Saving Mothers and Babies 2017-2019: Executive Summary

Final report the effect of the first wave of Covid-19 on use of maternal and reproductive health services and maternal and perinatal deaths in South Africa

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Abbreviations

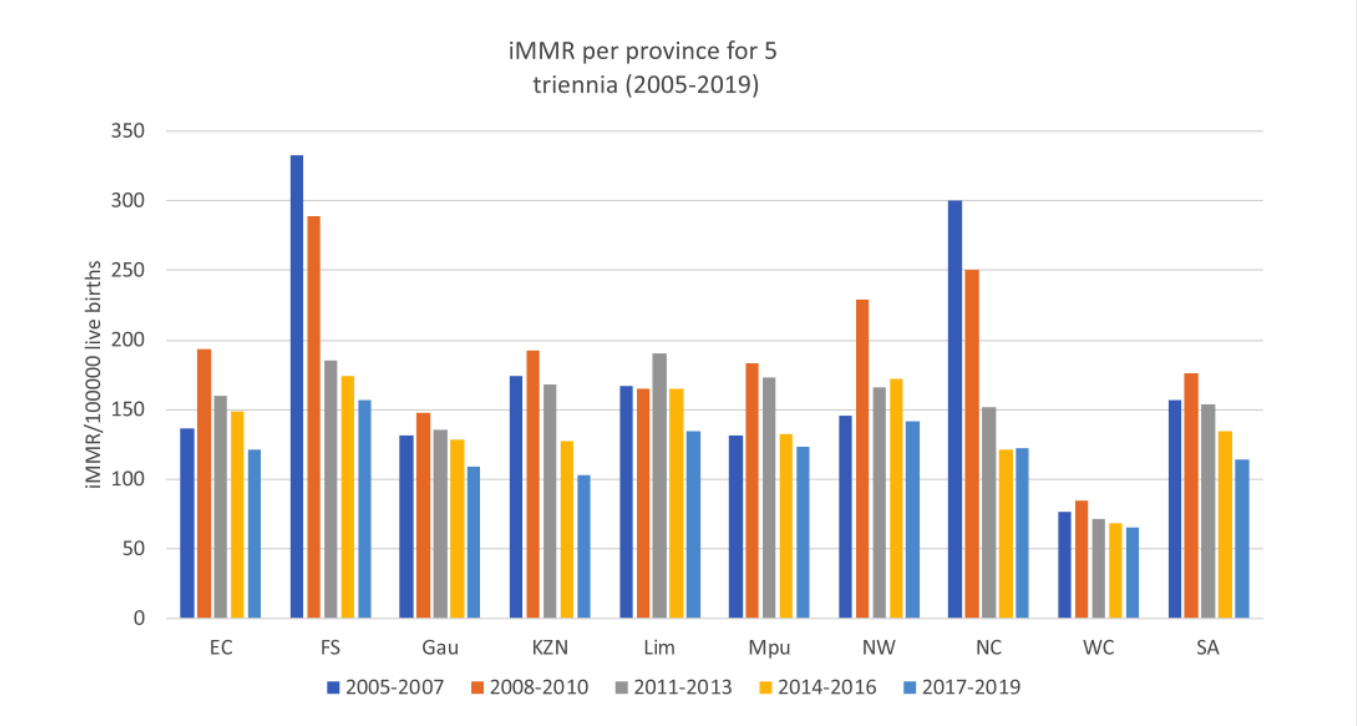
AR	Anaesthetic related
ART	Antiretroviral Therapy
BBA	Born before arrival
BMI	Body mass index
BP	Blood pressure
CD	Caesarean Delivery
CHC	Community Health Centre
CHW	Community health worker
CLEVER	Clinical care; Labour ward management; Eliminate barriers; Verify care; EOST on auto pilot; Respectful care
Clinic	Primary health care clinic
DCST	District Clinical Specialist Teams
DH	District hospital
DHIS	District health information system
ENNDR	Early Neonatal Death Rate
EC	Eastern Cape province
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 province
GP	Gauteng Province
HHAPI_NeSS	Quality improvement program: Improve Health System, train Health workers, reduce deaths from Asphyxia, Prematurity and Infection, Neonatal Survival Strategy
HIV	Human immune deficiency virus
HPD	Hypertensive disorders in pregnancy
iMMR	In Facility Maternal Mortality Ratio
IUCD	Intrauterine contraceptive device
KZN	KwaZulu-Natal province
LARC	Long acting reversal contraception
LBWR	Low Birth Weight Rate
LP	Limpopo province
M&M	Morbidity and Mortality meetings
M&S	Medical and Surgical conditions
MP	Mpumalanga province
MVA	Manual vacuum aspiration
NaPeMMCo	National Perinatal Morbidity and Mortality Committee
NC	Northern Cape province
NCCEMD	National Committee for Confidential Enquiries into Maternal Deaths
NHC	National central hospital
NPRI	Non-pregnancy related infections
NW	North West province
OH	Obstetric haemorrhage
OMBU	On-site Midwife run Birthing Unit
PHC	Primary health care
PPIP	Perinatal Problem Identification Programme
PMTCT	Prevention of Mother-to-Child Transmission
PNMR	Perinatal Mortality Rate
PPE	Personnel Protective Equipment
PPH	Postpartum haemorrhage
PRS	Pregnancy related sepsis
RH	Regional Hospital

SBR	Stillbirth Rate
TB	Tuberculosis
TH	Tertiary hospital
TOP	Termination of pregnancy
WBOT	Ward based outreach teams
WC	Western Cape province

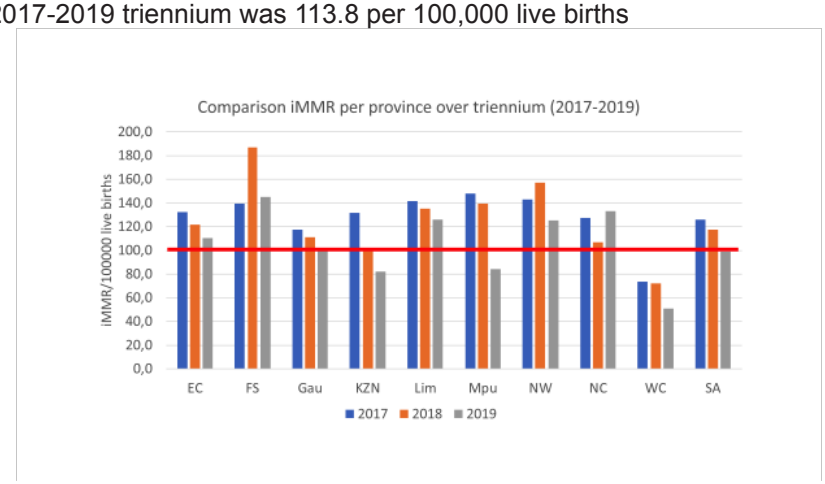
Findings NCCEMD

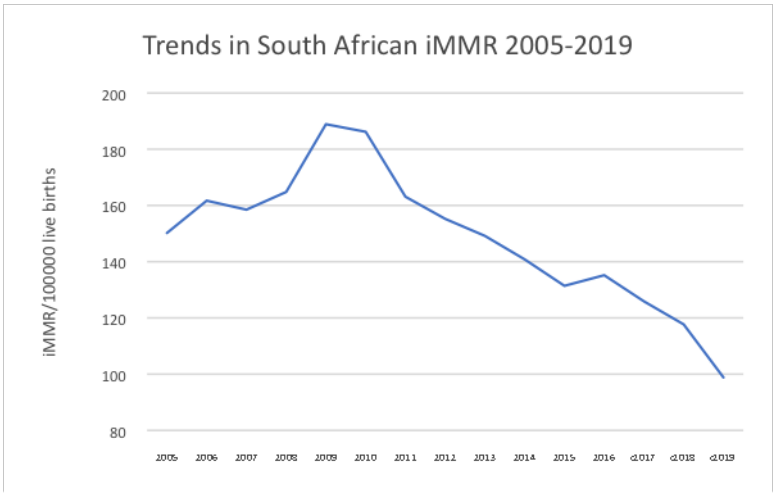
1. There has been a progressive and sustained reduction in maternal mortality in the last decade

a. In all provinces,



b. In all major underlying causes of maternal death except M&S and early pregnancy conditions,
c. The iMMR was below 100 per100,000 live births in 2019 for the first time ever recorded by the NCCEMD. The MMR estimated by the DHS in 1998 was 150/100000 live births.
d. The iMMR for the 2017-2019 triennium was 113.8 per 100,000 live births





2. The top 4 underlying causes are the top 4 in all provinces, but in varying order. They are NPRI, HPD, OH and M&S. M&S has emerged as a major underlying cause of mortality as the other conditions have decreased in frequency.

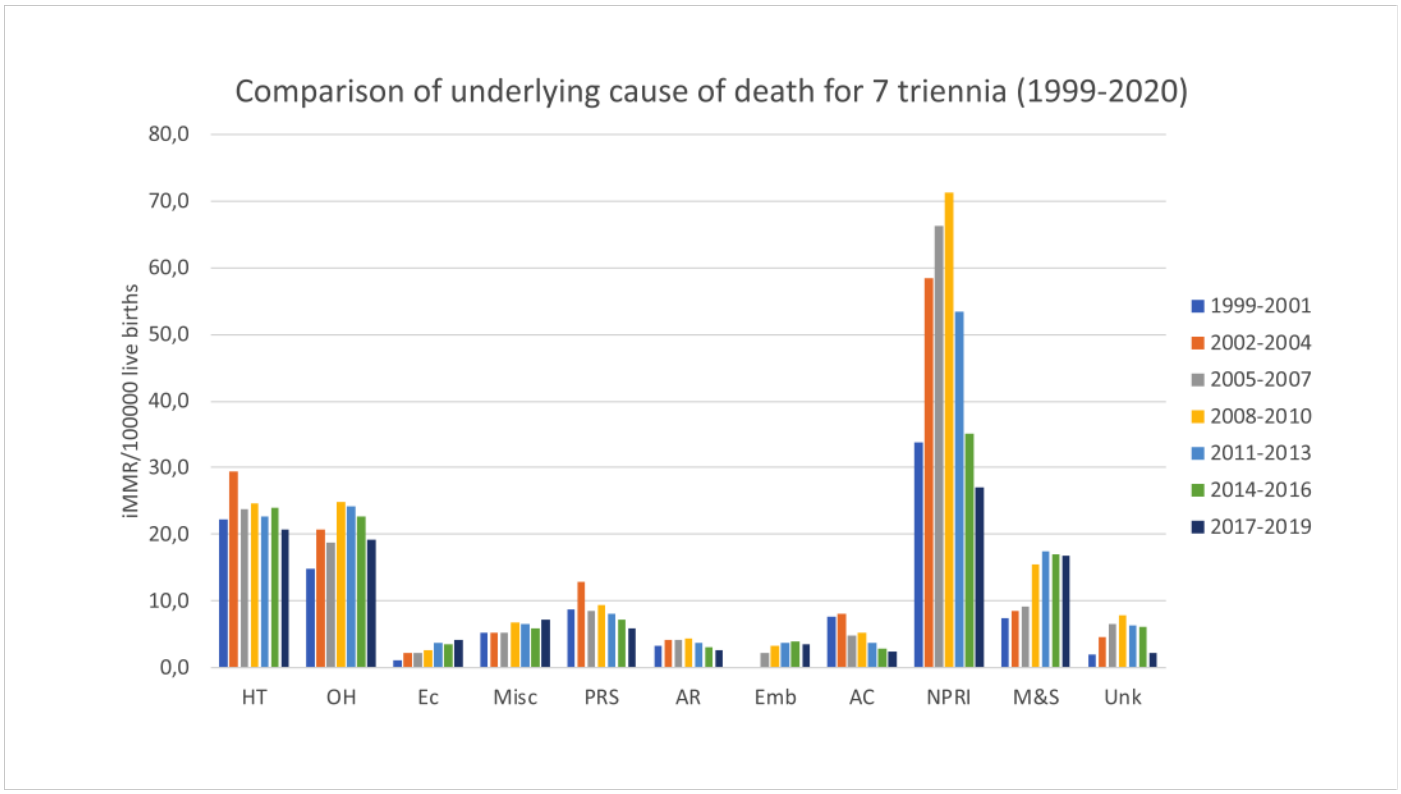
Primary obstetric problems	Eastern Cape	Free State	Gauteng (corrected)	KwaZu-lu-Natal	Limpopo (Corrected)	Mpuma-langa	North West	Northern Cape	Western Cape	South Africa
Medical and surgical disorders	19,02	20,00	17,45	19,78	14,25	13,05	20,07	12,54	11,82	16,91
Non-pregnancy-related infections	29,02	25,00	25,65	27,72	34,52	25,68	33,26	23,52	16,55	27,05
Ectopic pregnancy	1,61	4,29	4,43	3,72	5,94	6,32	6,31	4,70	2,03	4,19
Miscarriage	3,87	15,00	7,80	6,76	6,65	13,05	9,17	7,84	1,01	7,18
Pregnancy-related sepsis	6,45	9,29	6,22	5,24	6,52	4,21	8,03	0,00	5,74	5,99
Obstetric haemorrhage	22,89	31,43	16,28	12,34	28,61	26,95	22,93	26,65	7,09	19,11
Hypertensive disorders of pregnancy	20,96	40,00	22,27	13,35	23,12	23,58	32,68	29,79	8,44	20,73
Anaesthetic complications	2,58	6,43	1,76	3,21	2,88	3,37	1,72	4,70	1,69	2,72
Adverse drug reactions	1,61	0,00	0,85	0,68	1,84	0,00	0,57	0,00	1,01	0,89
Embolism	5,16	2,14	2,04	2,37	5,36	4,21	2,29	9,41	5,40	3,60
Acute collapse - cause unknown	4,51	0,71	3,08	2,37	2,62	1,26	2,87	0,00	1,69	2,53
Miscellaneous	0,64	0,00	0,79	0,17	1,27	0,00	1,15	1,57	1,69	0,74
Unknown - in facility	2,90	2,86	0,91	5,41	0,54	1,26	0,57	1,57	1,01	2,14

Key

	Most common
	2nd most common
	3rd most common
	4th most common

3. There are some problems with the way cause of death were classified with suicide being place under M&S, adverse drug reactions or coincidental. This may have masked the extent of the problem which is perceived as increasing.

4. Early pregnancy deaths (miscarriage and ectopic are together the 5th most common cause but have increased steadily over the triennia, thus are an emerging issue.



5. The provinces that are mainly rural have the highest number of conditions with iMMR 15% above the national average (NW 7/10; FS 6/10; MP 5/10; LP, NC 4/10; EC 3/10; KZ 2/10; GP, WC 1/10).

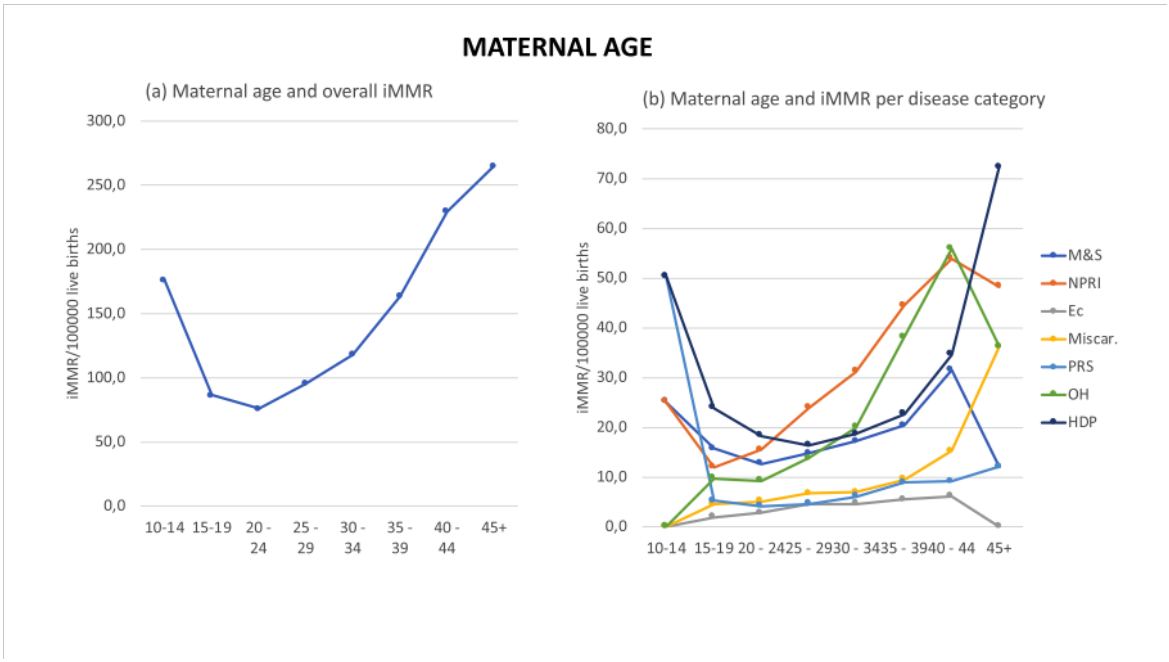
Table. iMMR of underlying conditions per province and their relationship to South Africa's iMMRs.

Primary obstetric problems	Eastern Cape	Free State	Gauteng (adjusted)	KwaZulu-Natal	Limpopo (adjusted)	Mpuma-langa	North West	Northern Cape	Western Cape
M&S	19,02	20,00	17,45	19,78	14,25	13,05	20,07	12,54	11,82
NPRI	29,02	25,00	25,65	27,72	34,52	25,68	33,26	23,52	16,55
Ec	1,61	4,29	4,43	3,72	5,94	6,32	6,31	4,70	2,03
Misc	3,87	15,00	7,80	6,76	6,65	13,05	9,17	7,84	1,01
PRS	6,45	9,29	6,22	5,24	6,52	4,21	8,03	0,00	5,74
OH	22,89	31,43	16,28	12,34	28,61	26,95	22,93	26,65	7,09
HDP	20,96	40,00	22,27	13,35	23,12	23,58	32,68	29,79	8,44
AR	2,58	6,43	1,76	3,21	2,88	3,37	1,72	4,70	1,69
Emb	5,16	2,14	2,04	2,37	5,36	4,21	2,29	9,41	5,40
AC	4,51	0,71	3,08	2,37	2,62	1,26	2,87	0,00	1,69

Key

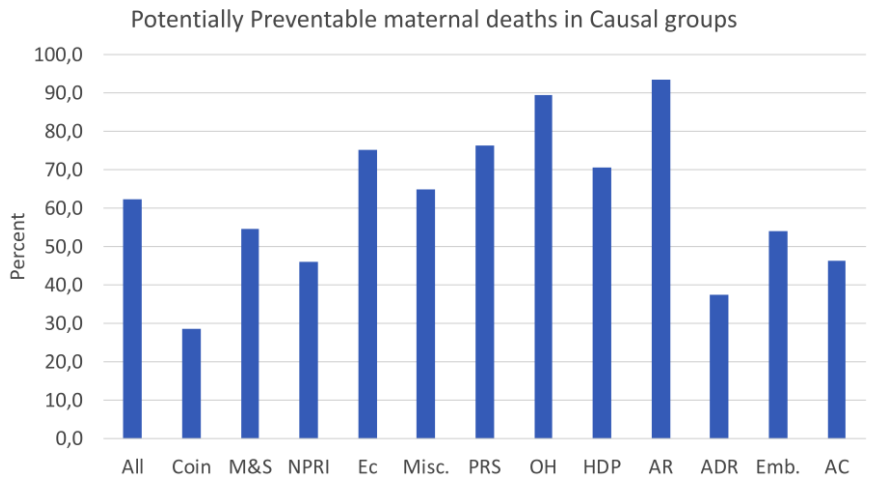
Primary obstetric problems	South Africa	<15% Below SA	>15% Above SA
Medical and surgical disorders (M&S)	16,91	14,4	19,4
Non-pregnancy-related infections (NPRI)	27,05	23,0	31,1
Ectopic pregnancy (Ec)	4,19	3,6	4,8
Miscarriage (Misc.)	7,18	6,1	8,3
Pregnancy-related sepsis (PRS)	5,99	5,1	6,9
Obstetric haemorrhage (OH)	19,11	16,2	22,0
Hypertensive disorders of pregnancy (HDP)	20,73	17,6	23,8
Anaesthetic complications (AR)	2,72	2,3	3,1
Embolism (Emb)	3,60	3,1	4,1
Acute collapse - cause unknown (AC)	2,53	2,2	2,9

6. The extremes of age have the highest iMMR, especially for HDP.



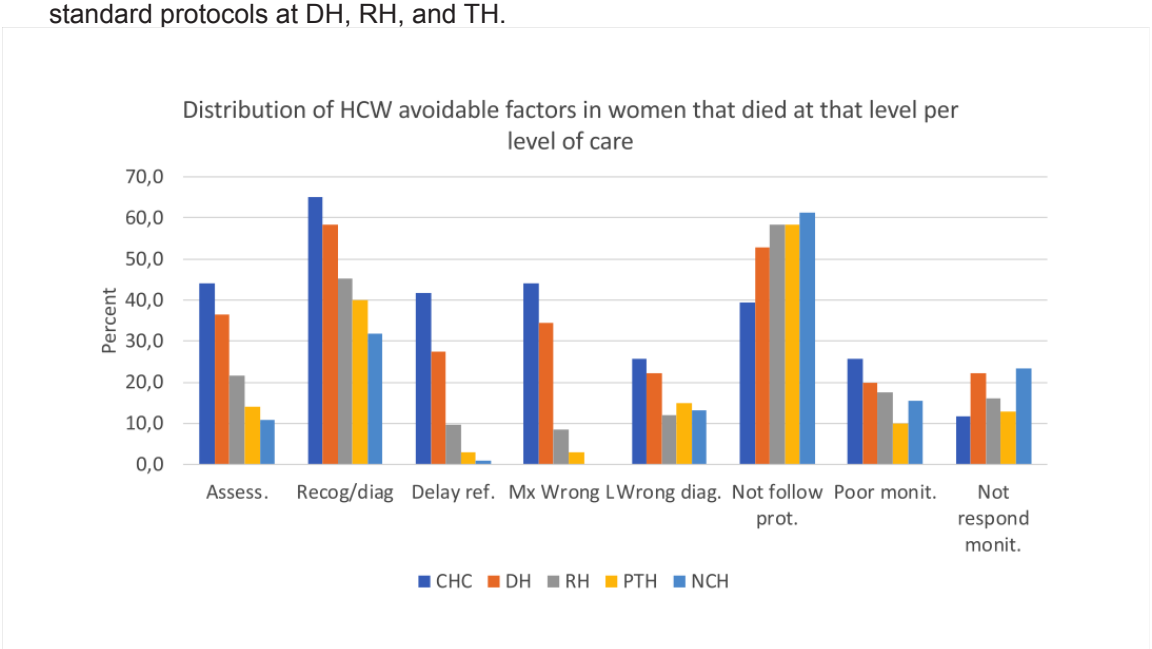
7. The majority of pregnant women who were HIV positive died despite being on ART; 18% of HIV positive deaths were not on treatment and 73.1% were on FDC. We are now moving on from problems of not testing for HIV or not starting ART, to a problem of ART failure, which we need to learn how to manage better.
8. There has been an marked increase of CDs. The CD rate is now 28.1% in the public sector. However, CD Case Fatality rate has declined in all provinces excepting the Free State.
9. CD has a 3 times higher mortality than vaginal delivery.
10. Prolonged labour and induced labour were not important associated factors. Previous CD is a significant associated factor for OH deaths.
11. Anaemia remains a major associated factor especially for NPRI, PRS, OH, and AR deaths.

12. 72.2% of women who died attended antenatal care but only 54% before 20 week's gestation. The vast majority of women who died due to M&S, HDP and NPRI attended antenatal clinics, indicating that there are quality of care issues during antenatal care.
13. Emergency referral appears not to be a problem from CHCs or district hospitals. 46.8% women who died were managed at some point at CHC with 2. 9% dying there (referral problems 1%); from DH 51.4% managed and 25.3% dying (referral problems 8%); regional hospitals 41.8% managed and 33.6% dying (referral problems 27%); 34.5% managed and died at tertiary level. Referral problems mean problems in women who died at that level either with referring the woman or delay in receiving the woman. However, individual case review of OH cases suggests otherwise; several patients waited a long time for an ambulance and died on the way or shortly after arrival at a RH/TH. This suggests a possible problem in how cases ae assessed.
14. 61% of women who died had an anaesthetic, 0.08% of the total women who had anaesthesia had it at CHCs, 24,9% DH, 35,4% RH, 19,2% PTH, 14,0% at NCH, 6,4% private hospitals.
15. Overall, 62.4% maternal deaths were potentially preventable; the major underlying conditions causing preventable deaths were anaesthetic related 93.3%, OH 89.5%, PRS 76.4%, Ectopic pregnancy 75.2%, HDP 70.6% miscarriage 64,9%. This is unchanged from previous years.



NB: 62.4% deaths in SA were potentially preventable

16. The major community orientated avoidable factors were delay seeking help, transport problems from home to health facility, lack of antenatal care, and unsafe abortion for those dying of miscarriage. This is unchanged from previous years.
17. Major administrative factors included lack of appropriately trained staff (skills shortage) doctors (20.5% of deaths), nurses (13.7% of deaths); OH, AR, Ectopic pregnancy and HDP were the conditions most affected.
18. Community avoidable (AF) and Administrative AF were similar across all levels of care; but medical care management at site of death was worst at DH where 80% were managed poorly, then at CHC and RH, where 60% were managed poorly. Treatment prior to referral was poor for 55% from DH, 50% from RH and 40% from CHC.
19. Major medical care problems were assessment and recognition of problems at CHC and DH; and not following standard protocols at DH, RH, and TH.

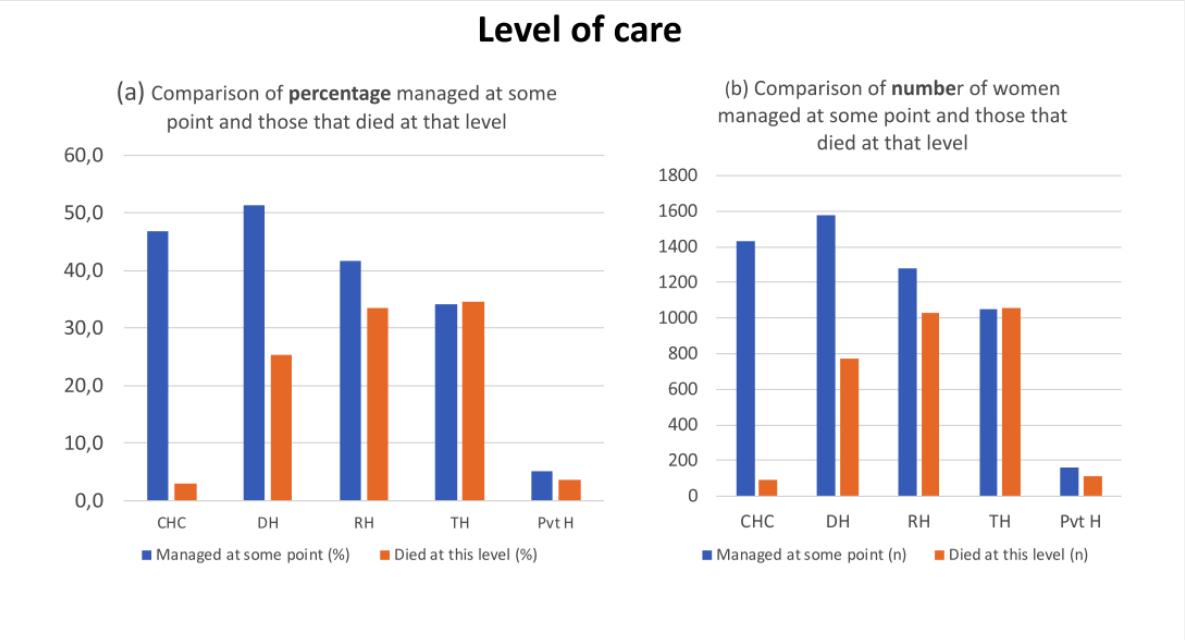


20. Inadequate assessments: (a) after vaginal delivery meant women transferred out shocked to postnatal ward; (b)

after CD discharged from theatre with abnormal vital signs and (c) discharged home from postnatal wards with tachycardia. “Sign-outs” from a),b), and c) often done by junior staff or not done at all.

21. On average

    a. A Clinic/CHC will see a woman who subsequently dies 0,5 times/year i.e. in 2 years the clinic/CHC will see one woman who subsequently dies; the database does not distinguish between a PHC clinic or CHC.
    b. A CHC will see a woman who subsequently dies 2 times/year i.e. in 6 months the CHC will see one woman who subsequently dies; this figure is where on assumes all cases seen at clinics were at CHCs.
    c. A district hospital will see a woman who subsequently dies, 1.7 times/year i.e. in 7 months the DH will see one woman who subsequently dies; this figure is less than CHCs because the DH do far more deliveries than CHCs and also CHCs can refer straight to a RH or TH.
    d. A regional hospital will see a woman who subsequently dies 4 times/year i.e. in 3 months the RH will see one woman who subsequently dies;
    e. A tertiary hospital will see a woman who subsequently dies 15 times/year i.e. in 3 weeks the TH will see one woman who subsequently dies;
    f. This frequency reduces dramatically at all levels, for each condition like HDP, OH, M&S and NPRI.



22. Overall the Clinics/CHCs and DH clinicians very rarely see severely sick pregnant women and at the clinics, when they do, the care is poor, this is especially the case where the woman dies at the DH. If the woman is referred, not surprisingly, the problem is detected better than those who die at the DH. At the RH and Tertiary levels, the overwhelming problem is not sticking to standard protocols; this could be due to poor clinical practices and / or overburdened services.
23. Lack of skills are most apparent at DH and CHC. A probable explanation is that the events are so rare and managed in the context of all the other cases seen at the primary level, thus HCWs may not recognise the problem at the CHC or DH, or assess it properly. Thus, we need to stratify the primary level, so that each pregnant woman will be reviewed antenatally by a skilled clinician at least once in the pregnancy at PHC (next level of expertise). This would be best done at the 30 week (28-34 week) visit.
24. 94% of PHC clinics conducting births (all clinics reporting a birth: n=870) do less than 1 delivery a month, 63% of CHC (all CHC: n= 257) do less than 1 delivery per day, 65% of DH do less than 5 deliveries per day (All DH: n=243). Skills cannot be maintained at these levels of delivery, especially at clinics and CHCs.
25. iMMR of preventable and non-preventable deaths have declined in each triennium.

Recommendations NCCEMD

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 expanded 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.

Conclusions NCCEMD

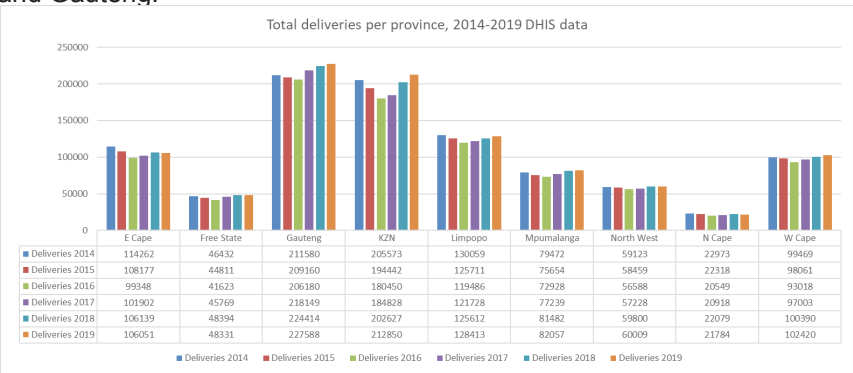
There has been a sustained, continual reduction in mortality, however this is no time for complacency. The clinicians and managers make the same errors as before, only less often. The drop in maternal mortality has exposed medical and surgical conditions now as a major cause of maternal death. This coupled with problems associated with non-pregnancy related infections and hypertensive disorders of pregnancy highlight the necessity of improving antenatal care at the primary care level. As shown above, at primary level there are too few skills to go around necessitating reorganisation of antenatal care at primary level to include a review of all pregnant women once during the third trimester of pregnancy and an in-house referral system for women who develop a risk factor by the most skilled midwife or primary care doctor. Further, there is an epidemic of caesarean deliveries and improving labour management by instituting on-site midwife run birthing units (OMBU), instituting the Safe Caesarean Delivery programme, developing a Safe Labour programme and rationalising birthing sites will control this problem. There has been a continual increase in early pregnancy maternal deaths and an expert group needs to devise methods of improving management early pregnancy:- miscarriage and ectopic diagnosis and management, early pregnancy counselling service and access to safe termination of pregnancy, earlier initiation of antenatal care after pregnancy diagnosis, mental health screening and identifying women at risk of suicide.

Unfortunately, the advent of the Covid-19 pandemic will test the health system enormously and make it difficult to maintain the gains made. We must be on our guard to ensure the key essential services still run efficiently.

		What	How	When & Where	
		Focal areas for interventions	Pillars necessary for quality Care	Interventions along continuum of care	
		5Hs	5 Pillars	Phase	Interventions at health care facilities
Mortality and morbidity reviews, minutes, actions, accountability and feedback	NCCEMD	1. HIV 2. Obstetric Haemorrhage 3. Hypertensive disorders in pregnancy 4. Heart and other M&S conditions 5. First Half pregnancy	1. Appropriately resources and accessible 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 2. Functional inter-facility consultation and 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 Out-reach from Regional hospitals or telephonic, or IT/Virtual linkages for advice in antenatal clinics and in emergency situations. Wi-fi in all facilities 3. 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 emergen-cy drills essential to maintain skills 4. Quality Care 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 5. Community 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 wom-en for social grants, and food parcels. Integration of Home affairs departments in delivery facilities enables immediate issuing of birth certificates and access to grants	1. Pre-pregnancy 2. First Half Preg-nancy 3. Pregnancy and Childbirth 4. Postnatal - Mother 5. Postnatal care - neonate	Pre-pregnancy • 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 • Pre-pregnancy high risk clinics Pregnancy Early pregnancy focus • 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 Antenatal care Follow-up antenatal care • 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 • Introduce new intrapartum care guidelines (CLEVER) • Training in Safe CD and anaesthesia Postnatal care mother • 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

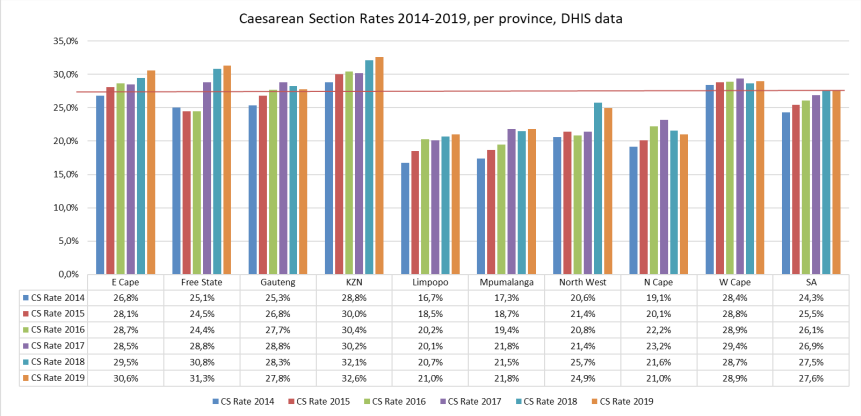
Main findings 2017-2019 NaPeMMCo

1. There was an increase in deliveries in almost every province over the three years, with the sharpest increase in KZN and Gauteng.



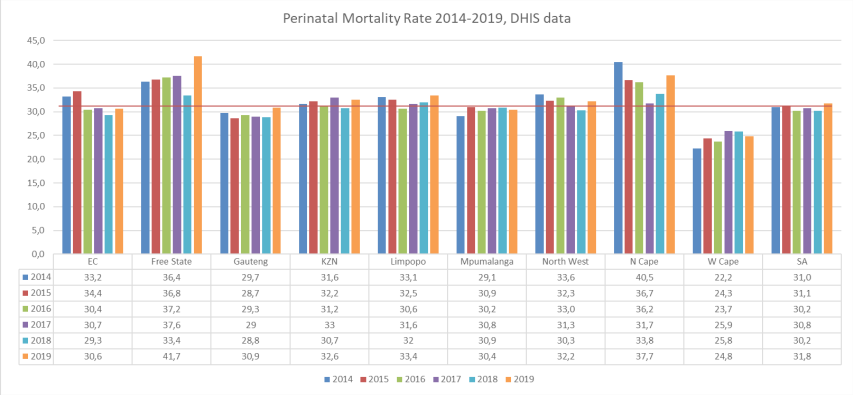
	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape
Deliveries 2014	114262	46432	211580	205573	130059	79472	59123	22973	99469
Deliveries 2015	108177	44811	209160	194442	125711	75654	58459	22318	98061
Deliveries 2016	99348	41623	206180	180450	119486	72928	56588	20549	93018
Deliveries 2017	101902	45769	218149	184828	121728	77239	57228	20918	97003
Deliveries 2018	106139	48394	224414	202627	125612	81482	59800	22079	100390
Deliveries 2019	106051	48331	227588	212850	128413	82057	60009	21784	102420

2. The national CD rate was 27.6%. The CD rate increased in every province except Northern Cape, while the Western Cape's CD rate remained virtually unchanged.



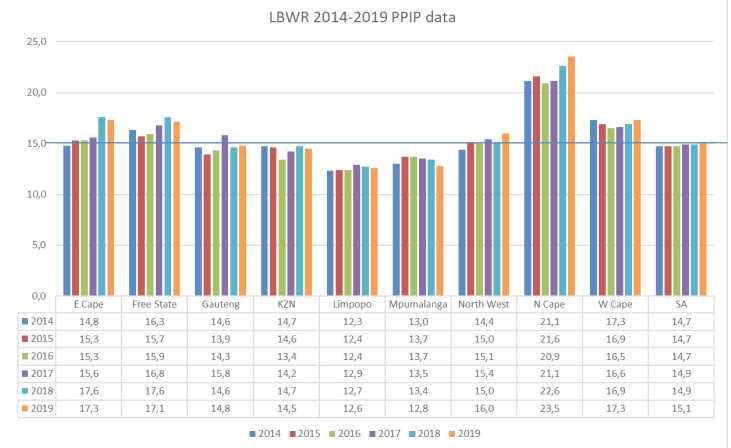
	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
CS Rate 2014	26,8%	25,1%	25,3%	28,8%	16,7%	17,3%	20,6%	19,1%	28,4%	24,3%
CS Rate 2015	28,1%	24,5%	26,8%	30,0%	18,5%	18,7%	21,4%	20,1%	28,8%	25,5%
CS Rate 2016	28,7%	24,4%	27,7%	30,4%	20,2%	19,4%	20,8%	22,2%	28,9%	26,1%
CS Rate 2017	28,5%	28,8%	28,8%	30,2%	20,1%	21,8%	21,4%	23,2%	29,4%	26,9%
CS Rate 2018	29,5%	30,8%	28,3%	32,1%	20,7%	21,5%	25,7%	21,6%	28,7%	27,5%
CS Rate 2019	30,6%	31,3%	27,8%	32,6%	21,0%	21,8%	24,9%	21,0%	28,9%	27,6%

3. The perinatal mortality rate for South Africa, as recorded on the DHIS, was unchanged from the previous triennium at 30.9 per 1000 total deliveries (all weights).



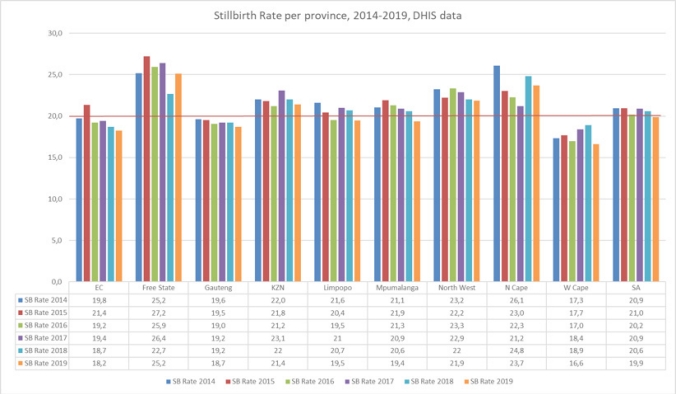
	EC	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
2014	33,2	36,4	29,7	31,6	33,1	29,1	33,6	40,5	22,2	31,0
2015	34,4	36,8	28,7	32,2	32,5	30,9	32,3	36,7	24,3	31,1
2016	30,4	37,2	29,3	31,2	30,6	30,2	33,0	36,2	23,7	30,2
2017	30,7	37,6	29	33	31,6	30,8	31,3	31,7	25,9	30,8
2018	29,3	33,4	28,8	30,7	32	30,9	30,3	33,8	25,8	30,2
2019	30,6	41,7	30,9	32,6	33,4	30,4	32,2	37,7	24,8	31,8

4. The Northern Cape has the highest percentage of low birth weight babies, with the national LBWR average at 15%.



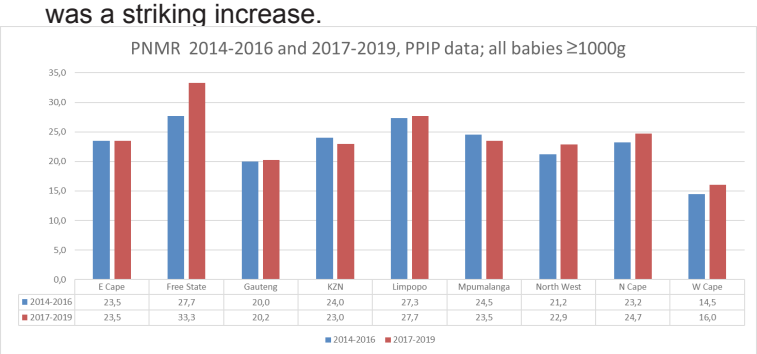
	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
2014	14,8	16,3	14,6	14,7	12,3	13,0	14,4	21,1	17,3	14,7
2015	15,3	15,7	13,9	14,6	12,4	13,7	15,0	21,6	16,9	14,7
2016	15,3	15,9	14,3	13,4	12,4	13,7	15,1	20,9	16,5	14,7
2017	15,6	16,8	15,8	14,2	12,9	13,5	15,4	21,1	16,6	14,9
2018	17,6	17,6	14,6	14,7	12,7	13,4	15,0	22,6	16,9	14,9
2019	17,3	17,1	14,8	14,5	12,6	12,8	16,0	23,5	17,3	15,1

5. The stillbirth rate is very gradually declining for most provinces. The national SBR is 20/1000. The highest SBR is in Free State and Northern Cape.



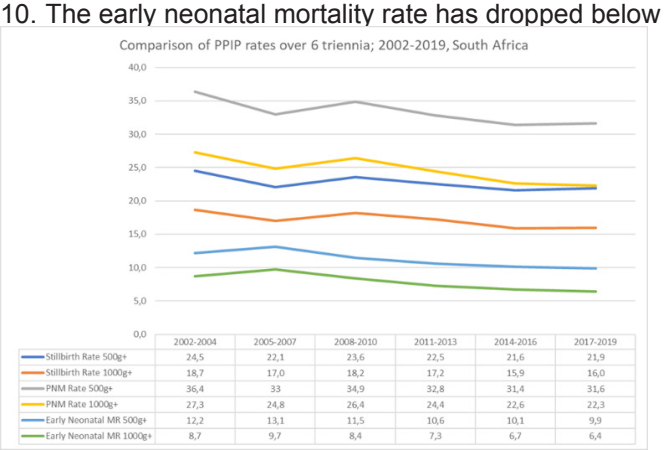
	EC	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape	SA
SB Rate 2014	19,8	25,2	19,6	22,0	21,6	21,1	23,2	26,1	17,3	20,9
SB Rate 2015	21,4	27,2	19,5	21,8	20,4	21,9	22,2	23,0	17,7	21,0
SB Rate 2016	19,2	25,9	19,0	21,2	19,5	21,3	23,3	22,3	17,0	20,2
SB Rate 2017	19,4	26,4	19,2	23,1	21	20,9	22,9	21,2	18,4	20,9
SB Rate 2018	18,7	22,7	19,2	22	20,7	20,6	22	24,8	18,9	20,6
SB Rate 2019	18,2	25,2	18,7	21,4	19,5	19,4	21,9	23,7	16,6	19,9

6. The main obstetric cause of death in babies ≥500g was spontaneous preterm labour, and in the ≥1000g category, the main cause of death was unexplained intra-uterine death.
7. In the group ≥1000g, 16.4% of babies died due to intra-partum asphyxia, which is an indicator of poor intra-partum care. When analysing the deaths of term babies (≥2500g) only, hypoxia remains the leading cause of neonatal deaths (60.9%).
8. The PNMR stayed mostly constant from the 2014-2016 triennium in all provinces except Free State, where there was a striking increase.



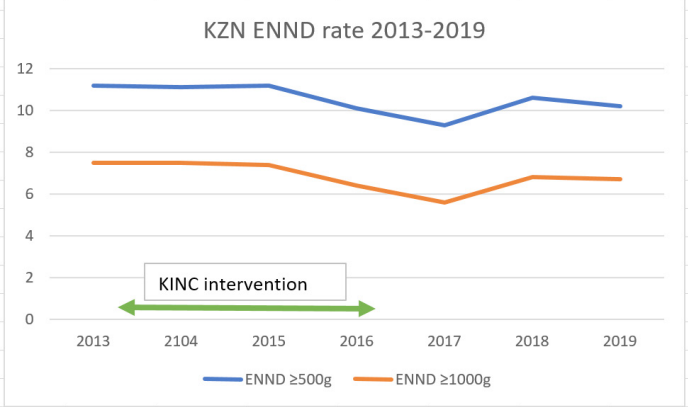
	E Cape	Free State	Gauteng	KZN	Limpopo	Mpumalanga	North West	N Cape	W Cape
2014-2016	23,5	27,7	20,0	24,0	27,3	24,5	21,2	23,2	14,5
2017-2019	23,5	33,3	20,2	23,0	27,7	23,5	22,9	24,7	16,0

9. There is a continued gradual decline in PNMR at every level of care over the last 5 triennia except National Central hospitals, where there was an increase in deaths.
10. The early neonatal mortality rate has dropped below 10/1000 for the first time in the 2017-2019 triennium.



	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
Stillbirth Rate 500g+	24,5	22,1	23,6	22,5	21,6	21,9
Stillbirth Rate 1000g+	18,7	17,0	18,2	17,2	15,9	16,0
PNM Rate 500g+	36,4	33	34,9	32,8	31,4	31,6
PNM Rate 1000g+	27,3	24,8	26,4	24,4	22,6	22,3
Early Neonatal MR 500g+	12,2	13,1	11,5	10,6	10,1	9,9
Early Neonatal MR 1000g+	8,7	9,7	8,4	7,3	6,7	6,4

11. The decrease in the perinatal mortality rate is mostly due to a decrease in the number of reported stillbirths.
12. The biggest gaps between PPIP and DHIS data remain in Gauteng (42%) and KZN (35%). This implies that more than one third of deaths in these provinces are not discussed at M&M meetings.
13. The ENNDR in KZN declined after the KINC intervention (data from PPIP):



13. The PNMR for babies ≥1000g is 22.8/1000 and the Neonatal Death Rate (≥1000g for first 28 days of life) is 8.8/1000.

14. The SBR for ≥1000g is 16.2. This is unchanged from the previous triennium.

AIMS

All provinces should aim for a Stillbirth Rate (≥1000g) of <15/1000 by 2030.
All provinces should aim for a Neonatal Death Rate (≥1000g) of <8/1000 by 2030
All provinces should have regular Morbidity and Mortality meetings that are entered in to the PPIP database so that at least 90% of deaths are discussed and entered.

Current status (red- below target, green above target, orange on track for 2030):

Province	Current status SBR ≥1000g	Current status NND ≥1000g	Current status PPIP (percentage of deaths entered)
Eastern Cape	16.7	10	82.7%
Free State	23.7	12.8	70.6%
Gauteng	14.6	7.2	57.6%
KZN	16.7	8.2	78.9%
Limpopo	17.6	13.8	74.7%
Mpumalanga	15.8	8.8	98.8%
North West	17.6	9.7	88.2%
Northern Cape	19	6.6	64.4%
Western cape	12.4	4.2	97.4%

NaPeMMCo Recommendations from the data

1. The KZN Initiative for Newborn Care model of funding has shown clear improvement in quality of care in new-borns and is recommended as a way to provide scale-up across the country.
2. Reduction of asphyxia deaths: continue with roll-out of HBB training. Add neonatal resuscitation drill (EOST) to ESMOE training.
3. Continue with HHAPI-NeSS strategy to address Asphyxia, Prematurity and Infection
4. Ensure functioning PPIP software at all delivery units with structures in place for M&M meetings and entering of data.
5. Implement Umbiflow as a means to decrease late stillbirths.
6. Focus on intrapartum care training to reduce birth asphyxia.
7. Investigate the high LBWR in N Cape and W Cape.
8. Free State appears to be the province with the biggest need for intervention e.g. KINC model.
9. The sudden increase in deaths at Central Hospitals needs to be interrogated to see if it is clinically significant and important. It could reflect appropriate referral of vulnerable babies to more specialised levels of care.
10. The annual increase in deliveries will place additional burden on birthing facilities; this must be taken in consideration for planning purposes.

Summary of findings of Rapid Report on effect of Covid-19 on use of maternal services and on maternal and perinatal mortality

Data was collected from DHIS and the NCCEMD for January to June 2019 and 2020. A comparison was made between data on service utilisation and outcomes for 2020 and 2019 to determine trends for 2020, particularly from April. National, provincial and district data are presented.

Antenatal visits

- There was a marked reduction in antenatal first visits in South Africa for April 2020 compared to 2019. This corresponded to the introduction of stage 5 lockdown restrictions. However, this was a temporary effect with return to similar numbers by June 2020.
- All province showed this pattern, except for the E Cape which persisted with reduced antenatal first visits in June 2020.
- All districts had a reduction in April which are particularly marked for some of the large metros; Johannesburg, eThekwini and Cape Town. The majority of districts show 'recovery' in May and June 2020 but this did not occur in OR Tambo, Mangaung, and Frances Baard; and to a lesser extent in Cape Town and Johannesburg.

Contraception visits

- Nationally, visits by women for contraception were less in April and May 2020 compared to April and May 2019 but similar in June 2020.
- In all provinces, except Northern Cape, there was a notable reduction in visits for contraception in April 2020, followed by a slight recovery in May and similar numbers for June 2020, compared to 2019 levels. Mpumalanga has had a marked reduction in contraception visits for January to May 2020, but this improved markedly in June.
- Considering depoprovera visits as a proxy for contraception visits, most districts followed the provincial trends, with lesser visits in April and May 2020 compared to 2019, but becoming similar in June 2020; this was particularly marked for Cape Town. However, the following districts remained with lesser numbers of visits in June: OR Tambo and Nelson Mandela bay in E Cape and eThekwini in KwaZulu-Natal.

Termination of Pregnancy Services

- Nationally there has been a significant drop in numbers of TOPs performed when lockdown level 5 started in April 2020, which remained reduced in May and June 2020, when compared with June 2019
- There was provincial variation with Free State, Gauteng, Limpopo, North West and N. Cape 'recovering' to 2019 levels in June 2020, whereas for E.Cape, KwaZulu-Natal, Mpumulanga and W. Cape number of TOPs remained reduced in June 2020 compared to 2019.
- The districts where the numbers of TOPs declined most and remained lower in June 2020 compared to 2019 were: Nelson Mandela Bay (EC), Lejweleputswa (FS), eThekwini (KZN), Vhembe (LIM), Gert Sibande (MPU) and Cape town (WC).

Facility Births

- There was an increase in facility live births in 2020 for each month from January to June 2020 compared to 2019, with the smallest increase in April 2020.
- Comparing provinces, there has been a marked reduction in births in KwaZulu-Natal from March to June 2020, and Eastern Cape in June 2020; otherwise the number of births in facilities has remained fairly constant. Limpopo and Mpumalanga has had consistently more births per month in 2020 compared to 2019.
- In most districts, live births have not fluctuated much between years. However, compared to 2019, there was an increase in facility live births in all districts in Limpopo and Ehlanzeni in Mpumulanga for Jan to June 2020; Oliver Tambo in May; and Fezile Daba and Johannesburg in June. Decreases were noted in Nelson Mandela Bay, K.Kaunda and Tshwane in May and June; and from March to June in eThekwini. W. Cape showed a marked decrease in April but returned to similar numbers in June 2020 compared to 2019

Maternal mortality

- At a national level, there has been a marked increase in numbers of maternal deaths in June 2020 compared to 2019, minimal change in April and a slight reduction in May 2020.

- The national iMMR increased slightly in the second quarter of 2020 (April to June) compared to 2019. This was most marked for W Cape, Limpopo, Gauteng and Eastern Cape, where it also increased compared to the first quarter (Jan to March) 2020. Mpumulanga and North West showed a rise in the second quarter 2020 compared to first quarter 2020; but not when compared to 2019.

Perinatal Mortality.

- The stillbirth rate has been fairly constant across the two years nationally and for most provinces. The only exceptions are Gauteng where it increased in May and June; and Mpumulanga which has shown a decline for April to June but this could be a reporting problem
- Nationally, the ENND rate has remained similar to the same period in 2019 Comparing ENND rates for provinces, Mpumulanga has shown an increase in April to June 2020, Free State showed a steep rise in April and reduction in May; and Northern Cape had a reduction in April and steep rise in May but both remaining lower in June 2020. Whether this reflects population movements between neighbouring provinces is uncertain.
- Nationally, there has been little change in numbers of perinatal deaths and perinatal mortality rate (PMNR) between 2019 and 2020
- Comparing provinces, the perinatal mortality rate was reduced in Mpumalanga and N. Cape in April 2020 compared to 2019 but nationally and for other provinces, there were no obvious trends in differences in perinatal mortality rates during 2020 compared to 2019.

Discussion and Conclusion.

There has been a major negative effect on women using antenatal care clinics and reproductive health (contraception and TOP) services since April 2020 when lockdown started. The pandemic and associated lockdown has caused an increase in maternal mortality rates in Western Cape, E Cape, Gauteng and Limpopo in the second quarter of 2020. The first three provinces have highest numbers of Covid 19 cases. However, it is unclear why there has been an increase in mortality in Limpopo, perhaps women have moved from Gauteng to Limpopo during lockdown. There is evidence of increase usage of clinics and services in Limpopo compared with 2019.

As yet there has been minimal impact on perinatal mortality. If home births and deaths were to be included and when data is available for July, when the pandemic was more advanced, additional effects are likely to be seen.

This rapid appraisal has identified some important trends and should be continued on a monthly basis through the duration of the Covid 19 pandemic

Recommendations

1. Health promotion messages must include and stress the importance of continued attendance at antenatal clinics and clinics for preventative services such as contraception and immunisation. MomConnect should also send out messages encouraging pregnant women to attend antenatal care.

2. Primary Health Care Clinics and Community Health Centres must continue to offer antenatal care, contraceptive, TOP, immunisation services and other primary care services.

3. Maternity units need to remain open despite Covid 19 infections. Thus, maternity units need adequate access to PPE and training of the staff on how to protect themselves. This must include behaviour at staff tea and lunches. Programmes to provide emotional support for staff in the maternity units should be introduced.

4. Clinicians must continue to keep updated with new developments in managing pregnant women and their babies with Covid-19. Protocols for managing pregnant women and their babies are regularly updated and available from the SAMRC/UP Maternal and Infant Health Care Strategies unit (matinfru@up.ac.za).

5. The rapid Covid-19 survey of pregnant women and their babies should be produced monthly to help with detecting new problems arising and improve planning.

Integrated recommendations for Saving Mothers and Babies (five 5s)

		What	How	When & Where	
	Committee	**Focal areas for interventions**	**Pillars necessary for quality Care**	**Interventions along continuum of care**	
				Phase	**Interventions**
Mortality and morbidity reviews, minutes, actions, accountability and feedback	NCCEMD	1. HIV 2. Obstetric Haemorrhage, 3. Hypertensive disorders in pregnancy, 4. Heart and other M&S conditions, 5. First Half pregnancy	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 and communication 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 and accessible 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 4. Community involvement 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 5. Quality care for all Establish minimum standards for safe maternity care/ safe care during labour including minimum staffing norms for safe care in labour. Adhere to criteria for safe discharge Respectful care at all levels	1. Pre-pregnancy 2. Pregnancy 3. Childbirth 4. Postnatal - mother 5. Postnatal - neonate	1. Contraception Pre-pregnancy evaluation 2. Antenatal care (early comprehensive First visit, TOP Review at 28-34 weeks; next level of expertise) 3. Effective intrapartum care, (OMBU Safe labour, CD and discharge) 4. Breastfeeding Comprehensive integrated 6 week visit 5. Integrated Neonatal care programme
	NaPeMMCo	1. Asphyxia, 2. prematurity, 3. Infection 4. Foetal growth restriction 5. Congenital infections			

Life course	Specific recommended interventions from NCCEMD/NaPeMMCo reports	Focus areas for implementation or improvement in quality of care, to reduce avoidable morbidity and mortality
Pre-pregnancy: • Preventing unplanned or unwanted pregnancies • Optimising HIV management	Access to adolescent and woman-friendly contraceptive services HIV- reduction of viral load before conception	Accessible contraception for high school students and tertiary education students Pre-conception counselling for previous serious pregnancy complications
Safe conception	Optimising chronic medical conditions, including minimising HIV viral load for the woman and her partner, controlling epilepsy with appropriate choice of drugs for pregnancy Folic acid supplementation to reduce risk of neural tube defects	Access to High Risk clinics for pre-conception counselling for women with medical or genetic conditions. Integration of family planning /contraception services into chronic medical follow-up clinics including HIV/ART clinics, cardiac clinics, diabetic clinics Folic acid supplementation as soon as contraception is stopped or a pregnancy is planned.
Early pregnancy (first half of pregnancy)	Pregnancy tests must be available at every clinic Access to ultrasound for early pregnancy bleeding MTOP available at every clinic Surgical and 2nd trimester TOP services available in every district	Early detection of pregnancy Access to free and safe TOP Skilled and prompt management of early pregnancy complications in casualty and gynae departments Early ANC booking with use of the new national DOH maternity case record, includes Mental health screening Appropriate identification and referral of high risk pregnancies Calcium, iron and folate supplementation for all pregnant women
First Booking visit	Promote early booking (community campaigns) BANC+ guidelines for effective antenatal care and appropriate referral Correct use of point-of-care testing (syphilis, HIV, Rh)	Booking before 20 weeks Prevention of anaemia (iron and folate supplementation) Calcium supplementation for all Vaccination (tettox, H1N1) Appropriate identification and referral for high risk pregnancies Mental health screen Ensure point of care rapid tests available to screen for syphilis in pregnancy, and that treatment with long-acting penicillin is given when screen positive
Antenatal care	Updated Maternity Care Guideline for effective antenatal care Establish next level of expertise referral system within PHC/MOU/CHC clinics Identification of women that may benefit from cerclage or progesterone to prevent premature labour Access to High Risk clinics at every level of care Create system where every pregnant woman is reviewed between 28-34 weeks by the most experienced staff member at the clinic.	Create system of first level referral for all PHC clinics and MOUs/CHC at those clinics Identify women at risk for preterm labour and supplement with progesterone where appropriate Manage medical conditions at specialist level Early identification of hypertensive disease. Discuss management of all pre-eclamptics with a specialist with appropriate referral Review of all pregnant women with most experienced staff member between 28-34 week's gestation
Labour and delivery	Correct use of partogram Implementation of IntraPartum Care Guideline Teaching on PPH (monograph) Access to aseptic techniques (handwashing, adequate supply of PPE etc) to do safe deliveries and reduce risk of nosocomial sepsis. Implementation of BMZ protocol (steroids)	Respectful care in labour: promote companionship in all labour wards. Correct use of intra-partum care guidelines to minimise unnecessary CD and birth asphyxia Safe CD Prevention of PPH Correct identification and management of PPH Infection prevention control measures in place to reduce maternal and new-born infection Steroids and referral for women at risk of imminent pre-term delivery
Immediate postpartum care	Use of the shock Index to recognise early bleeding Use of Early Warning Charts and special area for observation directly post delivery Training in HBB package Availability of LARCS at all delivery sites	Initiate breastfeeding Prevention of PPH Correct identification and management of PPH Management of the new born Care for the Small and Sick neonate Effective post-partum contraception Establish discharge checklist to be completed before discharge from labour ward and hospital
First weeks' post delivery	Implement Essential postnatal care package at all clinics Introduce Integrated Neonatal Care training package	6 days and 6 weeks post-delivery check-up for mother and baby Maintain breastfeeding

Final report the effect of the first wave of Covid-19 on use of maternal and reproductive health services and maternal and perinatal deaths in South Africa

Robert Pattinson, Sue Fawcus, Stefan Gebhardt, Ronelle Niit, Priya Soma-Pillay, Jack Moodley

Summary

Aim: To monitor the impact of the first wave of the Covid-19 pandemic on use of maternal and reproductive health services, and maternal and perinatal mortality.

Method: Data from the District Health Information System (DHIS) was used and 2020 data compared with 2019 as a control. The difference between 2020 and 2019 was used, a value that is positive indicates more cases in 2020 and negative indicates less cases in 2020. Visits for initiating antenatal care, termination of pregnancy services, contraceptive use and births in facilities were used to assess usage of maternal and reproductive health services; and number of maternal deaths to assess impact. Descriptive analysis of pregnant women who had delivered after having confirmed Covid-19 was performed from the NDoH/SAMRC/UP national monitoring database of Covid-19 in pregnancy, which deals only with public hospitals, was performed. PPIP data from Mpumalanga for the first two quarters of 2020 was analysed to assess impact on perinatal death. The first wave of Covid-19 infections had run though by the end of September 2020, so the first three quarters of 2020 are compared the same period in 2019. Lockdown was in effect for the second and third quarters.

Results: There were more births each month in facilities in 2020 than 2019 although there was a decline in lockdown stage 5. There was a marked movement of pregnant women to the more rural provinces and districts for delivery. Use of antenatal care as measured by the number starting antenatal care has held relatively steady, but with pregnant women attending clinics later than usual. Use of reproductive health services (contraceptive and termination of pregnancy services) declined markedly. There has been a marked increase in maternal deaths 30,0% (an excess of 132 maternal deaths) since lockdown started when compared with the same period in 2019. There have been 472 women reported who have delivered having had Covid-19 in the NDoH/SAMRC/UP database. Twenty-two maternal deaths (case fatality rate 4,7%) were recorded, and 13 stillbirths and 13 neonatal deaths (PNMR 55/1000 births). The caesarean delivery rate was 55%, prevalence of hypertensive disorders in pregnancy 14%, but spontaneous preterm labour only 3%. There has been a 20% increase in stillbirths in Mpumalanga after lockdown (second quarter 2020 when compared with the second quarter of 2019). The excess in stillbirths was due to hypertensive disorders of pregnancy and unexplained stillbirth.

Discussion: The NICD DOTCOV database recorded 1430 positive Covid-19 tests in pregnancy and 29 maternal deaths with Covid-19 by the middle of August. The NICD database combines both public and private testing, and approximately half of Covid-19 tests are done at private facilities. The NDoH/SAMRC/UP Covid-19 monitoring system has recorded 472 pregnant women in the public sector who had given birth and 22 maternal deaths reported till the 18th November 2020. Internationally the number of pregnant women with Covid-19 who die is low. The peak of excess maternal deaths was in June, which was before the peak in deaths due to Covid-19 and before the excess deaths peak projected by the SAMRC. It is very unlikely that the 132 deaths are all due to SARS-Cov-2 infection. The increase in stillbirths in Mpumalanga was from conditions that can be prevented by antenatal care.

Conclusion: There has been an increase of 30,0% in maternal deaths since lockdown started compared with the same period in 2019. Use of maternal services (in facility birth and antenatal care) has remained relatively steady, but use of reproductive health services has sharply declined since lockdown. It is very unlikely that the majority of excess maternal deaths are due to undiagnosed SARS-Cov-2 infection and much more likely that the deaths are due to the indirect effects of Covid-19 on maternal care services.

There has been two markedly different effects of Covid-19 on maternal care; the rural provinces experiencing increased pressure on their services due to pregnant women migrating from metropolitan areas back to their homes, increasing the burden on already under-resourced facilities; and metropolitan areas were inundated with severe Covid-19 specific conditions leading to an increased burden in these areas resulting in an inability to manage routine emergencies. The preparation for future responses will need to be targeted at solving these different issues.

Recommendations: The underlying causes of the of maternal deaths should be established as soon as possible.
In the meantime, it is essential to prepare for further waves or infections by:

- Ensuring basic maternal and reproductive health services remain open and functioning
- Ensuring adequate means of transport to and between health care facilities
- Ensuring health care providers are adequately protected with PPE and are provided with emotional support
- Ensuring health care facilities provide adequate protection for pregnant women attending routine services
- Ensuring pregnant women know they should still attend for antenatal care
- Ensuring women in the reproductive age know that they should still attend for contraception and TOP services. Consideration should be given to promoting long acting reversible contraceptives as they would obviate the need to visit the clinics regularly.

In the near future efforts must be made to make the primary health care clinics and maternity health facilities more resilient to health crises. This will have to include ensuring the rural facilities are better equipped to manage an influx of patients from outside their areas and metropolitan areas. Further, intensive care facilities in metropolitan areas will need to be increased to manage severe disease resulting from the epidemic. The expansion of numbers of community health workers announced in the mid-term budget could assist in CHWs not only doing Covid-19 related work, but also encouraging women in reproductive health age group to attend for maternal and reproductive health care.

Introduction

South Africa has a routine data system (the District Health Information System - DHIS) that collects data on the usage and outcome of the various services on offer in the public sector. Further, as the seriousness of the Covid-19 pandemic became apparent to the world, extra data systems were created to monitor the impact on the services, its impact on mortality and to describe the disease in a South African context. Guidelines were developed for screening and managing pregnant women for Covid-19 and guidelines for maternity staff for use of personal protective equipment (PPE) and health care messages for pregnant women were distributed.

Robertson et al.[1], had warned of between 8,3% - 38,6% per month potential increase in maternal mortality for low- and middle-income countries if routine and emergency services were not maintained by the health system or used by pregnant women. This report examines the usage of maternal services and the impact on mortality for the first quarter of the year, before Covid-19 lockdown, and the next two quarters after Covid-19 lockdown and when the first wave of the pandemic peaked in South Africa. The first wave of SARS-CoV-2 infections had ended by the end of September, and the lessons learnt from the first wave have been summarised for future use.

Method

Data from the DHIS was used and 2020 data compared with 2019 as a control. The difference between 2020 and 2019 was used, a value that is positive indicates more cases in 2020 and negative indicates less cases in 2020. Visits for initiating antenatal care, termination of pregnancy services, contraceptive use and births in facilities were used to assess usage of maternal services and number of maternal deaths, stillbirth and early neonatal deaths used to assess impact.

Validated data was only available from the DHIS up to end September 2020. The causes of maternal or perinatal deaths are not recorded on the DHIS. However, the Perinatal Problem Identification Programme is run in all provinces with Mpumalanga having a set system of review every quarter. This data was used to assess the impact on perinatal deaths for the province and to give an indication of the impact for the country. Further a specific monitoring system was set up by the National Department of Health (Maternal Health division) and the SAMRC/UP Maternal and Infant Health Care Strategies Unit to assess the effect of Covid-19 on pregnancy. This monitoring system collected information on women who had confirmed Covid-19 disease in pregnancy and who delivered. Only data on women who delivered in public hospitals was collected.

Analysis of the DHIS stillbirth data for 2020 was compared with data recorded on the PPIP for two provinces (see Stillbirths: DHIS versus PPIP table in Appendix 1). In Mpumalanga the discrepancies between quarters in DHIS and PPIP had been more in DHIS by similar margins of between 25-33%, but in Q2 2020 there was a deficit between DHIS and PPIP of 252 (a change of about 300%. In Western Cape the discrepancy between quarters in DHIS and PPIP in 2019 was negative (usually around 15%), in Q2 2020 the deficit was double but in Q3 there was an massive excess (5-6 times the previous deficits) in the DHIS data. These two provinces have reputations of keeping accurate statistics, thus it appears there are problems in some of the DHIS data after lockdown. This is probably the situation in all provinces.

For this reason just the national data is given for perinatal deaths. The perinatal analysis will be performed later when the PPIP data becomes available for the third quarter. This will be reported separately.

Data is presented first for the country and then for the provinces and metropolitan areas and some large districts. Appendix 1 gives the tables from which the different graphs were derived. In the graphs that demonstrate differences, values above the redline indicate that there were more events in 2020 than 2019, and below the redline indicates there were less events in 2020 when compared with 2019.

1 Timothy Roberton, Emily D Carter, Victoria B Chou, Angela R Stegmuller, Bianca D Jackson, Yvonne Tam, Talata Sawadogo-Lewis, Neff Walker. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. Lancet Glob Health 2020 Published Online May 12, 2020 https://doi.org/10.1016/S2214-109X(20)30229-1

Results

National data per month

Figure 1. In-facility births

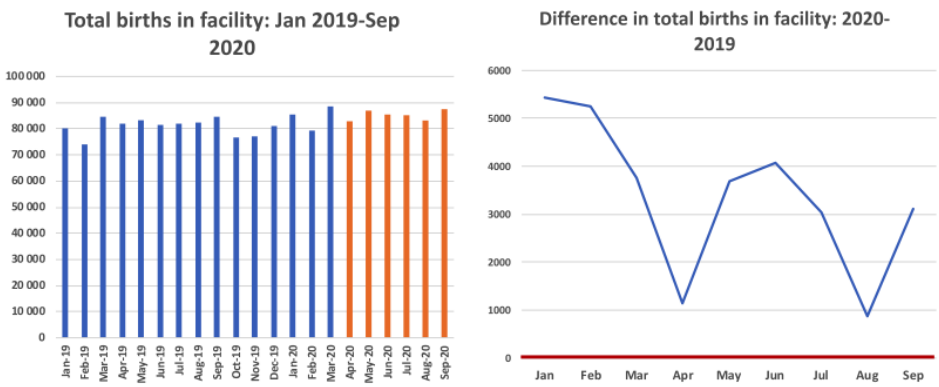


Figure 1 illustrate the births in facilities in 2019 and 2020 and the difference between each month of 2020 per month compared with 2019. There were more in-facility births per month in 2020 than 2019 but a sharp decrease in April when lockdown stage 5 was in place which has not recovered to pre-lockdown levels.

Figure 2. Difference in Antenatal care first visits: 2020-2019

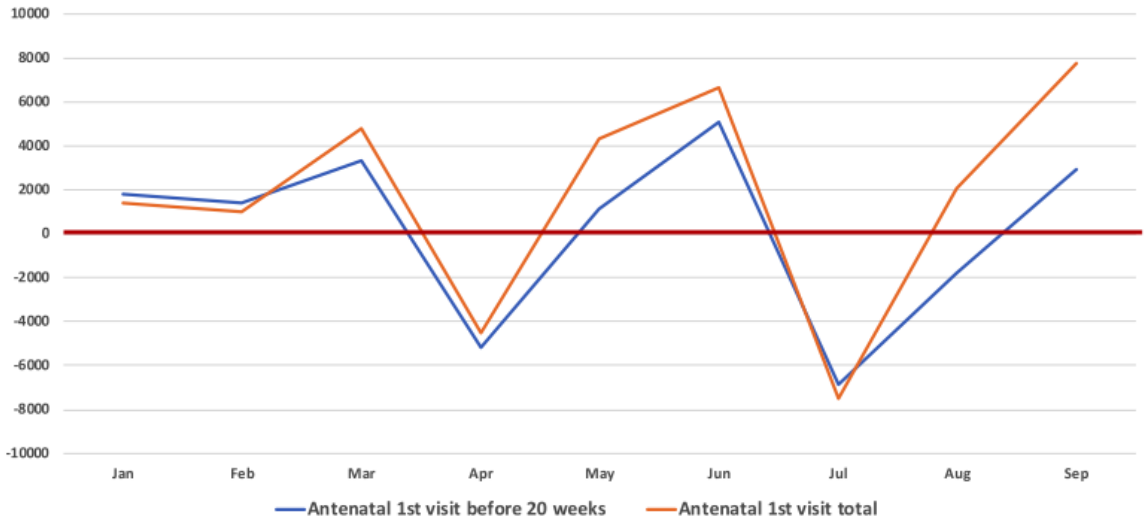


Figure 2 shows the difference in visits for initiation of antenatal care between 2020 and 2019. There was a considerable dip when lockdown started (in April) and a recovery in May and June, but a severe decline for July when the magnitude of the pandemic became apparent in South Africa.

Figure 3. Contraceptive use

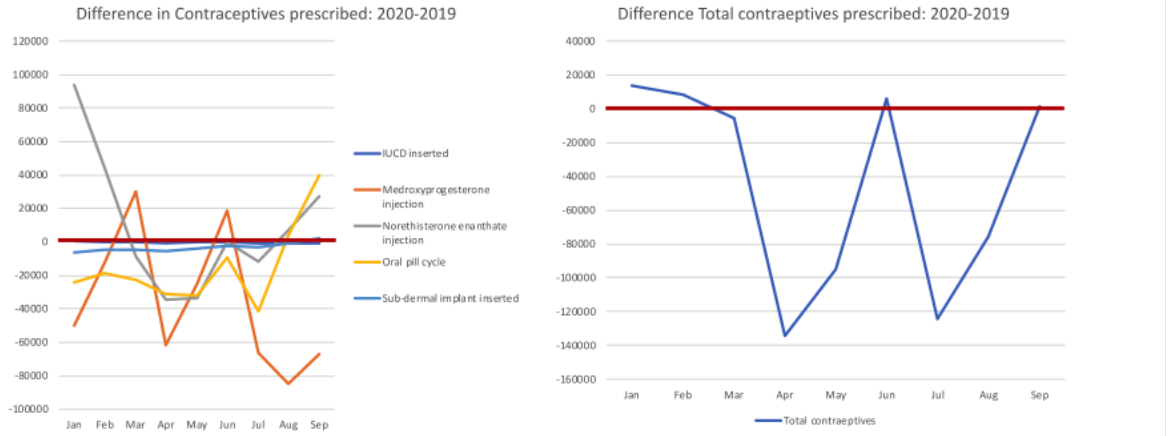


Figure 3 shows the difference in numbers of visits for contraceptives between 2020 and 2019. There has been a considerable reduction in contraceptive usage after lockdown.

Figure 4. Termination of pregnancy

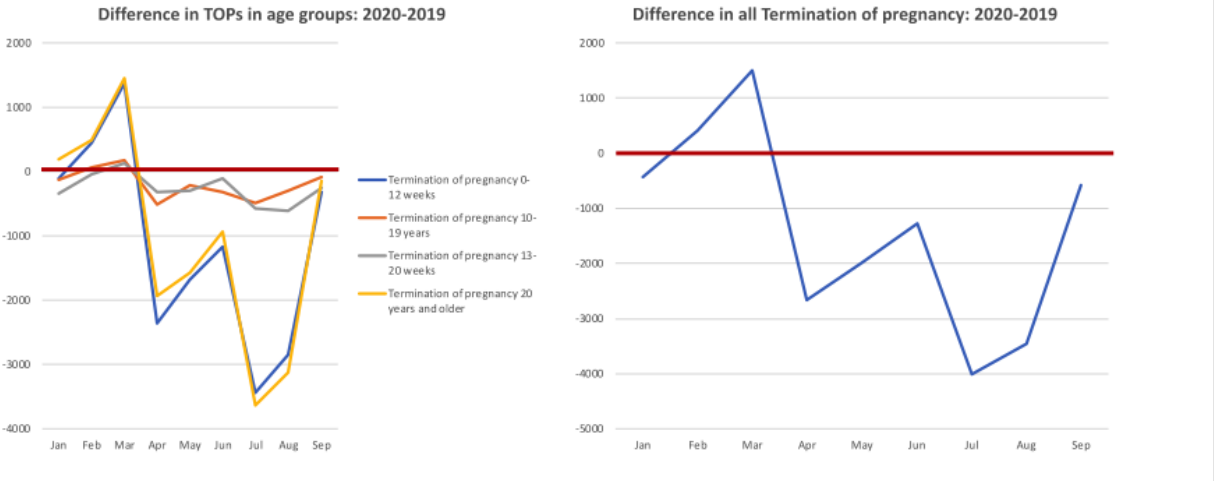


Figure 4 gives the usage of services for termination of pregnancy. There has been a steady decline in the use of these services.

Table 1 shows the difference between the number of maternal deaths before and after lockdown and the difference between 2020 and 2019. 2019 was the first year since the confidential enquiries in maternal deaths started in 1998 that the institutional Maternal Mortality Ratio (iMMR) fell below 100/100000 live births. This trend in the reduction of maternal deaths continued in the first quarter of 2020 with a 13% reduction in number compared with the first quarter of 2019.

Table 1. Maternal deaths before and after lockdown at end March

	Number	Difference
Total deaths Jan - Mar 2019	270	
Total deaths Jan - Mar 2020	235	-35
		-13,0%
Total deaths - April to Sep 2019	441	
Total deaths - April to Sep 2020	572	132
		30,0%

However, from lockdown stage 5 at the end of March and the Covid-19 surges in some provinces, from June to August, there has been a sharp increase of 30,0% in maternal deaths and the iMMR (Figure 5). Figure 6 illustrates the d difference in number of maternal deaths and iMMR per month.

Figure 5. Monthly iMMR: Jan 2019-Sept 2020

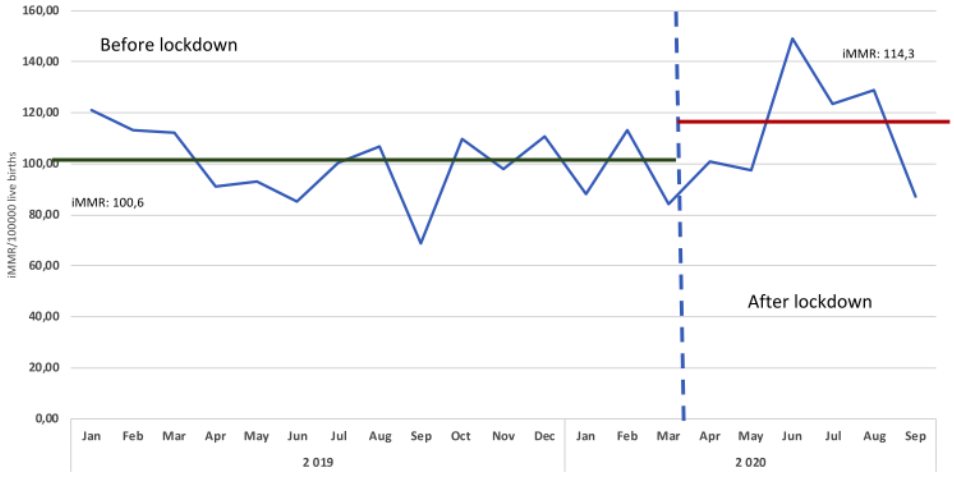
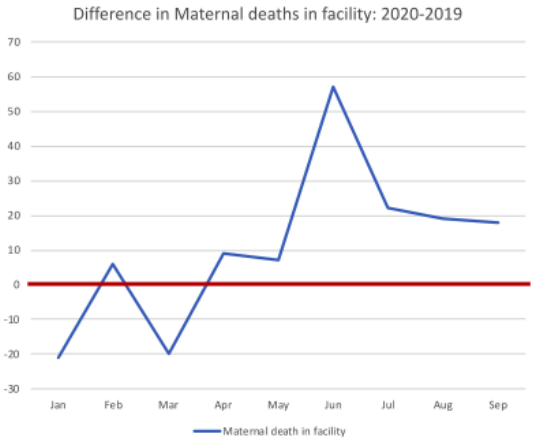
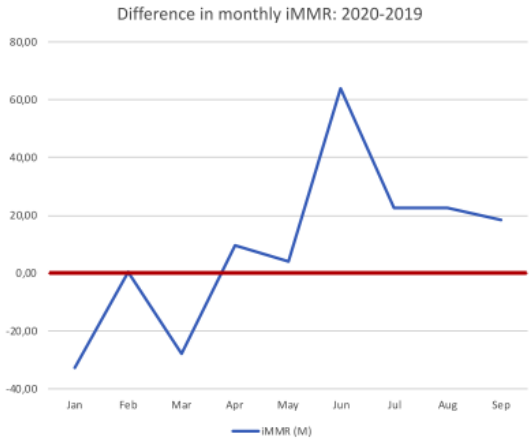


Figure 6. Maternal deaths: 132 extra deaths
Apr-Sep 2020-Apr-Sep 2019

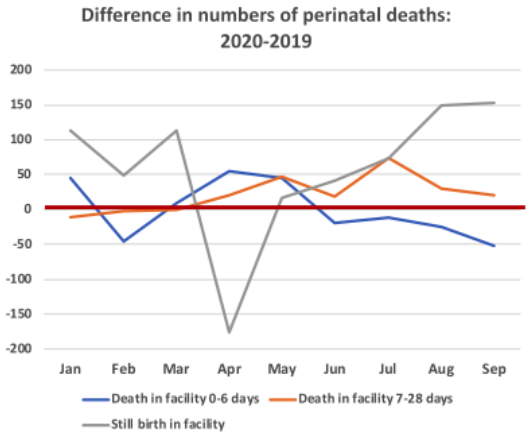




Perinatal indicators

Figure 7 illustrates the difference in perinatal mortality 2020-2019. There appears to be an increase in the stillbirth rate after lockdown. Note there is considerable concern over the accuracy of this data.

Figure 7. Perinatal indices



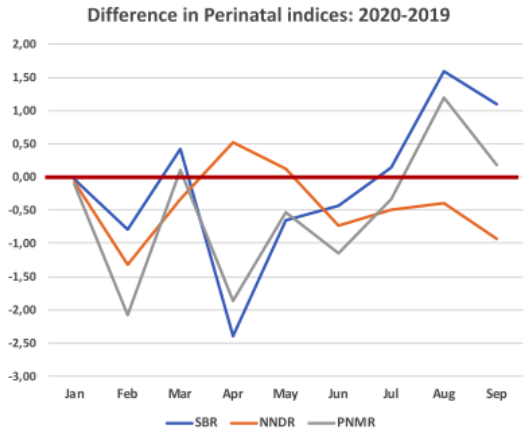


Table 2. Underlying causes perinatal deaths 1000g or more in Mpumalanga: Comparison of second quarter (Apr-Jun) 2020-2019 and first quarter (Jan-Mar) 2020-2019

	Apr-Jun 2020			Apr-Jun 2019		
	SB	ENND	PND	SB	ENND	PND
Antepartum haemorrhage	50	12	62	47	8	55
Fetal abnormality	13	16	29	11	18	29
Hypertensive disorders	73	14	87	57	19	76
Infections	1	0	1	4	0	4
Intrapartum asphyxia	46	46	92	33	53	86
Unexplained Intrauterine death	128	0	128	89	0	89
Intrauterine growth retardation	7	2	9	5	1	6
Maternal disease	3	0	3	4	1	5
Miscellaneous	1	0	1	3	1	4
No obstetric cause / Not applicable	0	3	3	0	4	4
Spontaneous preterm labour	3	32	35	5	39	44
Trauma	1	0	1	1	0	1
Total deaths	326	125	451	259	144	403
Total births	20150	19824	20150	19030	18771	19030
	Jan-Mar 2020			Jan-Mar 2019		
	SB	ENND	PND	SB	ENND	PND
Antepartum haemorrhage	62	13	75	47	17	64
Fetal abnormality	10	9	19	16	19	35
Hypertensive disorders	61	17	78	66	11	77
Infections	2	0	2	9	0	9
Intrapartum asphyxia	46	54	100	49	68	117
Unexplained Intrauterine death	119	0	119	105	0	105
Intrauterine growth retardation	3	2	5	10	0	10
Maternal disease	3	0	3	3	0	3
Miscellaneous	2	1	3	3	0	3
No obstetric cause / Not applicable	0	3	3	0	1	1
Spontaneous preterm labour	5	29	34	1	32	33
Trauma	0	0	0	0	0	0
Total deaths	313	128	441	309	148	457
Total births	20684	20371	20684	18898	18589	18898

Table 2 and 3 give the perinatal underlying causes and the perinatal indices for Mpumalanga in the first and second quarters for 2020 and 2019. The perinatal indices decreased in the first quarter of 2020 compared with 2019, but increased in the second quarter. Lockdown occurred at the start of the second quarter. The stillbirth rate in the second quarter of 2020 was 16,18/1000 births compared with 13,61/1000 births in 2019; an increase of 18,9%. This increase was mainly due to an increase of unexplained stillbirths and hypertensive disorders of pregnancy (HDP).

Table 3. Comparison of perinatal indices second quarter (Apr-Jun) 2020-2019 and first quarter (Jan-Mar) 2020-2019 in Mpumulanga

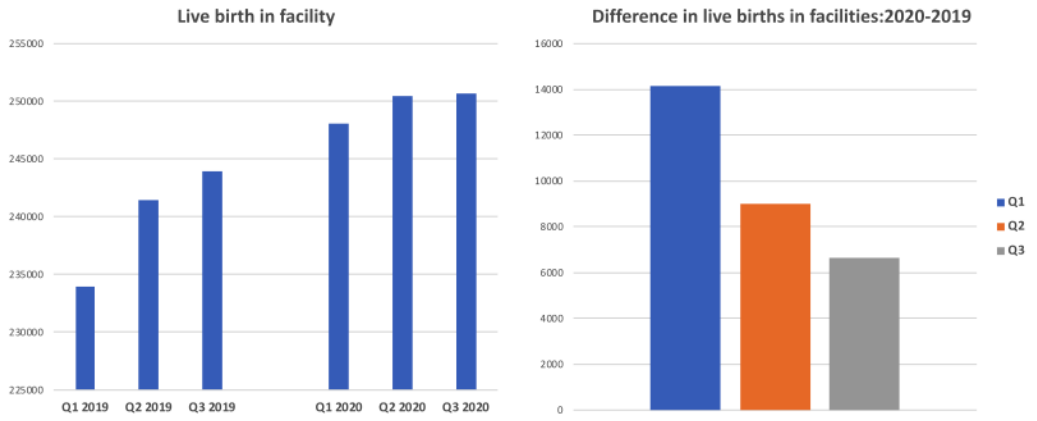
	Apr-Jun 2020 1000g+			Apr-Jun 2019 1000g+		
	SBR	ENNDR	PNMR	SBR	ENNDR	PNMR
Antepartum haemorrhage	2,48	0,61	3,08	2,47	0,43	2,89
Fetal abnormality	0,65	0,81	1,44	0,58	0,96	1,52
Hypertensive disorders	3,62	0,71	4,32	3,00	1,01	3,99
Infections	0,05	0,00	0,05	0,21	0,00	0,21
Intrapartum asphyxia	2,28	2,32	4,57	1,73	2,82	4,52
Unexplained Intrauterine death	6,35	0,00	6,35	4,68	0,00	4,68
Intrauterine growth retardation	0,35	0,10	0,45	0,26	0,05	0,32
Maternal disease	0,15	0,00	0,15	0,21	0,05	0,26
Miscellaneous	0,05	0,00	0,05	0,16	0,05	0,21
No obstetric cause / Not applicable	0,00	0,15	0,15	0,00	0,21	0,21
Spontaneous preterm labour	0,15	1,61	1,74	0,26	2,08	2,31
Trauma	0,05	0,00	0,05	0,05	0,00	0,05
All	16,18	6,31	22,38	13,61	7,67	21,18

	Jan-Mar 2020 1000g+			Jan-Mar 2019 1000g+		
	SBR	ENNDR	PNMR	SBR	ENNDR	PNMR
Antepartum haemorrhage	3,00	0,64	3,63	2,49	0,91	3,39
Fetal abnormality	0,48	0,44	0,92	0,85	1,02	1,85
Hypertensive disorders	2,95	0,83	3,77	3,49	0,59	4,07
Infections	0,10	0,00	0,10	0,48	0,00	0,48
Intrapartum asphyxia	2,22	2,65	4,83	2,59	3,66	6,19
Unexplained Intrauterine death	5,75	0,00	5,75	5,56	0,00	5,56
Intrauterine growth retardation	0,15	0,10	0,24	0,53	0,00	0,53
Maternal disease	0,15	0,00	0,15	0,16	0,00	0,16
Miscellaneous	0,10	0,05	0,15	0,16	0,00	0,16
No obstetric cause / Not applicable	0,00	0,15	0,15	0,00	0,05	0,05
Spontaneous preterm labour	0,24	1,42	1,64	0,05	1,72	1,75
Trauma	0,00	0,00	0,00	0,00	0,00	0,00
All	15,13	6,28	21,32	16,35	7,96	24,18

National Data per quarter

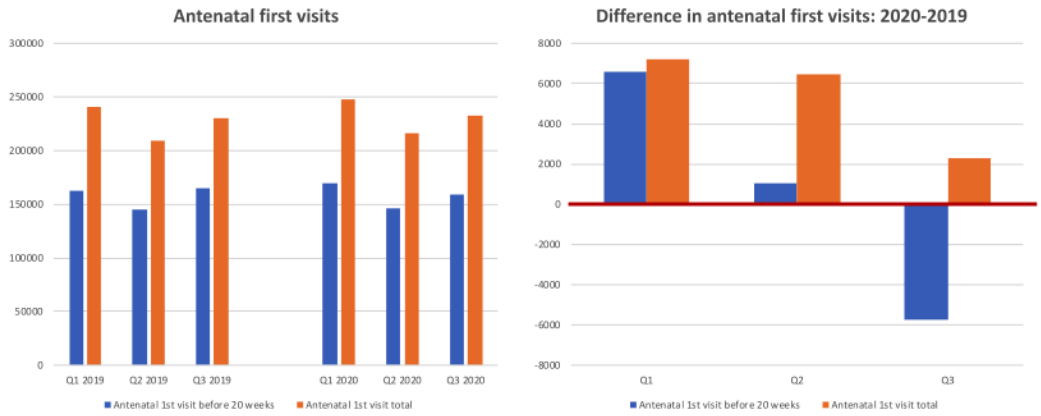
Figures 8-14 describe the national data per quarter. The trends can be seen more clearly per quarter. There has been an increase in live births in 2020 compared with 2019, but the increase was far less in the second and third quarters, (after lock down). It is possible that there was an increase in home births during this period, but data on this is not available. The provincial and metropolitan data shows that there has been a large migration back to rural areas during the pandemic. Perhaps this was due to unemployment and a wish to be close to one's family.

Figure 8. Live births in facility per quarter



Antenatal care first visit attendance increased per quarter, but it seems women were delaying their first visit as the first visits before 20 weeks' gestation were less than 2019 in Q3, and the number of increased visits were much smaller in Q2. However for all visits the numbers of visits were more than 2019, but the increase much less than 2019 in Q2 and Q3.

Figure 9. Antenatal Care



Visits for contraceptive services and termination of pregnancy dropped in both quarters after lockdown.

Figure 10. Contraceptive use

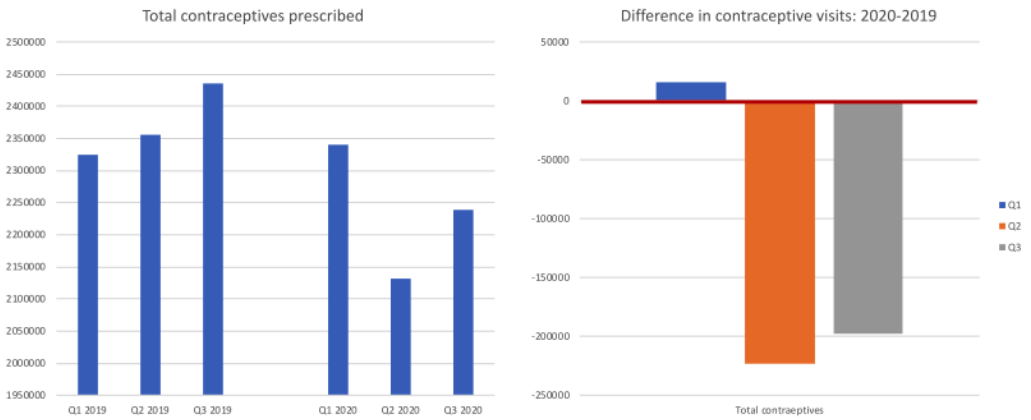
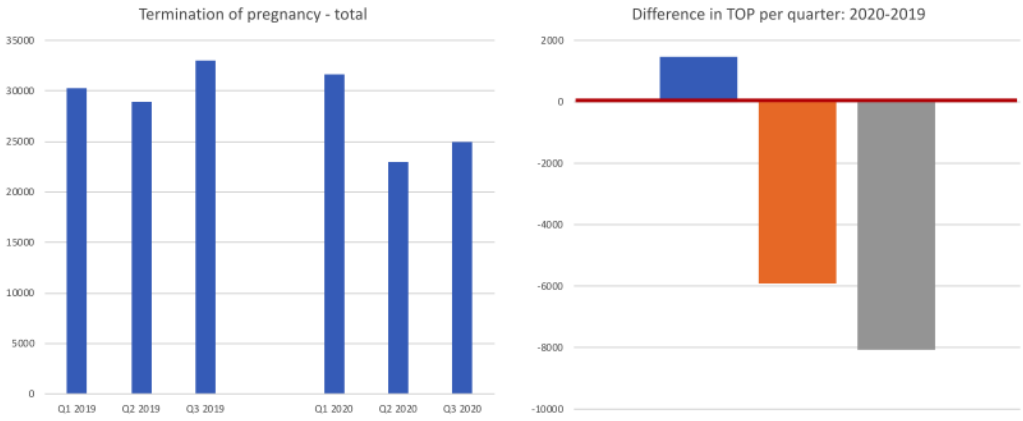


Figure 11. Termination of pregnancy



The number of maternal deaths increased for the second two quarters of 2020 after lockdown and during the peak of the first wave of the pandemic, as did the iMMR.

Figure 12. Maternal deaths

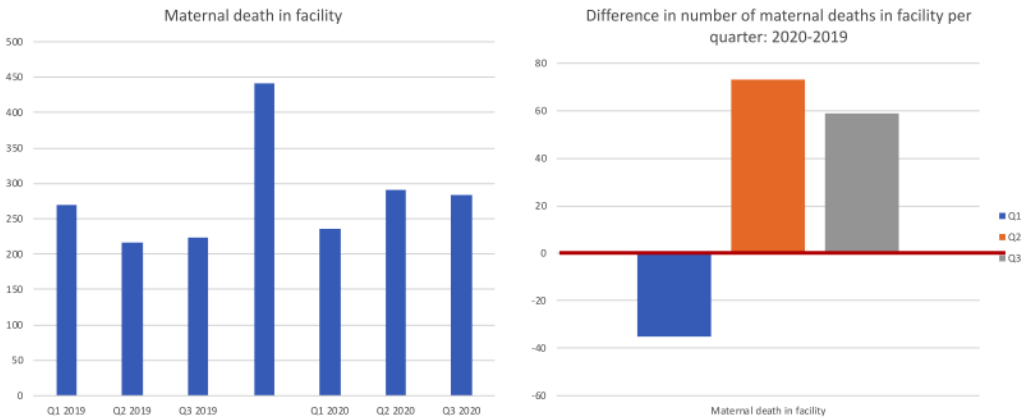
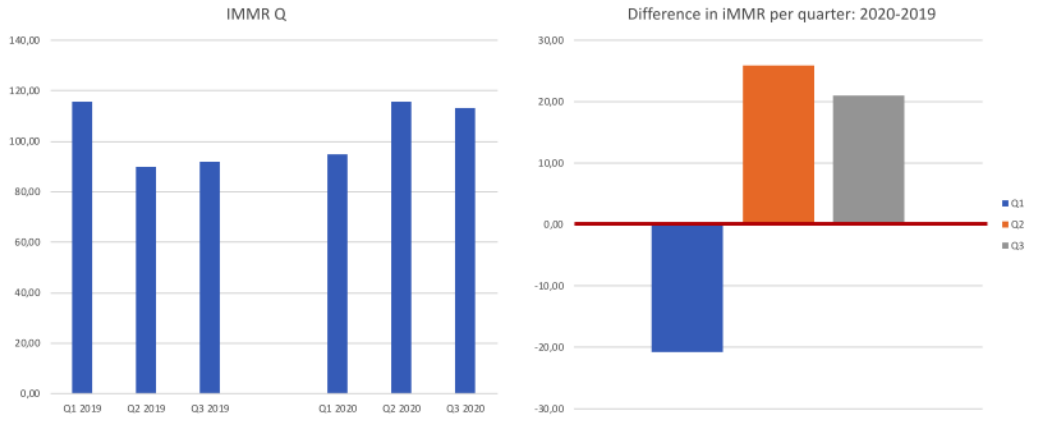
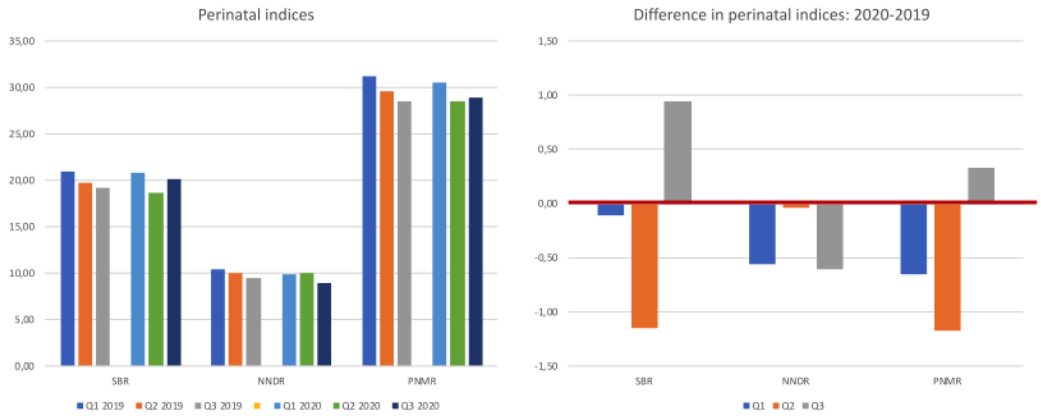


Figure 13. Institutional Maternal Mortality Ratio (iMMR)



Caution must be exercised in interpreting the perinatal indices as there are considerable discrepancies in the data in the DHIS and Perinatal Problem Identification Programme (PPIP) in the two provinces that historically have had virtually complete data. Descriptive data from one province shows that there has been an increase in stillbirths.

Figure 14. Perinatal indices per quarter



Description of women with Covid-19 in pregnancy

The NDoH/SAMRC/UP database has recorded 472 pregnant women who have delivered in the public sector following confirmed SARS-Cov-2 infection. The details are given in Appendix 2.

Figure 15 shows the distribution of the cases reported. The cases reported follow the provinces with the highest number of infections.

Figure 15. NDoH/SAMRC/UP Covid-19 in pregnancy monitoring database
November 11, 2020

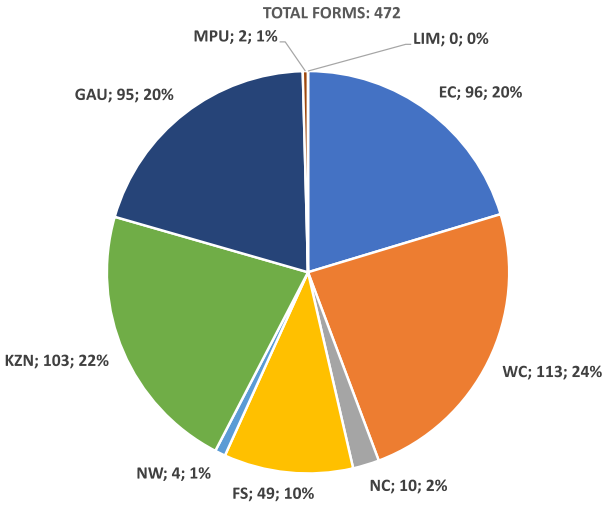


Table 4. Gestational age and birthweights of women diagnosed with Covid-19

GA at birth		N	%
	<30 weeks	33	6.99%
	30-34 weeks	77	16.31%
	35-36 weeks	69	14.62%
	37-41 weeks	262	55.51%
	>=42 weeks	6	1.27%
	Unknown	25	5.30%
Birthweight			
	>= 2500g	332	70.34%
	1500 - 2499g	91	19.28%
	1000 - 1499g	22	4.66%
	<1000g	4	0.85%
	Unknown	20	4.24%

Table 5. Mode of delivery and perinatal condition at birth of women diagnosed with Covid-19

Mode of delivery		N	%
	Normal vertex delivery	188	39.83%
	Vaginal breech delivery	4	0.85%
	Assisted vaginal delivery	5	1.06%
	Caesarean section before labour	159	33.69%
	Caesarean section during labour	100	21.19%
	Unknown/Not recorded	14	2.97%
Condition at birth			
	Born alive	433	91.74%
	Stillborn, alive on admission	3	0.64%
	Fresh stillborn, dead on admission	4	0.85%
	Stillborn, admission status unknkown	0	0.00%
	Macerated stillborn	6	1.27%

Table 6. HIV status and maternal obstetric conditionsof women diagnosed with Covid-19

HIV		N	%
	Negative	326	69.07%
	Positive, on long term ART	121	25.64%
	Unknown	13	2.75%
Maternal obstetric condition		N	%
	Hypertension/pre-eclampsia/eclampsia	68	14.41%
	Gestational diabetes	8	1.69%
	Spontaneous preterm labour	15	3.18%
	Premature rupture of membranes	6	1.27%
	Antepartum haemorrhage	3	0.64%
	Postpartum haemorrhage	0	0.00%
	Puerperal sepsis	0	0.00%
	Pneumonia/ARDS	10	2.12%
	Not recorded	161	34.11%
	Other:	201	42.58%

Table 7. Health systems usage of women diagnosed with Covid-19 (Cont.)

Health systems usage: mother			
	Admitted to high-care unit	45	9.53%
	Admitted to ICU	16	3.39%
	Intubated & ventilated	2	0.42%
	Death	22	4.66%
	Not recorded	335	70.97%
	Duration of hospital stay unknown	206	43.64%
	Duration of hospital stay 1-2 days	56	11.86%
	Duration of hospital stay 3-7 days	119	25.21%
	Duration of hospital stay >7 days	86	18.22%

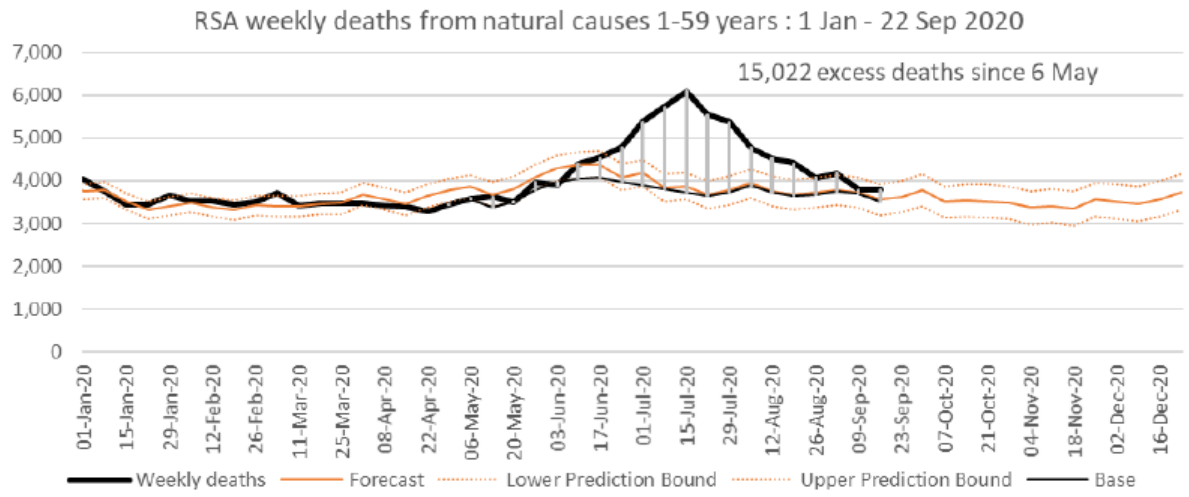
Table 8. Health systems usage of neonates of women diagnosed with Covid-19

Health systems usage: baby		
Stayed with the mother	187	39.62%
Discharge to interim caregiver	5	1.06%
Admitted to neonatal nursery	59	12.50%
Admitted to high-care unit	11	2.33%
Admitted to ICU	37	7.84%
Intubated & ventilated	0	0.00%
Death	13	2.75%
Not recorded	126	26.69%
Duration of nursery admission unknown	289	61.23%
Duration of nursery admission 0 days	35	7.42%
Duration of nursery admission 1-3 days	65	13.77%
Duration of nursery admission 4-7 days	37	7.84%
Duration of nursery admission >7 days	46	9.75%

A large proportion of babies that have been delivered were low birth weight (approximately 30%). There were 22 maternal deaths (case fatality rate 4,7%) and 13 stillbirths and 13 neonatal deaths (PNMR 55/1000 births). The caesarean delivery rate was 55%, prevalence of hypertensive disorders in pregnancy 14%, but spontaneous preterm labour only 3%. This descriptive data must be treated with caution as it can be potentially falsely high or low because number of women who have had Covid-19 but have not yet delivered.

The peak prevalence of maternal deaths was in June, a month before the peak in the mortality in the general population (July)[2].

Figure 16. Weekly deaths in South Africa (Burden of Disease Research Unit South African Medical Research Council 29 September 2020)



[2] REPORT ON WEEKLY DEATHS IN SOUTH AFRICA 1 JANUARY – 22 SEPTEMBER 2020 (WEEK 38) Debbie Bradshaw, Ria Laubscher, Rob Dorrington, Pam Groenewald, Tom Moultrie Burden of Disease Research Unit South African Medical Research Council 29 September 2020

Provincial, Metropolitan and some large district data.

Table 9. Abbreviations.

	Province
EC	Eastern Cape
FS	Free State
GP	Gauteng
KZ	KwaZulu-Natal
LP	Limpopo
MP	Mpumalanga
NC	Northern Cape
NW	North West
WC	Western Cape
SA	South Africa
	Metropolitan areas and large districts
BC	ec Buffalo City
NMB	ec Nelson Mandela Bay
Blo	fs Mangaung
Jhb	gp City of Johannesburg
Tsh	gp City of Tshwane
Eku	gp Ekurhuleni
Dur	kz eThekwini
Pmb	kz uMgungundlovu
Cap	lp Capricorn
Ehl	mp Ehlanzeni
FB	nc Frances Baard
KK	nw Dr Kenneth Kaunda
CT	wc City of Cape Town

Figures 18-34 illustrate the data per province and per large district.

Summary of provincial, metropolitan and large district data

There appears to have been a migration from urban to rural areas during lock down (Q2 and Q3), suggested by the increase in antenatal care first visits in rural areas after lockdown compared to predominantly urban areas. Contraceptive visits and TOPs declined in all areas. TOPs increased markedly in the City of Johannesburg in Q2 and Q3.

Births increased in all area except eThekwini which decreased (which might be explained by a migration to the rural areas in KZN) or home births. Maternal deaths and the iMMR increased in all areas after lockdown.

Figure 17. Antenatal first attendance

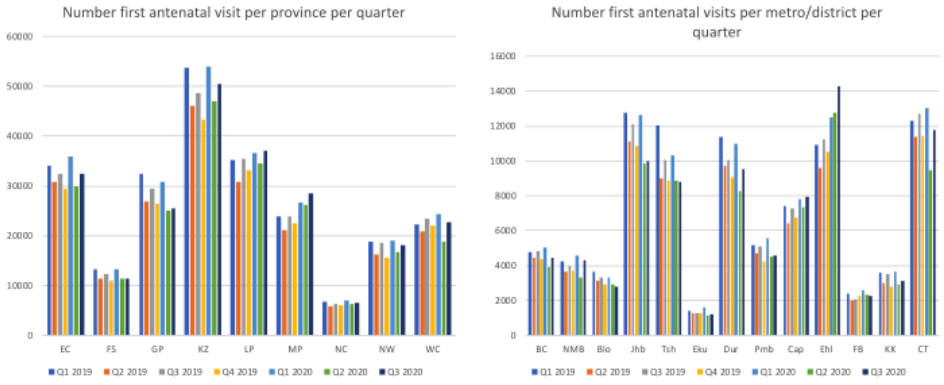


Figure 18. Difference in number of antenatal first attendance per quarter: 2020-2019

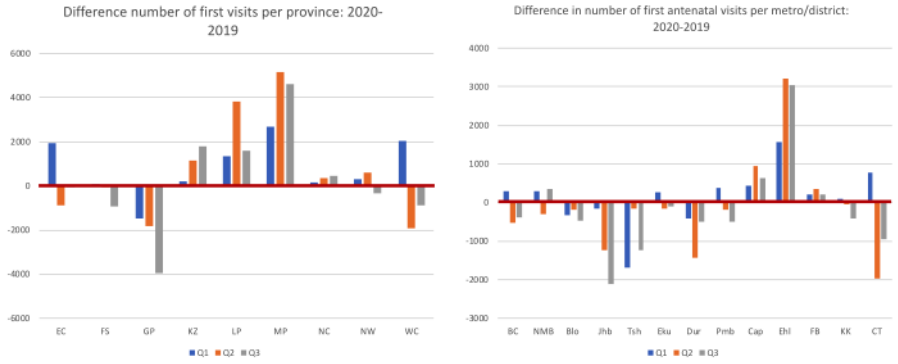


Figure 19. Percentage difference in antenatal first attendance per quarter: 2020-2019

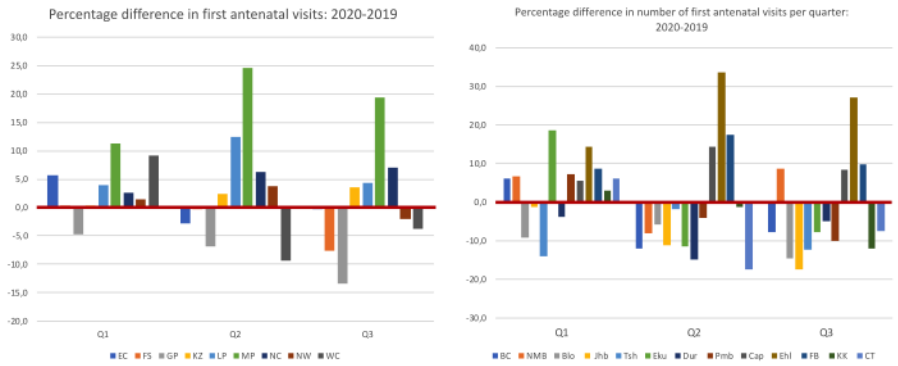


Figure 20. Contraception visits

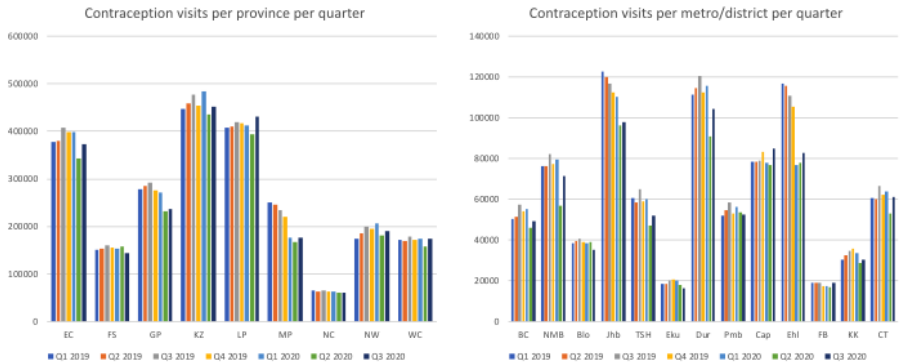


Figure 21. Difference in number of contraceptive visits per quarter: 2020-2019

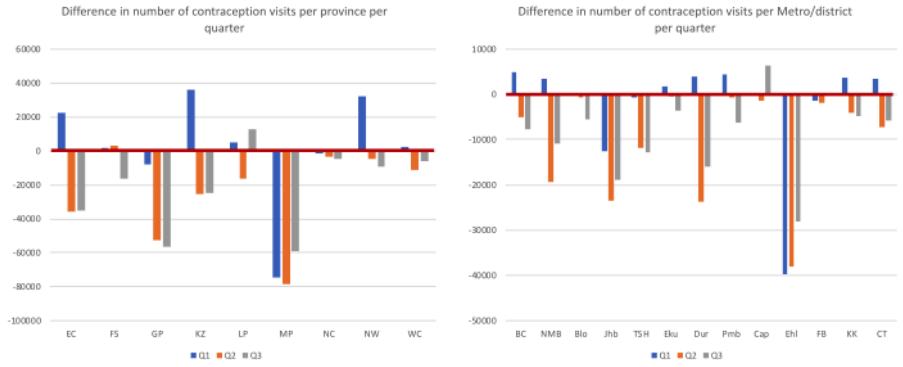


Figure 22. Percent difference in contraceptive visits: 2020-2019

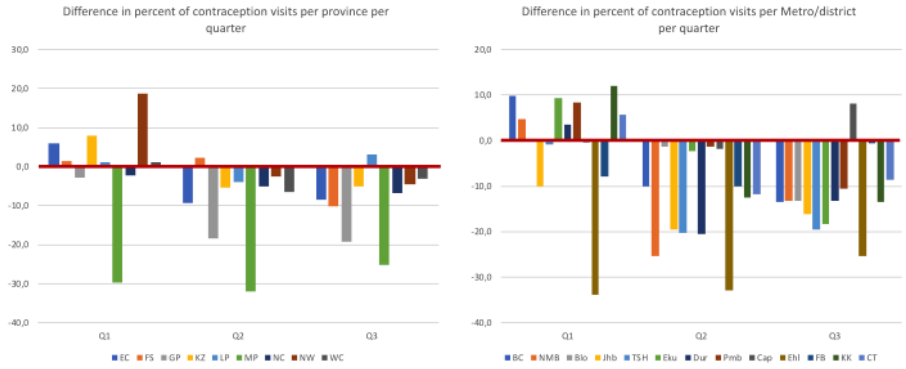


Figure 23. Termination of pregnancy

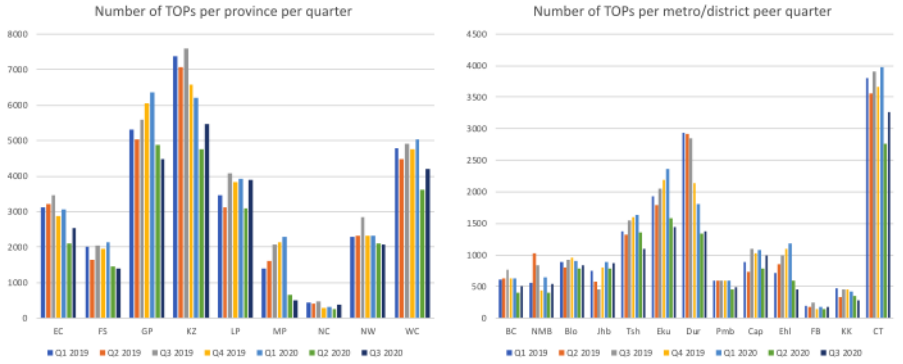


Figure 24. Difference in number of TOPs per quarter: 2020-2019

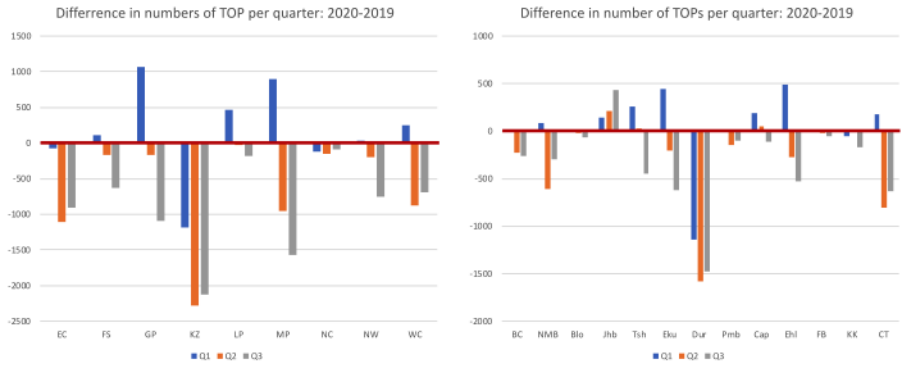


Figure 25. Percentage difference in TOPs per quarter: 2020-2019

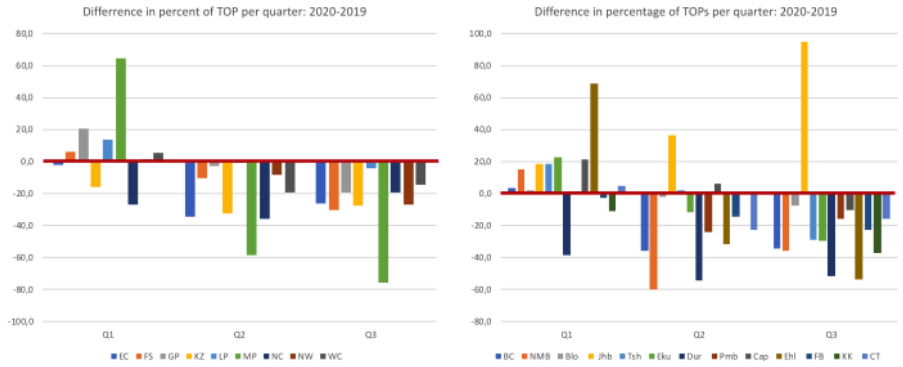


Figure 26. Live births in facility

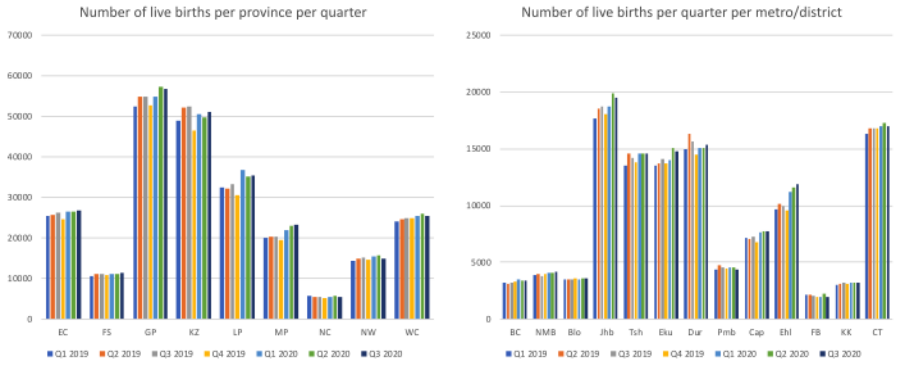


Figure 27. Difference in number of live births in facility: 2020-2019

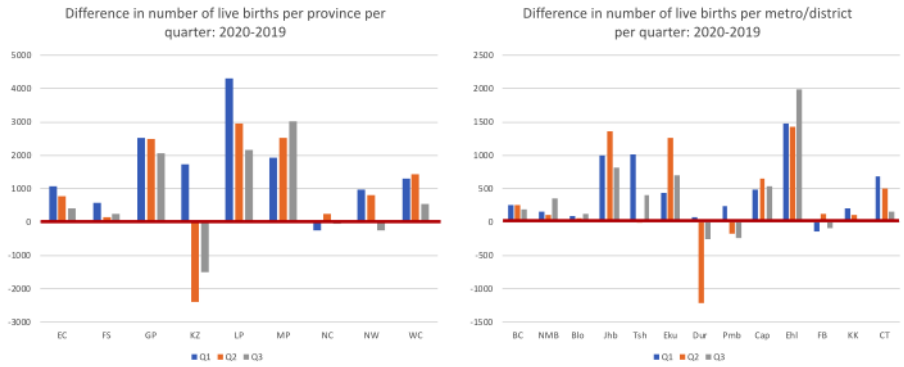


Figure 28. Percent difference in live births in facility per quarter: 2020-2019

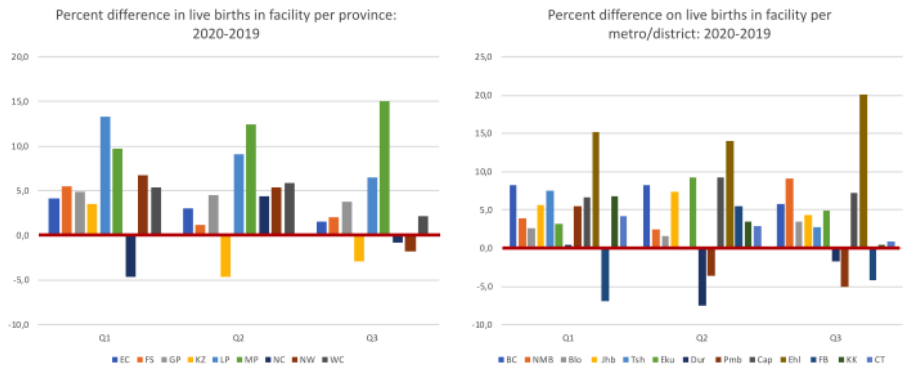


Figure 29. Maternal deaths per quarter

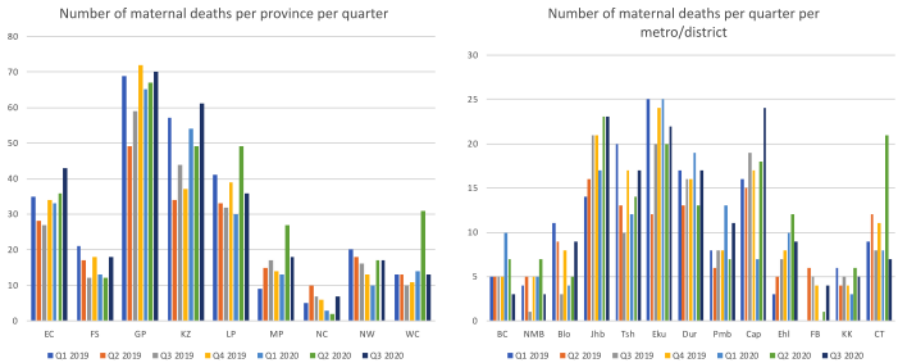


Figure 30. Difference in number of maternal deaths

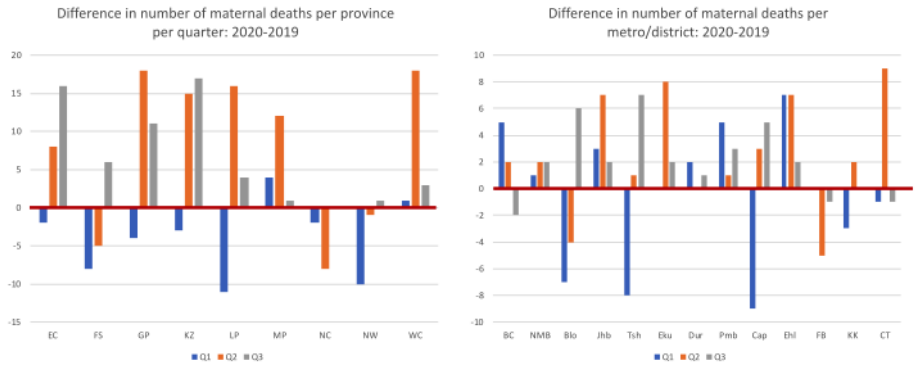


Figure 31. Percent difference in maternal deaths

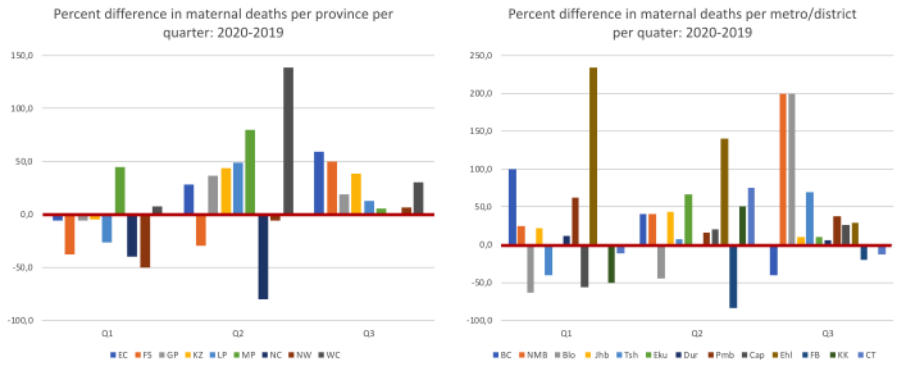


Figure 32. iMMR per quarter

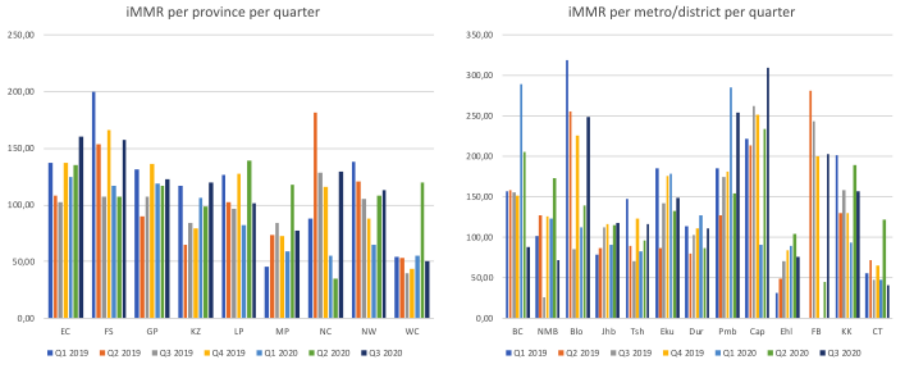


Figure 33. Difference in iMMR per quarter: 2020-2019

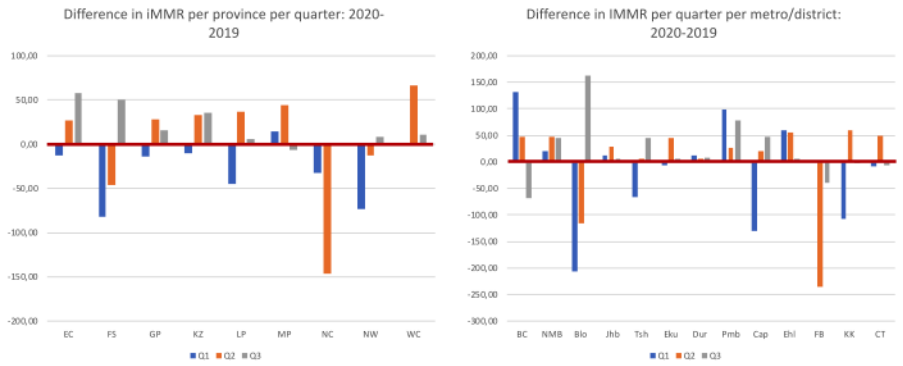
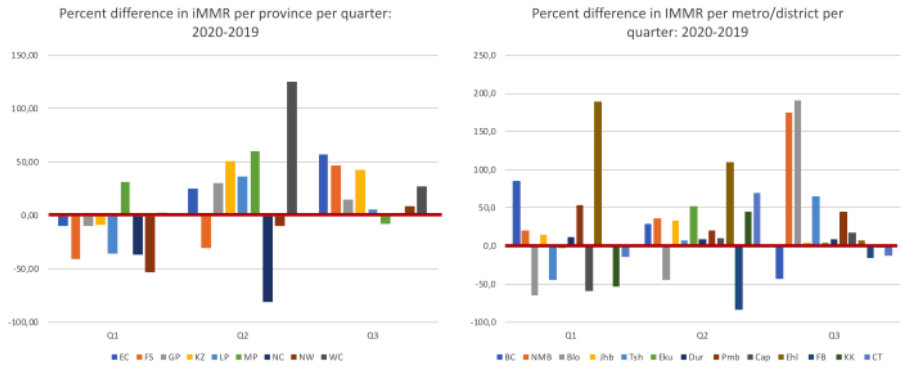


Figure 34. Percentage difference in iMMR per quarter: 2020-2019



Discussion

This report demonstrates that there has been a significant increase in maternal deaths after lockdown started and the surge of the pandemic; and a slight increase in stillbirths. This has been associated with a decrease in usage of reproductive health services but relatively stable use of maternity services (antenatal care and in facility births). The number of births in public health facilities per month was greater each month than in 2019, except for KwaZulu-Natal, where there was a decrease in in-facility births. There was a marked movement of pregnant women to the more rural provinces especially Mpumalanga and Limpopo provinces during lockdown and due the first wave of the pandemic as evidenced by a marked increase in first antenatal visits and births especially in Mpumalanga and Limpopo. The increase in deaths was across all areas (provinces, metropolitan areas and large rural districts). The underlying causes of the increase in stillbirths were due to HDP and unexplained stillbirths. Both these categories of deaths can be prevented by attendance at antenatal care.

The NICD DATCOV database reported in mid-August that there had been 1342 pregnant women who had tested positive for SARS-Cov-2 virus and 24 of these had died. This database collects data from both public and private laboratories. The NDoH/SAMRC/UP database for monitoring the effects of Covid-19 in pregnancy in South Africa reported 472 women with Covid-19 in mid-November 2020 that had given birth and 22 maternal deaths in this group. This database only records information at birth and only from women giving birth in public facilities. The MBRRACE-UK Rapid Report[3] on Covid-19 in pregnancy reported 9 maternal deaths related to Covid-19 in pregnancy, 7 direct deaths and in 2 Covid-19 was incidental to the death. This was out of 162344 pregnancies over 3 months; March to May 2020. It is too soon to evaluate the effect of Covid-19 in pregnancy, but the case fatality rate and the perinatal mortality rate for this subset of women who were diagnosed with Covid-19 is high. It is possible it is high because all the women with severe disease have delivered early and with time (as more women deliver after recovering from Covid-19) the mortality rates will drop.

3 Knight M, Bunch K, Cairns A, Cantwell R, Cox P, Kenyon S, Kotnis R, Lucas DN, Lucas S, Marshall L, Nelson-Piercy C, Page L, Rodger A, Shakespeare J, Tuffnell D, Kurinczuk JJ on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care Rapid Report: Learning from SARS-CoV-2-related and associated maternal deaths in the UK March – May 2020 Oxford: National Perinatal Epidemiology Unit, University of Oxford 2020

There will be under reporting of Covid-19 infections in pregnancy as not all women are tested, and there might be under-reporting of maternal deaths that tested positive for Covid-19. Bradshaw et al[2] considers that there might be twice as many deaths from Covid-19 as report, so even if the number of maternal deaths directly related to the SARS-CoV-2 virus is double to 44, it is still far less than the extra 132 maternal deaths observed. Thus, it is very unlikely that the excess maternal deaths reported after lockdown was initiated are all due to undiagnosed Covid-19 infections. Given the changed usage of maternal care services and the underutilisation of reproductive health services, it is highly likely that a major proportion of the deaths are due to the indirect effects of Covid-19 of which Robertson et al.[1], warned. The reduced usage was probably due to a combination of reduced transport available to clinics and reduced utilisation by women scared of contracting the virus in health facilities, but also due to reduced provision of maternal and reproductive health services. This was a consequence of diversion of staff and services towards Covid-19 care, staff sickness or quarantine, and the challenges in maintaining essential services.

It is this area which must be addressed in preparation for a potential second wave or another public health crisis.

Conclusion

There has been an increase of 30,0% maternal deaths till end September 2020 compared with 2019 since lockdown started in South Africa. This is probably only partially explained by deaths directly due to Covid-19 complications. It is very unlikely that the increased mortality is due to undiagnosed Covid-19 and much more likely the deaths are due to the indirect effects of Covid-19 on maternal and reproductive health services. Use of reproductive health services has sharply declined since lockdown, but in-facility births increased as did antenatal attendance for first visits but with women starting antenatal care later. There was a migration of pregnant women to the more rural provinces, especially Limpopo and Mpumalanga provinces.

There has been a two markedly different effects of Covid-19 on maternal care; the rural provinces experiencing excess pressure on their services due to pregnant women migrating from metropolitan areas back to their homes, increasing the burden on already under-resource facilities; and metropolitan areas were inundated with severe Covid-19 specific conditions leading to an increased burden in these areas resulting in an inability to manage routine emergencies. The preparation for future responses will need to be targeted at solving these different issues.

Recommendations

The underlying causes of the of maternal deaths should be established as soon as possible. Use of the National Committee for the Confidential Enquiries into Maternal Deaths would be a mechanism to rapidly allocate the pathological cause of the deaths for 2020 and the relationship to Covid-19 can be established.

In the meantime, it is essential to:

- Ensure basic maternal and reproductive health services remain open and functioning
- Ensure adequate means of transport to and between health care facilities
- Ensure health care providers are adequately protected with PPE and are provided with emotional support
- Ensure health care facilities provide adequate protection for pregnant women attending routine services
- Ensure pregnant women know they should still attend for antenatal care
- Ensure women in the reproductive age know that they should still attend for contraception and TOP services. Consideration should be given to promoting long acting reversible contraceptives as they would obviate the need to visit the clinics regularly.

In the near future efforts must be made to make the primary care clinics and maternity health facilities more resilient to health crises. This will have to include ensuring the rural facilities are better equipped to manage an influx of patients from outside their areas and metropolitan areas. Further, intensive care facilities in metropolitan areas will need to be increased to manage severe disease resulting from the epidemic. The expansion of numbers of community health workers announced in the mid-term budget could assist in CHWs not only doing Covid 19 related work, but also encouraging women in reproductive health age group to attend for maternal and reproductive health care.

Appendix 1

Tables of data
National data per month

Data Element	Jan-19	Feb-19	Mar-19	Apr-19	May19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May20	Jun-20	Jul-20	Aug-20	Sep-20
ENND	779	805	857	784	806	841	783	760	781	761	799	820	825	760	866	839	852	822	771	735	729
LNND	194	182	212	199	189	169	207	179	183	185	182	255	183	180	211	219	236	188	281	209	204
SBR	1712	1581	1719	1622	1670	1575	1654	1596	1528	1620	1621	1725	1825	1630	1833	1446	1687	1617	1727	1745	1681
Live birth in facility	78533	72482	82906	80115	81571	79804	80476	80680	82837	74841	75425	79506	83854	77673	86544	81424	85234	83833	83436	81404	85801
Total births	80245	74063	84625	81737	83241	81379	82130	82276	84365	76461	77046	81231	85679	79303	88377	82870	86921	85450	85163	83149	87482
PND	2491	2386	2576	2406	2476	2416	2437	2356	2309	2381	2420	2545	2650	2390	2699	2285	2539	2439	2498	2480	2410
Maternal death in facility	95	82	93	73	76	68	81	86	57	82	74	88	74	88	73	82	83	125	103	105	75
						2019											2020				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
iMMR (Monthly)	121,0	113,1	112,2	91,1	93,2	85,2	100,7	106,6	68,8	109,6	98,1	110,7	88,2	113,3	84,4	100,7	97,4	149,1	123,4	129,0	87,4
SBR	21,3	21,3	20,3	19,8	20,1	19,4	20,1	19,4	18,1	21,2	21,0	21,2	21,3	20,6	20,7	17,4	19,4	18,9	20,3	21,0	19,2
NNDR	9,9	11,1	10,3	9,8	9,9	10,5	9,7	9,4	9,4	10,2	10,6	10,3	9,8	9,8	10,0	10,3	10,0	9,8	9,2	9,0	8,5
PNMR	31,0	32,2	30,4	29,4	29,7	29,7	29,7	28,6	27,4	31,1	31,4	31,3	30,9	30,1	30,5	27,6	29,2	28,5	29,3	29,8	27,5
Antenatal 1st visit before 20 weeks	61935	51553	49662	48540	51935	44562	58434	53544	52818	59976	48959	38486	63731	52987	52993	43377	53056	49645	51576	51749	55761
Antenatal 1st visit total	93459	75701	71267	69496	75700	64621	82218	74958	73567	83422	69702	56292	94859	76683	76084	64987	80020	71262	74723	76995	81323
IUCD inserted	3948	4156	4336	4095	4218	3773	4422	4328	4515	5085	4087	3547	4503	4354	4286	3260	3802	3648	3646	3511	3998
Medroxyprogesterone injection	455325	387147	354707	397897	415025	348778	425305	408060	368639	398282	358145	304931	405195	374622	384723	335891	390075	367399	358643	323225	301579
Norethisterone enanthate injection	104726	101999	143173	161175	188306	168021	190544	193787	192792	244522	220394	192892	198328	146054	134159	126554	154854	168138	178571	200982	220253
Oral pill cycle	268805	227033	224622	221484	218998	184359	223880	203780	180071	210990	187787	195938	244807	208085	202289	190261	186734	174608	182397	207890	219840
Sub-dermal implant inserted	15187	14250	14673	13358	13511	11796	12399	11297	11900	10865	9487	6193	8792	9732	10100	7701	9282	9204	8971	10271	13934
Total contraceptives	847991	734585	741511	798009	840058	716727	856550	821252	757917	869744	779900	703501	861625	742847	735557	663667	744747	722997	732228	745879	759604
Termination of pregnancy - total	10980	10253	8992	9772	10129	8986	11618	11097	10314	12402	10555	7887	10542	10652	10492	7101	8145	7713	7607	7638	9734
Termination of pregnancy 0-12 weeks	9299	8675	7657	8577	8891	7805	10232	9724	8931	10781	9157	6850	9194	9118	9028	6217	7215	6639	6793	6876	8613
Termination of pregnancy 10-19 years	1522	1315	1104	1332	1200	1217	1508	1429	1308	1760	1395	1109	1389	1375	1279	819	983	897	1022	1133	1222
Termination of pregnancy 13-20 weeks	1681	1578	1335	1195	1238	1181	1386	1373	1383	1621	1398	1037	1348	1534	1464	884	930	1074	814	762	1121
Termination of pregnancy 20 years +	9058	8750	7757	8289	8786	7722	10050	9669	8672	10415	9035	6659	9252	9246	9206	6355	7218	6790	6415	6538	8523

National data per quarter

Data Element	Q1 2019	Q2 2019	Q3 2019	Q1 2020	Q2 2020	Q3 2020
Antenatal 1st visit before 20 weeks	163150	145037	164796	169711	146078	159086
Antenatal 1st visit total	240427	209817	230743	247626	216269	233041
Death in facility 0-6 days	2441	2431	2324	2451	2513	2235
Death in facility 7-28 days	588	557	569	574	643	694
Still birth in facility	5012	4867	4778	5288	4750	5153
Live birth in facility	233921	241490	243993	248071	250491	250641
Maternal death in facility	270	217	224	235	290	283
	Q1 2019	Q2 2019	Q3 2019	Q1 2020	Q2 2020	Q3 2020
IUCD inserted	12440	12086	13265	13143	10710	11155
Medroxyprogesterone injection	1197179	1161700	1202004	1164540	1093365	983447
Norethisterone enanthate injection	349898	517502	577123	478541	449546	599806
Oral pill cycle	720460	624841	607731	655181	551603	610127
Sub-dermal implant inserted	44110	38665	35596	28624	26187	33176
Total contraceptives	2324087	2354794	2435719	2340029	2131411	2237711
	Q1 2019	Q2 2019	Q3 2019	Q1 2020	Q2 2020	Q3 2020
Termination of pregnancy - total	30225	28887	33029	31686	22959	24979
Termination of pregnancy 0-12 weeks	25631	25273	28887	27340	20071	22282
Termination of pregnancy 10-19 years	3941	3749	4245	4043	2699	3377
Termination of pregnancy 13-20 weeks	4594	3614	4142	4346	2888	2697
Termination of pregnancy 20 years and older	25565	24797	28391	27704	20363	21476
	Q1 2019	Q2 2019	Q3 2019	Q1 2020	Q2 2020	Q3 2020
PND	7453	7298	7102	7739	7263	7388
All births	238933	246357	248771	253359	255241	255794
IMMR Q	115,42	89,86	91,81	94,73	115,77	112,91
SBR	20,98	19,76	19,21	20,87	18,61	20,15
NNDR	10,44	10,07	9,52	9,88	10,03	8,92
PNMR	31,19	29,62	28,55	30,55	28,46	28,88

Antenatal first visits

Province	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	33953	30726	32434	29551	35902	29856	32415
Free State	13225	11437	12405	10853	13258	11411	11454
Gauteng	32366	26905	29468	26350	30866	25085	25533
KwaZulu-Natal	53690	45999	48672	43355	53880	47124	50454
Limpopo	35249	30757	35564	33101	36614	34593	37135
Mpumalanga	23925	21056	23977	22395	26601	26229	28607
Northern Cape	6875	5891	6215	6178	7048	6259	6656
North West	18816	16215	18529	15606	19102	16819	18169
Western Cape	22328	20831	23479	22027	24355	18893	22618

Metro/Dis	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	4756	4469	4811	4371	5053	3932	4433
ec Nelson Mandela Bay	4274	3642	3967	3702	4564	3346	4307
fs Mangaung	3682	3108	3300	2899	3349	2933	2817
gp City of Johannesburg	12768	11126	12115	10859	12609	9883	9996
gp City of Tshwane	12028	8995	10036	8871	10339	8846	8807
gp Ekurhuleni	1376	1297	1304	1252	1632	1149	1203
kz eThekwini	11394	9696	10048	9051	10974	8253	9550
kz uMgungundlovu	5170	4710	5095	4273	5550	4520	4588
lp Capricorn	7410	6437	7300	6735	7833	7369	7922
mp Ehlanzeni	10943	9582	11247	10500	12502	12793	14291
nc Frances Baard	2405	2005	2080	2295	2613	2357	2287
nw Dr Kenneth Kaunda	3553	2970	3545	2765	3658	2933	3119
wc City of Cape Town	12276	11397	12702	11448	13041	9430	11755

Contraception

Province	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	376490	379450	407184	397924	399056	343684	372249
Free State	151836	154339	161328	155414	153924	157722	144839
Gauteng	278231	285100	292864	276605	270155	232712	236322
KwaZulu-Natal	448101	459644	476524	454867	483895	434471	451874
Limpopo	408515	411135	418483	417114	413464	394895	431438
Mpumalanga	249967	246249	235388	220508	175375	167802	176182
Northern Cape	64682	63967	66283	62281	63289	60703	61835
North West	173476	186363	198455	195655	205906	181843	189419
Western Cape	172789	168547	179210	172777	174965	157579	173553

Metro/Dis	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	50075	51253	57266	54140	54974	46145	49494
ec Nelson Mandela Bay	76059	76463	82372	77488	79634	57003	71428
fs Mangaung	38367	39794	40853	39140	38375	39243	35422
gp City of Johannesburg	122866	119969	116547	112324	110391	96454	97671
gp City of Tshwane	60464	58703	64985	58900	59898	46838	52215
gp Ekurhuleni	18509	18491	20201	20474	20252	18076	16504
kz eThekwini	111575	114551	120402	112607	115406	90943	104488
kz uMgungundlovu	51830	54489	58602	53266	56214	53742	52411
lp Capricorn	78218	78362	78741	83501	77920	77007	85108
mp Ehlanzeni	116685	115802	110636	105339	77038	77836	82592
nc Frances Baard	18784	18881	18978	17619	17312	16958	18857
nw Dr Kenneth Kaunda	30135	32607	34880	35526	33722	28522	30170
wc City of Cape Town	60663	60177	66606	62167	64068	53021	60940

Termination of pregnancy

Province	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	3138	3210	3 454	2871	3062	2098	2541
Free State	2016	1646	2032	1965	2133	1472	1408
Gauteng	5303	5028	5 584	6065	6371	4868	4491
KwaZulu-Natal	7390	7057	7 604	6571	6209	4771	5481
Limpopo	3462	3129	4 078	3826	3927	3105	3900
Mpumalanga	1393	1625	2 069	2145	2288	670	497
Northern Cape	440	406	467	302	322	259	378
North West	2298	2309	2835	2328	2334	2112	2076
Western Cape	4785	4477	4 906	4771	5040	3604	4207

Metro/Dis	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	612	621	767	626	633	398	503
ec Nelson Mandela Bay	559	1022	834	438	642	411	538
fs Mangaung	895	803	916	962	910	788	845
gp City of Johannesburg	748	578	449	801	888	788	876
gp City of Tshwane	1374	1328	1546	1597	1627	1351	1103
gp Ekurhuleni	1929	1793	2060	2190	2369	1587	1445
kz eThekwini	2943	2917	2848	2131	1801	1334	1370
kz uMgungundlovu	591	598	595	597	599	453	499
lp Capricorn	890	740	1 104	1024	1077	786	987
mp Ehlanzeni	708	861	990	1105	1192	591	462
nc Frances Baard	191	174	242	139	185	149	187
nw Dr Kenneth Kaunda	466	343	458	451	415	344	288
wc City of Cape Town	3803	3568	3901	3657	3983	2762	3269

Live births

Province	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	25534	25766	26367	24755	26589	26554	26784
Free State	10538	11084	11208	10812	11118	11214	11437
Gauteng	52364	54733	54771	52775	54900	57237	56847
KwaZulu-Natal	48892	52253	52553	46601	50633	49855	51048
Limpopo	32394	32314	33197	30542	36690	35271	35351
Mpumalanga	19917	20368	20201	19421	21859	22899	23233
Northern Cape	5666	5509	5432	5177	5403	5750	5390
North West	14462	14923	15259	14749	15435	15724	14994
Western Cape	24154	24540	25005	24940	25444	25987	25557

Metro/Dis	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	3199	3157	3212	3301	3461	3417	3399
ec Nelson Mandela Bay	3915	3950	3823	3969	4067	4049	4171
fs Mangaung	3451	3527	3500	3546	3543	3582	3620
gp City of Johannesburg	17704	18556	18677	18068	18707	19924	19497
gp City of Tshwane	13536	14586	14193	13805	14544	14574	14589
gp Ekurhuleni	13546	13753	14116	13677	13977	15016	14810
kz eThekwini	14948	16281	15638	14457	15013	15071	15376
kz uMgungundlovu	4332	4713	4574	4422	4570	4546	4340
lp Capricorn	7207	7045	7244	6761	7686	7693	7772
mp Ehlanzeni	9696	10142	9928	9558	11167	11568	11916
nc Frances Baard	2117	2137	2060	2001	1970	2253	1973
nw Dr Kenneth Kaunda	2987	3071	3170	3070	3192	3176	3184
wc City of Cape Town	16330	16778	16806	16815	17014	17274	16965

Maternal deaths

Province	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	35	28	27	34	33	36	43
Free State	21	17	12	18	13	12	18
Gauteng	69	49	59	72	65	67	70
KwaZulu-Natal	57	34	44	37	54	49	61
Limpopo	41	33	32	39	30	49	36
Mpumalanga	9	15	17	14	13	27	18
Northern Cape	5	10	7	6	3	2	7
North West	20	18	16	13	10	17	17
Western Cape	13	13	10	11	14	31	13

Metro/Dis	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	5	5	5	5	10	7	3
ec Nelson Mandela Bay	4	5	1	5	5	7	3
fs Mangaung	11	9	3	8	4	5	9
gp City of Johannesburg	14	16	21	21	17	23	23
gp City of Tshwane	20	13	10	17	12	14	17
gp Ekurhuleni	25	12	20	24	25	20	22
kz eThekwini	17	13	16	16	19	13	17
kz uMgungundlovu	8	6	8	8	13	7	11
lp Capricorn	16	15	19	17	7	18	24
mp Ehlanzeni	3	5	7	8	10	12	9
nc Frances Baard	0	6	5	4	0	1	4
nw Dr Kenneth Kaunda	6	4	5	4	3	6	5
wc City of Cape Town	9	12	8	11	8	21	7

Institutional Maternal Mortality Ratio (iMMR)

iMMR	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	137,07	108,67	102,40	137,35	124,11	135,57	160,54
Free State	199,28	153,37	107,07	166,48	116,93	107,01	157,38
Gauteng	131,77	89,53	107,72	136,43	118,40	117,06	123,14
KwaZulu-Natal	116,58	65,07	83,73	79,40	106,65	98,29	119,50
Limpopo	126,57	102,12	96,39	127,69	81,77	138,92	101,84
Mpumalanga	45,19	73,64	84,15	72,09	59,47	117,91	77,48
Northern Cape	88,25	181,52	128,87	115,90	55,52	34,78	129,87
North West	138,29	120,62	104,86	88,14	64,79	108,11	113,38
Western Cape	53,82	52,97	39,99	44,11	55,02	119,29	50,87

iMMR	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
ec Buffalo City	156,30	158,38	155,67	151,47	288,93	204,86	88,26
ec Nelson Mandela Bay	102,17	126,58	26,16	125,98	122,94	172,88	71,93
fs Mangaung	318,75	255,17	85,71	225,61	112,90	139,59	248,62
gp City of Johannesburg	79,08	86,23	112,44	116,23	90,88	115,44	117,97
gp City of Tshwane	147,75	89,13	70,46	123,14	82,51	96,06	116,53
gp Ekurhuleni	184,56	87,25	141,68	175,48	178,87	133,19	148,55
kz eThekwini	113,73	79,85	102,31	110,67	126,56	86,26	110,56
kz uMgungundlovu	184,67	127,31	174,90	180,91	284,46	153,98	253,46
lp Capricorn	222,01	212,92	262,29	251,44	91,07	233,98	308,80
mp Ehlanzeni	30,94	49,30	70,51	83,70	89,55	103,73	75,53
nc Frances Baard	0,00	280,77	242,72	199,90	0,00	44,39	202,74
nw Dr Kenneth Kaunda	200,87	130,25	157,73	130,29	93,98	188,92	157,04
wc City of Cape Town	55,11	71,52	47,60	65,42	47,02	121,57	41,26

Perinatal deaths and all births

Stillbirths	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	477	484	469	525	586	509	554
Free State	319	280	270	298	267	308	300
Gauteng	1017	1028	1057	1130	1096	1225	1011
KwaZulu-Natal	1210	1154	1086	1088	1256	998	1265
Limpopo	662	617	635	643	747	737	694
Mpumalanga	426	374	411	388	411	326	326
Northern Cape	132	124	125	148	133	119	110
North West	321	362	316	331	339	327	324
Western Cape	448	444	409	415	453	453	825
South Africa	5012	4867	4778	4966	5288	5002	5409

Early neonatal deaths	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	252	303	253	263	250	270	258
Free State	160	164	150	131	106	109	100
Gauteng	552	526	490	549	562	532	533
KwaZulu-Natal	514	469	470	437	470	491	414
Limpopo	373	378	418	424	435	390	330
Mpumalanga	200	184	201	223	199	300	215
Northern Cape	68	72	60	55	95	50	58
North West	132	161	145	130	141	181	155
Western Cape	190	174	137	168	193	190	172
South Africa	2441	2431	2324	2380	2451	2513	2235

Perinatal deaths	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	729	787	722	788	836	779	812
Free State	479	444	420	429	373	417	400
Gauteng	1569	1554	1547	1679	1658	1757	1544
KwaZulu-Natal	1724	1623	1556	1525	1726	1489	1679
Limpopo	1035	995	1053	1067	1182	1127	1024
Mpumalanga	626	558	612	611	610	626	541
Northern Cape	200	196	185	203	228	169	168
North West	453	523	461	461	480	508	479
Western Cape	638	618	546	583	646	643	997
South Africa	7453	7298	7102	7346	7739	7515	7644

All births	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Eastern Cape	26011	26250	26836	25280	27175	27063	27338
Free State	10857	11364	11478	11110	11385	11522	11737
Gauteng	53381	55761	55828	53905	55996	58462	57858
KwaZulu-Natal	50102	53407	53639	47689	51889	50853	52313
Limpopo	33056	32931	33832	31185	37437	36008	36045
Mpumalanga	20343	20742	20612	19809	22270	23225	23559
Northern Cape	5798	5633	5557	5325	5536	5869	5500
North West	14783	15285	15575	15080	15774	16051	15318
Western Cape	24602	24984	25414	25355	25897	26440	26382
South Africa	238933	246357	248771	234738	253359	255493	256050

Stillbirths: DHIS versus PPIP

	DHIS Q12019	PPIP Q12019	DHIS Q22019	PPIP Q22019	DHIS Q32019	PPIP Q32019	DHIS Q12020	PPIP Q12020	DHIS Q22020	PPIP Q22020	DHIS Q32020	PPIP Q32020
Mpumalanga	426	309	374	259			411	313	74	326		
Difference DHISPPIP	+117		+115				+98		-252			
Western Cape			444	507	409	472			330	456	825	472
Difference DHIS-PPIP			-63		-63				-126		+353	

In Mpumalanga the difference between quarters in DHIS and PPIP had been more in DHIS by similar margins, but in Q2 2020 there was a deficit between DHIS and PPIP of 252.

In Western Cape the difference between quarters in DHIS and PPIP in 2019 was negative, in Q2 2020 the deficit was double but in Q3 there was an massive excess in the DHIS data.

Thus the DHIS data after lockdown in these two provinces indicates problems with the data.

Appendix 2.

Covid-19 in pregnancy outcome

		EC		WC		NC	FS	NW	KZN	GAU	MPU	LIM	TOTAL	
	TOTAL FORMS	71		102		10	40	4	75	90	2	0	394	
Antenatal care														
	Yes	64		95		10	39	3	68	77	1	0	357	90.61%
	No	5		3		0	0	0	3	4	0	0	15	3.81%
	Unknown	2		4		0	1	1	4	9	1	0	22	5.58%
Maternal age														
	<18y	4		2		0	0	0	2	4	0	0	12	3.05%
	18-35y	52		76		8	31	3	47	62	2	0	281	71.32%
	>35y	19		22		2	7	1	24	25	0	0	100	25.38%
Parity														
	0	11		21		1	8	0	14	7	0	0	62	15.74%
	1-5	57		76		9	31	3	58	77	2	0	313	79.44%
	>5	2		5		0	1	1	3	6	0	0	18	4.57%
Delivered at this facility														
	Yes	60		96		9	37	3	64	82	2	0	353	89.59%
	No	6		4		1	0	0	4	1	0	0	16	4.06%
	Unknown	5		2		0	3	1	7	7	0	0	25	6.35%
GA at birth														
	<30 weeks	9		6		0	1	0	6	4	0	0	26	6.60%
	30-34 weeks	13		16		0	8	1	12	15	0	0	65	16.50%
	35-36 weeks	10		13		1	4	0	18	9	0	0	55	13.96%
	37-41 weeks	29		63		9	27	2	36	56	2	0	224	56.85%
	>=42 weeks	3		1		0	0	0	0	1	0	0	5	1.27%
	Unknown	7		3		0	0	1	3	5	0	0	19	4.82%
Birthweight														
	>= 2500g	42		81		8	30	2	47	62	2	0	274	69.54%
	1500 - 2499g	20		14		2	6	1	17	22	0	0	82	20.81%
	1000 - 1499g	3		3		0	2	0	5	4	0	0	17	4.31%
	<1000g	1		0		0	0	0	1	1	0	0	3	0.76%
	Unknown	5		3		0	2	1	3	1	0	0	15	3.81%

Gestation												
	Singleton	63	93	10	38	3	68	79	2	0	356	90.36%
	Multiple	2	3	-6	-4	-5	0	5	-6	-6	-17	-4.31%
	Unknown	6	4	0	1	1	5	8	0	0	25	6.35%
Mode of delivery												
	Normal vertex delivery	31	42	3	10	1	22	49	2	0	160	40.61%
	Vaginal breech delivery	1	1	0	0	0	1	0	0	0	3	0.76%
	Assisted vaginal delivery	0	3	0	1	0	0	1	0	0	5	1.27%
	Caesarean section before labour	21	39	5	20	1	28	24	0	0	138	35.03%
	Caesarean section during labour	17	13	2	7	1	20	13	0	0	73	18.53%
	Unknown/Not recorded	1	4	0	2	1	2	3	0	0	13	3.30%
Condition at birth												
	Born alive	62	94	8	36	3	69	89	2	0	363	92.13%
	Stillborn, alive on admission	2	0	0	0	0	0	0	0	0	2	0.51%
	Fresh stillborn, dead on admission	1	1	1	0	0	0	0	0	0	3	0.76%
	Stillborn, admission status unknown	0	0	0	0	0	0	0	0	0	0	0.00%
	Macerated stillborn	3	0	0	2	0	0	0	0	0	5	1.27%
Syphilis												
	Negative	47	45	5	26	1	34	71	2	0	231	58.63%
	Positive	1	0	0	0	0	2	7	0	0	10	2.54%
	Unknown	23	56	5	13	3	39	12	0	0	151	38.32%
HIV												
	Negative	45	68	8	31	2	46	75	2	0	277	70.30%
	Positive, on long term ART	25	26	1	6	1	26	12	0	0	97	24.62%
	Unknown	0	6	0	2	1	0	2	0	0	11	2.79%
Infant feeding												
	Breastfeeding	44	76	8	30	2	36	70	2	0	268	68.02%
	Formula	7	7	0	5	1	17	7	0	0	44	11.17%
	Unknown/Not recorded	17	10	2	4	0	17	9	0	0	59	14.97%

Maternal obstetric condition											
Hypertension/pre-eclampsia/eclampsia	11	8	4	4	0	7	24	0	0	58	14.72%
Gestational diabetes	1	2	0	0	0	1	3	0	0	7	1.78%
Spontaneous preterm labour	2	4	0	1	0	5	2	0	0	14	3.55%
Premature rupture of membranes	2	2	0	0	0	1	0	0	0	5	1.27%
Antepartum haemorrhage	2	0	0	0	0	0	1	0	0	3	0.76%
Postpartum haemorrhage	0	0	0	0	0	0	0	0	0	0	0.00%
Puerperal sepsis	0	0	0	0	0	0	0	0	0	0	0.00%
Pneumonia/ARDS	2	0	0	3	0	3	1	0	0	9	2.28%
Not recorded	25	25	6	22	0	24	34	1	0	137	34.77%
Other:	26	61	0	10	4	34	25	1	0	161	40.86%
Health systems usage: mother											
Admitted to high-care unit	5	12	1	4	1	13	4	0	0	40	10.15%
Admitted to ICU	2	0	1	2	1	2	6	0	0	14	3.55%
Intubated & ventilated	2	0	0	0	0	0	0	0	0	2	0.51%
Death	6	2	0	2	1	5	3	0	0	19	4.82%
Not recorded	49	76	9	36	2	56	74	2	0	304	77.16%
Duration of hospital stay unknown	18	41	2	7	1	35	47	1	0	152	38.58%
Duration of hospital stay 1-2 days	3	18	5	3	1	10	9	1	0	50	12.69%
Duration of hospital stay 3-7 days	24	26	3	23	1	16	18	0	0	111	28.17%
Duration of hospital stay >7 days	25	14	0	7	1	14	15	0	0	76	19.29%
Neonatal morbidity											
Respiratory distress syndrome	4	3	0	5	0	10	10	0	0	32	8.12%
Meconium aspiration syndrome	0	0	0	0	0	1	1	0	0	2	0.51%
Hypoxic-ischemic encephalopathy	0	0	0	0	0	0	0	0	0	0	0.00%
Necrotising enterocolitis	0	0	0	0	0	0	0	0	0	0	0.00%
Intracranial Haemorrhage	0	0	0	0	0	0	0	0	0	0	0.00%
Congenital abnormality	0	0	0	0	0	0	0	0	0	0	0.00%
Neonatal sepsis	0	1	0	0	0	0	0	0	0	1	0.25%
Not recorded/None	90	51	1	5	0	16	19	1	0	183	46.45%
Other:	-23	47	9	30	4	48	60	1	0	176	44.67%

Health systems usage: baby											
Stayed with the mother	31	37	6	26	1	11	56	1	0	169	42.89%
Discharge to interim caregiver	4	0	0	1	0	0	0	0	0	5	1.27%
Admitted to neonatal nursery	6	19	0	1	0	15	6	0	0	47	11.93%
Admitted to high-care unit	1	0	0	1	0	1	6	0	0	9	2.28%
Admitted to ICU	5	2	0	5	0	12	9	0	0	33	8.38%
Intubated & ventilated	0	0	0	0	0	0	0	0	0	0	0.00%
Death	3	2	1	1	0	2	1	0	0	10	2.54%
Not recorded	15	39	3	7	3	32	13	1	0	113	28.68%
Duration of nursery admission unknown	34	54	3	14	3	53	73	2	0	236	59.90%
Duration of nursery admission 0 days	14	12	0	0	0	1	2	0	0	29	7.36%
Duration of nursery admission 1-3 days	6	13	7	10	0	7	11	0	0	54	13.71%
Duration of nursery admission 4-7 days	6	7	0	11	1	7	1	0	0	33	8.38%
Duration of nursery admission >7 days	11	16	0	5	0	7	3	0	0	42	10.66%

Neonatal outcome

		EC	WC	NC	FS	NW	KZN	GAU	MPU	LIM	TOTAL	
	TOTAL FORMS	29	102	9	35	1	29	86	1	0	292	
Maternal information												
Parity												
	0	1	0	0	7	0	3	3	0	0	14	4.79%
	1 to 4	27	0	9	26	1	24	74	1	0	162	55.48%
	>=5	1	0	0	2	0	1	3	0	0	7	2.40%
	Unknown/Not Recorded	0	0	0	0	0	0	6	0	0	6	2.05%
Age												
	<18	1	0	0	1	0	1	4	0	0	7	2.40%
	18-34	23	0	7	21	0	20	58	1	0	130	44.52%
	>=35	5	0	2	13	1	8	23	0	0	52	17.81%
	Unknown/Not Recorded	0	0	0	0	0	0	1	0	0	1	0.34%
Antenatal Care												
	Yes	27	0	9	35	1	27	80	0	0	179	61.30%
	No	2	0	0	0	0	1	3	0	0	6	2.05%
	Unknown/Not Recorded	0	0	0	0	0	1	3	1	0	5	1.71%
HIV												
	Positive	9	0	2	5	0	10	24	0	0	50	17.12%
	Negative	20	0	7	28	1	19	62	1	0	138	47.26%
	Unknown/Not Recorded	0	0	0	2	0	0	0	0	0	2	0.68%
Mode of Delivery												
	Vaginal	12	0	2	9	0	8	49	1	0	81	27.74%
	Caesarean section	16	0	7	26	1	21	33	0	0	104	35.62%
	Assisted	0	0	0	0	0	0	0	0	0	0	0.00%
	Unknown/Not Recorded	1	0	0	0	0	0	4	0	0	5	1.71%
HDP												
	PET	7	0	2	4	1	3	16	0	0	33	11.30%
	Eclampsia	0	0	0	0	0	2	4	0	0	6	2.05%
	Non-pragnancy HT	0	0	0	0	0	0	1	0	0	1	0.34%
	None	11	0	6	28	0	22	53	0	0	120	41.10%
	Unknown/Not Recorded	11	0	1	3	0	2	11	1	0	29	9.93%

DM												
	Yes (gestational)	1	0	0	0	1	2	4	0	0	8	2.74%
	Yes (non gestational))	0	0	0	0	0	0	0	0	0	0	0.00%
	None	21	0	8	31	0	26	69	0	0	155	53.08%
	Unknown/Not Recorded	7	0	1	4	0	1	12	1	0	26	8.90%
Number of fetuses												
	1	25	0	9	34	1	26	72	1	0	168	57.53%
	2	3	0	0	0	0	1	9	0	0	13	4.45%
	>3	0	0	0	0	0	0	0	0	0	0	0.00%
	Unknown/Not Recorded	1	0	0	1	0	2	5	0	0	9	3.08%
Antenatal steriods												
	Yes	5	0	1	4	0	3	9	0	0	22	7.53%
	No	22	0	8	28	1	26	72	1	0	158	54.11%
	Unknown/Not Recorded	2	0	0	3	0	0	5	0	0	10	3.42%
Prolonged ROM												
	Yes	0	0	0	0	0	2	2	0	0	4	1.37%
	No	29	0	9	34	1	27	78	1	0	179	61.30%
	Unknown/Not Recorded	0	0	0	1	0	0	6	0	0	7	2.40%
Maternal pneumonia												
	Yes	1	0	0	3	0	4	3	0	0	11	3.77%
	No	28	0	9	31	1	23	72	1	0	165	56.51%
	Unknown/Not Recorded	0	4	0	1	0	2	11	0	0	18	6.16%
Maternal illness												
	Well	19	0	9	29	1	18	55	1	0	132	45.21%
	Ill	7	0	0	4	0	6	16	0	0	33	11.30%
	Critically Ill (HCU or ICU)	0	0	0	1	0	3	5	0	0	9	3.08%
	Unknown/Not Recorded	2	7	0	1	0	2	10	0	0	22	7.53%
Maternal Death												
	Yes	2	0	0	0	0	0	1	0	0	3	1.03%
	No	26	0	9	32	1	27	80	1	0	176	60.27%
	Unknown/Not Recorded	1	0	0	3	0	1	5	0	0	10	3.42%

Maternal Positive COVID test												
Type of test	PCR	26	0	2	28	1	23	68	1	0	149	51.03%
	Antibody	0	0	0	0	0	0	0	0	0	0	0.00%
	N/A (No test)	3	0	1	5	0	0	13	0	0	22	7.53%
	Other	0	102	6	2	0	6	5	0	0	121	41.44%
Neonatal Information												
Birth weight												
	1000g -1499g	2	0	0	0	0	1	1	0	0	4	1.37%
	1500g-1999g	5	0	0	2	0	0	5	0	0	12	4.11%
	2000g-2499g	0	0	0	0	0	0	0	0	0	0	0.00%
	>=2500	16	0	8	29	1	23	55	1	0	133	45.55%
	Unknown/Not Recorded	2	0	0	0	0	0	3	0	0	5	1.71%
Baby Gender												
	Male	16	0	4	15	1	15	39	0	0	90	30.82%
	Female	12	0	5	19	0	9	46	1	0	92	31.51%
	Unknown/Not Recorded	1	0	0	1	0	5	1	0	0	8	2.74%
Place of Birth												
	Inborn	23	0	9	35	1	24	78	1	0	171	58.56%
	Another facility	2	0	0	0	0	4	3	0	0	9	3.08%
	In transit	0	0	0	0	0	0	0	0	0	0	0.00%
	At home	3	0	0	0	0	0	3	0	0	6	2.05%
	Unknown/Not Recorded	1	0	0	0	0	1	2	0	0	4	1.37%
Gestational Age at Delivery												
	<34 weeks	5	0	0	3	0	2	7	0	0	17	5.82%
	34-36 weeks	6	0	0	6	0	7	16	0	0	35	11.99%
	>=37 weeks	12	0	9	26	1	20	60	1	0	129	44.18%
	Unknown/Not Recorded	6	0	0	0	0	0	3	0	0	9	3.08%
Apgar at Birth												
At 1 min												
	<7	1	31	0	2	0	0	4	0	0	38	13.01%
	>=7	23	10	9	32	1	26	78	1	0	180	61.64%
	Unknown/Not Recorded	5	61	0	1	0	3	4	0	0	74	25.34%
At 5 min												
	<7	0	0	0	0	0	0	1	0	0	1	0.34%
	>=7	24	0	9	34	1	27	81	1	0	177	60.62%
	Unknown/Not Recorded	5	0	0	1	0	2	4	0	0	12	4.11%

Neonatal Admission												
	NICU	1	0	0	5	0	6	6	0	0	18	6.16%
	HCU	0	0	0	1	0	1	3	0	0	5	1.71%
	Standard neonatal	3	0	0	0	0	0	12	0	0	15	5.14%
	With mother	16	0	9	24	0	20	55	1	0	125	42.81%
	Unknown/Not recorded	9	0	0	5	1	2	9	0	0	26	8.90%
	Other	0	102	0	0	0	0	1	0	0	103	35.27%
Neonatal signs and symptoms	**Multiple**											
	Rash	0	0	0	0	0	0	0	0	0	0	0.00%
	Oedoma	0	0	0	0	0	0	0	0	0	0	0.00%
	Fever	0	0	0	0	0	0	2	0	0	2	0.68%
	Hypothermia	0	0	0	0	0	1	2	0	0	3	1.03%
	Cyanosis	0	0	0	1	0	0	1	0	0	2	0.68%
	Respiratory Distress	0	0	0	5	0	2	7	0	0	14	4.79%
	Hypoglycaemia	0	0	0	0	0	3	1	0	0	4	1.37%
	Apnea	0	0	0	0	0	0	0	0	0	0	0.00%
	Lethargy	0	0	0	0	0	1	1	0	0	2	0.68%
	Seizures	0	0	0	0	0	0	1	0	0	1	0.34%
	fedding intolerance	0	0	0	0	0	0	0	0	0	0	0.00%
	Vomiting	0	0	0	0	0	0	0	0	0	0	0.00%
	Diarrhea	0	0	0	0	0	0	0	0	0	0	0.00%
	Dehydration	0	0	0	0	0	0	0	0	0	0	0.00%
	Pallor	0	0	0	0	0	0	0	0	0	0	0.00%
	Jaundice	0	0	0	0	0	1	4	0	0	5	1.71%
	Not recorded	22	0	8	25	1	13	0	1	0	70	23.97%
	Other	7	102	1	4	0	8	67	0	0	189	

Neonatal Diagnosis	**Multiple**											
	Prematurity	0	0	0	4	0	3	3	0	0	10	3.42%
	LBW	3	0	0	1	0	1	3	0	0	8	2.74%
	VLBW	0	0	0	0	0	0	0	0	0	0	0.00%
	ELBW	0	0	0	0	0	0	0	0	0	0	0.00%
	HMD	0	0	0	0	0	0	0	0	0	0	0.00%
	TTN	0	0	0	0	0	0	0	0	0	0	0.00%
	MAS	0	0	0	0	0	0	1	0	0	1	0.34%
	Congenital pneumonia	0	0	0	0	0	0	1	0	0	1	0.34%
	Congenital sepsis	0	0	0	0	0	0	0	0	0	0	0.00%
	Nasocomial sepsis	0	0	0	0	0	0	0	0	0	0	0.00%
	NEC	0	0	0	0	0	0	0	0	0	0	0.00%
	Jaundice (phototherapy)	0	0	0	0	0	0	1	0	0	1	0.34%
	Perinatal hypoxia (prem baby)	0	0	0	0	0	0	0	0	0	0	0.00%
	HIE	0	0	0	0	0	0	0	0	0	0	0.00%
	Intracranial haemorrhage	0	0	0	0	0	0	0	0	0	0	0.00%
	Shock	0	0	0	0	0	0	0	0	0	0	0.00%
	Congeniatal abnormalities	0	0	0	0	0	0	0	0	0	0	0.00%
	Not recorded	24	0	8	21	1	14	0	1	0	69	23.63%
	Other	2	102	1	9	0	11	77	0	0	202	
Interventions												
Respiratory	**Multiple**											
	O2	0	0	0	1	0	3	13	0	0	17	5.82%
	NPO2	0	0	0	0	0	1	12	0	0	13	4.45%
	HFNC	0	0	0	0	0	0	2	0	0	2	0.68%
	CPAP	0	0	0	4	0	0	2	0	0	6	2.05%
	IPPV	0	0	0	0	0	2	0	0	0	2	0.68%
	Oscillation	0	0	0	0	0	0	0	0	0	0	0.00%
	None/Not recorded	28	0	9	29	1	21	72	1	0	161	55.14%
	Other	1	102	0	1	0	2	-15	0	0	91	31.16%
Surfactant administration												
	Yes	0	0	0	1	0	1	2	0	0	4	1.37%
	No	10	0	8	32	0	23	54	0	0	127	43.49%
	Unknown/Not recorded	18	0	1	2	1	5	29	1	0	57	19.52%

Neonatal COVID testing												
COVID test Result1												
	Positive	0	0	0	0	0	0	3	0	0	3	1.03%
	Negative	0	0	1	4	0	6	7	0	0	18	6.16%
	Indeterminate	0	0	0	0	0	0	0	0	0	0	0.00%
	Not recorded	3	0	1	2	0	7	9	0	0	22	7.53%
	Not done	26	0	7	29	1	16	67	1	0	147	50.34%
COVID specimen type test 1												
	NPA	0	0	0	2	0	0	10	0	0	12	4.11%
	OPA	0	0	0	0	0	1	0	0	0	1	0.34%
	Tracheal aspirate	0	0	0	1	0	3	1	0	0	5	1.71%
	N/A (Not done/Not recorded)	29	0	9	32	1	22	74	1	0	168	57.53%
	Other	0	102	0	0	0	3	1	0	0	106	36.30%
Type of COVID test 1												
	PCR	0	0	0	5	0	5	12	0	0	22	7.53%
	Antibody	0	0	0	0	0	0	0	0	0	0	0.00%
	N/A (Not done/Not recorded)	29	0	8	30	1	22	73	1	0	164	56.16%
	Other	0	102	1	0	0	2	1	0	0	106	36.30%
COVID test Result2												
	Positive	0	0	0	0	0	0	0	0	0	0	0.00%
	Negative	0	0	0	1	0	1	1	0	0	3	1.03%
	Indeterminate	0	0	0	0	0	0	0	0	0	0	0.00%
	Not recorded	2	0	1	5	0	15	15	0	0	38	13.01%
	Not done	27	0	8	29	1	13	70	1	0	149	51.03%
COVID specimen type test 2												
	NPA	0	0	0	0	0	0	0	0	0	0	0.00%
	OPA	0	0	0	0	0	0	0	0	0	0	0.00%
	Tracheal aspirate	0	0	0	0	0	0	0	0	0	0	0.00%
	N/A (Not done/Not recorded)	29	0	9	35	0	26	85	1	0	185	63.36%
	Other	0	102	0	0	1	3	1	0	0	107	36.64%

Type of COVID test 2												
	PCR	0	0	0	0	0	0	0	0	0	0	0.00%
	Antibody	0	0	0	0	0	0	0	0	0	0	0.00%
	N/A (Not done/Not recorded)	29	0	9	35	1	26	85	1	0	186	63.70%
	Other	0	102	0	0	0	3	1	0	0	106	36.30%
Infant feeding	**Multiple**											
	Breastfeeding	15	0	9	26	1	20	62	1	0	134	45.89%
	Expressed breast milk	0	0	0	0	0	0	2	0	0	2	0.68%
	Infant formula	3	0	0	7	0	7	11	0	0	28	9.59%
	Donor milk	0	0	0	0	0	0	1	0	0	1	0.34%
	TPN	0	0	0	1	0	1	0	0	0	2	0.68%
	Unknown/Not recorded	10	0	0	2	0	1	11	0	0	24	8.22%
Neonatal Outcomes												
Discharge type												
	Remained with mother	14	0	8	12	1	19	36	1	0	91	31.16%
	Dicharged to mother	0	0	0	0	0	0	0	0	0	0	0.00%
	Discharged to caregiver	3	0	0	3	0	0	0	0	0	6	2.05%
	Referred out for neonatal care	0	0	0	0	0	1	6	0	0	7	2.40%
	Down-referred (step-down)	0	0	1	0	0	0	1	0	0	2	0.68%
	Death	3	0	0	1	0	0	0	0	0	4	1.37%
	Not recorded	8	0	0	2	0	6	21	0	0	37	12.67%
	Other	1	102	0	17	0	3	22	0	0	145	49.66%
Please note that items added under Other have been grouped												

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