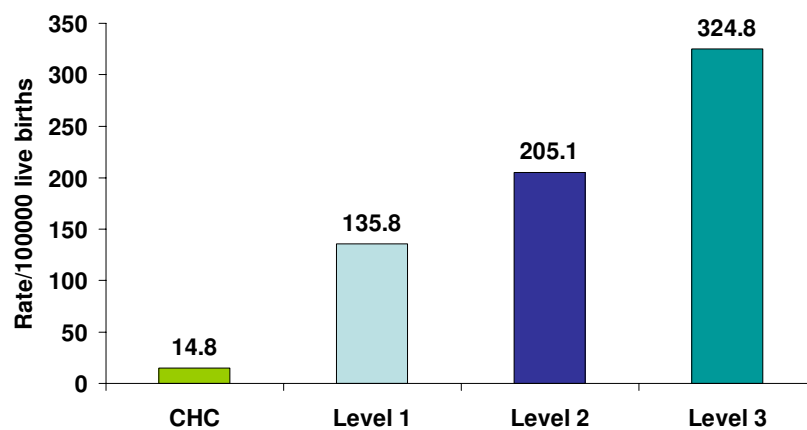


Figure 4 gives the *institutional* MMR for the levels of care. Even though the majority of deaths occur at level 1 institutions, the Institutional MMR is highest for the Level 3 institutions and the pattern is as expected, with the lowest mortality in the CHCs.

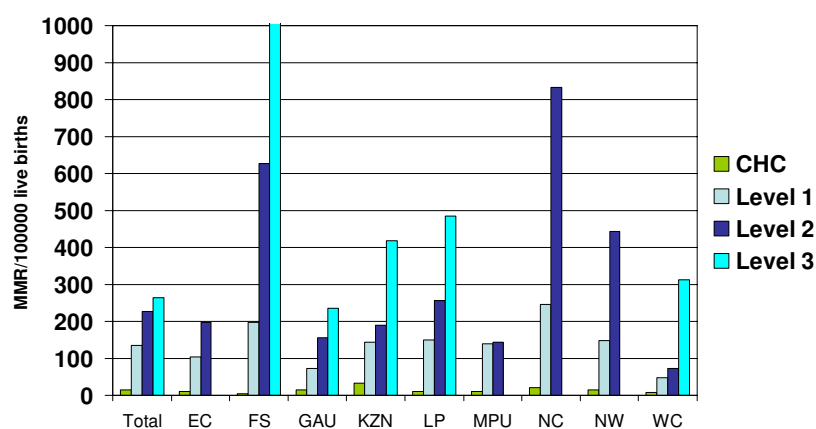
**Figure 4. MMR per level of care**



There is however considerable variation of the *institutional* MMRs for levels of care per province. (See Figures 5).



**Figure 5. MMR for deaths per province at each level of care**



The Free State province stands out with its Level 1 Institutional MMR being 198.6, level 2 being 626.1 and level 3 being 2498.4/100000 live births. The Free State province only has 24 level 3 maternity beds, all in one institution. Other provinces like North West, Northern Cape, Eastern Cape and Mpumalanga provinces do not have official level 3 beds. The organisation and distribution of tertiary level beds and hence care needs to be carefully examined.

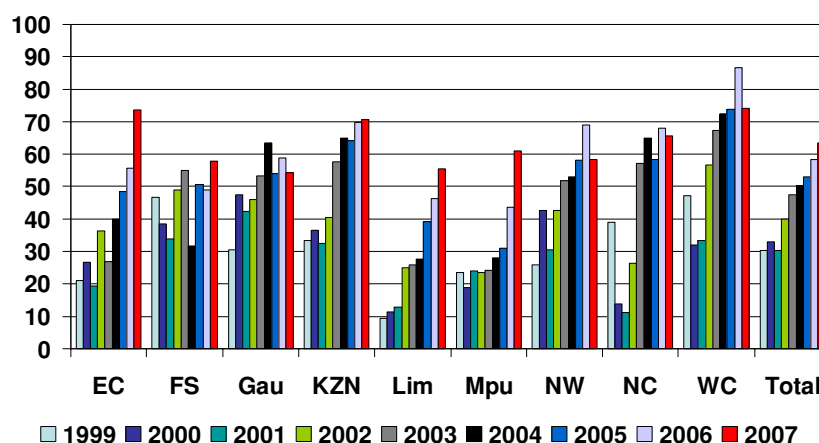
### **HIV testing**

Table 2 shows the HIV status of women who died and Figure 6 shows the percentage of HIV testing of maternal deaths per province. Fifty-nine percent of maternal deaths were tested for HIV infection from 2005-2007, up from 46.3% in the last triennium. Seventy-nine percent of those tested in 2005-2007 were HIV infected. This figure is very similar to that of the last triennium namely 78%. There has been a steady increase in testing, probably reflecting the expansion of the Prevention of Mother to Child Transmission Programme. Although the testing was variable, the total testing shows an improvement. This is likely to improve with further extension of the implementation of the strategic plan.

**Table 2. HIV status of maternal deaths 2005-2007 compare with 2002-2004**

HIV Status	2005-2007		2002-2004	
	N	%	N	%
<b>Positive</b>	1884	46.2	1226	36
<b>Negative</b>	511	12.5	351	10.3
<b>Unknown</b>	1682	41.3	1829	53.7

**Figure 6. Percent HIV testing of maternal deaths per Province: 1999-2007**



### Antenatal Care

In this report, where the antenatal care status was known, 76.1% of women who died during or within 6 weeks of pregnancy attended antenatal clinics (Table 3). This is considerably lower than the 95% antenatal care attendance given for the general population<sup>5</sup>. Health messages promoting early and regular attendance at antenatal care should continue and be strengthened. Antenatal care must be able to identify risk factors and manage them accordingly to prevent maternal deaths. Table 4 shows the antenatal usage in the conditions where antenatal care can potentially make a difference. The majority of women who subsequently died attended antenatal care, giving the health care system a good opportunity to intervene and prevent the death.

**Table 3. Antenatal usage 2005-2007**

	Number	Percentage of deaths
Received antenatal care	2601	63.8
No antenatal care	818	20.1
Unknown	658	16.1

**Table 4. Antenatal usage in those conditions where antenatal care can make a difference**

<b>Condition</b>	<b>Attended</b>	<b>Did not attend</b>	<b>% attended</b>
<b>Pre-existing maternal disease</b>	146	46	76.0
<b>Cardiac disease</b>	64	19	77.1
<b>Non pregnancy related infections</b>	1094	372	74.6
<b>AIDS</b>	624	174	78.2
<b>Hypertension</b>	441	105	80.8

### **Timing of emergency event leading to maternal death**

The postpartum period was the most common period for the problem resulting in death to occur, occurring in 45.4% of cases compared with 9% in early pregnancy, 36.7 antenatally and 8.7% intrapartum. The timing was unknown in 0.2% of cases.

#### 4. Primary obstetric causes of death

Table 5 gives the primary obstetric causes of death and compares it with the 1999-2001 and 2002-2004 trienniums. The top five conditions have remained the same, namely non-pregnancy related infections (43.7%), complications of hypertension (15.7%), obstetric haemorrhage (ante partum and post partum haemorrhage; 12.4%), pregnancy-related sepsis (9.0%) and pre-existing maternal disease (6.0%).

**Table 5. A comparison of primary obstetric causes of death between 1999-2001, 2002-2004 and 2005-2007**

Primary Obstetric Cause	1999-2001		2002-2004		2005-2007	
	N	%	N	%	N	%
<b>Direct</b>	<b>1462</b>	<b>59.8</b>	<b>1767</b>	<b>53.6</b>	<b>1819</b>	<b>45.9</b>
Hypertension	507	20.7	628	19.1	622	15.7
Postpartum haemorrhage	240	9.8	313	9.5	383	9.7
Antepartum haemorrhage	100	4.1	129	3.9	108	2.7
Ectopic pregnancy	27	1.1	47	1.4	55	1.4
Abortion	120	4.9	114	3.5	136	3.4
Pregnancy Related Sepsis	210	8.6	274	8.3	223	5.6
Anaesthetic related	76	3.1	91	2.8	107	2.7
Embolism	48	2	64	1.9	57	1.4
Acute collapse	134	5.5	107	3.2	128	3.2
<b>Indirect</b>	<b>939</b>	<b>38.4</b>	<b>1430</b>	<b>43.4</b>	<b>1966</b>	<b>49.7</b>
Non pregnancy related Infections	768	31.4	1246	37.8	1729	43.7
AIDS	416	17	662	20.1	915	23.1
Pre-existing Maternal Disease	171	7	184	5.6	237	6.0
<b>Unknown</b>	<b>44</b>	<b>1.8</b>	<b>99</b>	<b>3</b>	<b>174</b>	<b>4.4</b>
<b>Total</b>	<b>2445</b>	<b>100</b>	<b>3296</b>	<b>100</b>	<b>3959</b>	<b>100</b>
<b>Coincidental</b>	45		110		118	

Table 6 gives the details of the indirect deaths for 2005-2007.

**Table 6. Indirect causes of death 2005-2007**

<b>Indirect causes of death</b>	<b>Total n</b>	<b>% Sub-category</b>	<b>% All deaths</b>
<b>Non-pregnancy related infections</b>			
Pneumonia	393	22.7	9.6
AIDS	915	52.9	22.4
TB	229	13.2	5.6
Endocarditis	1	0.1	0
UTI	3	0.2	0.1
Malaria	16	0.9	0.4
Meningitis	106	6.1	2.6
Other	66	3.8	1.6
<b>Total</b>	<b>1729</b>	<b>100.0</b>	<b>43.7</b>
<b>Pre-existing medical disease</b>			
Cardiac disease	97	40.9	2.4
Endocrine	13	5.5	0.3
Gastrointestinal tract	31	13.1	0.8
Central Nervous System	21	8.9	0.5
Respiratory	40	16.9	1
Haematological	22	9.3	0.5
Genito-urinary	4	1.7	0.1
Auto-immune	7	3.0	0.2
Skeletal	2	0.8	0
<b>Total</b>	<b>237</b>	<b>100.0</b>	<b>5.8</b>
<b>Grande Total</b>	<b>1966</b>		<b>49.7</b>

Table 7 gives the primary obstetric causes expressed as maternal deaths per 100,000 live births. There has been a significant decrease in the rate of maternal deaths/100000 live births in complications of hypertension ( $p < 0.01$ , OR 0.86). A significant decrease was also recorded in deaths due to pregnancy related sepsis ( $p < 0.001$ , OR 0.80) but this is probably due to cases being misclassified as dying due to AIDS rather than pregnancy related sepsis (see below). Where the calculations were repeated using the same proportion of cases misclassified in 2005-2007 for 2002-2004, there was no difference deaths due to pregnancy related sepsis. There was a 20.9% increase in deaths due to non-pregnancy related infections. The MMR is used here only for comparison and to evaluate trends. The confidential enquiry is not an epidemiological study rather its value is in evaluating the quality of care.

**Table 7. Comparison of institutional Maternal Mortality Ratios per disease category**

Primary Obstetric Cause	2002-2004	2005-2007	p
<b>Direct</b>	77.99	69.95	
Hypertension	27.72	23.92	<0.01; OR 0.86
Postpartum haemorrhage	13.82	14.73	NS
Antepartum haemorrhage	5.69	4.15	NS
Ectopic pregnancy	2.07	2.12	NS
Abortion	5.03	5.23	NS
Pregnancy Related Sepsis	12.09	8.58	<0.0001; OR 0.80
Anaesthetic related	4.02	4.11	NS
Embolism	2.82	2.19	NS
Acute collapse	4.72	4.92	NS
<b>Indirect</b>	63.12	75.61	
Non pregnancy related Infections	55.00	66.49	<0.000: OR 1.21
AIDS	29.22	35.19	
Pre-existing Maternal Disease	8.12	9.11	NS
<b>Unknown</b>	4.37	6.69	
<b>Total</b>	145.48	152.25	NS

### The impact of HIV infection on maternal deaths

In the last triennium, the number of women being tested for HIV infection has risen sharply and the true impact of the disease on the pregnant population is now becoming apparent. The disease profile of pregnant women who die and are HIV infected is shown in Tables 8 and 9.

**Table 8. Distribution of HIV positive, negative and unknown in relation to primary causes of death (numbers)**

Primary Obstetric Cause	HIV +	HIV -	Unk
<b>Direct</b>	<b>401</b>	<b>359</b>	<b>1059</b>
Hypertension	111	136	375
Postpartum haemorrhage	79	83	221
Antepartum haemorrhage	15	21	72
Ectopic pregnancy	6	5	44
Abortion	40	5	91
Pregnancy Related Sepsis	91	38	94
Anaesthetic related	18	19	70
Embolism	10	21	26
Acute collapse	31	31	66
<b>Indirect</b>	<b>1414</b>	<b>114</b>	<b>438</b>
Non pregnancy related Infections	1347	55	327
AIDS	891	1	23
Pre-existing Maternal Disease	67	59	111
<b>Unknown</b>	<b>57</b>	<b>29</b>	<b>88</b>
<b>Total</b>	<b>1872</b>	<b>502</b>	<b>1585</b>
<b>Coincidental</b>	12	9	97

**Table 9. Distribution of HIV positive, negative and unknown in relation to primary causes of death (percentage)**

Primary Obstetric Cause	HIV + (%)	HIV – (%)	Unk (%)
<b>Direct</b>	21.4	71.5	66.8
Hypertension	5.9	27.1	23.7
Postpartum haemorrhage	4.2	16.5	13.9
Antepartum haemorrhage	0.8	4.2	4.5
Ectopic pregnancy	0.3	1.0	2.8
Abortion	2.1	1.0	5.7
Pregnancy Related Sepsis	4.9	7.6	5.9
Anaesthetic related	1.0	3.8	4.4
Embolism	0.5	4.2	1.6
Acute collapse	1.7	6.2	4.2
<b>Indirect</b>	75.5	22.7	27.6
Non pregnancy related Infections	72.0	11.0	20.6
AIDS	47.6	0.2	1.5
Pre-existing Maternal Disease	3.6	11.8	7.0
<b>Unknown</b>	3.0	5.8	5.6
<b>Total</b>	100.0	100.0	100.0
<b>Coincidental</b>	21.4	71.5	66.8

Most HIV infected women die of non-pregnancy related infections; the only other diseases which are relatively common are hypertension (5.9%), postpartum haemorrhage (4.2%) and pregnancy related sepsis (4.9%). Conversely, most of the HIV negative women die due to direct causes of death, namely hypertension (27.1%), obstetric haemorrhage (20.7%), and sepsis (8.6%).

Table 10 shows the distribution of the sub-categories of non-pregnancy related infection in relation to their HIV status.

**Table 10. Distribution of causes of non pregnancy related infections in relation to their HIV status**

Sub categories	HIV +	HIV -	Unk	Total
- Pneumonia	224	21	148	393
- AIDS	891	1	23	915
- TB	138	20	71	229
- Endocarditis	0	0	1	1
- UTI	1	0	2	3
- Appendicitis	0	0	0	0
- Malaria	3	2	11	16
- Meningitis	56	6	44	106
- Other	34	5	27	66
<b>Total</b>	1347	55	327	1729

Note: 24 patients wrongly classified as having AIDS (HIV-/unknown). A further 138 should have been classified as having AIDS as there were diagnosed as having TB.

In examining the group classified as having died due to AIDS the following were found:

- 58 women with AIDS also had had an abortion and 558 died postpartum
- 181 women with AIDS died postpartum and were classified as having septic shock as the final cause of death.
- 16 women with AIDS and dying postpartum had the final cause of death as hypovolaemic shock and had postpartum haemorrhage
- If these cases are re-classified under the direct causes of death, then 255 maternal deaths would be reclassified as direct deaths.

The net effect of this on all the maternal deaths is illustrated in Table 11.

**Table 11. New distribution of primary causes of death following the re-classification of the cases with AIDS having concomitant direct obstetric diseases**

Primary Obstetric Cause	HIV + (n)	HIV – (n)	Unk (n)	Total (n)	New %	Current %
<b>Direct</b>	<b>656</b>	<b>359</b>	<b>1059</b>	<b>2074</b>	<b>52.4</b>	45.9
Hypertension	111	136	375	622	15.7	15.7
Postpartum haemorrhage	95	83	221	399	<b>10.1</b>	9.7
Antepartum haemorrhage	15	21	72	108	2.7	2.7
Ectopic pregnancy	6	5	44	55	1.4	1.4
Abortion	98	5	91	194	<b>4.9</b>	3.4
Pregnancy Related Sepsis	272	38	94	404	<b>10.2</b>	5.6
Anaesthetic related	18	19	70	107	2.7	2.7
Embolism	10	21	26	57	1.4	1.4
Acute collapse	31	31	66	128	3.2	3.2
<b>Indirect</b>	<b>1189</b>	<b>114</b>	<b>438</b>	<b>1741</b>	<b>44.0</b>	49.7
Non pregnancy related Infections	1122	55	327	1504	<b>38.0</b>	43.7
Pre-existing Maternal Disease	67	59	111	237	6.0	6.0
<b>Unknown</b>	<b>57</b>	<b>29</b>	<b>88</b>	<b>174</b>	<b>4.4</b>	4.4
<b>Total</b>	<b>1872</b>	<b>502</b>	<b>1585</b>	<b>3959</b>	<b>100.0</b>	100.0

Using the new redistribution of primary causes of death (Table 11) there is a slight increase in deaths due to postpartum haemorrhage (6%), an increase of 44% in deaths due to abortion, an 82% increase in death due to pregnancy related sepsis and a decline in non-pregnancy related infections (14%). There were 598 deaths due to pregnancy related sepsis (abortion plus pregnancy related sepsis following viable pregnancies), 622 due to hypertension and 507 due to obstetric haemorrhage.



Direct causes of death are often regarded as areas where active treatment will save a life. The importance of this finding is that the role of sepsis (something we can manage using antibiotics and where necessary surgery) seems to have been underestimated previously. More attention must be placed on diagnosing and treating sepsis especially post-abortion and postnatally.

By extrapolating the proportion of women who attended antenatal care and tested, or declined testing and the proportion testing HIV positive or negative from the DHIS data for 2007, denominators for the number of women delivering who were HIV infected, negative or not known can be estimated. The *institutional* MMR for HIV negative women was 34/100000 live births, 328/100000 live births for those women who were HIV infected, and 275/100000 live births for those not testing.

### **Obstructed labour/prolonged labour**

Obstructed labour/prolonged labour is not recorded as a specific primary cause of death in the South African system. In the next report obstructed/prolonged labour will be recorded for maternal death as an underlying cause. This will give us a better idea of the impact of obstructed/prolonged labour on maternal deaths. However, in this triennium there were 163 maternal deaths that could be directly ascribed to obstructed labour (Table 12).

**Table 12. Deaths due to obstructed/prolonged labour**

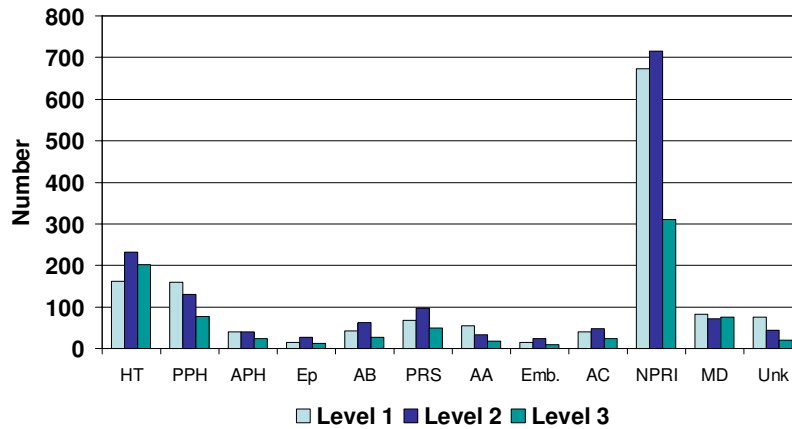
<b>Sub-category</b>	<b>Obstructed labour deaths</b>
PRS following CPD	51
PPH due to atony following prolonged labour	32
Ruptured uterus	80
Total (%)	163 (4.1%)

### **Levels of Care**

The proportion of the various causes of maternal deaths varied between the levels of care (see Figure 7), however non-pregnancy related infections was the most common cause at all levels of care. Postpartum haemorrhage and anaesthetic related deaths occurred most commonly at level 1 hospitals whereas complications due to hypertension and pregnancy related sepsis occurred at the same frequency at level 2 and 3 hospitals. Only in deaths due to pre-existing maternal disease did level 3

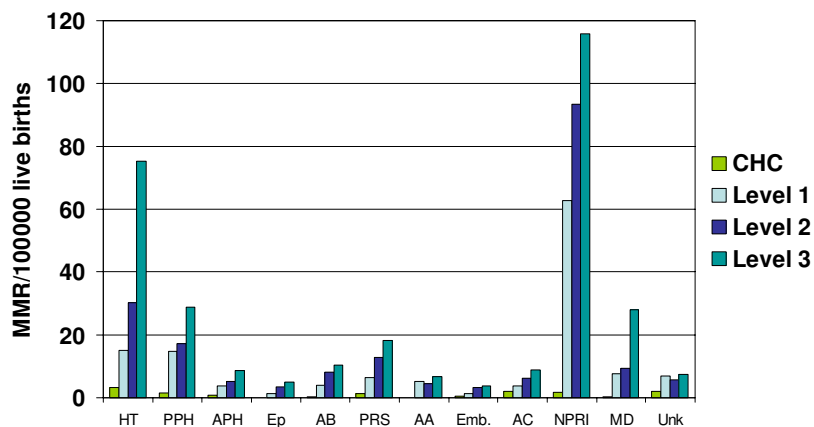
hospitals have more deaths than level 2 hospitals. Ideally, most deaths should occur in level 3 institutions, and the apparent excess of deaths in level 1 and 2 institutions is a cause for concern.

**Figure 7. Primary obstetric cause of reported maternal deaths: Numbers at Level 1, 2 and 3 Hospitals**



When the *institutional* MMR is calculated per disease category per level of care, an appropriate pattern appears

**Figure 8. Primary obstetric cause of reported maternal deaths: Institutional MMR at Level 1, 2 and 3 Hospitals**



### **Caesarean sections**

In 2005-2007 there were 477210 caesarean sections performed in South Africa, giving a caesarean section rate of 18.4%. The *institutional* MMR for caesarean sections was 198.2/100000 live births, whereas that for vaginal delivery was 77.8/100000 live births, a 2.5 times increase in risk of dying.

## 5. Avoidable factors, missed opportunities and substandard care

Tables 13-17 give a summary of the avoidable factors, missed opportunities and substandard care for the two triennia.

**Table 13. Avoidable factors, missed opportunities and substandard care for all cases**

Category	% of avoidable factors in assessable cases	
	2005-2007	2002-2004
Patient orientated	45.9	43.9
Administrative factors	29.9	32.1
Health worker related emergency management problems		
Primary level	58	53.8
Secondary level	49	48.3
Tertiary level	30.1	36.5
Resuscitation	22.7	22.3

There were 1519 (38.4%) clearly avoidable deaths within the health system reported by the assessors. This is approximately the same as reported in 2002-2004 where the clearly avoidable deaths 36.7%.

**Table 14. Avoidable factors, missed opportunities and substandard care with respect to patient orientated problems for all cases**

Major Problems	% of assessable deaths with avoidable factors	
	2005-2007 (n=3419)	2002-2004 (n=2836)
No antenatal care	17.7	18.1
Infrequent antenatal care	6.0	5.9
Delay in seeking medical help	26.7	26.8
Unsafe abortion*	25.7	21.1
Other	6.9	6.0

\* - Denominator is women who died due to abortions (136), not all maternal deaths

The lack of blood for transfusion has increased dramatically over the last triennium, from 9.2% to 19% of cases requiring blood.

**Table 15. Avoidable factors, missed opportunities and substandard care with respect to administrative problems for all cases**

Major Problems	% of assessable deaths with avoidable factors	
	2005-2007	2002-2004
	(n=3664)	(n=3079)
Transport problem home to institution	1.9	3.0
Transport problem between institutions <sup>*</sup>	8.4	9.7
Barriers to entry	1.0	0.5
Lack of accessibility	1.3	1.0
Lack of specific health care facilities	8.6	11.2
Lack of ICU facilities <sup>**</sup>	9.2	
Lack of blood for transfusion <sup>***</sup>	19.0	9.2
Lack of personnel	0.4	0.6
Lack of appropriately trained staff	8.9	12.8
Communication problems	4.2	3.4
Other	6.8	5.0

<sup>\*</sup> - Denominator is the number of cases that were referred between institutions (1649).

<sup>\*\*</sup> - Denominator is the number of women managed in tertiary institutions (850)

<sup>\*\*\*</sup> - Denominator was the number of cases which require urgent blood transfusions namely ectopic pregnancies, abortions due to trauma, ante and postpartum haemorrhage (559)

Table 16 gives the health worker orientated avoidable factors per level of care. The rankings of the avoidable factors is the same in all levels with level 1 institutions being consistently higher than level 2 institutions which are again consistently higher than level 3 institutions.

**Table 16. Health worker orientated problems per level of care**

2005-2007	Level 1		Level 2		Level 3	
	2090	%	1668	%	959	%
Assessable deaths (n)						
Initial assessment	252	12.1	135	8.1	52	5.4
Problem with recognition / diagnosis	459	22.0	298	17.9	90	9.4
Delay in referring patient	325	15.6	64	3.8	6	0.6
Managed at inappropriate level	287	13.7	52	3.1		0.0
Incorrect management (Incorrect diagnosis)	152	7.3	70	4.2	22	2.3
Substandard management (Correct diagnosis)	619	29.6	506	30.3	190	19.8
Not monitored / Infrequently monitored	153	7.3	93	5.6	43	4.5
Prolonged abnormal monitoring without action	126	6.0	102	6.1	39	4.1

Table 17 compares the health worker orientated problems in 2005-2007 with 2002-2004 per level of care. In level 1 institutions there has generally been little change except for a significant increase in substandard management in 2005-2007 (p=0.000, OR 1.42 95% CI 1.2-1.6). Level 2 institutions there has been a general improvement

except again for a significant increase in substandard management ( $p < 0.001$  OR 1.33 95% CI 1.13-1.56). In Level 3 institutions there has been an overall improvement.

**Table 17a. Comparison health worker orientated problems at Level 1 institutions between 2005-2007 and 2002-2004**

Assessable deaths (n)	2005-2007 Level 1		2002-2004 Level 1	
	2090	%	1709	%
Initial assessment	252	12.1	234	13.7
Problem with recognition / diagnosis	459	22.0	371	21.7
Delay in referring patient	325	15.6	282	16.5
Managed at inappropriate level	287	13.7	214	12.5
Incorrect management (Incorrect diagnosis)	152	7.3	116	6.8
Substandard management (Correct diagnosis)	619	29.6	390	22.8
Not monitored / Infrequently monitored	153	7.3	132	7.7
Prolonged abnormal monitoring without action	126	6.0	112	6.6

**Table 17b. Comparison health worker orientated problems at Level 2 institutions between 2005-2007 and 2002-2004**

Assessable deaths (n)	2005-2007 Level 2		2002-2004 Level 2	
	1668	%	1427	%
Initial assessment	135	8.1	184	12.9
Problem with recognition / diagnosis	298	17.9	286	20.0
Delay in referring patient	64	3.8	88	6.2
Managed at inappropriate level	52	3.1	66	4.6
Incorrect management (Incorrect diagnosis)	70	4.2	92	6.4
Substandard management (Correct diagnosis)	506	30.3	352	24.7
Not monitored / Infrequently monitored	93	5.6	117	8.2
Prolonged abnormal monitoring without action	102	6.1	86	6.0

**Table 17c. Comparison health worker orientated problems at Level 3 institutions between 2005-2007 and 2002-2004**

Assessable* deaths (n)	2005-2007 Level 3		2002-2004 Level 3	
	959	%	929	%
Initial assessment	52	5.4	73	7.9
Problem with recognition / diagnosis	90	9.4	129	13.9
Delay in referring patient	6	0.6	12	1.3
Managed at inappropriate level		0.0	-	-
Incorrect management (Incorrect diagnosis)	22	2.3	37	4.0
Substandard management (Correct diagnosis)	190	19.8	205	22.1
Not monitored / Infrequently monitored	43	4.5	71	7.6
Prolonged abnormal monitoring without action	39	4.1	48	5.2

Table 18 gives the problems recorded with resuscitation of the women. This is slightly up from 2002-2004 which recorded problems in 17.9% of cases compared with 20.0% in 2005-2007. The biggest problem recorded was in not supporting the circulation adequately.

**Table 18. Health Worker related resuscitation problems in all cases**

Description	% of assessable deaths with avoidable factors	Distribution of avoidable factor
	2005-2007 (n=699)	
Resuscitation	20.0	
- Airway not secured		16.0
- Circulation not corrected		56.5
- Inappropriate drugs given		1.6
- Incompletely investigated		8.2
- Not appropriately monitored		1.7

In the 2002-2004 triennium and again in 2005-2007 assessors were asked to classify each maternal death as to whether the death was clearly preventable within the health system, i.e. all preventable deaths *excluding* the patient orientated factors (Table 19). This is clearly a subjective measure, but was aimed at getting a measure of the potential for improvement and establishing areas for focusing attention. Over eighty percent of maternal deaths due to anaesthetic complications and postpartum haemorrhage were thought to be avoidable. Hypertension, obstetric haemorrhage, pregnancy related sepsis and non-pregnancy related infections were responsible for 4 out of 5 avoidable deaths.

**Table 19. Avoidable deaths per disease category**

Primary Obstetric Cause	Total deaths	Number avoidable	% Avoidable	% All avoidable deaths (n=1519)
<b>Direct</b>	<b>1819</b>	<b>1065</b>	<b>58.5</b>	<b>70.1</b>
Hypertension	622	304	48.9	20.0
Postpartum haemorrhage	383	308	80.4	20.3
Antepartum haemorrhage	108	74	68.5	4.9
Ectopic pregnancy	55	37	67.3	2.4
Abortion	136	74	54.4	4.9
Pregnancy Related Sepsis	223	128	57.4	8.4
Anaesthetic related	107	91	85.0	6.0
Embolism	57	15	26.3	1.0
Acute collapse	128	34	26.6	2.2
<b>Indirect</b>	<b>1966</b>	<b>421</b>	<b>21.4</b>	<b>27.7</b>
Non Pregnancy Related Infections	1729	355	20.5	23.4
(AIDS)	915	161	17.6	10.6
Pre-existing Maternal Disease	237	66	27.8	4.3
<b>Unknown</b>	<b>174</b>	<b>33</b>	<b>19.0</b>	<b>2.2</b>
<b>Total</b>	<b>3959</b>	<b>1519</b>	<b>38.4</b>	<b>100.0</b>

\* **Avoidable deaths** are those classified by the assessors as being clearly avoidable within the health system (i.e. patient orientated factors are excluded).

**% avoidable cause** is the percentage of avoidable deaths that occurred in each primary cause category. For example assessors classified 304 of 622 women who died due to complications of hypertension in pregnancy as being avoidable, that is 48.9%.

**% All avoidable deaths** is the percentage of the deaths that were thought, by the assessors, to be avoidable of the total number of avoidable deaths. For example assessors thought 304 deaths due to hypertension were avoidable, that is 20.0% of all the avoidable deaths (n=1519).

Table 20 compares 2005-2007 with 2002-2004 with regard to whether there were any changes in the number of deaths thought to be avoidable per disease category. Table 21 compares the two trienniums with respect to the proportion which the deaths that were thought to be avoidable contributed to the overall number of avoidable deaths. There has been a significant shift in both deaths regarded as being avoidable and their contribution to the overall avoidable deaths by non-pregnancy related infection, mainly the AIDS category. This is expected as the strategic plan is scaled-up and HIV testing is performed on more pregnant women and antiretroviral drugs become more readily available. This is a reflection of the improved knowledge of the national guidelines on managing HIV infections.



**Table 20. Comparison of avoidable deaths per disease category with 2002-2004**

Primary Obstetric Cause	2005-2007	2002-2004
	% Avoidable cause	% Avoidable cause
<b>Direct</b>	<b>58.5</b>	<b>59.9</b>
Hypertension	48.9	52.7
Postpartum haemorrhage	80.4	83.4
Antepartum haemorrhage	68.5	77.5
Ectopic pregnancy	67.3	63.8
Abortion	54.4	50.0
Pregnancy Related Sepsis	57.4	57.7
Anaesthetic related	85.0	90.1
Embolism	26.3	
Acute collapse	26.6	23.4
<b>Indirect</b>	<b>21.4</b>	<b>10.4</b>
Non Pregnancy Related Infections	20.5	9.1
(AIDS)	17.6	4.5
Pre-existing Maternal Disease	<b>27.8</b>	19.6
<b>Unknown</b>	<b>19.0</b>	
<b>Total</b>	<b>38.4</b>	<b>36.7</b>

**Table 21. Comparison of the contribution of each primary obstetric cause to avoidable deaths**

Primary Obstetric Cause	2005-2007	2002-2004
	% All avoidable deaths (n=1519)	% All avoidable deaths (n=1208)
<b>Direct</b>	<b>70.1</b>	<b>87.7</b>
Hypertension	20.0	27.4
Postpartum haemorrhage	20.3	21.6
Antepartum haemorrhage	4.9	8.3
Ectopic pregnancy	2.4	2.5
Abortion	4.9	4.7
Pregnancy Related Sepsis	8.4	13.1
Anaesthetic related	6.0	6.8
Embolism	1.0	
Acute collapse	2.2	3.3
<b>Indirect</b>	<b>27.7</b>	<b>12.3</b>
Non-pregnancy related infections	23.4	9.4
(AIDS)	10.6	2.5
Pre-existing maternal disease	4.3	3.0
<b>Unknown</b>	<b>2.2</b>	<b>0.0</b>
<b>Total</b>	<b>100.0</b>	<b>100.0</b>

(AIDS is a subset of non-pregnancy related infections)

## 6. Discussion

This fourth comprehensive report on confidential enquiries into maternal deaths continues to demonstrate the value of such a system. This report has once again clearly identified the numbers, causes and avoidable or remediable factors associated with maternal deaths. As stressed above, the CEMD system is not an epidemiological survey but can give an idea of the order of magnitude of the problems and potentially track any changes. In the triennium 2005-2007 the numbers of maternal deaths reported has increased, and the increase is mainly due to an increase in deaths due to non-pregnancy related infections and improved reporting.

The impact of the HIV epidemic is having on maternal deaths is clearly demonstrated in this report. Without the HIV epidemic the *institutional* MMR would be similar to other mid-income countries like Brazil, Argentina and Thailand. The *institutional* MMR of women who were HIV infected was almost ten times that of the HIV negative women. The *institutional* MMR of the group where the HIV status was unknown was also very high. The provider initiated counselling should reduce this number. If the HIV status is unknown, women who are HIV infected miss the opportunity of effective therapy that will save their lives. The increasing availability of antiretroviral therapy makes many of the deaths due to AIDS clearly avoidable and it is not surprising there has been an increase of clearly avoidable deaths from 9.1% of the non-pregnancy related infections and 4.5% of the AIDS deaths in 2002-2004 to 23.4% of non-pregnancy related infections and 17.6% of AIDS deaths. The scale-up of the antiretroviral therapy programme must continue expanding rapidly.

Complications of hypertension in pregnancy remain the most common direct cause of maternal deaths. There has been a 13.7% reduction in deaths due to complications of hypertension. This is unlikely to be due to problems with classification and may be the first real sign that the recommendations on managing hypertension in pregnancy are being adhered to. This is further supported by the small decrease in avoidable deaths due to hypertension. There is an apparent decrease in deaths due to pregnancy related sepsis (septic abortion and puerperal sepsis following viable pregnancies). However, this probably due more to problems with classification as discussed above. If the alternative classification is taken into account, pregnancy related sepsis would

have a MMR similar to that of complications of hypertension (22.93/100000 deliveries). Deaths due to obstetric haemorrhage (ante-partum and post-partum haemorrhage) and ectopic pregnancies seem to have stabilised.

Four out of five of clearly avoidable maternal deaths were due to complications of hypertension, obstetric haemorrhage, pregnancy related sepsis and non-pregnancy related infections. The ways to prevent these deaths are known. Specific protocols have been developed and these have been included in the recommendations given in the previous report. Despite this, the most important avoidable factor is still substandard care (i.e. the lack of adherence to standard protocols). Renewed effort must be put in to ensuring the protocols are known and used. The most effective method of outreach has been shown to be face-to-face teaching on-site by a respected clinician. This ideal is difficult to attain but some systematic sustainable method of outreach must be devised. Further emphasis on the major causes of maternal deaths must take place in all medical schools and nursing colleges and all post-graduate degrees that involve pregnant women.

The NCCEMD believes the implementation of the recommendations will result in a reduction of maternal deaths in South Africa. This appears to be the case in complications in hypertension. Further it believes their implementation is feasible and can be achieved within the health resources of the country.

The relatively low number of deaths occurring in level 3 institutions compared with level 1 and 2 is a cause for concern. Are the level 1 and 2 hospitals not referring the patients because the problem is not recognised or there is no transport available or are the level 3 institutions not accepting the referrals' as they have no space? Part of the answer is in lack of recognition of the problem as this is a common avoidable factor in both level 1 and 2 institutions. Delay in referral is a problem at level 1 institutions reflecting lack of recognition of the problem or lack of transport. Lack of transport between institutions was associated with 1 in 10 of maternal deaths where transport between institutions was required. There is no indication whether level 1 or 2 institutions tried to refer patients but the level 3 institutions were unable or unwilling to accept the patients, thus the magnitude of this problem is unknown at present. Alternatively are there just not enough tertiary beds. The Free State province is an

example of a province where there might be an acute shortage of tertiary beds. Other provinces have no tertiary beds and need to refer patients to other provinces. There are 9 national central hospitals and 6 provincial tertiary hospitals. Are these enough to manage all the tertiary patients seen in South Africa?

Lack of attendance at antenatal clinics continues to be a common patient related avoidable factor and health messages must continue to stress the need to attend antenatal clinic early in pregnancy. However, a large proportion of the women that subsequently died did attend clinics giving the health workers a chance to intervene and prevent the deaths. Attention will need to be paid to the quality of antenatal care so that these opportunities are not missed. This is particularly relevant to HIV infected women, women with hypertension or other pre-existing medical conditions.

Delay in seeking help was the most common patient related avoidable factor. The exact meaning of this is hard to establish as assessors can only use the data available in the case notes. If lack of transport or other factors inhibiting the woman seeking help is not recorded in the notes, the assessor will not be able to document them. Independent research has indicated most of the delays are due to the inability to access transport especially at night leading to delay, rather than lack of knowledge or concern by the patient.

## **Conclusion**

The final comment of the 1999-2001 report was *“Every woman who becomes pregnant and continues with her pregnancy does so in the expectation of delivering a healthy child and the joy and satisfaction of watching the child grow. Surely, it is the duty of society and the health care profession to do the utmost to fulfil this expectation? To this end, the deficiencies identified in this report must be urgently addressed. The committee are anxious to see clear signs of progress by the next triennial report”*.

Unfortunately this, with the notable exception of women dying from complications of hypertension in pregnancy, has not come to pass. We will have to redouble our efforts.

## 7. References

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## Ten Key Recommendations

The National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) reviewed the recommendations as outlined in the **Saving Mothers 2002-2004** report, assessing whether the recommendations are still relevant. A large number of problems previously identified were still present in this 2005-2007 report. Thus the majority of recommendations have remained the same or slightly modified. The key strategies identified in the previous report to accelerate implementation of the recommendations are included in these recommendations. The *golden threads* running through the implementation strategies for the recommendations continue as:

- Introduction of recommendations into managers Key Performance Areas
- Outreach on-site, face to face teaching and training that is documented

Areas for implementation of the recommendations are classified into policy and management, administration and monitoring and clinical practice where applicable. Targets to be achieved have been specified and should be fully in place by December 2010.

**1. Protocols on the management of important conditions causing maternal deaths must be available and utilised appropriately in all institutions (including facilities which only provide antenatal and postnatal services) where women deliver. All midwives and doctors must be trained on the use of these protocols.**

### **Motivation for recommendation**

The most frequent health worker related avoidable factor was substandard care, namely lack of adherence to standard protocols. This was present in 30% of cases managed in level 1 and 2 institutions and 20% in level 3 institutions. Four out of five clearly avoidable maternal deaths were due to complications of hypertension, obstetric haemorrhage, pregnancy related sepsis and non-pregnancy related infections. Problems in resuscitation occurred in 20% of cases.

The following are key conditions of which relevant protocols must be available:

- Hypertensive disorders in pregnancy
- Obstetric haemorrhage,
- Septic abortion,
- Puerperal Infections,
- HIV/AIDS (including community acquired pneumonias, PCP, meningitis and lactic acidosis), TB and Malaria
- Resuscitation: Maternal and Neonatal.
- Cardiac disease in pregnancy

**Note:** Protocols are derived from guidelines and are specific to each institution. For example the protocol for managing a woman with severe pre-eclampsia will be different in a primary health care clinic from a secondary level hospital, however, they will both comply with the guidelines for managing severe pre-eclampsia. Protocols will also differ between similar levels of institutions as referral routes; telephone numbers, types of emergency transport differ in different areas. Protocols are very detailed instructions for managing a condition and are specific to that institution. Guidelines contain the principles on how the woman should be managed. Protocols are derived from guidelines by the institution. (For more detail see **Saving Mothers: Policy and management guidelines for common causes of maternal death**. Government Printer, Pretoria, 2001, pp2-4)

### **Indicators**

1. Availability of relevant written protocols derived from **Guidelines for Maternity Care in South Africa 2007; Essential Steps in Managing the Common Causes of Maternal Death in South Africa;** and **Policy and Guidelines for the Implementation of the PMTCT Programme (11 February 2008)** in the form of posters, individual booklets or tool kits in relevant sections of health facilities
2. Availability of a functioning training programme for all institutions at district level
3. Availability of the functioning program on quality assurance for proper use of guidelines by midwives and doctors at district level

## **Targets**

1. **All** institutions must have relevant written protocols in the form of posters, individual booklet or tool kit in relevant sections of these facilities
2. All districts must have a written functioning training programme in all institutions
3. All districts must have a written functioning program on quality assurance for proper use of guidelines by all health professionals including midwives and doctors

## **Implementation strategy**

- Policy and Management
  - Clinical guidelines on management of important conditions causing maternal deaths should be updated, strengthened and distributed to all health institutions
  - The clinical guidelines should be included in undergraduate and postgraduate curricula for doctors and nurses. Motivations to the appropriate health professional bodies must be performed
  - Recommend to policy makers that implementation of the guidelines be incorporated into the Key Performance Areas of the appropriate managers.
- Administration and monitoring
  - Systems must be developed to facilitate training by institutional managers
  - All guidelines to be made available to the health care workers involved in maternity care either in hard copy or electronically
  - Have a strategy in place for monitoring availability of protocols and use of the protocols
- Clinical practice
  - On-site face-to face training should involve academic institutions and referral centres. Academic institutions and referral centres, including medical schools and nursing colleges, should be allocated areas of responsibilities. In addition medical schools and nursing colleges should improve the teaching of relevant clinical competencies and skills.



- All undergraduates must be trained on the **Guidelines for Maternity Care in South Africa 2007; Essential Steps in Managing the Common Causes of Maternal Death in South Africa; and Policy and Guidelines for the Implementation of the PMTCT Programme (11 February 2008).**

**2. Training should be provided for all health professional working in maternity units in practical obstetrical and surgical skills. Skills should be provided in anaesthesia, especially in level 1 institutions.**

**Motivation for recommendation**

Lack of appropriately trained staff was present in almost one in ten cases of maternal death. This varied from 2.2% to 21.2% in the provinces. It was present in 22.4% of anaesthetic related deaths, 17.5% of obstetric haemorrhages cases and approximately 10% in hypertension and pregnancy related sepsis. A special comment has been made at the apparent lack of surgical skills for caesarean section in the chapter on obstetric haemorrhage. Lack of resuscitation skills was also recorded in 20% of cases.

A training programme developed in South Africa for improving obstetric and surgical skills is available and has been tested on over a hundred interns throughout the country. The training programme (Essential Steps in Managing Obstetric Emergencies – ESMOE) improved the interns' skills between 31% and 65%. ESMOE Fire-Drills will be available in March 2009. The fire-drills are intended to train all the staff in the maternity units.

**Indicators**

1. Availability of ESMOE fire-drills and skills training in health care facilities
2. Availability of a ESMOE skills training programme for all institutions at district level
3. Availability of the functioning program on quality assurance for assessing skills of midwives and doctors at district level
4. Anaesthetic indicator

## **Target**

1. All hospitals must have implemented ESMOE fire-drills and skills training
2. All sub-districts must have access to ESMOE skills training programme for all institutions in the sub-district
3. All districts must have a functioning program on quality assurance for assessing skills of all health professionals including midwives and doctors

## **Implementation strategy**

- Policy and senior management
  - Develop a tool kit for regional anaesthesia to guide doctors at lower level institutions and this should be added to ESMOE training package
  - Recommend to policy makers that improving practical obstetric and surgical skills and skills in anaesthesia be incorporated into the Key Performance Areas of the appropriate managers.
  - Involve the HPCSA, the Colleges of Medicine (Obstetrics and Gynaecology, Anaesthesia, Paediatricians), Deans Committee, South African Society of Obstetrics and Gynaecology, South African Chapter of the RCOG, Society of Midwives of South Africa and Nursing Council in negotiations on this matter
- Administration and monitoring
  - ESMOE programme to be made available for doctors for improving skills
  - ESMOE programme to be made available for midwives for improving skills
  - Implement ESMOE Fire-drills for all maternity units
- Clinical practice
  - Outreach programmes by academic institutions and referral hospitals to all institutions performing caesarean sections
  - Strengthen supportive supervision of doctors and midwives
  - Outreach face-to-face, on-site training programmes (including District Hospitals and MOUs)

- A quality assurance programme should be implemented, using an appropriate tool.

### **3. All pregnant women should be offered information on, screening for and appropriate management of non-pregnancy related infections and common medical disorders**

The specific conditions are:

- HIV/AIDS
- Tuberculosis
- Malaria
- Hypertension
- Anaemia
- Cardiac disease

#### **Motivation for recommendation**

AIDS was the most common cause of maternal deaths in this report. Only 60% of the women who died were tested for HIV. In 2007, nationally approximately 22% of pregnant women were not counselled for or declined HIV testing at antenatal clinics. Without knowledge of the HIV status many opportunities to prevent maternal deaths are missed. Tuberculosis is commonly associated with AIDS.

Complications of hypertension were the most common direct causes of maternal deaths. Screening for hypertension is simple and inexpensive. Obstetric haemorrhage was the second most common direct cause of death. Pregnant women who are anaemic are at a major disadvantage if they develop an obstetric haemorrhage and are more likely to die. Screening for anaemia is simple and inexpensive. Pre-existing cardiac disease was the most common cause of maternal death in the pre-existing medical disorders. Although relatively uncommon women with cardiac lesions are at very high risk of death during pregnancy if the disease is not detected and managed appropriately. Screening is by taking an appropriate history and doing a clinical examination of the cardiovascular system.

## **Indicator**

Percentage institutions providing appropriate maternity care offering information on screening for and appropriate management of non-pregnancy related infections and common medical disorders.

## **Targets**

1. All institutions that perform maternity care should provide:
  - a. Provider initiated counselling and testing for HIV in all districts and sub-districts. HIV staging (including CD4 counts) to be performed in HIV infected women at point of diagnosis. Dual therapy to be started for all immediately on diagnosis at 28 weeks or immediately if the diagnosis is made after 28 weeks. HAART treatment for women with AIDS should be referred for and started within 2 weeks.
  - b. Appropriate history taking and examination for tuberculosis and where necessary for continued anti-tuberculosis therapy.
  - c. Malaria screening in malaria areas and malaria prophylaxis
  - d. Screening for anaemia, hypertensive disorders in pregnancy, and cardiac disease

## **Implementation strategy**

- Policy and Management
  - Key information for all women must be developed and made available for everyone by the maternal health unit
  - Recommend to policy makers that the implementation of informing, screening and managing non-pregnancy related infections and common medical disorders be incorporated into the Key Performance Areas of the appropriate managers.
  
- Administration and monitoring
  - Screening tools and treatment facilities and schedules must be available
  - Specific training on antiretroviral therapy for HIV should be provided

- Clinical practice
  - On-site face-to face training should include screening and treating HIV, TB, malaria, hypertension, anaemia and cardiac disease. Preferably academic institutions, including medical schools and nursing colleges, should be allocated areas of responsibilities. In addition medical schools and nursing colleges must improve the teaching of relevant clinical competencies and skills.

**4. Criteria for referral and referral routes must be established and utilized appropriately in all provinces. Emergency transport facilities must be available for all pregnant women in need (at any site).**

#### **Motivation for recommendation**

Problems with transport between institutions were reported in 8.4% of cases requiring transfer and that subsequently died. Delay in seeking medical help was reported in 26.7% of cases. The most common reason for the delay was the lack of transport between the woman's home and a health care institution. Delay in referring cases occurred in 15.6% and managing them at an inappropriate level occurred in 13.7% of women managed at some point at a level 1 institution. As each category is mutually exclusive almost 30% of maternal deaths managed at some point at a level 1 institution had problems with referral.

#### **Indicators**

1. Availability of referral routes and criteria for referral in the relevant areas in hospitals and emergency services
2. Time from call for and ambulance to arrival of the ambulance at site

#### **Target**

1. All facilities providing maternity services must have functional referral routes and referral criteria.
2. 70% of ambulances on red code calls must arrive at the emergency site within 1 hour of call.

## **Implementation strategy**

- Policy and Management
  - Referral systems must be clearly stated
  - Recommend that patients clinical records/charts accompany the patient on transfer
  - Build into referral system, transfer directly to appropriate health care level if necessary rather than from level 1 to 2 then to 3
  - Make obstetric emergencies (including ectopic pregnancies and major gynaecological haemorrhages), red code (highest priority)
  - Consideration should be given to **“waiting mothers areas”** where required.
  - Telecommunication networks must be extended to cover rural areas so that contact can be made with clinics and ambulances
  - Recommend to policy makers that the implementation of transport policy and implementation of referral criteria and routes be incorporated into the KPA’s of the appropriate managers
- Administration and monitoring
  - Establish written agreements between different health districts/regions, and provinces, and include emergency services in negotiations
  - Develop risk classification guidelines
  - Monitor transport times and investigate cases with excessive delays
  - Inform all health professionals of policies at least twice a year because of staffing changes
  - Work with emergency medical services in each province to identify delays and solve problems
- Clinical practice
  - Training in criteria for referral for all health professionals (doctors, nurses and emergency services)
  - Emergency medical personnel to be trained on obstetric emergencies
  - All referred patients to be seen by an experienced practitioner at the referral site within one hour. Emergencies must be seen immediately.

## 5. Postnatal care must be strengthened

### Motivation for recommendation

The postpartum period was the most common period for the problem resulting in death to occur, occurring in 45.4% of cases compared with 9% in early pregnancy, 36.7 antenatally and 8.7% intrapartum. Most maternal deaths occur after the woman has given birth.

Twenty-seven percent of the women who died due to pregnancy related sepsis following a viable pregnancy were reported to have delayed in seeking help. If these women were seen within 6 days of discharge their deaths might have been prevented.

### Indicator

Recorded visits at DHIS as a percentage of births in the sub-district.

### Targets

1. 60% of women and children attend postnatal care at 6 weeks
2. Establish a mechanism to monitor the number the of postpartum visits within 6 days of delivery

### Implementation strategy

- Policy and Management
  - Enforce the policy that women and their babies in the postnatal period are examined at 6 hours, **within** 6 days of delivery and at 6 weeks
  - Recommend to policy makers that the implementation of postnatal policy be incorporated into the Key Performance Areas of the appropriate managers.
- Administration and monitoring
  - Ensure postnatal women are properly examined regularly until discharge from the birth institution. Women with risk factors must be appropriately managed and an individual postnatal follow-up plan developed

- Encourage the clinics to be integrated so that the woman and her baby can be seen at the same time.
  - Investigate the possibility of community health workers visiting all women at their home within 6 days of delivery.
  - High risk patients should be followed in the appropriate institutions
  - Establish a mechanism of monitoring visits within 6 days of delivery
- Clinical practice
    - On-site face-to face training should include training in managing the puerperium e.g. Essential postnatal care training and postnatal card
    - Training in contraception must be emphasised

**6. Staffing and equipment norms must be established for each level and for every health institution concerned with the care of pregnant women.**

**Motivation for recommendation**

Many of the health worker related avoidable factors may be explained by a lack of staff and lack of staff is the most frequent complaint made by health workers when considering quality of care issues. Lack of staff was very infrequently mentioned as an avoidable factor in this report. That does not mean the problem is uncommon, it may be under reported. Assessors can only record lack of staff as an avoidable factor if it is recorded in the case notes. The only way to resolve the question of staffing is to have norms against which each institution can measure itself. The size of the problem of lack of staff will then be apparent.

**Indicator**

1. Availability of guidelines on allocation of human resources for maternal and neonatal health services
2. Availability of guidelines on essential equipments for provision of maternal and neonatal health care at different levels.



## **Target**

Written guidelines for human resource allocation and for essential equipment must be available at national, provincial, district and facility level.

## **Implementation strategy**

- Policy and Management
  - Establish staffing norms
  - Recruit new health workers and institute processes to retain staff
  - Establish training sites for new recruits
  - Recommend to policy makers that establishing staffing norms and methods of retaining staff be incorporated into the Key Performance Areas of the appropriate managers
  - Restrict staff rotation in maternity units
- Administration and monitoring
  - Essential equipment must be available
  - Equipment lists for managing pregnant and post partum women and their babies be updated regularly
  - Measure staffing against norms

## **7. Blood for transfusion must be available at every institution where caesarean sections are performed**

### **Motivation for recommendation**

Lack of blood for transfusion is becoming an increasing problem. It occurred in 19% of maternal deaths that required blood urgently. This is up from 9.2% in the previous triennium.

### **Indicator**

Percentage of applicable institutions having adequate emergency blood available

### **Target**

All applicable institutions

### **Implementation strategy**

- Policy and Management
  - Ensure that blood and all other blood products are available in all relevant facilities; Plasma expanders should also be available in the labour wards
  - Facilitate immediate replacement of depleted emergency blood supplies
  - Recommend to policy makers that availability of blood for transfusion be incorporated into the KPA's of the appropriate managers
- Administration and monitoring
  - Ensure blood availability in facility
  - Audit use and availability of blood
- Clinical practice
  - Training health workers on proper use of blood and blood products
  - Training health workers on measures to prevent the need for blood transfusion, e.g. use of iron and folic acid prophylaxis for all pregnant and post partum women; advice on proper nutrition; active management of the third stage of labour and the antenatal transfer of women at risk of postpartum haemorrhage (PPH) to the appropriate level of health care.

## **8. Contraceptive use must be promoted through education and service provision.**

### **Motivation for recommendation**

The best way to prevent maternal deaths is to prevent pregnancy. Many women do not plan their pregnancies and some pregnancies are not wanted. These women are at higher risk than those who planned their pregnancies. Women 35 years or older had a greater risk of maternal deaths than younger women. Also teenagers also had a greater risk of maternal deaths, especially due to complications of hypertension.

### **Indicators**

1. Percentage of tubal ligations in women over 35 years of age

2. Number of intrauterine contraceptive devices (IUCD) being inserted
3. Number of health care workers trained in IUCD insertion
4. Percentage of regional and provincial tertiary and national central hospitals have contraceptive services
5. Number of vasectomies performed

### **Targets**

1. Sustained increase in women using contraceptive services having tubal ligations, IUCD insertions and vasectomies performed
2. All districts must provide information on all forms of contraceptives and family planning
3. All regional and provincial tertiary and national central hospitals to have contraceptive services

### **Implementation strategy**

- Policy and Management
  - Ensure availability of all contraceptive methods, especially emergency contraception
  - Ensure public is advised on rights and sites
  - All health facilities irrespective of level of care should offer contraceptives
  - Ensure availability of all contraceptive methods, especially emergency contraception and IUCDs.
  - Recommend to policy makers that the implementation of improving contraceptive services be incorporated into the Key Performance Areas of the appropriate managers.
  - All health facilities irrespective of level of care should offer contraceptives
- Administration and monitoring
  - Provision of facilities and staff for tubal ligation
  - Ensure availability of all contraceptives
    - Primary health care
    - High risk patients
  - Implement fast lanes for women requiring contraceptives

- Clinical practice
  - Training in contraceptive use
  - Training of clinical personnel in tubal ligation techniques and insertion of IUCDs

## **9. The number of deaths from unsafe abortion must be reduced**

### **Motivation for recommendation**

The number of deaths due to abortion increased slightly in the last triennium. This was disappointing especially after the significant decrease in deaths in the previous triennium. The number of terminations of pregnancy in public institutions has been falling in the last triennium and the number of public institutions performing TOPs is declining. There is concern the rise in maternal deaths might be related to this as women have less accessibility to TOP services.

### **Indicators**

1. Percentage of functioning Termination of Pregnancy (TOP) services in relation to designated public sector units separately for first and second trimester pregnancies.
2. Availability of strategies for advertising TOP services within the district.

### **Targets**

1. All sub-districts must be able to provide first trimester TOPs
2. 70% of sub-districts must be able to provide second trimester TOPs

### **Implementation strategy**

- Policy and Management
  - Expand sites for second trimester TOP
  - Ensure availability of all contraceptive methods, especially emergency contraception
  - Ensure public is advised on rights and sites
  - Recommend to policy makers that reduction of numbers of deaths from unsafe abortion is incorporated in the KPA's of the appropriate managers

- Incentives should be recommended for doctors, midwives and registered nurses doing TOPs. Occupation specific dispensation for TOPs should be considered and negotiated with the Department of Health
- Consider medical termination of pregnancy to reduce waiting times for first trimester TOPs and decrease the number of second trimester TOPs
- Administration and monitoring
  - Make institutions available for TOPs
  - Streamline administrative route from requesting TOP to performance of TOP to a **maximum** of 2 visits one for assessment and one for performance
- Clinical practice
  - Training in TOPs for doctors, midwives and registered nurses
  - Hold regular value clarification workshops

**10. Women, families and communities at large must be empowered, involved and participate actively in activities, projects and programmes aiming at improving maternal and neonatal health as well as reproductive health in general.**

#### **Motivation for recommendation**

Patient related avoidable factors were recorded in 46.5% of maternal deaths. Including communities in activities related to pregnancy and having consistent health messages will reduce the number of patient related avoidable factors and result in less women dying.

#### **Indicators**

1. Percent functioning community empowerment programmes at sub-district level
2. Availability of appropriate Information, Education and Communication Material (IEC) or Behaviour Change and Communication (BCC) material addressing major issues around maternal deaths for women and the general population.

## **Targets**

1. 70% of sub-districts must be able to conduct at least quarterly activities targeting women and the general population to raise awareness and facilitate change of behaviour regarding maternal and neonatal health plus reproductive and sexual health in general; the activity should be documented and reported to the maternal health unit of the National Department of Health
2. 70% of sub-districts must be able to provide appropriate IEC or BCC material addressing major issues around maternal deaths for women and general population at all times.

## **Implementation strategy**

- Policy and Management
  - Develop and disseminate relevant information, education and communication material
  - Encourage male participation in reproductive health
  - Encourage a healthy lifestyle (including proper nutrition) as preventative measure
  - Recommend to policy makers that empowering the community in maternal and child care be incorporated into the Key Performance Areas of the appropriate managers
  - Pregnant women should be encouraged to and supported in arranging transport when she has medical problems or when labour starts
- Administration and monitoring
  - Create opportunities for linkages (such as open days) with stakeholders within the community
  - Involve the communications dept/unit and health promotion unit in disseminating information and encouraging community participation
- Clinical practice
  - Train health professionals on culture and traditions of their community
  - Train all health workers to be empathic towards patients and their families

