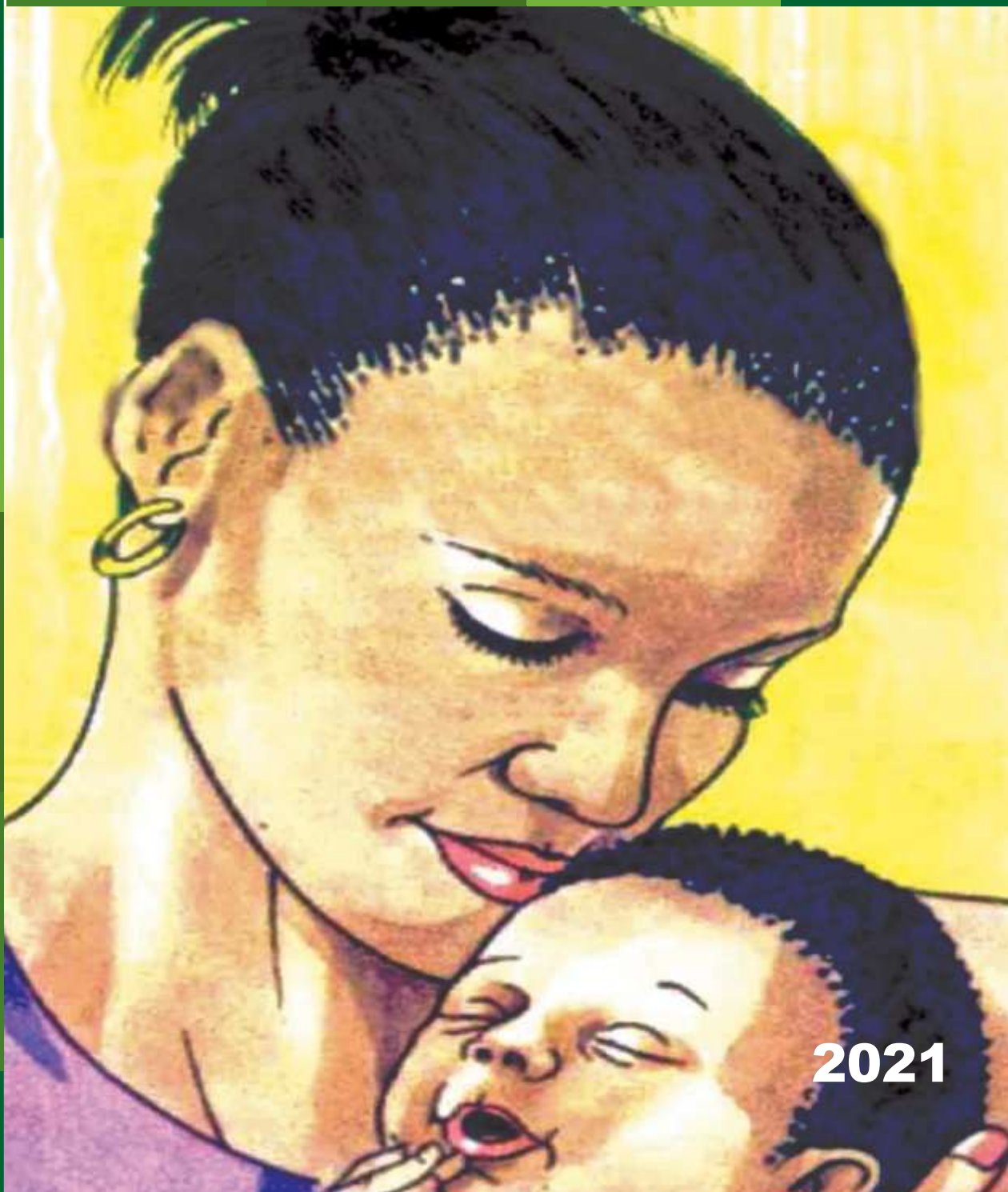


Saving Mothers and Babies



2021

Annual Report for 2021 – (includes data for second year of the COVID-19 pandemic)



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

A long and healthy life for all South Africans

NCCEMD members for 2021

Prof. Roland E Mhlanga* (Chairperson)

Prof. Susan Fawcus (Editor)

Prof. Lawrence Chauke (Co-Editor)

Dr Kaizer Baloyi

Dr M Makinde

Dr Motselisi Mbeki

Dr Neil Moran

Dr OC Shimange

Dr Sylvia Cebekhulu (Deputy Chairperson)

Dr Salome Komane

Dr Makogabane Ramogale-Zungu

Dr Su-Ritha Wessels

Dr Sibongile Mandondo

Kgabo Mohlake

Mookho Kumpi

MCWH Secretariat

Manala Makua

Ellence Mokaba

Joyce Mahuntsi

Frank Nchabeleng

Jemina Madiga

Magda Bothma

*sadly departed 2022, RIP

Bontle Mamabolo (South African Medical Research Council's Maternal and Infant Healthcare Strategies Unit) processed and analysed the MAMMAs data for the NCCEMD

Table of Contents

Abbreviations	5
Foreword.....	6
Executive Summary.....	7
1. Introduction	8
2. Methods	9
3. Maternal Deaths and Mortality rates 2021.....	9
4. Trends in Maternal Deaths and Maternal Mortality Rates	11
5. Primary Obstetric Causes of Maternal Deaths	14
6. Classification of maternal deaths directly due to COVID-19 complications	17
7. Primary Obstetric causes of death per province in 2021.....	18
8. Levels of Care, HIV, Caesarean delivery	20
9. Overview of Avoidable maternal deaths	23
10. Discussion.....	24
11. Conclusion	24
12. Recommendations	24
13. References.....	25
Appendices 1-4.....	26
Appendix 1: Subcategories of cause of death by province in 2021 (all uncorrected)	26
Appendix 2: Maternal deaths per underlying cause per district 2021	30
Appendix 3: Details of Avoidable Factors for Maternal deaths, 2021	35
Appendix 4: Recommendations from Saving Mothers triennial report 2017-2019.....	37

Abbreviations

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; EOOST on auto pilot; Respectful care
Clinic	Primary Healthcare Clinic
DCST	District Clinical Specialist Teams
DH	District Hospital
DHIS	District Health Information System
EC	Eastern Cape
EOOST	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 Immune Deficiency 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
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 deserve it. 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 ensure 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 assessment of individual maternal deaths in all nine provinces of 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 reporting to the Honourable Minister of Health, Dr JM Phaahla, with support from the 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. Prof. S Fawcus (editor) of the Saving Mothers' Reports and Bontle Mamabolo (SAMRC-UP) deserve special mention as well as South Africa's gratitude for these thoughtful documents and the contributions they made to decrease maternal and newborn deaths in South Africa.

South Africa was just celebrating the fruits of the implementation of these recommendations from the latest triennial report (Saving Mothers' Reports 2017–2019), which demonstrated that the assessment of individual maternal deaths and the lessons learned leading to recommendations do result in good news. For the first time since the initial report in 1998, the institutional maternal mortality ratio had dropped to less than 100 per 100 000 live births. This was certainly an achievement for South Africa, one of the few countries in the world that has an assessment of individual deaths and implements the recommendations. However, the unexpected happened. The COVID-19 pandemic came when we least expected it. South African women were not spared, and its aftermath is still evident. We also lost a significant number of healthcare workers. It had both direct and indirect effects on our health system, as highlighted in this interim report, where there were further increases in our iMMR, with COVID-19 still being the main contributor, and hopefully great lessons were learnt.

Let us continue to grow South Africa together in our journey to save lives. Together, we can.



DR SYLVIA N CEBEKHULU: NCCEMD ACTING CHAIRPERSON

Executive Summary

Introduction

The 2021 annual Saving Mothers report presents an overview of maternal mortality in 2021, with underlying causes and trends compared to previous years. It is important to note that this report covers the second year of the COVID-19 pandemic which commenced in March 2020 in South Africa and had a major effect on maternal health outcomes and utilisation of maternal /reproductive health services. During the year 2021, vaccination against COVID-19 became available in South Africa. However, due to prioritisation of older people and initial concerns about safety in pregnancy, the vaccine was not made widely available to pregnant women in South Africa until September 2021.

Methods

The method used to compile this report is the same as the one used for all previous annual reports, but the database was closed later than in previous years, (that is, in January 2023) due to delays in provincial notification and assessment processes, but also due to late submissions from certain provinces. Collection of maternal death data for the Saving Mothers report was severely hindered due to human resource and other challenges in maintaining the NCCEMD process during the pandemic. Many provincial assessors were heavily involved in managing the COVID-19 pandemic in their places of work.

The classification of maternal deaths used in South Africa is based on the WHO ICD 10 adaptation for maternal deaths and can be found in NCCEMD documents. Since SARS-CoV-2 or COVID-19 was a novel infection in 2020 with specific characteristics and high mortality, it needed to be incorporated into the maternal death classification of causes, in order to be identifiable. It was thus decided by the NCCEMD to code it on MAMMAs as follows: NPRI /Other (specify COVID-19 complication).

Results

In 2021, there were 1 497 deaths during pregnancy, childbirth, and the puerperium (DDPCP), reported to the NCCEMD and entered in the MAMMAs database, of which 1 473 were maternal deaths. The other 24 deaths were assessed to be coincidental deaths. There were 1 015 782 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 health facility deaths; whereas DHIS only includes public health facility deaths. However, for Gauteng in 2021 more deaths were reported to DHIS than to NCCEMD, suggesting under-reporting of maternal deaths to the NCCEMD. Therefore, a correction was made for Gauteng whereby the total maternal deaths were increased to match the DHIS number.

Main findings

- The corrected number of maternal deaths in 2021 was 1 504.
- The corrected Maternal Mortality Ratio (MMR) was 148.1 maternal deaths per 100 000 live births, which is a further increase from 2020 (MMR 126.1) and a 47% increase in maternal deaths from 2019 (MDs 1022, iMMR 98.8). This shows that the steep decline from 2010 to 2019 had been reversed in 2021 as well as 2020.
- The increased MMR from 2019, occurred in all provinces in South Africa.
- Non-Pregnancy Related Infections (NPRI) accounted for 554 MDs in 2021 (37% of deaths) and have sharply increased from previous years.
- COVID-19 pneumonia and complications increased from 2020, accounting for 66.6% of NPRI deaths and 25.1% of all maternal deaths in 2021.
- Obstetric haemorrhage (OH) deaths (n=234) increased to become the second most common cause.
- Medical and surgical (M&S) disorders and Hypertensive disorders (HDP) were the third and fourth most common causes respectively.
- The majority of deaths (84.5%) occurred at public hospitals with an increasing number (8.4%) in private

hospitals

- The Caesarean Delivery (CD) rate remained similar to 2019 and 2020, at 28 per cent, but the CD Case Fatality Rate increased to 203.6 CD associated deaths per 100,000 CDs, compared to 112.5 in 2019 and 145.7 in 2020.
- Deaths were assessed to be possibly or probably preventable by the health system for 56 per cent of women who died, the most avoidable being OH and HDP deaths, with lesser numbers in the NPRI group. Of note the proportion of deaths with Administrative avoidable factors was 52.6 per cent compared 48.1 per cent in the previous triennium and 57.1 per cent in 2020.

Discussion

Notification, submission, and assessment of maternal death cases for the Saving Mothers report was severely hindered after the onset of the COVID-19 pandemic. This meant that the data is not as precise and accurate as in previous years.

An important finding of this report is the 47 per cent increase in maternal deaths in 2021 compared to 2019, after correcting for under-reporting. This increase is greater than the South African Health Review chapter estimate of a 38 per cent increase for the first and second waves of the pandemic. Other global systematic reviews have also demonstrated increases in MMR during the pandemic of 30 to 40 per cent.

Assessment of the collateral impact of COVID-19 needs further interrogation of the data, although it is likely that the increase in OH deaths and deaths with administrative avoidable factors, reflect a decline in quality of maternity care, because OH mortality reflects health system functionality.

Conclusion

The reduction in iMMR seen in the previous triennium (2017-19) has been reversed even further in 2021 compared to 2020, due to the COVID-19 pandemic causing maternal deaths due to COVID-19 pneumonia, and due to the indirect effects on the management of other causes such as obstetric haemorrhage.

Recommendations

1. Recommendations of the 2017-2019 Saving Mothers report are still relevant and need to be implemented.
2. Functional Maternal and Newborn, and Sexual and Reproductive Health services must be maintained during times of COVID-19 or similar future pandemics, and COVID-19 care for pregnant women must be integrated into maternity care services.
3. Findings of E Motive trial for PPH to be implemented nationally.
4. Disseminate and teach on new SA Maternity Care Guidelines.
5. Update and continue with ESMOE training and drills.
6. Provinces to address administrative /system issues arising from their reports in their annual operational plans.
7. Maternal health needs to be prioritised at national level and appropriate investment and allocation of resources made to maternal health.

1. Introduction

The 2021 annual Saving Mothers report presents an overview of maternal mortality in South Africa, underlying causes and trends compared to previous years.

It is important to note that this report covers the second year of the COVID-19 pandemic which commenced in March 2020 in South Africa and had major effect on maternal health outcomes and utilisation of maternal /reproductive health services (1,2). During the second half of 2021, vaccination against COVID-19 also became available to pregnant women. However, due to prioritisation of older people and initial concerns about safety in pregnancy, the vaccine was not made widely available to pregnant women in South Africa until September 2021.

The pandemic also adversely affected the assessment process and data analysis process of the NCCEMD since many provincial assessors were heavily involved in managing the COVID-19 pandemic in their places of work.

In 2020, there was a change of the NCCEMD national committee members, and very sadly just as the new committee was moving forward, it experienced the untimely death of the new chairperson Prof. E Mhlanga in 2022; may his soul rest in peace.

The NCCEMD would also like to acknowledge the work of the previous Chairperson, Prof. J Moodley, and previous Saving Mothers editor, Prof. RC Pattinson, and the previous committee. The MRC Maternal and Infant Healthcare Strategies unit headed by Prof. 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. Prof. Pattinson, the previous editor, is acknowledged for his important and helpful contributions to this report.

The work of the NCCEMD continues to be supported by the National Department of Health's MCWH Directorate headed by Dr Manala Makua.

2. Methods

The method used to compile this report is the same as has been used for all the other annual reports (3). The database was closed much later than in previous years, in January 2023, due to general delays in provincial notification and assessment processes, but also due to late submissions from Gauteng and Limpopo.

The classification of maternal deaths used in South Africa is based on the WHO ICD 10 adaptation for maternal deaths (4).

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 (5).

Since SARS-CoV-2 or COVID-19 was a novel infection in 2020 with specific characteristics and high mortality, it needed to be incorporated into the classification in order to be identifiable. It was thus decided by the NCCEMD to code it as follows: NPRI /Other (specify COVID-19 complication). A death during pregnancy due to COVID-19 complications was thus categorised as an indirect maternal death.

There were also women who died from other primary causes e.g. OH, but whose condition was possibly exacerbated by concurrent COVID-19 infection. In such cases, the NCCEMD decided that COVID-19 infection should be included as a final cause or complication as: Other (specify COVID-19).

3. Maternal Deaths and Mortality rates 2021

Table 1 gives the live births from the DHIS, and maternal deaths submitted to the NCCEMD that were entered on the Maternal Morbidity and Mortality Audit System (MaMMAS) in 2021. It is important to note that all Deaths During Pregnancy, Childbirth, and the Puerperium (DDPCP), previously known as pregnancy related deaths, were reported. DDPCP includes any woman who died during pregnancy or the puerperium, and 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 2021, there were 1 497 deaths during pregnancy, childbirth, and the puerperium (DDPCP) reported to the NCCEMD and entered in the MAMMAs database, of which 1473 were maternal deaths, after excluding 24 coincidental deaths. There were 1 015 782 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 facility deaths, whereas DHIS only includes public health facility deaths. However, in 2021 more deaths were reported to DHIS than NCCEMD from Gauteng. Therefore, a correction was made for Gauteng whereby the DHIS number was used rather than the MAMMAS one. This is depicted in Table 2 which also shows trends in MDs and MMR from 2017.

Table 1: 2021 Births and deaths during pregnancy childbirth and puerperium (DDPCP), NCCEMD and DHIS Maternal deaths and iMMR per province (UNCORRECTED).

Province	Live births in facility	MaMMAS Deaths DDPCP	MaMMAS MD	DHIS MD 2021	DHIS iMMR	MaMMAs iMMR
ec Eastern Cape	110909	151	150	151	136.1	135.3
fs Free State	49073	115	114	100	203.8	232.3
gp Gauteng **	227182	318	310	341	150.1	136.5
kzn KwaZulu-Natal	214224	280	276	274	127.9	128.8
l Limpopo	135892	200	196	191	140.6	144.2
mp Mpumalanga	95700	168	167	142	148.4	174.5
nc Northern Cape	22528	43	43	38	168.7	190.87
nw North West	61528	117	116	97	157.7	188.53
wc Western Cape	98746	105	101	79	80.0	102.3
South Africa	1015782	1497	1473	1413	139.1	145.0

*DDPCP = Maternal deaths plus coincidental deaths ** Likely underreporting in Gauteng because DHIS MDs > MAMMAS MDs

Table 2. Number maternal deaths per province 2017-2021 (CORRECTED)

Province	c2017	c2018	2019	c2020	c2021	dhis md 2021	corrected immr 2021
ec Eastern Cape	138	131	118	191	150	151	135.25
fs Free State	67	92	74	94	114	100	232.31
(c) gp Gauteng	257	267	249	323	310 (c341)	341	136.5 (c150.10)
kzn KwaZulu-Natal	239	202	179	251	276	274	128.84
l Limpopo	174	152	166	167	196	191	144.23
mp Mpumalanga	117	112	70	99	167	142	174.5
nw North West	82	95	78	83	116	97	188.53
nc Northern Cape	28	25	32	23	43	38	190.87
wc Western Cape	73	74	56	105	101	79	102.28
sa South Africa	1175	1150	1022	1336	1473 (c1504)	1413	145.0 (c148.1)

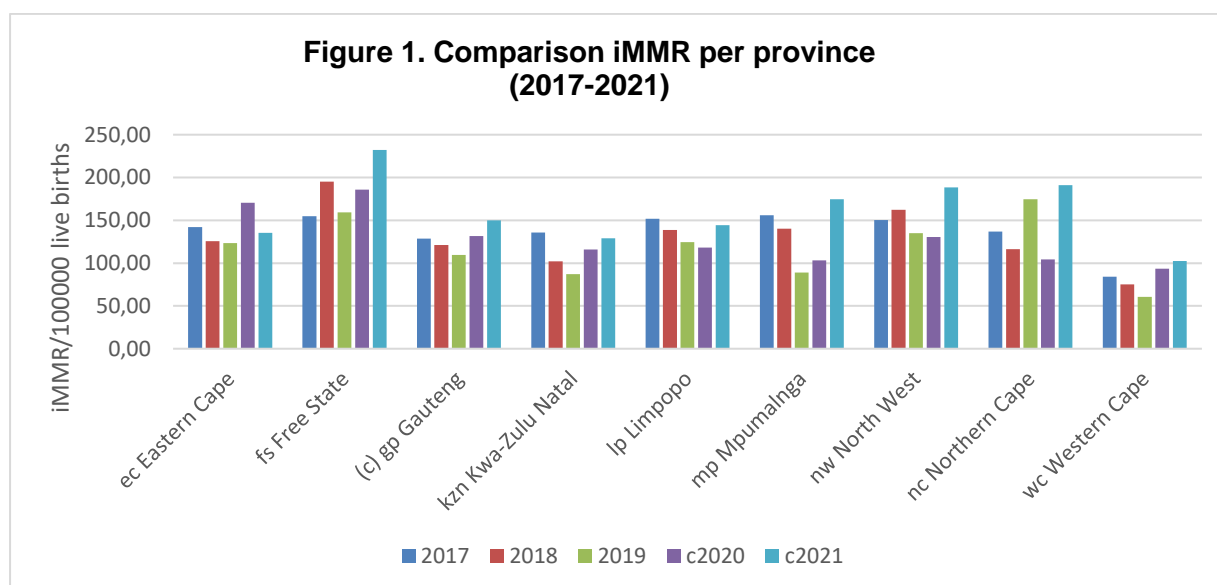
The corrected number of maternal deaths was 1 504. The corrected Maternal Mortality Rate (MMR) was 148.1 maternal deaths per 100 000 live births, which is a further increase from 2020 (MMR 126.1) and a 47 per cent in maternal deaths from 2019 (Total MDs 1022, MMR 98.8). This shows that the steep decline in MMR from 2010 had been reversed in 2021 as well as 2020.

Table 3 and Figure 1 give the institutional Maternal Mortality Ratio (iMMR) which excludes coincidental causes for 2017-2021 (CORRECTED). The increased MMR in 2021 when compared with 2019, occurred in all provinces in South Africa.

Table 3. iMMR per province per year 2017-2021 (corrected)

Province	2017	2018	2019	c2020	c2021
ec Eastern Cape	132.10	121.94	110.32	170.5	135.25
fs Free State	139.14	186.78	144.83	185.8	232.31
gp Gauteng ©	117.23	110.86	100.54	131.5	150.10
kzn Kwa-Zulu Natal	131.81	99.41	82.22	116	128.84
l Limpopo	141.82	134.97	126.20	118.1	144.23
mp Mpumalnga	148.11	139.09	84.07	103.2	174.5
nw North West	143.07	157.32	124.98	130.6	188.53
nc Northern Cape	126.98	106.83	133.13	104.3	190.87
wc Western Cape	73.52	72.09	50.77	93.3	102.28
sa South Africa	125.89	117.69	98.82	126.06	148.1

Figure 1. Comparison iMMR per province (2017-2021)



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 trends in iMMR from 2005. Following the encouraging and steep decline from 2010, with an iMMR less than 100 in 2019. There has been an increase in 2020, to 126.1 and a further increase in 2021 to 148.1. Both 2020 and 2021 were years affected by the COVID-19 pandemic. In 2021, there was an even greater upsurge in iMMR than in 2020, compared to previous years. The iMMR in 2021 increased by 47 per cent.

Figure 2. Number of maternal deaths from 1998-2021 in SA

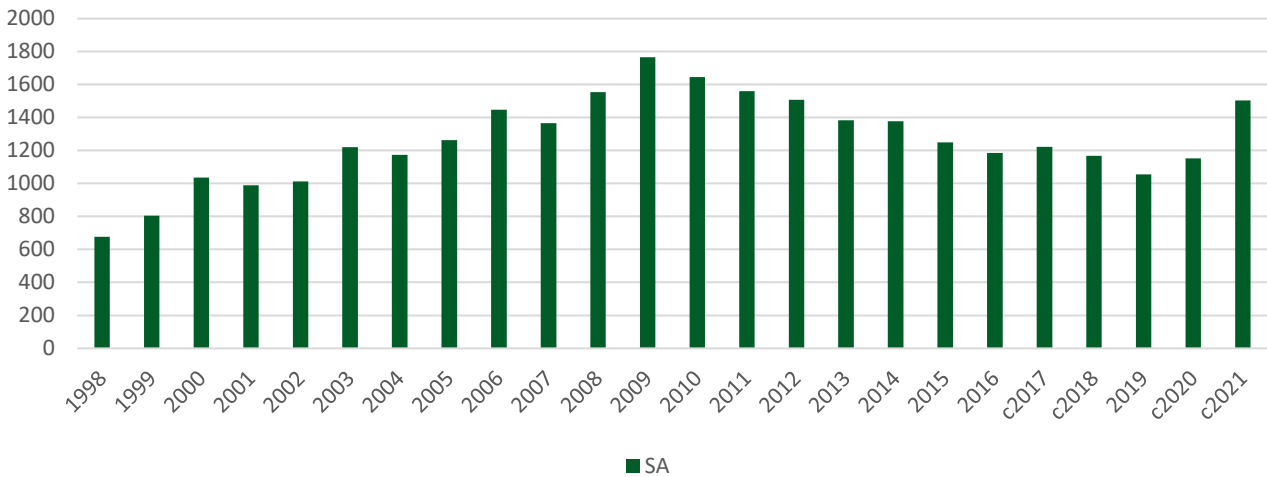


Figure 3 South African iMMR from 2005-2021

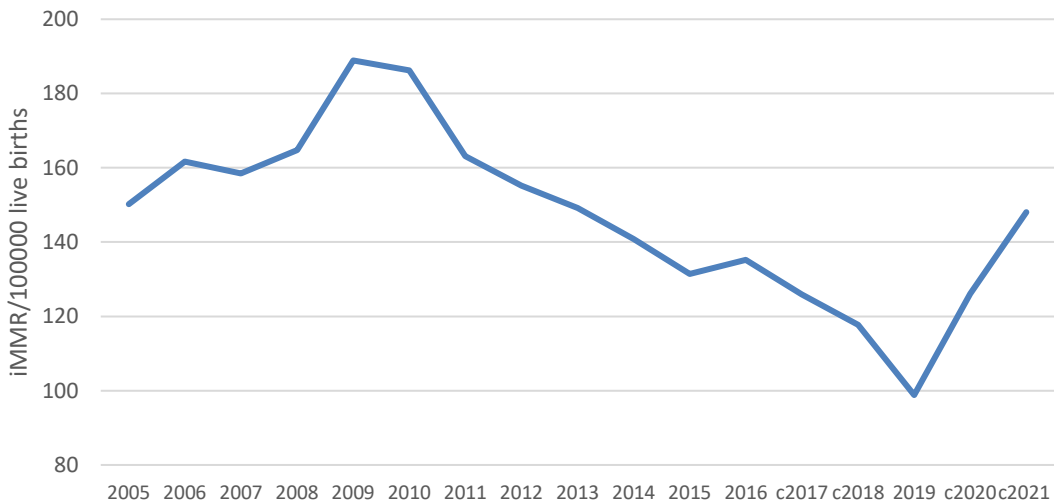
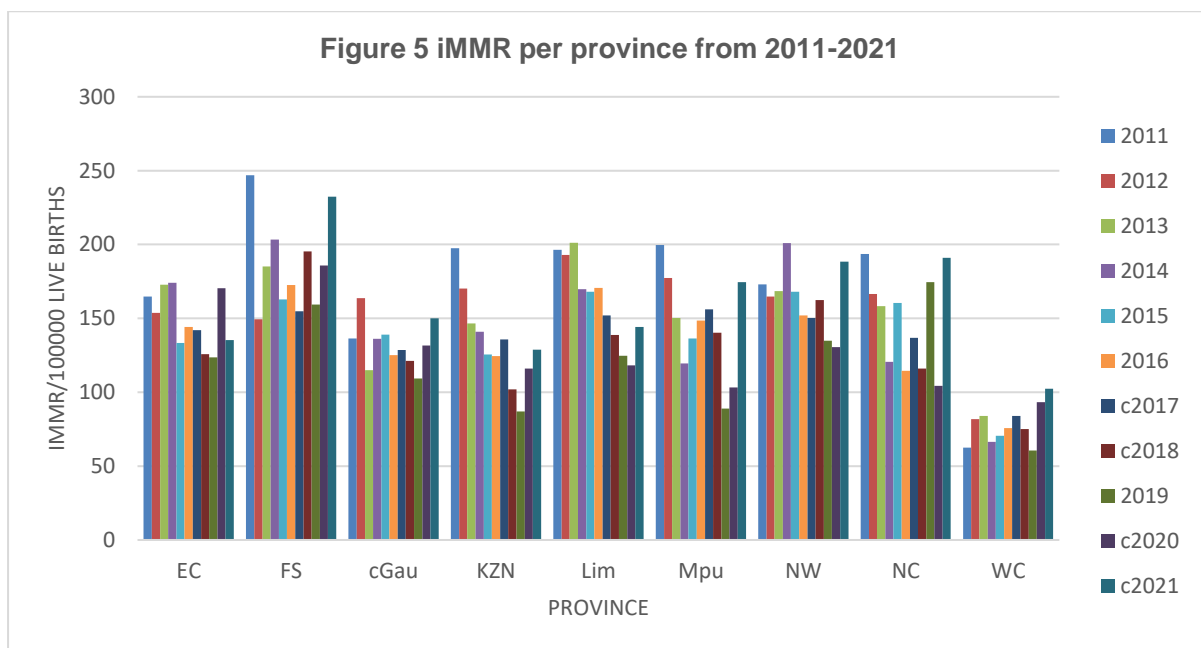
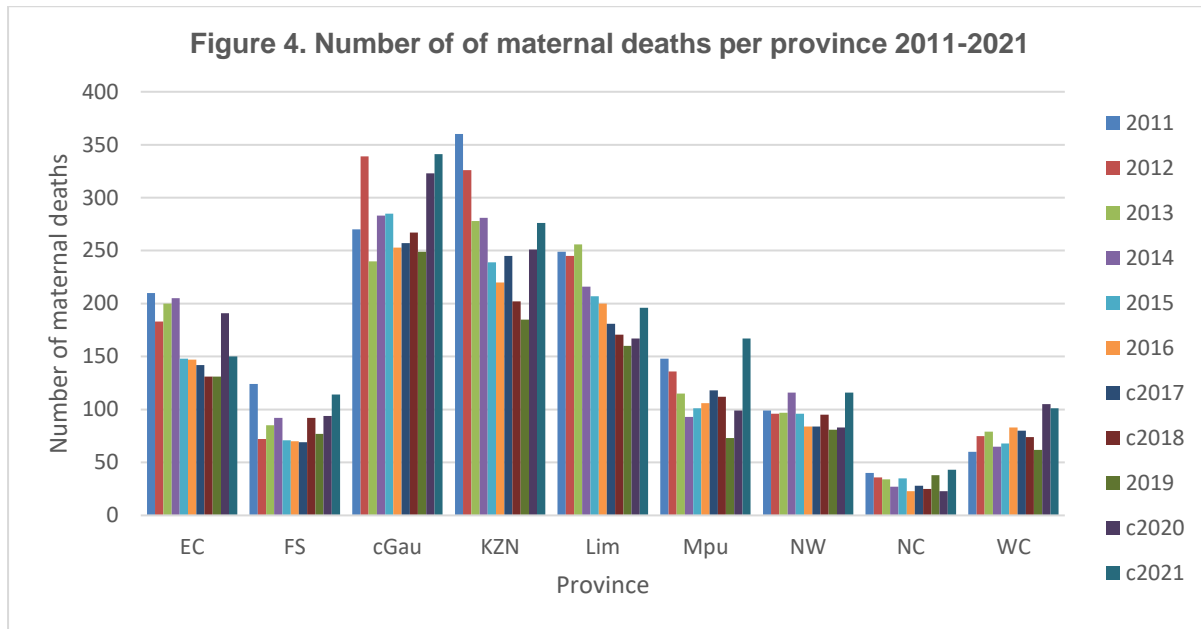


Figure 4 gives the number of maternal deaths per province and Figure 5 the iMMR per province since 2011. From 2011, there was a general trend to lower numbers of maternal deaths up to 2019, which then reversed in most provinces in 2020 and all provinces in 2021.



5. Primary Obstetric Causes of Maternal Deaths

Table 4 shows the primary cause of death and related iMMR in 2021. Non-Pregnancy Related Infections (NPRI) accounted for 554 MDs (37 per cent of deaths) and have sharply increased from previous years. COVID-19 pneumonia and complications increased even further from 2020, accounting for 66.6 per cent of NPRI deaths and 25.1 per cent of all maternal deaths. Obstetric haemorrhage (OH) deaths (n=234) increased to become the second most common cause. Medical and surgical (M&S) disorders and Hypertensive disorders (HPD) were the third and fourth most common causes respectively. Early pregnancy loss (ectopic and miscarriage) combined would be the fifth most common causal grouping.

Corrections were not made for Gauteng because it could not be assumed that the pattern of disease in 2021 was similar to that in the previous triennium for Gauteng which was severely affected by the COVID-19 pandemic. Therefore, the cause of death data that follows is uncorrected national data.

Table 4: Primary Obstetric cause of Maternal deaths and iMMR for 2021 (UNCORRECTED)

Primary obstetric problem	Number MDs	%	iMMR
INDIRECT			
Medical and surgical disorders	188	12.6	18.5
Non-pregnancy-related infections*	554	37	54.5
DIRECT			
Ectopic pregnancy	33	2.2	3.2
Miscarriage	54	3.6	5.3
Pregnancy-related sepsis	67	4.5	6.6
Obstetric haemorrhage	234	15.6	23.0
Hypertension	187	12.5	18.4
Anaesthetic complications	17	1.1	1.7
Adverse drug reactions	5	0.3	0.5
Embolism	43	2.9	4.2
Acute collapse - cause unknown	36	2.4	3.5
Miscellaneous	3	0.2	0.3
Unknown	52	3.5	5.1
Total:	1473	100	145.0

**Deaths from COVID-19 complications were classified under NPRI/other*

Subcategories of causes of maternal death by province are displayed in Appendix 1. The three following tables 5a, 5b, and 5c break down the three major primary obstetric causes in 2021 (NPRI, OH, and M&S) into subcategories and the proportions are compared with 2020 and the previous triennium (2017-2019).

Table 5a. Subcategories of NPRI MDs in 2021, compared with 2020 and 2017-2019 triennium

Non-pregnancy related infections subcategory	Number NPRI 2021	% NPRI 2021	% NPRI 2020	%NPRI 2017-2019
Pneumonia	85	15.3	23.40%	33.90%
TB	48	8.7	20%	36.20%
Meningitis	21	3.8	8.30%	10.90%
GIT, Appendicitis, Malaria, etc.	16	2.9	4.80%	11.70%
Other/specified*	384	69.3	43.90%	7.30%
Total	554	100	100%	100%

*369 specified as COVID-19 pneumonia /complication

The largest subcategory of NPRI in 2021 was Other (n=384), with COVID-19 pneumonia/complication specified in 369. This will be discussed in detail in section 6. This has increased markedly from the proportion in the previous triennium when it was 7.3 per cent. Of note, in 2020 and 2021, the proportion of NPRI deaths from pneumonia and TB declined.

Table 5b. Subcategories of Obstetric Haemorrhage in 2021, compared with 2020 and 2017-2019 triennium

Subcategory Haemorrhage	Number OH 2021	% Haemorrhage 2021	% Haemorrhage 2020	% Haemorrhage 2017-2019
Antepartum Haemorrhage	58	24.8	15.20%	17.60%
Ruptured uterus	29	12.4	15.70%	11.20%
PPH after vaginal delivery	78	33.3	28.30%	34%
Bleeding at/after caesarean delivery	69	29.5	40.80%	37.10%
Total	234	100	100%	100%

In 2021, the pattern of subcategories causing OH deaths changed in comparison to 2019, with Bleeding at/after Caesarean delivery (BLDADC) accounting for 29.5 per cent and the proportion due to PPH after vaginal delivery being greater. The small increase in deaths from antepartum haemorrhage is concerning. The increase in OH deaths to the second most common cause could reflect a decline in the quality of intrapartum care in 2021, and delays in accessing operating theatres due to unavailability for various reasons.

Table 5c. Subcategories of M&S Maternal deaths in 2021, compared with 2020 and 2017-2019 triennium

Medical and surgical disorders subcategory	Number M&S 2021	% M&S 2021	% M&S 2020	%M&S 2017-2019
Cardiac	53	28.2	29.80%	31.60%
Respiratory	17	9.0	14.60%	13.50%
Psych/Suicide	9	4.8	6.20%	4.60%
Neoplasm	14	7.4	10.10%	8.90%
Haemat, GIT, CNS, Autoimmune, etc.	51	27.1	13.50%	12.90%
Other	44	23.4	25.80%	28.50%
Total	188	100	100%	100%

The most common causal subcategory in the Medical and Surgical disorders group was cardiac conditions, of

which the majority were due to peripartum cardiomyopathy. The pattern of causal subcategories was similar to the previous triennium.

Trends in Primary Obstetric Causes 2017-2021.

Table 6 and 7, and Figure 6 compare numbers of maternal deaths and iMMR per Primary Obstetric cause from 2017 to 2021. They show the marked increase in NPRI deaths in 2020 and further in 2021, the concerning rise in OH deaths in 2020 and further in 2021, and lesser rise in Medical and Surgical disorder deaths. The decline in HDP deaths noted in 2020, compared to the previous triennium, was less in 2021.

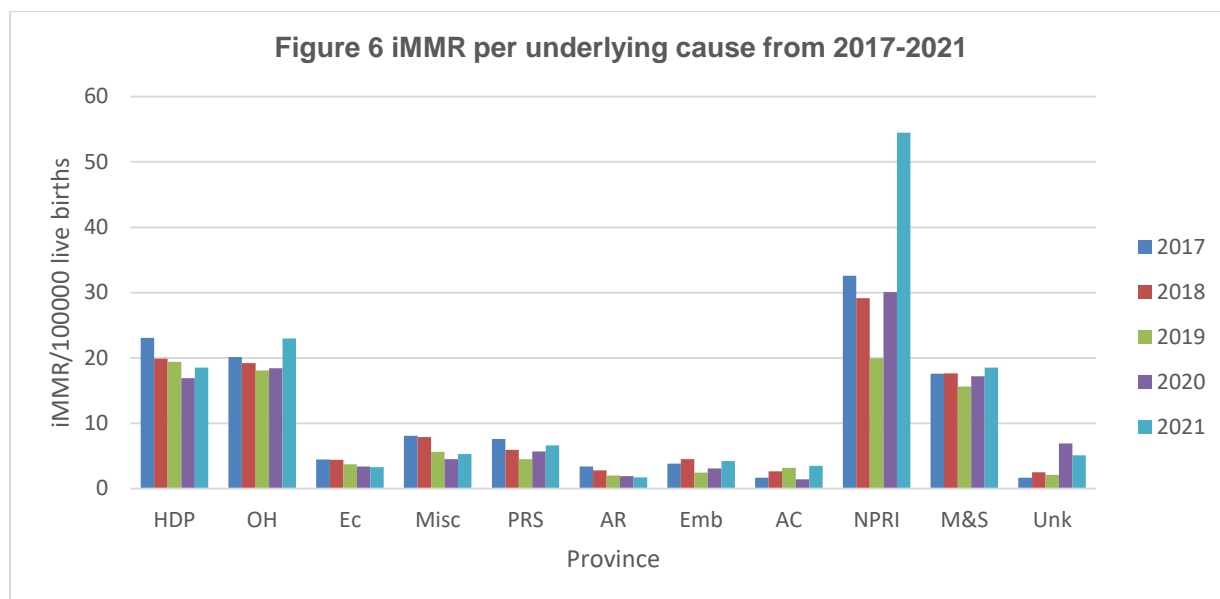
Table 6. Cause of DDPCP for 2021 compared to the preceding five years (uncorrected)

Primary Obstetric Problem	2017	2018	2019	2020	2021
Coincidental cause	38	34	43	31	24
Medical and surgical disorders	161	166	154	178	188
Non-pregnancy-related infections	297	276	197	312	554
Ectopic pregnancy	41	41	37	35	33
Miscarriage	75	73	56	47	54
Pregnancy-related sepsis	70	55	45	59	67
Obstetric haemorrhage	184	181	179	191	234
Hypertension	210	188	192	175	187
Anaesthetic complications	30	27	20	20	17
Adverse drug reactions	11	5	9	13	5
Embolism	35	43	24	32	43
Acute collapse - cause unknown	15	25	32	15	36
Miscellaneous	5	4	12	4	3
Unknown	53	64	45	71	52
DDPCP	1225	1182	1045	1183	1497

Table 7. Comparison of iMMR for underlying causes per year 2017-2021 (uncorrected)

Primary Obstetric Problem	2017	2018	2019	2020	2021
Hypertension	23.09	19.88	19.39	16.9	18.4
Obstetric haemorrhage	20.13	19.19	18.09	18.4	23.0
Ectopic pregnancy	4.46	4.4	3.75	3.4	3.3
Miscarriage	8.11	7.9	5.63	4.5	5.3
Pregnancy-related sepsis	7.62	5.95	4.52	5.7	6.6
Anaesthetic complications	3.4	2.79	2.02	1.9	1.7
Embolism	3.84	4.53	2.47	3.1	4.2
Acute collapse	1.68	2.64	3.21	1.4	3.5
Non-pregnancy related sepsis	32.59	29.15	19.95	30.1	54.5
Medical and surgical disorders	17.57	17.64	15.61	17.2	18.5
Unknown	1.66	2.52	2.12	6.9	5.1
iMMR for all maternal deaths (excluding coincidental deaths)	125,89	117,69	98.82	111.3	145.0

Figure 6 iMMR per underlying cause from 2017-2021



6. Classification of maternal deaths directly due to COVID-19 complications

Deaths due to COVID-19 complications were classified under NPRI/Other/specify COVID-19. The MAMMAs database showed a marked increase in NPRIs in most provinces. In previous reports, the subcategory TB and pneumonia were the most common subcategories, and ‘other’ one of the smaller groups. However, in 2021 there were 384 deaths in the NPRI /other category, 369 of which were specified as ‘COVID-19 complication’ (Figure 7). This group was three times larger than TB and pneumonia combined which had 48 and 85 deaths respectively (Table 5a).

Figure 7. Deaths from COVID-19 complications per province

Province	EC	FS	Gau	KZN	Lim	Mpu	NW	NC	WC	SA
Number NPRI/ COVID-19	32	17	78	89	43	33	20	14	43	369

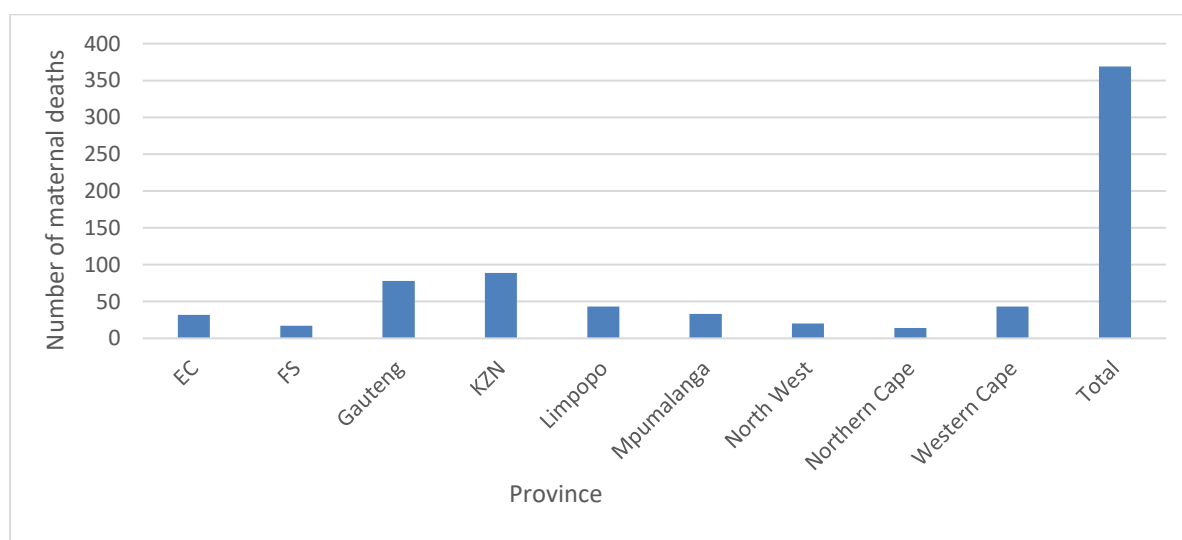


Figure 7 shows the direct contribution of COVID-19 to maternal mortality. However, it is likely to be an underestimate due to under reporting by Gauteng, which was particularly affected by the COVID-19 pandemic

in the second and third waves. Also, there could have been misclassification of COVID-19 deaths as NPRI/subcategory other pneumonia, or Medical and Surgical disorders/subcategory respiratory or coincidental. Obviously, misclassification could have occurred in the other direction; deaths coded as COVID-19 could have had another primary cause but incidentally found to be COVID-19 positive.

7. Primary Obstetric causes of death per province in 2021

Table 8 and 9, and Figure 8 shows the Primary Obstetric Causes of maternal death in numbers and iMMR for the provinces. NPRI deaths are the leading cause of death in all provinces.

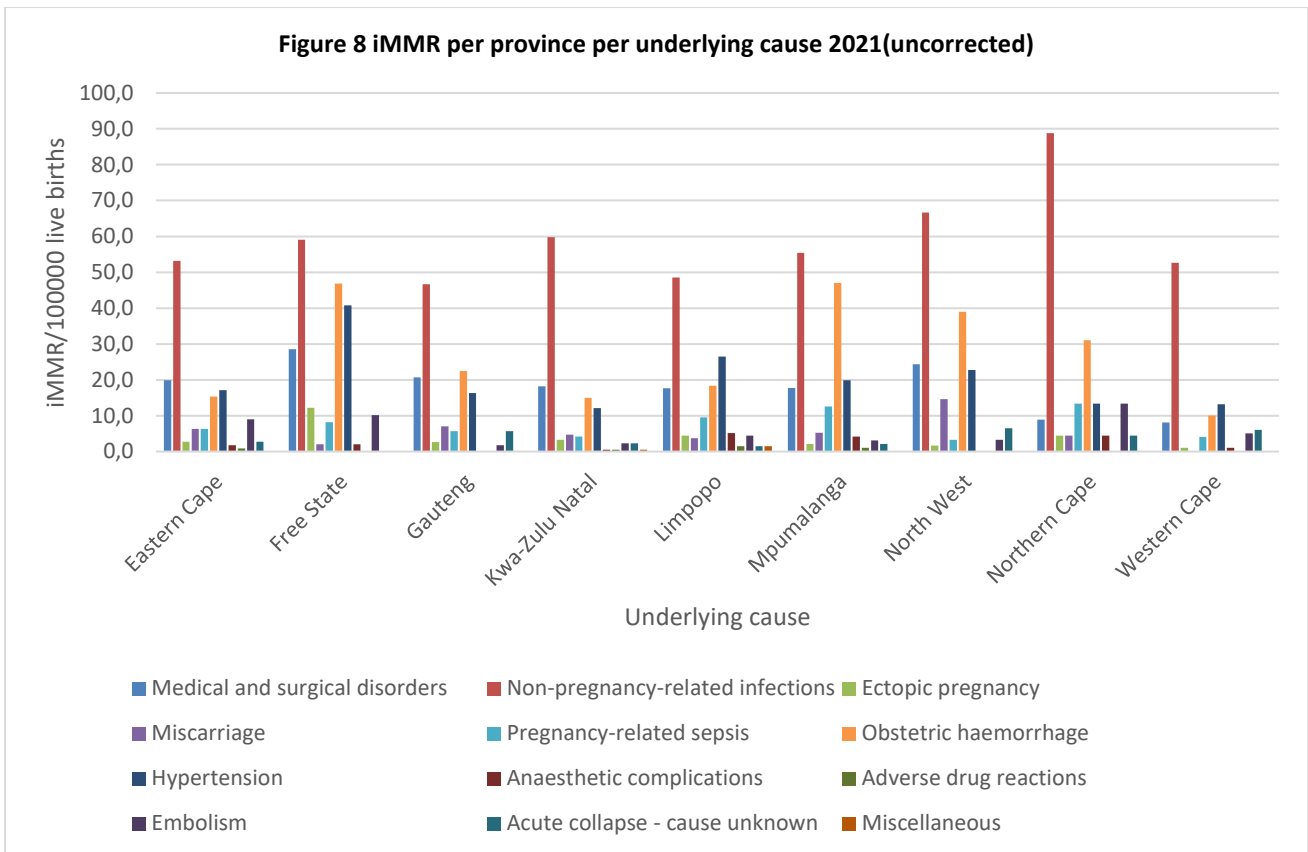
Table 8. Causes of DDPCP per province in 2021

2021	Easter n Cape	Free State	Gauten g	Kwa- Zulu Natal	Limpop o	Mpumalan ga	Nort h West	Norther n Cape	Wester n Cape	South Africa
Medical and surgical disorders	22	14	47	39	24	17	15	2	8	188
Non-pregnancy-related infections	59	29	106	128	66	53	41	20	52	554
Ectopic pregnancy	3	6	6	7	6	2	1	1	1	33
Miscarriage	7	1	16	10	5	5	9	1	0	54
Pregnancy-related sepsis	7	4	13	9	13	12	2	3	4	67
Obstetric haemorrhage	17	23	51	32	25	45	24	7	10	234
Hypertension	19	20	37	26	36	19	14	3	13	187
Anaesthetic complications	2	1	0	1	7	4	0	1	1	17
Adverse drug reactions	1	0	0	1	2	1	0	0	0	5
Embolism	10	5	4	5	6	3	2	3	5	43
Acute collapse - cause unknown	3	0	13	5	2	2	4	1	6	36
Miscellaneous	0	0	0	1	2	0	0	0	0	3
Unknown	0	11	17	12	2	4	4	1	1	52
Maternal deaths	150	114	310	276	196	167	116	43	101	1473
iMMR	135.2	232.3	136.5	128.8	144.2	174.5	188.5	190.9	102.3	145.0
Coincidental cause	1	1	8	4	4	1	1	0	4	24
DDCP	151	115	318	280	200	168	117	43	105	1497
DDCP iMMR	136.1	234.3	140.0	130.7	147.2	175.5	190.2	190.9	106.3	147.4
Live births (2021)	110909	49073	227182	214224	135892	95700	61528	22528	98746	1015782

Table 9. iMMR per Primary Obstetric Cause per province for 2021 (MDs per 100,000 LBs)

iMMR 2021	Easter n Cape	Free State	Gauten g	Kwa- Zulu Natal	Limpop o	Mpumalan ga	North West	Norther n Cape	Wester n Cape	South Africa
Medical and surgical disorders	19.8	28.5	20.7	18.2	17.7	17.8	24.3	8.9	8.1	18.5
Non-pregnancy-related infections	53.2	59.1	46.7	59.8	48.6	55.4	66.6	88.8	52.7	54.5
Ectopic pregnancy	2.7	12.2	2.6	3.3	4.4	2.1	1.6	4.4	1.0	3.3
Miscarriage	6.3	2.0	7.0	4.7	3.7	5.2	14.6	4.4	0.0	5.3
Pregnancy-related sepsis	6.3	8.2	5.7	4.2	9.6	12.5	3.3	13.3	4.1	6.6
Obstetric haemorrhage	15.3	46.9	22.5	14.9	18.4	47.0	39.0	31.1	10.1	23.0
Hypertension	17.1	40.8	16.3	12.1	26.5	19.9	22.8	13.3	13.2	18.4
Anaesthetic complications	1.8	2.0	0.0	0.5	5.2	4.2	0.0	4.4	1.0	1.7
Adverse drug reactions	0.9	0.0	0.0	0.5	1.5	1.0	0.0	0.0	0.0	0.5
Embolism	9.0	10.2	1.8	2.3	4.4	3.1	3.3	13.3	5.1	4.2
Acute collapse - cause unknown	2.7	0.0	5.7	2.3	1.5	2.1	6.5	4.4	6.1	3.5
Miscellaneous	0.0	0.0	0.0	0.5	1.5	0.0	0.0	0.0	0.0	0.3
Unknown	0.0	22.4	7.5	5.6	1.5	4.2	6.5	4.4	1.0	5.1
iMMR (excl. Coincidental deaths)	135.2	232.3	136.45	128.9	144.2	174.5	188.5	190.9	102.3	145.0
Coincidental Cause	0.9	2.0	3.5	1.9	2.9	1.0	1.6	0.0	4.1	2.4
iMMR (incl. coin)	136.1	234.3	140.0	130.8	147.1	175.5	190.1	190.9	106.4	147.4
Live births (2021)	110909	49073	227182	214224	135892	95700	61528	22528	98746	1015782

Figure 8 iMMR per province per underlying cause 2021(uncorrected)



In all provinces, NPRI was the most common cause of MD in 2021. There was variation between provinces in ranking of other causes with OH being the second most common cause in five provinces. A further breakdown of causes of maternal death by district is shown in Appendix 2.

8. Levels of Care, HIV, Caesarean delivery

Levels of Care of Maternal deaths

The majority (94.3%) of maternal deaths reported to the NCCEMD occurred in health facilities, with 0.9 per cent in transit and 4.8 per cent at 'home'. The NCCEMD process is not designed to receive notifications of home deaths, so this latter percentage is an underestimate (Tables 10 a and b).

The majority of deaths (84.5%) occurred at public hospitals with an increasing number (8.4%) in private hospitals. This is a higher proportion of deaths in private facilities, compared to previous reports.

Table 10a. Location of death, DDPCP

Primary obstetric problems	In Facility	In Transit	Home/Outside	Total
Coincidental cause	21	0	3	24
Medical and surgical disorders	185	1	2	188
Non-pregnancy-related infections	538	4	12	554
Ectopic pregnancy	29	1	3	33
Miscarriage	53	0	1	54
Pregnancy-related sepsis	63	2	2	67
Obstetric haemorrhage	222	4	8	234
Hypertension	181	1	5	187
Anaesthetic complications	17	0	0	17
Adverse drug reactions	5	0	0	5
Embolism	38	1	4	43
Acute collapse - cause unknown	31	0	5	36
Miscellaneous	3	0	0	3
Unknown	25	0	27	52
Total:	1411 (94.3%)	14(0.9%)	72(4.8%)	1497(100%)

Table 10b. In facility 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	3	0	7	5	9	0	24
Medical and surgical disorders	2	3	32	56	82	13	188
Non-pregnancy-related infections	12	8	90	168	195	81	554
Ectopic pregnancy	3	1	8	12	9	0	33
Miscarriage	1	1	17	12	23	0	54
Pregnancy-related sepsis	2	0	10	25	26	4	67
Obstetric haemorrhage	8	10	62	68	73	13	234
Hypertension	5	6	30	60	76	10	187
Anaesthetic complications	0	0	3	10	4	0	17
Adverse drug reactions	0	1	1	3	0	0	5
Embolism	4	1	12	13	10	3	43
Acute collapse - cause unknown	5	4	12	6	8	1	36

Primary obstetric problem	Outside	CHC	District hospital	Regional hospital	Tert/Nat central hospital	Private hospital	Total
Miscellaneous	0	0	0	2	1	0	3
Unknown	27	1	6	10	8	0	52
Total:	72(4.8%)	36(2.4%)	290(19.4%)	450(30.1%)	524(35%)	125(8.4%)	1497(100%)

HIV status of DDPCP

HIV status was positive in 40.5 per cent of women who died, and negative in 47.6 per cent, but for 11.8 per cent, their status was unknown (Table 11). This compares with 9.5 per cent unknown in the previous triennium, suggesting HIV testing may have been impacted by the COVID-19 pandemic. HIV negative deaths outnumbered HIV positive; this is the opposite to what was found in 2017-2019. It is probably because HIV treatment is widespread and because COVID-19 was causing MDs irrespective of HIV status.

Table 11. HIV status in DDPCP

Primary obstetric problems	Positive	Negative	Declined & Unknown	All
Coincidental cause	10	6	8	24
Medical and surgical disorders	64	99	25	188
Non-pregnancy-related infections	275	240	39	554
Ectopic pregnancy	16	5	12	33
Miscarriage	21	9	24	54
Pregnancy-related sepsis	40	23	4	67
Obstetric haemorrhage	86	123	25	234
Hypertension	43	123	21	187
Anaesthetic complications	4	12	1	17
Adverse drug reactions	3	2	0	5
Embolism	20	18	5	43
Acute collapse - cause unknown	10	21	5	36
Miscellaneous	0	3	0	3
Unknown	15	29	8	52
All	607 (40.5%)	713 (47.6%)	177(11.8%)	1497 (100%)

Caesarean delivery and Maternal deaths

The Caesarean Delivery (CD) rate in 2021 remained similar to 2019 and 2020, at 28 per cent, but the CD Case Fatality Rate increased to 203.6 CD associated deaths per 100,000 CDs, compared to 112.5 in 2019 and 145.7 in 2020 (Table 12).

This increase in CD CFR could reflect deterioration of quality of care relating to CD, or is more likely due to the higher CD rates in women with severe COVID-19 pneumonia, many of whom required intubation and early delivery.

There were 69 deaths from bleeding associated with CD, giving a BLDACD CFR for 2021 of 23.6, which is

less than 2020 (26.3) and the same as the previous triennium (23.6 in 2017-2019).

Table 12. Caesarean delivery and maternal deaths (*CD CFR = Number CD deaths per 100,000 CDs)

Province (2021)	Live births	CD	CD rate (%)	MD with CD	CD CFR 2021*
ec Eastern Cape	110909	32,718	29.5	50	152,8
fs Free State	49073	15,212	30.5	47	309
gp Gauteng	227182	68,155	30.0	152	223
kzn KwaZulu-Natal	214224	77,121	35.6	103	133.6
l Limpopo	135892	31,255	22.5	76	243.2
mp Mpumalanga	95700	20,097	21.2	65	323.4
nw North West	61528	12,920	21.3	39	301.9
nc Northern Cape	22528	5,181	22.7	17	328.1
wc Western Cape	98746	29,623	29.9	49	165.4
Total:	1015782	292282	28	598	203.6

9. Overview of Avoidable maternal deaths

Table 13 Impact of suboptimal care on maternal deaths in facilities.

Impact of suboptimal care*	Total
- No suboptimal care identified	528
- Suboptimal care, no impact on outcome	132
- Suboptimal care, possible impact on outcome	538
- Suboptimal care, probable impact on outcome	299

*55.9% potentially preventable within the health service.

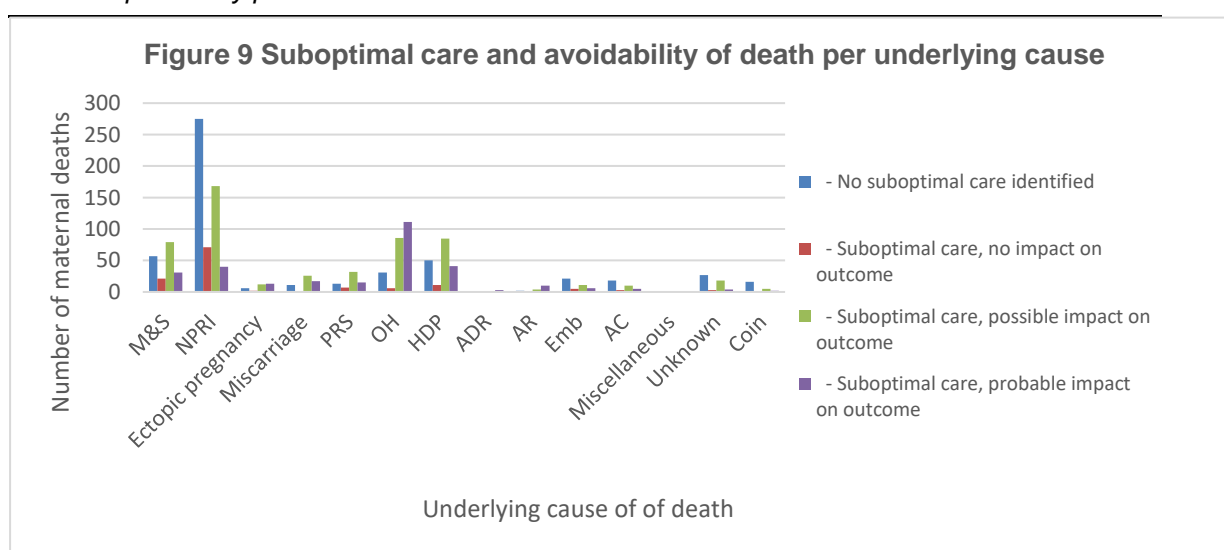


Table 13 describes the different categories of preventability of maternal deaths. Deaths were assessed to be possibly or probably preventable by the health system for 56 per cent of women who died, the most avoidable being OH and HYP deaths, with lesser numbers in the NPRI group. Of note was the proportion

of deaths with administrative avoidable factors was 52.6 per cent compared 48.1 per cent in the previous triennium and 57.1 per cent in 2020. These factors included delays in emergency transport, delays in attending to patients, non-availability of ICU beds, lack of staff on duty and non-availability of the required skill levels. Figure 9 shows that the majority of NPRI deaths were not thought to be preventable within the health system. However, OH had the highest numbers of potentially preventable deaths.

The collateral impact of the COVID-19 pandemic can be indirectly inferred from this data, since the excess maternal mortality appears not only to be contributed to by direct COVID-19 complications. Anecdotal accounts indicate quality of maternal care being negatively impacted by the requirements of managing the pandemic and lockdown measures. A more detailed examination of avoidable factors (Appendix 3) confirms this.

10. Discussion

Notification, submission, assessment and data entry of maternal death data for the Saving Mothers report was severely hindered after the onset of the COVID-19 pandemic. This means that the data is not as precise and accurate as in previous years.

An important finding of this report is the 47% increase in maternal death in 2021 compared to 2019, after correcting for under-reporting. This increase is even greater than the SAHR chapter estimate of a 38% increase for the first and second waves of the pandemic (1). Other global systematic reviews have also demonstrated increases in MMR during the pandemic of 30 to 40 % (6).

Assessment of the collateral impact of COVID-19 needs further interrogation of the data, although it is likely that the increase in OH deaths and deaths with administrative avoidable factors, reflects a decline in quality of maternity care, because OH mortality reflects health system functionality.

11. Conclusion

The reduction in iMMR seen in 2019 and the previous triennium has been reversed even further in 2021 compared to 2020, due to the COVID-19 pandemic causing maternal deaths due to COVID-19 pneumonia, and due to the indirect effects on the management of other causes such as obstetric haemorrhage.

12. Recommendations

1. Recommendations of the 2017-2019 Saving Mothers report are still relevant and need to be implemented.
2. Pandemic lessons about maintaining MNH and SRH services and integration of COVID-19 services into maternity care wards.
3. Findings of E Motive trial for PPH to be implemented nationally.
4. Disseminate and teach on new SA Maternity Care Guidelines.
5. Update and Continue with ESMOE training and drills.
6. Provinces to address administrative /system issues arising from their reports in their Annual Operational Plans
7. Maternal health needs to be prioritised at national level and appropriate investment and allocation of resources made to maternal health.

13. References

1. Robert Pattinson, Sue Fawcus, Stefan Gebhardt, Priya Soma-Pillay, Ronelle Niit, Jack Moodley. The impact of COVID-19 on use of maternal and reproductive health services and maternal and perinatal mortality. Ch.10 in South African Health Review. 2021.
2. Pillay Y, Barron P, Zondi T. Recovering from COVID-19 lockdowns: Routine public sector PHC services in South Africa, 2019 – 2021. S Afr Med J 2022;113(1):17-23.
<https://doi.org/10.7196/SAMJ.2022.v113i1.16619>
3. NCCEMD. Saving Mothers 2017-2019: Seventh triennial report on confidential enquiries into maternal deaths in South Africa. DOH Pretoria 2020
4. World Health Organisation. The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM, WHO, Geneva 2016
5. NCCEMD. Guidelines for completion of Maternal Death Notification Form 2020. DOH, Pretoria 2019
6. The INTERCOVID Multinational Cohort Study. Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection. JAMA Pediatr. 2021 Apr 22: e211050.
doi: 10.1001/jamapediatrics.2021.1050: 10.1001/jamapediatrics.2021.1050

Appendices 1-4

Appendix 1: Subcategories of cause of death by province in 2021 (all uncorrected)

Primary obstetric problem	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	South Africa
Coincidental cause	1	1	8	4	4	1	1	0	4	24
- MVA			1	1	3	1			2	8
- Other accidents									1	1
- Assault		1			1					2
- Other	1		7	3			1		1	13
Medical and surgical disorders	22	14	47	39	24	17	15	2	8	188
- Cardiomyopathy	4	2	8	9	5	1	2		1	32
- Rheumatic heart disease	2		2	4				1		9
- Other cardiac disease	2	1	4	1		3			1	12
- Endocrine			3	4	3	1	1	1		13
- GIT			2	3	1	1	1			8
- CNS	1		4	5	3		2		3	18
- Respiratory	2	2	3	1	2	2	4		1	17
- Haematological		1	1	1	1				1	5
- Genito-urinary	1	1	1							3
- Suicide	2	1	2	1		3				9
- Substance abuse				1						1
- Other psychiatric disease										0
- Neoplasm	1		4	5		3			1	14
- Auto-immune		1		1		1				3
- Other	7	5	13	3	9	2	5			44
Non-pregnancy-related infections	59	29	106	128	66	53	41	20	52	554
- PCP pneumonia	2	7	7	8	7	6	4			41
- Other pneumonia	2	1	8	9	3	6	8	4	3	44
- TB	13	1	4	11	5	3	6	2	3	48
- UTI	1									1
- Appendicitis				1		1				2
- Cryptococcal meningitis				4	1				1	6

Primary obstetric problem	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	South Africa
- Other meningitis	5	1	1	2	2	2	1		1	15
- Kaposi's sarcoma			2	1	1					4
- Hepatitis			1							1
- Gastroenteritis	1			1	1					3
- Wasting syndrome			1	1	1	1			1	5
- Other	35	19	82	90	45	34	22	14	43	384
Ectopic pregnancy	3	6	6	7	6	2	1	1	1	33
- Less than 20 weeks	3	6	5	5	6	2	1	1	1	30
- More than 20 weeks (extrauterine pregnancy)			1	2						3
Miscarriage	7	1	16	10	5	5	9	1	0	54
- Septic miscarriage	5	1	12	5	5	4	5			37
- Haemorrhage (non-traumatic)	1		2	3		1	2	1		10
- Uterine trauma			1							1
- GTD	1		1	1						3
- Following legal TOP				1			2			3
Pregnancy-related sepsis	7	4	13	9	13	12	2	3	4	67
- Chorioamnionitis (ruptured membranes)			1							1
- Chorioamnionitis (intact membranes)					1	1	1			3
- Puerperal sepsis after NVD	4	2	5	3	6	2		2	1	25
- Puerperal sepsis after CD	3	2	7	6	4	6			3	31
- Bowel trauma at CD					2	3	1	1		7
Obstetric haemorrhage	17	23	51	32	25	45	24	7	10	234
- Abruption with hypertension	2	3	5	5	2	2	3	1	1	24
- Abruption without hypertension	1	2		6		3	1	1		14

Primary obstetric problem	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	South Africa
- Placenta praevia		1	4	2		2	2			11
- Other APH not specified		1	2	1	2	2	1			10
- Ruptured uterus with previous CD	3	1	2	1		2	3		1	13
- Ruptured uterus without previous CD	1		5	1		5	2		2	16
- Uterine atony after vaginal delivery	2	1	9	3	7	2		2		26
- Vaginal trauma after vaginal delivery		1	1			1		1		4
- Cervical trauma after vaginal delivery		4	1		1	1				7
- Retained placenta after NVD (morb adherent)	1	2	1	1		1	2	1	1	10
- Retained placenta after NVD (not adherent)		1	1		1	2	5		1	11
- Inverted uterus after vaginal delivery	1	1								2
- Other PPH not specified after vaginal delivery	2		3	2	3	6	1		1	18
- Bleeding during CD (morbidly adherent placenta)			1	1		3	1			6
- Bleeding during CD (not adherent placenta)		2	3	3	1	1	1			11
- Bleeding after Caesarean delivery	3	3	13	6	8	12	2	1	3	51
Hypertension	19	20	37	26	36	19	14	3	13	187
- Chronic hypertension	1	2		1	1					5
- Gestational hypertension	1		1	1	6				1	10
- Pre-eclampsia with severe features	6	4	8	6	1	7		1	2	35

Primary obstetric problem	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	South Africa
- Pre-eclampsia without severe features	1	2	4	1	2			1	1	12
- Eclampsia	8	7	17	13	15	11	8	1	6	86
- HELLP	2	5	6	3	11	1	6		2	36
- Liver rupture			1	1					1	3
Anaesthetic complications	2	1	0	1	7	4	0	1	1	17
- General anaesthetic					3	2				5
- Spinal anaesthetic	2	1		1	4	2		1	1	12
Adverse drug reactions	1	0	0	1	2	1	0	0	0	5
- ARV medication					1					1
- TB medication										0
- Other medication	1				1					2
- Herbal medication				1		1				2
Embolism	10	5	4	5	6	3	2	3	5	43
- Pulmonary embolism	10	5	4	5	5	1	2	3	5	40
- Amniotic fluid embolism					1	2				3
Acute collapse - cause unknown	3	0	13	5	2	2	4	1	6	36
Miscellaneous	0	0	0	1	2	0	0	0	0	3
- Hyperemesis gravidarum				1	2					3
- Acute fatty liver										0
Unknown	0	11	17	12	2	4	4	1	1	52
- Death at home or outside health services		9	9	3	2	3	4	1	1	32
- No primary cause found			2	5		1				8
- Lack of information		2	6	4						12
Total:	151	115	318	280	200	168	117	43	105	1497

Appendix 2: Maternal deaths per underlying cause per district 2021

Province	District	M&S	NPRI	Ec	Miscarriage	PRS	OH	HDP	AR	ADR	Emb	AC	Miscellaneous	Unk	Coïn	Total
ec Eastern Cape	Alfred Nzo Districts	1	1	0	1	1	1	0	0	1	2	0	0	0	0	8
ec Eastern Cape	Amahole+ Buffalo city	8	15	2	1	0	5	3	0	0	3	2	0	0	0	39
ec Eastern Cape	Chris Hani	1	4	0	0	1	1	1	1	0	2	0	0	0	0	11
ec Eastern Cape	Joe Gqabi District Municipality	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
ec Eastern Cape	Nelson Mandela Bay Metropolitan	3	17	0	2	1	3	7	0	0	3	0	0	0	0	36
ec Eastern Cape	Oliver Tambo	9	20	1	3	4	7	7	1	0	0	0	0	0	1	53
ec Eastern Cape	Sarah Baartman	0	2	0	0	0	0	1	0	0	0	0	0	0	0	3
ec Eastern Cape		151														
fs Free State	Fezile Dabi	1	2	2	0	1	5	4	1	0	1	0	0	1	0	18
fs Free State	Lejweletswa	0	10	1	0	0	7	4	0	0	1	0	0	3	0	26
fs Free State	Mangaung Metropolitan Municipality															
fs Free State	Thabo Mofutsanyana	3	6	2	1	0	6	3	0	0	1	0	0	4	0	26
fs Free State	Xhariep District Municipality	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
fs Free State	Motheo	10	11	1	0	3	4	9	0	0	2	0	0	3	1	44
fs Free State		115														
gp Gauteng	City of Johannesburg Metropolitan Municipality	19	39	0	3	6	12	8	0	0	0	6	0	2	2	97
gp Gauteng	City of Tswane Metropolitan	11	40	0	4	3	22	12	0	0	1	1	0	6	2	102

Province	District	M&S	NPRI	Ec	Miscarriage	PRS	OH	HDP	ARR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
gp Gauteng	Ekurhuleni Metropolitan Municipality	13	19	4	9	0	11	11	0	0	3	4	0	4	1	79
gp Gauteng	Sedibeng District Municipality	3	3	2	0	1	3	4	0	0	0	1	0	1	1	19
gp Gauteng	West Rand District Municipality	1	5	0	0	3	3	2	0	0	0	1	0	4	2	21
gp Gauteng	Motsweding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
gp Gauteng	318															
kzn KwaZulu-Natal	Amajuba District Municipality	2	10	0	0	0	0	2	0	0	0	0	0	1	0	15
kzn KwaZulu-Natal	eThekweni Metropolitan Municipality	16	53	4	6	4	12	12	1	0	1	3	1	5	2	120
kz KwaZulu-Natal	Harry Gwala District Municipality	2	3	0	0	0	0	0	0	0	1	0	0	0	0	6
kzn KwaZulu-Natal	iLembe District Municipality	2	3	0	1	0	2	0	0	1	0	0	0	1	0	10
kzn KwaZulu-Natal	King Cetshwayo District Municipality	3	18	1	1	0	6	3	0	0	0	0	0	1	0	33
kz KwaZulu-Natal	Ugu District Municipality	2	6	0	0	1	2	3	0	0	0	0	0	0	2	16
kzn KwaZulu-Natal	uMgungundlovu District Municipality	10	24	1	1	1	5	1	0	0	2	1	0	3	0	49
kzn KwaZulu-Natal	Umkhanyakude District Municipality	0	0	0	0	1	0	3	0	0	0	0	0	0	0	4
kzn KwaZulu-Natal	Umzinyathi District Municipality	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2

Province	District	M&S	NPR I	Ec	Miscarriage	PRS	OH	HDP	ARR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
kzn	KwaZulu-Natal	2	5	0	0	2	1	1	0	0	1	0	0	0	0	12
kzn	Zululand District Municipality	0	5	1	0	1	1	4	0	0	0	0	0	1	0	13
kzn	KwaZulu-Natal	280														
l	Capricorn District Municipality	17	39	2	2	8	13	22	2	0	3	1	0	0	2	111
l	Mopani District Municipality	0	10	1	0	2	3	4	1	0	1	1	1	0	0	24
l	Sekhukhune District Municipality	4	3	2	1	0	4	4	3	1	0	0	0	1	2	25
l	Vhembe District Municipality	3	9	0	2	1	3	3	0	0	1	0	0	0	0	22
l	Waterberg District Municipality	0	5	1	0	2	2	3	1	1	1	0	1	1	0	18
l	Bohla-bela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
l	Limpopo	200														
mp	mp Ehlanzeni District Municipality	11	25	0	2	5	16	9	2	1	3	1	0	1	0	76
mp	mp Gert Sibande District Municipality	1	11	0	1	3	14	4	0	0	0	1	0	1	1	37
mp	mp Nkangala District Municipality	5	17	2	2	4	15	6	2	0	0	0	0	2	0	55
mp	Mpumalanga	168														

Province	District	M&S	NPRI	Ec	Miscarriage	PRS	OH	HDP	ARR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
nc Northern Cape	Frances Baard District Municipality	1	11	0	0	2	3	1	1	0	1	0	0	0	0	20
nc Northern Cape	John Taolo Gaetsewe District Municipality	0	3	0	1	0	2	1	0	0	1	1	0	0	0	9
nc Northern Cape	Namakwa District Municipality	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
nc Northern Cape	Pixley ka Seme District Municipality	0	3	0	0	0	1	0	0	0	0	0	0	0	0	4
nc Northern Cape	Zwele ntlang a Fatman Mgca wu District Municipality	1	3	1	0	1	1	1	0	0	1	0	0	0	0	9
nc Northern Cape	43															
nw North West	Bojanala Platinum District Municipality	8	13	1	4	2	10	6	0	0	1	0	0	2	1	48
nw North West	Dr Kenneth Kaunda District Municipality	2	13	0	2	0	3	0	0	0	1	2	0	0	0	23
nw North West	Dr Ruth Segomotsi Mompati District Municipality	2	6	0	1	0	2	2	0	0	0	0	0	1	0	14
nw North West	Ngaka Modiri Molema District Municipality	3	9	0	2	0	9	6	0	0	0	2	0	1	0	32

Province	District	M&S	NPR I	Ec	Miscarriage	PRS	OH	HDP	ARR	ADR	Emb	AC	Miscellaneous	Unk	Coin	Total
nw North West	117															
wc Western Cape	Cape Winelands District Municipality	1	6	0	0	0	2	1	0	0	0	0	0	0	0	10
wc Western Cape	Central Karoo District Municipality	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
wc Western Cape	City of Cape Town Metropolitan Municipality	6	35	1	0	4	6	10	1	0	5	5	0	1	4	78
wc Western Cape	Garden Route District Municipality	0	7	0	0	0	1	1	0	0	0	0	0	0	0	9
wc Western Cape	Overberg District Municipality	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
wc Western Cape	West Coast District Municipality	0	4	0	0	0	1	0	0	0	0	0	0	0	0	5
wc Western Cape	105															
South Africa		188	554	33	53	68	231	190	17	5	43	36	3	52	24	1497

Appendix 3: Details of Avoidable Factors for Maternal deaths, 2021

Table A3a. Patient/Community level avoidable factors

Description	Number	% of cases
Lack of information	152	10.2
No avoidable factor	679	45.4
No antenatal care	239	16
Infrequent antenatal care	50	3.3
Delay in accessing medical help	434	29
Declined medication/surgery/advice	99	6.6
Family problem	26	1.7
Community problem	18	1.2
Unsafe abortion	17	1.1
Other	89	5.9
Total cases	1803	

Table A3bAdministrative avoidable factors

Description	Number	% of cases
Lack of information	135	9
No avoidable factor	709	47.4
Transport problem: Home to institution	24	1.6
Transport problem: Institution to institution	84	5.6
Lack of accessibility: Barriers to entry	19	1.3
Lack of accessibility: Other	22	1.5
Delay in attending to patient (Overburdened service)	106	7.1
Delay in attending to patient (Reason unknown)	74	4.9
Lack of healthcare facilities: ICU	145	9.7
Lack of healthcare facilities: Blood/blood products	28	1.9
Lack of healthcare facilities: Other	44	2.9
Inadequate numbers of staff on duty	105	7
Appropriate skill not available on site/on standby	146	9.8
Communication problems: Technical	22	1.5
Communication problems: Interpersonal	32	2.1
Other	140	9.4
Total cases	1835	

Table A3c. Medical Care avoidable factors by level of care

Description	Community health centre			District hospital			Regional hospital			Tertiary hospital / above			Private hospital		
	No.	% of all cases	% of cases at level	No.	% of all cases	% of cases at level	No.	% of all cases	% of cases at level	No.	% of all cases	% of cases at level	No.	% of all cases	% of cases at level
Managed at this level	661	44.2	100	647	43.2	100	570	38.1	100	516	34.5	100	156	10.4	100
Lack of information	64	4.3	9.8	58	3.9	9.0	39	2.6	6.8	39	2.6	7.6	22	1.5	14.1
No avoidable factor	353	23.6	53.4	240	16	37.1	222	14.8	38.9	278	18.6	53.9	84	5.6	53.8
Initial assessment	128	8.6	19.4	130	8.7	20.1	74	4.9	13	53	3.5	10.3	21	1.4	13.5
Problem with recognition / diagnosis	120	8	18.2	198	13.2	30.6	127	8.5	22.3	61	4.1	11.8	37	2.5	23.7
Delay in referring the patient	72	4.8	10.9	125	8.4	19.3	41	2.7	7.2	7	0.5	1.4	4	0.3	2.6
Managed at inappropriate level	29	1.9	4.4	83	5.5	12.8	23	1.5	4	0	0	0	0	0	0
Incorrect management (Wrong diagnosis)	17	1.1	2.6	54	3.6	8.3	39	2.6	6.8	11	0.7	2.1	8	0.5	5.1
Sub-standard management (Correct diagnosis)	72	4.8	10.9	162	10.8	25	171	11.4	30	122	8.1	23.6	27	1.8	17.3
Not monitored / Infrequently monitored	13	0.9	2	60	4	9.3	49	3.3	8.6	17	1.1	3.3	1	0.1	0.6
Prolonged abnormal monitoring with no action taken	19	1.3	2.9	64	4.3	9.9	68	4.5	11.9	34	2.3	6.6	7	0.5	4.5

Appendix 4: Recommendations from Saving Mothers triennial report 2017-2019

The recommendations assume that **every** site conducts **morbidity and mortality review** meetings, where **minutes** are kept, **actions** assigned to individuals and there is **feedback** at subsequent meetings to hold individuals to **account**.

Summary of crucial recommendations

- Contraception services need to expand to include postpartum IUCD insertion and LARCs; and ensuring contraceptive availability at all facilities caring for women and at high risk medical clinics.
- Set up an expert group to recommend on improving management of early pregnancy and its complications: miscarriage and ectopic management, early pregnancy counselling service and access to safe TOP, earlier initiation of antenatal care after pregnancy diagnosis, screening for mental health issues and identifying women at risk of suicide.
- 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.
- Establish On-site Midwife run Birthing Units (OMBUs) at all large district, regional and tertiary hospitals (conducting large numbers of births for women with no risk factors).
- Establish a Safe Labour criteria and evaluation programme like the Safe Caesarean Delivery (surgery and anaesthesia) programme and maintain focus on the Safe CD programme.
- Implement the updated PMTCT protocol for better HIV management and TB detection.
- 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 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.
- Ensure functional communication channels exist for consultation with and referral to higher levels of care e.g. by using the "Vula App".
- Prior to discharge from a ward and facility, specific criteria must be met and documented.

The following poster summarises the crucial recommendations according to the 5 Hs (priority conditions), essential health system pillars and key interventions along the continuum of care.

Poster of key Recommendations from Saving Mothers triennial report 2017-2019

	What Focal areas for interventions 5Hs	How Pillars necessary for quality Care 3 Pillars	When & Where Interventions along continuum of care All phases (3Cs) Phase	Interventions at health care facilities
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.	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 	Pre-pregnancy <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
	2. Obstetric Haemorrhage			First Half Pregnancy <ul style="list-style-type: none"> • 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 Mx, early pregnancy counselling service and access to safe TOP, earlier initiation ANC after pregnancy diagnosis, screening mental health and identifying women at risk suicide
	3. Hypertensive disorders in pregnancy	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	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 	Pregnancy and Childbirth <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
	4. Heart and other M&S conditions	3. Appropriately resources 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		Postnatal – Mother <ul style="list-style-type: none"> • 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
	5. First Half pregnancy			





National Department of Health
Dr AB Xuma Building
1112 Voortrekker Road
PRETORIA Town lands 351-JR
0001
Switchboard: 012 395 8000

