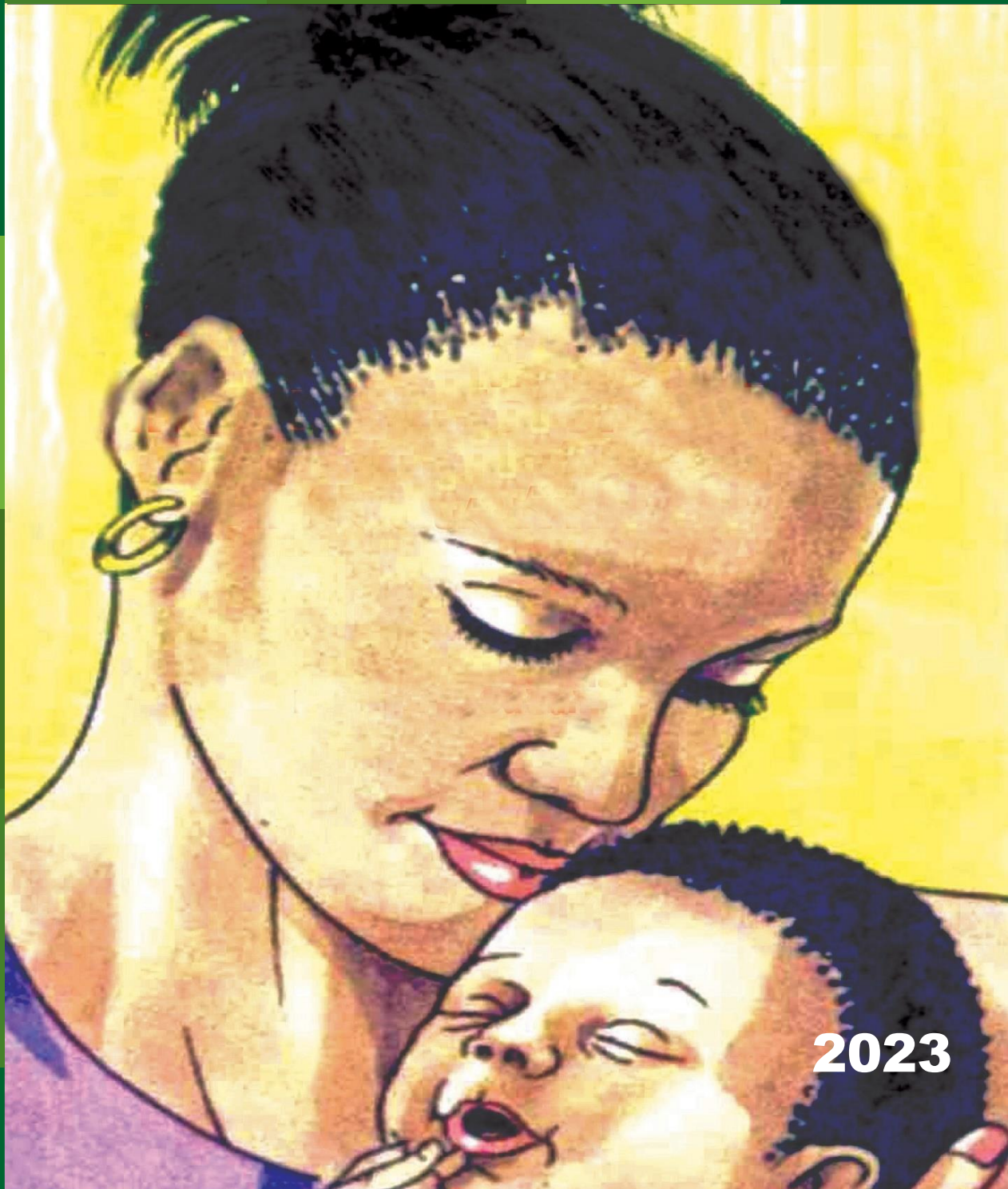


Saving Mothers



2023

National Committee for Confidential Enquiry into Maternal Deaths: Annual Report for 2023



health

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Health
REPUBLIC OF SOUTH AFRICA



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Acronyms

AR	Anaesthetic Related
ART	Antiretroviral Therapy
BBA	Born Before Arrival
BMI	Body Mass Index
BP	Blood Pressure
CD	Caesarean Delivery
CFR	Case Fatality Rate
CHC	Community Health Centre
CHW	Community Health Worker
CLEVER	Clinical care; Labour ward management; Eliminate barriers; Verify care; EOSt on auto pilot; Respectful care
Clinic	Primary healthcare clinic
DCST	District Clinical Specialist Teams
DDPCP	Deaths During Pregnancy, Childbirth and Puerperium
DH	District hospital
DHIS	District Health Information System
EC	Eastern Cape
EOSt	Emergency Obstetric Simulation Training
ESMOE	Essential Steps in Managing Obstetric Emergencies
FDC	Fixed Dose Combination
FRANC	First Referral For Antenatal Care
FS	Free State
GP	Gauteng
HIV	Human Immunodeficiency Virus
HDP	Hypertensive Disorders In Pregnancy
iMMR	In Facility Maternal Mortality Ratio
IUCD	Intrauterine contraceptive device
KZN	KwaZulu-Natal
LARC	Long-Acting Reversible Contraception
LP	Limpopo
MaMMAS	Maternal Mortality and Morbidity Audit System
M&S	Medical and Surgical conditions
MD	Maternal Death
MP	Mpumalanga
MVA	Manual Vacuum Aspiration
NaPeMMCo	National Perinatal Morbidity and Mortality Committee
NC	Northern Cape
NCCEMD	National Committee for Confidential Enquiries into Maternal Deaths
NCH	National Central Hospital
NPRI	Non-Pregnancy-Related Infections
NW	North West
OH	Obstetric Haemorrhage
OMBU	On-site Midwife run Birthing Unit
PHC	Primary healthcare
PMTCT	Prevention of Mother-to-Child Transmission
PPE	Personal Protective Equipment
PPH	Postpartum Haemorrhage
PRS	Pregnancy-Related Sepsis
RH	Regional Hospital
TB	Tuberculosis
TH	Tertiary Hospital
TOP	Termination Of Pregnancy
WBOT	Ward Based Outreach Teams
WC	Western Cape

Foreword

The death of a woman during pregnancy, childbirth or the puerperium still remains one of the greatest possible tragedies. The right to life is everyone's constitutional right and women also deserves such. Everyone has the right to have access to healthcare services, including reproductive healthcare. All women must feel safe when faced with the need to seek care everywhere within our health system, and it is everyone's moral obligation to ascertain that safety.

In South Africa, a system of National Confidential Enquiries into Maternal Deaths exists to review maternal deaths. This team consists of highly committed healthcare professionals who dedicate their time to the confidential assessments of individual maternal deaths in all nine provinces in South Africa. This confidential enquiry identifies challenges in the health system and makes recommendations for improvement. The recommendations are produced in the form of annual and triennial reports which highlight shortcomings in the healthcare system, avoidable factors in individual clinical care and whether the death could have been prevented or not.

The NCCEMD works as a ministerial team, with support from the current Minister of Health, Dr A. Motsoaledi and previous, Dr J. Phaahla, as well as the National Department of Health (NDOH) MCWH team.

It is quite a mammoth task to bring such triennial and annual reports to fruition, and it involves tremendous effort, energy and meticulous attention to detail, and Professor S. Fawcus (editor) of the Saving Mothers' Reports and B. Mamabolo (SAMRC- UP) need special mention and South Africa's gratitude for these thoughtful documents and contributions that they have made to decrease maternal and newborn deaths in South Africa.

The peaks of MMR seen during the COVID-19 pandemic have reversed but further decline in MMR is not in keeping with the SDG target of reaching an MMR of 70 MD per 100 000 livebirths by 2030. This 2023 interim report highlights the iMMR of 111.7, which is higher than the previous year (109.6 MD per 100000 livebirths in 2022). There is much provincial variation in numbers, rates and pattern of causes. Potentially preventable deaths remain similar to previous triennia at 58 per cent; these need to be reduced and together we can do it.

Let's continue to grow South Africa together in our journey to save lives. Together we can!



Dr Sylvia N Cebekhulu: NCCEMD Chairperson

Executive Summary

Introduction

The 2023 annual Saving Mothers report will present an overview of maternal mortality in South Africa, underlying causes and trends compared to previous years.

The previous triennium 2020-2022 was dominated by the occurrence of the COVID-19 pandemic which caused a 30 and 47 per cent increase in maternal mortality in 2020 and 2021 respectively. By 2022, the iMMR had declined to 109.6 maternal deaths per 100,000 live births which was similar to pre-pandemic levels (1).

Methods

The method used to compile this report is the same as for previous annual Saving Mothers reports (2). The MaMMAS database was closed in June 2024, later than in previous years, due to general delays in provincial notification and assessment processes, but also due to late submissions from some provinces. The classification of maternal deaths that is used in South Africa is based on the WHO ICD 10 adaptation for maternal deaths (3).

Maternal deaths are classified by primary obstetric cause, for example obstetric haemorrhage (OH), non-pregnancy related infections (NPRI) etc. These are then subdivided into causal subcategories e.g. for OH: uterine atony, bleeding at caesarean delivery (CD) etc.; and for NPRI: TB, pneumonia etc. The classification can be found in NCCEMD documents (4).

Avoidable factors are identified by assessors and classified according to the NCCEMD framework into patient/community level factors, administrative factors and healthcare provider related factors (4).

Results

In 2023, there were 929 deaths during pregnancy, childbirth, and the puerperium (DDPCP) that were reported to the NCCEMD and entered in the MaMMAS database and 902 were Maternal deaths, after excluding 27 coincidental deaths. There were 883,254 live births reported to the DHIS in public health facilities. Greater numbers of deaths were reported to NCCEMD than to DHIS for most provinces, as in previous years. This is because NCCEMD includes deaths which happened outside health facilities and deaths at private hospitals in addition to facility deaths, whereas DHIS only includes public health facility deaths. However, in 2023 significantly more deaths were reported to DHIS than NCCEMD from Eastern Cape (13 more), Gauteng (42 more), and Limpopo (24 more) provinces, and six more for KwaZulu-Natal (KZN). The discrepancy is thought to be due to under reporting which is of great concern given that the NCCEMD process was designed to be the most accurate system. Therefore, as in previous reports, a correction was made for these provinces whereby the DHIS number was used rather than the MaMMAS statistic to calculate rates.

Main findings

- The corrected number of maternal deaths in 2023 was 987.
- The corrected maternal mortality ratio (iMMR) was 111.7 maternal deaths per 100,000 live births.
- The iMMR increased slightly from 2022 (iMMR 109.6) and 2019 (pre-pandemic 98.8). The above suggest that the steep decline in iMMR from 2010 has stabilised after the surges observed in the COVID-19 pandemic years but is not declining further.
- Provincial variations in trends were observed in 2023. Compared with 2022, iMMR increased by more than 10 MDs per 100,000 LBs in Eastern Cape, Free State, North West, and Northern Cape; remained similar in KwaZulu-Natal, Limpopo, Mpumalanga and Western Cape; and decreased in Gauteng.
- Non-pregnancy related Infections (NPRI) were still the leading cause (154 deaths) but were only marginally higher than Medical and Surgical disorders (M&S, 152), Hypertensive disorders (HDP, 149) and Obstetric haemorrhage (OH, 146). These four causes stand out as the commonest causes with less difference between them than observed in previous years where NPRI dominated, and M&S was the fourth cause.
- Embolism has increased to be the fifth most common cause (55 deaths), followed by miscarriage (52 deaths), pregnancy related sepsis (44 deaths) and ectopic pregnancy (33 deaths). Of note, if ectopic pregnancy and miscarriage are combined as 'early pregnancy deaths', this category accounts for 85 deaths which would then be the fifth most common cause.

- Considerable variation in the pattern of causes in different provinces was observed with HDP being the leading cause in four provinces, M&S in three provinces, NPRI in two provinces, and OH in one province.
- The majority of deaths (84.9%) occurred at public hospitals with 5.2 per cent in private hospitals.
- The caesarean delivery (CD) rate in 2023 was 32.3 per cent, which is higher than in 2020-2022 when it was 28 per cent. The CD case-fatality rate (CFR) was 122.3 deaths per 100,000 CDs. This is less than in the previous triennium when it was 155.9.
There were 41 deaths from bleeding associated with caesarean delivery (BLDADC), giving a BLDADC CFR for 2023 of 14.4. This has reduced markedly from 22.3 in the previous triennium, but there are large differences between provinces in both CD rates and BLDADC CFR.
- Deaths were assessed to be possibly or probably preventable by the health system for 58 per cent of women who died, the most avoidable being OH and HDP deaths, with lesser numbers in the NPRI group.

Discussion

There is ongoing concern about the discrepancies between MaMMAS and DHIS data for some provinces where DHIS numbers unexpectedly exceed MaMMAS numbers. This needs further investigation.

The steep decline in iMMR from 2011 to 2019 has not been sustained after the peaks of the COVID-19 impact subsided. Although one year of data is insufficient to note trends, the iMMR has increased slightly from 2022.

This is concerning for the South African's target of reaching MMR of 70 by 2030. It could also be hindered by budgetary cuts in the coming years.

For South Africa, NPRI was the most frequent cause of MD. However, there is a changing pattern of primary obstetric causes with NPRI not being the major cause in several provinces where M&S or HDP have overtaken it. Hypertension was the major cause in four provinces, M&S in three, NPRI in two and OH in one. In NC, HDP and NPRI were equal first. OH deaths have decreased whereas M&S and Embolism have increased. This changing pattern is in keeping with the obstetric transition seen in high income countries (5).

The percentage of MDs assessed to be potentially preventable within the health system was 58 per cent deaths and this is where attention is needed. Such factors included non -availability of appropriate skill on-site or on standby, poor problem recognition, and substandard care.

Conclusion

The corrected iMMR for 2023 was 111.7. The peaks of MMR seen during the COVID-19 pandemic have reversed but further decline in MMR is not in keeping with the target of reaching an MMR of 70 by 2023.

NPRI and M&S remain the most common causes of MD followed closely by HDP and OH. There is much provincial variation in numbers, rates and pattern of the causes of deaths.

Potentially preventable deaths remain similar to previous triennia at 58 per cent and these need to be reduced

Recommendations

1. Recommendations of the 2017-2019 and 2020-2022 Saving Mothers reports are still relevant and need to be implemented (Appendices 4 and 5) at all levels of care.
2. Accuracy of MaMMAS and DHIS notifications of maternal deaths need to be investigated.
3. E Motive approach for managing PPH with objective blood loss measurement using a calibrated drape or tray for early detection, and a standardised bundled approach for first response treatment, must be scaled up nationally to all maternity healthcare facilities.
4. Disseminate and teach on new SA Maternity Care Guidelines (6).
5. Ensure appropriate thromboprophylaxis is administered after vaginal and after caesarean delivery to women at high risk of thromboembolism.
6. Training and protocols to emphasise recognition, management and referral of maternal medical disorders (e.g. cardiac disease) and non-pregnancy related infections. In particular, there is a need for clear protocols regarding i) persistent maternal tachycardia and ii) anaemia in pregnancy, which are often signs of underlying acute or chronic disease.
7. Re-establish a national ESMOE board so that modules are updated and made widely accessible, and ensure all maternity facilities continue with ESMOE training and drills.
8. Provinces to address administrative and health systems issues arising from this report in their annual performance plans.
9. When rotating staff or employing new staff, ensure experienced staff remain in maternity settings to orientate and supervise the new or inexperienced staff.

10. Maternal health needs to be prioritised at national level and appropriate investment and allocation of resources made to maternal health.

1. Introduction

The 2023 annual Saving Mothers report will present an overview of maternal mortality in South Africa, underlying causes and trends compared to previous years.

The previous triennium 2020-2022 was dominated by the occurrence of the COVID-19 pandemic which caused a 30 and 47 per cent increase in maternal mortality in 2020 and 2021 respectively. By 2022, the iMMR had declined to 109.6 maternal deaths per 100,000 live births and was similar to pre-pandemic levels (1).

The MRC Maternal and Infant Healthcare Strategies unit headed by Professor Feucht, continues to collate the MaMMAS data for the Saving Mothers report and the NCCEMD is very grateful to Bontle Mamabolo from the MRC for her important contribution in this regard.

The report is made possible by the work of provincial assessors in each province who assess each maternal death and the provincial MCWH coordinators who coordinate the notification and assessment process.

The NCCEMD coordinates the confidential enquiry at national level and its work is supported by the National Department of Health's MCWH directorate previously headed by Dr Manala Makua and now headed by Professor Lesley Bamford.

2. Methods

The method used to compile this report is the same as has been used for all the other annual reports (2). The database was closed in June 2023, later than in previous years, due to general delays in provincial notification and assessment processes, but also due to late submissions from some provinces

The classification of maternal deaths used in South Africa is based on the WHO ICD 10 adaptation for maternal deaths (3).

Maternal deaths are classified by primary obstetric causes, for example obstetric haemorrhage (OH), non-pregnancy related infections (NPRI) etc. These are then subdivided into causal subcategories e.g. for OH: uterine atony, bleeding at caesarean delivery (CD) etc.; and for NPRI: TB, pneumonia etc. The classification can be found in NCCEMD documents (4).

Avoidable factors are identified by assessors and classified according to the NCCEMD framework into patient/community level factors, administrative factors and healthcare provider related factors (4).

3. Maternal deaths and mortality rates 2023

Table 1 gives the live births from the DHIS, and maternal deaths submitted to the NCCEMD and entered on the Maternal Morbidity and Mortality Audit System (MaMMAS) in 2023, as well as those recorded by DHIS. It is important to note that all Deaths During Pregnancy, Childbirth, and the Puerperium (DDPCP), previously known as pregnancy related deaths, were reported. DDPCP include any woman who died during pregnancy or the puerperium and include coincidental deaths such as those due to motor vehicle accidents, natural disasters, and assault. The definition of a maternal death excludes these coincidental deaths.

In 2023, there were 929 deaths during pregnancy, childbirth, and the puerperium (DDPCP), reported to the NCCEMD and entered in the MaMMAS database, of which 902 were maternal deaths, after excluding 27 coincidental deaths. There were 883,254 live births, reported to public health facilities via DHIS.

Greater numbers of deaths were reported to NCCEMD than to DHIS for most provinces, as in previous years. This is because NCCEMD includes deaths which happened outside health facilities and deaths at private hospitals in addition to public sector facility deaths, whereas DHIS only includes public health facility deaths. However, in 2023 significantly more deaths were reported to DHIS than NCCEMD from Eastern Cape (13),

Gauteng (42), and Limpopo (24) , and six more for KZN. The discrepancy is thought to be due to under reporting which is of great concern given that the NCCEMD process was designed to be the most accurate system. Indeed, in 2023 the DHIS iMMR (105.9) was greater than the uncorrected MaMMAS iMMR (102.1). Therefore, as in previous reports, a correction was made for these provinces whereby the DHIS number was used rather than the MaMMAS statistic. This is shown in Table 2, which also shows trends in MDs and MMR from 2017. These discrepancies need further investigation, which should include both checking for under-reporting to MaMMAS, as well as exploring possible 'over-reporting' of maternal deaths to DHIS in the provinces with discrepancies.

Table 1. 2023 Births and deaths during pregnancy childbirth and puerperium (DDPCP), NCCEMD and DHIS maternal deaths and iMMR per province (UNCORRECTED)

Province	Live births	MaMMAS deaths (DDPCP)	MaMMAS MD	DHIS MD	MaMMAS iMMR	DHIS iMMR
Eastern Cape	91856	117	116	129	126.3	140.4
Free State	43010	65	60	51	139.5	118.6
Gauteng	201763	178	175	217	86.7	107.6
KwaZulu-Natal	191839	166	163	169	85.0	88.1
Limpopo	113106	116	112	136	99.0	120.2
Mpumalanga	73026	102	101	90	138.3	123.2
Northern Cape	22367	36	35	29	156.5	129.7
North West	55731	76	75	68	134.6	122.0
Western Cape	90546	73	65	46	71.8	50.8
South Africa	883244	929	902	935	102.1	105.9

Table 2. Number Maternal Deaths per province 2017-2023 (CORRECTED)

	c2017	c2018	2019	c2020	2021	c2022	c2023	DHIS MD 2023	Corrected iMMR 2023
Eastern Cape	142	131	131	191	151	133	116 (c 129)	129	126.3 (c 140.4)
Free State	69	92	77	94	115	55	60	51	139.5
Gauteng	257	267	249	323	318	266	175 (c 217)	217	86.7 (c 107.6)
KwaZulu-Natal	245	202	185	251	280	189	163 (c 169)	169	85.0 (c 88.1)
Limpopo	181	171	160	167	200	143	112 (c 136)	136	99.0 (c 120.2)
Mpumalanga	118	112	73	99	168	113	101	90	138.3
North West	84	95	81	83	117	70	75	68	156.5
Northern Cape	28	25	38	23	43	26	35	29	134.6
Western Cape	80	74	62	105	105	67	65	46	71.8
South Africa	1222	1169	1056	1183	1497	1062	902 (c 987)	935	102.1 (c 111.7)

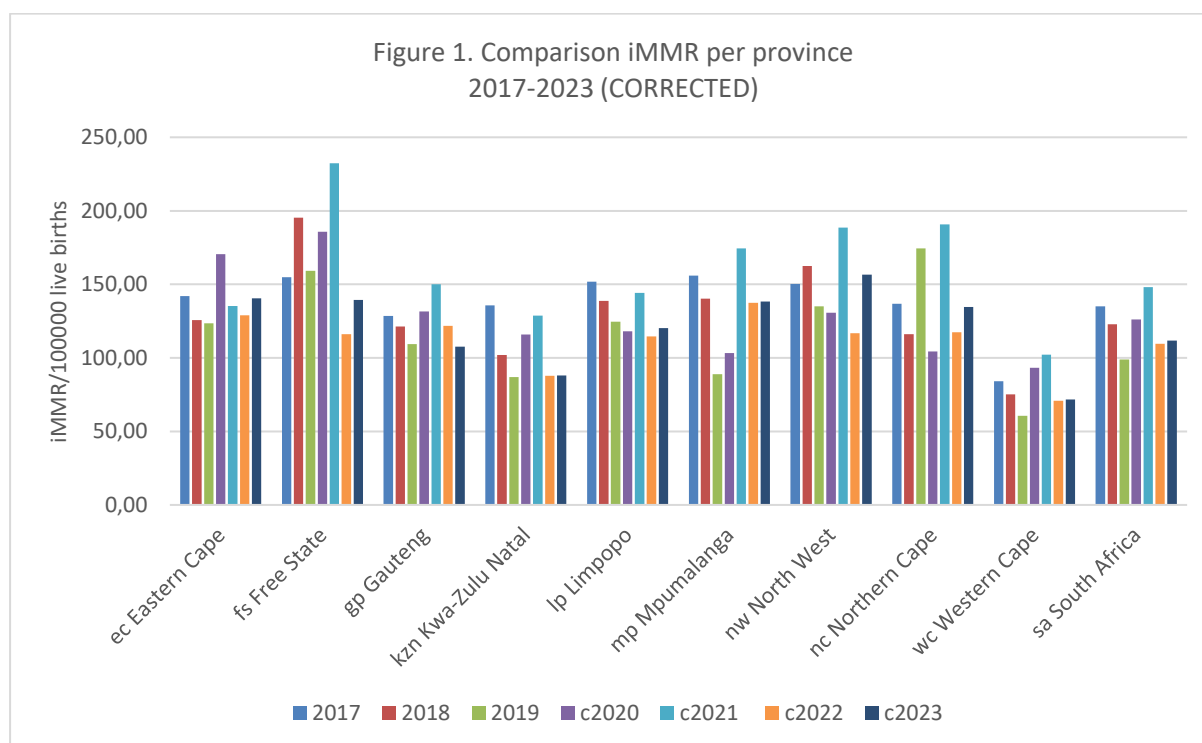
The corrected number of maternal deaths was 987. The corrected maternal mortality rate (iMMR) was 111.7

maternal deaths per 100,000 live births, which is a slight increase from 2022 (MMR 109.6) and from 2019 (pre-pandemic 98.8). This shows that the steep decline in MMR from 2010 has been stabilised after the surges observed in the COVID-19 pandemic years but is not declining further.

Table 3 and Figure 1 give the corrected institutional Maternal Mortality Ratio (iMMR) which excludes coincidental causes for 2017-2023. Provincial variations in trends are observed when 2023 is compared with 2022: iMMR increased by more than 10 MDs per 100,000LBs in EC, FS, NW, NC, remained similar in KZN, Limpopo, Mpumalanga, WC, and decreased in Gauteng.

Table 3. iMMR per province per year 2017-2023 (CORRECTED)

Province	2017	2018	2019	c2020	c2021	c2022	c2023
Eastern Cape	142.10	125.78	123.53	170.52	135.25	128.9	126.3 (c 140.4)
Free State	154.85	195.27	159.32	185.8	232.31	116.2	139.5
Gauteng	128.53	121.31	109.41	131.52	150.1	121.7	86.7 (c 107.6)
KwaZulu-Natal	135.69	101.93	86.92	116	128.84	87.8	85.0 (c 88.1)
Limpopo	151.89	138.72	124.60	118.1	144.23	114.7	99.0 (c 120.2)
Mpumalanga	156.04	140.34	88.94	103.2	174.5	137.4	138.3
Northwest	150.23	162.44	134.98	130.6	188.53	116.8	156.5
Northern Cape	136.75	116.12	174.44	104.3	190.87	117.4	134.6
Western Cape	84.02	75.13	60.54	93.3	102.28	70.8	71.8
South Africa	134.97	122.90	98.82	126.06	148.06	109.9	102.1 (c 111.7)



4. Trends in maternal deaths and maternal mortality rates

Figure 2 shows the national number of maternal deaths recorded per year since the inception of the confidential enquiries. Figure 3 shows the trend in iMMR from 2005. Following the encouraging and steep decline from 2010, with an iMMR less than 100 in 2019, there was an increase in 2020 to 126.1 and a further increase in 2021 to 148.1. This declined in 2022 to 109.6, and in 2023 was 111.7 maternal deaths per 100,000 live births.

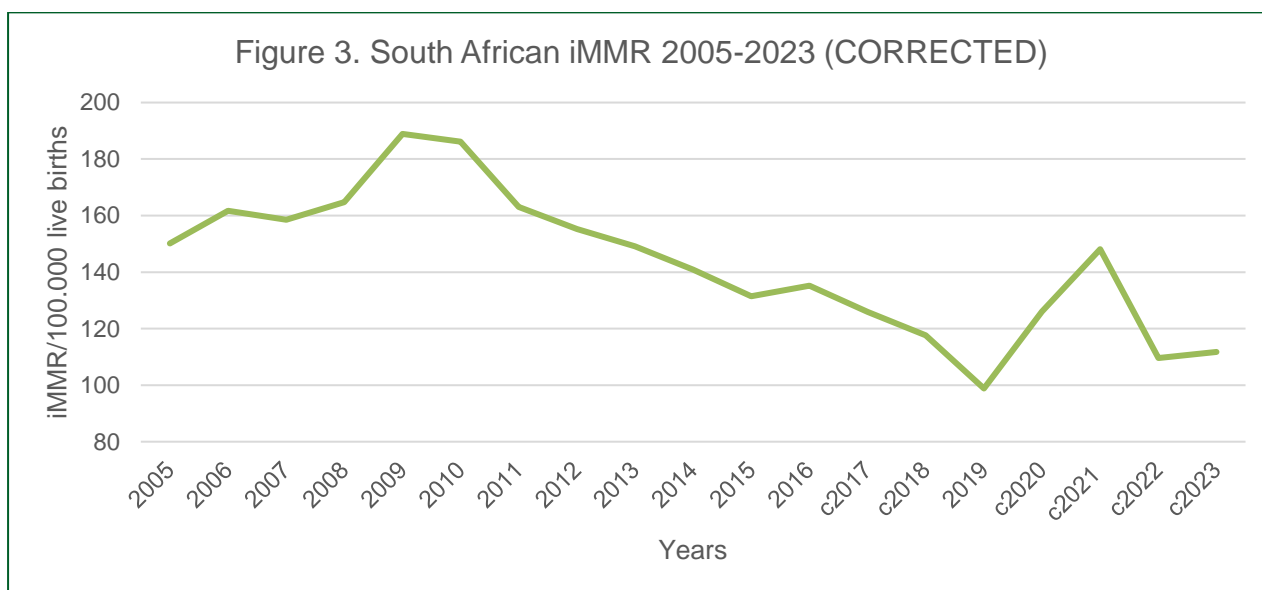
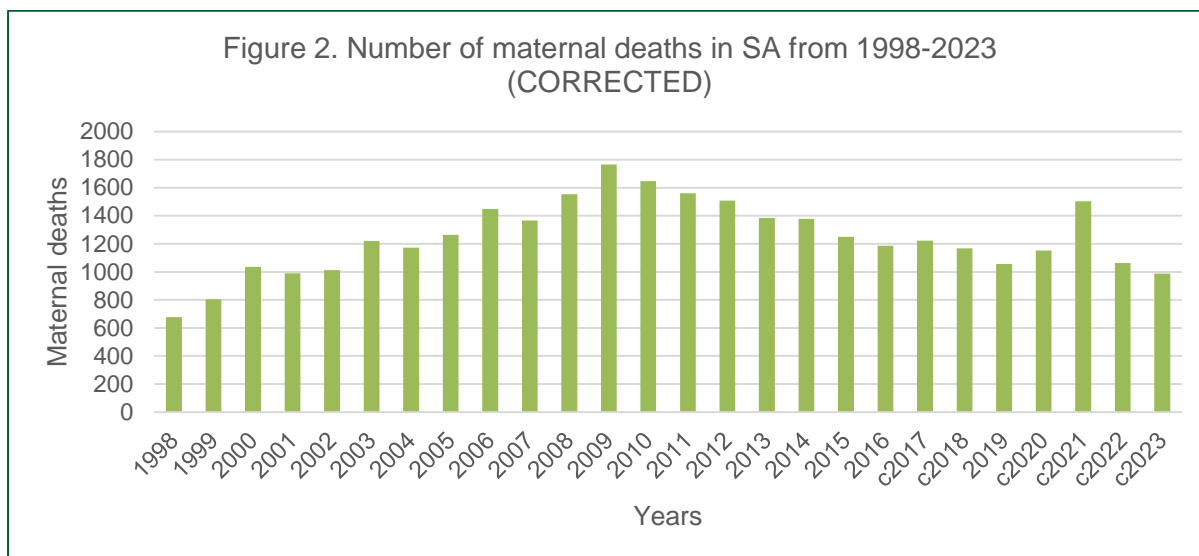


Figure 4 gives the trends in numbers of maternal deaths per province for the last ten years, from 2013, and Figure 5 the iMMR per province over the same time period. From 2013, there was a general trend to lower numbers of maternal deaths up to 2019, which then reversed in most provinces in 2020 and all provinces in 2021, before stabilising in 2022 and 2023 for most provinces except Gauteng which shows a steep decline.

Figure 4. Number of maternal deaths per province 2013-2023 (CORRECTED)

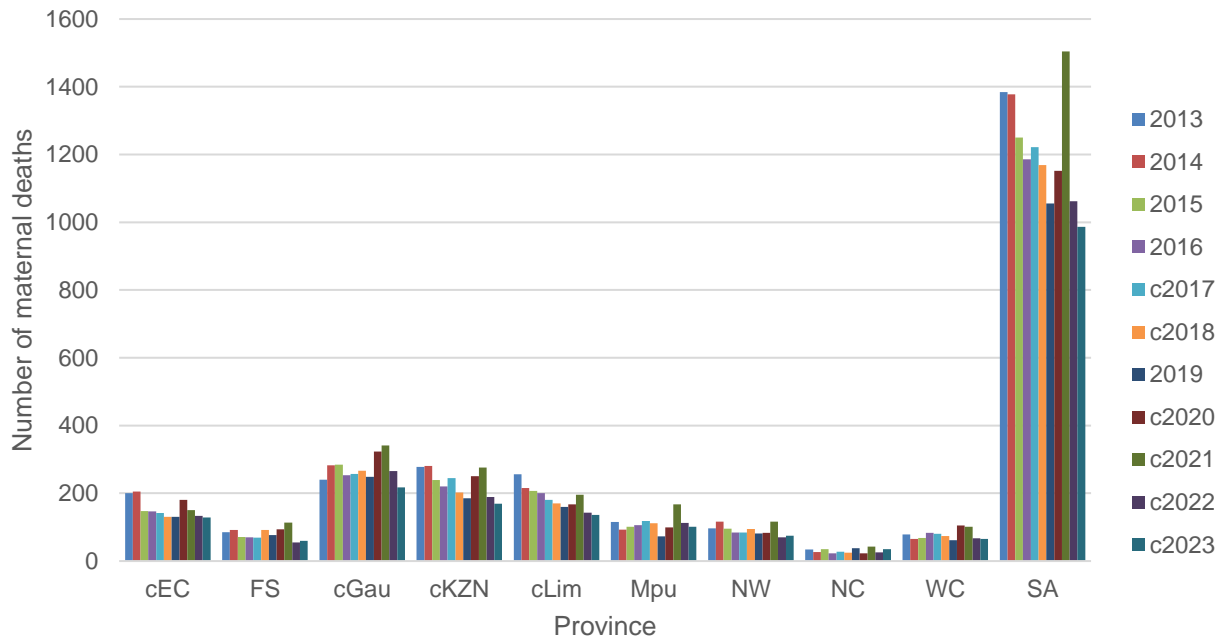
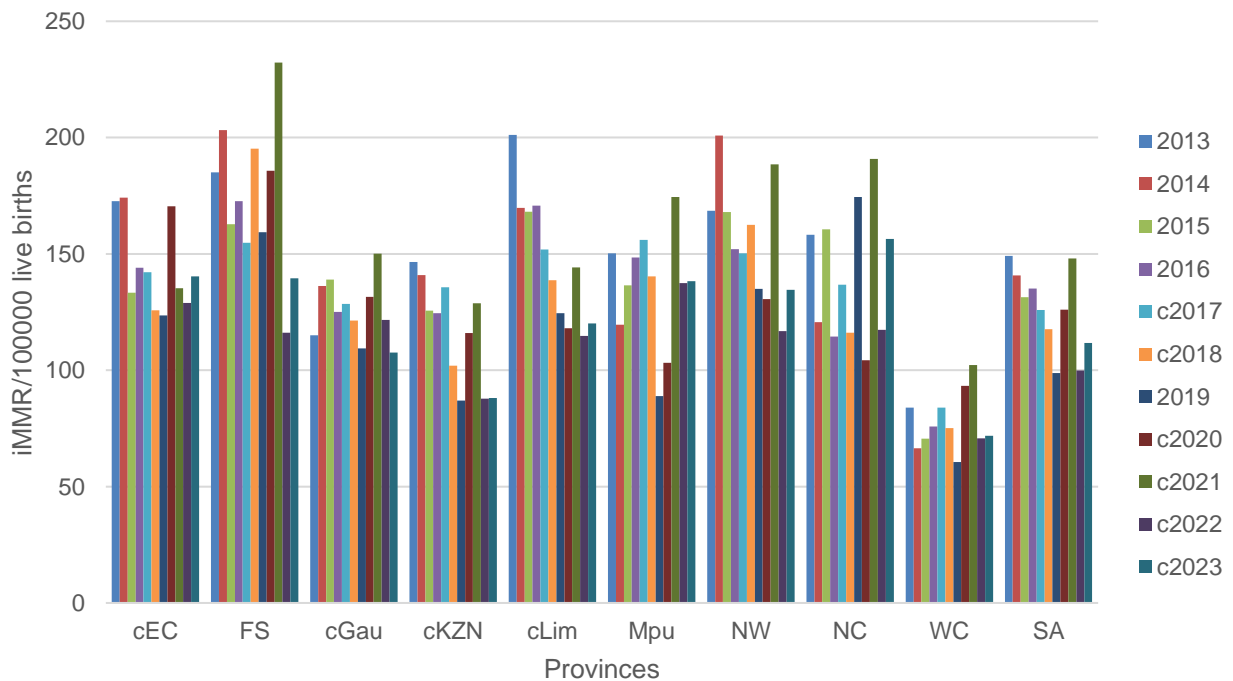


Figure 5. iMMR per provinces from 2013-2023 (CORRECTED)



5. Primary obstetric causes of maternal deaths

Table 4 shows the primary obstetric cause of death and related iMMR in 2023. Non-pregnancy related infections (NPRI) are still the leading cause (154 deaths) but were only marginally higher than M&S (152), HDP (149) and OH (146). These four causes stand out as the commonest causes with less difference between them than in

previous years when NPRI dominated, and M&S was the fourth cause. Embolism has increased to be the fifth most common cause (55 deaths), followed by miscarriage (52 deaths), pregnancy related sepsis (44 deaths) and ectopic pregnancy (33 deaths). Of note, if ectopic pregnancy and miscarriage are combined as 'early pregnancy' deaths, this category accounts for 85 deaths which would then be the fifth most common cause.

The high number of deaths with unknown cause is a problem and reflects the poor availability of post-mortem services for maternal deaths in many provinces.

There were 27 coincidental deaths which are not included as maternal deaths.

Corrections to align to DHIS numbers were not made for provinces that were suspected of underreporting to the NCCEMD, as the DHIS does not provided information on causes of maternal deaths. Therefore, the cause of death that follows is uncorrected national data.

Table 4. Primary obstetric cause of maternal deaths and iMMR for 2023 (UNCORRECTED)

Primary obstetric problem	Number MDs	%	iMMR
INDIRECT			
Medical and surgical disorders	152	16.9	17.2
Non-pregnancy-related infections	154	17.1	17.4
DIRECT			
Ectopic pregnancy	33	3.7	3.7
Miscarriage	52	5.8	5.9
Pregnancy-related sepsis	44	4.9	5.0
Obstetric haemorrhage	146	16.2	16.5
Hypertension	149	16.5	16.9
Anaesthetic complications	21	2.3	2.4
Adverse drug reactions	9	1.0	1.0
Embolism	55	6.1	6.2
Acute collapse - cause unknown	17	1.9	1.9
Miscellaneous	9	1.0	1.0
Unknown	61	6.8	6.9
TOTAL:	902	100	102.1

Causal subcategories of maternal death by province are displayed in Appendix 2.

The four following tables 5a, 5b, 5c and 5d break down the four major primary obstetric causes in 2023 (NPRI, M&S, HDP and OH) into subcategories and the proportions are compared with 2022 and the previous triennium (2020-2022).

Table 5a. Subcategories of NPRI MDs in 2023, compared with 2022 and previous triennium

Non-pregnancy related infections	Number NPRI	% NPRI	% NPRI 2022	%NPRI 2020-2022
Pneumonia	45	29.2	33.9	20.6%
TB	62	40.3	35.0	16.7%
Meningitis	20	13.0	11.7	6.4%
GIT, Appendicitis, Malaria etc.	15	9.7	10.0	4.6%
Other/specified*	12	7.8	9.4	51.7%
Total	154	100	100	100%

The highest proportion of NPRI deaths 2023 were due to TB and pneumonia with only 7.8 per cent classified as 'other' This contrasts with the 2020-2022 triennium where the 'other' category predominated at 51.7 per cent due to deaths from COVID complications. The fact that 62 deaths in 2023 were due to TB must be flagged for future attention.

Table 5b. Subcategories of M&S maternal deaths in 2023, compared with 2022 and previous triennium

Medical and surgical disorders	Number M&S	% M&S	% M&S 2022	%M&S 2020-2022
Cardiac	46	30.3	35.7	30.6%
Respiratory	19	12.5	12.1	11.7%
Psych/Suicide	18	11.8	3.6	5.1%
Neoplasm	9	5.9	7.9	9.0%
Haemat, GIT, CNS, Autoimmune etc.	38	25.0	27.9	26.3%
Other	22	14.5	12.9	17.3%
Total	152	100	100	100%

The highest proportion of M&S deaths were due to cardiac causes, mostly peripartum cardiomyopathy, which is similar to previous years.

There has been a notable increase in the proportion of deaths from psychiatric causes /suicide, which have doubled.

Table 5c Subcategories of HDP maternal deaths in 2023, compared with 2022 and previous triennium

Hypertension	Number HDP	% HDP	% HDP 2022	%HDP 2020-2022
Chronic hypertension	12	8.1	3.6	3.9%
Gestational hypertension	5	3.4	4.8	4.8%
Pre-eclampsia, Eclampsia, HELLP	131	87.9	88.0	89.4%
Liver rupture	1	0.7	3.6	1.9%
Total	149	100	100	100%

The most frequent causal subcategory in HDP deaths were the pre-eclampsia/eclampsia/HELLP subgroup; and this is similar to previous years. In this subgroup, eclampsia accounted for 63 of the 131 deaths.

Table 5d. Subcategories of obstetric haemorrhage in 2023, compared with 2022 and previous triennium

Haemorrhage	Number Haemorrhage	% Haemorrhage	% Haemorrhage 2022	% Haemorrhage 2020-2022
Antepartum Haemorrhage	37	25.3	22.8	21.2%
Ruptured uterus	19	13.0	19.1	15.0%
PPH after vaginal delivery	49	33.6	29.6	30.7%
Bleeding at/after Caesarean delivery	41	28.1	28.4	33.1%
Total	146	100	100	100%

PPH after vaginal delivery was the most common causal subcategory (showing an increase from 2022), followed by BLDACD which has declined. The proportion of APH deaths have increased, but uterine rupture deaths have declined.

Trends in primary obstetric causes 2017-2023

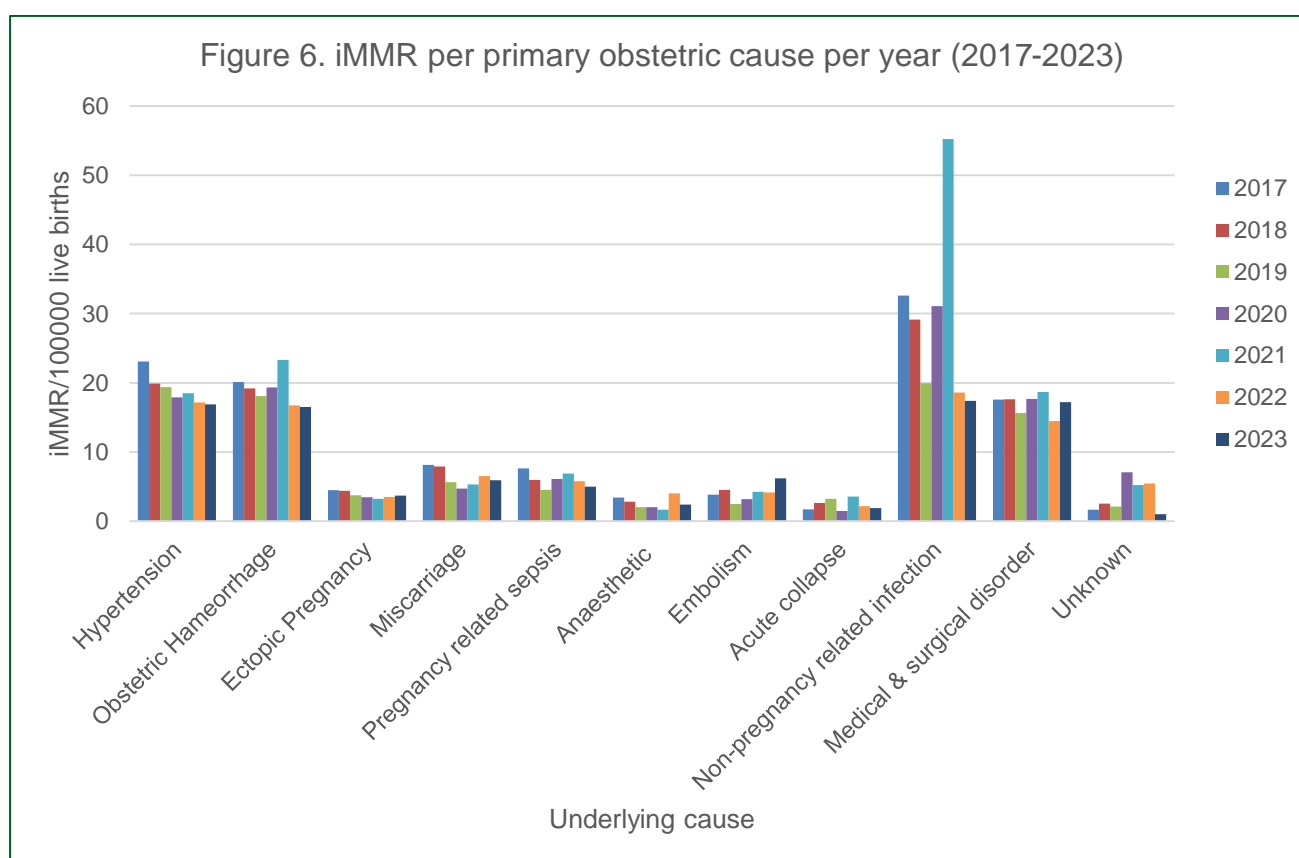
Tables 6 and 7, and Figure 6 compare numbers of maternal deaths and iMMR per primary obstetric cause from 2017 to 2023. They show the marked increase in NPRI deaths in 2020 and 2021, and an increase also in OH, HDP and M&S deaths during these years due to direct and indirect effects of the Covid-19 pandemic respectively. However, a reduction in NPRI, HDP and OH iMMRs was noted in 2022 and 2023 which is very encouraging. Compared to 2022, iMMR from M&S and embolism increased in 2023. The increase in anaesthetic deaths noted in 2022 did not persist in 2023.

Table 6. Cause of maternal deaths for 2023 compared to the preceding six years (UNCORRECTED)

Primary Obstetric Problem	2017	2018	2019	2020	2021	2022	2023
Coincidental cause	38	34	43	31	24	24	27
Medical and surgical disorders	161	166	154	183	190	140	152
Non-pregnancy-related infections	297	276	197	322	561	180	154
Ectopic pregnancy	41	41	37	36	33	34	33
Miscarriage	75	73	56	49	54	63	52
Pregnancy-related sepsis	70	55	45	63	68	56	44
Obstetric haemorrhage	184	181	179	200	237	162	146
Hypertension	210	188	192	185	188	166	149
Anaesthetic complications	30	27	20	21	17	39	21
Adverse drug reactions	11	5	9	13	6	7	9
Embolism	35	43	24	33	43	40	55
Acute collapse - cause unknown	15	25	32	15	36	21	17
Miscellaneous	5	4	12	4	3	8	9
Unknown	53	64	45	73	53	53	61
Maternal deaths	1225	1182	1045	1228	1513	993	929

Table 7. Comparison of iMMR for underlying causes per year 2017-2023 (UNCORRECTED)

	2017	2018	2019	2020	2021	2022	2023
Hypertension	23.09	19.88	19.39	17.89	18.51	17.15	16.9
Obstetric Haemorrhage	20.13	19.19	18.09	19.32	23.33	16.73	16.5
Ectopic Pregnancy	4.46	4.4	3.75	3.48	3.25	3.51	3.7
Miscarriage	8.11	7.9	5.63	4.73	5.32	6.51	5.9
Pregnancy related sepsis	7.62	5.95	4.52	6.09	6.90	5.78	5.0
Anaesthetic	3.4	2.79	2.02	2.03	1.67	4.03	2.4
Embolism	3.84	4.53	2.47	3.19	4.23	4.13	6.2
Acute collapse	1.68	2.64	3.21	1.45	3.54	2.17	1.9
Non-pregnancy related infection	32.59	29.15	19.95	31.1	55.23	18.59	17.4
Medical & surgical disorder	17.57	17.64	15.61	17.68	18.70	14.46	17.2
Unknown	1.66	2.52	2.12	7.05	5.22	5.47	6.9
iMMR for all maternal deaths	125.89	117.69	98.82	115.62	146.6	100.09	102.10



6. Primary obstetric causes of death per province in 2023

Tables 8 and 9, and Figure 8 show the numbers and iMMR for primary obstetric causes per province. Considerable variation in the pattern of causes in different provinces were observed with Hypertension being the leading cause in four provinces, M&S in three provinces, NPRI in two provinces, and OH in one province. In Northern Cape, NPRI and Hypertension were equal as the main cause of death.

Table 8. Causes of maternal deaths per province in 2023

2023	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	South Africa
Medical and surgical disorders	30	7	34	23	9	18	16	4	11	152
Non-pregnancy-related infections	27	10	26	30	27	11	6	7	10	154
Ectopic pregnancy	1	5	4	5	4	4	3	2	5	33
Miscarriage	5	2	19	7	4	7	5	1	2	52
Pregnancy-related sepsis	8	1	10	6	5	4	5	2	3	44
Obstetric haemorrhage	19	8	23	33	21	17	16	2	7	146
Hypertension	16	16	21	25	19	22	17	7	6	149
Anaesthetic complications	2	1	1	3	6	3	1	2	2	21
Adverse drug reactions	0	0	2	2	2	0	0	1	2	9
Embolism	6	2	14	13	4	7	2	1	6	55
Acute collapse - cause unknown	2	0	4	2	0	0	1	3	5	17
Miscellaneous	0	0	2	1	5	1	0	0	0	9
Unknown	0	8	15	13	6	7	3	3	6	61
Maternal deaths	116	60	175	163	112	101	75	35	65	902
Coincidental cause	1	5	3	3	4	1	1	1	8	27
DDCP	117	65	178	166	116	102	76	36	73	929
Live births (2023)	91856	43010	201763	191839	113106	73026	55731	22367	90546	883244

Table 9. iMMR per primary obstetric cause per province for 2023 (MDs per 100,000 LBs)

iMMR 2023	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Total
Medical and surgical disorders	32.7	16.3	16.9	12.0	8.0	24.6	28.7	17.9	12.1	17.2
Non-pregnancy-related infections	29.4	23.3	12.9	15.6	23.9	15.1	10.8	31.3	11.0	17.4
Ectopic pregnancy	1.1	11.6	2.0	2.6	3.5	5.5	5.4	8.9	5.5	3.7
Miscarriage	5.4	4.7	9.4	3.6	3.5	9.6	9.0	4.5	2.2	5.9
Pregnancy-related sepsis	8.7	2.3	5.0	3.1	4.4	5.5	9.0	8.9	3.3	5.0
Obstetric haemorrhage	20.7	18.6	11.4	17.2	18.6	23.3	28.7	8.9	7.7	16.5
Hypertension	17.4	37.2	10.4	13.0	16.8	30.1	30.5	31.3	6.6	16.9
Anaesthetic complications	2.2	2.3	0.5	1.6	5.3	4.1	1.8	8.9	2.2	2.4
Adverse drug reactions	0.0	0.0	1.0	1.0	1.8	0.0	0.0	4.5	2.2	1.0
Embolism	6.5	4.7	6.9	6.8	3.5	9.6	3.6	4.5	6.6	6.2
Acute collapse - cause unknown	2.2	0.0	2.0	1.0	0.0	0.0	1.8	13.4	5.5	1.9
Miscellaneous	0.0	0.0	1.0	0.5	4.4	1.4	0.0	0.0	0.0	1.0
Unknown	0.0	18.6	7.4	6.8	5.3	9.6	5.4	13.4	6.6	6.9
iMMR (excl. coin)	126.3	139.5	86.7	85.0	99.0	138.3	134.6	156.5	71.8	102.1
Coincidental cause	1.1	11.6	1.5	1.6	3.5	1.4	1.8	4.5	8.8	3.1
iMMR (incl. coin)	127.4	151.1	88.2	86.5	102.6	139.7	136.4	161.0	80.6	105.2
Live births (2023)	91856	43010	201763	191839	113106	73026	55731	22367	90546	883244

Key:	Top four most underlying causes
	Most common
	2 nd most common
	3 rd most common
	4 th most common

A further breakdown of causes of maternal death by district is shown in Appendix 3.

7. Levels of care, HIV, caesarean delivery

Levels of care of maternal deaths

The majority (90.3%) of maternal deaths reported to the NCCEMD occurred in health facilities, with 1.5 per cent in transit and 8.2 per cent at 'home'. The NCCEMD process is not designed to receive notifications of home deaths, so this latter percentage is an underestimate (Tables 10a and 10b).

The majority of deaths (84.9%) occurred at public hospitals with 5.2 per cent in private hospitals.

Table 10a. Location of death, DDPCP

Primary obstetric problem	Facility	In transit	Home/ outside	Total
Coincidental cause	19	0	8	27
Medical and surgical disorders	147	0	5	152
Non-pregnancy-related infections	146	3	5	154
Ectopic pregnancy	29	1	3	33
Miscarriage	51	0	1	52
Pregnancy-related sepsis	44	0	0	44
Obstetric haemorrhage	138	3	5	146
Hypertension	143	2	4	149
Anaesthetic complications	21	0	0	21
Adverse drug reactions	9	0	0	9
Embolism	52	1	2	55
Acute collapse - cause unknown	14	1	2	17
Miscellaneous	8	1	0	9
Unknown	18	2	41	61
Total:	839 (90.3%)	14 (1.5%)	76 (8.2%)	929 (100.0%)

Table 10b. Deaths per level of care and primary obstetric cause

Primary obstetric problem	Outside	CHC	District hospital	Regional hospital	Tert/Nat central hospital	Private hospital	Total
Coincidental cause	8	0	8	6	5	0	27
Medical and surgical disorders	5	5	19	47	72	4	152
Non-pregnancy-related infections	5	2	41	52	51	3	154
Ectopic pregnancy	3	4	14	7	5	0	33
Miscarriage	1	1	13	19	18	0	52

Primary obstetric problem	Outside	CHC	District hospital	Regional hospital	Tert/Nat central hospital	Private hospital	Total
Pregnancy-related sepsis	0	1	6	15	19	3	44
Obstetric haemorrhage	5	2	43	51	38	7	146
Hypertension	4	11	20	42	67	5	149
Anaesthetic complications	0	0	10	6	5	0	21
Adverse drug reactions	0	0	3	0	6	0	9
Embolism	2	2	14	14	17	6	55
Acute collapse - cause unknown	2	1	4	4	4	2	17
Miscellaneous	0	0	1	2	5	1	9
Unknown	41	2	4	6	6	2	61
Total	76 (8.2%)	31 (3.3%)	200 (21.5%)	271 (29.2%)	318 (34.2%)	33 (5.2%)	929 (100.0%)

HIV status of DDPCP

HIV status was positive in 38.5 per cent of women who died, and negative for 47.7 per cent, but for 13.7 per cent, their status was unknown (Table 11). This compares with 13.4 per cent unknown in the previous triennium.

Table 11. HIV status in DDPCP

Primary obstetric problem	Positive	Negative	Declined test	Unknown	Total
Coincidental cause	8	7	0	12	27
Medical and surgical disorders	53	81	0	18	152
Non-pregnancy-related infections	115	39	0	0	154
Ectopic pregnancy	9	3	0	21	33
Miscarriage	19	11	0	22	52
Pregnancy-related sepsis	15	24	0	5	44
Obstetric haemorrhage	50	81	0	15	146
Hypertension	41	92	0	16	149
Anaesthetic complications	4	16	0	1	21
Adverse drug reactions	1	7	0	1	9
Embolism	15	36	1	3	55
Acute collapse - cause unknown	5	11	0	1	17
Miscellaneous	3	4	0	2	9
Unknown	20	31	0	10	61
Total	358 (38.5%)	443 (47.7%)	1 (0.1%)	127 (13.7%)	929 (100.0%)

Caesarean delivery and maternal deaths

The Caesarean Delivery (CD) rate in 2023 of 32.3 per cent is higher than previous triennia when it was 28 per cent. The CD Case Fatality Rate (CFR) was 122.3 deaths in women delivered by CD per 100,000 CDs performed (Table 12). This is less than in the previous triennium when it was 155.9, but Table 12 shows marked differences between provinces.

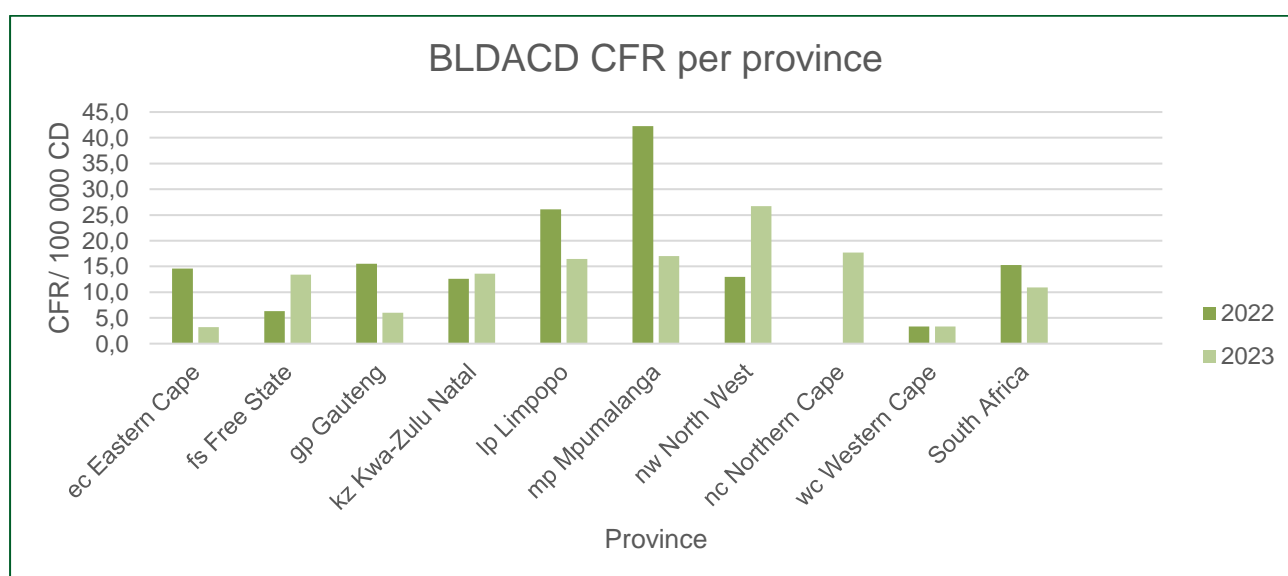
There were 41 deaths from bleeding associated with CD, giving a BLDACD CFR for 2023 of 14.4 deaths from bleeding associated with CD per 100,000 CDs performed. This has reduced markedly from 22.3 in the previous triennium, but there are marked differences between provinces as shown in Figure 7.

Table 12. Caesarean delivery and maternal deaths

Province	Live births (2023)	CD	CD rate (%)	MD with CD	CFR* 2023
Eastern Cape	91856	30993	33.7	39	125.8
Free State	43010	14948	34.8	26	173.9
Gauteng	201763	66389	32.9	64	96.4
KwaZulu-Natal	191839	73697	38.4	64	86.8
Limpopo	113106	30383	26.9	48	158.0
Mpumalanga	73026	17642	24.2	35	198.4
Northwest	55731	14971	26.9	30	200.4
Northern Cape	22367	5652	25.3	17	300.8
Western Cape	90546	29784	32.9	25	83.9
Total:	883244	284459	32.2	348	122.3

*CD CFR = Number CD deaths per 100,000 CDs

Figure 7. BLDACD CFR* per year per province



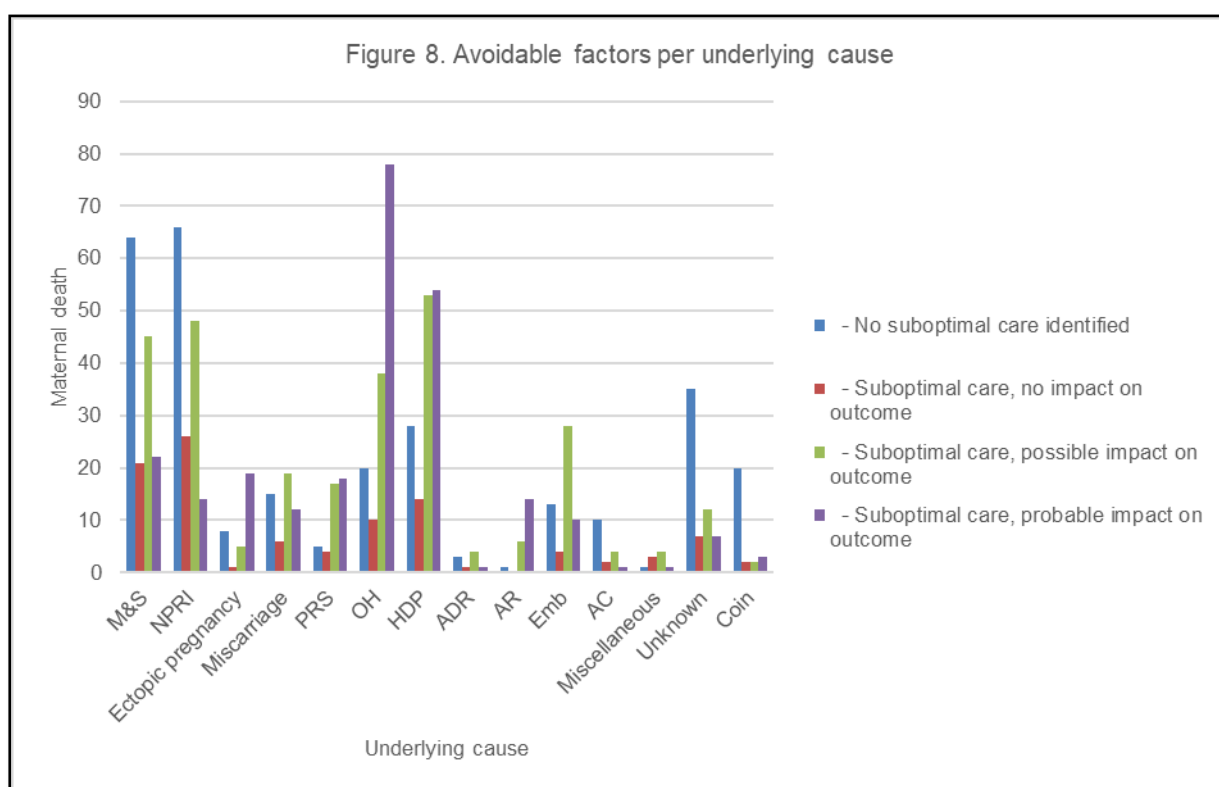
*BLDACD CFR = Number CD deaths classified as being due to bleeding during or after CD per 100,000 CDs

8. Overview of preventable maternal deaths

Table 13 describes the different categories of preventability of maternal deaths within the health system. Deaths were assessed to be possibly or probably preventable by the health system for 539 (58%) of women who died, the most commonly avoidable being OH and HDP deaths, with lesser numbers in the NPRI group (Figure 8).

Table 13. Impact of suboptimal care by the health system (n=929)

IMPACT OF SUBOPTIMAL CARE	N	%
- No suboptimal care identified	289	31.1
- Suboptimal care, no impact on outcome	101	10.9
- Suboptimal care, possible impact on outcome	285	30.7
- Suboptimal care, probable impact on outcome	254	27.3



Avoidable factors are subdivided into those occurring at patient/community level (Table 14), administration related (Table 15), and medical care related (Table 16). Administration and medical care related factors are the health system factors combined in Table 13.

Avoidable factors at patient/community level were identified in 53.5 per cent of deaths. The most common factors at this level were delay accessing medical help (32.6%) and lack of antenatal care (20.2%), but the reasons for these are not well investigated due to the nature of the Confidential Enquiry process.

Table 14. Patient/Community level avoidable factors

Description	Number	% of cases
Lack of information	80	8.6
No avoidable factor	352	37.9
No antenatal care	188	20.2
Infrequent antenatal care	43	4.6
Delay in accessing medical help	303	32.6
Declined medication/surgery/advice	89	9.6
Family problem	23	2.5
Community problem	6	0.6
Unsafe abortion	15	1.6
Other	80	8.6
Total cases	929	

Administrative avoidable factors were identified in 47.4 per cent of deaths which has decreased from the previous triennium when it was 50 per cent. The most common problems were appropriate skill not available on-site or on standby (12.1%), delay in institution-to-institution transport (7.1%) and delay in attending to patients due to overburdened services (6.5%).

Table 15. Administrative avoidable factors

Description	Number	% of cases
Lack of information	67	7.2
No avoidable factor	422	45.4
Transport problem: Home to institution	36	3.9
Transport problem: Institution to institution	66	7.1
Lack of accessibility: Barriers to entry	16	1.7
Lack of accessibility: Other	12	1.3
Delay in attending to patient (Overburdened service)	60	6.5
Delay in attending to patient (Reason unknown)	41	4.4
Lack of healthcare facilities: ICU	53	5.7
Lack of healthcare facilities: Blood/blood products	22	2.4
Lack of healthcare facilities: Other	34	3.7
Inadequate numbers of staff on duty	47	5.1
Appropriate skill not available on site / on standby	112	12.1
Communication problems: Technical	19	2.0
Communication problems: Interpersonal	15	1.6
Other	93	10.0
Total cases	929	

Table 16. Medical Care avoidable factors by level of care

Description	Community Health Centre		District Hospital		Regional Hospital		Tertiary Hospital / above		Private Hospital	
	Number	% of cases at level	Number	% of cases at level	Number	% of cases at level	Number	% of cases at level	Number	% of cases at level
Managed at this level	405	100.	427	100.	375	100.	305	100.	49	100.
Lack of information	27	6.7	38	8.9	26	6.9	17	5.6	11	22.4
No avoidable factor	215	53.1	118	27.6	139	37.1	155	50.8	14	28.6
Initial assessment	96	23.7	112	26.2	69	18.4	28	9.2	9	18.4
Problem with recognition/ diagnosis	89	22.0	141	33.0	100	26.7	52	17.0	16	32.7
Delays in referring the patient	48	11.9	80	18.7	27	7.2	5	1.6	1	2.0
Managed at inappropriate level	24	5.9	68	15.9	25	6.7	4	1.3	2	4.1
Incorrect management (Wrong diagnosis)	21	5.2	40	9.4	22	5.9	16	5.2	6	12.2
Sub-standard management (Correct diagnosis)	37	9.1	113	26.5	108	28.8	72	23.6	12	24.5
Not monitored / infrequently monitored	12	3.0	38	8.9	20	5.3	14	4.6	1	2.0
Prolonged abnormal monitoring with no action taken	12	3.0	51	11.9	43	11.5	27	8.9	5	10.2

Problems with initial assessment and problem recognition/diagnosis were the most frequently identified problem at CHC, DH level, RH and private hospital level. Substandard care was also a frequent avoidable factor at DH, RH, TH and in private hospitals. Over 10 per cent of deaths at DH, RH and in private hospitals were associated with prolonged abnormal monitoring with no action taken.

9. Discussion

There is ongoing concern about the discrepancies between MaMMAS and DHIS maternal death numbers for some provinces where DHIS numbers unexpectedly exceed MaMMAS numbers. This needs investigation of NCCEMD coverage of reporting MDs but also the accuracy of DHIS reporting of MDs, whereby there could be mistaken reporting of MDs. This needs to be corrected so the Saving Mothers reports does not have to continue with a process of adjusting/correcting data in every report.

It is notable that the total number of maternal deaths (987 corrected or 902 uncorrected) in 2023 was less than in previous years. However, live births also declined in 2023. The overall iMMR therefore increased slightly to 111.7.

The steep decline in iMMR from 2011 to 2019 has not been sustained after the peaks of the COVID-19 effect

subsided. Although one year of data is insufficient to note trends, the iMMR has increased slightly from 2022. This is concerning for the South Africa's target of reaching an MMR of 70 by 2030. Achieving this target could also be hindered by budgetary cuts in the coming years.

For South Africa, NPRI is the most frequent cause of maternal death. However, there is a changing pattern of primary obstetric cause with NPRI not being the major cause in several provinces where M&S, HDP or OH have overtaken it. Hypertension was the major cause in four provinces, M&S in three, NPRI in two and OH in one. In NC, HPD and NPRI were equal first. OH deaths have decreased whereas M&S and Embolism have increased. This changing pattern is in keeping with the obstetric transition seen in high income countries (5).

There is an imperative to address the increasing proportions of maternal deaths from medical disorders and thromboembolism. The updated Integrated Maternal and Perinatal Care Guidelines for South Africa has an expanded chapter 16 which address this. It includes algorithms for managing anaemia, heart disease, shortness of breath, and thromboprophylaxis for venous thromboembolism. An algorithm for persistent maternal tachycardia is described in Appendix 6 of this report.

48 per cent of deaths were assessed to be potentially preventable within the health system, and this is where attention is needed. The most common causes of potentially preventable deaths were OH and HDP. Given the documented problems of non-availability of appropriate skill onsite or on standby, poor problem recognition, substandard care and prolonged abnormal observations without action taken, it is important that experienced staff are not rotated out of maternity wards.

10. Conclusion

The Total number of maternal deaths in 2023 was lower than previous years. Also, the number of live births declined. The corrected iMMR for 2023 was 111.7 which is slightly increased from 2022 and pre-pandemic in 2019. The peaks of iMMR seen during the Covid pandemic have reversed but further decline in MMR is not in keeping with the target of reaching MMR of 70 by 2030.

NPRI and M&S remain the most common causes of MD closely followed by Hypertension and Obstetric Haemorrhage. There is much provincial variation in numbers, rates and pattern of causes of maternal deaths. Potentially preventable deaths remain similar to previous triennia at 58 per cent and these need to be reduced

11. Recommendations

- 11.1 Recommendations of the 2017-2019 and 2020-2022 Saving Mothers reports are still relevant and need to be implemented (appendices 4 and 5) at all levels of care.
- 11.2 Accuracy of MaMMAS and DHIS notifications of maternal deaths need to be investigated.
- 11.3 E Motive approach for managing PPH with objective blood loss measurement using a calibrated drape or tray for early detection, and a standardised bundled approach for first response treatment, must be scaled up nationally to all maternity healthcare facilities.
- 11.4 Disseminate and teach on new South African Maternity Care Guidelines (6).
- 11.5 Ensure appropriate thromboprophylaxis is administered after vaginal and post caesarean delivery to women at high risk of thromboembolism.
- 11.6 Training and protocols to emphasise recognition, management and referral of maternal medical disorders (e.g. cardiac disease) and non-pregnancy related infections. In particular, there is a need for clear protocols regarding i) persistent maternal tachycardia and ii) anaemia in pregnancy, which are often signs of underlying acute or chronic disease.
- 11.7 Re-establish a national ESMOE board so that modules are updated and made widely accessible, and ensure all maternity facilities continue with ESMOE training and drills.
- 11.8 Provinces to address administrative and health systems issues arising from this report in their Annual performance plans.
- 11.9 When rotating staff or employing new staff, ensure experienced staff remain in maternity settings to orientate and supervise the new or inexperienced staff.
- 11.10 Maternal health needs to be prioritised at national level and appropriate investment and allocation of resources made to maternal health.

12. References

- 12.1 NCCEMD. Eighth Comprehensive Triennial Saving Mothers report of the National Committee for Confidential Enquiry into Maternal deaths 2020-2022, DOH, Pretoria 2024
- 12.2 NCCEMD. Saving Mothers Annual reports on confidential enquiries into maternal deaths in South Africa for 2020 and 2021. DOH Pretoria 2020, 2021
- 12.3 World Health Organization. The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM, WHO, Geneva 2016
- 12.4 NCCEMD. Guidelines for completion of Maternal Death Notification Form 2020. DOH, Pretoria 2019
- 12.5 Boerma T, Campbell O, Amouzou A, Blumenberg C, Blencowe H, Moran Allisyn et al. Maternal mortality, stillbirths, and neonatal mortality: a transition model based on analyses of 151 countries. *The Lancet Global Health* 2023; Volume 11, Issue 7, e1024 - e1031
- 12.6 Department Health South Africa. National Integrated Maternal and Perinatal Care Guidelines for South Africa: A manual for clinics, community health centres, district and regional hospital. Fifth Edition 2024. DOH Pretoria (in print).

Appendices 1-6

Appendix 1: Reliability of Data

Table 17. Comparison DHIS and MaMMAs DDPCP

2023	MaMMAS MD/ in facility	DHIS MD	Diff MaMMAS vs DHIS	%diff
ec Eastern Cape	116	129	-13.0	-11.2
fs Free State	60	51	9.0	15.0
gp Gauteng	175	217	-42.0	-24.0
kz KwaZulu-Natal	163	169	-6.0	-3.7
lp Limpopo	112	136	-24.0	-21.4
mp Mpumalanga	101	90	11.0	10.9
nc Northern Cape	35	29	6.0	17.1
nw North West	75	68	7.0	9.3
wc Western Cape	65	46	19.0	29.2
South Africa				
Estimated deaths in SA	902	935	-33	-3.7
Live births (2023)	883244			
iMMR	102.1	105.9	-3.7	-3.7

Appendix 2: Subcategories of cause of death by province in 2022 (uncorrected)

Primary obstetric problem	Eastern Cape	Free State	Gauteng	Kwa-Zulu Natal	Limpopo	North West	Northern Cape	Western Cape	Mpumalanga	Total
Coincidental cause	1	5	3	3	4	1	1	8	1	27
- MVA				1	1			1		3
- Other accidents					1					1
- Assault				1			1	1		3
- Other	1	5	3	1	2	1		6	1	20
Medical and surgical disorders	30	7	34	23	9	16	4	11	18	152
- Cardiomyopathy	9	1	8	4	1	6		2	2	33
- Rheumatic heart disease			1							1
- Other cardiac disease	3		3	1	1			2	2	12
- Endocrine			2			2			1	5
- GIT			1	3	1	1		2	1	9
- CNS	5	1	2	2		1	1	1	1	14
- Respiratory	1	1	4	3	3		2	2	3	19
- Haematological	1	2		1		1			1	6
- Genito-urinary										0
- Suicide	1		4	3	1	1		1	4	15
- Skeletal					1					1
- Other psychiatric disease			1		1		1			3
- Neoplasm	1		4	2				1	1	9
- Auto-immune		1		1		1				3
- Other	9	1	4	3		3			2	22
Non-pregnancy-related infections	27	10	26	30	27	6	7	10	11	154
- PCP pneumonia	3	2	6	3	4		1		2	21

Primary obstetric problem	Eastern Cape	Free State	Gauteng	Kwa-Zulu Natal	Lim-popo	North West	Northern Cape	Western Cape	Mpumalanga	Total
- Other pneumonia	3	1	5	7	1		3	2	2	24
- TB	13		12	10	14	5	2	4	2	62
- Endocarditis								2		2
- Malaria					1					1
- Cryptococcal meningitis	1			3	1			1	1	7
- Other meningitis	4	2		3	3				1	13
- Kaposi's sarcoma	3									3
- Gastroenteritis		1		2	2	1				6
- Wasting syndrome		2		1						3
- Other		2	3	1	1		1	1	3	12
Ectopic pregnancy	1	5	4	5	4	3	2	5	4	33
- Less than 20 weeks	1	5	4	5	4	3	2	5	4	33
- More than 20 weeks (extrauterine pregnancy)										0
Miscarriage	5	2	19	7	4	5	1	2	7	52
- Septic miscarriage	4	2	11	5	3	5	1		5	36
- Haemorrhage (non-traumatic)			6	2				2	1	11
- Uterine trauma			1							1
- GTD			1						1	2
- Following legal TOP	1				1					2
Pregnancy-related sepsis	8	1	10	6	5	5	2	3	4	44
- Chorioamnionitis (ruptured membranes)					1					1
- Chorioamnionitis (intact membranes)		1								1
- Puerperal sepsis after NVD	3		4	3	1	3		1	3	18
- Puerperal sepsis after CD	4		4	2	2	2	1	2	1	18
- Bowel trauma at CD	1		2	1	1		1			6
Obstetric haemorrhage	19	8	23	33	21	16	2	7	17	146
- Abruption with hypertension	3	1	4	3	3	2			4	20
- Abruption without hypertension			3	2	4	1			1	11
- Placenta praevia			1	1						2
- Other APH not specified	1		2	1						4
- Ruptured uterus with previous CD			1	3	2	1			2	9
- Ruptured uterus without previous CD	2			4	2				2	10
- Uterine atony after vaginal delivery	1	1	2			2		1	2	9
- Vaginal trauma after vaginal delivery	2			1		2				5
- Cervical trauma after vaginal delivery				1				1		2
- Retained placenta after NVD (morb adherent)	2	1	3	2						8
- Retained placenta after NVD (not adherent)	4	1		3	1	1		3		13
- Inverted uterus after vaginal delivery		1			1			1	1	4
- Other PPH not specified after vaginal delivery	1	1			2	2	1		1	8
- Bleeding during CD (morbidly adherent placenta)			3	1						4
- Bleeding during CD (not adherent placenta)	2		3	2	1	1			1	10

Primary obstetric problem	Eastern Cape	Free State	Gauteng	Kwa-Zulu Natal	Limpopo	North West	Northern Cape	Western Cape	Mpumalanga	Total
- Bleeding after Caesarean delivery	1	2	1	9	5	4	1	1	3	27
Hypertension	16	16	21	25	19	17	7	6	22	149
- Chronic hypertension		2	1	1	1	4	1		2	12
- Gestational hypertension	2		2		1					5
- Pre-eclampsia with severe features	3	1	4	8	1	5	3	1	5	31
- Pre-eclampsia without severe features	2	2	1	1	1	1		1	1	10
- Eclampsia	5	8	8	13	11	7	3	3	5	63
- HELLP	4	3	4	2	4			1	9	27
- Liver rupture			1							1
Anaesthetic complications	2	1	1	3	6	1	2	2	3	21
- General anaesthetic					2		1		1	4
- Spinal anaesthetic	2	1	1	3	4	1	1	2	2	17
Adverse drug reactions	0	0	2	2	2	0	1	2	0	9
- ARV medication										0
- TB medication										0
- Other medication			1	1	1					3
- Herbal medication			1	1			1	2		5
- Blood transfusion reaction					1					1
Embolism	6	2	14	13	4	2	1	6	7	55
- Pulmonary embolism	6	2	12	12	4	2	1	6	4	49
- Amniotic fluid embolism			2	1					3	6
Acute collapse - cause unknown	2	0	4	2	0	1	3	5	0	17
Miscellaneous	0	0	2	1	5	0	0	0	1	9
- Hyperemesis gravidarum			2	1	5					8
- Acute fatty liver									1	1
Unknown	0	8	15	13	6	3	3	6	7	61
- Death at home or outside health services		5	12	5	5	2	3	4	6	42
- No primary cause found		1		2		1		2		6
- Lack of information		2	3	6	1				1	13
TOTAL:	117	65	178	166	116	76	36	73	102	929

Appendix 3: Maternal deaths per underlying cause per district 2023

Province	District	M&S	NPRI	Ec	Mis-carriage	PRS	OH	HDP	AR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
ec Eastern Cape																117
ec Eastern Cape	Alfred Nzo Districts	0	1	0	0	0	3	0	0	0	1	0	0	0	0	5
ec Eastern Cape	Amahole+ Buffalo city	10	2	1	2	1	4	4	2	0	0	1	0	0	1	28
ec Eastern Cape	Chris Hani	3	3	0	0	0	0	0	0	0	3	0	0	0	0	9
ec Eastern Cape	Joe Gqabi District Municipality	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
ec Eastern Cape	Nelson Mandela Bay Metropolitan	7	9	0	3	4	2	4	0	0	2	1	0	0	0	32

Province	District	M&S	NPRI	Ec	Mis-carriage	PRS	OH	HDP	AR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
ec Eastern Cape	Oliver Tambo	10	12	0	0	2	9	8	0	0	0	0	0	0	0	41
ec Eastern Cape	Sarah Baartman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
fs Free State																65
fs Free State	Fezile Dabi	0	1	3	0	0	2	1	0	0	0	0	0	1	2	10
fs Free State	Lejweleputswa	0	1	1	0	0	1	3	0	0	1	0	0	2	1	10
fs Free State	Mangaung Metropolitan Municipality															0
fs Free State	Thabo Mofutsanyana	2	4	0	1	1	3	7	1	0	1	0	0	3	2	25
fs Free State	Xhariep District Municipality	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
fs Free State	Motheo	4	3	1	1	0	2	5	0	0	0	0	0	2	0	18
gp Gauteng																178
gp Gauteng	City of Johannesburg Metropolitan Municipality	8	9	1	9	4	4	3	0	1	4	2	0	5	0	50
gp Gauteng	City of Tshwane Metropolitan	11	8	0	7	4	10	7	0	0	3	0	2	4	2	58
gp Gauteng	Ekurhuleni Metropolitan Municipality	11	2	1	3	2	4	8	1	1	3	1	0	6	0	43
gp Gauteng	Sedibeng District Municipality	2	3	1	0	0	4	2	0	0	4	0	0	0	1	17
gp Gauteng	West Rand District Municipality	2	4	1	0	0	1	1	0	0	0	1	0	0	0	10
gp Gauteng	Motsweding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
kz KwaZulu-Natal																166
kz KwaZulu-Natal	kz Amajuba District Municipality	3	4	0	0	0	0	3	0	0	0	0	0	0	1	11
kz KwaZulu-Natal	kz eThekweni Metropolitan Municipality	6	10	3	2	1	12	7	2	1	2	2	0	6	1	55
kz KwaZulu-Natal	kz Harry Gwala District Municipality	1	2	1	1	0	1	1	1	0	0	0	0	0	0	8
kz KwaZulu-Natal	kz iLembe District Municipality	1	0	1	1	0	2	1	0	0	1	0	0	0	0	7
kz KwaZulu-Natal	kz King Cetshwayo District Municipality	4	7	0	0	3	5	2	0	0	1	0	1	1	0	24
kz KwaZulu-Natal	kz Ugu District Municipality	1	2	0	0	1	1	0	0	0	2	0	0	1	0	8
kz KwaZulu-Natal	kz uMgungundlovu District Municipality	3	4	0	1	1	2	3	0	0	1	0	0	3	1	19
kz KwaZulu-Natal	kz Umkhanyakude District Municipality	1	0	0	0	0	5	2	0	0	3	0	0	0	0	11

Province	District	M&S	NPRI	Ec	Mis-carriage	PRS	OH	HDP	AR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
kz KwaZulu-Natal	kz Umzinyathi District Municipality	0	0	0	1	0	2	1	0	0	0	0	0	0	0	4
kz KwaZulu-Natal	kz Uthukela District Municipality	3	0	0	0	0	3	1	0	0	2	0	0	0	0	9
kz KwaZulu-Natal	kz Zululand District Municipality	0	1	0	1	0	0	4	0	1	1	0	0	2	0	10
lp Limpopo																116
lp Limpopo	lp Capricorn District Municipality	4	13	0	1	1	6	11	2	1	2	0	3	2	2	48
lp Limpopo	lp Mopani District Municipality	1	5	0	0	2	1	6	2	0	0	0	1	2	0	20
lp Limpopo	lp Sekhukhune District Municipality	4	3	1	1	1	4	1	0	0	2	0	1	2	1	21
lp Limpopo	lp Vhembe District Municipality	0	2	2	2	0	8	0	1	1	0	0	0	0	1	17
lp Limpopo	lp Waterberg District Municipality	0	4	1	0	1	2	1	1	0	0	0	0	0	0	10
lp Limpopo	Bohlabela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mp Mpumalanga																102
mp Mpumalanga	mp Ehlanzeni District Municipality	7	7	2	4	2	7	8	1	0	2	0	1	3	1	45
mp Mpumalanga	mp Gert Sibande District Municipality	6	2	2	2	1	5	8	2	0	1	0	0	3	0	32
mp Mpumalanga	mp Nkangala District Municipality	5	2	0	1	1	5	6	0	0	4	0	0	1	0	25
nc Northern Cape																36
nc Northern Cape	nc Frances Baard District Municipality	1	5	2	1	2	1	6	1	1	1	2	0	1	0	24
nc Northern Cape	nc John Taolo Gaetsewe District Municipality	0	1	0	0	0	1	1	1	0	0	1	0	1	0	6
nc Northern Cape	nc Namakwa District Municipality	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
nc Northern Cape	nc Pixley ka Seme District Municipality	1	1	0	0	0	0	0	0	0	0	0	0	1	1	4
nc Northern Cape	nc Zwelentlana Fatman Mgcau District Municipality	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
nw North West																76
nw North West	nw Bojanala Platinum District Municipality	4	1	0	2	1	3	4	0	0	1	1	0	2	0	19
nw North West	nw Dr Kenneth Kaunda District Municipality	6	3	1	2	2	4	5	0	0	0	0	0	0	1	24

Province	District	M&S	NPRI	Ec	Mis-carriage	PRS	OH	HDP	AR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
nw North West	nw Dr Ruth Segomotsi Mompoti District Municipality	1	2	2	0	0	2	4	0	0	1	0	0	1	0	13
nw North West	nw Ngaka Modiri Molema District Municipality	5	0	0	1	2	7	4	1	0	0	0	0	0	0	20
wc Western Cape		73														
wc Western Cape	wc Cape Winelands District Municipality	0	0	0	0	2	2	0	0	0	1	1	0	0	0	6
wc Western Cape	wc Central Karoo District Municipality	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
wc Western Cape	wc City of Cape Town Metropolitan Municipality	10	8	5	2	1	4	6	2	2	4	3	0	6	5	58
wc Western Cape	wc Garden Route District Municipality	0	2	0	0	0	1	0	0	0	0	0	0	0	1	4
wc Western Cape	wc Overberg District Municipality	1	0	0	0	0	0	0	0	0	1	1	0	0	0	3
wc Western Cape	wc West Coast District Municipality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa		152	154	33	52	44	146	149	21	9	55	17	9	61	27	929

Appendix 4: Recommendations from Saving Mothers triennial reports 2017-2019 and 2020-2022

Key Recommendations

This is a summary of crucial recommendations arising from both the 2017-2019 and the 2020-2022 triennial reports.

All maternity sites must conduct morbidity and mortality review meetings, where:

- minutes are kept,
- actions are assigned to individuals,
- there is follow-up to check that the actions have been performed and there is accountability.

Maternal and neonatal health services must be prioritised irrespective of existing parallel programmes by:

- Political commitment by NDOH and provinces in line with the International Maternal and Neonatal Health Conference (IMNHC) declaration. (The DOH, SA signed the IMNHC Commitment to achieve the SDG of an MMR of 70 maternal deaths per 100,000 live births by 2030; and to promote respectful, dignified, and safe care for women in maternity services in South Africa).
- MECs must ensure that the non-negotiable essential functions for MNH are in place and function properly. This includes ensuring that all equipment, medicines and other consumables required to implement the maternal and newborn package of care are in place in all health facilities/service points, and to feedback to the Ministry of Health quarterly.
- Financial Investment - funding for MNH services must be directed towards addressing the leading causes of maternal and neonatal mortality and should be ring fenced.

Provincial health system interventions and oversight to ensure:

- The NCCEMD process functions effectively as mandated by DOH in each province, and data is submitted accurately and timeously.

- Integration of HIV care, COVID-19 care, Contraception, Safe Surgery and Mental Health services into maternity and neonatal health services.
- Regular monitoring and evaluation of progress towards implementing NCEMD recommendations and progress towards the SDG.
- Strengthen lines of communications at all levels of care. Support is required for frontline healthcare workers from the province down to the lowest levels of care. HODs and MECs to visit institutions and engage with clinicians and patients on their daily challenges.
- Ensure functional communication channels exist for consultation with and referral to higher levels of care (inter-facility). Promote easy access to maternity care by the community.
- Establish On-site Midwife run Birthing Units (OMBUs) at all large district, regional and tertiary hospitals which currently conduct large numbers of births of low-risk women. This will allow healthcare workers to focus on those women with risk factors.

General Clinical management interventions:

Focus to be on the top five leading cause of maternal deaths, five **Hs** by:

- Institutionalising COVID-19 pandemic lessons about maintaining MNH and SRH services during humanitarian or service delivery crises.
- Contraceptive services need to be expanded to include postpartum LARCs (esp. IUCD insertion), and Contraceptive availability at all facilities caring for women and at high-risk medical clinics must be ensured.
- Antenatal care restructured to ensure every problem case is reviewed on-site prior to referral by the most experienced midwife, and all antenatal clients to be assessed at least once between 28 to 34 weeks gestation by an experienced antenatal care provider (midwife or doctor).
- Clinical examination skills during antenatal, intrapartum and postpartum care must be emphasised with ongoing training.
- Prior to discharge from a ward and facility, specific criteria must be checked and documented, with appropriate action taken for abnormal findings, and to ensure women are not discharged in unstable condition.

Specific interventions for 5Hs:

- **HIV** - Implement the updated PMTCT protocol now named Vertical Transmission Prevention (VTP) for better HIV management and TB detection (viral load suppression and escalation for second line agents when needed).
- Ensure CD4 results are reviewed, and high-risk women treated appropriately to prevent and treat HIV associated infections
- **Haemorrhage** -Establish a Safe Labour minimum standards criteria and evaluation programme like the Safe Caesarean Delivery (surgery and anaesthesia) programme. Continue implementation of pre-existing initiatives e.g., NASG, Massive blood transfusion protocol, safe CD audits; and evaluate their impacts. Implementation of new approach for early detection and management of PPH in all maternity sites: EMOTIVE drape and care bundle for PPH.
- **Hypertension** - Guideline dissemination with training. Early pregnancy counselling service and access to safe MTOP when indicated. Community awareness for earlier initiation of antenatal care.
- **Heart** (medical and surgical disorders) - Medical Obstetric clinics to be established at regional and tertiary hospitals for women with medical disorders requiring multi-disciplinary care. Screening questions and Clinical examination skills during antenatal care. Screening for mental health issues and identifying women at risk of suicide.
- **first Half** of pregnancy complications – Develop strategies to improve management of early pregnancy complications (miscarriage, TOP and ectopic pregnancy). Pregnancy testing to be available at all health facilities and in the community. Early recognition and Diagnosis of pregnancy complications, and prompt referral to higher levels of care when indicated. Outreach to primary care gynaecology services in CHCs for training and clinical support. Early pregnancy counselling service and improved access to safe TOP; all health facilities must either provide a safe TOP service or have a clear referral policy to a facility that provides safe TOP.

Training and policies

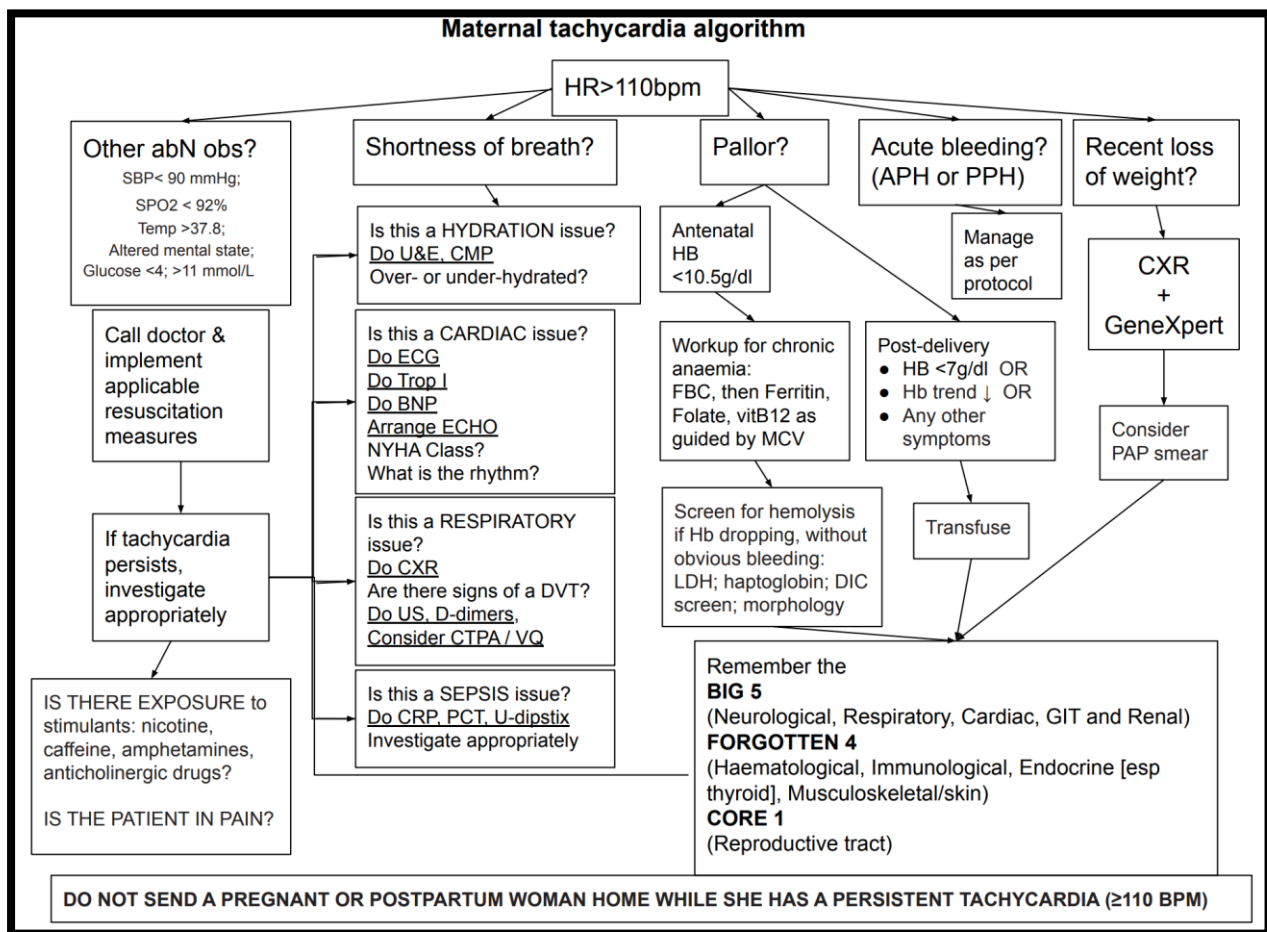
- ESMOE board to be constituted, ESMOE modules updated and programme to restart.
- ESMOE Training (including anaesthetic ESMOE) to be compulsory for all new staff and two-yearly updates for existing staff.
- EOST drills/exercises must occur monthly in maternity facilities. This is especially so at primary care and district hospital level as the rarity of conditions makes doing emergency drills essential to maintain skills.
- Each hospital and CHC should have at least one on-site trainer able to run the relevant ESMOE modules and drills.
- Adherence to new SA Maternity Care Guideline.

The following poster summarises the crucial recommendations according to the five Hs (priority conditions), essential health system pillars and key interventions along the continuum of care.

Appendix 5: Poster of key recommendations from Saving Mothers triennial report 2017-2019

	What	How	When & Where	
	Focal areas for interventions 5Hs	Pillars necessary for quality Care 3 Pillars	Interventions along continuum of care All phases (3Cs)	Phase
NCCEMD Mortality and morbidity reviews, minutes, actions, accountability and feedback	1. HIV	1. Competent (knowledgeable and skilled) health care providers Ensure ESMOE (including anaesthetic ESMOE) training for all new staff and two-yearly updates for existing staff. EOST drills/exercises must occur monthly in maternity facilities. This is especially so at primary care level as the rarity of conditions makes doing emergency drills essential to maintain skills 2. Functional inter-facility referral system Ensure proper communication between clinicians at various levels and sites using Vula App. Improve access at Level one to higher level of expertise via Outreach from Regional hospitals or telephonic, or IT/Virtual linkages for advice in antenatal clinics and in emergency situations. Wi-Fi in all facilities 3. Appropriately resourced health facilities Equipment and human resources determined by Safe Labour and CD programmes. On site Midwifery Birthing Units (OMBUs) to relieve pressure on Regional and Tertiary hospital labour wards. Policy on retention of staff in historically disadvantaged districts	Community <ul style="list-style-type: none"> • Use MomConnect to send messages to pregnant women • CHWs to integrate maternal health, mental health and contraception into their home visits • Increase numbers of social workers available to assess at risk women for social grants, and food parcels. Integration of Home affairs departments in delivery facilities enables immediate issuing of birth certificates and access to grants Quality Care <ul style="list-style-type: none"> • Establish minimum standards for safe maternity care/ safe care during labour including minimum staffing norms for safe care in labour. • Respectful care at all levels 	Pre-pregnancy
	2. Obstetric Haemorrhage			First Half Pregnancy
	3. Hypertensive disorders in pregnancy			Pregnancy and Childbirth
	4. Heart and other M&S conditions			Postnatal - Mother
	5. First Half pregnancy			
			Interventions at health care facilities	
			Contraception <ul style="list-style-type: none"> • Contraception services need to expanded to include postpartum IUCD insertion and LARCs; and ensuring contraceptive availability at all facilities caring for women and at high risk medical clinics, adolescent clinics and higher institutions First evaluation/visit – antenatal care <ul style="list-style-type: none"> • Set up expert group to recommend on improving management early pregnancy, miscarriage and ectopic Ms, early pregnancy counselling service and access to safe TOP, earlier initiation ANC after pregnancy diagnosis, screening mental health and identifying women at risk suicide Follow-up antenatal care <ul style="list-style-type: none"> • Antenatal care restructured to ensure every problem case reviewed on-site prior to referral by most experienced midwife and all pregnant women have their pregnancies reviewed by the most experienced and knowledgeable midwife at least once between 28-34 week's gestation Intrapartum care <ul style="list-style-type: none"> • Introduce new Intrapartum care guidelines (CLEVER) • Training in Safe CD and anaesthesia Discharge of mother <ul style="list-style-type: none"> • Following hypertension with severe features, senior advice should be sought before discharge and patients provided with antihypertensive medications • Before discharge certain criteria must be met. Temperature <37.2, Pulse <100, • Improve postnatal care coverage including use of contraception and detection of mental health problems 	

Appendix 6: Algorithm for management of persistent tachycardia*



*Adapted by NCCEMD and Dr B. Gaunt from: Adam S, Soma-Pillay P ed, *Obstetrics Essentials 4th Edition*, Pretoria 2023.

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