Saving Mothers

2017-2019

Triennial Technical report 2017-2019

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

A long and healthy life for all South Africans

Saving Mothers 2017-2019: Seventh triennial report on confidential enquiries into maternal deaths in South Africa

Technical Report

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Contents

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
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
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
LP	Limpopo province
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
PMTCT	Prevention of Mother-to-Child Transmission
PPE	Personnel Protective Equipment
PPH	Postpartum haemorrhage
PRS	Pregnancy related sepsis
RH	Regional Hospital
TB	Tuberculosis
TH	Tertiary hospital
TOP	Termination of pregnancy
WBOT	Ward based outreach teams
WC	Western Cape province

Foreword

Pregnancy and childbirth are joyous periods for families and communities world-wide. Therefore, the goal for all health care providers involved in the care of pregnant women should be to provide respectful care and minimize complications and mortality. Mortality should be an uncomment event.

The National Committee on Confidential Enquiries into Maternal deaths set up by Doctor Nkosazana Dlamini-Zuma has worked tirelessly has a team to learn lessons from the assessments of individual maternal deaths in all nine provinces in South Africa.

The lessons learnt have led to recommendations not only to improve clinical management during pregnancy but also during childbirth and the postpartum period. In addition, the recommendations are produced in the form of triennial reports which highlight short-comings in the health care system, avoidable factors in individual clinical care and whether the death could have been prevented. Bringing such triennial and annual reports to fruition involves tremendous effort, energy and meticulous attention to detail. Even though the NCCEMD works as a team, Professor Bob Pattinson the editor of the Saving Mothers' Reports needs special mention and South Africa's gratitude for these thoughtful documents and contributions he has made to decrease maternal and newborn deaths in South Africa.

The latest triennial report (Saving Mothers' Reports 2017-2019) is highly relevant in that it demonstrates that the assessment of individual maternal deaths and the lessons learnt leading to recommendations does result in good news. For the first time since the initial report in1998, the institutional maternal mortality ratio has dropped to less than 100 per 100 000 live births. This certainly an achievement for South Africa, one of the few countries in the world which has assessment of individual deaths and which implements the recommendations. The National department of health should be congratulated for setting up the Ministerial advisory committees for Saving Lives of Mothers, Babies and Children.

The main causes of deaths viz. non-pregnancy related infections, obstetric hemorrhage and hypertensive disorders in pregnancy remain the same albeit in decreased numbers. The biggest decrease in deaths since 2010 has been the decrease in deaths from non- pregnancy related infections due to the introduction of antiretroviral therapy.

There are however some concerns about some causes of deaths. These relate to deaths from early pregnancy deaths, such as miscarriage and ectopic pregnancies, and deaths from suicide. These need close attention over the next few years. Further educational institutions need to place increased emphasis on respectful care and professionalism, and improving clinical skills of all health care providers.

J Moodley
Chair NCCEMD

Summary of key Findings

1. There has been a progressive and sustained reduction in maternal mortality
    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 LBs
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.
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).
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 weeks 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.
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 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.

Summary of Recommendations

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 be 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 Early Pregnancy expert group to develop a strategy for: improving management of early pregnancy and its complications (miscarriage and ectopic); early pregnancy counselling service and access to safe TOP; earlier initiation of antenatal care after pregnancy diagnosis; and screening for mental health issues and identifying women at risk of suicide.
- Antenatal care restructured to ensure that every problem case is reviewed on-site prior to referral by the most experienced midwife, and that 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 to care for and conduct 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.

Details and Framework of recommendations (5s)

Focal areas for intervention (5Hs)

1. HIV
2. Obstetric Haemorrhage
3. Hypertensive disorders in pregnancy
4. Heart and other medical and surgical conditions
5. First Half of pregnancy (<20 weeks)

Five Pillars necessary for Effective care

1. Appropriately resourced and Accessible health facilities

- On-site Midwife run Birthing Units (OMBU). It is essential to introduce these units as they will allow for decongestion of overcrowded hospital labour wards, grouping of skills, reduction in caesarean deliveries, allow doctors to concentrate on the sick women and avoid emergency transport issues.
- Providing access to the next level of expertise at a primary health care clinic (PHC) will allow for all women's' pregnancies to be reviewed and enhance communication with receiving hospitals. This involves:
  - Wi-fi for all staff should be installed at all health facilities, to facilitate consultation with referral centres, participation in virtual audit meetings and virtual training sessions.
  - Outreach to the referring hospitals in the catchment must be part of the job description of all specialists in obstetrics and gynaecology and anaesthetics.
  - Every District Hospital must have a designated obstetrics and gynaecology specialist and a designated anaesthetic specialist whom they can consult with directly for advice about patient management, protocols etc.
- Regional and tertiary hospitals should establish joint clinics involving obstetricians and physicians for the management of women with underlying medical disease. Management of these patients should include a delivery plan and a plan for future contraception.
- District hospitals should have a transitional high care area to continue monitoring, stabilise and manage women while awaiting transfer to regional and tertiary facilities.
- All hospitals which manage early pregnancy complications must have a facility separate from the main theatre complex for performing evacuation of the uterus by manual vacuum aspiration (MVA) without general anaesthesia; but with safe protocols for analgesia or sedation.
- All hospitals must be able to provide termination of pregnancy services to ensure that all women have access to safe TOP. Medical TOP must be available at but not restricted to dedicated TOP clinics.
- Ensure capacity and accessibility of facilities for outpatient postnatal care within six days of delivery.
- All tertiary education institutions must have on-site or easy access for students to sexual and reproductive health services including contraception and safe TOP.
- Fighting the HIV epidemic must remain a priority, with multiple strategies including integration of HIV screening and care into maternal and women's health care services.
- Establish minimum standards for safe maternity care/safe care during labour including minimum staffing norms for safe care in labour.
- Liaise with forensic and medical pathology services at district and provincial level to increase both number and quality of post-mortems; and to facilitate earlier verbal results. This would enable better elucidation of deaths with Unknown and Other causes.
- The review at the 28-34 weeks antenatal care visit must be carried out by the most senior and skilled sister preferably an advanced midwife.

- Maternity waiting homes at all delivery facilities where women frequently present with babies born at home (BBAs).
- Inequities in outcomes between provinces must be addressed by ensuring that all birthing facilities meet minimum standards for safe care during labour including minimum staffing norms.
- Inequities in maternal and perinatal outcomes between provinces require attention to staffing levels and clinical governance.
- In regional hospitals, audit the capacity of staff and facilities to manage women with septic shock. Recommended norms and standards for staff and facilities, including intensive care units should be followed.

2. Functional inter-facility consultation and referral system

- Ensure there are clear referral criteria for obstetrics specifying which women must be referred from primary level to district hospital level, and which women must be referred from district to specialist level. These criteria must be known to all relevant health workers at both the referring and receiving facilities.
- On-call rosters for doctors at hospitals must be shared with all referring facilities in the catchment area.
- Every District Hospital must have a designated obstetrics and gynaecology specialist at their referring facility whom they can consult with directly for advice about patient management, protocols etc. (Direct Telephonic links or Vula app for 24-hour specialist support to district hospital doctors).
- All measures to stabilize the woman possible for that specific level of care to be performed prior to referral.
- Work with ambulance services to ensure appropriate prioritisation of bleeding patients and availability of urgent paramedic assisted ambulances.
- Promote the procurement and implementation of NASGs.
- Vula App system to facilitate referrals.
- Maternity waiting areas to allow women to be near the facility when labour starts
- Management of every case of patient with an HDP should be discussed at least telephonically with an obstetrics and gynaecology specialist.
- Wi-fi for all staff should be installed at all health facilities, to facilitate consultation with referral centres, participation in virtual audit meetings and virtual training sessions.

3. Competent (knowledgeable and skilled) health care providers

- There must be regular training of doctors and nurses in emergency resuscitative management of circulatory shock in the context of early pregnancy (ectopic and miscarriage) and PPH. This should include regular EOST drills on the management of shock.
- There must be regular training of doctors and nurses on the recognition and management of (a) ectopic and (b) different types of miscarriage, including indications and technique for evacuation of the uterus, and criteria for referral to specialist level. Single operator evacuation of the uterus under sedation must not be performed.

- There must be continued training and upskilling of anaesthetists, particularly on airway management and the recognition of shock and its management under anaesthesia.
- Anaesthetists performing regional anaesthesia must also be competent in general anaesthesia.
- Strengthen anaesthesia services at District Hospitals: More Medical Officers with Diploma in Anaesthesia training; ESMOE training and drills; Improve anaesthetic back up from regional hospitals.
- Every district hospital must have at least one doctor designated as an anaesthetic lead who will have the responsibility to gain and maintain adequate anaesthetic skills for the district hospital level, which includes skills in general anaesthesia. This doctor must mentor and train the remaining doctors at the hospital, to ensure that safe anaesthesia can be provided for caesarean deliveries and laparotomies for ectopic pregnancy.
- Focus on reducing deaths from uterine atony and retained placentae by ensuring earlier detection of PPH and improved response at CHCs and DH.
- Empowering labour ward nurses and midwives to implement immediate measures for obstetric emergencies at all levels of care.
- Training of health care providers working in maternity on the new HIV, TB and ART guidelines.
- HIV positive pregnant women who are acute or chronically unwell need thorough investigation of TB and other opportunistic infections with involvement of internal medicine and infectious specialists early.
- Every hospital and CHC must have at least one ESMOE trainer amongst their staff, who is given time to conduct regular training and fire drills.
- Continue implementation of ESMOE/EOST training, Safe CD protocol, updated PPH algorithms, use of NASG and Massive Obstetric Haemorrhage Transfusion Protocol
- PHC staff should undergo the First level Referral for Antenatal Care (FRANC) course to enable the review of all pregnant women during antenatal care and facilitate detecting complications and suitable referrals.

4. Quality of Care

- Ensure respectful care at all levels.
- When called to an obstetric emergency (e.g. new admission with pre-eclampsia) the doctor on call must promptly attend to the patient in person. If unable to do this due to a concurrent clinical commitment, then the second on-call must be called and come in person.
- For all obstetric emergencies, at least one doctor must stay with the patient until the vital signs have stabilised.
- At change of shift, doctors and midwives covering labour ward must always hand over in person to the team starting the new shift; the hand over must include a summary of each patient in the labour ward as well as a detailed review of any critically ill patient.
- Improve effectiveness of facility and District morbidity and mortality meetings; Ensure input from senior clinical personnel, managers and DCST. Ensure problems identified are addressed locally and at higher levels where required.

- Women with pre-eclampsia with severe features must be examined diligently prior to hospital discharge and ensure that both the Blood Pressure and pulse rate are normal. Patients with hypertensive disorders in pregnancy must continue their anti-hypertensive agents following hospital discharge and seen again within 5-7 days at the site of delivery. In addition, all women with pre-eclampsia with severe features must have their laboratory studies and a complete cardiovascular examination preferably ECG and X-ray chest if they have had early onset pre-eclampsia or chronic hypertension to exclude cardiomyopathy.
- No woman should be discharged from labour ward to the postnatal area if Systolic BP is <100 and/or Pulse is =>110 and/or ongoing bleeding.
- No woman should be discharged from the hospital if any abnormal vital signs such as heart rate >100 are recorded and immediate readmission is advised in women with any symptoms and signs suggestive of sepsis or cardiac failure.
- On discharge from the place of delivery, advise women on signs of infection, and what to do if these are noticed.
- Casualty departments must have clear policies ensuring that shocked gynaecological patients are given equal priority and attention by casualty staff compared to any other category of shocked patient.
- Maternity health workers must take responsibility to gain and maintain knowledge and skills required to prevent maternal deaths. This includes surgical skills, anaesthetic skills, competence in HIV and TB care, as well as management of labour and obstetric emergencies. This applies to sessional doctors as well as full-time workers.
- Slight elevations of BP (135-139/85-89); women should be asked to return for a BP check within 3 to 7 days. Sessional doctors at clinics need ESMOE training on HDP.
- Women should be screened for mental health conditions and gender-based violence at the first ante-natal visit. Some women may require ongoing support at subsequent visits. Ensure that in young women in early pregnancy seen as an emergency, a detailed history on herbal medications and screening for suicide is considered.
- Facility managers must ensure that all doctors and nurses are aware of their professional and ethical responsibilities when on-duty, and must hold them accountable when these responsibilities are neglected.

5. Community

- Young women (adolescents and women less than 24 years) and their families must be informed of the warning signs of pre-eclampsia.
- Health professionals must discuss the use of MomConnect and transport issues if an emergency occurs especially in rural areas.
- Communities must be educated about contraception, “booking early for antenatal care”, recognising and acting on danger signs in early pregnancy, and how to access safe TOP.
- Family planning and contraception services must be promoted in all communities and must be made more accessible in order to reach all those who would benefit from them, including teenagers.

- Develop training package for CHWs and WBOTs, to sensitise communities to problem of PPH.

Interventions along the continuum of care

1. Pre-pregnancy

Contraception

- All women in the reproductive age group should receive advice on contraception. In particular, the long acting reversible contraception (LARC) methods should be promoted.
- All health professionals must ensure that they discuss family planning with women in the antenatal period (especially those over 35 years) and ensure that the woman's family planning requests are followed through at delivery or post-delivery.
- Contraceptive counselling should begin at school level and contraceptive services should be available at times convenient for school-going girls, higher educational facilities and working women. Innovative strategies such as tele-medicine must be devised to achieve this, with collaboration between the Departments of Health and Education.
- Use of postpartum IUCD to be promoted in all facilities performing deliveries.
- Preventing unintended pregnancies and ensuring safe conception in women living with HIV. This requires integration of family planning counselling and provision within the HIV care and ART services.
- Ensure safe conception issues are discussed with women in the reproductive age attending care for chronic medical conditions such as diabetes, and heart disease.
- All tertiary education institutions must have on-site or easy access for students to sexual and reproductive health services including contraception and safe TOP.
- Institute adolescent contraceptive clinics.

2.Pregnancy

Early Pregnancy focus

- Set up an expert group to develop strategies for improving management of early pregnancy issues: miscarriage and ectopic management, early pregnancy counselling service and access to safe TOP, earlier initiation antenatal care after pregnancy diagnosis, screening mental health and identifying women at risk suicide.

Antenatal care

- Expert review at 28 weeks
- Availability of next level of expertise

3. Intrapartum Care

- **Establish OMBUs** at all large district, regional and tertiary hospitals
- **Safe Caesarean delivery**: All hospitals conducting caesarean deliveries must comply with the minimum standards for safe caesarean delivery. Compliance must be assessed by regular internal review and intermittent external review.

- Ensure that all hospitals performing Caesarean delivery have performed and are compliant with the safe Caesarean Delivery Anaesthesia Checklist. This will ensure the availability of emergency resuscitation and airway equipment.
- Perform regular CD ESMOE Anaesthesia drills.
- Following Caesarean delivery or other abdominal surgery during pregnancy, women presenting with recurrent admissions or persistent abdominal signs require multidisciplinary consultations where prompt decisions regarding the need for re-look laparotomy must be made.
- Educate all doctors performing Caesarean deliveries about precautions for preventing bowel injury at repeat Caesarean deliveries. Ensure protocols are in place for intraoperative management of bowel injuries, including general surgical help, and transfer to higher levels of care.
- Strongly consider thrombo-prophylaxis for women who are obese (BMI > 35), those who have prolonged hospital stays and those who have had emergency caesarean delivery.
- **Establish minimum standards for Safe Labour ward care**: Establish a Safe Labour criteria and evaluation programme like the Safe Caesarean Delivery programme.
- Institute CLEVER programme[1] in all labour wards.

4. 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.

[1] Oosthuizen SJ, Bergh AM, Grimbeek J, Pattinson RC. Midwife-led obstetric units working 'CLEVER': Improving perinatal outcome indicators in a South African health district. South African Medical Journal. 2019 Jan 31;109(2):95-101

		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 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. **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 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 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	1. **Pre-pregnancy** 2. **First Half Pregnancy** 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 develop strategies to improve management early pregnancy: miscarriage and ectopic Mx, early pregnancy counselling service and access to safe TOP, earlier initiation ANC after pregnancy diagnosis, mental health screeningand 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

Conclusions

There has been a progressive and sustained, 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. The high numbers of deaths from PPH after vaginal delivery highlight the importance of improving basic intrapartum care by instituting on-site midwife run birthing units (OMBU); and adherence to minimum criteria for labour ward care and discharge from labour ward and facility. Further, there is a marked increase in caesarean delivery rates and although CD CFR, has declined, the Safe Caesarean Delivery programme must continue and expand. There has been a continual increase in early pregnancy maternal deaths and an expert group needs to devise strategies to: improve diagnosis and management early pregnancy complications (miscarriage and ectopic); provide early pregnancy counselling service and access to safe termination of pregnancy; promote earlier initiation of antenatal care after pregnancy diagnosis; and promote 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.

Overview

Introduction

The NCCEMD was established in 1997 and in 1999 brought out its first Saving Mothers Report which dealt with 1998. Since then an annual short report has been produced and a comprehensive triennial report. This 2017-2019 report is the seventh such triennial report.

A confidential enquiry in maternal deaths is not an epidemiological report, it is a quality of care report. However, if the methodology is consistent then trends in mortality can be ascertained.

The first few years entailed getting the systems in place and sorting out the database and definitions. In the initial reports there was some under-reporting of deaths combined with an increase in maternal deaths due to the HIV epidemic. The systems and databases have been stable since at least 2008-2010 (fourth triennial report) but probably also for 2005-2007 (third triennial report). There have been minor changes in classification to bring it in line with the ICD 10 Maternal Mortality classification in 2008-2010, but the methodology has remained consistent. Thus, it is valid to use the previous reports to ascertain trends in mortality, the causes of mortality and the missed opportunities and substandard care.

This overview will review 2017-2019 and the trends over the last 12 years (4 triennial reports) to derive some key messages and recommendations for the NCCEMD Seventh Saving Mothers report. The first combined Saving Mothers and Babies triennial report for 2017-2019 will be published separately. Combining the two reports and integrating recommendations was thought to be important since health care workers in maternity and perinatal services look after mother, fetus and newborn concurrently.
The detailed NCCEMD data for 2017-2019 is available as an appendix at the end of this report.

Methodology and Data validity

The method used to collect the data, the database and the definitions of conditions has remained identical to the 2014-2016 report and very similar to the 2008-2010 and 2011-2013 reports.

Table 1. Comparison of maternal deaths recorded in the District Health Information System (DHIS) and maternal deaths submitted to the NCCEMD and entered on the MaMMAS database 2019-2017

2019	DHIS	MaMMAS	Outside Facility	Pvt H	Coincidental	Comparable MaMMAS	Diff
ec Eastern Cape Province	121	120	4	1	2	113	-8
fs Free State Province	69	77	8	1	3	65	-4
gp Gauteng Province	249	176	7	13	7	149	-100
kz KwaZulu-Natal Province	177	185	8	5	6	166	-11
lp Limpopo Province	145	173	14	5	7	147	2
mp Mpumalanga Province	55	73	4	2	3	64	9
nw North West Province	67	81	6	4	3	68	1
nc Northern Cape Province	28	35	9	1	3	22	-6
wc Western Cape Province	49	62	9	3	6	44	-5
South Africa	960	982	69	35	40	838	-122

Table 2. Comparison of maternal deaths recorded in the District Health Information System (DHIS) and maternal deaths submitted to the NCCEMD and entered on the MaMMAS database 2019-2017 (cont.)

2018	DHIS	MaMMAS deaths	Outside facility	Pvt H	Coincidental	Comparable MaMMAS	diff
ec Eastern Cape Province	118	134	10	3	3	118	0
fs Free State Province	81	95	8	1	3	83	2
gp Gauteng Province	267	257	3	9	10	235	-32
kz KwaZulu-Natal Province	174	205	11	13	3	178	4
lp Limpopo Province	135	155	16	7	3	130	-5
mp Mpumalanga Province	93	113	5	5	1	102	9
nw North West Province	93	100	4	6	5	85	-8
nc Northern Cape Province	14	25	7	1	0	17	3
wc Western Cape Province	64	78	11	0	4	63	-1
South Africa	1039	1162	75	45	32	1011	-28

2017	DHIS deaths	MaMMAS deaths	Outside facility	Pvt H	Coincidental	Comparable MaMMAS	**diff**
Eastern Cape	135	142	12	2	4	124	-11
Free State	65	69	5	0	2	62	-3
Gauteng	257	223	5	8	9	201	-56
KwaZulu-Natal	193	245	13	9	6	217	24
Limpopo	150	181	15	7	7	152	2
Mpumalanga	97	118	8	4	1	105	8
North West	69	84	5	3	2	74	5
Northern Cape	18	28	4	0	0	24	6
Western Cape	53	80	15	2	7	56	3
South Africa	1037	1170	82	35	38	1015	-22

	DHIS	MaMMAS	Outside Facility	Pvt H	Coincidental	Comp. MaMMAS	Diff
2017	1037	1170	82	35	38	1015	-22
2018	1039	1162	75	45	32	1011	-28
2019	960	982	69	35	40	838	-122
2017-2019	3036	3314	226	115	110	2863	-173

Tables 1 and 2 indicate that there is fairly good correlation with DHIS once the confounders, (deaths outside facilities, deaths in private hospitals and coincidental deaths) are removed and Gauteng excluded.

Due to problems in Gauteng with collection of cases in 2017, and assessments and MaMMAS data entry in 2019, their numbers were adjusted to match the DHIS data. Also, for Limpopo in 2019 an adjustment to the number of cases entered in MaMMAS was made by including additional number of maternal deaths reported to the provincial MCWH coordinators office, which had not been entered into MAMMAs.

The 2018 Saving Mothers report did not include detailed Gauteng data as the files had been lost in a fire at the Bank of Lisbon where they were housed. Despite the loss of files in the fire, 257 files of the 267 maternal deaths recorded by DHIS were entered into MaMMAS. The missing files were identified from the DHIS records. This implies that the maternal deaths recorded by DHIS are reliable. For this reason, the maternal deaths for 2017 and 2019 were adjusted to match the DHIS data.

Provincial and National iMMR

Table 3 gives the institutional Maternal Mortality Ratio (iMMR) which excludes coincidental causes and deaths occurring outside health facilities. The table shows iMMR per year and for the whole triennium. In 2019, for the first time there are three provinces (Kwa-Zulu-Natal, Mpumalanga and Western Cape) that have a iMMR below 100/100000 live births; and the iMMR for 2019 was 98.82 deaths per 100,000 live births. Compared to 2017, all provinces had a reduction in iMMR in 2019 except Free State and Northern Cape where it has increased. Of note, KwaZulu-Natal, Mpumulanga and Western Cape had marked reductions.

Table 3. iMMR per year 2017-2019

Province	2017	2018	2019	iMMR 2017-9
ec Eastern Cape Province	132,10	121,94	110,32	121,24
fs Free State Province	139,14	186,78	144,83	157,14
gp Gauteng Province ©	117,23	110,86	100,54	109,52
kz KwaZulu-Natal Province	131,81	99,41	82,22	103,11
lp Limpopo Province ©	141,82	134,97	126,20	134,13
mp Mpumalanga Province	148,11	139,09	84,07	122,95
nw North West Province	143,07	157,31	124,98	141,62
nc Northern Cape Province	126,98	106,83	133,13	122,28
wc Western Cape Province	73,52	72,09	50,77	65,17
South Africa	**125,89**	**117,69**	**98,82**	**113,77**

There has been a progressive and sustained reduction in maternal mortality

a. In all provinces;
b. In all major underlying causes of maternal death;
c. The iMMR was below 100/100000 live births for the first time in 2019. The MMR estimated by the DHS in 1998 was 150/100000 live births;
d. The iMMR for South Africa for the 2017-2019 triennium was 113.8.

Table 4. Number of Post mortems performed for maternal deaths and suspected cause of death

Primary obstetric problems	No PM	PM	Total	%
Medical and surgical disorders	316	144	460	31,3
Non-pregnancy-related infections	653	83	736	11,3
Ectopic pregnancy	68	45	113	39,8
Miscarriage	138	56	194	28,9
Pregnancy-related sepsis	101	60	161	37,3
Obstetric haemorrhage	307	209	516	40,5
Hypertension	396	165	561	29,4
Anaesthetic complications	31	44	75	58,7
Adverse drug reactions	15	9	24	37,5
Embolism	45	53	98	54,1
Acute collapse - cause unknown	35	32	67	47,8
Miscellaneous	12	7	19	36,8
No primary cause found	14	10	24	41,7
Lack of information	24	12	36	33,3
MD	**2155**	**929**	**3084**	**30,1**
Death at home or outside health services	55	41	96	42,7
Coincidental cause	44	65	109	59,6
DDPCP	**2254**	**1035**	**3289**	

Establishing cause of maternal death was done by the independent provincial assessors based on clinical assessment of the patient's file and facility report but also on post-mortem results when performed with available results. Only 30.1% of maternal deaths had post mortems, reflecting the national shortage of anatomical and forensic pathology services, particularly in some provinces. See Table 4.

Underlying causes per province

Table 5. Number of maternal deaths per underlying cause and province 2017-2019

Primary obstetric problems	Eastern Cape	Free State	Gauteng (corrected)	KwaZulu-Natal	Limpopo (Corrected)	Mpuma-langa	North West	Northern Cape	Western Cape	South Africa
Medical and surgical disorders	59	28	115	117	53	31	35	8	35	481
Non-pregnancy-related infections	90	35	170	164	128	61	58	15	49	770
Ectopic pregnancy	5	6	29	22	22	15	11	3	6	119
Miscarriage	12	21	52	40	25	31	16	5	3	204
Pregnancy-related sepsis	20	13	41	31	24	10	14	0	17	170
Obstetric haemorrhage	71	44	108	73	106	64	40	17	21	544
Hypertensive disorders of pregnancy	65	56	147	79	86	56	57	19	25	590
Anaesthetic complications	8	9	12	19	11	8	3	3	5	77
Adverse drug reactions	5	0	6	4	7	0	1	0	3	25
Embolism	16	3	13	14	20	10	4	6	16	102
Acute collapse - cause unknown	14	1	20	14	10	3	5	0	5	72
Miscellaneous	2	0	5	1	5	0	2	1	5	21
Unknown - in facility	9	4	6	32	2	3	1	1	3	61
Maternal deaths	**376**	**220**	**725**	**610**	**497**	**292**	**247**	**78**	**193**	**3238**
Live births 2017-9	310130	140004	661647	591582	370581	237502	174408	63789	296132	2845775
Immr	121,24	157,14	109,52	103,11	134,13	122,95	141,62	122,28	65,17	113,77
Unknown - death outside facility	12	13	19	13	13	6	8	7	10	101
Coincidental cause	9	8	31	15	17	5	10	3	17	115
DDPCP	397	241	774	638	528	303	265	88	220	3454

Table 6. Maternal Mortality Rate by underling cause per province 2017-2019

Primary obstetric problems	Eastern Cape	Free State	Gauteng (corrected)	KwaZulu-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

Tables 5 and 6 show that the top 4 underlying causes are the top 4 in all provinces, but in varying order. They are NPRI, HDP, OH and M&S. M&S has emerged as a major cause of underlying cause of mortality as the other conditions have decreased in frequency. 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.
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.

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

Table 7. iMMR per province for underlying cause of maternal death

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

Levels of Care

The referral network is working with the lowest mortality in the primary level of care, increasing markedly as the levels of care increase (Tables 8 and 9)
Of note, private hospital deaths are excluded because there was no denominator for births in private hospitals.

Table 8. Number maternal deaths per underlying category and level of care (corrected for Limpopo and Gauteng) 2017-2019

Adjusted for Gauteng and Limpopo	CHC	District hospital	Regional hospital	Tertiary hospital	National central hospital	Total
Medical and surgical disorders	11	76	125	118	108	438
Non-pregnancy-related infections	8	194	288	154	93	737
Ectopic pregnancy	4	43	30	21	11	109
Miscarriage	1	58	72	43	22	195
Pregnancy-related sepsis	2	20	67	42	27	157
Obstetric haemorrhage	21	163	184	78	48	493
Hypertension	21	100	191	131	102	545
Anaesthetic complications	0	42	15	7	9	73
Adverse drug reactions	0	6	3	11	4	25
Embolism	5	24	26	22	5	82
Acute collapse - cause unknown	7	25	15	12	3	62
Miscellaneous	0	4	5	4	4	18
Unknown	10	22	21	8	0	61
Maternal deaths	91	776	1040	652	436	2996

Table 9. Maternal mortality ratio maternal deaths per underlying category and level of care (corrected for Limpopo and Gauteng) 2017-2019

Adjusted for Gauteng and Limpopo	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	In facility iMMR
Medical and surgical disorders	2,41	6,49	16,34	48,58	63,39	15,56
Non-pregnancy-related infections	1,75	16,63	37,73	63,63	54,52	26,20
Ectopic pregnancy	0,88	3,73	3,95	8,60	6,34	3,89
Miscarriage	0,22	4,98	9,40	17,63	12,68	6,94
Pregnancy-related sepsis	0,44	1,69	8,72	17,20	15,85	5,58
Obstetric haemorrhage	4,38	13,96	24,11	32,24	27,89	17,52
Hypertension	4,38	8,63	25,06	54,17	59,59	19,39
Anaesthetic complications	0,00	3,65	1,91	3,01	5,07	2,59
Adverse drug reactions	0,00	0,53	0,41	4,73	2,54	0,89
Embolism	1,09	2,05	3,41	9,03	3,17	2,92
Acute collapse - cause unknown	1,53	2,13	1,91	5,16	1,90	2,22
Miscellaneous	0,00	0,36	0,68	1,72	2,54	0,63
Unknown	2,19	1,87	2,72	3,44	0,00	2,18
iMMR	19,26	66,69	136,34	269,13	255,48	106,52

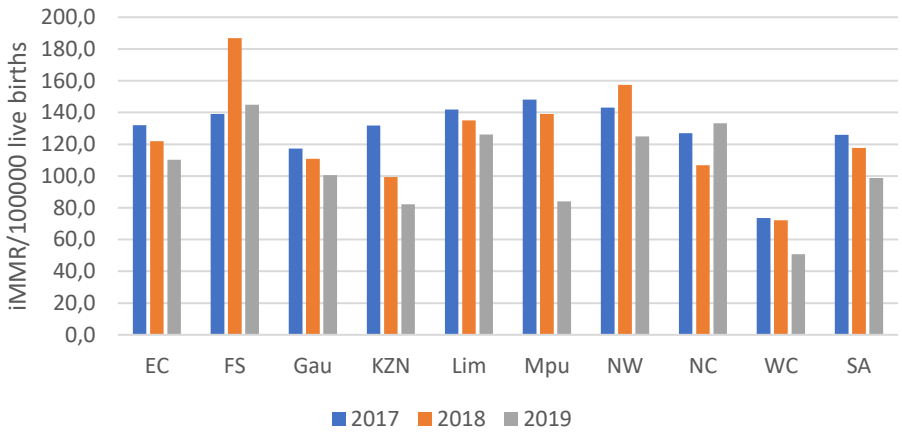
Trends in the underlying causes of maternal deaths

Table 10 compares the iMMR per underlying cause from 2017 to 2019. In all underlying causes there has been a reduction in mortality.
Figure 1 compares the iMMR per provinces from 2017 – 2019. For SA overall and for all provinces, except N.Cape, it was lowest in 2019 .

Table 10. Comparison of underlying causes per year 2017-2019

Primary obstetric problems	2017	2018	2019
Hypertensive disorders of pregnancy	23,09	19,88	19,39
Obstetric haemorrhage	20,13	19,19	18,09
Ectopic pregnancy	4,46	4,40	3,75
Miscarriage	8,11	7,90	5,63
Pregnancy-related sepsis	7,62	5,95	4,52
Anaesthetic complications	3,40	2,79	2,02
Embolism	3,84	4,53	2,47
Acute collapse - cause unknown	1,68	2,64	3,21
Non-pregnancy-related infections	32,59	29,15	19,95
Medical and surgical disorders	17,57	17,64	15,61
Unknown	1,66	2,52	2,12
iMMR for all maternal deaths	**125,89**	**117,69**	**98,82**

Figure 1. Comparison iMMR per province over trieneium (2017-2019)



The final and contributory final causes of death have remained similar to previous triennia (Table 11).

Table 11. Distribution of final and contributory causes of death per underlying condition 2017-2019

2017-2019	All	M&S	Cardiac disease	NPRI	Ec	Misca	PRS	OH	HDP	AR	ADR	Emb	AC	Micell	Unk	Home	Coin
Circulatory system	40,2	15,9	6,9	23,0	90,3	90,7	88,8	95,9	15,0	14,7	8,3	9,2	13,4	15,8	9,0	3,1	29,4
- Hypovolaemic shock	23,9	5,7	2,1	3,0	84,1	28,9	6,8	89,3	10,5	13,3	0,0	6,1	10,4	10,5	5,1	3,1	22,0
- Septic shock	16,3	10,2	4,8	20,0	6,2	61,9	82,0	6,6	4,5	1,3	8,3	3,1	3,0	5,3	3,8	0,0	7,3
Respiratory failure	30,4	32,4	22,1	62,1	18,6	16,5	19,3	8,7	21,7	50,7	37,5	24,5	14,9	21,1	16,0	7,3	31,2
Cardiac failure/Pulmonary oedema	16,5	32,4	73,8	8,7	9,7	8,8	6,8	6,6	35,1	10,7	4,2	19,4	13,4	15,8	5,8	3,1	9,2
Acute collapse due to embolism	4,3	5,9	10,3	1,0	0,9	0,5	1,9	1,0	1,6	5,3	4,2	73,5	9,0	0,0	1,3	2,1	1,8
Renal failure	14,6	16,3	11,0	16,4	8,8	25,8	29,2	6,2	19,8	1,3	33,3	5,1	4,5	15,8	2,6	1,0	9,2
Liver failure	8,4	9,6	3,4	8,2	4,4	10,3	14,9	3,1	12,3	0,0	33,3	4,1	1,5	42,1	5,1	1,0	8,3
Cerebral complications	20,4	22,2	5,5	17,4	4,4	4,1	5,6	4,1	56,3	33,3	25,0	2,0	11,9	5,3	6,4	2,1	28,4
- Intracranial haemorrhage	6,5	5,4	0,7	0,4	0,0	1,0	0,0	0,8	28,5	0,0	0,0	0,0	1,5	0,0	1,3	0,0	14,7
- Cerebral oedema resulting in coning	2,0	2,6	1,4	0,7	0,0	0,0	0,0	0,2	8,0	0,0	4,2	0,0	0,0	0,0	1,3	1,0	1,8
- Meningitis	3,2	0,4	0,0	12,6	0,0	1,0	0,6	0,0	0,2	0,0	4,2	1,0	0,0	0,0	0,0	0,0	0,0
- Cerebral emboli	0,3	0,9	0,0	0,3	0,0	0,0	2,5	0,0	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
- Brain death following hypoxic event	3,9	4,3	0,0	0,8	3,5	1,0	0,0	1,4	10,2	29,3	12,5	1,0	4,5	0,0	0,6	0,0	2,8
- Unspecified	4,5	8,5	3,4	2,6	0,9	1,0	2,5	1,7	9,1	4,0	4,2	0,0	6,0	5,3	3,2	1,0	9,2
Metabolic	13,6	17,4	10,3	15,6	14,2	16,5	29,8	7,8	8,7	2,7	25,0	11,2	9,0	52,6	8,3	0,0	17,4
- Maternal ketoacidosis	2,5	4,3	2,1	2,4	5,3	4,1	3,1	2,3	1,4	0,0	4,2	1,0	0,0	15,8	3,8	0,0	0,9
- Electrolyte imbalance	7,0	7,6	3,4	9,8	7,1	6,2	14,3	4,1	4,3	1,3	8,3	6,1	4,5	26,3	0,0	0,0	11,0
- Thyroid crisis	0,2	0,7	0,7	0,4	0,0	0,0	0,0	0,0	0,0	0,0	4,2	0,0	0,0	0,0	0,6	0,0	0,0
- Lactic acidosis	2,8	2,8	2,1	2,0	1,8	5,7	9,9	1,2	2,3	0,0	8,3	4,1	3,0	5,3	1,9	0,0	2,8
- Other	1,0	2,0	2,1	1,0	0,0	0,5	2,5	0,2	0,7	1,3	0,0	0,0	1,5	5,3	1,9	0,0	2,8
Haematological	28,6	18,3	9,7	21,5	37,2	52,1	28,6	62,0	23,4	8,0	25,0	7,1	6,0	21,1	11,5	3,1	12,8
- DIC	14,4	7,0	2,8	5,7	11,5	24,7	16,1	38,4	15,2	5,3	20,8	4,1	1,5	10,5	3,8	0,0	5,5
- Severe anaemia	14,3	11,3	6,9	15,8	25,7	27,3	12,4	23,6	8,2	2,7	4,2	3,1	4,5	10,5	7,7	3,1	7,3
Immune system failure	20,8	12,8	11,0	57,1	11,5	17,5	28,6	9,3	4,6	5,3	8,3	8,2	11,9	10,5	6,4	4,2	4,6

Description of factors associated with maternal deaths

Maternal age and maternal deaths 2017-2019

Table 12 and figures 2 and 3 illustrate the relationship between maternal age and maternal deaths. The extremes of age are at the highest risks of maternal death, particularly from hypertensive disorders of pregnancy.

Table 12. Maternal age and iMMR of the underlying cause of maternal death

Primary obstetric problem	10-14	15-19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45+
Medical and surgical disorders	25,1	15,6	12,7	14,8	17,1	20,4	31,5	12,1
Non-pregnancy-related infections	25,1	11,9	15,4	23,9	31,2	44,5	53,9	48,2
Ectopic pregnancy	0,0	1,9	2,7	4,4	4,6	5,5	6,1	0,0
Miscarriage	0,0	4,5	5,0	6,7	6,9	9,5	15,2	36,2
Pregnancy-related sepsis	50,3	5,2	4,1	4,6	6,1	8,9	9,1	12,1
Obstetric haemorrhage	0,0	9,7	9,3	13,7	20,0	38,2	55,9	36,2
Hypertension	50,3	23,8	18,3	16,3	18,6	22,7	34,6	72,3
Anaesthetic complications	0,0	1,1	2,2	2,7	2,9	2,6	7,1	12,1
Adverse drug reactions	0,0	1,1	0,7	0,7	1,1	0,6	1,0	12,1
Embolism	0,0	2,2	2,0	3,1	5,0	4,0	7,1	12,1
Acute collapse - cause unknown	0,0	2,6	1,6	2,0	2,2	4,3	4,1	0,0
Miscellaneous	25,1	0,0	1,0	0,9	0,5	0,3	0,0	0,0
No primary cause found	0,0	3,0	0,5	0,7	0,3	0,6	2,0	12,1
Lack of information	0,0	3,7	0,4	0,9	1,3	1,7	2,0	0,0
Maternal deaths	176,0	86,4	76,0	95,4	117,9	163,7	229,7	265,3

Denominator: Statistical release P0305 **Recorded live births 2018**, StatsSA June 2020

Figure 2. Maternal age and overall iMMR

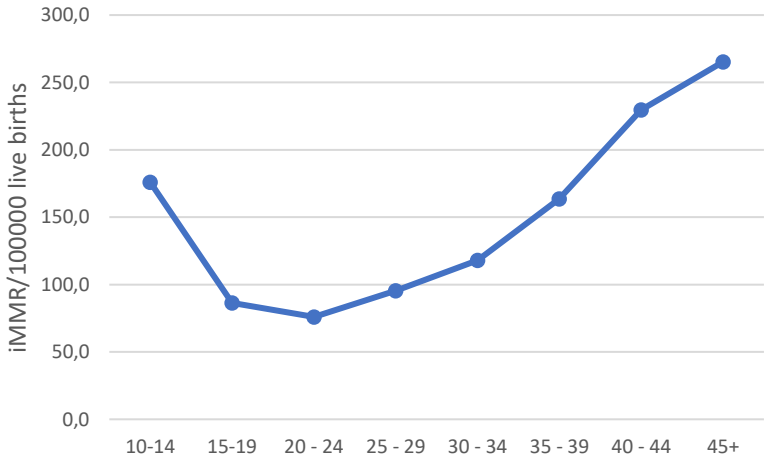
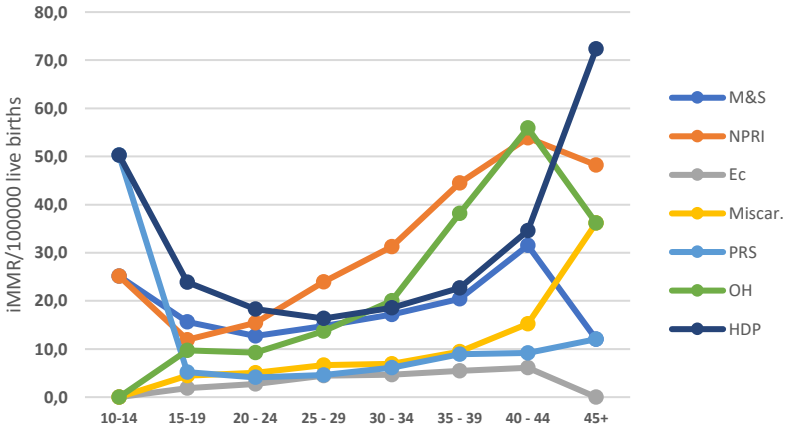


Figure 3. Maternal age and iMMR per disease category



M&S – Pre-existing medical and surgical conditions, NPRI – Non-pregnancy related infections, Ec – ectopic pregnancy, Miscar. – Miscarriage, PRS – Pregnancy related sepsis, OH – Obstetric haemorrhage, HDP – Hypertensive disorders of pregnancy

Relationship between parity and maternal death

Table 13. Distribution of disease category within the parity

Primary obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unknown	Total
Medical and surgical disorders	16,4	14,5	13,9	18,0	12,9	7,9	10,8	11,8	14,9
Non-pregnancy-related infections	19,3	25,7	27,0	22,4	24,3	30,2	24,3	26,9	23,9
Ectopic pregnancy	4,1	2,8	2,9	3,9	1,5	0,0	0,0	20,4	3,7
Miscarriage	4,7	6,9	6,3	4,7	6,4	4,8	10,8	20,4	6,3
Pregnancy-related sepsis	5,9	5,2	5,5	3,9	4,0	7,9	5,4	3,2	5,2
Obstetric haemorrhage	10,6	15,1	21,5	21,5	24,3	31,7	24,3	2,2	16,7
Hypertensive disorders in pregnancy	25,4	18,7	14,2	15,2	14,9	9,5	10,8	5,4	18,2
Anaesthetic complications	2,8	3,1	1,9	2,2	2,5	0,0	0,0	1,1	2,4
Adverse drug reactions	1,1	1,0	0,6	0,3	0,5	0,0	0,0	1,1	0,8
Embolism	3,8	2,2	2,3	5,0	3,0	0,0	10,8	5,4	3,2
Acute collapse - cause unknown	2,0	2,4	2,4	1,4	3,5	1,6	2,7	0,0	2,2
Miscellaneous	0,7	0,8	0,4	0,6	1,0	0,0	0,0	0,0	0,6
No primary cause found	1,2	0,9	0,4	0,6	0,0	3,2	0,0	0,0	0,8
Lack of information	2,0	0,6	0,7	0,6	1,5	3,2	0,0	2,2	1,2
Maternal deaths	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Table 14. Distribution of the parity within the disease category

Primary obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unknown	Total
Medical and surgical disorders	30,2	24,6	21,1	14,1	5,7	1,1	0,9	2,4	100,0
Non-pregnancy-related infections	22,3	27,3	25,5	11,0	6,7	2,6	1,2	3,4	100,0
Ectopic pregnancy	31,0	19,5	17,7	12,4	2,7	0,0	0,0	16,8	100,0
Miscarriage	20,6	27,8	22,7	8,8	6,7	1,5	2,1	9,8	100,0
Pregnancy-related sepsis	31,1	25,5	23,6	8,7	5,0	3,1	1,2	1,9	100,0
Obstetric haemorrhage	17,4	22,9	29,1	15,1	9,5	3,9	1,7	0,4	100,0
Hypertensive disorders in pregnancy	38,5	26,0	17,6	9,8	5,3	1,1	0,7	0,9	100,0
Anaesthetic complications	32,0	32,0	17,3	10,7	6,7	0,0	0,0	1,3	100,0
Adverse drug reactions	37,5	33,3	16,7	4,2	4,2	0,0	0,0	4,2	100,0
Embolism	32,7	17,3	16,3	18,4	6,1	0,0	4,1	5,1	100,0
Acute collapse - cause unknown	25,4	28,4	25,4	7,5	10,4	1,5	1,5	0,0	100,0
Miscellaneous	31,6	31,6	15,8	10,5	10,5	0,0	0,0	0,0	100,0
No primary cause found	41,7	29,2	12,5	8,3	0,0	8,3	0,0	0,0	100,0
Lack of information	47,2	13,9	13,9	5,6	8,3	5,6	0,0	5,6	100,0
Maternal deaths	27,5	25,3	22,6	11,7	6,5	2,0	1,2	3,0	100,0

Primigravida have the highest proportion of mortality for HDP, and multipara for OH.

HIV infection

Of the maternal deaths who were HIV positive, 18%, were not on treatment, and 73.1% were on FDC (Table 15).

Table 15. Details of HIV testing and treatment

HIV status	n	%
Positive	1541	46,9
Negative	1383	42,0
Declined test	0	0
Unknown	365	11,1

HIV treatment	Known positive 1541	% of known HIV pos
None	282	18,3
Dual therapy	7	0,5
FDC	1126	73,1
Other HAART	126	8,2

Table 16 . Distribution of pattern of disease and HIV status

Primary obstetric problems	All	Declined and Unk.	Negative	Positive	Disease pattern FDC
Medical and surgical disorders	14,9	11,3	20,1	11,1	12,1
Non-pregnancy-related infections	23,9	7,2	5,1	43,5	41,5
Ectopic pregnancy	3,7	18,8	1,1	3,0	2,4
Miscarriage	6,3	22,3	3,0	6,0	4,6
Pregnancy-related sepsis	5,2	2,4	4,7	6,2	5,8
Obstetric haemorrhage	16,7	9,9	21,5	13,9	15,3
Hypertensive disorders in pregnancy	18,2	17,5	29,5	8,5	9,6
Anaesthetic complications	2,4	0,7	3,6	1,7	1,7
Adverse drug reactions	0,8	1,7	0,8	0,6	0,6
Embolism	3,2	2,7	4,5	2,1	2,4
Acute collapse - cause unknown	2,2	1,4	2,9	1,7	1,9
Miscellaneous	0,6	1,0	0,8	0,3	0,4
No primary cause found	0,8	1,4	0,9	0,5	0,7
Lack of information	1,2	1,7	1,5	0,7	1,0
Maternal deaths	100,0	100,0	100,0	100,0	100,0

Table 17. Distribution of HIV status within each disease category

Primary obstetric problems	All	Declined and Unk.	Negative	Positive
Medical and surgical disorders	100,0	7,2	56,7	36,1
Non-pregnancy-related infections	100,0	2,9	9,0	88,2
Ectopic pregnancy	100,0	48,7	12,4	38,9
Miscarriage	100,0	33,5	20,1	46,4
Pregnancy-related sepsis	100,0	4,3	37,9	57,8
Obstetric haemorrhage	100,0	5,6	54,3	40,1
Hypertensive disorders in pregnancy	100,0	9,1	68,4	22,5
Anaesthetic complications	100,0	2,7	62,7	34,7
Adverse drug reactions	100,0	20,8	41,7	37,5
Embolism	100,0	8,2	59,2	32,7
Acute collapse - cause unknown	100,0	6,0	56,7	37,3
Miscellaneous	100,0	15,8	57,9	26,3
No primary cause found	100,0	16,7	50,0	33,3
Lack of information	100,0	13,9	55,6	30,6
Maternal deaths	100,0	9,5	42,2	48,3

HIV positive women accounted for 88% of the NPRI deaths (Table 17)

Women early in pregnancy were the least likely to be on ART Table 18)

Table 18. Treatment of HIV within each disease category

Primary obstetric problems	No Treatment	Dual	FDC
Medical and surgical disorders	13,9	0,6	79,5
Non-pregnancy-related infections	20,5	0,3	69,6
Ectopic pregnancy	27,3	0,0	59,1
Miscarriage	35,6	0,0	55,6
Pregnancy-related sepsis	22,6	2,2	67,7
Obstetric haemorrhage	13,0	0,5	80,2
Hypertensive disorders in pregnancy	12,7	0,0	82,5
Anaesthetic complications	11,5	0,0	69,2
Adverse drug reactions	22,2	0,0	77,8
Embolism	6,3	3,1	81,3
Acute collapse - cause unknown	8,0	0,0	84,0
Miscellaneous	20,0	0,0	80,0
No primary cause found	0,0	0,0	100,0
Lack of information	0,0	0,0	100,0
Maternal deaths	18,4	0,5	73,0

Mode of delivery, Caesarean delivery, and Hysterectomy

The CD rate, now at 28.1% has increased markedly over the triennia, and continues to increase. Although not covered in this data set, it is noted that, with the Covid- 19 pandemic in 2020, there is a worrying trend of doing CD for Covid-19 infected women.

Table 19. iMMR by mode of delivery and level of care

Underlying obstetric problems	Vaginal	CD	DH CD	RH CD	TH CD	NC CD	CHC CD
Medical and surgical disorders	6,68	18,31	4,17	11,16	39,01	48,15	0,00
Non-pregnancy-related infections	14,53	11,49	4,86	10,46	18,95	19,26	0,00
Ectopic pregnancy	0,00	0,13	0,00	0,00	0,00	1,20	0,00
Miscarriage	0,44	0,00	0,00	0,00	0,00	0,00	0,00
Pregnancy-related sepsis	3,75	10,16	2,08	9,76	20,06	21,67	0,00
Obstetric haemorrhage	9,80	35,82	26,73	31,04	54,62	38,52	175,44
Hypertensive disorders of pregnancy	6,14	36,36	6,94	34,52	92,52	63,80	350,88
Anaesthetic complications	0,10	8,15	11,80	3,84	6,69	6,02	0,00
Adverse drug reactions	0,34	0,13	0,00	0,00	0,00	1,20	0,00
Embolism	1,27	5,88	3,12	4,18	8,92	3,61	0,00
Acute collapse - cause unknown	1,07	2,67	2,08	1,74	5,57	1,20	350,88
Miscellaneous	0,20	0,40	0,00	0,70	0,00	1,20	0,00
No primary cause found	0,29	0,67	0,00	0,70	1,11	0,00	0,00
Lack of information	0,44	0,67	0,35	0,70	0,00	0,00	0,00
iMMR	45,06	130,86	62,14	108,80	247,45	205,85	877,19

Table 20. iMMR of vaginal births and underlying causes

Underlying obstetric problems	CHC	DH	RH	PTH	NCH
Medical and surgical disorders	0,85	2,25	9,24	29,27	28,48
Non-pregnancy-related infections	0,42	8,78	24,35	46,67	41,01
Ectopic pregnancy	0,00	0,00	0,00	0,00	0,00
Miscarriage	0,00	0,45	0,42	0,79	1,14
Pregnancy-related sepsis	0,42	1,01	7,14	15,82	7,97
Obstetric haemorrhage	2,97	6,98	14,70	19,77	9,11
Hypertensive disorders of pregnancy	1,06	2,48	9,03	19,77	27,34
Anaesthetic complications	0,00	0,00	0,00	0,00	2,28
Adverse drug reactions	0,00	0,11	0,21	3,95	0,00
Embolism	0,42	0,90	0,84	4,75	1,14
Acute collapse - cause unknown	0,64	0,68	1,47	2,37	1,14
Miscellaneous	0,00	0,11	0,00	0,79	2,28
No primary cause found	0,21	0,11	0,42	1,58	0,00
Lack of information	0,21	0,56	0,00	1,58	0,00

Tables 19 and 20 compare iMMR by mode of delivery and level of care. CD delivery is associated with a threefold higher MMR than vaginal delivery

Table 21. Proportion of maternal deaths with Hysterectomies

Primary obstetric problems	No Hyst.	Hyst. Done	Total
Medical and surgical disorders	452	8 (1.7%)	460
Non-pregnancy-related infections	725	11(1.5%)	736
Ectopic pregnancy	110	3(2.7%)	113
Miscarriage	159	35(18%)	194
Pregnancy-related sepsis	115	46(28.6%)	161
Obstetric haemorrhage	387	129(25%)	516
Hypertensive disorders in pregnancy	542	19(3.4%)	561
Anaesthetic complications	72	3 (4%)	75
Embolism	94	4(4.1%)	98
Acute collapse - cause unknown	66	1(1.5%)	67
Miscellaneous	17	2(10.5%)	19
- No primary cause found	23	1 (4.2%)	24
- Lack of information	33	3 (8.3%)	36
MD	2795	265 (8.7%)	3060
- Death at home or outside health services	95	1	96
Coincidental cause	105	4	109
DDPCP	3019	270	3289

It is again obvious that there is considerable delay in managing women with haemorrhage and sepsis with relatively very few hysterectomies being performed. This is a reflection of the lack of clinical skills (Table 21).

Prolonged labour

Table 22. Numbers maternal deaths with prolonged labour and underlying cause of death

Primary obstetric problems	No Prolonged labour	Prolonged labour	Were in labour	% in labour having prolonged labour	CD and in labour	CD and prolonged labour	% CD with prolonged labour
Medical and surgical disorders	243	11	254	4,3	95	6	6,3
Non-pregnancy-related infections	348	8	356	2,2	54	4	7,4
Ectopic pregnancy	10	0	10	0,0	0	0	
Miscarriage	9	0	9	0,0	0	0	
Pregnancy-related sepsis	79	15	94	16,0	47	12	25,5
Obstetric haemorrhage	326	56	382	14,7	221	39	17,6
Hypertensive disorders in pregnancy	367	18	385	4,7	212	8	3,8
Anaesthetic complications	51	10	61	16,4	54	9	16,7
Adverse drug reactions	11	1	12	8,3	1		0,0
Embolism	62	3	65	4,6	32	3	9,4
Acute collapse - cause unknown	40	4	44	9,1	13	2	15,4
Miscellaneous	10	0	10	0,0	3	0	0,0
No primary cause found	8	2	10	20,0	4	1	25,0
Lack of information	17		17	0,0	3		0,0
MD	1581	128	1709	7,5	739	84	11,4
Death at home or outside health services	46	1	47	2,1	10	1	10,0
Coincidental cause	44	0	44	0,0	11	0	0,0
DDPCP	1671	129	1800	7,2	760	85	11,2

Sepsis and haemorrhage are unsurprisingly related to prolonged labour, but less frequently than anticipated (Table 22).

Anaemia

Table 23. Numbers maternal deaths with anaemia and underlying cause of death

Primary obstetric problems	No Anaemia	Anaemia	HB Known	% anaemic	Unknown
Medical and surgical disorders	247	118	365	32,3	95
Non-pregnancy-related infections	273	312	585	53,3	151
Ectopic pregnancy	16	54	70	77,1	43
Miscarriage	46	59	105	56,2	89
Pregnancy-related sepsis	60	44	104	42,3	57
Obstetric haemorrhage	328	102	430	23,7	86
Hypertensive disorders in pregnancy	387	76	463	16,4	98
Anaesthetic complications	56	14	70	20,0	5
Adverse drug reactions	13	4	17	23,5	7
Embolism	64	19	83	22,9	15
Acute collapse - cause unknown	49	6	55	10,9	12
Miscellaneous	11	6	17	35,3	2
No primary cause found	11	6	17	35,3	7
Lack of information	16	9	25	36,0	11
Death at home or outside health services	43	17	60	28,3	36
Coincidental cause	31	17	48	35,4	61
DDPCP	1651	863	2514	34,3	775

Anaemia remains are major risk factor especially in NPRI, PRS, OH, AR

History of Previous Caesarean Delivery

Table 24. Numbers maternal deaths with previous CD and underlying cause of death

Primary obstetric problems	No Prev. CD	Prev. CD	Unk.
Medical and surgical disorders	319	79	62
Non-pregnancy-related infections	500	110	126
Ectopic pregnancy	65	6	42
Miscarriage	99	26	69
Pregnancy-related sepsis	97	32	32
Obstetric haemorrhage	351	130	35
Hypertensive disorders in pregnancy	429	91	41
Anaesthetic complications	50	21	4
Adverse drug reactions	21	0	3
Embolism	68	15	15
Acute collapse - cause unknown	49	11	7
Miscellaneous	13	2	4
No primary cause found	16	4	4
Lack of information	26	5	5
MD	2103	532	449
Death at home or outside health services	62	8	26
Coincidental cause	54	6	49
DDPCP	2219	546	524

A history of previous CD is most frequent in maternal deaths from OH

Induction of labour

The highest proportions of IOLs occurred in maternal deaths from OH and HDP (Table 25)

Table 25. Numbers maternal deaths having Induction of labour and underlying cause of death

Primary obstetric problems	Not induced	Induced	Unk.	N/A
Medical and surgical disorders	408	28	12	12
Non-pregnancy-related infections	653	41	11	31
Ectopic pregnancy	101	0	2	10
Miscarriage	148	24	8	14
Pregnancy-related sepsis	126	16	17	2
Obstetric haemorrhage	436	70	9	1
Hypertensive disorders in pregnancy	475	66	5	15
Anaesthetic complications	61	9	2	3
Adverse drug reactions	18	3	2	1
Embolism	76	13	4	5
Acute collapse - cause unknown	55	9	2	1
Miscellaneous	14	3	1	1
No primary cause found	19	3		2
Lack of information	30	3	1	2
MD	2620	288	76	100
Death at home or outside health services	83	3	6	4
Coincidental cause	96	2	4	7
DDPCP	2799	293	86	111

Health system

Antenatal Care

Table 26. Antenatal care details amongst maternal deaths

Primary obstetric problems	No ANC	Unknown	Received ANC	Total ANC known	% known to have received ANC	<20 weeks	% <20 weeks
Medical and surgical disorders	98	38	324	422	76,8	183	56,5
Non-pregnancy-related infections	229	52	455	684	66,5	229	50,3
Ectopic pregnancy	86	13	14	100	14,0	11	78,6
Miscarriage	134	26	34	168	20,2	27	79,4
Pregnancy-related sepsis	28	26	107	135	79,3	47	43,9
Obstetric haemorrhage	66	17	433	499	86,8	218	50,3
Hypertensive disorders in pregnancy	95	28	438	533	82,2	254	58,0
Anaesthetic complications	8	1	66	74	89,2	35	53,0
Adverse drug reactions	8	2	14	22	63,6	8	57,1
Embolism	16	7	75	91	82,4	49	65,3
Acute collapse - cause unknown	4	4	59	63	93,7	29	49,2
Miscellaneous	4	3	12	16	75,0	8	66,7
No primary cause found	9		15	24	62,5	8	53,3
Lack of information	11	2	23	34	67,6	10	43,5
MD	796	219	2069	2865	72,2	1116	53,9
Death at home or outside health services	14	17	65	79	82,3	39	60,0
Coincidental cause	28	37	44	72	61,1	24	54,5
DDPCP	838	273	2178	3016	72,2	1179	54,1

There were 72,2% of maternal deaths who had attended antenatal care but only 54% attended before 20 weeks. The majority of women who died from M&S, HDP, NPRI and OH attended antenatal clinic, indicating that the quality of care given at antenatal care is a problem

Emergency Referrals

Table 27. Details of Emergency Referrals for maternal deaths

(a) Primary obstetric problems	Not Referred	CHC	DH	RH	PTH	NCH	Pvt H
Medical and surgical disorders	202	79	108	37	19	3	12
Non-pregnancy-related infections	327	166	187	39	6	1	10
Ectopic pregnancy	65	25	17	2	1	0	3
Miscarriage	99	37	43	8	3	0	4
Pregnancy-related sepsis	73	19	55	11	1	0	2
Obstetric haemorrhage	268	111	118	12	1	1	5
Hypertensive disorders in pregnancy	208	133	155	47	7	0	11
Anaesthetic complications	46	13	13	1	1	0	1
Adverse drug reactions	14	3	7	0	0	0	0
Embolism	60	12	18	6	1	0	1
Acute collapse - cause unknown	53	6	6	1	0	0	1
Miscellaneous	8	3	5	2	0	0	1
No primary cause found	15	6	2	1			
Lack of information	27	4	5				
MD	1465	617	739	167	40	5	51
Death at home or outside health services	83	7	3	1			2
Coincidental cause	79	9	15	4	0	1	1
DDPCP	1627	633	757	172	40	6	54

(b) Level Referred from	n	% of referred patients	% of maternal deaths	Problems with emergency referral from this level that is directly linked to the maternal death	Died at this level and there was a inter- institution transport problem	% between institution transfer problem
CHC	633	38,1	19,2	13	15,3	1,0
District Hospital	757	45,5	23,0	66	9,0	8,0
Regional Hospital	172	10,3	5,2	50	5,1	27,0
Tertiary Hospital	40	2,4	1,2	42	6,9	
National Central Hospital	6	0,4	0,0	16	4,0	
Private Hospital	54	3,2	1,6	1	1,0	
Total	1662	100,0	50,5	193	11,6	

(c) Level death occurred	Cases managed at some point		Cases died at this level	
	N	%		%
CHC	1433	46,8	89	2,9
DH	1576	51,4	774	25,3
RH	1280	41,8	1028	33,6
TH	1048	34,2	1060	34,6
Pvt H	159	5,2	113	3,7
TOTAL	3064		3064	

Emergency referral appears not be a problem from CHCs or district hospitals; 46,8% of 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. Table 27 (c), Figure 4, Figure 5

Figure 4. Comparison of percentage managed at some point and those that died at that level

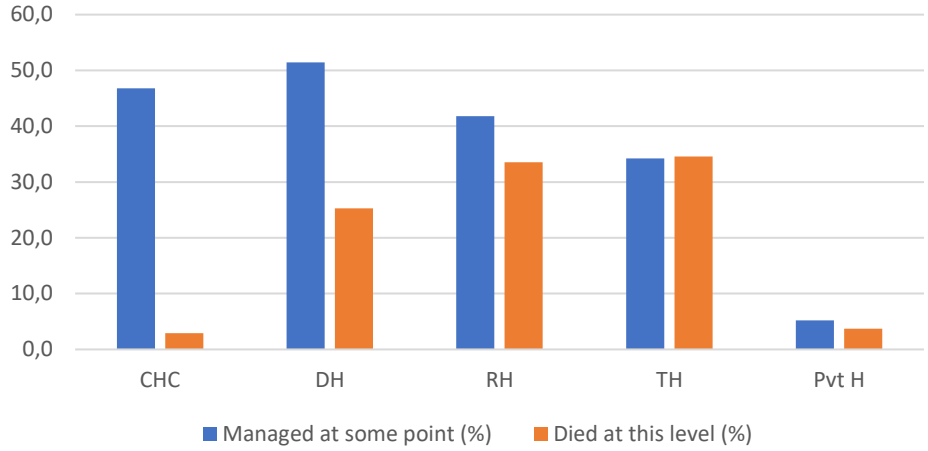


Figure 5. Comparison of number of women managed at some point and those that died at that level

Anaesthesia

There were 61% of maternal deaths who had an anaesthetic; 0,001% at CHC, 16,7% at DH, 23,8% at RH, 12,9% at PTH, 9,4% at NCH, and 4,3% at private hospitals (Table 28)

Table 28. Numbers of anaesthetics performed by level of care and underlying cause

Primary obstetric problems	No anaesthesia	CHC	DH	RH	PTH	NHC	Pvt H
Medical and surgical disorders	311	0	15	49	32	37	16
Non-pregnancy-related infections	624	0	15	51	24	15	7
Ectopic pregnancy	70	0	18	12	7	5	1
Miscarriage	109	0	19	34	19	11	2
Pregnancy-related sepsis	53	1	18	41	25	20	3
Obstetric haemorrhage	191	0	122	113	44	27	19
Hypertensive disorders in pregnancy	303	0	35	95	66	48	14
Anaesthetic complications	6	0	43	14	4	4	4
Adverse drug reactions	22	0	1	0	0	1	0
Embolism	52	0	12	16	8	3	7
Acute collapse - cause unknown	49	0	8	5	4	1	0
Miscellaneous	9	0	0	4	2	2	2
No primary cause found	17			2	2		3
Lack of information	29		2	3	1		1
MD	**1845**	**1**	**308**	**439**	**238**	**174**	**79**
Death at home or outside health services	83		3	7	2		1
Coincidental cause	92	0	2	5	5	4	1
DDPCP	2020	1	313	451	245	178	81

Avoidable factors

Overall, 62,4% maternal deaths were potentially preventable; with the major underlying conditions being AR (93,3%), OH (89,5%), PRS (76,4%), Ectopic pregnancy (75,2%), HDP (70,6%), miscarriage (64,9%). This is unchanged from previous years(Table 29) and Figure 6.

The Major community orientate avoidable factors were delay seeking help, transport problems from home to health facility, none or infrequent attendance for antenatal care, and unsafe abortion for those dying of miscarriage. This is unchanged from previous years. (Table 31)

Major administrative factors included lack of appropriately trained staff (skills shortage) of doctors (20.5% of deaths), nurses (13.7% of deaths); OH, AR, Ectopic pregnancy and HDP were the conditions most affected (Table 32).

Community AF and Administrative AF were similar across all levels of care; but medical care management at site of death worst at DH 80% managed poorly, then CHC and RH 60% managed poorly. Treatment prior to referral 55% poor DH, 50% RH and 40% CHC.

Major problem assessment and recognition of problem CHC and DH, and not following standard protocols at DH, RH, and TH, either due to poor clinical practices or overburdened services. (Table 33)

Examples of substandard care include inadequate assessments: (a) after vaginal delivery, 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.

Avoidable factors 2017-2019

Table 29. Proportion of cases per underlying cause with avoidable factors managed at that level (>60%)

2017-2019	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
Community/patient orientated	59,9	66,7	53,9	82,9	61,3	100,7	64,2	34,7	50,9	15,3	95,0	33,7	46,9	41,2		
Administrative	52,3	28,4	43,6	39,4	64,4	56,5	54,7	74,8	60,2	61,4	33,3	41,6	32,1	36,8	44,4	32,1
Resuscitation	54,9	52,5	46,6	50,1	69,5	62,4	47,9	68,3	51,1	78,5	42,9	42,7	42,9	47,1	65,2	75,0
Medical care - CHC	39,3	27,3	32,8	51,0	29,0	15,6	31,3	39,2	47,4	24,3	16,7	15,8	32,4	20,0	29,8	16,7
Medical care – District Hospital	69,4	60,0	62,6	57,3	86,0	76,7	68,8	90,1	64,6	96,1	28,6	55,3	64,5	44,4	69,8	61,9
Medical care – Regional hospital	59,0	41,9	57,8	46,2	74,2	67,6	65,4	78,6	59,9	81,3	50,0	45,7	58,3	66,7	35,7	12,5
Medical care – Tertiary and above	40,2	25,9	33,8	29,5	67,9	59,3	50,8	53,5	41,8	50,0	16,7	42,3	41,7	42,9	44,4	66,7
Medical Care – Private Hospital	62,9	0,0	65,4	40,0	40,0	133,3	55,6	80,0	60,7	80,0	-	55,6	100,0	50,0	66,7	50,0

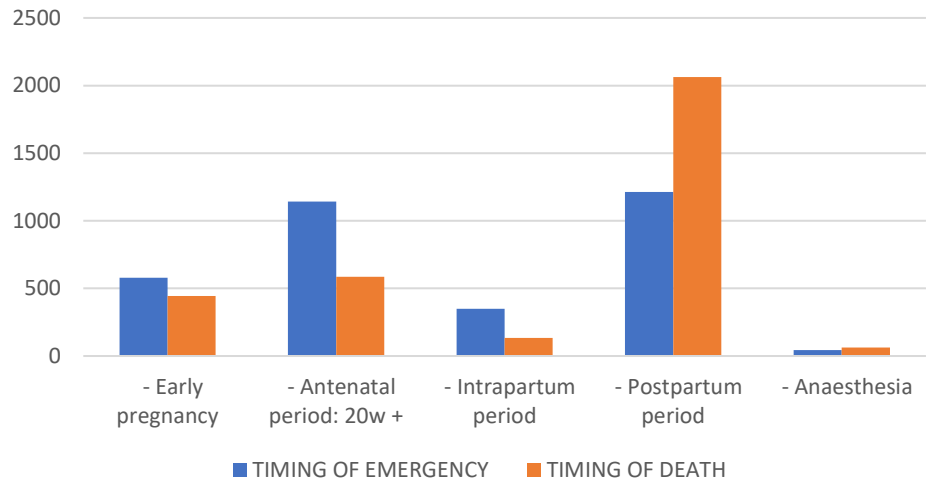
District hospitals stand out as having the most avoidable factors (table 29, Table 35 and Figure 8).

Table 30 and Figure 7 show that the largest proportion of emergency events occur antepartum and postpartum, with the majority of deaths occurring postpartum

Table 30. Timing of emergency and timing of death

2017-2019	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
TIMING OF EMERGENCY																
- Early pregnancy	579	34	83	143	102	113	1	13	27	5	4	12	4	7	31	18
- Antenatal period: 20w +	1141	64	178	321	5	18	17	82	336	5	12	13	23	6	61	40
- Intrapartum period	348	3	27	27	0	5	12	147	51	37	1	14	13	1	10	3
- Postpartum period	1213	8	174	245	3	59	132	281	144	14	7	59	28	5	54	35
- Anaesthesia	43	1	1	1	4	1	2	7	7	19	0	0	0	0	0	0
TIMING OF DEATH																
- Early pregnancy	443	30	67	109	87	74	0	6	17	2	3	8	4	5	31	18
- Antenatal period: 20w +	585	46	94	183	5	11	2	13	138	1	9	12	16	0	55	39
- Intrapartum period	134	0	11	7	0	2	3	44	25	16	1	7	8	1	9	3
- Postpartum period	2064	32	285	436	13	107	155	434	374	35	11	69	39	13	61	36
- Anaesthesia	63	1	3	1	8	0	1	19	7	21	0	2	0	0	0	0

Figure 7. Timing of emergency and timing of maternal death



Patient and community factors by underlying cause

Table 31. Patient and community orientated avoidable factors per underlying cause

2017-2019	All	Coin	M&S	NPRI	Ec	Miscr.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
% no avoidable factor	46,8	49,4	51,5	24,6	46,1	19,1	43,2	67,0	53,0	86,3	19,0	68,8	60,3	61,1	38,0	31,1
Total cases	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96
Proportion of assessable cases																
	All	**Coin**	**M&S**	**NPRI**	**Ec**	**Miscr.**	**PRS**	**OH**	**HDP**	**AR**	**ADR**	**Emb.**	**AC**	**Mcell**	**Unk**	**Home**
No antenatal care	37,3	37,8	34,6	36,6	60,0	53,4	24,1	32,5	39,5	70,0	17,6	37,9	13,0	14,3	31,3	23,8
Infrequent antenatal care	12,8	4,4	12,7	10,2	1,8	1,5	10,8	20,5	22,6	20,0	0,0	10,3	30,4	14,3	13,4	16,7
Delay in accessing medical help	55,8	11,1	48,8	63,2	52,7	73,3	63,9	51,8	48,0	20,0	64,7	44,8	39,1	71,4	59,7	66,7
Declined medication/surgery/advice	16,1	0,0	16,1	28,0	3,6	5,3	24,1	4,8	10,5	10,0	5,9	17,2	17,4	0,0	10,4	14,3
Family problem	3,3	33,3	4,9	2,5	0,0	2,3	1,2	3,0	2,0	0,0	0,0	3,4	0,0	0,0	0,0	0,0
Community problem	1,1	11,1	0,0	0,8	0,0	0,8	2,4	1,2	0,0	0,0	0,0	0,0	0,0	0,0	4,5	2,4
Unsafe abortion	3,1	4,4	0,0	0,6	1,8	30,5	0,0	0,6	0,0	0,0	0,0	0,0	0,0	14,3	1,5	0,0
Other	14,5	46,7	19,0	14,5	5,5	6,9	4,8	17,5	9,3	10,0	35,3	17,2	17,4	14,3	19,4	19,0

Administrative avoidable factors 2017-2019 per underlying cause

Table 32. Administrative avoidable factors 2017-2019 per underlying cause

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
% no avoidable factor	51,6	75,2	60,4	63,8	38,9	48,1	50,3	28,3	42,6	41,7	66,7	61,3	72,1	63,2	66,1	76,3
Total maternal deaths	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96

Distribution of assessable cases with avoidable factors	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
Transport problem: Home to institution	1,9	1,0	1,2	0,6	0,9	0,6	0,0	4,6	3,4	0,0	0,0	0,0	1,6	0,0	3,9	3,9
Transport problem: Institution to institution	6,2	4,0	3,3	3,3	7,4	3,9	2,7	13,1	10,1	4,2	0,0	4,3	4,9	0,0	3,1	0,0
Lack of accessibility: Barriers to entry	1,2	0,0	1,4	1,1	0,0	0,0	1,3	2,0	1,5	1,4	0,0	1,1	0,0	0,0	0,8	0,0
Lack of accessibility: Other	0,7	0,0	1,9	0,4	0,9	0,6	0,0	0,8	0,4	0,0	0,0	1,1	1,6	0,0	0,8	0,0
Delay initiating critical care (Overburdened service)	6,4	3,0	6,5	3,7	12,0	9,4	12,1	8,8	6,5	6,9	4,2	2,2	3,3	5,3	2,4	0,0
Lack of health care facilities: ICU	8,3	5,9	6,5	8,9	8,3	14,4	10,7	6,2	12,7	5,6	8,3	3,2	0,0	5,3	1,6	0,0
Lack of health care facilities: Blood/blood products	3,1	1,0	0,5	0,7	3,7	4,4	3,4	11,2	1,9	2,8	4,2	1,1	1,6	0,0	0,0	0,0
Lack of health care facilities: Other	2,9	1,0	3,0	2,3	4,6	1,7	2,0	3,6	3,5	1,4	4,2	7,5	0,0	0,0	2,4	0,0
Lack of appropriately trained staff: Doctors	20,5	12,9	14,2	12,6	28,7	20,4	24,2	39,0	21,2	36,1	0,0	17,2	11,5	10,5	7,9	7,9
Lack of appropriately trained staff: Nurses	13,7	9,9	8,2	9,3	17,6	8,3	14,1	26,3	17,7	6,9	0,0	11,8	4,9	21,1	7,9	7,9
Communication problems: Technical	1,6	1,0	0,9	2,2	4,6	2,2	0,7	2,0	1,3	1,4	0,0	2,2	0,0	0,0	0,0	0,0
Communication problems: Interpersonal	3,0	3,0	4,2	3,0	0,9	3,3	2,0	4,2	2,0	2,8	4,2	2,2	3,3	0,0	1,6	0,0
Other	9,1	4,0	10,0	8,0	13,0	7,7	4,7	10,2	9,5	12,5	8,3	11,8	9,8	10,5	9,4	9,2

Medical care avoidable factors per underlying cause

Table 33. Medical care avoidable factors per underlying cause

% no avoidable factors	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
COMMUNITY HEALTH CENTRE	62,0	77,3	68,9	50,3	74,2	84,4	68,7	62,6	53,6	75,7	83,3	84,2	70,6	80,0	71,9	83,3
DISTRICT HOSPITAL	34,1	45,7	40,6	45,8	17,5	30,0	33,8	13,9	38,8	7,8	71,4	44,7	38,7	55,6	32,6	42,9
REGIONAL HOSPITALS	42,7	61,3	46,0	55,1	25,8	35,1	35,9	23,5	40,9	18,8	50,0	54,3	50,0	33,3	64,3	87,5
TERTIARY HOSPITALS AND ABOVE	60,8	74,1	67,1	72,6	35,7	42,6	50,8	47,4	58,2	50,0	83,3	57,7	58,3	57,1	55,6	33,3
PRIVATE HOSPITALS	42,9	100,0	46,2	60,0	60,0	33,3	44,4	28,0	42,9	20,0		44,4	0,0	50,0	33,3	50,0

Table 35. Suboptimal care and Cause of death

IMPACT OF SUBOPTIMAL CARE	**All**	**Coin**	**M&S**	**NPRI**	**Ec**	**Misc.**	**PRS**	**OH**	**HDP**	**AR**	**ADR**	**Emb.**	**AC**	**Mcell**	**Unk**	**Home**
- No suboptimal care identified	924	66	164	274	21	41	30	40	122	4	12	32	29	9	80	61
- Suboptimal care, no impact on outcome	312	12	45	124	7	27	8	14	43	1	3	13	7	2	6	3
- Suboptimal care, possible impact on outcome	1021	16	160	261	21	60	62	140	178	9	7	35	23	6	43	23
- Suboptimal care, probable impact on outcome	1032	15	91	77	64	66	61	322	218	61	2	18	8	2	27	9
Total	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96

Proportion of suboptimal care	**All**	**Coin**	**M&S**	**NPRI**	**Ec**	**Misc.**	**PRS**	**OH**	**HDP**	**AR**	**ADR**	**Emb.**	**AC**	**Mcell**	**Unk**	**Home**
- No suboptimal care identified	28,1	60,6	35,7	37,2	18,6	21,1	18,6	7,8	21,7	5,3	50,0	32,7	43,3	47,4	51,3	63,5
- Suboptimal care, no impact on outcome	9,5	11,0	9,8	16,8	6,2	13,9	5,0	2,7	7,7	1,3	12,5	13,3	10,4	10,5	3,8	3,1
- Suboptimal care, possible impact on outcome	31,0	14,7	34,8	35,5	18,6	30,9	38,5	27,1	31,7	12,0	29,2	35,7	34,3	31,6	27,6	24,0
- Suboptimal care, probable impact on outcome	31,4	13,8	19,8	10,5	56,6	34,0	37,9	62,4	38,9	81,3	8,3	18,4	11,9	10,5	17,3	9,4

	All	**Coin**	**M&S**	**NPRI**	**Ec**	**Misc.**	**PRS**	**OH**	**HDP**	**AR**	**ADR**	**Emb.**	**AC**	**Mcell**	**Unk**	**Home**
Potentially preventable deaths	62,4	28,4	54,6	45,9	75,2	64,9	76,4	89,5	70,6	93,3	37,5	54,1	46,3	42,1	44,9	33,3

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Further analysis of Avoidable factors and Level of Care

Tables 35-42 and figures 8-17 go through an analysis of avoidable factors at the various levels of care to identify at what level the major problems are and try and determine why there are these problems at that level. The analysis shows clearly the major problem lies at the level of district hospitals and contributed to by the CHCs for certain conditions like obstetric haemorrhage and hypertensive disorders in pregnancy. The woman, family and community and the administrative avoidable factors are distributed more or less equally across all levels, but there are large differences at the medical care level. At the primary care and district hospital level there are greatest levels of lack of appropriately trained nurses and doctors and at district hospitals the largest proportion of potentially avoidable deaths. However, this is not surprising when the clinical exposure to problems are analysed.

In numbers, most maternal deaths occur at regional hospitals, as well as the number of potentially preventable deaths, but proportionately the potentially preventable deaths at regional hospitals are less than those at district hospitals. The issues at regional hospitals are mainly not following standard protocols and this often reflects the lack of specialist cover at these hospitals.

Table 35. Avoidable factors and Level of Care

IMPACT OF SUBOPTIMAL CARE	All	CHC	DH	RH	TH	NC	Pvt H
- No suboptimal care identified	924	27	116	241	188	190	36
- Suboptimal care, no impact on outcome	312	10	67	105	69	43	8
- Suboptimal care, possible impact on outcome	1021	28	255	346	212	95	39
- Suboptimal care, probable impact on outcome	1032	24	336	336	174	89	30
	3289	89	774	1028	643	417	113

IMPACT OF SUBOPTIMAL CARE (%)	All	CHC	DH	RH	TH	NC	Pvt H
- No suboptimal care identified	28,1	30,3	15,0	23,4	29,2	45,6	31,9
- Suboptimal care, no impact on outcome	9,5	11,2	8,7	10,2	10,7	10,3	7,1
- Suboptimal care, possible impact on outcome	31,0	31,5	32,9	33,7	33,0	22,8	34,5
- Suboptimal care, probable impact on outcome	31,4	27,0	43,4	32,7	27,1	21,3	26,5

	All	CHC	DH	RH	TH	NC	Pvt H
Potentially preventable deaths	**62,4**	**58,4**	**76,4**	**66,3**	**60,0**	**44,1**	**61,1**

Figure 8. Potentially preventable deaths and Level of Care

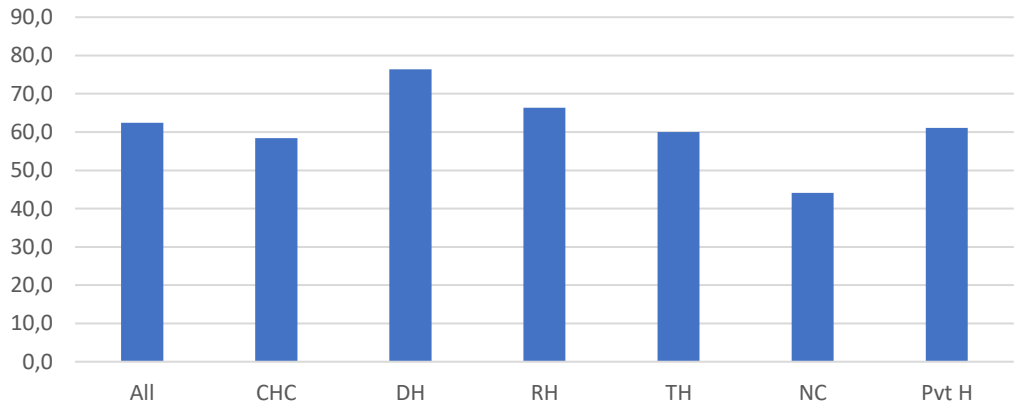


Table 36. Community related Avoidable factors and Level of Care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Lack of information	287	5	46	72	48	32	22
No avoidable factor	1405	34	351	444	260	199	57
Assessable cases	3002	84	728	956	595	385	91
% no avoidable factor	46,8	40,5	48,2	46,4	43,7	51,7	62,6
Number Avoidable cases	1597	50	377	512	335	186	34
Distribution in assessable cases							
No antenatal care	19,9	16,7	19,2	19,8	21,8	19,5	12,1
Infrequent antenatal care	6,8	9,5	6,6	6,1	6,4	8,8	4,4
Delay in accessing medical help	29,7	32,1	30,5	30,3	32,3	20,5	16,5
Declined medication/surgery/advice	8,6	7,1	7,8	9,0	9,6	7,3	8,8
Family problem	1,8	3,6	1,9	2,1	1,3	1,6	0,0
Community problem	0,6	1,2	0,4	0,3	0,8	0,5	0,0
Unsafe abortion	1,6	0,0	1,6	1,5	1,7	2,1	2,2
Other	7,7	15,5	7,0	8,6	6,1	8,3	3,3

Table 37. Administrative Avoidable Factors and level of care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Lack of information	193	4	39	51	33	21	12
No avoidable factor	1597	44	306	492	298	243	74
Assessable cases that died at this level	3096	85	735	977	610	396	101
% no avoidable factor	51,6	51,8	41,6	50,4	48,9	61,4	73,3
Accessible cases with avoidable factors	1499	41	429	485	312	153	27
Distribution of in assessable cases							
Transport problem: Home to institution	1,9	3,5	2,9	1,5	1,1	1,0	1,0
Transport problem: Institution to institution	6,2	15,3	9,0	5,1	6,9	4,0	1,0
Lack of accessibility: Barriers to entry	1,2	0,0	1,5	1,3	1,6	0,0	0,0
Lack of accessibility: Other	0,7	0,0	1,1	1,0	0,3	0,5	0,0
Delay initiating critical care (Overburdened service)	6,4	4,7	5,7	7,3	8,7	6,8	1,0
Lack of health care facilities: ICU	8,3	1,2	4,6	9,2	13,0	13,1	1,0
Lack of health care facilities: Blood/blood products	3,1	2,4	5,3	3,6	1,3	1,5	4,0
Lack of health care facilities: Other	2,9	2,4	2,2	4,8	3,1	1,0	0,0
Lack of appropriately trained staff: Doctors	20,5	12,9	32,9	19,0	19,7	11,4	11,9
Lack of appropriately trained staff: Nurses	13,7	20,0	21,9	12,1	11,3	9,1	5,9
Communication problems: Technical	1,6	4,7	1,6	1,6	1,5	1,0	3,0
Communication problems: Interpersonal	3,0	4,7	3,0	4,0	3,3	0,8	4,0
Other	9,1	9,4	9,8	8,5	9,7	8,1	6,9

Table 38. Resuscitation Avoidable Factors and level of care

Description	CHC	DH	RH	TH	NC	Pvt H	All	Outside
Lack of information	10	80	64	46	18	16	257	23
Not attempted	19	185	154	115	39	8	641	121
Assessable cases	60	509	810	482	360	89	2391	81
No avoidable factor	35	264	512	331	245	61	1523	75
% unavoidable cases	58,3	51,9	63,2	68,7	68,1	68,5	63,7	92,6
Avoidable cases	25	245	298	151	115	28	868	6
Distribution of avoidable factors								
Airway problems	28,0	16,3	13,4	13,9	13,0	0,0	14,3	16,7
Breathing problems	24,0	35,5	35,6	31,1	33,0	35,7	34,1	33,3
Circulation problems	44,0	60,0	54,0	50,3	58,3	60,7	55,6	66,7
Drug problems	4,0	10,6	3,7	6,6	0,9	3,6	6,1	50,0
Investigation problems	8,0	11,8	7,4	6,6	3,5	0,0	7,7	0,0
Monitoring problems	16,0	24,5	13,8	11,3	7,0	7,1	15,4	33,3

Quality of medical care of pregnant women who died

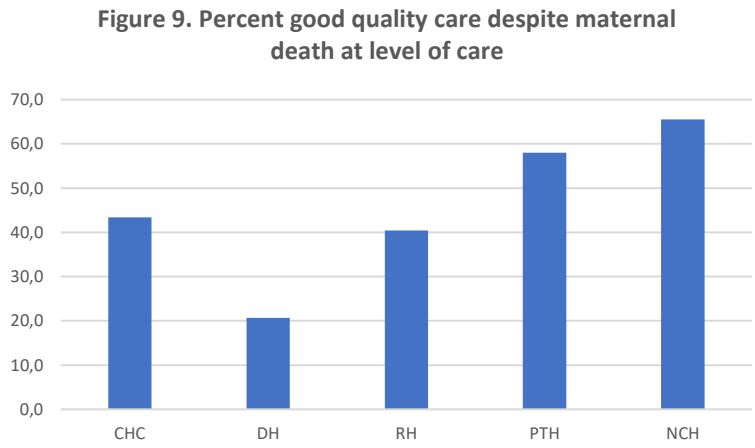


Table 39. Assessment of Care of woman at site of death

Description	CHC	DH	RH	PTH	NCH
Died at this level	89	774	1028	643	417
Managed at this level	82	753	983	591	393
Lack of information	6	46	50	19	19
Assessable cases	76	707	933	572	374
No avoidable factor	33	146	377	332	245
% no avoidable factors	43,4	20,7	40,4	58,0	65,5
Cases with Avoidable factors	43	561	556	240	129
Initial assessment	19	205	120	34	14
Problem with recognition / diagnosis	28	327	251	96	41
Delay in referring the patient	18	154	54	7	1
Managed at inappropriate level	19	193	48	7	0
Incorrect management (Wrong diagnosis)	11	125	67	36	17
Sub-standard management (Correct diagnosis)	17	297	325	140	79
Not monitored / Infrequently monitored	11	112	97	24	20
Prolonged abnormal monitoring with no action taken	5	124	89	31	30
Distribution of avoidable factors in women that died					
Initial assessment	44,2	36,5	21,6	14,2	10,9
Problem with recognition / diagnosis	65,1	58,3	45,1	40,0	31,8
Delay in referring the patient	41,9	27,5	9,7	2,9	0,8
Managed at inappropriate level	44,2	34,4	8,6	2,9	0,0
Incorrect management (Wrong diagnosis)	25,6	22,3	12,1	15,0	13,2
Sub-standard management (Correct diagnosis)	39,5	52,9	58,5	58,3	61,2
Not monitored / Infrequently monitored	25,6	20,0	17,4	10,0	15,5
Prolonged abnormal monitoring with no action taken	11,6	22,1	16,0	12,9	23,3

Figure 10. Distribution of avoidable factors in women that died at that level per level of care

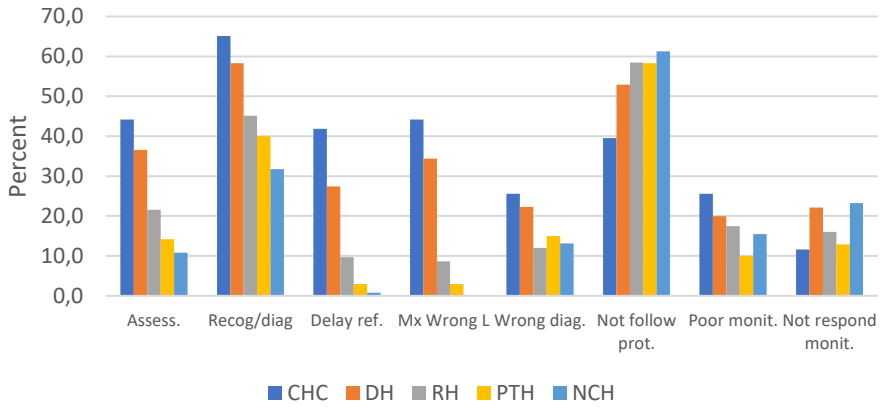


Table 40. Care of woman prior to referral from site

Description	CHC	DH	RH
Managed at this level prior to referral	1344	801	233
Lack of information	91	65	22
Assessable cases	1253	736	211
No avoidable factor	781	344	108
% no avoidable factors	62,3	46,7	51,2
Cases with Avoidable factors in referral	472	392	103
Initial assessment	234	132	32
Problem with recognition / diagnosis	249	188	40
Delay in referring the patient	173	186	41
Managed at inappropriate level	74	94	17
Incorrect management (Wrong diagnosis)	37	53	9
Sub-standard management (Correct diagnosis)	107	144	47
Not monitored / Infrequently monitored	22	31	15
Prolonged abnormal monitoring with no action taken	39	42	13
Distribution of Avoidable factors in referred cases			
Initial assessment	49,6	33,7	31,1
Problem with recognition / diagnosis	52,8	48,0	38,8
Delay in referring the patient	36,7	47,4	39,8
Managed at inappropriate level	15,7	24,0	16,5
Incorrect management (Wrong diagnosis)	7,8	13,5	8,7
Sub-standard management (Correct diagnosis)	22,7	36,7	45,6
Not monitored / Infrequently monitored	4,7	7,9	14,6
Prolonged abnormal monitoring with no action taken	8,3	10,7	12,6

Figure 11. Percent of good quality care before referral of woman who subsequently died

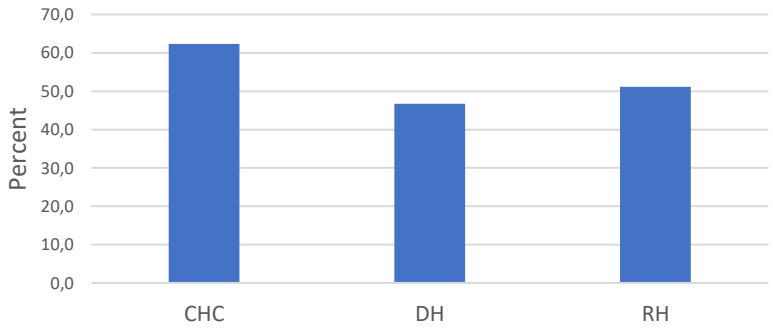


Figure 12. Distribution of avoidable factors in women who were referred from that level

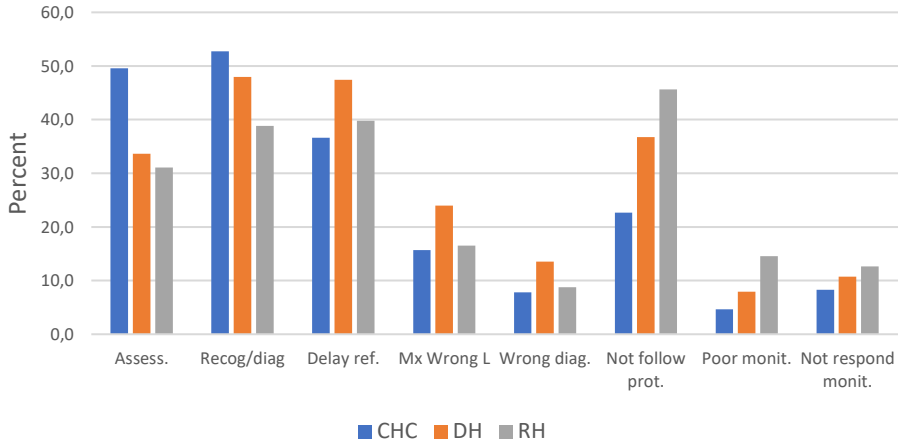


Table 41. Potentially preventable deaths by level of care for major cause maternal death

Deaths per level	M&S	NPRI	PRS	OH	HDP	All
Community Health Centre	11	8	2	20	20	89
District Hospital	73	187	19	97	97	774
Regional Hospital	120	277	64	177	184	1028
Provincial Tertiary Hospital	113	148	40	75	126	643
National Central Hospital	100	86	25	44	94	417

Potentially preventable deaths per level	M&S	NPRI	PRS	OH	HDP	All
Community Health Centre	9	2	1	18	14	52
District Hospital	55	109	16	81	81	591
Regional Hospital	69	130	55	163	136	682
Provincial Tertiary Hospital	58	60	24	68	93	359
National Central Hospital	34	26	19	30	45	184
Total potentially preventable deaths	225	327	115	360	369	1868

Proportion of Potentially preventable deaths at each level	M&S	NPRI	PRS	OH	HDP	All
Community Health Centre	81,8	25,0	50,0	90,0	70,0	58,4
District Hospital	75,3	58,3	84,2	83,5	83,5	76,4
Regional Hospital	57,5	46,9	85,9	92,1	73,9	66,3
Provincial Tertiary Hospital	51,3	40,5	60,0	90,7	73,8	55,8
National Central Hospital	34,0	30,2	76,0	68,2	47,9	44,1

Figure 13. Maternal deaths per level of care

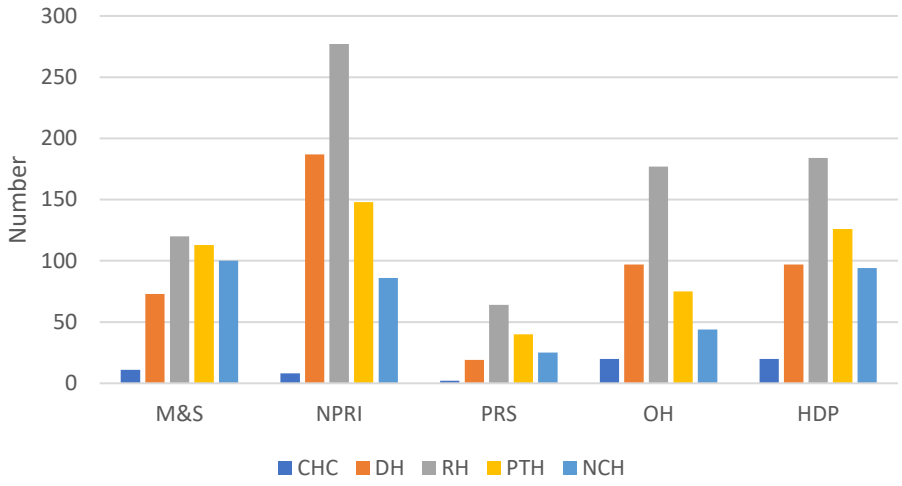


Figure 14. Potentially preventable maternal deaths at that level of care per underlying cause

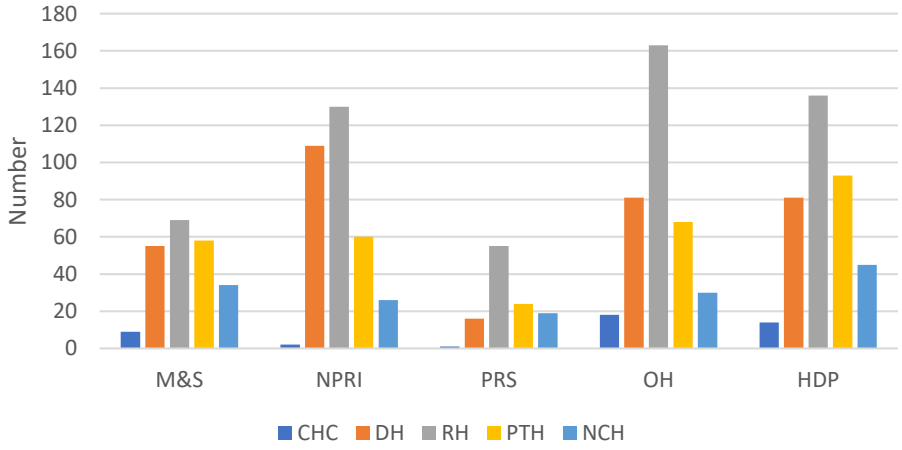


Figure 15. Potentially preventable deaths at that level of care per underlying cause

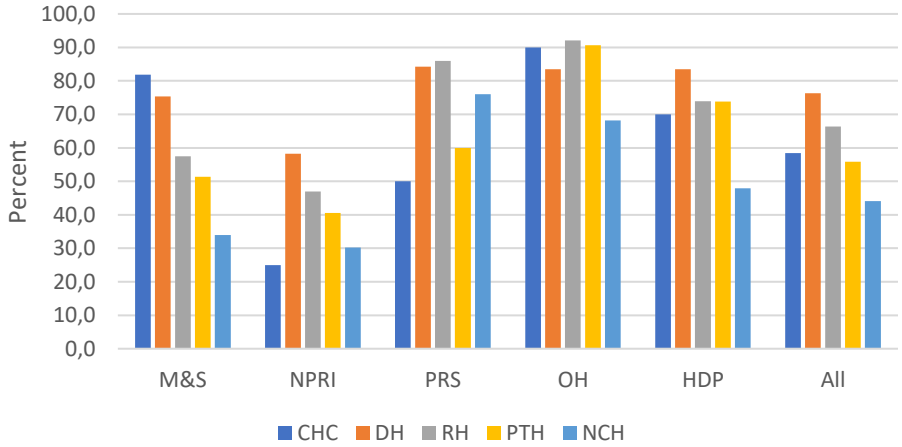


Table 42. Details of maternal deaths managed at and died at each level of care

Medical care	Clinic/CHC	CHC	DH	RH	Tert. H
Died (triennium)	89	89	774	1028	1060
Managed (triennium)	1554	1554	1216	591	984
MD /year	30	30	258	343	353
MD managed at some point/year	518	518	405	197	328
MD Per facility died/year	0,026	0,115	1,062	7,615	16,061
MD per facility managed at some point/year	0,456	2,016	1,668	4,378	14,909
No. potentially preventable deaths (triennium)	515	515	953	659	369
Total assessable cases seen (triennium)	1329	1329	1443	1144	572
% potentially preventable deaths of assessable cases	38,8	38,8	66,0	57,6	64,5
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	109,0	141,2	81,9	86,4	89,3

Note: *MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.*

Interpretation of Level of Care data

On average:

A Clinic/CHC will see a woman who subsequently 0,5/year i.e. in 2 years the clinic/CHC will see one woman who subsequently dies.

A CHC will see a woman who subsequently 2/year i.e. in 6 months the CHC will see one woman who subsequently dies.

A district hospital will see a will see a woman who subsequently dies 1,7/year i.e. in 7 months the DH will see one woman who subsequently dies.

A regional hospital will see will see a woman who subsequently dies 4/year i.e. in 2 months the RH will see one woman who subsequently dies.

A tertiary hospital will see will see a woman who subsequently 15/year i.e. in 3 weeks the Tertiary will see one woman who subsequently dies.

Potentially preventable MMR per level of care

This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.

It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

Summary

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 the problem is picked up better than those who die. At the RH and Tertiary level the overwhelming problem is not sticking to standard protocols.

Figure 16. Comparison of number of poor quality medical care per level

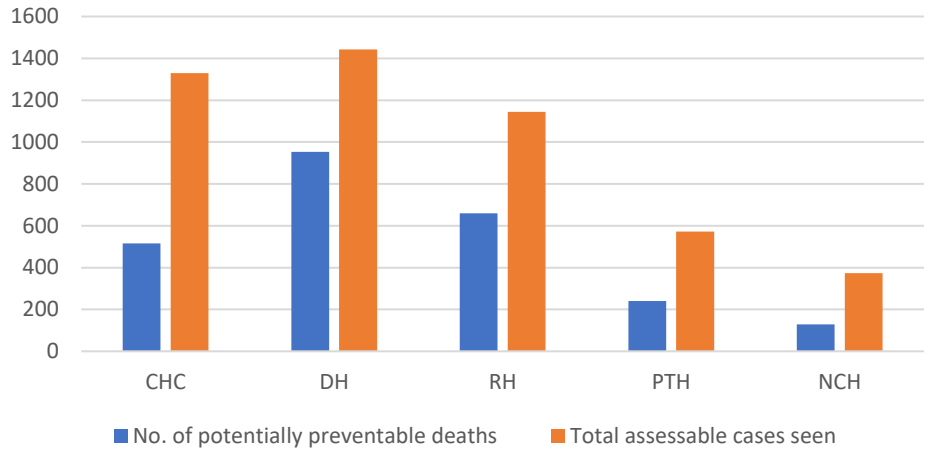


Figure 17. Potentially preventable MMR by level of care

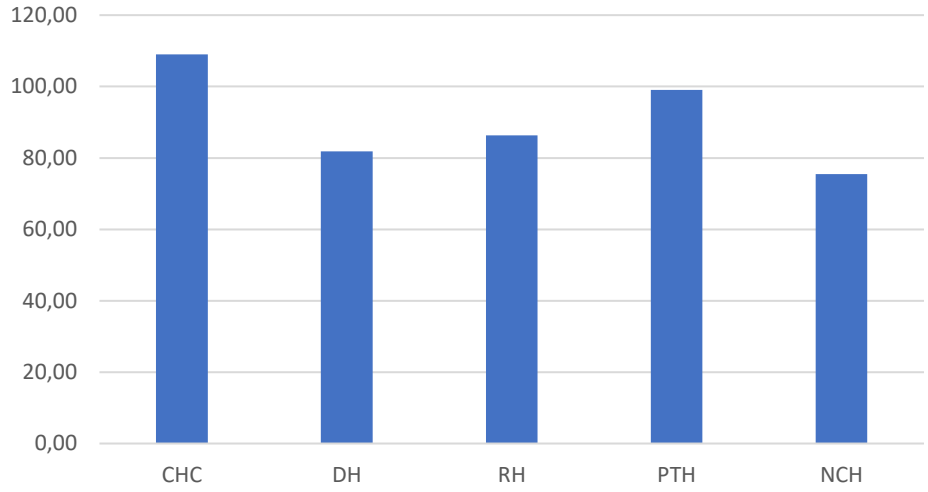


Table 42. Administrative avoidable factors and Level of Care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Distribution of avoidable factors in assessable cases							
Lack of appropriately trained staff: Doctors	20,5	12,9	32,9	19,0	19,7	11,4	11,9
Lack of appropriately trained staff: Nurses	13,7	20,0	21,9	12,1	11,3	9,1	5,9
Distribution in potentially preventable deaths							
Lack of appropriately trained staff: Doctors	42,4	26,8	56,4	38,4	38,5	29,4	44,4
Lack of appropriately trained staff: Nurses	28,3	41,5	37,5	24,3	22,1	23,5	22,2

In a third of maternal deaths in DHs there was lack of doctor skills and in 20% of cases lack of nursing skills that contributed to the deaths. In potentially preventable deaths, that was much higher.

Events that lead to deaths at the primary level of care are very infrequent and when they occur the medical and nursing personnel is ill equipped to recognise and manage them.

Table 43. Estimation of maternity workload at Primary health care facilities

Deliveries in Primary care	Clinic n=874	Cumulative %	CHC n=257	Cumulative %	DH n=243	Cumulative %
<1/month (<12/year)	475	54,3	18	7,0		
<2/month (<24/year)	595	68,1				
<3/month (<36/year)	654	74,8				
<4/month (<48/year)	701	80,2				
<5/month (<60/year)	738	84,4				
<6/month (<72/year)	759	86,8				
<7/month (<84/year)	779	89,1				
<8/month (<96/year)	791	90,5				
<9/month (<108 year)	801	91,6				
<10/month (<120/year)	813	93,0				
>10/month (>120/year)	65					
>1/day (>365/year)	12					
<1/day (<365/year)	862		160	62,3	46	18,9
<2/day (<730/year)			200	77,8	87	35,8
<3/day (<1095/year)			227	88,3	117	48,1
<4/day (<1460/year)			240	93,4	136	56,0
<5/day (<1825/year)			251	97,7	158	65,0
>5/day (>1825/year)	1		6		85	
2000-2999/year	1		5		37	
3000-3999/year			1		17	
4000-4999/year			0		13	
5000+/year			0		6	

Note: Data taken from DHIS. The number of clinics doing deliveries varies, one presumes the very low numbers for most of the primary care clinics are unplanned births at the clinic. This also only give the births and does not include the other services that the clinics, CHCs and DH provide.

The key aspect arising from this data is the problem of retention of clinical skills for conducting a birth. This will be very difficult at a clinic if there is less than a birth per day; per nurse the number of deliveries must be very low. This also applied to the CHCs, 62% are conducting less than one birth per day.

Trends

Trends in Maternal deaths

Figure 18 give the number of maternal deaths recorded per year since the inception of the Confidential Enquiry. This number is the true maternal deaths with the coincidental and maternal deaths outside of the facility with the cause unknown removed. It is important to note for 2019 there were 978 maternal deaths. This is the first time since 2002 that the maternal deaths have fallen below 1000. There has been a steady decline in maternal deaths since 2009.

Figure 18. Number of maternal deaths from 1998-2019 in SA

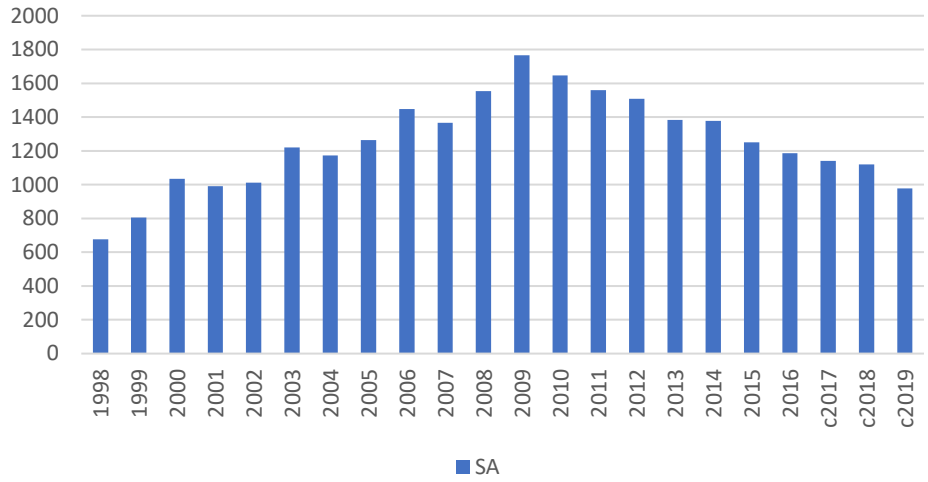


Figure 19 give the trends in institutional maternal mortality ratio (iMMR) from 2005 to 2019. The iMMR has fallen below 100/100000 live births at 98/100000 live births in 2019.

Figure 19. South African iMMR 2005-2019

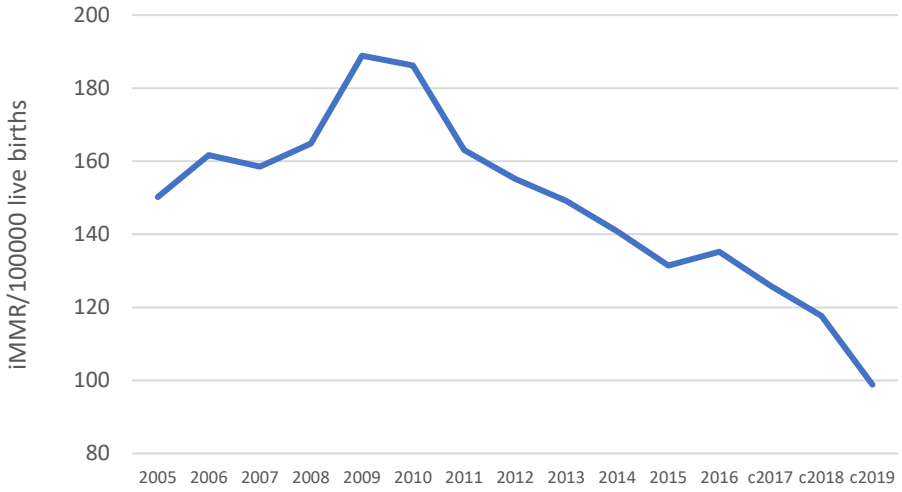


Figure 20 and 21 gives the number of maternal deaths per province and the iMMR per province since 2005. From 2009 there has been generally a trend to lower numbers of maternal deaths and iMMR per province.

Figure 20. Number of maternal deaths per province from 2005-2018

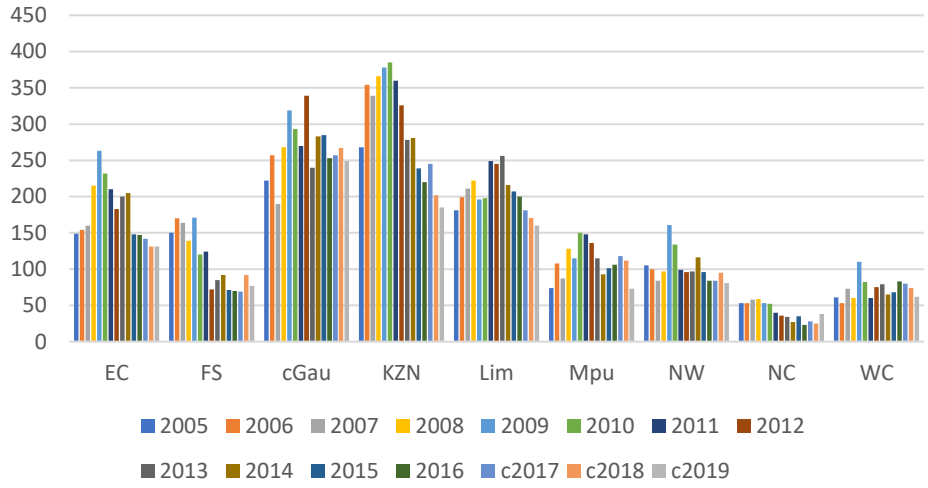
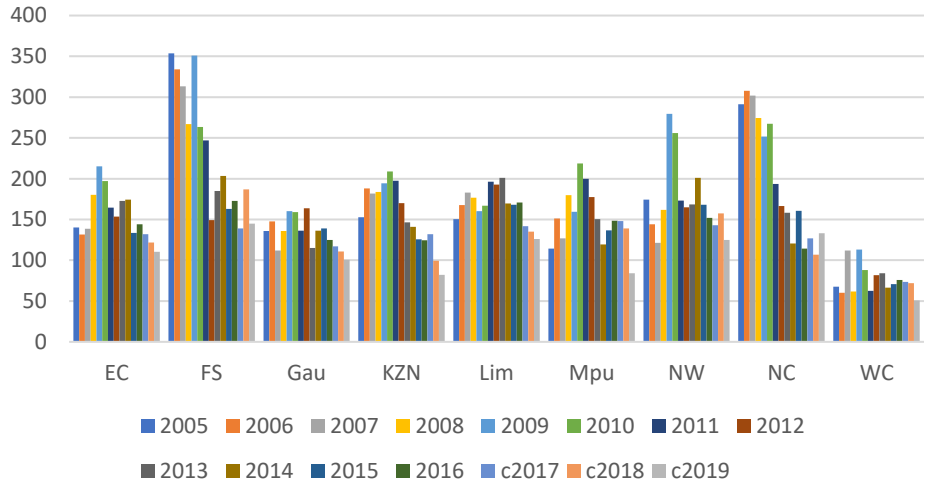
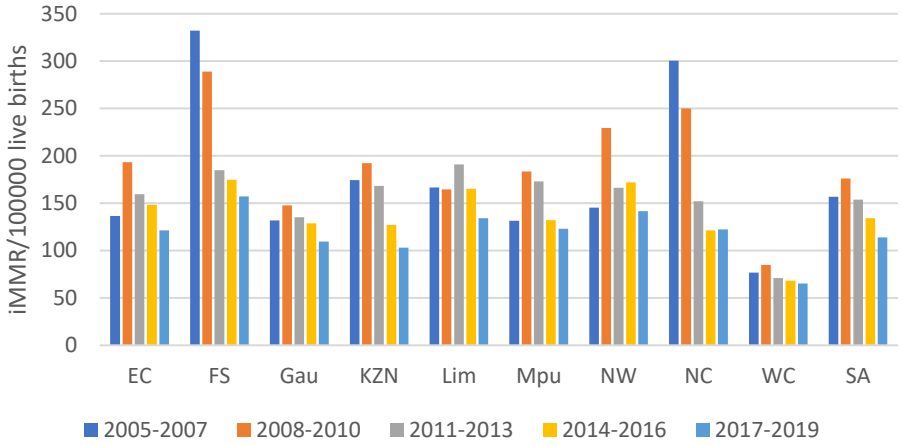


Figure 21. iMMR per province from 2005-2019



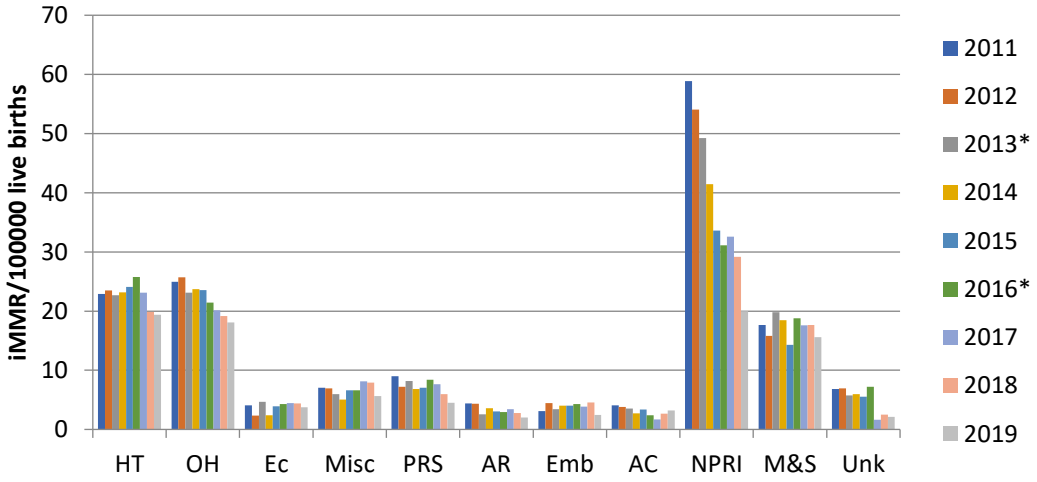
This trend is better shown in the five triennia (figure 22). The peak maternal mortality was in 2008-2010 for most provinces and South Africa as a whole

Figure 22. iMMR per province for 5 triennia (2005-2019)



Trends in underlying causes of maternal deaths

Figure 23. Comparison iMMR per underlying cause from 2011-2019



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The iMMR has shown the steepest decline, following introduction of ART therapy after 2010. (Figure 23 and Table 44).
Trends are better seen when triennia are compared (Figure 24). Deaths from OH, HPD and PRS have declined. M&S have increased and plateaued. Of concern is the steady increase in early pregnancy deaths (miscarriage and ectopic)

Table 44. Distribution of iMMR per underlying causes from seven triennia, 1999-2019

	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
Hypertensive disorders of pregnancy	22,26	29,43	23,85	24,58	22,75	24,02	20,73
Obstetric haemorrhage	14,93	20,72	18,82	24,91	24,32	22,67	19,11
Ectopic pregnancy	1,19	2,20	2,11	2,72	3,63	3,45	4,19
Miscarriage	5,27	5,34	5,21	6,73	6,58	6,00	7,18
Pregnancy-related sepsis	8,74	12,84	8,55	9,34	8,04	7,30	5,99
Anaesthetic complications	3,34	4,27	4,10	4,38	3,73	3,16	2,72
Embolism			2,19	3,37	3,63	4,03	3,60
Acute collapse - cause unknown	7,55	8,01	4,91	5,36	3,77	2,80	2,53
Non-pregnancy-related infections	33,72	58,40	66,28	71,29	53,47	35,17	27,05
Medical and surgical disorders	7,51	8,62	9,09	15,57	17,53	16,97	16,91
Unknown	1,93	4,64	6,67	7,82	6,44	6,14	2,14
iMMR	106,42	154,48	151,77	176,22	153,88	134,33	113,77

Note: The systems changed in the early years. The denominator uses was from StatsSA; from 2005-2007 the denominator was DHIS. Definitions also change during the 21 years. The best comparison is from 2011 onwards, although 2008-2010 was very similar to the subsequent years. Embolism was included in acute collapse from 1999-2004.

Figure 24. Comparison of 7 triennia (1999-2019)

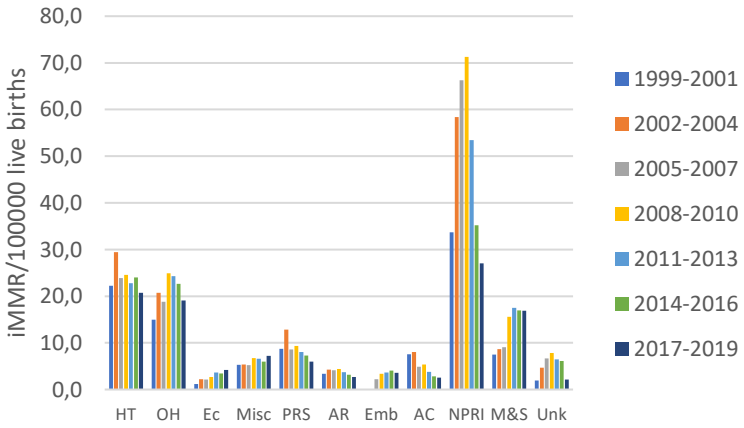


Figure 25. iMMR of potentially preventable maternal deaths

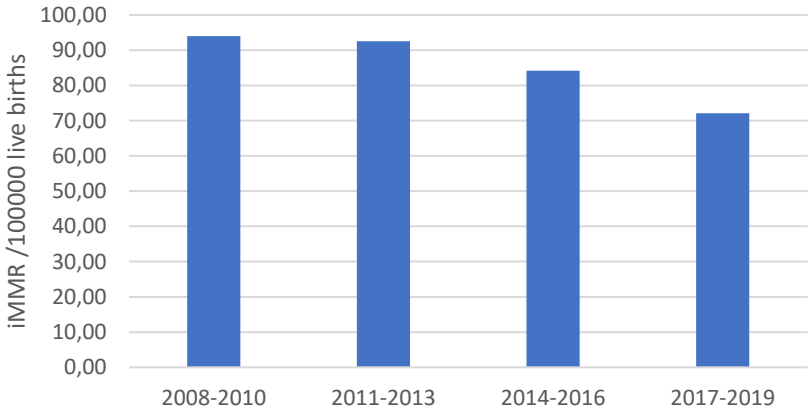


Figure 26. iMMR of non-preventable maternal deaths

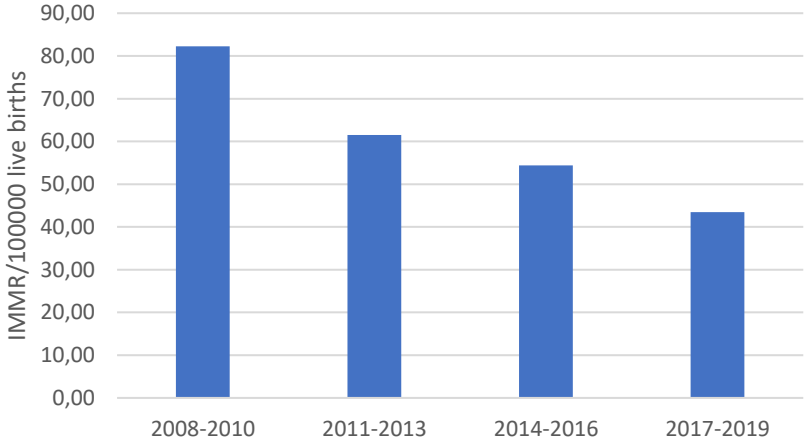


Figure 27. iMMR of potentially preventable deaths per underlying cause

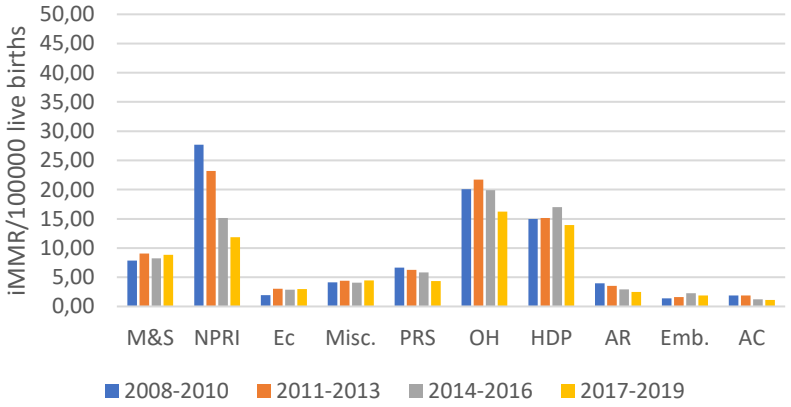
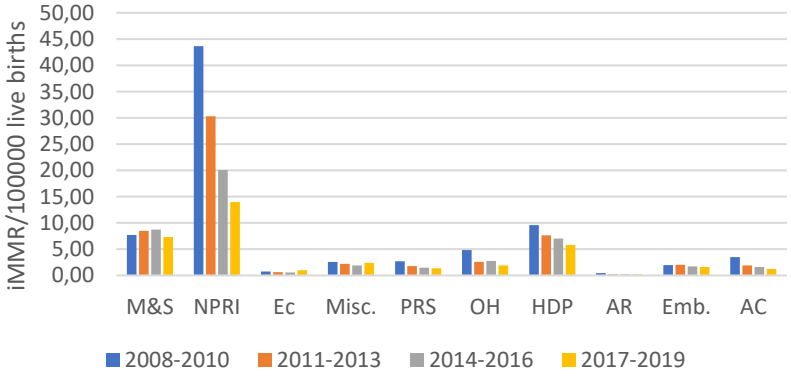


Figure 28. iMMR of non-preventable deaths per underlying cause



Progress on Safer Caesarean Delivery Interventions; 2017-2019

During 2017-2019, 800,065 Caesarean deliveries (CD) were performed in the South Africa public sector, giving a national CD rate of 28.1%, a marked increase from 25.7% in 2014-2016. There were 1059 maternal deaths in women who had CD, giving a case fatality rate for CD of 145.7 deaths per 100,000 CDs. To put this in context the estimated CD CFR in Sub-Saharan Africa is 1090 per 100,000 CDs (1) and 21 in Netherlands (2). There are large provincial variations in both CD rate and CD CFR, as shown in Table 45. Provinces with low CD rate such as Limpopo and Mpumalanga tend to have higher CD CFR; whereas provinces with higher CD rates such as Kwazulu-Natal and Western Cape have lower CD CFR. This could be explained by the 'occasional operator' phenomenon particularly in district hospitals; or it could be that in provinces with low CD rates there are insufficient facilities, skilled personnel (both surgical and anaesthetic) and access to CD, so those that are done are performed too late for prolonged labour, resulting in difficult surgery, sepsis and haemorrhage. Free State is the exception to this observation, having both a high CD rate and high CD CFR.

Table 45. Caesarean delivery: Numbers, Rates and CFR per province and for South Africa

2017-2019	Live births	2017-2019 CD	CD rate 2017-2019	MD 2017-2019 CD*	CFR 2017-2019**
Eastern Cape	310130	93406	30,1	136	145,6
Free State	140004	43622	31,2	82	188,0
Gauteng	661647	190790	28,8	282	147,8
KwaZulu-Natal	591582	191634	32,4	187	97,6
Limpopo	370581	78023	21,1	147	188,6
Mpumalanga	237502	52579	22,1	86	163,6
North West	174408	43941	25,2	49	111,5
Northern Cape	63789	13914	21,8	24	172,5
Western Cape	296132	87477	29,5	66	75,4
South Africa	2845775	748155	26,7	1059	141.5

** Maternal deaths exclude Coincidental and deaths outside health facility*

*** CD CFR was 145.7 in 2017, 132.2 in 2018, and 112.5 in 2019*

Although women who had a CD had a CFR almost three times that of vaginal delivery (132.04 vs 45.06 per 100,000 deliveries by that route), it is important to note that women who delivered by CD and died did not necessarily die as a result of the CD, but often due to an underlying medical problem or for the obstetric indication for the CD. For example, if the cause of deaths was eclampsia or TB meningitis, the CD was incidental to the outcome. However, if they died as a result of Bleeding associated with CD, Anaesthesia, Uterine sepsis, or Thromboembolism, the CD is likely to have been contributory to the death. Table 46 shows the underlying cause of maternal death across provinces in women who had CD. For South Africa, the most common underlying cause of death in women who had a CD was Hypertension (27.3%), Obstetric Haemorrhage (26.8%), Medical and Surgical disorders (13.6%), Non Pregnancy related infections (8,6%), Pregnancy related sepsis (7.6%), Thromboembolism/acute collapse (6.2%) and Anaesthesia (6%).

Table 46. Underlying cause of death in women with CD who died

Primary obstetric problems	EC	FS	GP	KZN	LP	Mpu	NW	NC	WC	SA
Medical and surgical disorders	19	10	38	38	13	8	7	1	10	144
Non-pregnancy-related infections	14	2	30	23	10	5	2	0	6	91
Ectopic pregnancy	0	0	1	0	0	0	0	0	0	1
Miscarriage	0	0	0	0	0	0	0	0	0	0
Pregnancy-related sepsis	14	4	22	15	9	3	2	0	11	80
Obstetric haemorrhage	35	25	72	30	57	32	16	7	10	284
Hypertensive disorders of pregnancy	29	29	91	40	37	26	19	8	10	289
Anaesthetic complications	6	6	11	16	10	7	2	3	3	64
Adverse drug reactions	1	0	0	0	0	0	0	0	0	1
Embolism	8	3	5	7	5	4	1	3	9	45
Acute collapse - cause unknown	6	0	7	6	2	0	0	0	0	21
Miscellaneous	0	0	0	0	0	0	0	0	3	3
No primary cause found	1		2	2						5
Insufficient information				4				1		5
MD CD	136	82	282	187	147	86	49	24	66	1059

Haemorrhage deaths included those of women with CDs who had antepartum haemorrhage complications and ruptured uterus, but were mostly (189 cases) classified as bleeding associated with CD (BLDACD). There is obviously some overlap between the sub-categories. BLDACD was highlighted as a serious and increasing problem in the 2014-2016 Saving Mothers report. The BLDACD CFR in 2017-2019 was 23.6 per 100,000 CDs, which is considerably reduced from 31.7 in 2014-2016.

For the BLDACD deaths, anaesthetic factors may not have been the primary cause but were often contributory to the death. In analysing the anaesthetic factors, the Database for the Retrospective Analysis of Maternal Anaesthesia (DRAMA) records the maternal deaths who had received an anaesthetic. The assessments in all provinces are performed by specialist anaesthetists, who are referred the maternal deaths who received an anaesthetic in a particular province.

Various data are entered on the database, and deaths are assessed taking into account the anaesthetic contribution to the maternal death as follows:

- Death due solely to the anaesthetic
- Death due to another cause (such as haemorrhage), but action or inaction by the anaesthetist might have contributed significantly to the death or events leading to the death.
- Substandard anaesthetic that did not contribute to the death
- No substandard anaesthesia care identified and death was due to another cause

In the triennium 2017-2019 there were 921 mortalities entered on the DRAMA database. Sixty-six of these were assessed as being as a direct result of anaesthesia, and 139 were attributed to be due to secondary anaesthetic problems, where the action or inaction by the anaesthetist contributed significantly to the maternal death.

Of the 139 secondary anaesthetic deaths, 69 were associated with Bleeding associated with CD. This means that in a large proportion of maternal deaths due to haemorrhage before, during or immediately after CD (BLDACD), the anaesthetist played a pivotal role. See Table 47..

Table 47. Analysis of the anaesthetic contribution to the number of maternal deaths from BLDACD

Province	2017 Secondary	**2017 OH**	2018 Secondary	**2018 OH**	2019 Secondary	**2019 OH**	**Total OH**
Eastern Cape	5	**2**	5	**5**	5	**4**	11
Free State	4	**2**	1	**1**	6	**3**	6
Gauteng	16	**8**	9	**3**	7	**5**	16
KwaZulu-Natal	11	**6**	14	**5**	8	**3**	14
Limpopo	5	**3**	7	**0**	9	**3**	6
Mpumalanga	6	**5**	6	**2**	0	**0**	7
Northern Cape	1	**1**	0	**0**	2	**2**	3
North West	2	**2**	4	**2**	2	**0**	4
Western Cape	2	**1**	1	**0**	1	**1**	2
Total	52	**30**	47	**18**	40	**21**	**69**

The three major contributory factors in these 69 cases of significant anaesthetic contribution to death to BLDACD were:

- An inappropriate method of anaesthesia
- Delay in recognition of the onset of complications, both intraoperatively and immediately postoperatively in the recovery room
- Poor or delayed resuscitation.

It is important to note the level of care at which CDs were performed and the CD CFR for each level of care. This is shown in Tables 48 and 49.. Of concern is the relatively high CD CFR for haemorrhage and anaesthesia at District hospitals. DHs are meant to perform low risk CDs but cannot always select which patient arrive with emergencies and they also tend to have the least skills with non- specialist surgeons and anaesthetists. The high CD CFRs at Regional and Tertiary hospitals reflect the high-risk nature of their patient load, but also that many of the women who died at these higher levels had actually had their CD at a district hospital. Overall, 22.9% of patients were referred onwards from DH and then died at a regional or tertiary facility.

Table 48. CD per level or care

		CHC CD	**DH CD**	**RH CD**	**TH CD**	**NC CD**	**Total CD**
CD 2019		186	100088	99478	31590	28299	259641
CD 2018		215	95459	96160	30443	27263	249540
CD 2017		169	92491	91123	27682	27509	238974
		570	288038	286761	89715	83071	748155
Births							**Total births**
	2019	160213	406476	265002	73618	56487	961796
	2018	155483	390250	252610	72840	55272	926455
	2017	156650	379641	245483	69682	59093	910549
Total		472346	1176367	763095	216140	170852	2798800
CD rate							
	2017	0,1	24,4	37,1	39,7	46,6	26,2
	2018	0,1	24,5	38,1	41,8	49,3	26,9
	2019	0,1	24,6	37,5	42,9	50,1	27,0
All		**0,1**	**24,5**	**37,6**	**41,5**	**48,6**	**26,7**

Table 49. CFR of Caesarean deliveries and underlying cause per level of care

Underlying obstetric problems	CHC CD CFR	DH CD CFR	RH CD CFR	PTH CD CFR	NCH CD CFR
Medical and surgical disorders	0,0	4,2	11,2	39,0	48,2
Non-pregnancy-related infections	0,0	4,9	10,5	18,9	19,3
Ectopic pregnancy	0,0	0,0	0,0	0,0	1,2
Miscarriage	0,0	0,0	0,0	0,0	0,0
Pregnancy-related sepsis	0,0	2,1	9,8	20,1	21,7
Obstetric haemorrhage	175,4	26,7	31,0	54,6	38,5
Hypertensive disorders of pregnancy	350,9	6,9	34,5	92,5	63,8
Anaesthetic complications	0,0	11,8	3,8	6,7	6,0
Adverse drug reactions	0,0	0,0	0,0	0,0	1,2
Embolism	0,0	3,1	4,2	8,9	3,6
Acute collapse - cause unknown	350,9	2,1	1,7	5,6	1,2
Miscellaneous	0,0	0,0	0,7	0,0	1,2
No primary cause found	0,0	0,0	0,7	1,1	0,0
Lack of information	0,0	0,3	0,7	0,0	0,0
CFR CD	**877,2**	**62,1**	**108,8**	**247,5**	**205,8**

Triennial and provincial comparisons of CD rates and CFRs.

Table 50 describes CD numbers, rates and CD CFRs over 4 triennia. Of concern is the steady increase in CD rates, which has persisted despite CD no longer being recommended for women with HIV infection due to widespread roll out of ART therapy. Encouragingly, the CD CFR has decreased sequentially from 2011, but the BLDACD increased in 2011-2013 and 2014-2016, and has declined in the recent triennium.

Table 50. CD numbers, rates and CFR from 2005 to 2019 in South Africa

	2008-2010	2011-2013	2014-2016	2017-2019
Total numbers CD	563508	655705	699850	748155
CD rate (%)	20.0	23.2	25.7	26,7
Number deaths with CD	1230	1243	1184	1059
Numbers deaths with BLDACD	180	221	222	189
CD CFR (per 100,000 CDs)	218.3	189	169.6	132.4
BLDACD CFR (per 100,000 CDs)	29.1	31.8	31.7	23.6

Following concerns raised about Safety of CD and the problem of Bleeding associated with CD in South Africa in previous reports, there have been several interventions: ESMOE training expanded to include management of bleeding at CD, ESMOE CD anaesthetic module, Use of Tranexamic acid, promotion of fresh dried plasma as well as emergency blood in all facilities that perform CD, and Safe CD surgical and anaesthesia audits of all hospitals to ensure they meet minimum standards. More recently, the use of the Non-pneumatic Anti-Shock Garment (NASG) for transfer of patients with massive blood loss has been introduced and implemented in some provinces. The ESMOE training package in Safe Anaesthesia has also been introduced, which aims to ensure safe practices for both regional and general anaesthesia at all levels of care.

Despite these initiatives, there are some provinces where CD CFR has not improved and although improvement has occurred in most provinces, large disparities between provinces remain with highest CD and BLDACD CFRs in Free State and Limpopo, and lowest In KwaZulu-Natal and Western Cape, see Table 51

Table 51. CD numbers, rates and CFRs by province for 2017-2019

Province	Total CD 2017-2019	CD Rate 2017-2019	CD deaths 2017-19	BLDACD deaths 2017-2019	CD CFR 2017-2019 (per 100,000 CDs)	BLDACD CFR 2017-2019 (per 100,000 CDs)
	N	%	N	N		
Eastern Cape	93406	30.1	136	27	145.6	28.9
Free State	43622	31.2	82	13	188	29.8
Gauteng	190790	28.8	282	46	147.8	24.1
KwaZulu-Natal	191634	32.4	187	22	97.6	11.5
Limpopo	78023	21.1	147	41	188.6	52.5
Mpumalanga	52579	22.1	86	19	163.6	36.1
North West	44375	25.4	49	10	111.5	22.5
Northern Cape	13914	21.8	24	4	175.5	28.7
Western Cape	87477	29.5	66	6	75.4	6.9
South Africa	748155	26.7	1059	189	141.5	25.3

Comparisons between triennia for each province for CD CFR and BLDACD CFR are illustrated in Figures 29 and 30.

Figure 29. Provincial CD CFR for 2017-2019 and 2014-2016

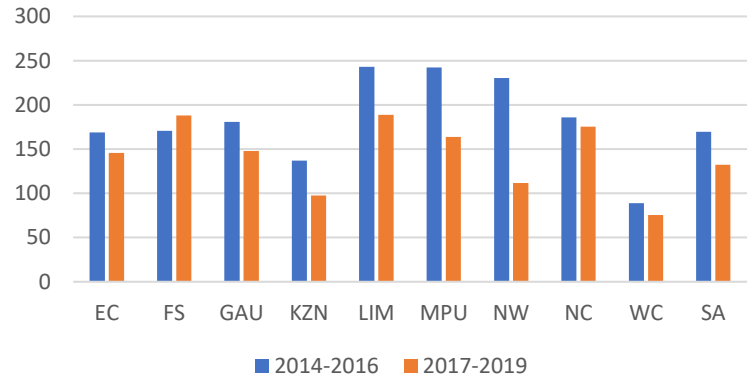
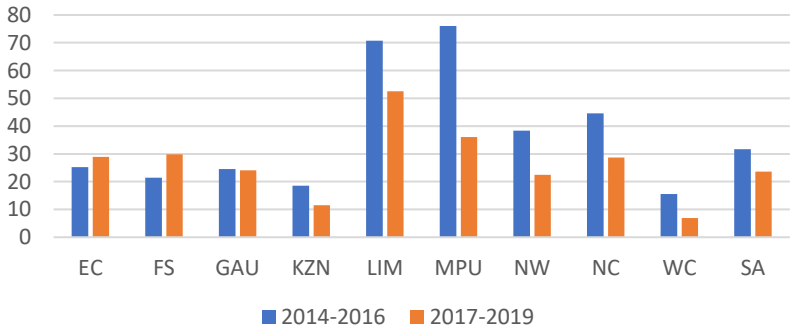


Figure 30. Provincial BLDACD CFR for 2017-2019 and 2014-2016



For the majority of provinces, CD and BLDACD CFR declined in 2017-2019, except Free State which has shown an increase in both CD CFR and BLDACD CFR in 2017-2019, and E Cape for BLDACD CFR. Despite high CFRs Limpopo and Mpumalanga have shown declines from the previous triennium.

An appraisal of implementation of the Safe CS and Safe Anaesthesia action plans and audit needs to be done on whether and how they were implemented in different provinces. The

national protocols, training videos and policies were disseminated but only in some provinces was there an active process of visiting and auditing hospitals for compliance (KZN, W Cape, Free State, Mpumalanga and E.Cape). In addition, the 2017 Saving Mothers report showed a correlation between high CD CFR and lack of appropriately skilled staff both to perform surgery and anaesthesia and to monitor postoperatively. Staffing, resource and leadership issues still need to be addressed

Conclusion and Recommendations

The increasing Caesarean Delivery rate is very concerning; whilst the decline in Case Fatality rates from CD and Bleeding at CD can be viewed as progress. However, wide disparities in CD CFR still exist between provinces which requires focus on resources, skills availability for surgery and anaesthesia, leadership and training.

The Safe CD audit and action plan aims both to reduce unnecessary CD, but also to promote surgical safety. It must be implemented in all provinces and districts, and repeated to ensure changes have been made in response to findings. An appraisal of its implementation and effectiveness and to what extent it has been incorporated into Provincial Annual operating plans to ensure accountability, would be valuable.

References

1. Sobhy S et al. Maternal and perinatal mortality and complications associated with caesarean section in low and middle income countries; a systematic review and meta-analysis. Lancet published online March 2019 http://dx.doi.org/10.1016/S0140-6736(18)32386-9
2. Kalliandis A et al. Maternal mortality after Caesarean section in the Netherlands . Eur J Obs Gyn Reprod Biol. 2018; 229:148-152

Section 3 Abstracts

Hypertensive Disorders of Pregnancy (2017-2019)

Key Data Points

- There were 590 maternal deaths due to Hypertensive Disorders in Pregnancy (HDP) in the current triennium, 2017-2019; this was 71 deaths less than the 661 deaths recorded in the previous triennium 2013-2015. The number of deaths due to HDP in the current triennium in individual provinces ranged from 19 in the Northern Cape (NC) to 147 in Gauteng (GP)
- Eclampsia (n=275) accounted for the majority of deaths. The numbers of deaths in the other categories of HDP were Pre-eclampsia with severe features (n=164); HELLP(n=96); chronic hypertension (n=39) and liver rupture (n=16).
- Overall, HDP accounted for 17% of the 3454 maternal deaths in the period 2017-2019.
- The institutional Maternal Mortality Ratio (IMMR) was 20.73 per 100,000 live births. There were 2,845,775 live births in the public sector in the 3 year period. Two provinces, Free State (40 per 100,000 live births) and NW (32.7) had the highest IMMRs.
- Most deaths due to HDP occurred in Regional Hospitals (RH). However, a substantial number occurred in District Hospitals (n = 100); Community Health Centers (n=21) and deaths outside health facilities(n=20). There were 29, 49 and 10 deaths due to pre-eclampsia with severe features, eclampsia and HELLP respectively in DH. Nine deaths due to eclampsia occurred in CHCs.
- There were 19 maternal deaths due to HDP reported by Private Health Facilities (10 were due to eclampsia).
- There was a decline IMMRs over the three years, being 21.46 in the year 2017; 20.08 in 2018 and 18.32 in 2019, demonstrating a slight downward trend over the three years.
- Final Causes of deaths due to HDP: Cerebral complications (intracranial hemorrhage (n=160); cerebral edema (n= 45) and brain edema (n=57) following an hypoxia event, accounted for 56.3% of all deaths due to HDP, while cardiac failure/pulmonary edema (35.1%) ; acute kidney injury (19.8%); DIC (15.2%) and liver failure (12.3%) were other major final causes of death. Severe anemia (<8g/dl) was present in 8.2% of those who died from HDP.
- HIV Status and HDP Deaths: Of 561 deaths, the HIV "status" was unknown in 51 cases. Of those tested, 78% were HIV negative and 22% were HIV positive.
- Maternal Age and HDP deaths: Of 561 deaths, 66 were <19 years, while 134 were between the ages of 20 -24 years.
- The IMMR for those between the age of 10 and 14 years was 50.3 and 20.3 per 100,000 live births for those aged 19 to 24 years. Those who were 45 years or more had an IMMR of 72.3/100,000 live births.
- Parity and HDP: a substantial proportion of deaths occurred in primigravidae (n=216), accounting for 21% of all HDP deaths. In addition, 121 (46%) of 263 eclamptics who died were primigravidae.
- Approximately 60 % of all HDP deaths had an avoidable factor.

SUMMARY

Mortality Rates associated with HDP remain substantial, despite a slight decline in the iMMR.

The Major causes of death remain the same viz cerebral complications , pulmonary edema, acute kidney injury and disseminated intravascular coagulation.

Primigravidae, especially those < 19 years, remain at high risk of death due to eclampsia.

RECOMMENDATIONS

1. **Contraception**: messages about reproductive health for both males and females must be strengthened at all educational facilities – schools, colleges, universities. All health professionals must ensure that women over the age of 35 years especially those over 45 years must be offered appropriate contraceptive methods in the antenatal period.

   Teenagers are at risk of developing PE and have a high MMR. Women above 35 years and especially those > 45 years are at risk of mortality from HDP.
2. **Communities**: young women (adolescents and women less than 24 years) and their families must be informed of the warning signs of PE. Health professionals must discuss the use of Mom Connect and transport issues, if an emergency occurs especially in rural areas.

   The Health System must rethink the issue of " Waiting Mothers areas" in rural areas. Delays in Ambulance services and delays in getting transport for women who developed complications at home in rural areas was identified as one of avoidable causes of deaths from HDP.
3. **District hospitals and management of severe pre-eclampsia and eclampsia**: Due consideration must be given to referral patterns and the site of management of HDPs.

   A reflection of charts shows that patients from clinics are transferred to DH then onto RH in some provinces. All PE with severe features must be managed at RH because prediction of severe complications is clinically difficult. Further delivery does not mean cure and such patients require close observations during and following child birth.
4. **Professionalism**: Doctor's must attend to patients with severe PE as soon as possible. Standard operating procedures should be developed in which if a doctor is called to attend an emergency or phones a second on call to attend to a patient rather than give orders over the phone. The doctor must examine the patient, lower the high blood pressure immediately and he or she must stay with the patient until she is "stabilized."
5. **Post Natal Observations and hospital discharge.** Patients with PE with severe features must be examined diligently prior to hospital discharge and ensure that both the Blood Pressure and pulse rate are normal. Patients with HDP must continue their anti-hypertensive agents following hospital discharge and seen again within 5-7 days at the site of delivery. In addition all women with HPD with severe features must have their laboratory studies and a complete cardiovascular examination preferably ECG and X ray chest if they have had early onset PE or chronic hypertension to exclude cardiomyopathy.

A substantial number of patients with PE with severe features returned with pulmonary edema within 28 days following delivery. *Such patients have been discharged with elevated pulse rates.*

6. **Borderline / pre-hypertension /stage 1 hypertension**. Slight elevations of BP should be asked to return for a BP check within 3 days or referred to a High Risk clinic. Sessional doctors at clinics need ESMOE training.
   Patients with the above levels of BP have been sent home by doctors and nurses and asked to return in 4-6 weeks

Maternal deaths from Obstetric Haemorrhage 2017-2019

Maternal deaths from Obstetric Haemorrhage (OH) decreased in the recent triennium, in part due to focused advocacy and training. OH was the third most common cause of maternal death, accounting for 544 deaths or 15.7% of the total. This compares with 635 (17.4%) deaths in the 2014-2016 triennium. The OH related maternal mortality ratio (MMR) was 19.1 deaths per 100,000 live births, which is less than 23.1 in 2014-2016, and 24.3 in 2011-2013. The MMR in 2019 of 18.1 was markedly reduced from previous years. There was considerable provincial variation with the triennial MMR due to haemorrhage being highest in Free State (31.4) the only province to increase from 2014-2016, and Limpopo (28.6); and lowest in Kwazulu Natal (12.3) and Western Cape (7.1).

Underlying features in OH death were maternal age over 35 yrs (37%), prolonged labour (14.7%), anaemia (23.7%), HIV positive (40.1%), previous Caesarean Delivery (CD, 23.9%), and current CD (49.3%).

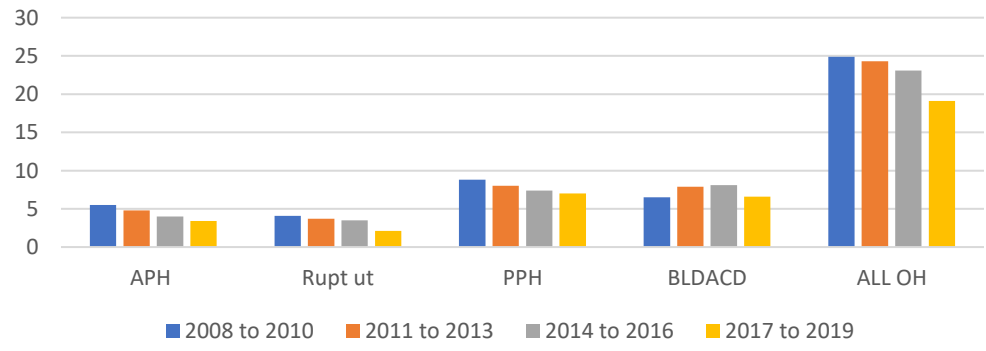
The major causal groups of death from haemorrhage were:

1. Postpartum haemorrhage (PPH) following vaginal delivery (36.4%, MMR 7.0 per 100,00 live births), mostly from uterine atony, retained placenta and unspecified PPH.
2. Bleeding associated with Caesarean delivery (BLDACD, 34.7%, MMR 6.6), mostly detected after CD.
3. Antepartum haemorrhage (17.2%, MMR 3.4) mostly from abruptio placentae
4. Ruptured uterus (11.2%, MMR 2.1) equally from a scarred and unscarred uterus.

Compared to 2014-2016, the MMRs from all the above four groups have decreased, most markedly for ruptured uterus. Of concern is that PPH after vaginal delivery now forms the largest proportion of OH deaths in SA with a lesser decline in MMR (7.0) from previous triennium (7.4). It is possible that the oxytocin stock outs in 2018 contributed to this.

Reviewing the last 4 triennia from 2008-2019, there has been a sequential decrease in MMR of APH, Ruptured uterus and PPH after vaginal delivery, but BLDACD MMR increased in 2011-2013 and 2014-2016 before declining in 2017-2019 see Figure 52.

Figure 52: Trends in MMR of OH causal groups 2008-2019



Provincial trends indicate variations between provinces with BLDACD remaining the most common sub-category in E Cape, Gauteng and Limpopo, whereas for all the others PPH after vaginal delivery has the highest OH MMR.

During 2017-2019, 800,499 caesarean deliveries (CDs) were performed, giving a national CD rate of 28.1% (ranging from 21.1% in Limpopo to 32.4% Kwazulu-Natal. The case fatality rate (CFR) from BLDACD in 2017 -2019 was 23.6 BLDACD deaths per 100,000 live births, which is markedly less that the CFR of 30.6 in 2014-2016. Decreases of BLDACD CFR were noted in Kwazulu-Natal, Limpopo, Mpumulanga, North West, Northern Cape and Western Cape. It increased in Eastern Cape and Free State, and remained unchanged in Gauteng.

Antenatal care was received by 86.8%. The majority of OH deaths (85.8%) occurred at public hospitals; 30.4% at district hospitals (DH), 34.3% at regional hospitals(RH) and 23.1% at tertiary hospitals (TH/NC). The corresponding MMRs for level of care were CHC 4.38, DH 13.96, RH 24.11 and TH/NC 30.5 per 100,000 live births. These level of care statistics refer to where the women died, not where they delivered, as many women were referred from district level with bleeding after delivery or CD to a regional or tertiary facility. There were 51.9% of the OH deaths who had been referred, mostly from CHCs (21.3%) and District hospitals (22.9%) demonstrating the importance of availability of emergency transport and optimizing care before and during referral.

Assessors judged the majority (89.5%) of the OH deaths to be possibly or probably avoidable; and 62.4% were thought to be probably avoidable. Patient related avoidable factors, mostly delay in seeking care, were present for 34.7%. Administrative factors occurred for 74.8%, highlighting major problems in health facility management and training. Administrative factors included lack of blood (15.7%), delays in inter-institution transport (18.2%), delays initiating clinical care due to overburdened services (12.3%), and a lack of appropriately trained doctors (54%) or nurses (36.7%) especially at district hospitals. Health worker related avoidable factors occurred for 39.2% of assessable deaths at CHC level, 90.1% at DH, 78.6% at RH and 53.5% at TH/NC. At CHC and DH, problems were identified with initial assessment and problem recognition; whereas at all three levels of hospital, substandard care was the most frequent problem. Emergency hysterectomy was performed in 25% of all OH deaths (27% of deaths from bleeding associated with CD and 17.2% of women dying from PPH after vaginal delivery).

Many interventions were developed following the previous Saving Mothers triennial report. The focus on Safe CD, updated ESMOE OH protocols and introduction of emergency drills are likely to have contributed to the decline in OH deaths, together with improved health of HIV positive women due to expanded ARV provision. Other interventions (Non pneumatic Anti Shock Garment for referrals, Massive Haemorrhage Transfusion Protocols and use of tranexamic acid for PPH were only introduced latterly in the triennium and although they appeared to have had an impact in 2019, their main impact should be seen in the next triennium.

Key recommendations

- Focus on reducing deaths from uterine atony and retained placentae by ensuring earlier detection of PPH and improved response to refractory bleeding.
- Ensure vital signs normal (Systolic BP ≥100 and Pulse ≤100 with no excess bleeding before leaving labour ward
- Continue implementation of ESMOE/EOST training, Safe CD protocol, updated PPH algorithms, use of NASG and Massive Obstetric Haemorrhage Transfusion Protocol
- Direct Telephonic links for 24-hour specialist support to district hospital doctors.
- DCSTs to ensure essential competencies available and EOST drills performed on PPH / Safe CD
- Develop training package for CHWs and WBOTs, to sensitise communities to problem of PPH.
- Work with Ambulance services to ensure appropriate prioritisation of bleeding patients and availability of urgent paramedic assisted ambulances.

Early pregnancy loss

Summary of Findings

There were 323 early pregnancy deaths in 2017-2019, a 24% increase compared to 2014-2016. One hundred and nineteen deaths (119) were caused by ectopic pregnancy (25% increase), and 204 by complications of miscarriage (24% increase). These are the highest numbers of early pregnancy deaths that have been recorded in any triennium since the confidential enquiries into maternal deaths in South Africa started in 1998. Fifty-seven percent (57%) of ectopic pregnancy deaths and 34% of miscarriage deaths were clearly avoidable within the health system during the 2017-19 triennium. The equivalent figures for the 2014-16 triennium were 63% for ectopic deaths and 30% for miscarriage deaths. In summary, despite a large proportion of early pregnancy deaths, and in particular ectopic pregnancy deaths, being clearly avoidable, the numbers of these deaths are increasing. This suggests that the recommendations made in the last Saving Mothers report (2014-16) for reducing early pregnancy deaths have been neglected. The data raise concern about the poor quality of care rendered to women with complications of early pregnancy (including unwanted pregnancy) across all levels of care. The recommendations in the current report remain similar to those in previous Saving Mothers reports. Greater efforts are now required to implement these recommendations.

Ectopic pregnancy

Deaths from ectopic pregnancy occurred most frequently at district hospitals (37%), followed by tertiary/central (27%) and regional (26%) hospitals. Nine cases (8%) were classified as extrauterine pregnancy beyond 20 weeks' gestation. Although only 51% of women who died from ectopic pregnancy had known HIV status, of those who were tested, 76% were HIV infected. The final cause of death was hypovolaemic shock in 81%. The most frequent patient behaviour-related avoidable factors were lack of antenatal care and delay in accessing medical help. The most frequent administrative avoidable factor was lack of appropriately trained doctors. With regard to management by health care providers, there were avoidable factors in 82% of cases at district hospital, 74% of cases at regional hospital level, and 64% of cases at tertiary level. The most frequent health care provider-related avoidable factors were failure to make the diagnosis, and therefore incorrect management, substandard care despite making the right diagnosis, and substandard resuscitation of hypovolaemic shock. In 20% there was no resuscitation attempted. Anaesthesia was only administered in 38% of cases, suggesting missed opportunities for surgical intervention.

Miscarriage

Deaths from miscarriage occurred most frequently at regional hospitals (36%), followed by tertiary/central (31%) and district (29%) hospitals. Of the subcategories of miscarriage, 71% were classified as septic miscarriage, 20% as deaths from haemorrhage (non-traumatic), 6% as deaths from uterine trauma, 3% followed legal termination of pregnancy, and 2% were classified as gestational trophoblastic disease. Although 34% of women who died from miscarriage had unknown HIV status, of those who were tested, 70% were HIV infected. The final cause of death was septic shock in 56% and hypovolaemic shock in 24%. The most frequent patient behaviour-related avoidable factors were delay in accessing medical help, no antenatal care, and unsafe abortion. The latter was documented in 25% of miscarriage deaths where avoidable factors were assessable, higher than the 22% in 2014-2016. The most frequent administrative avoidable factors were lack of appropriately trained doctors and lack of access to an intensive care unit. With regard to management by health care providers, there were avoidable factors in 70% of cases at district hospital level, 65% of

cases at regional hospital and 57% of cases at tertiary/central level. The most frequent health care provider-related avoidable factors were substandard care despite making the right diagnosis, failure to make the diagnosis or recognise the severity of the condition, and substandard resuscitation of circulatory shock, whether due to sepsis or hypovolaemia. In 22% there was no resuscitation attempted. At district hospital level specifically, delay in referral or failure to refer was an additional prominent avoidable factor. Anaesthesia was only administered in 44% of cases, suggesting missed opportunities for surgical intervention.

Key recommendations

1. Family planning and contraception services must be promoted in all communities and must be made more accessible in order to reach all those who would benefit from them, including teenagers. Contraception services must be integrated into HIV care services.

2. Fighting the HIV/AIDS epidemic must remain a priority, with multiple strategies including integration of HIV/AIDS screening and care into maternal and women's care services.

3. Communities must be educated about contraception, "booking early for antenatal care", recognising and acting on danger signs in early pregnancy, and how to access safe TOP.

4. There must be regular training of doctors and nurses in the recognition and emergency resuscitative management of circulatory shock in the context of early pregnancy. This should include regular "fire drills" on the management of shock.

5. Casualty departments must have clear policies ensuring that shocked gynaecological patients are given equal priority and attention by casualty staff compared to any other category of shocked patient.

6. There must be regular training of doctors and nurses on the recognition and management of different types of miscarriage, including indications and technique for evacuation of the uterus, and criteria for referral to specialist level

7. All hospitals which manage early pregnancy complications must have a facility separate from the main theatre complex for performing evacuation of the uterus by manual vacuum aspiration (MVA) without general anaesthesia

8. All hospitals must be able to provide medical termination of pregnancy to ensure that all women have access to safe TOP. Medical TOP must be available at but not restricted to dedicated TOP clinics.

9. There must be regular training of doctors and nurses on the recognition of ectopic pregnancy and its management, particularly the need for immediate surgery if the patient is shocked.

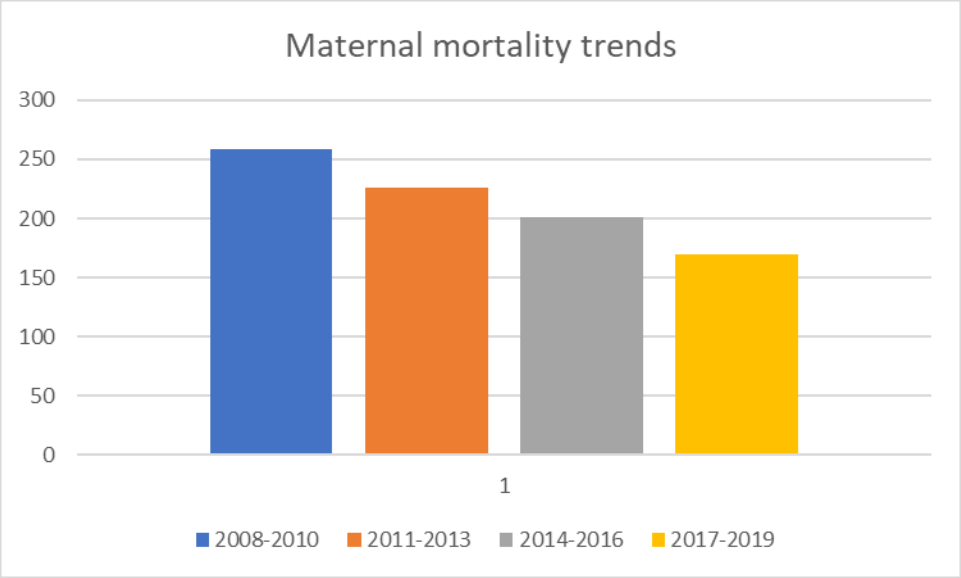
10. Facility managers must ensure that all doctors and nurses are aware of their professional and ethical responsibilities when on-duty, and must hold them accountable when these responsibilities are neglected.

Pregnancy-related sepsis following viable pregnancies

Summary of findings

The previous reports including Saving Mothers reports consistently, uses the term "pregnancy-related sepsis" and that the deaths from pregnancy related sepsis (PRS) are those that are caused by infections in the genital tract or in tissues involved in the birth process in viable pregnancies. In an attempt to standardise maternal sepsis definition; the WHO defines maternal sepsis as the "life-threatening organ dysfunction resulting from the infection during pregnancy, childbirth, post-abortion or postpartum". Deaths from septic miscarriage (though as part of new definition) are described elsewhere in this report. Between 2017 and 2019, 170 women died as a result of PRS and this is at least 31deaths less that 2014-2016 and it is the lowest amongst all the trienniums. The number of deaths decreased every triennium since 2008-2010 (258), 2011-2013 (226), 2014-2016 (205) and 2017-2019 (170) (see figure 1). This decline is supported by the institutional maternal mortality rate (iMMR 100,000 live births) which showed the same trends over the last four trienniums. There was also a steady decline in the iMMR over the past three years of the last triennium with the lowest at 4.11 in 2019

Figure 53: Triennial maternal mortality trends from pregnancy related sepsis



Of these 170 deaths, 76 women had sepsis after vaginal delivery, 69 after caesarean section, 18 suffered bowel trauma during caesarean section and seven deaths were caused by chorioamnionitis. The proportion of deaths after caesarean section fluctuates from 43.8 percent (2011-2013) to 49.3 percent (2014-2016) and then 47.2percent for this triennium. The recent increase in the deaths from bowel injury at caesarean section may indicate a trend of increasing numbers of difficult repeat caesarean sections.

For less than 10 per cent of the women their HIV status was unknown (four per cent, compared to nine per cent in 2014-2016) and an increasing percentage of 75.6 percent was on treatment with ARVs, versus 75.2 percent in 2014-2016, 49 per cent in 2011-2013 and only 20 per cent in 2008-2010.

Almost all the deaths (97.5 percent) occurred in hospital, mainly in regional and tertiary facilities. Free State and North West have the highest iMMR due to PRS (9.29 and 8.03 respectively) whilst Mpumalanga is maintaining the decrease of its iMMR from 12.8 to 4.48 then 4.21 in the past three trienniums respectively.

There has been a decline in the avoidable deaths as compared to 2014-2016 although still significant. On the patient side, delay in accessing care is the most important contributor (64.2 per cent). The severity of PRS is often underestimated by the healthcare providers and its management is inadequate. Avoidable factors associated with the healthcare providers were present in 68.8 per cent of cases in district hospitals, 65.4percent of cases in regional hospitals and 55.6 percent in private hospitals. While the rate of PRS deaths has shown a slow but steady decline in recent years, the high proportion of avoidable deaths is of concern. More than sixty percent of women who died from complications related to PRS received substandard treatment at the district, regional and tertiary levels of care despite the correct diagnosis being made and this suggest possible lack of insight into the treatment of such patients as supported by the lack of appropriately trained doctors and nurses in more than seventy percent of deaths. Lastly, the majority (greater than ninety percent) of women with PRS died during the postpartum period.

Key recommendations

1. Ensure capacity and accessibility of facilities for outpatient postnatal care within six days of delivery in all districts. On discharge from the place of delivery, advise women on signs of infection, and what to do if these are noticed.
2. Strengthen systems to ensure detection and treatment of HIV infection as early as possible in pregnancy, including strategies to ensure initiation of antenatal care as early as possible in gestation (before 14 weeks).
3. Ensure that surgeons and operating theatre staff follow standard precautions before and during Caesarean sections, including asepsis, good and safe surgical technique, and routine prophylactic antibiotics. Extended doses of antibiotics must be given in women with risk factors for PRS.
4. Remind and educate clinicians about suspecting and recognising septic shock in ill postpartum women, using forums such as morbidity and mortality meetings, or formal ESMOE training or other training platforms.
5. No woman should be discharged from the hospital if any abnormal vital signs are recorded and immediate readmission is advised in women with any symptoms and signs suggestive of sepsis.
6. Proper initial triage of these patients and immediate implementation of maternal sepsis' bundles must always be done at all levels of care.
7. In district hospital protocols, especially in rural areas, must emphasise recognition of septic shock and the need for early transfer of such women to higher levels of care, after the immediate implementation of sepsis' bundles as outlined in the maternity care guidelines.
8. In regional hospitals, audit the capacity of staff and facilities to manage women with septic shock. Recommended norms and standards for staff and facilities, including intensive care units, should be followed.
9. Educate all doctors performing Caesarean sections about precautions for preventing bowel injury at repeat Caesarean section. Ensure protocols are in place for intraoperative management of bowel injuries, including general surgical help, and transfer to higher levels of care

Embolism / Acute Collapse

Summary Findings

- During the triennium 2017-2019, one hundred and seventy four deaths were classified as due to Embolism and Acute Collapse (cause unknown). Amongst those who died from Embolism, 102 were due to Pulmonary Embolism and 72 due to Acute Collapse cause unknown.
- Amongst those who died from Embolism (n=102), there were 93 cases due to Pulmonary Embolism (Pul Emb) and 9 cases due to Amniotic Fluid Embolism.
- Pulmonary Embolism and Acute Collapse deaths occurred at all levels of Health Care particularly at district, regional and tertiary hospitals In addition, a number of deaths occurred outside health facilities (home deaths =9).
- The iMMR for embolism and acute collapse remained constant in all previous reports since 2011 and was 3.2 and 2.53 per 100,000 live births respectively. There was however a decline in deaths due to Pul Emb in the year 2019.
- Like the previous triennial report, the case fatality rates for Pulm Emb were substantially higher for caesarean delivery (CD) than (VD) vaginal delivery (CD =40 vs. VD =23).
- The number of deaths related to maternal age show that a substantial proportion due to Pul Emb occurred in young women (under 19 years =5, between 20-24 years n= 14 and 28 in the age group 25-29 years). There were only 19 above the age of 35 years. None the less the iMMR was greatest in those above the age of 40 years (IMMR = 7.1 per 100,000 live births).
  In respect to parity, 29 (32% of deaths due to Pul Emb occurred in those who were parity 0 and 1. The iMMR was greatest in those parity 6 and greater
- In a proportion of women who were obese, who had pronged hospitalization, prolonged labor including prolonged second stages of labor and operative vaginal delivery, Pulmonary Embolism was consider a cause of death revealed by post mortem.

Recommendations

- Strongly consider thrombo-prophylaxis for women who are obese (BMI > 30), those who have prolonged hospital stays and those who have had caesarean delivery.
- Ensure that in cases of acute collapse –cause unknown, in which the cause of death is unexplained and in patients who died from a surgical procedure that a post mortem is requested. More importantly if a post mortem has been done, ensure that at least the gross post mortem results are obtained. This can be done by building relationships with the experts who perform post mortems in your health district.

MATERNAL DEATHS associated with Anaesthesia in the triennium 2017-2019

There were 921 maternal deaths entered on the Database for the Retrospective Analysis of Maternal Anaesthesia (DRAMA). These were maternal deaths **who had received an anaesthetic** during the triennium 2017-2019.

The assessments in all provinces are performed by specialist anaesthetists, who are referred every maternal death who has received an anaesthetic in that specific province.

The data that is captured includes the following:

- Hospital where the death occurred; level of care of the facility
- Parity and age of the woman and other anonymized demographics
- Anaesthetic details
- Surgical procedure and details, indications for surgery
- Drugs used, and details of the uterotonics used, as well as the resuscitation
- Whether a post mortem was requested
- Obstetrician's proposed cause of death and proposed death on the maternal death notification form (MDNF)
- Avoidable anaesthetic factors
- Anaesthetic contribution to the death. This may be one of 4 options:
    - Death due solely to the anaesthetic
    - Death due to another cause (such as haemorrhage), but action or inaction by the anaesthetist might have contributed significantly to the death or events leading to the death.
    - Substandard anaesthetic that did not contribute to the death
    - No substandard anaesthesia care identified and death was due to another cause

Of these 921 mortalities, 66 deaths (7%) were as a direct result of anaesthesia, and an additional 139 (15%) were attributed to secondary anaesthetic problems. A secondary anaesthetic problem is a death due to another cause (such as haemorrhage and hypertension), but action or inaction by the anaesthetist might have contributed significantly to the death or events leading to the death.

The primary and secondary causes amount to 205 deaths, which constitutes 22% of all of the deaths where an anaesthetic was given. This is a very high proportion of all of the deaths.

The MaMMAS figures indicate that 77 women died as a direct result of the anaesthetic during this triennium. This discrepancy of 11 deaths between the DRAMA and the MaMMAS database may be due to the fact that in some provinces the anaesthetic assessors did not receive all of the patient files in order to perform the anaesthetic assessment.

Note: Many anaesthetic records were missing (especially in Gauteng) and there was also significant under-reporting of all cases in Gauteng, as well as in the Northern Cape. In the latter province there is a lack of capacity for anaesthetic assessments.

Table 54. The breakdown by provinces of the DRAMA data

Province	2017 Primary	2017 Secondary	2018 Primary	2018 Secondary	2019 Primary	2019 Secondary	Total
E Cape	3	5	2	5	2	5	22
Free State	2	4	4	1	1	6	18
Gauteng	4	16	1	9	5	7	42
KwaZulu Natal	11	11	7	14	2	8	53
Limpopo	6	5	1	7	2	9	30
Mpumalanga	5	6	3	6	0	0	20
N Cape	0	1	0	0	0	2	3
Northwest	0	2	0	4	0	2	8
W Cape	1	2	2	1	2	1	9
Total	32	52	20	47	14	40	**205**

As can be seen from Table 54, KwaZulu Natal has the largest number of deaths due to anaesthesia in both primary and secondary categories, followed closely by Gauteng and then Limpopo.

Overall observations involving the 921 deaths of mothers who received anaesthesia are as follows:

- The anaesthetic chart was available to the assessors in 70% of cases.
- The theatre record was available in 85% of the cases that were assessed.
- Seventy per cent of the mothers died in regional or tertiary hospitals.
- Most of the mothers who died did so in relation to their first anaesthetic, which was administered between the hours of 07h00 and 16h00 in 50% of cases.
- Fifty-five per cent of anaesthetics were general anaesthesia, and 36% neuraxial blockade, usually a spinal.
- Of grave concern is the trend to perform evacuations of the uterus under sedation with no patient monitoring and a single operator administering the sedation and performing the evacuation.
- If additional anaesthesia was required for a patient, the indications were:
    - Resuscitative measures (60%)
    - Failed spinal anaesthesia (15%)
- Most anaesthetics were administered by medical officers and community service doctors. Of concern is the fact that Clinical Associates and Interns also administered anaesthesia. This would appear to have been unsupervised.
- An alarming observation is that in 2.5% of the cases the anaesthetist also performed or assisted with the surgeon. Most of these 21 cases were single operator evacuations, although there were also two or three caesarean deliveries.
- The surgery performed under anaesthesia in 66% of the cases was Caesarean delivery. A further 20% were laparotomies, most commonly for postpartum haemorrhage or ectopic pregnancy. Evacuations comprised 10% of the surgery.
- Hypotension after the administration of the anaesthetic was a major morbidity in 25% of mothers before delivery of the baby and more commonly after delivery, in 35% of women.

- In mothers who underwent caesarean sections, many had the baby delivered as part of the resuscitation (perimortem delivery). The figures for the triennium are as follows:
  - 2017: 17%
  - 2018: 23%
  - 2019: 31%
- Postmortem examinations were requested in >35% of cases, with very few results being available in the records.
- Haemorrhage was the commonest cause of death in mothers who underwent anaesthesia, resulting in 25% of the deaths. Many of these involved the anaesthetist and would fall into the category of secondary anaesthetic deaths, in which action or inaction by the anaesthetist might have contributed significantly to the death or events leading to the death.
- Hypertension was the cause of 17% of the deaths in 2017 and 2019, and once again the anaesthetist may have played a significant role.
- In 2018 medical and surgical conditions were involved in 21% of the deaths.

Avoidable factors that were listed in these maternal deaths who received an anaesthetic were as follows:

- Poor or delayed resuscitation (17%)
- Delay in recognition of the onset of complications (17%)
- Failure of postoperative care (17%)
- Inappropriate method of anaesthesia (10%)

All of these factors are doctor-dependent, skills-wise. The failure of postoperative care involves nurses as well.
All of these factors could have been flagged (and possibly rectified) by the Safe Caesarean Delivery Anaesthetic checklist, had implementation been rolled out at all hospitals where anaesthesia is administered.
In summary, 921 deaths were entered on the DRAMA database in the triennium 2017 – 2019. Of these, 22% could be attributed to the anaesthetic and poor conduct of anaesthesia in the face of complications such as haemorrhage and hypertension. In addition, the single operator cases were unsafe and not in keeping with the standards of care, as were the anaesthetics administered by untrained and unsupervised “anaesthetists”.

Non-Pregnancy Related Infections

Summary of findings

Death due to Non pregnancy related infections(NPRI) remain the leading cause of maternal mortality for the triennium 2017-2019.There were 770 deaths reported for this category compared to 978 deaths in 2014-2016.This is a significant drop in maternal mortality of 21,3 per cent from the previous triennium (2014-2016). All provinces reported deaths from NPRI with the highest number in Gauteng (173) followed by KZN (164) and Limpopo (128). Distribution of iMMR per underlying cause from 2011-2019 shows a significant decrease of NPRI over the years from 58,87 in 2011 to 19,95 in 2019 and triennial drop from 53,47 in 2011-2013 to 27,05 in 2017-2019.

Level of care: Majority of deaths occurred at regional hospital with 37, 6 per cent followed by district hospital at 25, 4 per cent, tertiary hospital at 20, 1 per cent then national central hospital at 11,7 per cent which shows the same trends in 2014-2016.

Distribution of maternal death per age and parity: NPRI were highest between age 20-39 at (n=646) 87, 8 per cent and between Para 0-2 at (n=653) 88,7per cent.

HIV status: There were 649 HIV positive deaths in the NPRI category which contributed the highest 43, 5 per cent of overall maternal mortality. In these category 88, 2 per cent were HIV positive, 5, 1 per cent were negative and 7, 5 per cent unknown (unchanged from 2014-2016). Those who received treatment were (n=452) which made 69, 9 per cent and 20, 5 per cent were not on treatment.

Cause of death: The major cause of death remains respiratory infections with TB, PCP pneumonia and other pneumonias responsible for 62, 1 per cent of deaths. TB is still the major contributor even though there is a slight decrease of 7, 3 per cent from 2014-2016. Other HIV related infections showed a decrease in numbers namely; other meningitis (45 vs 64), cryptococcal meningitis (38 vs 44), and gastroenteritis (25 vs 51). However, there were 17 deaths from malaria with slight increase from 13 in 2014-2016.

Final cause of death: Overall, in the NPRI 62,1 per cent of maternal deaths were due to respiratory failure followed by immune system failure at 57,1 per cent and septic shock at 20,0 per cent.

Avoidable factors: Patient oriented problems were identified in 82.9 per cent of deaths with 16.9 per cent increase from 2014-2016. The most common factor was delay in seeking medical help at 63, 2 per cent followed by no antenatal care at 36, 6 per cent and declined medical/surgery/advice at 28, 0 per cent. Administrative problems were identified in 39, 4 per cent of deaths with 6, 7 per cent increase from 2014-2016. Mostly due to lack of appropriately trained staff (nurses and doctors) at 60, 7 per cent, lack of ICU facilities at 24.0 per cent and delay in initiating critical care due to overburdened service at 10, 5 per cent. This has been noted in the last triennial report.

Most of the deaths were referred and managed at regional hospitals and tertiary hospitals with 46,1 and 27,4 per cent potentially preventable deaths of assessable cases and potentially preventable MMR of 17,69 and 14,28, with 53,8% and 72,6% good care rendered respectively at this levels.

Resuscitation problems were identified in 48, 4 per cent of deaths a slight reduction of 4, 3 per cent from the last triennium.

Of concern is that majority of the deaths happens during the postpartum period and early pregnancy (less than 20 weeks). Review of folders should assist in finding the reasons whether is it due to lack of postpartum care and strict monitoring of HIV infected mothers and those who were known HIV positive interrupted treatment and present early in

pregnancy in a critical condition and die. These questions will be unpacked with folder reviews.

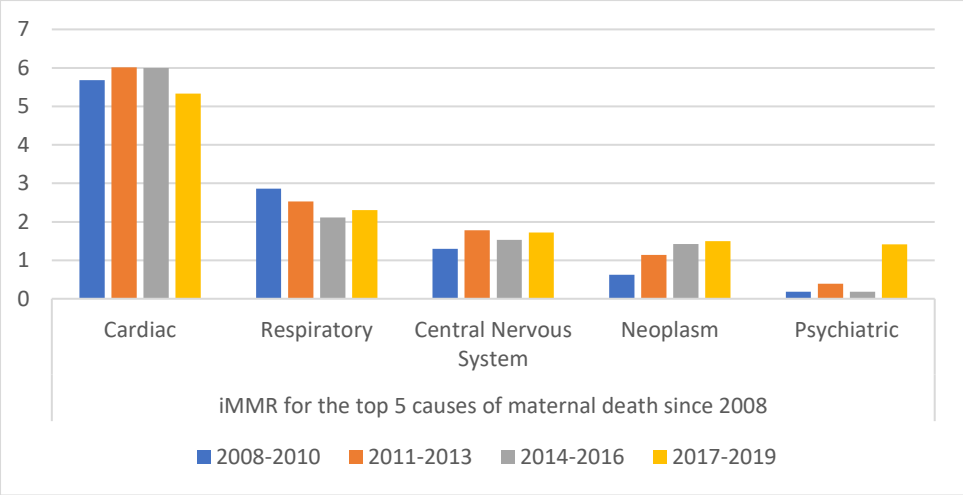
RECOMMENDATIONS

1. Primary prevention of HIV, especially among women of childbearing age.
2. Preventing unintended pregnancies by promotion of contraception especially the long acting reversible contraception (LARC) methods.
3. Ensure safe conception among women living with HIV.
4. HIV testing to identify all women who are HIV positive, including those who seroconvert during pregnancy.
5. Provide antiretroviral therapy (ART) on the same day that her HIV positive status becomes known, to optimise maternal health and to prevent mother to child transmission of HIV as per the New PMTCT guideline 2020 and guidelines for maternity care in South Africa.
6. Monitor the maternal viral load to ensure that all HIV positive pregnant and breastfeeding women are virologically suppressed on ART.
7. Mandatory screening for TB and other infections at all subsequent antenatal visits.
8. All women eligible for TB preventative therapy (TPT) and prophylaxis of opportunistic infections (CPT) must be initiated as per guidelines without delays.
9. HIV positive pregnant women who are acute or chronically unwell need thorough investigation of TB and other opportunistic infections with involvement of internal medicine and infectious specialists early.
10. Training of health care providers on the new HIV, TB and ART guidelines.
11. Ensure continuous monitoring of HIV positive women during the post-partum and breastfeeding period for 24months and longer if indicated and link them to Community Healthcare Workers (CHW) for continuum of care.

Maternal deaths due to Medical and Surgical disorders 2017-2019

Four hundred and eighty-one women demised as a result of medical and surgical disease during the 2017-2019 triennium. There has been a steady decline in iMMR for all maternal deaths in South Africa; however, the iMMR of 16.91 for medical and surgical conditions has remained relatively unchanged since 2008. The iMMR for 2008-2010 was 15.57, 17.54 for 2011-2013 and 17.04 for 2014-2016. Medical and surgical causes remain the fourth most common cause of maternal death in South Africa. The most common causes of death in this category are: cardiac (n=152), respiratory (n=65), central nervous system (n=49), neoplasm (n=43) and psychiatric deaths (n=40). The iMMR for deaths due to cardiac, respiratory and central nervous system disorders has remained relatively constant since the 2008-2010 triennium but the iMMR for neoplasm and psychiatric disorders has increased steadily with more than 4 times increase in psychiatric deaths over the last 2 triennia (Figure 31). Twenty-four deaths occurred in private institutions. Deaths due to cardiac and respiratory conditions made up 62.5% of medical and surgical deaths in private institutions.

Figure 31. Trends in iMMR from most common M&S conditions.



Eighty-seven (19.9%) deaths occurred at district level or lower. This figure is 6% lower than the 24.9% reported in the 2014-2016 report suggesting that more women are being referred for specialist care. The highest iMMR (31.5) was recorded for women in the 40-44 year age category followed by young girls in the age category 10-14 years (iMMR = 25.1). Cardiac disease and neoplasm were responsible for 48.4% of deaths in the 40-44 year age category while cardiac, respiratory and suicide were the most common cause of death in girls under the age of 14. One hundred and seventy-four (36%) women presented to healthcare institutions with an acute emergency condition in the ante-natal period while majority of deaths occurred post-partum (n=285; 59.3%). Maternal death assessors believed that medical care was suboptimal in 296 (64%) cases and in 54.6% of cases suboptimal care was possibly or probably linked to the maternal death. No ante-natal care, delay in accessing medical help by patients, lack of appropriately trained doctors to deal with medical problems, lack of health care facilities and delays in initiating critical care as a result of an overburdened service were important avoidable factors identified in the public sector. Private institutions were assessed

for avoidable factors related to medical care and not administrative or patient-related factors. Sixty-five percent of deaths in private institutions were assessed as avoidable.

Deaths due to psychiatric disease

There has been a significant increase in suicides reported for this triennium. Seventy percent of suicides took place in KwaZulu Natal and Limpopo with 60% of deaths taking place among young women under the age of 24 years. Majority of deaths occurred during the ante-natal period suggesting that unplanned and unwanted pregnancy could be a significant contributor to maternal mortality in this young age-group. Many of the women who attempted suicide presented in advanced stages of organ failure when medical intervention was too late to save lives. Sucidal ideation is a common feature of postnatal depression. The peak presentation for postnatal depression is around 6 weeks postpartum and it is possible that some deaths occurred after the 42-day reporting period.

Other medical conditions – recurring themes

Cardiac and respiratory conditions were major contributors to maternal mortality in this category. The need for making a correct diagnosis for women presenting with shortness of breath was highlighted in the 2014-2016 report. Once again assesors noted the general delay in physician/obstetric medicine review for prompt diagnosis and intervention. This often resulted in clinical deterioration of the patients' condition. Many healthcare professionals failed to offer contraceptive advice for women with underlying medical disease. Women at risk who had previous high-risk pregnancies had not received adequate post-pregnancy advice regarding risk in future pregnancies.

Recommendations

1. Women should be screened for mental health conditions and gender-based violence at the first ante-natal visit. Some women may require ongoing support at subsequent visits.
2. Regional and tertiary hospitals should establish joint clinics involving obstetricians and physcians for the management of women with underlying medical disease. Management of these patients should include a delivery plan and a plan for future contraception.
3. All women in the reproductive age group should receive contraceptive advice. Contraceptive counselling should begin at school level and contraceptive services should be avalailable at times convenient for school-going girls and working women. Contraceptive counselling using tele-medicine services must be considered.
4. District hospitals should have a transitional highcare area to stabilise and manage women while awaiting transfer to tertiary facilites
5. Women presenting with recurrent admisions or persistent abdominal signs require multidisciplinary consultations where prompt decisions regarding the need for re-look laparotomy must be made.
6. Consideration should be given to include an emergency medical/cardiac module as part of the ESMOE course

Maternal deaths from small subgroups, 2017-2019

(Adverse Drug Reactions (ADR), Hyperemesis Gravidarum (HMG), and Acute Fatty Liver (AFLS).

Adverse Drug Reactions

There were 25 deaths, (0.75% of all maternal deaths), with an iMMR of 0.85 deaths per 100,000 live births). This is less than 2014-2016, when there were 54 deaths with an iMMR of 1.96. These ADR deaths have been separately classified since 2014, due to concerns of substantial numbers of deaths from the NVP based Antiretroviral (ARV)regimen used prior to this. There were 130 deaths from ARV complications in 2011-2013 which decreased to 27 in 2014-2016, after nevirapine was replaced with efavirenz, and tenofovir was introduced to replace AZT. In 2017 to 2019, there were 3 deaths from ARV complications, 2 from TB medications, 7 'other' and 13 'herbal'. Folders will be reviewed for these two categories. Some misclassification of cause of death have been noted with suicide from herbal medications being classified as ADRs rather than suicide.

There were no ADR deaths in Free State, Mpumulanga or Northern Cape. Limpopo had the highest number (7), 6 of which were 'herbal' meds; Gauteng (5), E Cape (5), Kwazulu-Natal (4), W Cape (3), North West (1). Data was available for further analysis for 24 women. Nine women were HIV positive. Three of the deaths occurred in early pregnancy, 9 antenatally after 20 weeks, one intrapartum and 11 postpartum. Six occurred at district hospital, 3 at regional and 15 at tertiary/ national central.

In some cases, young women in their first or early second trimester admitted as emergencies and in whom there was no likely clinical cause, detailed history to illicit whether herbal medications or other poisonous substances were taken for illegal termination of pregnancy or suicide. Post mortems in such patients showed evidence of potential poisonous substances and herbal medications in their stomachs. The final results of the investigations of these substances were not obtained.

Avoidable factors were mostly at patient/ community level (95%). For 33.3 % there were administrative problems, and there were health care provider problems for 16.7% at CHC level, 28.6% at District hospital, 50 % at Regional hospital and 16.7% at Tertiary hospitals. These numbers of deaths are too small to draw conclusions or make recommendations.

Of note is the greatly reduced numbers of complications from ARV medications, from 130 (2011-2013) to 3 in the current triennium due to utilisation of safer medical combination ARV regimens.

The deaths from complications from 'other meds and herbal meds' need to be explored by folder review. Clinicians should ensure that in young women in early pregnancy admitted as an emergency, should have a detailed history on herbal medications and suicide is considered. Health services must improve access to legal termination of pregnancy services so women do not resort to harmful medications to abort unwanted pregnancies

Hyperemesis Gravidarum (HMG)

There were nine deaths from Hyperemesis gravidarum, with an iMMR of 0.28 per 100,000 live births. This compares with 10 for 2014-2016. There were no HMG deaths in Free State, Mpumulanga, or Western Cape. There were 4 in Limpopo and I in E Cape, Gauteng, Kwazulu Natal, North West and Northern Cape. There were three deaths at district hospitals, 1 at Regional and 4 at Tertiary/national central. In those who died from miscellaneous causes there were four patients who died from Hyperemesis Gravidarum. Reflections on the folders of these deaths suggest that the patients were managed at district hospitals by inexperienced doctors and such patients were not completely investigated and resuscitated. Despite being re-admitted several times with the same diagnosis, advice from specialists was not obtained

Acute Fatty Liver (AFLS)

There were 12 deaths from AFLS with an iMMR of 0.390 per 100,000 live births. This compares with 8 in 2014 -2016 when the iMMR was 0.29. There were no deaths in Free State, Kwazulu Natal, Mpumulanga or Northern Cape. There were 5 deaths in W Cape, 4 in Gauteng and I in E Cape, Limpopo and North West. There was one death at a district hospital, 4 at Regional, 4 at tertiary/national central and 2 at private hospitals.
Since numbers are small, HMG and AFLS are analysed together in MAMMAs as Miscellaneous (n =21). In terms of timing of emergency, it was in early pregnancy (7); antenatal after 20 weeks for 6, intrapartum for 5 and postpartum for 5. Deaths occurred in early pregnancy for 5, intrapartum for one and postpartum for 13. It would have been expected that the HMG deaths were all in early pregnancy or antenatal. This finding raises queries about the diagnosis and whether it could have been vomiting from another cause. Avoidable factors occurred at patient community level for 41.2%. and Administrative problems for 36.8%. Health care provider problems were present at CHC (20%), District Hospital (44.4%); Regional hospital (66.7%), Tertiary/National Central for 42.9% and private hospitals (50%). Assessors thought that 42.1% of cases were possibly or probably avoidable. Numbers are too small to make Recommendations.

Co-incidental, and inconclusive causes of DDPCP

This Abstract focuses on a group of deaths which are coincidental / fortuitous (non-maternal) and others which are termed 'unknown' and are inconclusive as to whether they were true maternal deaths or coincidental for reasons such as: cause could not be established, death outside a health facility or lack of available information.

Coincidental deaths

There were 115 of these, accounting for 3.3% of Deaths During Pregnancy, Childbirth and the Puerperium (DDPCP). The proportion remains similar to previous triennia; 119 deaths (2.7% of DDPCP in 2011-2013, and 117 deaths (3.1%) in 2014-2016.

Coincidental deaths are not maternal deaths and are excluded from calculations of maternal mortality ratios (MMRs).

Coincidental deaths accounted for 2.3% of DDPCP in E Cape, 3.3% in Free State, 4% in Gauteng, 2.4% in Kwazulu Natal, 3.4% in Limpopo, 1.7% in Mpumulanga, 3.8% in North Wets, 3.4% in N Cape and 7.7% in W Cape. The higher proportion in W Cape is probably due to greater availability of forensic pathology services and involvement in the Maternal Death enquiries.

The causal subcategories were:

Motor vehicle accidents - 34 (29.6%)

Other accidents – 11 (9.6%)

Assault – 10 (8.7%)

Other – 59 (51.3%). There are at least 10 femicides in this group.

It has been noted that some misclassification of maternal deaths has occurred with some suicide deaths being categorised as coincidental when they should be under the psychiatric component of Indirect Maternal deaths

Postmortems were done for 59.6%

Of the 115 deaths, 21.1% occurred at home/outside a facility, 0.9% in CHCs, 22% at district hospitals, 24.8% at regional hospitals, 28.4% at tertiary/national central hospitals and 2.8% in private hospitals.

The majority (42.2 %) occurred antenatally after 20 weeks, with 27.5% occurring in early pregnancy and 29% postpartum.

There were 45.9% with unknown HIV status, 37.6% negative and 16.5% HIV positive.

The proportion of deaths with possibly or probable avoidable factors was 28.5% which is lower than for maternal deaths. The largest proportion of avoidable factors (66.7%) was at patient / community level.

Given the concern about gender based violence in South Africa (the 'second 'epidemic), it would be important to look further into the assault and 'other' subcategories, to see if there were others in addition to the ten identified due to femicide. In USA femicide figures prominently as a cause of DDPCP. In terms of MVAs, certain countries such as UK, have strict regulations about seat belt use in pregnancy. It is not known to what extent there is such an awareness in South Arica and definitely not in crowded public transport

Unknown

This is a difficult and varied group of deaths to understand, and analyse collectively. It requires further folder reviews. These deaths with unknown causes include those (a) at

home and outside facilities with no clinical notes of the final event, (b) those in facilities where no cause could be identified and (c) deaths where there was lack of information. It is obviously unclear how many in this group are maternal deaths and how many could be coincidental. There were 163 deaths in this group, accounting for 4.7% of DDPCP.
If they are reviewed as maternal deaths they accounted for 4.9% with an MMR of 2.14, which is less than 6.14 in 2014-2016, and 6.44 in 2011-2013. They thus appear to be decreasing.

They accounted for 5.3% of DDPCP in E. Cape, 7.1% in Free State, 3.2% in Gauteng, 7.1% in KwaZulu Natal, 2.5% in Limpopo, 3% in Mpumulanga, 3.4% in North West, 9.1% in Northern Cape and 5.9% in W Cape.

In terms of subcategories:
101 (62%) were deaths at home or outside, 25 (15.3%) were facility deaths where no cause could be found and 37 (22.7%) there was lack of information.
Of the deaths that occurred in facilities, 49 (31.4%) were in public hospitals and 6 (3.8%) in private hospitals.
HIV status was unknown for 20.5%, positive for 23.7 and negative for 65.8%. In terms of age 23.9% were less than 20yrs which is a higher proportion than the general obstetric population. The largest proportion of deaths occurred antenatally after 20 weeks (39.1%) with 19.9% occurring in early pregnancy, 6.4% intrapartum and 34.6% postpartum. Of the 61 who delivered 33% were by Caesarean delivery and 66.7% by vaginal delivery.

In terms of avoidability, this is difficult to assess where cause of death s is unknown, but substandard care was identified for 44.9%. There were patient community related problem for 38% and administrative for 66.1%.

The inability to allocate a cause reflects a lack of post-mortems. Only 40.4 % had post-mortems (42.7% of those at home/outside, 41.7% with no cause found, and 33.3% with lack information). Insufficient PMs are being done even when medico-legally indicated such as for home/outside deaths. This reflects a national shortage of forensic pathology services. Also of note amongst the 25 where no primary cause was found, 41.7% had had a PM; suggesting poor quality PMs or lack of correlation with clinical features.

Improving accurate classification of deaths and increasing the number and quality of post mortems would aid in reducing the proportion of these coincidental and unknown groups of deaths.

Appendix: Master tables NCCEMD 2017-2019

1.Reliability of data

2019	DHIS	MaMMAS	Outside Facility	Pvt H	Coincidental	Comparable MaMMAS	Diff
ec Eastern Cape Province	121	120	4	1	2	113	-8
fs Free State Province	69	77	8	1	3	65	-4
gp Gauteng Province	249	176	7	13	7	149	-100
kz KwaZulu-Natal Province	177	185	8	5	6	166	-11
lp Limpopo Province	145	173	14	5	7	147	2
mp Mpumalanga Province	55	73	4	2	3	64	9
nw North West Province	67	81	6	4	3	68	1
nc Northern Cape Province	28	35	9	1	3	22	-6
wc Western Cape Province	49	62	9	3	6	44	-5
South Africa	960	982	69	35	40	838	-122

2018	DHIS	MaMMAS deaths	Outside facility	Pvt H	Coincidental	Comparable MaMMAS	diff
ec Eastern Cape Province	118	134	10	3	3	118	0
fs Free State Province	81	95	8	1	3	83	2
gp Gauteng Province	267	257	3	9	10	235	-32
kz KwaZulu-Natal Province	174	205	11	13	3	178	4
lp Limpopo Province	135	155	16	7	3	130	-5
mp Mpumalanga Province	93	113	5	5	1	102	9
nw North West Province	93	100	4	6	5	85	-8
nc Northern Cape Province	14	25	7	1	0	17	3
wc Western Cape Province	64	78	11	0	4	63	-1
South Africa	1039	1162	75	45	32	1011	-28

2017	DHIS deaths	MaMMAS deaths	Outside facility	Pvt H	Coincidental	Comparable MaMMAS	**diff**
Eastern Cape	135	142	12	2	4	124	-11
Free State	65	69	5	0	2	62	-3
Gauteng	257	223	5	8	9	201	-56
KwaZulu-Natal	193	245	13	9	6	217	24
Limpopo	150	181	15	7	7	152	2
Mpumalanga	97	118	8	4	1	105	8
North West	69	84	5	3	2	74	5
Northern Cape	18	28	4	0	0	24	6
Western Cape	53	80	15	2	7	56	3
South Africa	1037	1170	82	35	38	1015	-22

	DHIS	MaMMAS	Outside Facility	Pvt H	Coincidental	Comp. MaMMAS	Diff
2017	1037	1170	82	35	38	1015	-22
2018	1039	1162	75	45	32	1011	-28
2019	960	982	69	35	40	838	-122
2017-2019	3036	3314	226	115	110	2863	-173

2.Underlying causes of Maternal death 2017-2019 and province

Underlying obstetric problems	EC	FS	Gau ©	KZN	Lim ©	Mpu	NW	NC	WC	SA
Coincidental cause	**9**	**8**	**31**	**15**	**18**	**5**	**10**	**3**	**17**	**115**
- MVA	1	5	10	5	5			2	6	34
- Other accidents			2	4	1		1	1	2	11
- Assault			1	3	2		1		3	10
- Other	8	3	17	3	9	5	8		6	59
Medical and surgical disorders	**59**	**28**	**115**	**117**	**53**	**31**	**35**	**8**	**35**	**481**
- Cardiac disease	17	7	36	37	18	9	9	3	15	152
- Endocrine	4	3	4	1	2		2	1	2	19
- GIT	1		11	8	1	2	4	1	1	29
- CNS	5	4	10	17	3	3	1		6	49
- Respiratory	11	6	11	9	10	5	9	2	2	65
- Haematological	2	3	6	6	4		3		2	26
- Genito-urinary	2		0		3	2	1		1	9
- Psychiatric			0	20	1				1	22
- Auto-immune		1	2						1	4
- Neoplasm	6	1	18	9	2	2	2		3	43
- Other	11	3	17	10	7	8	4	1	1	62
Non-pregnancy-related infections	**90**	**35**	**170**	**164**	**128**	**61**	**58**	**15**	**49**	**770**
- PCP pneumonia	9	12	26	24	33	11	14	4	4	137
- Other pneumonia	7	6	34	31	14	7	8	3	15	124
- TB	44	11	69	61	34	24	17	2	17	279
- UTI			0	1	1				0	2
- Appendicitis			1	1		2			2	6
- Influenza				2						2
- Malaria			6	3	9		1		2	20
- Cryptococcal meningitis	5	1	5	6	13	4	3		2	40
- Other meningitis	7	1	6	9	9	7	4	1	1	44
- Kaposi's sarcoma	4		1	2			2		0	9
- Hepatitis	1	1	2	3	1	1	1		0	10
- Gastroenteritis	3		6	5	6	1	4		1	26
- Wasting syndrome	2		4	4	1		1	3	0	15
- Other	8	3	11	12	8	4	3	2	5	56
Ectopic pregnancy	**5**	**6**	**29**	**22**	**22**	**15**	**11**	**3**	**6**	**119**
- Less than 20 weeks	3	6	24	22	21	14	11	3	6	109
- More than 20 weeks	2		6		1	1			0	10
Miscarriage	**12**	**21**	**52**	**40**	**25**	**31**	**16**	**5**	**3**	**204**
- Septic miscarriage	8	13	38	25	19	21	15	4	2	145
- Haemorrhage (non-traumatic)	3	6	10	7	2	8	1	1	1	40
- Uterine trauma	1		1	5	2	2			0	12
- GTD		1	1	1						3
- Following legal TOP		1	1	2	1				0	5
Pregnancy-related sepsis	**20**	**13**	**41**	**31**	**24**	**10**	**14**	**0**	**17**	**170**
- Chorioamnionitis (ruptured membranes)		1	1	1					0	3
- Chorioamnionitis (intact membranes)			0	1		1	1		1	4
- Puerperal sepsis after NVD	6	5	15	14	14	6	11		5	76
- Puerperal sepsis after C/section	13	6	18	13	6	3	2		8	69
- Bowel trauma at C/section	1	1	7	2	5				3	18

Underlying obstetric problems	EC	FS	Gau ©	KZN	Lim ©	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**71**	**44**	**108**	**73**	**106**	**64**	**40**	**17**	**21**	**544**
- Abruption with hypertension	5	6	6	3	2	7	2	1	1	33
- Abruption without hypertension	4	2	10	5	8	7	3	2	1	42
- Placenta praevia	1		5	2	1	1	1		1	12
- Other APH not specified			1	1	2		1	1	2	9
- Ruptured uterus with previous c/s	1	3	5	5	7	3	2	1	1	28
- Ruptured uterus without previous c/s	6	2	3	6	7	4	3	1	1	33
- Retained placenta	9	6	5	8	5	4	3	4	1	45
- Morbidly adherent placenta	2	1	1	2	3	2			2	13
- Uterine atony	7	3	10	4	11	7	6	1	3	52
- Vaginal trauma	1		4	2		1	1		0	9
- Cervical trauma		1	0	2	4		2		0	9
- Inverted uterus	1		4	2	1				1	9
- Bleeding during Caesarean section	5	3	17	4	6	1	3	1	0	41
- Bleeding after Caesarean section	22	10	29	18	35	18	7	3	6	148
- Other PPH not specified	7	7	7	9	13	9	6	2	1	61
Hypertensive disorders of pregnancy	**65**	**56**	**147**	**79**	**86**	**56**	**57**	**19**	**25**	**590**
- Chronic hypertension	1	7	16	2	1	3	2	2	5	39
- Proteinuric hypertension	20	20	36	21	21	12	19	9	6	164
- Eclampsia	36	19	66	49	44	19	26	6	10	275
- HELLP	8	7	26	5	17	22	9	2	1	96
- Liver rupture		3	3	2	3		1		3	16
Anaesthetic complications	**8**	**9**	**12**	**19**	**11**	**8**	**3**	**3**	**5**	**77**
- General anaesthetic		1	0	3	5	2			2	13
- Epidural anaesthetic			0	1					1	2
- Spinal anaesthetic	8	8	12	15	5	6	3	3	2	62
Adverse drug reactions	**5**	**0**	**6**	**4**	**7**	**0**	**1**	**0**	**3**	**25**
- ARV medication			2				1		0	3
- TB medication			0	1					1	2
- Other medication	2		3		1				1	7
- Herbal medication	3		0	3	6				1	13
Embolism	**16**	**3**	**13**	**14**	**20**	**10**	**4**	**6**	**16**	**102**
- Pulmonary embolism	16	2	11	13	18	10	3	6	14	93
- Amniotic fluid embolism		1	2	1	2		1		2	9
Acute collapse - cause unknown	**14**	**1**	**20**	**14**	**10**	**3**	**5**	**0**	**5**	**72**
Miscellaneous	**2**	**0**	**5**	**1**	**5**	**0**	**2**	**1**	**5**	**21**
- Hyperemesis gravidarum	1		1	1	4		1	1	0	9
- Acute fatty liver	1		4		1		1		5	12
Unknown	**21**	**17**	**25**	**45**	**15**	**9**	**9**	**8**	**13**	**162**
- Death at home or outside health services	12	13	19	13	13	6	8	7	10	101
- No primary cause found	5	1	4	12		1	1		1	25
- Lack of information	4	3	2	20	2	2		1	2	37
Deaths during Pregnancy, Childbirth and Peurperium	**397**	**241**	**774**	**638**	**528**	**303**	**265**	**88**	**220**	**3454**
Live births 2017-2019	**310130**	**140004**	**661647**	**591582**	**370581**	**237502**	**174408**	**63789**	**296132**	**2845775**

3.Maternal Mortality Ratio per underlying cause and province 2017-2019

Underlying obstetric problems	EC	FS	Gau ©	KZN	Lim ©	Mpu	NW	NC	WC	SA
Coincidental cause	**2,90**	**5,71**	**4,64**	**2,54**	**4,73**	**2,11**	**5,73**	**4,70**	**5,74**	**4,05**
- MVA	0,32	3,57	1,52	0,85	1,43	0,00	0,00	3,14	2,03	1,21
- Other accidents	0,00	0,00	0,33	0,68	0,30	0,00	0,57	1,57	0,68	0,40
- Assault	0,00	0,00	0,18	0,51	0,59	0,00	0,57	0,00	1,01	0,37
- Other	2,58	2,14	2,61	0,51	2,40	2,11	4,59	0,00	2,03	2,08
Medical and surgical disorders	**19,02**	**20,00**	**17,45**	**19,78**	**14,25**	**13,05**	**20,07**	**12,54**	**11,82**	**16,91**
- Cardiac disease	5,48	5,00	5,49	6,25	4,96	3,79	5,16	4,70	5,07	5,33
- Endocrine	1,29	2,14	0,61	0,17	0,57	0,00	1,15	1,57	0,68	0,67
- GIT	0,32	0,00	1,69	1,35	0,30	0,84	2,29	1,57	0,34	1,03
- CNS	1,61	2,86	1,49	2,87	0,81	1,26	0,57	0,00	2,03	1,72
- Respiratory	3,55	4,29	1,70	1,52	2,74	2,11	5,16	3,14	0,68	2,30
- Haematological	0,64	2,14	0,85	1,01	1,20	0,00	1,72	0,00	0,68	0,92
- Genito-urinary	0,64	0,00	0,00	0,00	0,86	0,84	0,57	0,00	0,34	0,32
- Psychiatric	0,00	0,00	0,00	3,38	0,32	0,00	0,00	0,00	0,34	0,78
- Auto-immune	0,00	0,71	0,36	0,00	0,00	0,00	0,00	0,00	0,34	0,16
- Neoplasm	1,93	0,71	2,67	1,52	0,57	0,84	1,15	0,00	1,01	1,50
- Other	3,55	2,14	2,58	1,69	1,91	3,37	2,29	1,57	0,34	2,18
Non-pregnancy-related infections	**29,02**	**25,00**	**25,65**	**27,72**	**34,53**	**25,68**	**33,26**	**23,52**	**16,55**	**27,05**
- PCP pneumonia	2,90	8,57	3,91	4,06	8,88	4,63	8,03	6,27	1,35	4,81
- Other pneumonia	2,26	4,29	5,09	5,24	3,66	2,95	4,59	4,70	5,07	4,37
- TB	14,19	7,86	10,41	10,31	9,08	10,11	9,75	3,14	5,74	9,79
- UTI	0,00	0,00	0,00	0,17	0,27	0,00	0,00	0,00	0,00	0,07
- Appendicitis	0,00	0,00	0,15	0,17	0,00	0,84	0,00	0,00	0,68	0,21
- Influenza	0,00	0,00	0,00	0,34	0,00	0,00	0,00	0,00	0,00	0,07
- Malaria	0,00	0,00	0,88	0,51	2,31	0,00	0,57	0,00	0,68	0,72
- Cryptococcal meningitis	1,61	0,71	0,82	1,01	3,54	1,68	1,72	0,00	0,68	1,39
- Other meningitis	2,26	0,71	0,88	1,52	2,31	2,95	2,29	1,57	0,34	1,56
- Kaposi's sarcoma	1,29	0,00	0,18	0,34	0,00	0,00	1,15	0,00	0,00	0,32
- Hepatitis	0,32	0,71	0,33	0,51	0,27	0,42	0,57	0,00	0,00	0,36
- Gastroenteritis	0,97	0,00	0,85	0,85	1,72	0,42	2,29	0,00	0,34	0,91
- Wasting syndrome	0,64	0,00	0,55	0,68	0,32	0,00	0,57	4,70	0,00	0,52
- Other	2,58	2,14	1,60	2,03	2,16	1,68	1,72	3,14	1,69	1,95
Ectopic pregnancy	**1,61**	**4,29**	**4,43**	**3,72**	**5,94**	**6,32**	**6,31**	**4,70**	**2,03**	**4,19**
- Less than 20 weeks	0,97	4,29	3,58	3,72	5,60	5,89	6,31	4,70	2,03	3,85
- More than 20 weeks	0,64	0,00	0,85	0,00	0,30	0,42	0,00	0,00	0,00	0,34
Miscarriage	**3,87**	**15,00**	**7,80**	**6,76**	**6,65**	**13,05**	**9,17**	**7,84**	**1,01**	**7,18**
- Septic miscarriage	2,58	9,29	5,70	4,23	5,15	8,84	8,60	6,27	0,68	5,09
- Haemorrhage (non-traumatic)	0,97	4,29	1,58	1,18	0,57	3,37	0,57	1,57	0,34	1,39
- Uterine trauma	0,32	0,00	0,21	0,85	0,57	0,84	0,00	0,00	0,00	0,41
- GTD	0,00	0,71	0,15	0,17	0,00	0,00	0,00	0,00	0,00	0,11
- Following legal TOP	0,00	0,71	0,15	0,34	0,30	0,00	0,00	0,00	0,00	0,18
Pregnancy-related sepsis	**6,45**	**9,29**	**6,22**	**5,24**	**6,52**	**4,21**	**8,03**	**0,00**	**5,74**	**5,99**
- Chorioamnionitis (ruptured membranes)	0,00	0,71	0,18	0,17	0,00	0,00	0,00	0,00	0,00	0,11
- Chorioamnionitis (intact membranes)	0,00	0,00	0,00	0,17	0,00	0,42	0,57	0,00	0,34	0,14
- Puerperal sepsis after NVD	1,93	3,57	2,34	2,37	3,73	2,53	6,31	0,00	1,69	2,68
- Puerperal sepsis after C/section	4,19	4,29	2,70	2,20	1,57	1,26	1,15	0,00	2,70	2,41
- Bowel trauma at C/section	0,32	0,71	1,01	0,34	1,22	0,00	0,00	0,00	1,01	0,64

Underlying obstetric problems	EC	FS	Gau ©	KZN	Lim ©	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**22,89**	**31,43**	**16,28**	**12,34**	**28,61**	**26,95**	**22,93**	**26,65**	**7,09**	**19,11**
- Abruption with hypertension	1,61	4,29	0,88	0,51	0,61	2,95	1,15	1,57	0,34	1,16
- Abruption without hypertension	1,29	1,43	1,51	0,85	2,14	2,95	1,72	3,14	0,34	1,47
- Placenta praevia	0,32	0,00	0,76	0,34	0,27	0,42	0,57	0,00	0,34	0,42
- Other APH not specified	0,00	0,00	0,21	0,17	0,59	0,00	0,57	1,57	0,68	0,30
- Ruptured uterus with previous c/s	0,32	2,14	0,70	0,85	1,86	1,26	1,15	1,57	0,34	0,97
- Ruptured uterus without previous c/s	1,93	1,43	0,52	1,01	1,81	1,68	1,72	1,57	0,34	1,16
- Retained placenta	2,90	4,29	0,70	1,35	1,47	1,68	1,72	6,27	0,34	1,58
- Morbidly adherent placenta	0,64	0,71	0,18	0,34	0,86	0,84	0,00	0,00	0,68	0,47
- Uterine atony	2,26	2,14	1,49	0,68	3,01	2,95	3,44	1,57	1,01	1,83
- Vaginal trauma	0,32	0,00	0,61	0,34	0,00	0,42	0,57	0,00	0,00	0,32
- Cervical trauma	0,00	0,71	0,00	0,34	1,18	0,00	1,15	0,00	0,00	0,33
- Inverted uterus	0,32	0,00	0,55	0,34	0,27	0,00	0,00	0,00	0,34	0,30
- Bleeding during Caesarean section	1,61	2,14	2,61	0,68	1,74	0,42	1,72	1,57	0,00	1,43
- Bleeding after Caesarean section	7,09	7,14	4,44	3,04	9,31	7,58	4,01	4,70	2,03	5,20
- Other PPH not specified	2,26	5,00	1,12	1,52	3,49	3,79	3,44	3,14	0,34	2,16
Hypertensive disorders of pregnancy	**20,96**	**40,00**	**22,27**	**13,35**	**23,13**	**23,58**	**32,68**	**29,79**	**8,44**	**20,73**
- Chronic hypertension	0,32	5,00	2,43	0,34	0,30	1,26	1,15	3,14	1,69	1,38
- Proteinuric hypertension	6,45	14,29	5,49	3,55	5,60	5,05	10,89	14,11	2,03	5,77
- Eclampsia	11,61	13,57	10,01	8,28	11,79	8,00	14,91	9,41	3,38	9,66
- HELLP	2,58	5,00	3,86	0,85	4,54	9,26	5,16	3,14	0,34	3,39
- Liver rupture	0,00	2,14	0,48	0,34	0,89	0,00	0,57	0,00	1,01	0,55
Anaesthetic complications	**2,58**	**6,43**	**1,76**	**3,21**	**2,88**	**3,37**	**1,72**	**4,70**	**1,69**	**2,72**
- General anaesthetic	0,00	0,71	0,00	0,51	1,42	0,84	0,00	0,00	0,68	0,47
- Epidural anaesthetic	0,00	0,00	0,00	0,17	0,00	0,00	0,00	0,00	0,34	0,07
- Spinal anaesthetic	2,58	5,71	1,76	2,54	1,47	2,53	1,72	4,70	0,68	2,18
Adverse drug reactions	**1,61**	**0,00**	**0,85**	**0,68**	**1,84**	**0,00**	**0,57**	**0,00**	**1,01**	**0,89**
- ARV medication	0,00	0,00	0,36	0,00	0,00	0,00	0,57	0,00	0,00	0,12
- TB medication	0,00	0,00	0,00	0,17	0,00	0,00	0,00	0,00	0,34	0,07
- Other medication	0,64	0,00	0,48	0,00	0,32	0,00	0,00	0,00	0,34	0,26
- Herbal medication	0,97	0,00	0,00	0,51	1,52	0,00	0,00	0,00	0,34	0,44
Embolism	**5,16**	**2,14**	**2,04**	**2,37**	**5,36**	**4,21**	**2,29**	**9,41**	**5,40**	**3,60**
- Pulmonary embolism	5,16	1,43	1,70	2,20	4,76	4,21	1,72	9,41	4,73	3,26
- Amniotic fluid embolism	0,00	0,71	0,33	0,17	0,61	0,00	0,57	0,00	0,68	0,33
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**
- Hyperemesis gravidarum	0,32	0,00	0,21	0,17	0,97	0,00	0,57	1,57	0,00	0,32
- Acute fatty liver	0,32	0,00	0,58	0,00	0,30	0,00	0,57	0,00	1,69	0,42
Unknown	**6,77**	**12,14**	**3,74**	**7,61**	**4,15**	**3,79**	**5,16**	**12,54**	**4,39**	**5,70**
- Death at home or outside health services	3,87	9,29	2,86	2,20	3,53	2,53	4,59	10,97	3,38	3,55
- No primary cause found	1,61	0,71	0,55	2,03	0,00	0,42	0,57	0,00	0,34	0,87
- Lack of information	1,29	2,14	0,33	3,38	0,62	0,84	0,00	1,57	0,68	1,28
Deaths during pregnancy childbirth and puerperium	**128,01**	**172,14**	**116,99**	**107,85**	**142,49**	**127,58**	**151,94**	**137,95**	**74,29**	**121,38**

4.Number of Underlying causes per sub-category per level of care 2017-2019

2017-2019	Outside	CHC	District hospital	Regional hospital	Tertiary hospital	National Central hospital	Private hospital	Total N
Coincidental cause	**23**	**1**	**24**	**27**	**17**	**14**	**3**	**109**
- MVA	7	0	6	7	5	4	3	32
- Other accidents	3	0	2	1	3	2	0	11
- Assault	3	0	1	5	0	0	0	9
- Other	10	1	15	14	9	8	0	57
Medical and surgical disorders	**19**	**11**	**73**	**120**	**113**	**100**	**24**	**460**
- Cardiac disease	10	3	23	30	34	35	10	145
- Endocrine	1	1	2	7	7	2	0	20
- GIT	0	1	2	11	5	6	1	26
- CNS	3	1	10	13	12	7	1	47
- Respiratory	1	2	13	18	12	12	5	63
- Haematological	0	2	4	6	4	7	2	25
- Genito-urinary	0	0	2	1	4	1	1	9
- Auto-immune	0	0	1	0	0	2	0	3
- Skeletal	0	0	0	0	0	0	1	1
- Psychiatric	2	0	6	11	2	0	1	22
- Neoplasm	0	0	5	9	12	14	0	40
- Other	2	1	5	14	21	14	2	59
Non-pregnancy-related infections	**17**	**8**	**187**	**277**	**148**	**86**	**13**	**736**
- PCP pneumonia	1	2	33	56	28	8	3	131
- Other pneumonia	3	3	24	50	23	11	4	118
- TB	6	3	71	99	46	38	3	266
- Influenza	0	0	0	0	0	1	1	2
- Endocarditis	0	0	0	0	0	1	0	1
- UTI	0	0	1	1	0	0	0	2
- Appendicitis	1	0	2	1	0	1	0	5
- Malaria	1	0	1	4	8	3	0	17
- Cryptococcal meningitis	0	0	9	18	9	2	0	38
- Other meningitis	2	0	12	15	12	4	0	45
- Kaposi's sarcoma	0	0	0	2	5	2	0	9
- Hepatitis	0	0	4	3	2	1	0	10
- Gastroenteritis	0	0	13	8	2	2	0	25
- Wasting syndrome	1	0	5	2	4	2	0	14
- Other	2	0	12	18	9	10	2	53
Ectopic pregnancy	**7**	**4**	**42**	**29**	**20**	**10**	**1**	**113**
- Less than 20 weeks	7	4	41	28	17	7	0	104
- More than 20 weeks	0	0	1	1	3	3	1	9
Miscarriage	**5**	**1**	**56**	**69**	**41**	**20**	**2**	**194**
- Septic miscarriage	2	0	34	50	32	17	2	137
- Haemorrhage (non-traumatic)	2	1	15	12	5	3	0	38
- Uterine trauma	1	0	4	5	1	0	0	11
- GTD	0	0	1	1	1	0	0	3
- Following legal TOP	0	0	2	1	2	0	0	5
Pregnancy-related sepsis	**4**	**2**	**19**	**64**	**40**	**25**	**7**	**161**
- Chorioamnionitis (ruptured membranes)	0	0	1	1	0	1	0	3
- Chorioamnionitis (intact membranes)	0	1	1	1	1	0	0	4
- Puerperal sepsis after NVD	2	1	11	30	20	6	3	73
- Puerperal sepsis after C/section	2	0	6	24	14	16	3	65
- Bowel trauma at C/section	0	0	0	8	5	2	1	16

2017-2019	Outside	CHC	District hospital	Regional hospital	Tertiary hospital	National Central hospital	Private hospital	Total N
Obstetric haemorrhage	**20**	**20**	**157**	**177**	**75**	**44**	**23**	**516**
- Abruption with hypertension	0	0	7	16	4	4	1	32
- Abruption without hypertension	0	1	10	17	4	7	1	40
- Placenta praevia	0	2	1	3	2	2	1	11
- Other APH not specified	0	0	1	4	1	0	0	6
- Ruptured uterus with previous c/s	0	0	12	8	4	2	2	28
- Ruptured uterus without previous c/s	1	1	16	9	3	2	0	32
- Retained placenta	6	5	11	15	5	1	0	43
- Morbidly adherent placenta	0	1	4	4	0	2	3	14
- Uterine atony	1	1	17	18	5	4	3	49
- Vaginal trauma	0	1	2	1	2	2	0	8
- Cervical trauma	0	0	3	3	2	0	1	9
- Inverted uterus	1	2	1	3	0	1	0	8
- Bleeding during Caesarean section	1	0	6	16	8	4	3	38
- Bleeding after Caesarean section	3	1	45	42	29	12	7	139
- Other PPH not specified	7	5	21	18	6	1	1	59
Hypertensive disorders of pregnancy	**21**	**20**	**97**	**184**	**126**	**94**	**19**	**561**
- Chronic hypertension	2	1	7	11	3	8	0	32
- Proteinuric hypertension	7	5	29	53	39	22	6	161
- Eclampsia	9	13	49	86	51	45	10	263
- HELLP	2	0	10	29	29	17	3	90
- Liver rupture	1	1	2	5	4	2	0	15
Anaesthetic complications	**0**	**0**	**41**	**14**	**7**	**8**	**5**	**75**
- General anaesthetic	0	0	6	6	0	1	0	13
- Epidural anaesthetic	0	0	1	0	1	0	0	2
- Spinal anaesthetic	0	0	34	8	6	7	5	60
Adverse drug reactions	**0**	**0**	**6**	**3**	**11**	**4**	**0**	**24**
- ARV medication	0	0	0	0	2	1	0	3
- TB medication	0	0	0	0	2	0	0	2
- Other medication	0	0	1	2	2	2	0	7
- Herbal medication	0	0	5	1	5	1	0	12
Embolism	**11**	**5**	**23**	**25**	**21**	**5**	**8**	**98**
- Pulmonary embolism	11	5	20	22	21	4	6	89
- Amniotic fluid embolism	0	0	3	3	0	1	2	9
Acute collapse - cause unknown	**7**	**7**	**24**	**14**	**12**	**3**	**0**	**67**
Miscellaneous	**0**	**0**	**4**	**5**	**4**	**4**	**2**	**19**
- Hyperemesis gravidarum	0	0	3	1	3	1	0	8
- Acute fatty liver	0	0	1	4	1	3	2	11
Unknown	**91**	**10**	**21**	**20**	**8**	**0**	**6**	**156**
- Death at home or outside health services	85	4	4	2	1	0	0	96
- No primary cause found	1	3	3	8	5	0	4	24
- Lack of information	5	3	14	10	2	0	2	36
Live births 2017-2019		472346	1164308	763095	242215	170849		2812813

5.Maternal Mortality Ratio per underlying cause sub-category and level of care

2017-2019	CHC	District hospital	Regional hospital	Tertiary hospital	National central hospital	Total
Coincidental cause	**0,21**	**2,06**	**3,54**	**7,02**	**8,19**	**3,88**
- MVA	0,00	0,52	0,92	2,06	2,34	1,14
- Other accidents	0,00	0,17	0,13	1,24	1,17	0,39
- Assault	0,00	0,09	0,66	0,00	0,00	0,32
- Other	0,21	1,29	1,83	3,72	4,68	2,03
Medical and surgical disorders	**2,33**	**6,27**	**15,73**	**46,65**	**58,53**	**16,35**
- Cardiac disease	0,64	1,98	3,93	14,04	20,49	5,15
- Endocrine	0,21	0,17	0,92	2,89	1,17	0,71
- GIT	0,21	0,17	1,44	2,06	3,51	0,92
- CNS	0,21	0,86	1,70	4,95	4,10	1,67
- Respiratory	0,42	1,12	2,36	4,95	7,02	2,24
- Haematological	0,42	0,34	0,79	1,65	4,10	0,89
- Genito-urinary	0,00	0,17	0,13	1,65	0,59	0,32
- Auto-immune	0,00	0,09	0,00	0,00	1,17	0,11
- Skeletal	0,00	0,00	0,00	0,00	0,00	0,04
- Psychiatric	0,00	0,52	1,44	0,83	0,00	0,78
- Neoplasm	0,00	0,43	1,18	4,95	8,19	1,42
- Other	0,21	0,43	1,83	8,67	8,19	2,10
Non-pregnancy-related infections	**1,69**	**16,06**	**36,30**	**61,10**	**50,34**	**26,17**
- PCP pneumonia	0,42	2,83	7,34	11,56	4,68	4,66
- Other pneumonia	0,64	2,06	6,55	9,50	6,44	4,20
- TB	0,64	6,10	12,97	18,99	22,24	9,46
- Influenza	0,00	0,00	0,00	0,00	0,59	0,07
- Endocarditis	0,00	0,00	0,00	0,00	0,59	0,04
- UTI	0,00	0,09	0,13	0,00	0,00	0,07
- Appendicitis	0,00	0,17	0,13	0,00	0,59	0,18
- Malaria	0,00	0,09	0,52	3,30	1,76	0,60
- Cryptococcal meningitis	0,00	0,77	2,36	3,72	1,17	1,35
- Other meningitis	0,00	1,03	1,97	4,95	2,34	1,60
- Kaposi's sarcoma	0,00	0,00	0,26	2,06	1,17	0,32
- Hepatitis	0,00	0,34	0,39	0,83	0,59	0,36
- Gastroenteritis	0,00	1,12	1,05	0,83	1,17	0,89
- Wasting syndrome	0,00	0,43	0,26	1,65	1,17	0,50
- Other	0,00	1,03	2,36	3,72	5,85	1,88
Ectopic pregnancy	**0,85**	**3,61**	**3,80**	**8,26**	**5,85**	**4,02**
- Less than 20 weeks	0,85	3,52	3,67	7,02	4,10	3,70
- More than 20 weeks	0,00	0,09	0,13	1,24	1,76	0,32
Miscarriage	**0,21**	**4,81**	**9,04**	**16,93**	**11,71**	**6,90**
- Septic miscarriage	0,00	2,92	6,55	13,21	9,95	4,87
- Haemorrhage (non-traumatic)	0,21	1,29	1,57	2,06	1,76	1,35
- Uterine trauma	0,00	0,34	0,66	0,41	0,00	0,39
- GTD	0,00	0,09	0,13	0,41	0,00	0,11
- Following legal TOP	0,00	0,17	0,13	0,83	0,00	0,18
Pregnancy-related sepsis	**0,42**	**1,63**	**8,39**	**16,51**	**14,63**	**5,72**
- Chorioamnionitis (ruptured membranes)	0,00	0,09	0,13	0,00	0,59	0,11
- Chorioamnionitis (intact membranes)	0,21	0,09	0,13	0,41	0,00	0,14
- Puerperal sepsis after NVD	0,21	0,94	3,93	8,26	3,51	2,60
- Puerperal sepsis after C/section	0,00	0,52	3,15	5,78	9,36	2,31
- Bowel trauma at C/section	0,00	0,00	1,05	2,06	1,17	0,57

2017-2019	CHC	District hospital	Regional hospital	Tertiary hospital	National central hospital	Total
Obstetric haemorrhage	**4,23**	**13,48**	**23,20**	**30,96**	**25,75**	**18,34**
- Abruption with hypertension	0,00	0,60	2,10	1,65	2,34	1,14
- Abruption without hypertension	0,21	0,86	2,23	1,65	4,10	1,42
- Placenta praevia	0,42	0,09	0,39	0,83	1,17	0,39
- Other APH not specified	0,00	0,09	0,52	0,41	0,00	0,21
- Ruptured uterus with previous c/s	0,00	1,03	1,05	1,65	1,17	1,00
- Ruptured uterus without previous c/s	0,21	1,37	1,18	1,24	1,17	1,14
- Retained placenta	1,06	0,94	1,97	2,06	0,59	1,53
- Morbidly adherent placenta	0,21	0,34	0,52	0,00	1,17	0,50
- Uterine atony	0,21	1,46	2,36	2,06	2,34	1,74
- Vaginal trauma	0,21	0,17	0,13	0,83	1,17	0,28
- Cervical trauma	0,00	0,26	0,39	0,83	0,00	0,32
- Inverted uterus	0,42	0,09	0,39	0,00	0,59	0,28
- Bleeding during Caesarean section	0,00	0,52	2,10	3,30	2,34	1,35
- Bleeding after Caesarean section	0,21	3,86	5,50	11,97	7,02	4,94
- Other PPH not specified	1,06	1,80	2,36	2,48	0,59	2,10
Hypertensive disorders of pregnancy	**4,23**	**8,33**	**24,11**	**52,02**	**55,02**	**19,94**
- Chronic hypertension	0,21	0,60	1,44	1,24	4,68	1,14
- Proteinuric hypertension	1,06	2,49	6,95	16,10	12,88	5,72
- Eclampsia	2,75	4,21	11,27	21,06	26,34	9,35
- HELLP	0,00	0,86	3,80	11,97	9,95	3,20
- Liver rupture	0,21	0,17	0,66	1,65	1,17	0,53
Anaesthetic complications	**0,00**	**3,52**	**1,83**	**2,89**	**4,68**	**2,67**
- General anaesthetic	0,00	0,52	0,79	0,00	0,59	0,46
- Epidural anaesthetic	0,00	0,09	0,00	0,41	0,00	0,07
- Spinal anaesthetic	0,00	2,92	1,05	2,48	4,10	2,13
Adverse drug reactions	**0,00**	**0,52**	**0,39**	**4,54**	**2,34**	**0,85**
- ARV medication	0,00	0,00	0,00	0,83	0,59	0,11
- TB medication	0,00	0,00	0,00	0,83	0,00	0,07
- Other medication	0,00	0,09	0,26	0,83	1,17	0,25
- Herbal medication	0,00	0,43	0,13	2,06	0,59	0,43
Embolism	**1,06**	**1,98**	**3,28**	**8,67**	**2,93**	**3,48**
- Pulmonary embolism	1,06	1,72	2,88	8,67	2,34	3,16
- Amniotic fluid embolism	0,00	0,26	0,39	0,00	0,59	0,32
Acute collapse - cause unknown	**1,48**	**2,06**	**1,83**	**4,95**	**1,76**	**2,38**
Miscellaneous	**0,00**	**0,34**	**0,66**	**1,65**	**2,34**	**0,68**
- Hyperemesis gravidarum	0,00	0,26	0,13	1,24	0,59	0,28
- Acute fatty liver	0,00	0,09	0,52	0,41	1,76	0,39
Unknown	**2,12**	**1,80**	**2,62**	**3,30**	**0,00**	**5,55**
- Death at home or outside health services	0,85	0,34	0,26	0,41	0,00	3,41
- No primary cause found	0,64	0,26	1,05	2,06	0,00	0,85
- Lack of information	0,64	1,20	1,31	0,83	0,00	1,28

6.Number maternal deaths per underlying category and level of care (corrected for Limpopo and Gauteng)

Adjusted for Gauteng and Limpopo	CHC	District hospital	Regional hospital	Tertiary hospital	National central hospital	Total
Medical and surgical disorders	11	76	125	118	108	438
Non-pregnancy-related infections	8	194	288	154	93	737
Ectopic pregnancy	4	43	30	21	11	109
Miscarriage	1	58	72	43	22	195
Pregnancy-related sepsis	2	20	67	42	27	157
Obstetric haemorrhage	21	163	184	78	48	493
Hypertension	21	100	191	131	102	545
Anaesthetic complications	0	42	15	7	9	73
Adverse drug reactions	0	6	3	11	4	25
Embolism	5	24	26	22	5	82
Acute collapse - cause unknown	7	25	15	12	3	62
Miscellaneous	0	4	5	4	4	18
Unknown	10	22	21	8	0	61
Maternal deaths	91	776	1040	652	436	2996

7.Maternal mortality ratio maternal deaths per underlying category and level of care (corrected for Limpopo and Gauteng)

Adjusted for Gauteng and Limpopo	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	In facility iMMR
Medical and surgical disorders	2,41	6,49	16,34	48,58	63,39	15,56
Non-pregnancy-related infections	1,75	16,63	37,73	63,63	54,52	26,20
Ectopic pregnancy	0,88	3,73	3,95	8,60	6,34	3,89
Miscarriage	0,22	4,98	9,40	17,63	12,68	6,94
Pregnancy-related sepsis	0,44	1,69	8,72	17,20	15,85	5,58
Obstetric haemorrhage	4,38	13,96	24,11	32,24	27,89	17,52
Hypertension	4,38	8,63	25,06	54,17	59,59	19,39
Anaesthetic complications	0,00	3,65	1,91	3,01	5,07	2,59
Adverse drug reactions	0,00	0,53	0,41	4,73	2,54	0,89
Embolism	1,09	2,05	3,41	9,03	3,17	2,92
Acute collapse - cause unknown	1,53	2,13	1,91	5,16	1,90	2,22
Miscellaneous	0,00	0,36	0,68	1,72	2,54	0,63
Unknown	2,19	1,87	2,72	3,44	0,00	2,18
iMMR	19,26	66,69	136,34	269,13	255,48	106,52

8.Comparison of iMMR per underlying category, per level of care and year

	2017						2018						2019					
Not adjusted	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total
Medical and surgical disorders	5	29	42	30	27	153	4	24	38	38	47	166	2	20	40	45	26	141
Non-pregnancy-related infections	4	66	113	56	34	284	3	69	99	57	32	272	1	52	65	35	20	180
Ectopic pregnancy	1	18	11	5	2	39	0	13	9	9	5	41	3	11	9	6	3	33
Miscarriage	0	18	24	20	7	70	0	23	30	8	8	74	1	15	15	13	5	50
Pregnancy-related sepsis	1	11	19	21	11	66	1	5	29	7	11	56	0	3	16	12	3	39
Obstetric haemorrhage	7	52	59	32	11	176	6	54	68	22	16	179	7	51	50	21	17	161
Hypertension	5	34	66	50	38	201	9	34	63	37	29	186	6	29	55	39	27	174
Anaesthetic complications	0	20	3	3	2	30	0	12	5	2	5	26	0	9	6	2	1	19
Adverse drug reactions	0	1	1	5	3	10	0	1	2	3	0	6	0	4	0	3	1	8
Embolism	3	7	9	8	1	34	1	11	10	8	3	42	1	5	6	5	1	22
Acute collapse - cause unknown	2	7	2	1	0	15	1	10	6	5	1	25	4	7	6	6	2	27
Miscellaneous	0	0	2	2	1	5	0	1	0	1	1	4	0	3	3	1	2	10
No primary cause found	0	0	2	0	0	4	0	2	5	3	0	12	3	1	1	2	0	8
Lack of information	2	3	4	0	0	11	0	5	3	2	0	12	1	6	3	0	0	13
Maternal Deaths	30	266	357	233	137	1098	25	264	367	202	158	1101	29	216	275	190	108	885

Note: Private hospital deaths and outside deaths not included

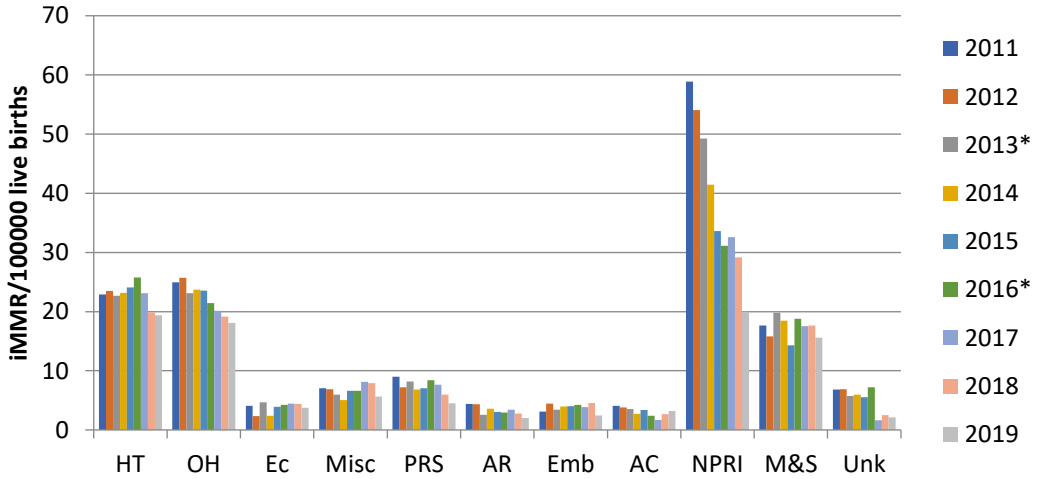
Level of care Live births	**2019**	**2018**	**2017**	**2017-2019**
Community Health Centre	160213	155483	156650	472346
District hospital	394417	390250	379641	1164308
Regional hospital	265002	252610	245483	763095
Tertiary hospital	73618	72840	95757	242215
National central hospital	56485	55271	59093	170849
Total	949735	926454	936624	2812813

	2017						2018						2019					
Non corrected	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total	CHC	District hospital	Regional hospital	Tertiary hospital	Nat central hospital	Total
Medical and surgical disorders	3,19	7,64	17,11	31,33	45,69	16,34	2,57	6,15	15,04	52,17	85,04	17,92	1,25	5,07	15,09	61,13	46,03	14,85
Non-pregnancy-related infections	2,55	17,38	46,03	58,48	57,54	30,32	1,93	17,68	39,19	78,25	57,90	29,36	0,62	13,18	24,53	47,54	35,41	18,95
Ectopic pregnancy	0,64	4,74	4,48	5,22	3,38	4,16	0,00	3,33	3,56	12,36	9,05	4,43	1,87	2,79	3,40	8,15	5,31	3,47
Miscarriage	0,00	4,74	9,78	20,89	11,85	7,47	0,00	5,89	11,88	10,98	14,47	7,99	0,62	3,80	5,66	17,66	8,85	5,26
Pregnancy-related sepsis	0,64	2,90	7,74	21,93	18,61	7,05	0,64	1,28	11,48	9,61	19,90	6,04	0,00	0,76	6,04	16,30	5,31	4,11
Obstetric haemorrhage	4,47	13,70	24,03	33,42	18,61	18,79	3,86	13,84	26,92	30,20	28,95	19,32	4,37	12,93	18,87	28,53	30,10	16,95
Hypertensive disorders of pregnancy	3,19	8,96	26,89	52,22	64,31	21,46	5,79	8,71	24,94	50,80	52,47	20,08	3,75	7,35	20,75	52,98	47,80	18,32
Anaesthetic complications	0,00	5,27	1,22	3,13	3,38	3,20	0,00	3,07	1,98	2,75	9,05	2,81	0,00	2,28	2,26	2,72	1,77	2,00
Adverse drug reactions	0,00	0,26	0,41	5,22	5,08	1,07	0,00	0,26	0,79	4,12	0,00	0,65	0,00	1,01	0,00	4,08	1,77	0,84
Embolism	1,92	1,84	3,67	8,35	1,69	3,63	0,64	2,82	3,96	10,98	5,43	4,53	0,62	1,27	2,26	6,79	1,77	2,32
Acute collapse - cause unknown	1,28	1,84	0,81	1,04	0,00	1,60	0,64	2,56	2,38	6,86	1,81	2,70	2,50	1,77	2,26	8,15	3,54	2,84
Miscellaneous	0,00	0,00	0,81	2,09	1,69	0,53	0,00	0,26	0,00	1,37	1,81	0,43	0,00	0,76	1,13	1,36	3,54	1,05
No primary cause found	0,00	0,00	0,81	0,00	0,00	0,43	0,00	0,51	1,98	4,12	0,00	1,30	1,87	0,25	0,38	2,72	0,00	0,84
Lack of information	1,28	0,79	1,63	0,00	0,00	1,17	0,00	1,28	1,19	2,75	0,00	1,30	0,62	1,52	1,13	0,00	0,00	1,37
iMMR	19,15	70,07	145,43	243,32	231,84	117,2	16,08	67,65	145,28	277,32	285,86	118,84	18,10	54,76	103,77	258,09	191,20	93,18

9.Distribution of iMMR per underlying causes from 2011-2019

Primary obstetric problems	2011	2012	2013	2014	2015	2016	2017	2018	2019
Hypertensive disorders of pregnancy	22,9	23,48	22,69	23,19	24,07	25,78	23,09	19,88	19,39
Obstetric haemorrhage	24,94	25,71	23,13	23,71	23,53	21,41	20,13	19,19	18,09
Ectopic pregnancy	4,07	2,34	4,65	2,41	3,9	4,26	4,46	4,40	3,75
Miscarriage	7,06	6,91	5,98	5,04	6,61	6,62	8,11	7,90	5,63
Pregnancy-related sepsis	8,99	7,22	8,19	6,82	7,05	8,4	7,62	5,95	4,52
Anaesthetic complications	4,39	4,36	2,55	3,57	3,04	2,96	3,40	2,79	2,02
Embolism	3,1	4,46	3,43	3,99	4,01	4,26	3,84	4,53	2,47
Acute collapse - cause unknown	4,07	3,82	3,54	2,73	3,36	2,37	1,68	2,64	3,21
Non-pregnancy-related infections	58,87	54,08	49,24	41,44	33,61	31,11	32,59	29,15	19,95
Medical and surgical disorders	17,66	15,83	19,81	18,47	14,31	18,81	17,57	17,64	15,61
Unknown	6,85	6,91	5,75	5,98	5,53	7,21	1,66	2,52	2,12
iMMR	**163,11**	**155,23**	**149,17**	**140,81**	**131,41**	**135,19**	**125,89**	**117,69**	**98,82**

10. Comparison iMMR per underlying cause from 2011-2019

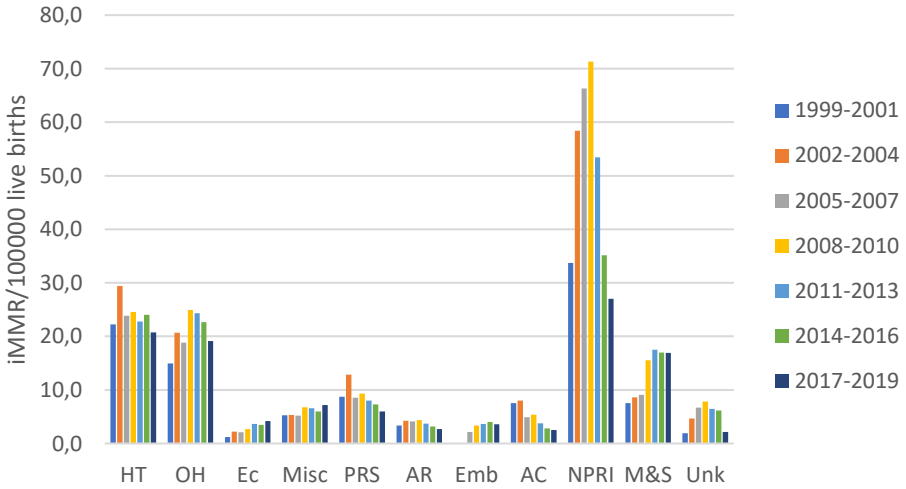


11.Distribution of iMMR per underlying causes from seven triennia, 1999-2019

	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
Hypertensive disorders of pregnancy	22,26	29,43	23,85	24,58	22,75	24,02	20,73
Obstetric haemorrhage	14,93	20,72	18,82	24,91	24,32	22,67	19,11
Ectopic pregnancy	1,19	2,20	2,11	2,72	3,63	3,45	4,19
Miscarriage	5,27	5,34	5,21	6,73	6,58	6,00	7,18
Pregnancy-related sepsis	8,74	12,84	8,55	9,34	8,04	7,30	5,99
Anaesthetic complications	3,34	4,27	4,10	4,38	3,73	3,16	2,72
Embolism			2,19	3,37	3,63	4,03	3,60
Acute collapse - cause unknown	7,55	8,01	4,91	5,36	3,77	2,80	2,53
Non-pregnancy-related infections	33,72	58,40	66,28	71,29	53,47	35,17	27,05
Medical and surgical disorders	7,51	8,62	9,09	15,57	17,53	16,97	16,91
Unknown	1,93	4,64	6,67	7,82	6,44	6,14	2,14
iMMR	106,42	154,48	151,77	176,22	153,88	134,33	113,77

Note: The systems changed in the early years. The denominator uses was from StatsSA; from 2005-2007 the denominator was DHIS. Definitions also change during the 21 yeears. The best comparison is from 2011 onwards, although 2008-2010 was very similar to the subsequent years. Embolism was included in acute collapse from 1999-2014.

12.Comparison of 7 triennia (1999-2020)



13.Final and contributory causes of maternal death per underlying condition 2017-2019

2017-2019	All	M&S	Cardiac disease	NPRI	Ec	Miscar	PRS	OH	HDP	AR	ADR	Emb	AC	Micell	Unk	Home	Coin
Circulatory system	1322	73	10	169	102	176	143	495	84	11	2	9	9	3	14	3	32
- Hypovolaemic shock	787	26	3	22	95	56	11	461	59	10		6	7	2	8	3	24
- Septic shock	535	47	7	147	7	120	132	34	25	1	2	3	2	1	6		8
Respiratory failure	1001	149	32	457	21	32	31	45	122	38	9	24	10	4	25	7	34
Cardiac failure/Pulmonary oedema	542	149	107	64	11	17	11	34	197	8	1	19	9	3	9	3	10
Acute collapse due to embolism	140	27	15	7	1	1	3	5	9	4	1	72	6		2	2	2
Renal failure	480	75	16	121	10	50	47	32	111	1	8	5	3	3	4	1	10
Liver failure	276	44	5	60	5	20	24	16	69	0	8	4	1	8	8	1	9
Cerebral complications	672	102	8	128	5	8	9	21	316	25	6	2	8	1	10	2	31
- Intracranial haemorrhage	214	25	1	3		2		4	160				1		2		16
- Cerebral oedema resulting in coning	67	12	2	5				1	45		1				2	1	2
- Meningitis	104	2		93		2	1		1		1	1					
- Cerebral emboli	9	4		2			4		2								
- Brain death following hypoxic event	129	20		6	4	2		7	57	22	3	1	3		1		3
- Unspecified	149	39	5	19	1	2	4	9	51	3	1		4	1	5	1	10
Metabolic	447	80	15	115	16	32	48	40	49	2	6	11	6	10	13	0	19
- Maternal ketoacidosis	83	20	3	18	6	8	5	12	8		1	1		3	6		1
- Electrolyte imbalance	230	35	5	72	8	12	23	21	24	1	2	6	3	5			12
- Thyroid crisis	8	3	1	3							1				1		
- Lactic acidosis	92	13	3	15	2	11	16	6	13		2	4	2	1	3		3
- Other	34	9	3	7		1	4	1	4	1			1	1	3		3
Haematological	941	84	14	158	42	101	46	320	131	6	6	7	4	4	18	3	14
- DIC	472	32	4	42	13	48	26	198	85	4	5	4	1	2	6		6
- Severe anaemia	469	52	10	116	29	53	20	122	46	2	1	3	3	2	12	3	8
Immune system failure	685	59	16	420	13	34	46	48	26	4	2	8	8	2	10	4	5
Maternal deaths	3289	460	145	736	113	194	161	516	561	75	24	98	67	19	156	96	109
Unknown	228	14	3	11	2	7	6	7	10	0	1	4	31	0	128	95	7
- Home death	110	2	1	6	1	2	2	5	5			1	9		74	69	3
- Unknown	118	12	2	5	1	5	4	2	5		1	3	22		54	26	4
Other	257	67	18	26	3	13	12	17	20	24	10	7	11	3	17	7	27
- Other	257	67	18	26	3	13	12	17	20	24	10	7	11	3	17	7	27

14.**Distribution of final and contributory causes of death per underlying condition 2017-2019**

2017-2019	All	M&S	Cardiac disease	NPRI	Ec	Misca	PRS	OH	HDP	AR	ADR	Emb	AC	Micell	Unk	Home	Coin
Circulatory system	40,2	15,9	6,9	23,0	90,3	90,7	88,8	95,9	15,0	14,7	8,3	9,2	13,4	15,8	9,0	3,1	29,4
- Hypovolaemic shock	23,9	5,7	2,1	3,0	84,1	28,9	6,8	89,3	10,5	13,3	0,0	6,1	10,4	10,5	5,1	3,1	22,0
- Septic shock	16,3	10,2	4,8	20,0	6,2	61,9	82,0	6,6	4,5	1,3	8,3	3,1	3,0	5,3	3,8	0,0	7,3
Respiratory failure	30,4	32,4	22,1	62,1	18,6	16,5	19,3	8,7	21,7	50,7	37,5	24,5	14,9	21,1	16,0	7,3	31,2
Cardiac failure/Pulmonary oedema	16,5	32,4	73,8	8,7	9,7	8,8	6,8	6,6	35,1	10,7	4,2	19,4	13,4	15,8	5,8	3,1	9,2
Acute collapse due to embolism	4,3	5,9	10,3	1,0	0,9	0,5	1,9	1,0	1,6	5,3	4,2	73,5	9,0	0,0	1,3	2,1	1,8
Renal failure	14,6	16,3	11,0	16,4	8,8	25,8	29,2	6,2	19,8	1,3	33,3	5,1	4,5	15,8	2,6	1,0	9,2
Liver failure	8,4	9,6	3,4	8,2	4,4	10,3	14,9	3,1	12,3	0,0	33,3	4,1	1,5	42,1	5,1	1,0	8,3
Cerebral complications	20,4	22,2	5,5	17,4	4,4	4,1	5,6	4,1	56,3	33,3	25,0	2,0	11,9	5,3	6,4	2,1	28,4
- Intracranial haemorrhage	6,5	5,4	0,7	0,4	0,0	1,0	0,0	0,8	28,5	0,0	0,0	0,0	1,5	0,0	1,3	0,0	14,7
- Cerebral oedema resulting in coning	2,0	2,6	1,4	0,7	0,0	0,0	0,0	0,2	8,0	0,0	4,2	0,0	0,0	0,0	1,3	1,0	1,8
- Meningitis	3,2	0,4	0,0	12,6	0,0	1,0	0,6	0,0	0,2	0,0	4,2	1,0	0,0	0,0	0,0	0,0	0,0
- Cerebral emboli	0,3	0,9	0,0	0,3	0,0	0,0	2,5	0,0	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
- Brain death following hypoxic event	3,9	4,3	0,0	0,8	3,5	1,0	0,0	1,4	10,2	29,3	12,5	1,0	4,5	0,0	0,6	0,0	2,8
- Unspecified	4,5	8,5	3,4	2,6	0,9	1,0	2,5	1,7	9,1	4,0	4,2	0,0	6,0	5,3	3,2	1,0	9,2
Metabolic	13,6	17,4	10,3	15,6	14,2	16,5	29,8	7,8	8,7	2,7	25,0	11,2	9,0	52,6	8,3	0,0	17,4
- Maternal ketoacidosis	2,5	4,3	2,1	2,4	5,3	4,1	3,1	2,3	1,4	0,0	4,2	1,0	0,0	15,8	3,8	0,0	0,9
- Electrolyte imbalance	7,0	7,6	3,4	9,8	7,1	6,2	14,3	4,1	4,3	1,3	8,3	6,1	4,5	26,3	0,0	0,0	11,0
- Thyroid crisis	0,2	0,7	0,7	0,4	0,0	0,0	0,0	0,0	0,0	0,0	4,2	0,0	0,0	0,0	0,6	0,0	0,0
- Lactic acidosis	2,8	2,8	2,1	2,0	1,8	5,7	9,9	1,2	2,3	0,0	8,3	4,1	3,0	5,3	1,9	0,0	2,8
- Other	1,0	2,0	2,1	1,0	0,0	0,5	2,5	0,2	0,7	1,3	0,0	0,0	1,5	5,3	1,9	0,0	2,8
Haematological	28,6	18,3	9,7	21,5	37,2	52,1	28,6	62,0	23,4	8,0	25,0	7,1	6,0	21,1	11,5	3,1	12,8
- DIC	14,4	7,0	2,8	5,7	11,5	24,7	16,1	38,4	15,2	5,3	20,8	4,1	1,5	10,5	3,8	0,0	5,5
- Severe anaemia	14,3	11,3	6,9	15,8	25,7	27,3	12,4	23,6	8,2	2,7	4,2	3,1	4,5	10,5	7,7	3,1	7,3
Immune system failure	20,8	12,8	11,0	57,1	11,5	17,5	28,6	9,3	4,6	5,3	8,3	8,2	11,9	10,5	6,4	4,2	4,6

15.HIV status and underlying condition

Underlying obstetric problems	All	Declined and Unk.	Negative	Positive	HIV Positive Treatment		
					No Treatment	Dual	FDC
Medical and surgical disorders	460	33	261	166	23	1	132
Non-pregnancy-related infections	736	21	66	649	133	2	452
Ectopic pregnancy	113	55	14	44	12	0	26
Miscarriage	194	65	39	90	32	0	50
Pregnancy-related sepsis	161	7	61	93	21	2	63
Obstetric haemorrhage	516	29	280	207	27	1	166
Hypertension	561	51	384	126	16	0	104
Anaesthetic complications	75	2	47	26	3	0	18
Adverse drug reactions	24	5	10	9	2	0	7
Embolism	98	8	58	32	2	1	26
Acute collapse - cause unknown	67	4	38	25	2	0	21
Miscellaneous	19	3	11	5	1	0	4
No primary cause found	24	4	12	8			8
Lack of information	36	5	20	11			11
Maternal deaths	3084	292	1301	1491	274	7	1088
Death at home or outside health services	96	23	41	32	3		25
Coincidental cause	109	50	41	18	5	0	13
DDPCP	3289	365	1383	1541	282	7	1126

16.Distribution of pattern of disease and HIV status

Primary obstetric problems	All	Declined and Unk.	Negative	Positive	Disease pattern FDC
Medical and surgical disorders	14,9	11,3	20,1	11,1	12,1
Non-pregnancy-related infections	23,9	7,2	5,1	43,5	41,5
Ectopic pregnancy	3,7	18,8	1,1	3,0	2,4
Miscarriage	6,3	22,3	3,0	6,0	4,6
Pregnancy-related sepsis	5,2	2,4	4,7	6,2	5,8
Obstetric haemorrhage	16,7	9,9	21,5	13,9	15,3
Hypertensive disorders in pregnancy	18,2	17,5	29,5	8,5	9,6
Anaesthetic complications	2,4	0,7	3,6	1,7	1,7
Adverse drug reactions	0,8	1,7	0,8	0,6	0,6
Embolism	3,2	2,7	4,5	2,1	2,4
Acute collapse - cause unknown	2,2	1,4	2,9	1,7	1,9
Miscellaneous	0,6	1,0	0,8	0,3	0,4
No primary cause found	0,8	1,4	0,9	0,5	0,7
Lack of information	1,2	1,7	1,5	0,7	1,0
Maternal deaths	100,0	100,0	100,0	100,0	100,0

17.Distribution of HIV status within each disease category

Primary obstetric problems	All	Declined and Unk.	Negative	Positive
Medical and surgical disorders	100,0	7,2	56,7	36,1
Non-pregnancy-related infections	100,0	2,9	9,0	88,2
Ectopic pregnancy	100,0	48,7	12,4	38,9
Miscarriage	100,0	33,5	20,1	46,4
Pregnancy-related sepsis	100,0	4,3	37,9	57,8
Obstetric haemorrhage	100,0	5,6	54,3	40,1
Hypertensive disorders in pregnancy	100,0	9,1	68,4	22,5
Anaesthetic complications	100,0	2,7	62,7	34,7
Adverse drug reactions	100,0	20,8	41,7	37,5
Embolism	100,0	8,2	59,2	32,7
Acute collapse - cause unknown	100,0	6,0	56,7	37,3
Miscellaneous	100,0	15,8	57,9	26,3
No primary cause found	100,0	16,7	50,0	33,3
Lack of information	100,0	13,9	55,6	30,6
Maternal deaths	100,0	9,5	42,2	48,3

18.Treatment of HIV within each disease category

Primary obstetric problems	No Treatment	Dual	FDC
Medical and surgical disorders	13,9	0,6	79,5
Non-pregnancy-related infections	20,5	0,3	69,6
Ectopic pregnancy	27,3	0,0	59,1
Miscarriage	35,6	0,0	55,6
Pregnancy-related sepsis	22,6	2,2	67,7
Obstetric haemorrhage	13,0	0,5	80,2
Hypertensive disorders in pregnancy	12,7	0,0	82,5
Anaesthetic complications	11,5	0,0	69,2
Adverse drug reactions	22,2	0,0	77,8
Embolism	6,3	3,1	81,3
Acute collapse - cause unknown	8,0	0,0	84,0
Miscellaneous	20,0	0,0	80,0
No primary cause found	0,0	0,0	100,0
Lack of information	0,0	0,0	100,0
Maternal deaths	18,4	0,5	73,0

19.Maternal age and Maternal deaths 2017-2019

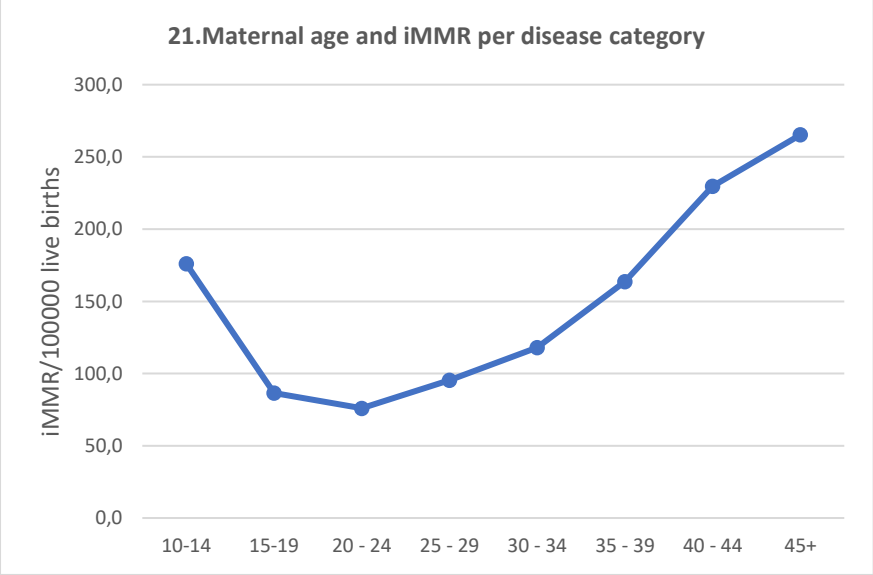
Primary obstetric problem	< 20	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45+	Unk	Total
Coincidental cause	20	33	19	17	16	3	0	1	109
- MVA	0	10	5	7	8	1	0	1	32
- Other accidents	0	6	1	1	1	2	0	0	11
- Assault	3	2	1	2	1	0	0	0	9
- Other	17	15	12	7	6	0	0	0	57
Medical and surgical disorders	**43**	**93**	**113**	**107**	**71**	**31**	**1**	**1**	**460**
- Cardiac disease	9	28	35	42	21	10	0	0	145
- Endocrine	1	4	4	4	4	3	0	0	20
- GIT	0	3	6	8	6	3	0	0	26
- CNS	4	5	16	11	9	2	0	0	47
- Respiratory	12	12	15	12	8	3	0	1	63
- Haematological	0	8	11	4	2	0	0	0	25
- Genito-urinary	1	3	2	3	0	0	0	0	9
- Auto-immune	0	2	1	0	0	0	0	0	3
- Skeletal	0	0	0	1	0	0	0	0	1
- Psychiatric	8	8	3	0	2	1	0	0	22
- Neoplasm	3	6	11	6	8	5	1	0	40
- Other	5	14	9	16	11	4	0	0	59
Non-pregnancy-related infections	**33**	**113**	**183**	**195**	**155**	**53**	**4**	**0**	**736**
- PCP pneumonia	2	16	50	32	19	11	1	0	131
- Other pneumonia	8	18	22	33	25	11	1	0	118
- TB	8	43	68	68	60	19	0	0	266
- Influenza	0	0	0	0	2	0	0	0	2
- Endocarditis	0	0	0	0	0	1	0	0	1
- UTI	0	1	1	0	0	0	0	0	2
- Appendicitis	0	1	1	2	0	0	1	0	5
- Malaria	3	3	3	4	3	1	0	0	17
- Cryptococcal meningitis	1	4	8	13	10	2	0	0	38
- Other meningitis	6	8	6	10	14	1	0	0	45
- Kaposi's sarcoma	0	2	1	4	1	1	0	0	9
- Hepatitis	0	2	1	5	2	0	0	0	10
- Gastroenteritis	1	4	3	5	7	5	0	0	25
- Wasting syndrome	2	3	3	5	1	0	0	0	14
- Other	2	8	16	14	11	1	1	0	53
Ectopic pregnancy	**5**	**20**	**34**	**29**	**19**	**6**	**0**	**0**	**113**
- Less than 20 weeks	5	19	33	26	16	5	0	0	104
- More than 20 weeks	0	1	1	3	3	1	0	0	9
Miscarriage	**12**	**37**	**51**	**43**	**33**	**15**	**3**	**0**	**194**
- Septic miscarriage	11	25	40	31	17	10	3	0	137
- Haemorrhage (non-traumatic)	1	9	5	9	12	2	0	0	38
- Uterine trauma	0	0	3	3	2	3	0	0	11
- GTD	0	2	1	0	0	0	0	0	3
- Following legal TOP	0	1	2	0	2	0	0	0	5
Pregnancy-related sepsis	**16**	**30**	**35**	**38**	**31**	**9**	**1**	**1**	**161**
- Chorioamnionitis (ruptured membranes)	2	1	0	0	0	0	0	0	3
- Chorioamnionitis (intact membranes)	0	1	1	1	1	0	0	0	4
- Puerperal sepsis after NVD	5	12	16	19	15	5	0	1	73
- Puerperal sepsis after C/section	9	15	15	12	12	1	1	0	65
- Bowel trauma at C/section	0	1	3	6	3	3	0	0	16

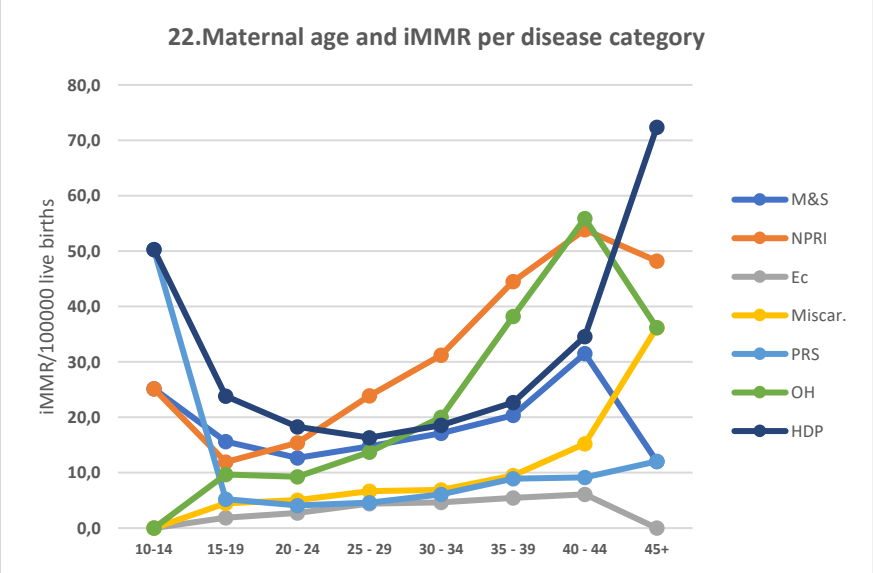
Primary obstetric problem	< 20	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45+	Unk	Total
Obstetric haemorrhage	**26**	**68**	**105**	**125**	**133**	**55**	**3**	**1**	**516**
- Abruption with hypertension	2	10	6	7	4	3	0	0	32
- Abruption without hypertension	5	8	8	9	8	1	0	1	40
- Placenta praevia	0	2	3	1	4	1	0	0	11
- Other APH not specified	0	1	0	2	3	0	0	0	6
- Ruptured uterus with previous c/s	0	2	9	9	8	0	0	0	28
- Ruptured uterus without previous c/s	2	2	5	9	10	4	0	0	32
- Retained placenta	2	8	10	9	7	7	0	0	43
- Morbidly adherent placenta	0	1	3	3	7	0	0	0	14
- Uterine atony	4	5	8	10	15	7	0	0	49
- Vaginal trauma	0	1	1	2	2	2	0	0	8
- Cervical trauma	2	1	2	1	3	0	0	0	9
- Inverted uterus	2	2	3	1	0	0	0	0	8
- Bleeding during Caesarean section	1	1	7	12	11	6	0	0	38
- Bleeding after Caesarean section	4	20	24	33	41	16	1	0	139
- Other PPH not specified	2	4	16	17	10	8	2	0	59
Hypertensive disorders of pregnancy	**66**	**134**	**125**	**116**	**79**	**34**	**6**	**1**	**561**
- Chronic hypertension	1	3	3	9	12	2	2	0	32
- Proteinuric hypertension	16	43	35	34	21	10	1	1	161
- Eclampsia	44	65	59	52	26	15	2	0	263
- HELLP	5	21	24	16	17	6	1	0	90
- Liver rupture	0	2	4	5	3	1	0	0	15
Anaesthetic complications	**3**	**16**	**21**	**18**	**9**	**7**	**1**	**0**	**75**
- General anaesthetic	0	4	3	4	0	2	0	0	13
- Epidural anaesthetic	0	0	0	1	1	0	0	0	2
- Spinal anaesthetic	3	12	18	13	8	5	1	0	60
Adverse drug reactions	**3**	**5**	**5**	**7**	**2**	**1**	**1**	**0**	**24**
- ARV medication	0	0	0	2	0	1	0	0	3
- TB medication	0	1	0	1	0	0	0	0	2
- Other medication	2	2	1	1	0	0	1	0	7
- Herbal medication	1	2	4	3	2	0	0	0	12
Embolism	**6**	**15**	**24**	**31**	**14**	**7**	**1**	**0**	**98**
- Pulmonary embolism	5	14	23	28	12	6	1	0	89
- Amniotic fluid embolism	1	1	1	3	2	1	0	0	9
Acute collapse - cause unknown	**7**	**12**	**15**	**14**	**15**	**4**	**0**	**0**	**67**
Miscellaneous	**1**	**7**	**7**	**3**	**1**	**0**	**0**	**0**	**19**
- Hyperemesis gravidarum	1	3	3	1	0	0	0	0	8
- Acute fatty liver	0	4	4	2	1	0	0	0	11
Unknown	31	24	31	36	20	11	3	0	156
- Death at home or outside health services	13	17	19	26	12	7	2	0	96
- No primary cause found	8	4	5	2	2	2	1	0	24
- Lack of information	10	3	7	8	6	2	0	0	36

20.iMMR and maternal age per disease category 2017-2019

Primary obstetric problem	10-14	15-19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45+
Medical and surgical disorders	25,1	15,6	12,7	14,8	17,1	20,4	31,5	12,1
Non-pregnancy-related infections	25,1	11,9	15,4	23,9	31,2	44,5	53,9	48,2
Ectopic pregnancy	0,0	1,9	2,7	4,4	4,6	5,5	6,1	0,0
Miscarriage	0,0	4,5	5,0	6,7	6,9	9,5	15,2	36,2
Pregnancy-related sepsis	50,3	5,2	4,1	4,6	6,1	8,9	9,1	12,1
Obstetric haemorrhage	0,0	9,7	9,3	13,7	20,0	38,2	55,9	36,2
Hypertension	50,3	23,8	18,3	16,3	18,6	22,7	34,6	72,3
Anaesthetic complications	0,0	1,1	2,2	2,7	2,9	2,6	7,1	12,1
Adverse drug reactions	0,0	1,1	0,7	0,7	1,1	0,6	1,0	12,1
Embolism	0,0	2,2	2,0	3,1	5,0	4,0	7,1	12,1
Acute collapse - cause unknown	0,0	2,6	1,6	2,0	2,2	4,3	4,1	0,0
Miscellaneous	25,1	0,0	1,0	0,9	0,5	0,3	0,0	0,0
No primary cause found	0,0	3,0	0,5	0,7	0,3	0,6	2,0	12,1
Lack of information	0,0	3,7	0,4	0,9	1,3	1,7	2,0	0,0
Maternal deaths	176,0	86,4	76,0	95,4	117,9	163,7	229,7	265,3

Denominator: Statistical release P0305 **Recorded live births 2018**, StatsSA June 2020





Parity and maternal deaths 2017-2019

23. Parity and Underlying obstetric problem

Underlying obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unk	Total
Coincidental cause	**36**	**19**	**17**	**7**	**3**	**0**	**2**	**25**	**109**
- MVA	8	2	6	2	2	0	0	12	32
- Other accidents	2	2	2	1	0	0	1	3	11
- Assault	3	0	2	1	0	0	0	3	9
- Other	23	15	7	3	1	0	1	7	57
Medical and surgical disorders	**139**	**113**	**97**	**65**	**26**	**5**	**4**	**11**	**460**
- Cardiac disease	35	34	38	26	7	3	1	1	145
- Endocrine	9	4	5	0	2	0	0	0	20
- GIT	3	8	4	7	2	1	1	0	26
- CNS	15	12	12	4	2	1	0	1	47
- Respiratory	22	15	14	5	2	0	1	4	63
- Haematological	9	8	5	3	0	0	0	0	25
- Genito-urinary	3	2	4	0	0	0	0	0	9
- Auto-immune	1	1	1	0	0	0	0	0	3
- Skeletal	1	0	0	0	0	0	0	0	1
- Psychiatric	12	3	3	1	0	0	0	3	22
- Neoplasm	12	12	4	7	4	0	1	0	40
- Other	17	14	7	12	7	0	0	2	59
Non-pregnancy-related infections	**164**	**201**	**188**	**81**	**49**	**19**	**9**	**25**	**736**
- PCP pneumonia	32	41	31	8	11	2	2	4	131
- Other pneumonia	26	29	33	17	5	1	1	6	118
- TB	52	81	67	31	16	9	3	7	266
- Influenza	0	0	0	2	0	0	0	0	2
- Endocarditis	0	0	0	0	0	1	0	0	1
- UTI	0	2	0	0	0	0	0	0	2
- Appendicitis	2	0	2	0	0	0	0	1	5
- Malaria	6	4	4	1	1	1	0	0	17
- Cryptococcal meningitis	8	6	18	2	3	1	0	0	38
- Other meningitis	11	12	9	8	2	0	1	2	45
- Kaposi's sarcoma	3	3	1	1	0	1	0	0	9
- Hepatitis	1	3	3	2	0	0	0	1	10
- Gastroenteritis	3	3	8	3	6	0	1	1	25
- Wasting syndrome	8	4	0	1	1	0	0	0	14
- Other	12	13	12	5	4	3	1	3	53
Ectopic pregnancy	**35**	**22**	**20**	**14**	**3**	**0**	**0**	**19**	**113**
- Less than 20 weeks	33	21	18	10	3	0	0	19	104
- More than 20 weeks	2	1	2	4	0	0	0	0	9
Miscarriage	**40**	**54**	**44**	**17**	**13**	**3**	**4**	**19**	**194**
- Septic miscarriage	32	35	32	10	10	2	4	12	137
- Haemorrhage (non-traumatic)	5	13	7	6	1	0	0	6	38
- Uterine trauma	2	1	4	1	1	1	0	1	11
- GTD	1	2	0	0	0	0	0	0	3
- Following legal TOP	0	3	1	0	1	0	0	0	5
Pregnancy-related sepsis	**50**	**41**	**38**	**14**	**8**	**5**	**2**	**3**	**161**
- Chorioamnionitis (ruptured membranes)	3	0	0	0	0	0	0	0	3
- Chorioamnionitis (intact membranes)	1	1	1	1	0	0	0	0	4
- Puerperal sepsis after NVD	18	20	16	6	6	4	1	2	73
- Puerperal sepsis after C/section	24	16	16	4	2	1	1	1	65
- Bowel trauma at C/section	4	4	5	3	0	0	0	0	16

Underlying obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unk	Total
Obstetric haemorrhage	**90**	**118**	**150**	**78**	**49**	**20**	**9**	**2**	**516**
- Abruption with hypertension	9	8	7	6	2	0	0	0	32
- Abruption without hypertension	14	9	7	4	4	1	1	0	40
- Placenta praevia	1	5	4	1	0	0	0	0	11
- Other APH not specified	1	2	1	2	0	0	0	0	6
- Ruptured uterus with previous c/s	2	10	6	7	3	0	0	0	28
- Ruptured uterus without previous c/s	1	6	9	8	5	3	0	0	32
- Retained placenta	9	9	7	6	2	5	3	2	43
- Morbidly adherent placenta	1	2	5	4	2	0	0	0	14
- Uterine atony	11	10	11	10	4	3	0	0	49
- Vaginal trauma	1	2	3	1	1	0	0	0	8
- Cervical trauma	5	2	2	0	0	0	0	0	9
- Inverted uterus	2	4	2	0	0	0	0	0	8
- Bleeding during Caesarean section	3	6	16	4	5	3	1	0	38
- Bleeding after Caesarean section	24	30	43	18	18	4	2	0	139
- Other PPH not specified	6	13	27	7	3	1	2	0	59
Hypertensive disorders in pregnancy	**216**	**146**	**99**	**55**	**30**	**6**	**4**	**5**	**561**
- Chronic hypertension	7	9	6	4	5	0	0	1	32
- Proteinuric hypertension	55	44	36	18	6	1	1	0	161
- Eclampsia	121	62	40	21	11	4	2	2	263
- HELLP	30	26	14	10	6	1	1	2	90
- Liver rupture	3	5	3	2	2	0	0	0	15
Anaesthetic complications	**24**	**24**	**13**	**8**	**5**	**0**	**0**	**1**	**75**
- General anaesthetic	4	4	1	3	0	0	0	1	13
- Epidural anaesthetic	1	1	0	0	0	0	0	0	2
- Spinal anaesthetic	19	19	12	5	5	0	0	0	60
Adverse drug reactions	**9**	**8**	**4**	**1**	**1**	**0**	**0**	**1**	**24**
- ARV medication	0	1	1	0	1	0	0	0	3
- TB medication	1	0	1	0	0	0	0	0	2
- Other medication	3	3	0	0	0	0	0	1	7
- Herbal medication	5	4	2	1	0	0	0	0	12
Embolism	**32**	**17**	**16**	**18**	**6**	**0**	**4**	**5**	**98**
- Pulmonary embolism	29	16	14	17	5	0	3	5	89
- Amniotic fluid embolism	3	1	2	1	1	0	1	0	9
Acute collapse - cause unknown	**17**	**19**	**17**	**5**	**7**	**1**	**1**	**0**	**67**
Miscellaneous	**6**	**6**	**3**	**2**	**2**	**0**	**0**	**0**	**19**
- Hyperemesis gravidarum	1	5	0	2	0	0	0	0	8
- Acute fatty liver	5	1	3	0	2	0	0	0	11
Unknown	**56**	**31**	**25**	**12**	**14**	**6**	**0**	**12**	**156**
- Death at home or outside health services	29	19	17	8	11	2	0	10	96
- No primary cause found	10	7	3	2	0	2	0	0	24
- Lack of information	17	5	5	2	3	2	0	2	36

24 Parity and underlying cause 2017-2019

Primary obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unknown	Total
Medical and surgical disorders	139	113	97	65	26	5	4	11	460
Non-pregnancy-related infections	164	201	188	81	49	19	9	25	736
Ectopic pregnancy	35	22	20	14	3	0	0	19	113
Miscarriage	40	54	44	17	13	3	4	19	194
Pregnancy-related sepsis	50	41	38	14	8	5	2	3	161
Obstetric haemorrhage	90	118	150	78	49	20	9	2	516
Hypertensive disorders in pregnancy	216	146	99	55	30	6	4	5	561
Anaesthetic complications	24	24	13	8	5	0	0	1	75
Adverse drug reactions	9	8	4	1	1	0	0	1	24
Embolism	32	17	16	18	6	0	4	5	98
Acute collapse - cause unknown	17	19	17	5	7	1	1	0	67
Miscellaneous	6	6	3	2	2	0	0	0	19
No primary cause found	10	7	3	2	0	2	0	0	24
Lack of information	17	5	5	2	3	2	0	2	36
Maternal deaths	849	781	697	362	202	63	37	93	3084

25.Distribution of disease category within the parity

Primary obstetric problem	**P0**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6+**	**Unknown**	**Total**
Medical and surgical disorders	16,4	14,5	13,9	18,0	12,9	7,9	10,8	11,8	14,9
Non-pregnancy-related infections	19,3	25,7	27,0	22,4	24,3	30,2	24,3	26,9	23,9
Ectopic pregnancy	4,1	2,8	2,9	3,9	1,5	0,0	0,0	20,4	3,7
Miscarriage	4,7	6,9	6,3	4,7	6,4	4,8	10,8	20,4	6,3
Pregnancy-related sepsis	5,9	5,2	5,5	3,9	4,0	7,9	5,4	3,2	5,2
Obstetric haemorrhage	10,6	15,1	21,5	21,5	24,3	31,7	24,3	2,2	16,7
Hypertensive disorders in pregnancy	25,4	18,7	14,2	15,2	14,9	9,5	10,8	5,4	18,2
Anaesthetic complications	2,8	3,1	1,9	2,2	2,5	0,0	0,0	1,1	2,4
Adverse drug reactions	1,1	1,0	0,6	0,3	0,5	0,0	0,0	1,1	0,8
Embolism	3,8	2,2	2,3	5,0	3,0	0,0	10,8	5,4	3,2
Acute collapse - cause unknown	2,0	2,4	2,4	1,4	3,5	1,6	2,7	0,0	2,2
Miscellaneous	0,7	0,8	0,4	0,6	1,0	0,0	0,0	0,0	0,6
No primary cause found	1,2	0,9	0,4	0,6	0,0	3,2	0,0	0,0	0,8
Lack of information	2,0	0,6	0,7	0,6	1,5	3,2	0,0	2,2	1,2
Maternal deaths	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

26.Distribution of the parity within the disease category

Primary obstetric problem	P0	P1	P2	P3	P4	P5	P6+	Unknown	Total
Medical and surgical disorders	30,2	24,6	21,1	14,1	5,7	1,1	0,9	2,4	100,0
Non-pregnancy-related infections	22,3	27,3	25,5	11,0	6,7	2,6	1,2	3,4	100,0
Ectopic pregnancy	31,0	19,5	17,7	12,4	2,7	0,0	0,0	16,8	100,0
Miscarriage	20,6	27,8	22,7	8,8	6,7	1,5	2,1	9,8	100,0
Pregnancy-related sepsis	31,1	25,5	23,6	8,7	5,0	3,1	1,2	1,9	100,0
Obstetric haemorrhage	17,4	22,9	29,1	15,1	9,5	3,9	1,7	0,4	100,0
Hypertensive disorders in pregnancy	38,5	26,0	17,6	9,8	5,3	1,1	0,7	0,9	100,0
Anaesthetic complications	32,0	32,0	17,3	10,7	6,7	0,0	0,0	1,3	100,0
Adverse drug reactions	37,5	33,3	16,7	4,2	4,2	0,0	0,0	4,2	100,0
Embolism	32,7	17,3	16,3	18,4	6,1	0,0	4,1	5,1	100,0
Acute collapse - cause unknown	25,4	28,4	25,4	7,5	10,4	1,5	1,5	0,0	100,0
Miscellaneous	31,6	31,6	15,8	10,5	10,5	0,0	0,0	0,0	100,0
No primary cause found	41,7	29,2	12,5	8,3	0,0	8,3	0,0	0,0	100,0
Lack of information	47,2	13,9	13,9	5,6	8,3	5,6	0,0	5,6	100,0
Maternal deaths	27,5	25,3	22,6	11,7	6,5	2,0	1,2	3,0	100,0

27.Caesarean Delivery per province

2017	Live births	CD	CD rate (%)	MD with CD	CFR 2017
Eastern Cape	99927	29064	29,1	42	144,5
Free State	44559	13164	29,5	31	235,5
Gauteng	213955	62847	29,4	80	127,3
KwaZulu-Natal	180565	55734	30,9	79	141,7
Limpopo	119163	24487	20,5	51	208,3
Mpumalanga	75621	16786	22,2	32	190,6
North West	55915	13267	23,7	17	128,1
Northern Cape	20475	4471	21,8	5	111,8
Western Cape	95218	28561	30,0	25	87,5
South Africa	905398	248381	27,4	362	145,7

Province	Live births	CD	CD Rate	MD CD 2018	CFR CD 2018
Eastern Cape	104152	31270	29,5	46	147,1
Free State	47114	14919	30,8	26	174,3
Gauteng	220104	63456	28,3	103	162,3
KwaZulu-Natal	198167	65010	32,1	50	76,9
Limpopo	123005	26011	20,7	44	169,2
Mpumalanga	79806	17532	21,5	33	188,2
North West	58484	15375	25,7	16	104,1
Northern Cape	21530	4764	21,6	9	188,9
Western Cape	98494	28777	28,7	26	90,3
South Africa	950856	267114	28,1	353	132,2

2019	Live births	2019 CD	CD rate 2019	MD CD (GP, LP adjusted)	CFR 2019
Eastern Cape	106051	33072	30,1	47	142,1
Free State	48331	15539	31,2	27	173,8
Gauteng	227588	64487	28,8	86	133,4
KwaZulu-Natal	212850	70890	32,4	53	74,8
Limpopo	128413	27525	21,1	47	170,8
Mpumalanga	82075	18261	22,1	21	115,0
North West	60009	15299	25,4	17	111,1
Northern Cape	21784	4679	21,8	9	192,3
Western Cape	102420	30139	29,5	13	43,1
South Africa	**989521**	**284570**	**28,1**	**320**	**112,5**

2917-2019	Live births	2017-2019 CD	CD rate 2017-2019	MD 2017-2019 CD*	CFR 2017- 2019
Eastern Cape	310130	93406	30,1	136	145,6
Free State	140004	43622	31,2	82	188,0
Gauteng	661647	190790	28,8	282	147,8
KwaZulu-Natal	591582	191634	32,4	187	97,6
Limpopo	370581	78023	21,1	147	188,6
Mpumalanga	237502	52579	22,1	86	163,6
North West	174408	43941	25,2	49	111,5
Northern Cape	63789	13914	21,8	24	172,5
Western Cape	296132	87477	29,5	66	75,4
South Africa	2845775	800065	28,1	1059	132,4

* - Maternal deaths (exclude Coincidental and deaths outside health facility)

28.CD per province and underlying cause 2017-2019

Primary obstetric problems	EC	FS	GP ©	KZN	LP ©	Mpu	NW	NC	WC
Coincidental cause	**1**	**2**	**8**	**2**	**0**	**0**	**1**	**0**	**1**
- MVA	1	2	2	1					1
- Other accidents			2						
- Other			4	1			1		
Medical and surgical disorders	**19**	**10**	**38**	**38**	**13**	**8**	**7**	**1**	**10**
- Cardiac disease	2	3	13	19	5	2	2	1	6
- Endocrine	3	1				1			1
- GIT	1		2	2	1		1		
- CNS	2	2	4	8		1	1		1
- Respiratory	2	1	6	1	3	2	1		
- Haematological		2		2	1		1		
- Genito-urinary	2						1		
- Skeletal			1						
- Psychiatric				3	1				1
- Neoplasm	4		6	1					1
- Other	3	1	6	2	1	2			
Non-pregnancy-related infections	**14**	**2**	**30**	**23**	**10**	**5**	**2**	**0**	**6**
- PCP pneumonia		1	5	3	1	1	1		3
- Other pneumonia	2	1	6	6	2	1			2
- TB	5		7	5	1	1			
- Influenza				1					
- UTI				1					
- Appendicitis				1					
- Malaria					1				
- Cryptococcal meningitis	1			2	1	1			
- Other meningitis	5		1	1	2	1			
- Kaposi's sarcoma			1						
- Hepatitis	1		1				1		
- Gastroenteritis			1						
- Wasting syndrome	0			1					
- Other			7	2	1				1
Ectopic pregnancy	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
- More than 20 weeks			1						
Miscarriage	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pregnancy-related sepsis	**14**	**4**	**22**	**15**	**9**	**3**	**2**	**0**	**11**
- Chorioamnionitis (ruptured membranes)		1							
- Puerperal sepsis after C/section	13	3	18	13	4	3	2		8
- Bowel trauma at C/section	1		5	2	4				3
Obstetric haemorrhage	**35**	**25**	**72**	**30**	**57**	**32**	**16**	**7**	**10**
- Abruption with hypertension	1	4	4	2		1		1	1
- Abruption without hypertension	1	2	8	1	3	5	3		
- Placenta praevia	1		2	1	1	1	1		
- Other APH not specified			1				1		
- Ruptured uterus with previous c/s	1	2	5	1	3	2	1	1	2
- Ruptured uterus without previous c/s	1	1	1		3			1	
- Morbidly adherent placenta	1	1	1	2	2	2			1
- Uterine atony	2	1	4		1				
- Bleeding during Caesarean section	5	3	18	4	7	1	3	1	
- Bleeding after Caesarean section	22	9	27	18	34	18	7	3	6
- Other PPH not specified		2	1	1	2	2			
Hypertension	**29**	**29**	**91**	**40**	**37**	**26**	**19**	**8**	**10**
- Chronic hypertension		3	6					1	
- Proteinuric hypertension	9	11	27	12	10	5	4	2	5
- Eclampsia	16	9	39	26	16	7	10	4	4
- HELLP	4	5	15	1	10	14	4	1	1
- Liver rupture		1	4	1	1		1		
Anaesthetic complications	**6**	**6**	**11**	**16**	**10**	**7**	**2**	**3**	**3**
- General anaesthetic		1			4	1			
- Epidural anaesthetic				1					1
- Spinal anaesthetic	6	5	11	15	5	6	2	3	2
Primary obstetric problems	EC	FS	GP ©	KZN	LP ©	Mpu	NW	NC	WC

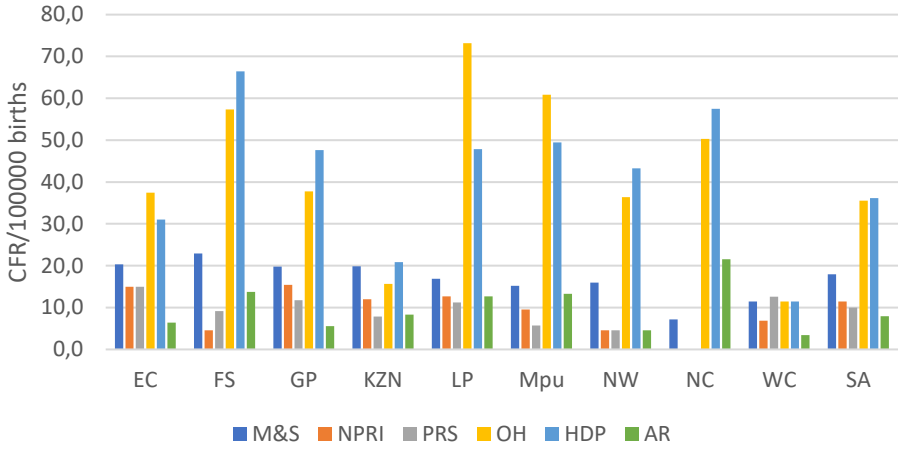
Primary obstetric problems	EC	FS	GP ©	KZN	LP ©	Mpu	NW	NC	WC
Adverse drug reactions	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
- Herbal medication	1								
Embolism	**8**	**3**	**5**	**7**	**5**	**4**	**1**	**3**	**9**
- Pulmonary embolism	8	2	4	7	4	4	1	3	8
- Amniotic fluid embolism		1	1		1				1
Acute collapse - cause unknown	**6**	**0**	**7**	**6**	**2**	**0**	**0**	**0**	**0**
Miscellaneous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
Acute fatty liver									3
Unknown	**3**	**3**	**4**	**6**	**3**	**1**	**0**	**1**	**1**
- Death at home or outside health services	2	3	1		3	1			1
- No primary cause found	1		2	2					
Insufficient information				4				1	

Primary obstetric problems	EC	FS	GP	KZN	LP	Mpu	NW	NC	WC	SA
Medical and surgical disorders	19	10	38	38	13	8	7	1	10	144
Non-pregnancy-related infections	14	2	30	23	10	5	2	0	6	91
Ectopic pregnancy	0	0	1	0	0	0	0	0	0	1
Miscarriage	0	0	0	0	0	0	0	0	0	0
Pregnancy-related sepsis	14	4	22	15	9	3	2	0	11	80
Obstetric haemorrhage	35	25	72	30	57	32	16	7	10	284
Hypertension	29	29	91	40	37	26	19	8	10	289
Anaesthetic complications	6	6	11	16	10	7	2	3	3	64
Adverse drug reactions	1	0	0	0	0	0	0	0	0	1
Embolism	8	3	5	7	5	4	1	3	9	45
Acute collapse - cause unknown	6	0	7	6	2	0	0	0	0	21
Miscellaneous	0	0	0	0	0	0	0	0	3	3
No primary cause found	1		2	2						5
Insufficient information				4				1		5
MD CD	136	82	282	187	147	86	49	24	66	1059
										0
Death at home or outside health services	2	3	1		3	1			1	11
Coincidental cause	1	2	8	2	0	0	1	0	1	15
DDPCP	397	241	774	638	528	303	265	88	220	3454
MD CD	136	84	292	183	150	86	50	23	64	1068
Live births	310130	140004	661647	591582	370581	237502	174408	63789	296132	2845775
Caesarean deliveries	93406	43622	190790	191634	78023	52579	43941	13914	87477	800065

29. CFR per province per underlying cause

Primary obstetric problems	EC	FS	GP	KZN	LP	Mpu	NW	NC	WC	SA
Medical and surgical disorders	20,34	22,92	19,79	19,83	16,89	15,22	15,93	7,19	11,43	17,99
Non-pregnancy-related infections	14,99	4,58	15,46	12,00	12,67	9,51	4,55	0,00	6,86	11,42
Pregnancy-related sepsis	14,99	9,17	11,75	7,83	11,26	5,71	4,55	0,00	12,57	10,02
Obstetric haemorrhage	37,47	57,31	37,73	15,65	73,18	60,86	36,41	50,31	11,43	35,51
Hypertension	31,05	66,48	47,62	20,87	47,85	49,45	43,24	57,50	11,43	36,15
Anaesthetic complications	6,42	13,75	5,57	8,35	12,67	13,31	4,55	21,56	3,43	7,94
Adverse drug reactions	1,07	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,12
Embolism	8,56	6,88	2,47	3,65	7,04	7,61	2,28	21,56	10,29	5,65
Acute collapse - cause unknown	6,42	0,00	3,71	3,13	2,81	0,00	0,00	0,00	0,00	2,66
Miscellaneous	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,43	0,37
No primary cause found	1,07	0,00	1,24	1,04	0,00	0,00	0,00	0,00	0,00	0,67
Insufficient information	0,00	0,00	0,00	2,09	0,00	0,00	0,00	7,19	0,00	0,62
MD CD	145,60	187,98	147,82	97,58	188,58	163,56	111,51	172,49	75,45	132,38

30.Comparison case fatality rate (CFR) for caesarean delivery per province and major condition



31. Caesarean delivery , level of care and underlying cause of maternal death 2017-2019

Underlying obstetric problems	Vaginal	CD	DH CD	RH CD	TH CD	NC CD	Pvt CD	CHC CD
Coincidental cause	**13**	**14**	**1**	**4**	**4**	**3**	**1**	**0**
- Other accidents	3	7	1	2	2	2	1	
- Assault	1	2						
- Other	9	5		2	2	1		
Medical and surgical disorders	**137**	**137**	**12**	**32**	**35**	**40**	**16**	**0**
- Cardiac disease	45	51	4	10	13	19	5	
- Endocrine	3	6	1	1	3	2		
- GIT	8	7	1	3	1	2		
- CNS	13	18	3	7	5			
- Respiratory	24	15	1	4	1	4	5	
- Haematological	6	5		1	2		2	
- Genito-urinary	2	4			2	1	1	
- Skeletal		1					1	
- Auto-immune	1	5	1	3	1			
- Psychiatric	2							
- Neoplasm	12	11	1	2	2	6		
- Other	21	14		1	5	6	2	
Non-pregnancy-related infections	**298**	**86**	**14**	**30**	**17**	**16**	**7**	**0**
- PCP pneumonia	57	11	3	4	1		3	
- Other pneumonia	41	19	3	7	6	2	1	
- TB	126	20	4	7	3	4	1	
- Influenza	1	1		1	1	1		
- Appendicitis		1		1				
- Malaria	5	1						
- UTI		1						
- Cryptococcal meningitis	13	3		1	1	1		
- Other meningitis	10	12	2	5	2	2		
- Kaposi's sarcoma	3	2			1	1		
- Hepatitis	2	3		1	1	1		
- Gastroenteritis	11	1				1		
- Wasting syndrome	6	1	1					
- Other	23	10	1	3	1	3	2	
Ectopic pregnancy	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**
- More than 20 weeks		1				1		
Miscarriage	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
- Septic miscarriage	5							
- Haemorrhage (non-traumatic)	3							
- Uterine trauma	1							
Pregnancy-related sepsis	**77**	**76**	**6**	**28**	**18**	**18**	**4**	**0**
- Chorioamnionitis (ruptured membranes)	1	1		1				
- Chorioamnionitis (intact membranes)	3							
- Puerperal sepsis after NVD	69							
- Puerperal sepsis after C/section	2	61	6	21	13	16	3	
- Bowel trauma at C/section	2	14		6	5	2	1	

Underlying obstetric problems	Vaginal	CD	DH CD	RH CD	TH CD	NC CD	Pvt CD	CHC CD
Obstetric haemorrhage	**201**	**268**	**77**	**89**	**49**	**32**	**16**	**1**
- Abruption with hypertension	15	12	3	7		1	1	
- Abruption without hypertension	14	23	5	8	4	5	1	
- Placenta praevia	2	7	1	2	1	2	1	
- Other APH not specified	2	1		1				
- Ruptured uterus with previous c/s	3	17	7	4	3	2	1	
- Ruptured uterus without previous c/s	9	8	3	2	2	1		
- Retained placenta	41							
- Morbidly adherent placenta	2	10	4	3		1	2	
- Uterine atony	42	7	1	2	1	3		
- Vaginal trauma	8							
- Cervical trauma	9							
- Inverted uterus	7							
- Bleeding during Caesarean section		38	6	16	8	4	3	
- Bleeding after Caesarean section	1	137	44	41	29	12	7	1
- Other PPH not specified	46	8	3	3	1	1		
Hypertensive disorders of pregnancy	**126**	**272**	**20**	**99**	**83**	**53**	**12**	**2**
- Chronic hypertension	5	9	3	2		4		
- Proteinuric hypertension	40	80	9	33	22	12	3	
- Eclampsia	54	124	7	42	40	26	6	2
- HELLP	24	52	1	19	19	9	3	
- Liver rupture	3	7		3	2	2		
Anaesthetic complications	**2**	**61**	**34**	**11**	**6**	**5**	**5**	**0**
- General anaesthetic		6	3	3				
- Epidural anaesthetic		2	1		1			
- Spinal anaesthetic	2	53	30	8	5	5	5	
Adverse drug reactions	**7**	**1**	**0**	**0**	**0**	**1**	**0**	**0**
- ARV medication	1							
- TB medication	2							
- Herbal medication	4	1				1		
Embolism	**26**	**44**	**9**	**12**	**8**	**3**	**7**	**0**
- Pulmonary embolism	23	40	9	10	8	2	6	
- Amniotic fluid embolism	3	4		2		1	1	
Acute collapse - cause unknown	**22**	**20**	**6**	**5**	**5**	**1**	**0**	**2**
Miscellaneous	**4**	**3**	**0**	**2**	**0**	**1**	**0**	**0**
- Hyperemesis gravidarum	2							
- Acute fatty liver	2	3		2		1		
Unknown	**40**	**21**	**1**	**4**	**1**	**0**	**3**	**0**
- Death at home or outside health services	25	11						
- No primary cause found	6	5		2	1		2	
- Lack of information	9	5	1	2			1	

Underlying obstetric problems	Vaginal	CD	DH CD	RH CD	TH CD	NC CD	Pvt CD	CHC CD
Medical and surgical disorders	137	137	12	32	35	40	16	0
Non-pregnancy-related infections	298	86	14	30	17	16	7	0
Ectopic pregnancy	0	1	0	0	0	1	0	0
Miscarriage	9	0	0	0	0	0	0	0
Pregnancy-related sepsis	77	76	6	28	18	18	4	0
Obstetric haemorrhage	201	268	77	89	49	32	16	1
Hypertensive disorders of pregnancy	126	272	20	99	83	53	12	2
Anaesthetic complications	2	61	34	11	6	5	5	0
Adverse drug reactions	7	1	0	0	0	1	0	0
Embolism	26	44	9	12	8	3	7	0
Acute collapse - cause unknown	22	20	6	5	5	1	0	2
Miscellaneous	4	3	0	2	0	1	0	0
No primary cause found	6	5		2	1		2	
Lack of information	9	5	1	2			1	
Total	924	979	179	312	222	171	70	5
Births per route of delivery	2050645	748155	288038	286761	89715	83071		570
CFR	45,06	130,86	62,14	108,80	247,45	205,85		877,19

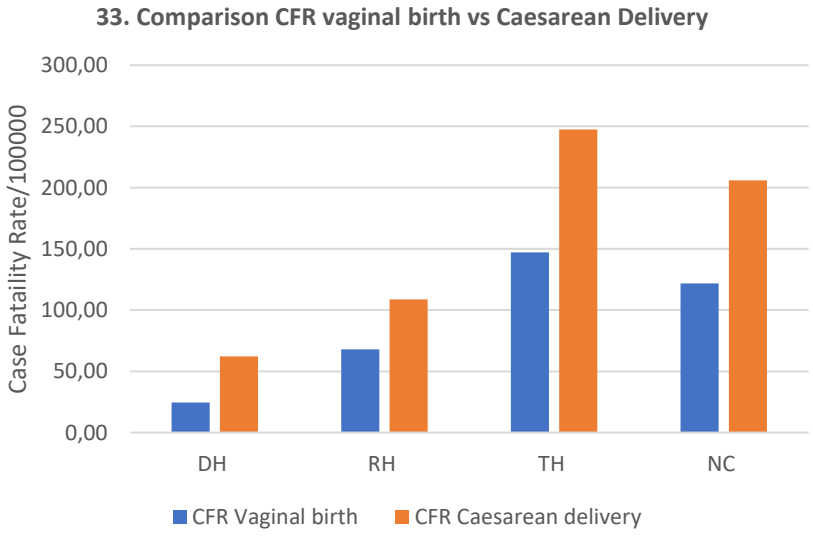
Underlying obstetric problems	Vaginal	CD	DH CD	RH CD	TH CD	NC CD	CHC CD
Medical and surgical disorders	6,68	18,31	4,17	11,16	39,01	48,15	0,00
Non-pregnancy-related infections	14,53	11,49	4,86	10,46	18,95	19,26	0,00
Ectopic pregnancy	0,00	0,13	0,00	0,00	0,00	1,20	0,00
Miscarriage	0,44	0,00	0,00	0,00	0,00	0,00	0,00
Pregnancy-related sepsis	3,75	10,16	2,08	9,76	20,06	21,67	0,00
Obstetric haemorrhage	9,80	35,82	26,73	31,04	54,62	38,52	175,44
Hypertensive disorders of pregnancy	6,14	36,36	6,94	34,52	92,52	63,80	350,88
Anaesthetic complications	0,10	8,15	11,80	3,84	6,69	6,02	0,00
Adverse drug reactions	0,34	0,13	0,00	0,00	0,00	1,20	0,00
Embolism	1,27	5,88	3,12	4,18	8,92	3,61	0,00
Acute collapse - cause unknown	1,07	2,67	2,08	1,74	5,57	1,20	350,88
Miscellaneous	0,20	0,40	0,00	0,70	0,00	1,20	0,00
No primary cause found	0,29	0,67	0,00	0,70	1,11	0,00	0,00
Lack of information	0,44	0,67	0,35	0,70	0,00	0,00	0,00
CFR	**45,06**	**130,86**	**62,14**	**108,80**	**247,45**	**205,85**	**877,19**

	Caesarean Deliveries				2017-2019	
Province	2017	2018	2019	2017-2019	Births	CD rate
ec Eastern Cape	29064	31270	33072	93406	310130	30,1
fs Free State	13164	14919	15539	43622	140004	31,2
gp Gauteng	62847	63456	64487	190790	661647	28,8
kz KwaZulu-Natal	55734	65010	70890	191634	591582	32,4
lp Limpopo	24487	26011	27525	78023	370581	21,1
mp Mpumalanga	16786	17532	18261	52579	237502	22,1
nw North West	13701	15375	15299	44375	174408	25,4
nc Northern Cape	4471	4764	4679	13914	63789	21,8
wc Western Cape	28561	28777	30139	87477	296132	29,5
SA Total	248815	267114	284570	800499	2845775	28,1

32. Vaginal births and maternal deaths 2017-2019

Underlying obstetric problems	CHC	DH	RH	PTH	NCH	Pvt H
Coincidental cause	**0**	**2**	**3**	**3**	**4**	**0**
- Other accidents		2		1		
- Assault			1			
- Other			2	2	4	
Medical and surgical disorders	**4**	**20**	**44**	**37**	**25**	**2**
- Cardiac disease	2	7	12	12	7	
- Endocrine			2		1	
- GIT		1	2	1	3	1
- CNS		4	2	4	2	1
- Respiratory	1	3	9	7	4	
- Haematological	1	1	2	1	1	
- Genito-urinary			1	1	1	
- Psychiatric			2			
- Neoplasm		2	3	5	2	
- Other		2	9	6	4	
Non-pregnancy-related infections	**2**	**78**	**116**	**59**	**36**	**2**
- PCP pneumonia		19	28	7	2	
- Other pneumonia	2	7	21	4	5	1
- TB		34	48	23	19	
- Influenza						1
- Malaria				3	2	
- Cryptococcal meningitis		3	5	4	1	
- Other meningitis		3	3	4		
- Kaposi's sarcoma			1	1	1	
- Hepatitis			1	1		
- Gastroenteritis		4	5	1	1	
- Wasting syndrome		1	1	4		
- Other		7	3	7	5	
Ectopic pregnancy	**0**	**0**	**0**	**0**	**0**	**0**
Miscarriage	**0**	**4**	**2**	**1**	**1**	**0**
- Septic miscarriage		2	1	1	1	
- Haemorrhage (non-traumatic)		1	1			
- Uterine trauma		1				
Pregnancy-related sepsis	**2**	**9**	**34**	**20**	**7**	**3**
- Chorioamnionitis (intact membranes)	1		1	1		
- Chorioamnionitis (ruptured membranes)					1	
- Puerperal sepsis after NVD	1	9	30	18	6	3
- Puerperal sepsis after C/section			1	1		
- Bowel trauma at C/section			2			

Underlying obstetric problems	CHC	DH	RH	PTH	NCH	Pvt H
Obstetric haemorrhage	**14**	**62**	**70**	**25**	**8**	**6**
- Abruption with hypertension		2	8	3	2	
- Abruption without hypertension		5	8		1	
- Placenta praevia	1					
- Other APH not specified			1	1		
- Ruptured uterus with previous c/s			1	1		1
- Ruptured uterus without previous c/s		6	1	1		
- Retained placenta	5	9	15	5	1	
- Morbidly adherent placenta	1		1			
- Uterine atony	1	16	16	4	1	3
- Vaginal trauma	1	2	1	2	2	
- Cervical trauma		3	3	2		1
- Bleeding after Caesarean section		1				
- Inverted uterus	2		3		1	
- Other PPH not specified	3	18	12	5		1
Hypertensive disorders of pregnancy	**5**	**22**	**43**	**25**	**24**	**3**
- Chronic hypertension	1		2	1	1	
- Proteinuric hypertension	2	8	11	10	5	2
- Eclampsia	2	10	22	7	10	1
- HELLP		2	8	6	8	
- Liver rupture		2		1		
Anaesthetic complications	**0**	**0**	**0**	**0**	**2**	**0**
- Spinal anaesthetic					2	
Adverse drug reactions	**0**	**1**	**1**	**5**	**0**	**0**
- ARV medication				1		
- TB medication				2		
- Herbal medication		1	1	2		
Embolism	**2**	**8**	**4**	**6**	**1**	**1**
- Pulmonary embolism	2	6	4	6	1	
- Amniotic fluid embolism		2				1
Acute collapse - cause unknown	**3**	**6**	**7**	**3**	**1**	**0**
Miscellaneous	**0**	**1**	**0**	**1**	**2**	**0**
- Hyperemesis gravidarum		1		1		
- Acute fatty liver					2	
Unknown	**4**	**6**	**2**	**4**	**0**	**0**
- Death at home or outside health services	2					
- No primary cause found	1	1	2	2		
- Lack of information	1	5		2		



34. Maternal deaths with Vaginal births and underlying causes 2017-2019

Underlying obstetric problems	CHC	DH	RH	PTH	NCH	Pvt H
Medical and surgical disorders	4	20	44	37	25	2
Non-pregnancy-related infections	2	78	116	59	36	2
Ectopic pregnancy	0	0	0	0	0	0
Miscarriage	0	4	2	1	1	0
Pregnancy-related sepsis	2	9	34	20	7	3
Obstetric haemorrhage	14	62	70	25	8	6
Hypertensive disorders of pregnancy	5	22	43	25	24	3
Anaesthetic complications	0	0	0	0	2	0
Adverse drug reactions	0	1	1	5	0	0
Embolism	2	8	4	6	1	1
Acute collapse - cause unknown	3	6	7	3	1	0
Miscellaneous	0	1	0	1	2	0
No primary cause found	1	1	2	2		
Lack of information	1	5		2		
Maternal deaths	**34**	**217**	**323**	**186**	**107**	**17**
Live births	471776	888329	476334	126425	87781	
iMMR	7,21	24,43	67,81	147,12	121,89	

35.CFR of vaginal births and underlying causes per level of care

Underlying obstetric problems	CHC CFR	DH CFR	RH CFR	PTH CFR	NCH CFR
Medical and surgical disorders	0,85	2,25	9,24	29,27	28,48
Non-pregnancy-related infections	0,42	8,78	24,35	46,67	41,01
Ectopic pregnancy	0,00	0,00	0,00	0,00	0,00
Miscarriage	0,00	0,45	0,42	0,79	1,14
Pregnancy-related sepsis	0,42	1,01	7,14	15,82	7,97
Obstetric haemorrhage	2,97	6,98	14,70	19,77	9,11
Hypertensive disorders of pregnancy	1,06	2,48	9,03	19,77	27,34
Anaesthetic complications	0,00	0,00	0,00	0,00	2,28
Adverse drug reactions	0,00	0,11	0,21	3,95	0,00
Embolism	0,42	0,90	0,84	4,75	1,14
Acute collapse - cause unknown	0,64	0,68	1,47	2,37	1,14
Miscellaneous	0,00	0,11	0,00	0,79	2,28
No primary cause found	0,21	0,11	0,42	1,58	0,00
Lack of information	0,21	0,56	0,00	1,58	0,00
CFR vaginal	**7,21**	**24,43**	**67,81**	**147,12**	**121,89**

36.CFR of Caesarean deliveries and underlying cause per level of care

Underlying obstetric problems	CHC CD CFR	DH CD CFR	RH CD CFR	PTH CD CFR	NCH CD CFR
Medical and surgical disorders	0,0	4,2	11,2	39,0	48,2
Non-pregnancy-related infections	0,0	4,9	10,5	18,9	19,3
Ectopic pregnancy	0,0	0,0	0,0	0,0	1,2
Miscarriage	0,0	0,0	0,0	0,0	0,0
Pregnancy-related sepsis	0,0	2,1	9,8	20,1	21,7
Obstetric haemorrhage	175,4	26,7	31,0	54,6	38,5
Hypertensive disorders of pregnancy	350,9	6,9	34,5	92,5	63,8
Anaesthetic complications	0,0	11,8	3,8	6,7	6,0
Adverse drug reactions	0,0	0,0	0,0	0,0	1,2
Embolism	0,0	3,1	4,2	8,9	3,6
Acute collapse - cause unknown	350,9	2,1	1,7	5,6	1,2
Miscellaneous	0,0	0,0	0,7	0,0	1,2
No primary cause found	0,0	0,0	0,7	1,1	0,0
Lack of information	0,0	0,3	0,7	0,0	0,0
CFR CD	**877,2**	**62,1**	**108,8**	**247,5**	**205,8**

37.Hysterectomy

Primary obstetric problems	No Hyst.	Hyst. Done	Total
Coincidental cause	**105**	**4**	**109**
- MVA	28	4	32
- Other accidents	11		11
- Assault	9		9
- Other	57		57
Medical and surgical disorders	**452**	**8**	**460**
- Cardiac disease	144	1	145
- Endocrine	20		20
- GIT	25	1	26
- CNS	46	1	47
- Respiratory	62	1	63
- Haematological	25		25
- Genito-urinary	9		9
- Auto-immune	3		3
- Skeletal	1		1
- Psychiatric	22		22
- Neoplasm	38	2	40
- Other	57	2	59
Non-pregnancy-related infections	**725**	**11**	**736**
- PCP pneumonia	130	1	131
- Other pneumonia	116	2	118
- TB	262	4	266
- Influenza	2		2
- Endocarditis	1		1
- UTI	2		2
- Appendicitis	5		5
- Malaria	17		17
- Cryptococcal meningitis	37	1	38
- Other meningitis	44	1	45
- Kaposi's sarcoma	9		9
- Hepatitis	10		10
- Gastroenteritis	25		25
- Wasting syndrome	14		14
- Other	51	2	53
Ectopic pregnancy	**110**	**3**	**113**
- Less than 20 weeks	101	3	104
- More than 20 weeks	9		9
Miscarriage	**159**	**35**	**194**
- Septic miscarriage	112	25	137
- Haemorrhage (non-traumatic)	34	4	38
- Uterine trauma	7	4	11
- GTD	1	2	3
- Following legal TOP	5		5
Pregnancy-related sepsis	**115**	**46**	**161**
- Chorioamnionitis (ruptured membranes)	3		3
- Chorioamnionitis (intact membranes)	3	1	4
- Puerperal sepsis after NVD	59	14	73
- Puerperal sepsis after C/section	38	27	65
- Bowel trauma at C/section	12	4	16

Primary obstetric problems	No Hyst.	Hyst. Done	Total
Obstetric haemorrhage	**387**	**129**	**516**
- Abruption with hypertension	25	7	32
- Abruption without hypertension	32	8	40
- Placenta praevia	7	4	11
- Other APH not specified	4	2	6
- Ruptured uterus with previous c/s	17	11	28
- Ruptured uterus without previous c/s	28	4	32
- Retained placenta	41	2	43
- Morbidly adherent placenta	6	8	14
- Uterine atony	35	14	49
- Vaginal trauma	7	1	8
- Cervical trauma	6	3	9
- Inverted uterus	8		8
- Bleeding during Caesarean section	22	16	38
- Bleeding after Caesarean section	96	43	139
- Other PPH not specified	53	6	59
Hypertension	**542**	**19**	**561**
- Chronic hypertension	31	1	32
- Proteinuric hypertension	158	3	161
- Eclampsia	258	5	263
- HELLP	84	6	90
- Liver rupture	11	4	15
Anaesthetic complications	**72**	**3**	**75**
- General anaesthetic	13		13
- Epidural anaesthetic	2		2
- Spinal anaesthetic	57	3	60
Adverse drug reactions	**24**	**0**	**24**
- ARV medication	3		3
- TB medication	2		2
- Other medication	7		7
- Herbal medication	12		12
Embolism	**94**	**4**	**98**
- Pulmonary embolism	85	4	89
- Amniotic fluid embolism	9		9
Acute collapse - cause unknown	**66**	**1**	**67**
Miscellaneous	**17**	**2**	**19**
- Hyperemesis gravidarum	8		8
- Acute fatty liver	9	2	11
Unknown	**151**	**5**	**156**
- Death at home or outside health services	95	1	96
- No primary cause found	23	1	24
- Lack of information	33	3	36
DDPCP	**3019**	**270**	**3289**

Primary obstetric problems	No Hyst.	Hyst. Done	Total
Medical and surgical disorders	452	8	460
Non-pregnancy-related infections	725	11	736
Ectopic pregnancy	110	3	113
Miscarriage	159	35	194
Pregnancy-related sepsis	115	46	161
Obstetric haemorrhage	387	129	516
Hypertension	542	19	561
Anaesthetic complications	72	3	75
Embolism	94	4	98
Acute collapse - cause unknown	66	1	67
Miscellaneous	17	2	19
- No primary cause found	23	1	24
- Lack of information	33	3	36
MD	2795	265	3060
- Death at home or outside health services	95	1	96
Coincidental cause	105	4	109
DDPCP	3019	270	3289

Primary obstetric problems	Hyst. Done (%)
Medical and surgical disorders	1,7
Non-pregnancy-related infections	1,5
Ectopic pregnancy	2,7
Miscarriage	18,0
Pregnancy-related sepsis	28,6
Obstetric haemorrhage	25,0
Hypertension	3,4
Anaesthetic complications	4,0
Embolism	4,1
Acute collapse - cause unknown	1,5
Miscellaneous	10,5
- No primary cause found	4,2
- Lack of information	8,3
MD	8,7
- Death at home or outside health services	1,0
Coincidental cause	3,7
DDPCP	8,2

38.Complicating conditions

Anaemia

Primary obstetric problems	No Anaemia	Anaemia	HB Known	% anaemic	Unknown
Coincidental cause	**31**	**17**	**48**	**35,4**	**61**
- MVA	8	3	11	27,3	21
- Other accidents	4	2	6	33,3	5
- Assault	4	1	5	20,0	4
- Other	15	11	26	42,3	31
Medical and surgical disorders	**247**	**118**	**365**	**32,3**	**95**
- Cardiac disease	90	37	127	29,1	18
- Endocrine	16		16	0,0	4
- GIT	12	8	20	40,0	6
- CNS	27	10	37	27,0	10
- Respiratory	28	18	46	39,1	17
- Haematological	7	12	19	63,2	6
- Genito-urinary	4	1	5	20,0	4
- Auto-immune	1	1	2	50,0	1
- Skeletal	1		1	0,0	
- Psychiatric	13	2	15	13,3	7
- Neoplasm	15	16	31	51,6	9
- Other	33	13	46	28,3	13
Non-pregnancy-related infections	**273**	**312**	**585**	**53,3**	**151**
- PCP pneumonia	58	47	105	44,8	26
- Other pneumonia	50	40	90	44,4	28
- TB	76	130	206	63,1	60
- Influenza		2	2	100,0	
- Endocarditis		1	1	100,0	
- UTI	1	1	2	50,0	
- Appendicitis	3	1	4	25,0	1
- Malaria	3	8	11	72,7	6
- Cryptococcal meningitis	8	20	28	71,4	10
- Other meningitis	22	15	37	40,5	8
- Kaposi's sarcoma	5	3	8	37,5	1
- Hepatitis	6	3	9	33,3	1
- Gastroenteritis	6	16	22	72,7	3
- Wasting syndrome	7	7	14	50,0	
- Other	28	18	46	39,1	7
Ectopic pregnancy	**16**	**54**	**70**	**77,1**	**43**
- Less than 20 weeks	15	51	66	77,3	38
- More than 20 weeks	1	3	4	75,0	5
Miscarriage	**46**	**59**	**105**	**56,2**	**89**
- Septic miscarriage	37	40	77	51,9	60
- Haemorrhage (non-traumatic)	5	12	17	70,6	21
- Uterine trauma	1	4	5	80,0	6
- GTD	1	1	2	50,0	1
- Following legal TOP	2	2	4	50,0	1
Pregnancy-related sepsis	**60**	**44**	**104**	**42,3**	**57**
- Chorioamnionitis (ruptured membranes)	1		1	0,0	2
- Chorioamnionitis (intact membranes)	2	2	4	50,0	
- Puerperal sepsis after NVD	22	26	48	54,2	25
- Puerperal sepsis after C/section	26	14	40	35,0	25
- Bowel trauma at C/section	9	2	11	18,2	5

Primary obstetric problems	No Anaemia	Anaemia	HB Known	% anaemic	Unknown
Obstetric haemorrhage	**328**	**102**	**430**	**23,7**	**86**
- Abruption with hypertension	20	7	27	25,9	5
- Abruption without hypertension	27	7	34	20,6	6
- Placenta praevia	5	3	8	37,5	3
- Other APH not specified	2	3	5	60,0	1
- Ruptured uterus with previous c/s	17	7	24	29,2	4
- Ruptured uterus without previous c/s	25	5	30	16,7	2
- Retained placenta	21	11	32	34,4	11
- Morbidly adherent placenta	9	3	12	25,0	2
- Uterine atony	35	5	40	12,5	9
- Vaginal trauma	5	1	6	16,7	2
- Cervical trauma	5	1	6	16,7	3
- Inverted uterus	3	2	5	40,0	3
- Bleeding during Caesarean section	25	8	33	24,2	5
- Bleeding after Caesarean section	89	33	122	27,0	17
- Other PPH not specified	40	6	46	13,0	13
Hypertension	**387**	**76**	**463**	**16,4**	**98**
- Chronic hypertension	21	2	23	8,7	9
- Proteinuric hypertension	118	25	143	17,5	18
- Eclampsia	170	38	208	18,3	55
- HELLP	67	10	77	13,0	13
- Liver rupture	11	1	12	8,3	3
Anaesthetic complications	**56**	**14**	**70**	**20,0**	**5**
- General anaesthetic	6	6	12	50,0	1
- Epidural anaesthetic	2		2	0,0	
- Spinal anaesthetic	48	8	56	14,3	4
Adverse drug reactions	**13**	**4**	**17**	**23,5**	**7**
- ARV medication	2	1	3	33,3	
- TB medication	1		1	0,0	1
- Other medication	1	1	2	50,0	5
- Herbal medication	9	2	11	18,2	1
Embolism	**64**	**19**	**83**	**22,9**	**15**
- Pulmonary embolism	56	18	74	24,3	15
- Amniotic fluid embolism	8	1	9	11,1	
Acute collapse - cause unknown	**49**	**6**	**55**	**10,9**	**12**
Miscellaneous	**11**	**6**	**17**	**35,3**	**2**
- Hyperemesis gravidarum	4	3	7	42,9	1
- Acute fatty liver	7	3	10	30,0	1
Unknown	**70**	**32**	**102**	**31,4**	**54**
- Death at home or outside health services	43	17	60	28,3	36
- No primary cause found	11	6	17	35,3	7
- Lack of information	16	9	25	36,0	11

Primary obstetric problems	No Anaemia	Anaemia	HB Known	% anaemic	Unknown
Medical and surgical disorders	247	118	365	32,3	95
Non-pregnancy-related infections	273	312	585	53,3	151
Ectopic pregnancy	16	54	70	77,1	43
Miscarriage	46	59	105	56,2	89
Pregnancy-related sepsis	60	44	104	42,3	57
Obstetric haemorrhage	328	102	430	23,7	86
Hypertension	387	76	463	16,4	98
Anaesthetic complications	56	14	70	20,0	5
Adverse drug reactions	13	4	17	23,5	7
Embolism	64	19	83	22,9	15
Acute collapse - cause unknown	49	6	55	10,9	12
Miscellaneous	11	6	17	35,3	2
No primary cause found	11	6	17	35,3	7
Lack of information	16	9	25	36,0	11
Death at home or outside health services	43	17	60	28,3	36
Coincidental cause	31	17	48	35,4	61
DDPCP	1651	863	2514	34,3	775

Previous Caesarean Delivery

Primary obstetric problems	No Prev. CD	Prev. CD	Unk.
Coincidental cause	**54**	**6**	**49**
- MVA	9	3	20
- Other accidents	6		5
- Assault	7		2
- Other	32	3	22
Medical and surgical disorders	**319**	**79**	**62**
- Cardiac disease	103	29	13
- Endocrine	13	4	3
- GIT	15	5	6
- CNS	30	12	5
- Respiratory	43	7	13
- Haematological	18	6	1
- Genito-urinary	5	2	2
- Auto-immune	2		1
- Skeletal	1		
- Psychiatric	17	2	3
- Neoplasm	30	5	5
- Other	42	7	10
Non-pregnancy-related infections	**500**	**110**	**126**
- PCP pneumonia	97	13	21
- Other pneumonia	70	22	26
- TB	178	36	52
- Influenza	2		
- Endocarditis	1		
- UTI	1	1	
- Appendicitis	4		1
- Malaria	12	3	2
- Cryptococcal meningitis	23	8	7
- Other meningitis	31	10	4
- Kaposi's sarcoma	8	1	
- Hepatitis	5	3	2
- Gastroenteritis	18	4	3
- Wasting syndrome	13	1	
- Other	37	8	8
Ectopic pregnancy	**65**	**6**	**42**
- Less than 20 weeks	57	6	41
- More than 20 weeks	8		1
Miscarriage	**99**	**26**	**69**
- Septic miscarriage	76	16	45
- Haemorrhage (non-traumatic)	12	7	19
- Uterine trauma	5	2	4
- GTD	2		1
- Following legal TOP	4	1	
Pregnancy-related sepsis	**97**	**32**	**32**
- Chorioamnionitis (ruptured membranes)	3		
- Chorioamnionitis (intact membranes)	4		
- Puerperal sepsis after NVD	45	10	18
- Puerperal sepsis after C/section	41	11	13
- Bowel trauma at C/section	4	11	1

Primary obstetric problems	No Prev. CD	Prev. CD	Unk.
Obstetric haemorrhage	**351**	**130**	**35**
- Abruption with hypertension	23	8	1
- Abruption without hypertension	34	5	1
- Placenta praevia	5	6	
- Other APH not specified	6		
- Ruptured uterus with previous c/s	2	26	
- Ruptured uterus without previous c/s	29	2	1
- Retained placenta	35	1	7
- Morbidly adherent placenta	3	11	
- Uterine atony	42	3	4
- Vaginal trauma	6	2	
- Cervical trauma	8		1
- Inverted uterus	6		2
- Bleeding during Caesarean section	24	12	2
- Bleeding after Caesarean section	82	49	8
- Other PPH not specified	46	5	8
Hypertension	**429**	**91**	**41**
- Chronic hypertension	26	2	4
- Proteinuric hypertension	122	30	9
- Eclampsia	200	39	24
- HELLP	69	17	4
- Liver rupture	12	3	
Anaesthetic complications	**50**	**21**	**4**
- General anaesthetic	6	4	3
- Epidural anaesthetic	2		
- Spinal anaesthetic	42	17	1
Adverse drug reactions	**21**	**0**	**3**
- ARV medication	3		
- TB medication	2		
- Other medication	5		2
- Herbal medication	11		1
Embolism	**68**	**15**	**15**
- Pulmonary embolism	61	13	15
- Amniotic fluid embolism	7	2	
Acute collapse - cause unknown	**49**	**11**	**7**
Miscellaneous	**13**	**2**	**4**
- Hyperemesis gravidarum	3	2	3
- Acute fatty liver	10		1
Unknown	**104**	**17**	**35**
- Death at home or outside health services	62	8	26
- No primary cause found	16	4	4
- Lack of information	26	5	5

Primary obstetric problems	No Prev. CD	Prev. CD	Unk.
Medical and surgical disorders	319	79	62
Non-pregnancy-related infections	500	110	126
Ectopic pregnancy	65	6	42
Miscarriage	99	26	69
Pregnancy-related sepsis	97	32	32
Obstetric haemorrhage	351	130	35
Hypertension	429	91	41
Anaesthetic complications	50	21	4
Adverse drug reactions	21	0	3
Embolism	68	15	15
Acute collapse - cause unknown	49	11	7
Miscellaneous	13	2	4
No primary cause found	16	4	4
Lack of information	26	5	5
MD	2103	532	449
Death at home or outside health services	62	8	26
Coincidental cause	54	6	49
DDPCP	2219	546	524

Induced Labour

Primary obstetric problems	Not induced	Induced	Unk.	N/A
Coincidental cause	**96**	**2**	**4**	**7**
- MVA	26		2	4
- Other accidents	11			
- Assault	9			
- Other	50	2	2	3
Medical and surgical disorders	**408**	**28**	**12**	**12**
- Cardiac disease	138	5		2
- Endocrine	18	2		
- GIT	24	1	1	
- CNS	42	1	2	2
- Respiratory	47	7	6	3
- Haematological	24	1		
- Genito-urinary	9			
- Auto-immune	1	1		1
- Skeletal	1			
- Psychiatric	17	2		3
- Neoplasm	34	5	1	
- Other	53	3	2	1
Non-pregnancy-related infections	**653**	**41**	**11**	**31**
- PCP pneumonia	116	6	3	6
- Other pneumonia	106	6	2	4
- TB	242	12	3	9
- Endocarditis		1		
- Influenza	2			
- UTI	2			
- Appendicitis	4			1
- Malaria	13	2	1	1
- Cryptococcal meningitis	33	1	1	3
- Other meningitis	41	2		2
- Kaposi's sarcoma	7	2		
- Hepatitis	9			1
- Gastroenteritis	22	2		1
- Wasting syndrome	11	1	1	1
- Other	45	6		2
Ectopic pregnancy	**101**	**0**	**2**	**10**
- Less than 20 weeks	92		2	10
- More than 20 weeks	9			
Miscarriage	**148**	**24**	**8**	**14**
- Septic miscarriage	110	15	5	7
- Haemorrhage (non-traumatic)	26	5	3	4
- Uterine trauma	8	1		2
- GTD	2			1
- Following legal TOP	2	3		
Pregnancy-related sepsis	**126**	**16**	**17**	**2**
- Chorioamnionitis (ruptured membranes)	3			
- Chorioamnionitis (intact membranes)	3	1		
- Puerperal sepsis after NVD	57	7	9	
- Puerperal sepsis after C/section	51	6	7	1
- Bowel trauma at C/section	12	2	1	1

Primary obstetric problems	Not induced	Induced	Unk.	N/A
Obstetric haemorrhage	**436**	**70**	**9**	**1**
- Abruption with hypertension	29	2	1	
- Abruption without hypertension	34	6		
- Placenta praevia	11			
- Other APH not specified	3	2		1
- Ruptured uterus with previous c/s	26	2		
- Ruptured uterus without previous c/s	19	13		
- Retained placenta	36	5	2	
- Morbidly adherent placenta	14			
- Uterine atony	40	9		
- Vaginal trauma	6	1	1	
- Cervical trauma	7	1	1	
- Inverted uterus	8			
- Bleeding during Caesarean section	34	4		
- Bleeding after Caesarean section	123	14	2	
- Other PPH not specified	46	11	2	
Hypertension	**475**	**66**	**5**	**15**
- Chronic hypertension	28	3	1	
- Proteinuric hypertension	129	26	1	5
- Eclampsia	231	21	2	9
- HELLP	74	14	1	1
- Liver rupture	13	2		
Anaesthetic complications	**61**	**9**	**2**	**3**
- General anaesthetic	9	1		3
- Epidural anaesthetic	1	1		
- Spinal anaesthetic	51	7	2	
Adverse drug reactions	**18**	**3**	**2**	**1**
- ARV medication	3			
- TB medication	1	1		
- Other medication	4	1	2	
- Herbal medication	10	1		1
Embolism	**76**	**13**	**4**	**5**
- Pulmonary embolism	71	9	4	5
- Amniotic fluid embolism	5	4		
Acute collapse - cause unknown	**55**	**9**	**2**	**1**
Miscellaneous	**14**	**3**	**1**	**1**
- Hyperemesis gravidarum	6	2		
- Acute fatty liver	8	1	1	1
Unknown	**132**	**9**	**7**	**8**
- Death at home or outside health services	83	3	6	4
- No primary cause found	19	3		2
- Lack of information	30	3	1	2

Primary obstetric problems	Not induced	Induced	Unk.	N/A
Medical and surgical disorders	408	28	12	12
Non-pregnancy-related infections	653	41	11	31
Ectopic pregnancy	101	0	2	10
Miscarriage	148	24	8	14
Pregnancy-related sepsis	126	16	17	2
Obstetric haemorrhage	436	70	9	1
Hypertension	475	66	5	15
Anaesthetic complications	61	9	2	3
Adverse drug reactions	18	3	2	1
Embolism	76	13	4	5
Acute collapse - cause unknown	55	9	2	1
Miscellaneous	14	3	1	1
No primary cause found	19	3		2
Lack of information	30	3	1	2
MD	2620	288	76	100
Death at home or outside health services	83	3	6	4
Coincidental cause	96	2	4	7
DDPCP	2799	293	86	111

Prolonged labour

Primary obstetric problems	No Prolonged labour	Prolonged labour	Were in labour
Coincidental cause	**44**	**0**	**44**
- MVA	12		12
- Other accidents	5		5
- Assault	2		2
- Other	25		25
Medical and surgical disorders	**243**	**11**	**254**
- Cardiac disease	81	4	85
- Endocrine	10		10
- GIT	13		13
- CNS	25	3	28
- Respiratory	37	2	39
- Haematological	12		12
- Genito-urinary	7		7
- Psychiatric	9		9
- Neoplasm	15	1	16
- Other	34	1	35
Non-pregnancy-related infections	**348**	**8**	**356**
- PCP pneumonia	61		61
- Other pneumonia	52	4	56
- TB	123		123
- Influenza	1		1
- Endocarditis	1		1
- UTI	2		2
- Appendicitis	2		2
- Malaria	4		4
- Cryptococcal meningitis	16	2	18
- Other meningitis	25		25
- Kaposi's sarcoma	4		4
- Hepatitis	6		6
- Gastroenteritis	13		13
- Wasting syndrome	6		6
- Other	32	2	34
Ectopic pregnancy	**10**	**0**	**10**
- Less than 20 weeks	6		6
- More than 20 weeks	4		4
Miscarriage	**9**	**0**	**9**
- Septic miscarriage	2		2
- Haemorrhage (non-traumatic)	6		6
- Uterine trauma	1		1
Pregnancy-related sepsis	**79**	**15**	**94**
- Chorioamnionitis (ruptured membranes)	1	1	2
- Chorioamnionitis (intact membranes)	3	3	6
- Puerperal sepsis after NVD	37	9	46
- Puerperal sepsis after C/section	30	2	32
- Bowel trauma at C/section	8		8

Primary obstetric problems	No Prolonged labour	Prolonged labour	Were in labour
Obstetric haemorrhage	**326**	**56**	**382**
- Abruption with hypertension	20	3	23
- Abruption without hypertension	33	1	34
- Placenta praevia	8		8
- Other APH not specified	5		5
- Ruptured uterus with previous c/s	12	3	15
- Ruptured uterus without previous c/s	18	3	21
- Retained placenta	19	3	22
- Morbidly adherent placenta	11	1	12
- Uterine atony	34	6	40
- Vaginal trauma	6		6
- Cervical trauma	6	2	8
- Inverted uterus	5		5
- Bleeding during Caesarean section	22	6	28
- Bleeding after Caesarean section	93	24	117
- Other PPH not specified	34	4	38
Hypertension	**367**	**18**	**385**
- Chronic hypertension	18	1	19
- Proteinuric hypertension	111	6	117
- Eclampsia	164	7	171
- HELLP	64	3	67
- Liver rupture	10	1	11
Anaesthetic complications	**51**	**10**	**61**
- General anaesthetic	2	1	3
- Epidural anaesthetic	2		2
- Spinal anaesthetic	47	9	56
Adverse drug reactions	**11**	**1**	**12**
- ARV medication	2		2
- TB medication	2		2
- Herbal medication	7	1	8
Embolism	**62**	**3**	**65**
- Pulmonary embolism	54	2	56
- Amniotic fluid embolism	8	1	9
Acute collapse - cause unknown	**40**	**4**	**44**
Miscellaneous	**10**	**0**	**10**
- Hyperemesis gravidarum	3		3
- Acute fatty liver	7		7
Unknown	**71**	**3**	**74**
- Death at home or outside health services	46	1	47
- No primary cause found	8	2	10
- Lack of information	17		17

CD in labour and CD and prolonged labour

Primary obstetric problems	CD and in labour	CD and prolonged labour
Coincidental cause	**11**	**0**
- MVA	5	
- Other accidents	2	
- Other	4	
Medical and surgical disorders	**95**	**6**
- Cardiac disease	34	3
- Endocrine	5	
- GIT	5	
- CNS	12	2
- Respiratory	10	
- Haematological	4	
- Genito-urinary	4	
- Psychiatric	4	
- Neoplasm	6	1
- Other	11	
Non-pregnancy-related infections	**54**	**4**
- PCP pneumonia	5	
- Other pneumonia	11	
- TB	11	2
- Influenza	1	
- UTI	1	
- Appendicitis	1	
- Malaria	1	
- Cryptococcal meningitis	2	
- Other meningitis	9	
- Hepatitis	2	
- Gastroenteritis	1	
- Other	9	2
Ectopic pregnancy	**0**	**0**
Miscarriage	**0**	**0**
Pregnancy-related sepsis	**47**	**12**
- Chorioamnionitis (ruptured membranes)	1	1
- Puerperal sepsis after C/section	38	9
- Bowel trauma at C/section	8	2
Obstetric haemorrhage	**221**	**39**
- Abruption with hypertension	9	2
- Abruption without hypertension	21	1
- Placenta praevia	6	
- Other APH not specified	1	
- Ruptured uterus with previous c/s	10	
- Ruptured uterus without previous c/s	5	2
- Morbidly adherent placenta	10	1
- Uterine atony	7	2
- Bleeding during Caesarean section	28	6
- Bleeding after Caesarean section	116	24
- Other PPH not specified	8	1
Hypertension	**212**	**8**
- Chronic hypertension	7	1
- Proteinuric hypertension	64	1
- Eclampsia	97	5
- HELLP	38	1
- Liver rupture	6	
Anaesthetic complications	**54**	**9**
- General anaesthetic	3	1
- Epidural anaesthetic	2	
- Spinal anaesthetic	49	8
Adverse drug reactions	**1**	
- Herbal medication	1	0

Primary obstetric problems	CD and in labour	CD and prolonged labour
Embolism	**32**	**3**
- Pulmonary embolism	28	2
- Amniotic fluid embolism	4	1
Acute collapse - cause unknown	**13**	**2**
Miscellaneous	**3**	**0**
- Acute fatty liver	3	
Unknown	**17**	**2**
- Death at home or outside health services	10	1
- No primary cause found	4	1
- Lack of information	3	

Primary obstetric problems	No Prolonged labour	Prolonged labour	Were in labour	% in labour having prolonged labour	CD and in labour	CD and prolonged labour	% CD with prolonged labour
Medical and surgical disorders	243	11	254	4,3	95	6	6,3
Non-pregnancy-related infections	348	8	356	2,2	54	4	7,4
Ectopic pregnancy	10	0	10	0,0	0	0	
Miscarriage	9	0	9	0,0	0	0	
Pregnancy-related sepsis	79	15	94	16,0	47	12	25,5
Obstetric haemorrhage	326	56	382	14,7	221	39	17,6
Hypertension	367	18	385	4,7	212	8	3,8
Anaesthetic complications	51	10	61	16,4	54	9	16,7
Adverse drug reactions	11	1	12	8,3	1		0,0
Embolism	62	3	65	4,6	32	3	9,4
Acute collapse - cause unknown	40	4	44	9,1	13	2	15,4
Miscellaneous	10	0	10	0,0	3	0	0,0
No primary cause found	8	2	10	20,0	4	1	25,0
Lack of information	17		17	0,0	3		0,0
MD	1581	128	1709	7,5	739	84	11,4
Death at home or outside health services	46	1	47	2,1	10	1	10,0
Coincidental cause	44	0	44	0,0	11	0	0,0
DDPCP	1671	129	1800	7,2	760	85	11,2

39.Post-mortems

Primary obstetric problems	No PM	PM	Total	%
Coincidental cause	**44**	**65**	**109**	**59,6**
- MVA	11	21	32	65,6
- Other accidents	2	9	11	81,8
- Assault	2	7	9	77,8
- Other	29	28	57	49,1
Medical and surgical disorders	**316**	**144**	**460**	**31,3**
- Cardiac disease	91	54	145	37,2
- Endocrine	15	5	20	25,0
- GIT	18	8	26	30,8
- CNS	39	8	47	17,0
- Respiratory	49	14	63	22,2
- Haematological	16	9	25	36,0
- Genito-urinary	5	4	9	44,4
- Auto-immune	3		3	0,0
- Skeletal	1		1	0,0
- Psychiatric	5	17	22	77,3
- Neoplasm	31	9	40	22,5
- Other	43	16	59	27,1
Non-pregnancy-related infections	**653**	**83**	**736**	**11,3**
- PCP pneumonia	123	8	131	6,1
- Other pneumonia	100	18	118	15,3
- TB	236	30	266	11,3
- Influenza	2		2	0,0
- Endocarditis		1	1	100,0
- UTI	2		2	0,0
- Appendicitis	1	4	5	80,0
- Malaria	13	4	17	23,5
- Cryptococcal meningitis	36	2	38	5,3
- Other meningitis	42	3	45	6,7
- Kaposi's sarcoma	8	1	9	11,1
- Hepatitis	10		10	0,0
- Gastroenteritis	23	2	25	8,0
- Wasting syndrome	12	2	14	14,3
- Other	45	8	53	15,1
Ectopic pregnancy	**68**	**45**	**113**	**39,8**
- Less than 20 weeks	63	41	104	39,4
- More than 20 weeks	5	4	9	44,4
Miscarriage	**138**	**56**	**194**	**28,9**
- Septic miscarriage	102	35	137	25,5
- Haemorrhage (non-traumatic)	24	14	38	36,8
- Uterine trauma	8	3	11	27,3
- GTD	1	2	3	66,7
- Following legal TOP	3	2	5	40,0
Pregnancy-related sepsis	**101**	**60**	**161**	**37,3**
- Chorioamnionitis (ruptured membranes)	1	2	3	66,7
- Chorioamnionitis (intact membranes)	3	1	4	25,0
- Puerperal sepsis after NVD	56	17	73	23,3
- Puerperal sepsis after C/section	34	31	65	47,7
- Bowel trauma at C/section	7	9	16	56,3

Primary obstetric problems	No PM	PM	Total	%
Obstetric haemorrhage	**307**	**209**	**516**	**40,5**
- Abruption with hypertension	18	14	32	43,8
- Abruption without hypertension	27	13	40	32,5
- Placenta praevia	8	3	11	27,3
- Other APH not specified	3	3	6	50,0
- Ruptured uterus with previous c/s	13	15	28	53,6
- Ruptured uterus without previous c/s	14	18	32	56,3
- Retained placenta	29	14	43	32,6
- Morbidly adherent placenta	7	7	14	50,0
- Uterine atony	33	16	49	32,7
- Vaginal trauma	6	2	8	25,0
- Cervical trauma	6	3	9	33,3
- Inverted uterus	8		8	0,0
- Bleeding during Caesarean section	18	20	38	52,6
- Bleeding after Caesarean section	80	59	139	42,4
- Other PPH not specified	37	22	59	37,3
Hypertension	**396**	**165**	**561**	**29,4**
- Chronic hypertension	23	9	32	28,1
- Proteinuric hypertension	104	57	161	35,4
- Eclampsia	198	65	263	24,7
- HELLP	64	26	90	28,9
- Liver rupture	7	8	15	53,3
Anaesthetic complications	**31**	**44**	**75**	**58,7**
- General anaesthetic	6	7	13	53,8
- Epidural anaesthetic		2	2	100,0
- Spinal anaesthetic	25	35	60	58,3
Adverse drug reactions	**15**	**9**	**24**	**37,5**
- ARV medication	3		3	0,0
- TB medication	1	1	2	50,0
- Other medication	4	3	7	42,9
- Herbal medication	7	5	12	41,7
Embolism	**45**	**53**	**98**	**54,1**
- Pulmonary embolism	43	46	89	51,7
- Amniotic fluid embolism	2	7	9	77,8
Acute collapse - cause unknown	**35**	**32**	**67**	**47,8**
Miscellaneous	**12**	**7**	**19**	**36,8**
- Hyperemesis gravidarum	6	2	8	25,0
- Acute fatty liver	6	5	11	45,5
Unknown	**93**	**63**	**156**	**40,4**
- Death at home or outside health services	55	41	96	42,7
- No primary cause found	14	10	24	41,7
- Lack of information	24	12	36	33,3

Primary obstetric problems	No PM	PM	Total	%
Medical and surgical disorders	316	144	460	31,3
Non-pregnancy-related infections	653	83	736	11,3
Ectopic pregnancy	68	45	113	39,8
Miscarriage	138	56	194	28,9
Pregnancy-related sepsis	101	60	161	37,3
Obstetric haemorrhage	307	209	516	40,5
Hypertension	396	165	561	29,4
Anaesthetic complications	31	44	75	58,7
Adverse drug reactions	15	9	24	37,5
Embolism	45	53	98	54,1
Acute collapse - cause unknown	35	32	67	47,8
Miscellaneous	12	7	19	36,8
No primary cause found	14	10	24	41,7
Lack of information	24	12	36	33,3
MD	**2155**	**929**	**3084**	**30,1**
Death at home or outside health services	55	41	96	42,7
Coincidental cause	44	65	109	59,6
DDPCP	**2254**	**1035**	**3289**	

40.Antenatal Care

Primary obstetric problems	No ANC	Unknown	Received ANC	Total ANC known	% known to have received ANC	<20 weeks	% <20 weeks
Coincidental cause	**28**	**37**	**44**	**72**	**61,1**	**24**	**54,5**
- MVA	5	16	11	16	68,8	6	54,5
- Other accidents	2	5	4	6	66,7		0,0
- Assault	2	3	4	6	66,7	3	75,0
- Other	19	13	25	44	56,8	15	60,0
Medical and surgical disorders	**98**	**38**	**324**	**422**	**76,8**	**183**	**56,5**
- Cardiac disease	21	7	117	138	84,8	67	57,3
- Endocrine	4	3	13	17	76,5	7	53,8
- GIT	8	3	15	23	65,2	10	66,7
- CNS	8	6	33	41	80,5	19	57,6
- Respiratory	14	9	40	54	74,1	22	55,0
- Haematological	5		20	25	80,0	14	70,0
- Genito-urinary	1		8	9	88,9	5	62,5
- Skeletal			1	1	100,0		0,0
- Auto-immune	2	1		2	0,0		
- Psychiatric	10	2	10	20	50,0	4	40,0
- Neoplasm	10	2	28	38	73,7	15	53,6
- Other	15	5	39	54	72,2	20	51,3
Non-pregnancy-related infections	**229**	**52**	**455**	**684**	**66,5**	**229**	**50,3**
- PCP pneumonia	42	9	80	122	65,6	44	55,0
- Other pneumonia	37	10	71	108	65,7	35	49,3
- TB	87	21	158	245	64,5	76	48,1
- Influenza			2	2	100,0		0,0
- Endocarditis			1	1	100,0		0,0
- UTI			2	2	100,0	2	100,0
- Appendicitis	1		4	5	80,0	1	25,0
- Malaria	11		6	17	35,3	6	100,0
- Cryptococcal meningitis	15	2	21	36	58,3	10	47,6
- Other meningitis	15	3	27	42	64,3	11	40,7
- Kaposi's sarcoma	1		8	9	88,9	5	62,5
- Hepatitis	3		7	10	70,0	5	71,4
- Gastroenteritis	3	2	20	23	87,0	11	55,0
- Wasting syndrome	3		11	14	78,6	9	81,8
- Other	11	5	37	48	77,1	14	37,8
Ectopic pregnancy	**86**	**13**	**14**	**100**	**14,0**	**11**	**78,6**
- Less than 20 weeks	81	12	11	92	12,0	8	72,7
- More than 20 weeks	5	1	3	8	37,5	3	100,0
Miscarriage	**134**	**26**	**34**	**168**	**20,2**	**27**	**79,4**
- Septic miscarriage	99	18	20	119	16,8	15	75,0
- Haemorrhage (non-traumatic)	25	6	7	32	21,9	5	71,4
- Uterine trauma	7	1	3	10	30,0	3	100,0
- GTD	1	1	1	2	50,0	1	100,0
- Following legal TOP	2		3	5	60,0	3	100,0
Pregnancy-related sepsis	**28**	**26**	**107**	**135**	**79,3**	**47**	**43,9**
- Chorioamnionitis (ruptured membranes)	1		2	3	66,7	1	50,0
- Chorioamnionitis (intact membranes)	2		2	4	50,0	2	100,0
- Puerperal sepsis after NVD	17	11	45	62	72,6	18	40,0
- Puerperal sepsis after C/section	8	11	46	54	85,2	22	47,8
- Bowel injury during surgery		4	12	12	100,0	4	33,3

Primary obstetric problems	No ANC	Unknown	Received ANC	Total ANC known	% known to have received ANC	<20 weeks	% <20 weeks
Obstetric haemorrhage	**66**	**17**	**433**	**499**	**86,8**	**218**	**50,3**
- Abruption with hypertension	4	1	27	31	87,1	14	51,9
- Abruption without hypertension	3	1	36	39	92,3	19	52,8
- Placenta praevia	1		10	11	90,9	2	20,0
- Other APH not specified	1		5	6	83,3	3	60,0
- Ruptured uterus with previous c/s	3	2	23	26	88,5	17	73,9
- Ruptured uterus without previous c/s	2		30	32	93,8	16	53,3
- Retained placenta	11	1	31	42	73,8	12	38,7
- Morbidly adherent placenta	2		12	14	85,7	7	58,3
- Uterine atony	6	2	41	47	87,2	21	51,2
- Vaginal trauma	1		7	8	87,5	4	57,1
- Cervical trauma		1	8	8	100,0	6	75,0
- Inverted uterus	3		5	8	62,5	3	60,0
- Bleeding during Caesarean section		3	35	35	100,0	17	48,6
- Bleeding after Caesarean section	13	4	122	135	90,4	52	42,6
- Other PPH not specified	16	2	41	57	71,9	25	61,0
Hypertension	**95**	**28**	**438**	**533**	**82,2**	**254**	**58,0**
- Chronic hypertension	7	1	24	31	77,4	16	66,7
- Proteinuric hypertension	15	4	142	157	90,4	85	59,9
- Eclampsia	55	14	194	249	77,9	111	57,2
- HELLP	15	9	66	81	81,5	37	56,1
- Liver rupture	3		12	15	80,0	5	41,7
Anaesthetic complications	**8**	**1**	**66**	**74**	**89,2**	**35**	**53,0**
- General anaesthetic	6		7	13	53,8	4	57,1
- Epidural anaesthetic			2	2	100,0	2	100,0
- Spinal anaesthetic	2	1	57	59	96,6	29	50,9
Adverse drug reactions	**8**	**2**	**14**	**22**	**63,6**	**8**	**57,1**
- ARV medication	1		2	3	66,7	1	50,0
- TB medication	1		1	2	50,0	1	100,0
- Other medication	4	2	1	5	20,0	1	100,0
- Herbal medication	2		10	12	83,3	5	50,0
Embolism	**16**	**7**	**75**	**91**	**82,4**	**49**	**65,3**
- Pulmonary embolism	16	6	67	83	80,7	46	68,7
- Amniotic fluid embolism		1	8	8	100,0	3	37,5
Acute collapse - cause unknown	**4**	**4**	**59**	**63**	**93,7**	**29**	**49,2**
Miscellaneous	**4**	**3**	**12**	**16**	**75,0**	**8**	**66,7**
- Hyperemesis gravidarum	2		6	8	75,0	5	83,3
- Acute fatty liver	2	3	6	8	75,0	3	50,0
Unknown	**34**	**19**	**103**	**137**	**75,2**	**57**	**55,3**
- Death at home or outside health services	14	17	65	79	82,3	39	60,0
- No primary cause found	9		15	24	62,5	8	53,3
- Lack of information	11	2	23	34	67,6	10	43,5

Primary obstetric problems	No ANC	Unknown	Received ANC	Total ANC known	% known to have received ANC	<20 weeks	% <20 weeks
Medical and surgical disorders	98	38	324	422	76,8	183	56,5
Non-pregnancy-related infections	229	52	455	684	66,5	229	50,3
Ectopic pregnancy	86	13	14	100	14,0	11	78,6
Miscarriage	134	26	34	168	20,2	27	79,4
Pregnancy-related sepsis	28	26	107	135	79,3	47	43,9
Obstetric haemorrhage	66	17	433	499	86,8	218	50,3
Hypertension	95	28	438	533	82,2	254	58,0
Anaesthetic complications	8	1	66	74	89,2	35	53,0
Adverse drug reactions	8	2	14	22	63,6	8	57,1
Embolism	16	7	75	91	82,4	49	65,3
Acute collapse - cause unknown	4	4	59	63	93,7	29	49,2
Miscellaneous	4	3	12	16	75,0	8	66,7
No primary cause found	9		15	24	62,5	8	53,3
Lack of information	11	2	23	34	67,6	10	43,5
MD	796	219	2069	2865	959,786	1116	53,9
Death at home or outside health services	14	17	65	79	82,3	39	60,0
Coincidental cause	28	37	44	72	61,1	24	54,5
DDPCP	838	273	2178	3016	72,2	1179	54,1

41. Referrals

Primary obstetric problems	Not Referred	CHC	DH	RH	PTH	NCH	Pvt H
Coincidental cause	**79**	**9**	**15**	**4**	**0**	**1**	**1**
- MVA	21	1	5	3		1	1
- Other accidents	8		3				
- Assault	8		1				
- Other	42	8	6	1			
Medical and surgical disorders	**202**	**79**	**108**	**37**	**19**	**3**	**12**
- Cardiac disease	60	26	35	11	10	1	2
- Endocrine	6	3	5	4			2
- GIT	13	3	6	1		1	2
- CNS	19	11	12	3	1		1
- Respiratory	29	10	14	8			2
- Haematological	12	1	7	3	2		
- Genito-urinary	3	1	3	1			1
- Auto-immune	2		1				
- Skeletal	1						
- Psychiatric	14	4	3	1			
- Neoplasm	17	7	10	1	2	1	2
- Other	26	13	12	4	4		
Non-pregnancy-related infections	**327**	**166**	**187**	**39**	**6**	**1**	**10**
- PCP pneumonia	58	35	34	1	2		1
- Other pneumonia	58	23	25	10		1	1
- TB	115	68	58	17	2		6
- Influenza	1			1			
- Endocarditis	1						
- UTI	2						
- Appendicitis	3		1				1
- Malaria	3	4	9	1			
- Cryptococcal meningitis	17	7	12	1	1		
- Other meningitis	21	5	17	2			
- Kaposi's sarcoma	4	1	2	1			1
- Hepatitis	3	4	3				
- Gastroenteritis	13	6	6				
- Wasting syndrome	8	1	4	1			
- Other	20	12	16	4	1		
Ectopic pregnancy	**65**	**25**	**17**	**2**	**1**	**0**	**3**
- Less than 20 weeks	59	23	16	2	1		3
- More than 20 weeks	6	2	1				
Miscarriage	**99**	**37**	**43**	**8**	**3**	**0**	**4**
- Septic miscarriage	67	26	32	7	2		3
- Haemorrhage (non-traumatic)	23	7	6	1			1
- Uterine trauma	7	2	1		1		
- GTD	1	1	1				
- Following legal TOP	1	1	3				
Pregnancy-related sepsis	**73**	**19**	**55**	**11**	**1**	**0**	**2**
- Chorioamnionitis (ruptured membranes)	2		1				
- Chorioamnionitis (intact membranes)	2	1	1				
- Puerperal sepsis after NVD	35	9	24	4			1
- Puerperal sepsis after C/section	26	8	23	6	1		1
- Bowel trauma at C/section	8	1	6	1			

Primary obstetric problems	Not Referred	CHC	DH	RH	PTH	NCH		Pvt H
Obstetric haemorrhage	**268**	**111**		**118**	**12**	**1**	**1**	**5**
- Abruption with hypertension	12	11		8	1			
- Abruption without hypertension	18	14		5	3			
- Placenta praevia	4	2		4	1			
- Other APH not specified	4	4		2				
- Ruptured uterus with previous c/s	18			5	1			
- Ruptured uterus without previous c/s	17	11		3	1			
- Retained placenta	26	9		8				
- Morbidly adherent placenta	9	1		2	1			1
- Uterine atony	26	11		10	1			1
- Vaginal trauma	4	1		3				
- Cervical trauma	3			5				1
- Inverted uterus	5	3						
- Bleeding during Caesarean section	18	7		12				1
- Bleeding after Caesarean section	70	22		41	3	1	1	1
- Other PPH not specified	34	15		10				
Hypertension	**208**	**133**		**155**	**47**	**7**	**0**	**11**
- Chronic hypertension	15	7		8	1			1
- Proteinuric hypertension	58	44		45	10	2		2
- Eclampsia	103	59		66	26	3		6
- HELLP	26	18		32	10	2		2
- Liver rupture	6	5		4				
Anaesthetic complications	**46**	**13**		**13**	**1**	**1**	**0**	**1**
- General anaesthetic	10	1		2				
- Epidural anaesthetic	2							
- Spinal anaesthetic	34	12		11	1	1		1
Adverse drug reactions	**14**	**3**		**7**	**0**	**0**	**0**	**0**
- ARV medication	1	2						
- TB medication	1			1				
- Other medication	6			1				
- Herbal medication	6	1		5				
Embolism	**60**	**12**		**18**	**6**	**1**	**0**	**1**
- Pulmonary embolism	54	10		18	5	1		1
- Amniotic fluid embolism	6	2			1			
Acute collapse - cause unknown	**53**	**6**		**6**	**1**	**0**	**0**	**1**
Miscellaneous	**8**	**3**		**5**	**2**	**0**	**0**	**1**
- Hyperemesis gravidarum	3	3		1	1			
- Acute fatty liver	5			4	1			1
Unknown	**125**	**17**		**10**	**2**	**0**	**0**	**2**
- Death at home or outside health services	83	7		3	1			2
- No primary cause found	15	6		2	1			
- Lack of information	27	4		5				

Primary obstetric problems	Not Referred	CHC	DH	RH	PTH	NCH	Pvt H
Medical and surgical disorders	202	79	108	37	19	3	12
Non-pregnancy-related infections	327	166	187	39	6	1	10
Ectopic pregnancy	65	25	17	2	1	0	3
Miscarriage	99	37	43	8	3	0	4
Pregnancy-related sepsis	73	19	55	11	1	0	2
Obstetric haemorrhage	268	111	118	12	1	1	5
Hypertension	208	133	155	47	7	0	11
Anaesthetic complications	46	13	13	1	1	0	1
Adverse drug reactions	14	3	7	0	0	0	0
Embolism	60	12	18	6	1	0	1
Acute collapse - cause unknown	53	6	6	1	0	0	1
Miscellaneous	8	3	5	2	0	0	1
No primary cause found	15	6	2	1			
Lack of information	27	4	5				
MD	1465	617	739	167	40	5	51
Death at home or outside health services	83	7	3	1			2
Coincidental cause	79	9	15	4	0	1	1
DDPCP	1627	633	757	172	40	6	54

42.Anaesthesia

Primary obstetric problems	No anaesthesia	CHC	DH	RH	PTH	NHC	Pvt H
Coincidental cause	**92**	**0**	**2**	**5**	**5**	**4**	**1**
- MVA	24		2	2	2	1	1
- Other accidents	8				1	2	
- Assault	8			1			
- Other	52			2	2	1	
Medical and surgical disorders	**311**	**0**	**15**	**49**	**32**	**37**	**16**
- Cardiac disease	94		5	13	15	13	5
- Endocrine	14		1	1	4		
- GIT	15		1	5	2	3	
- CNS	31		2	9	3	2	
- Respiratory	49		4	4		1	5
- Haematological	18			4		1	2
- Genito-urinary	5			1	1	1	1
- Auto-immune	3						
- Skeletal							1
- Psychiatric	17		1	4			
- Neoplasm	23			5	4	8	
- Other	42		1	3	3	8	2
Non-pregnancy-related infections	**624**	**0**	**15**	**51**	**24**	**15**	**7**
- PCP pneumonia	119		1	7	1		3
- Other pneumonia	94		6	10	6	1	1
- TB	240		3	12	7	3	1
- Influenza	1					1	
- Endocarditis	1						
- UTI	1			1			
- Appendicitis	3				1	1	
- Malaria	13			3	1		
- Cryptococcal meningitis	33			4	1		
- Other meningitis	32		3	6	2	2	
- Kaposi's sarcoma	6			1	1	1	
- Hepatitis	7				2	1	
- Gastroenteritis	23			1		1	
- Wasting syndrome	12			1	1		
- Other	39		2	5	1	4	2
Ectopic pregnancy	**70**	**0**	**18**	**12**	**7**	**5**	**1**
- Less than 20 weeks	64		18	12	7	3	
- More than 20 weeks	6					2	1
Miscarriage	**109**	**0**	**19**	**34**	**19**	**11**	**2**
- Septic miscarriage	72		11	28	14	10	2
- Haemorrhage (non-traumatic)	27		5	3	2	1	
- Uterine trauma	6		1	3	1		
- GTD	1		1		1		
- Following legal TOP	3		1		1		
Pregnancy-related sepsis	**53**	**1**	**18**	**41**	**25**	**20**	**3**
- Chorioamnionitis (ruptured membranes)	1			2			
- Chorioamnionitis (intact membranes)	3				1		
- Puerperal sepsis after NVD	44		2	14	8	5	
- Puerperal sepsis after C/section	5	1	12	18	13	14	2
- Bowel trauma at C/section			4	7	3	1	1

Primary obstetric problems	No anaesthesia	CHC	DH	RH	PTH	NHC	Pvt H
Obstetric haemorrhage	**191**	**0**	**122**	**113**	**44**	**27**	**19**
- Abruption with hypertension	16		4	7		4	1
- Abruption without hypertension	14		7	11	4	4	
- Placenta praevia	5		2	2		1	1
- Other APH not specified	3			2	1		
- Ruptured uterus with previous c/s	9		8	3	5	1	2
- Ruptured uterus without previous c/s	18		8	3	2	1	
- Retained placenta	32		2	7	2		
- Morbidly adherent placenta	1		5	3		2	3
- Uterine atony	24		4	13	4	2	2
- Vaginal trauma	3		1	2	1	1	
- Cervical trauma	3		3	2	1		
- Inverted uterus	8						
- Bleeding during Caesarean section	1		13	13	5	3	3
- Bleeding after Caesarean section	5		62	39	18	8	7
- Other PPH not specified	49		3	6	1		
Hypertension	**303**	**0**	**35**	**95**	**66**	**48**	**14**
- Chronic hypertension	25		2	2		3	
- Proteinuric hypertension	87		11	27	19	13	4
- Eclampsia	146		14	43	30	23	7
- HELLP	38		8	20	14	7	3
- Liver rupture	7			3	3	2	
Anaesthetic complications	**6**	**0**	**43**	**14**	**4**	**4**	**4**
- General anaesthetic	2		6	5			
- Epidural anaesthetic			1		1		
- Spinal anaesthetic	4		36	9	3	4	4
Adverse drug reactions	**22**	**0**	**1**	**0**	**0**	**1**	**0**
- ARV medication	3						
- TB medication	2						
- Other medication	6					1	
- Herbal medication	11		1				
Embolism	**52**	**0**	**12**	**16**	**8**	**3**	**7**
- Pulmonary embolism	47		12	14	8	2	6
- Amniotic fluid embolism	5			2		1	1
Acute collapse - cause unknown	**49**	**0**	**8**	**5**	**4**	**1**	**0**
Miscellaneous	**9**	**0**	**0**	**4**	**2**	**2**	**2**
- Hyperemesis gravidarum	4			1	2	1	
- Acute fatty liver	5			3		1	2
Unknown	**129**	**0**	**5**	**12**	**5**	**0**	**5**
- Death at home or outside health services	83		3	7	2		1
- No primary cause found	17			2	2		3
- Lack of information	29		2	3	1		1

Primary obstetric problems	No anaesthesia	CHC	DH	RH	PTH	NHC	Pvt H
Medical and surgical disorders	311	0	15	49	32	37	16
Non-pregnancy-related infections	624	0	15	51	24	15	7
Ectopic pregnancy	70	0	18	12	7	5	1
Miscarriage	109	0	19	34	19	11	2
Pregnancy-related sepsis	53	1	18	41	25	20	3
Obstetric haemorrhage	191	0	122	113	44	27	19
Hypertension	303	0	35	95	66	48	14
Anaesthetic complications	6	0	43	14	4	4	4
Adverse drug reactions	22	0	1	0	0	1	0
Embolism	52	0	12	16	8	3	7
Acute collapse - cause unknown	49	0	8	5	4	1	0
Miscellaneous	9	0	0	4	2	2	2
No primary cause found	17			2	2		3
Lack of information	29		2	3	1		1
MD	**1845**	**1**	**308**	**439**	**238**	**174**	**79**
Death at home or outside health services	83		3	7	2		1
Coincidental cause	92	0	2	5	5	4	1
DDPCP	2020	1	313	451	245	178	81

43. Summary Avoidable factors 2017-2019

2017-2019	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
PATIENT ORIENTED PROBLEMS																
- Avoidable factors identified	1669	48	212	529	57	146	86	172	256	11	19	30	23	7	73	46
- No avoidable factors	1405	44	218	167	47	31	63	337	280	63	4	64	35	11	41	19
- Lack of information	287	20	37	58	11	32	15	13	33	2	3	5	9	1	48	35
Assessable cases	2787	72	393	638	93	145	134	496	503	72	20	89	49	17	66	30
Proportion avoidable factors identified	59,9	66,7	53,9	82,9	61,3	100,7	64,2	34,7	50,9	15,3	95,0	33,7	46,9	41,2		
ADMINISTRATIVE PROBLEMS																
- Avoidable factors identified	1538	27	176	264	67	96	76	365	310	43	8	37	18	7	44	18
- No avoidable factors	1597	76	259	445	42	87	75	141	229	30	16	57	44	12	84	58
- Lack of information	193	8	31	39	5	13	12	18	24	3	0	5	6	0	29	20
Assessable cases	2942	95	404	670	104	170	139	488	515	70	24	89	56	19	99	56
Proportion avoidable factors identified	52,3	28,4	43,6	39,4	64,4	56,5	54,7	74,8	60,2	61,4	33,3	41,6	32,1	36,8	44,4	32,1
RESUSCITATION PROBLEMS																
- Avoidable factors identified	1538	52	176	325	73	98	69	299	246	51	9	38	21	8	73	54
- No avoidable factors	1523	53	244	369	37	79	84	182	277	20	14	56	37	10	61	30
- Lack of information	257	6	42	45	5	20	9	43	42	6	2	5	9	1	22	12
Assessable cases	2804	99	378	649	105	157	144	438	481	65	21	89	49	17	112	72
Proportion avoidable factors identified	54,9	52,5	46,6	50,1	69,5	62,4	47,9	68,3	51,1	78,5	42,9	42,7	42,9	47,1	65,2	75,0

2017-2019	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
MEDICAL CARE - CHC																
- Managed at this level	1528	28	198	341	33	51	72	290	315	37	12	40	38	6	67	36
- Avoidable factors identified	556	6	59	158	9	7	21	107	143	9	2	6	11	1	17	5
- No avoidable factors	876	17	124	156	23	38	46	171	162	28	10	32	24	4	41	25
- Lack of information	115	6	18	31	2	6	5	17	13	0	0	2	4	1	10	6
Assessable cases	1413	22	180	310	31	45	67	273	302	37	12	38	34	5	57	30
Proportion avoidable factors identified	39,3	27,3	32,8	51,0	29,0	15,6	31,3	39,2	47,4	24,3	16,7	15,8	32,4	20,0	29,8	16,7
MEDICAL CARE - DISTRICT HOSPITAL																
- Managed at this level	1644	40	200	389	60	104	82	290	279	55	14	40	32	9	50	25
- Avoidable factors identified	1057	21	117	205	49	69	53	247	168	49	4	21	20	4	30	13
- No avoidable factors	520	16	76	164	10	27	26	38	101	4	10	17	12	5	14	9
- Lack of information	120	5	13	31	3	14	5	16	19	4	0	2	1	0	7	4
Assessable cases	1524	35	187	358	57	90	77	274	260	51	14	38	31	9	43	21
Proportion avoidable factors identified	69,4	60,0	62,6	57,3	86,0	76,7	68,8	90,1	64,6	96,1	28,6	55,3	64,5	44,4	69,8	61,9
MEDICAL CARE - REGIONAL HOSPITAL																
- Managed at this level	1308	37	181	328	31	80	82	195	259	16	6	36	18	9	30	8
- Avoidable factors identified	724	13	93	144	23	50	51	147	148	13	3	16	7	6	10	1
- No avoidable factors	524	19	74	172	8	26	28	44	101	3	3	19	6	3	18	7
- Lack of information	81	6	20	16	0	6	4	8	12	0	0	1	6	0	2	0
Assessable cases	1227	31	161	312	31	74	78	187	247	16	6	35	12	9	28	8
Proportion avoidable factors identified	59,0	41,9	57,8	46,2	74,2	67,6	65,4	78,6	59,9	81,3	50,0	45,7	58,3	66,7	35,7	12,5
MEDICAL CARE - TERTIARY & ABOVE																
- Managed at this level	1065	30	225	247	30	59	66	116	208	15	13	26	13	7	10	4
- Avoidable factors identified	408	7	72	69	19	32	32	61	84	7	2	11	5	3	4	2
- No avoidable factors	617	20	143	170	10	23	32	54	117	7	10	15	7	4	5	1
- Lack of information	51	3	12	13	2	5	3	2	7	1	1	0	1	0	1	1
Assessable cases	1014	27	213	234	28	54	63	114	201	14	12	26	12	7	9	3
Proportion avoidable factors identified	40,2	25,9	33,8	29,5	67,9	59,3	50,8	53,5	41,8	50,0	16,7	42,3	41,7	42,9	44,4	66,7
MEDICAL CARE - PRIVATE HOSPITAL																
- Managed at this level	168	5	33	18	5	6	11	28	32	6	0	9	1	3	11	5
- Avoidable factors identified	88	0	17	6	2	4	5	20	17	4	0	5	1	1	6	2
- No avoidable factors	60	3	12	9	3	1	4	7	12	1	0	4	0	1	3	2
- Lack of information	28	2	7	3	0	3	2	3	4	1	0	0	0	1	2	1
Assessable cases	140	3	26	15	5	3	9	25	28	5	0	9	1	2	9	4
Proportion avoidable factors identified	62,9	0,0	65,4	40,0	40,0	133,3	55,6	80,0	60,7	80,0	-	55,6	100,0	50,0	66,7	50,0

2017-2019	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
TIMING OF EMERGENCY																
- Early pregnancy	579	34	83	143	102	113	1	13	27	5	4	12	4	7	31	18
- Antenatal period: 20w +	1141	64	178	321	5	18	17	82	336	5	12	13	23	6	61	40
- Intrapartum period	348	3	27	27	0	5	12	147	51	37	1	14	13	1	10	3
- Postpartum period	1213	8	174	245	3	59	132	281	144	14	7	59	28	5	54	35
- Anaesthesia	43	1	1	1	4	1	2	7	7	19	0	0	0	0	0	0
TIMING OF DEATH																
- Early pregnancy	443	30	67	109	87	74	0	6	17	2	3	8	4	5	31	18
- Antenatal period: 20w +	585	46	94	183	5	11	2	13	138	1	9	12	16	0	55	39
- Intrapartum period	134	0	11	7	0	2	3	44	25	16	1	7	8	1	9	3
- Postpartum period	2064	32	285	436	13	107	155	434	374	35	11	69	39	13	61	36
- Anaesthesia	63	1	3	1	8	0	1	19	7	21	0	2	0	0	0	0

IMPACT OF SUBOPTIMAL CARE	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
- No suboptimal care identified	924	66	164	274	21	41	30	40	122	4	12	32	29	9	80	61
- Suboptimal care, no impact on outcome	312	12	45	124	7	27	8	14	43	1	3	13	7	2	6	3
- Suboptimal care, possible impact on outcome	1021	16	160	261	21	60	62	140	178	9	7	35	23	6	43	23
- Suboptimal care, probable impact on outcome	1032	15	91	77	64	66	61	322	218	61	2	18	8	2	27	9
Total	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96

Proportion of suboptimal care	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
- No suboptimal care identified	28,1	60,6	35,7	37,2	18,6	21,1	18,6	7,8	21,7	5,3	50,0	32,7	43,3	47,4	51,3	63,5
- Suboptimal care, no impact on outcome	9,5	11,0	9,8	16,8	6,2	13,9	5,0	2,7	7,7	1,3	12,5	13,3	10,4	10,5	3,8	3,1
- Suboptimal care, possible impact on outcome	31,0	14,7	34,8	35,5	18,6	30,9	38,5	27,1	31,7	12,0	29,2	35,7	34,3	31,6	27,6	24,0
- Suboptimal care, probable impact on outcome	31,4	13,8	19,8	10,5	56,6	34,0	37,9	62,4	38,9	81,3	8,3	18,4	11,9	10,5	17,3	9,4

	All	Coin	M&S	NPRI	Ec	Misc.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
Potentially preventable deaths	62,4	54,6	45,9	75,2	64,9	76,4	89,5	70,6	93,3	37,5	54,1	46,3	42,1	44,9	28,4	33,3

44.Patient and community orientated avoidable factors per underlying cause

2017-2019	All	Coin	M&S	NPRI	Ec	Miscr.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell	Unk	Home
Lack of information	287	20	37	58	11	32	15	13	33	2	3	5	9	1	48	35
No avoidable factor	1405	44	218	167	47	31	63	337	280	63	4	64	35	11	41	19
Assessable cases	3002	89	423	678	102	162	146	503	528	73	21	93	58	18	108	61
% no avoidable factor	46,8	49,4	51,5	24,6	46,1	19,1	43,2	67,0	53,0	86,3	19,0	68,8	60,3	61,1	38,0	31,1
Cases with avoidable factors	1597	45	205	511	55	131	83	166	248	10	17	29	23	7	67	42
No antenatal care	596	17	71	187	33	70	20	54	98	7	3	11	3	1	21	10
Infrequent antenatal care	204	2	26	52	1	2	9	34	56	2	0	3	7	1	9	7
Delay in accessing medical help	891	5	100	323	29	96	53	86	119	2	11	13	9	5	40	28
Declined medication/surgery/advice	257	0	33	143	2	7	20	8	26	1	1	5	4	0	7	6
Family problem	53	15	10	13	0	3	1	5	5	0	0	1	0	0	0	0
Community problem	17	5	0	4	0	1	2	2	0	0	0	0	0	0	3	1
Unsafe abortion	49	2	0	3	1	40	0	1	0	0	0	0	0	1	1	0
Other	232	21	39	74	3	9	4	29	23	1	6	5	4	1	13	8
Total cases	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96
Proportion of assessable cases																
	All	**Coin**	**M&S**	**NPRI**	**Ec**	**Miscr.**	**PRS**	**OH**	**HDP**	**AR**	**ADR**	**Emb.**	**AC**	**Mcell**	**Unk**	**Home**
No antenatal care	37,3	37,8	34,6	36,6	60,0	53,4	24,1	32,5	39,5	70,0	17,6	37,9	13,0	14,3	31,3	23,8
Infrequent antenatal care	12,8	4,4	12,7	10,2	1,8	1,5	10,8	20,5	22,6	20,0	0,0	10,3	30,4	14,3	13,4	16,7
Delay in accessing medical help	55,8	11,1	48,8	63,2	52,7	73,3	63,9	51,8	48,0	20,0	64,7	44,8	39,1	71,4	59,7	66,7
Declined medication/surgery/advice	16,1	0,0	16,1	28,0	3,6	5,3	24,1	4,8	10,5	10,0	5,9	17,2	17,4	0,0	10,4	14,3
Family problem	3,3	33,3	4,9	2,5	0,0	2,3	1,2	3,0	2,0	0,0	0,0	3,4	0,0	0,0	0,0	0,0
Community problem	1,1	11,1	0,0	0,8	0,0	0,8	2,4	1,2	0,0	0,0	0,0	0,0	0,0	0,0	4,5	2,4
Unsafe abortion	3,1	4,4	0,0	0,6	1,8	30,5	0,0	0,6	0,0	0,0	0,0	0,0	0,0	14,3	1,5	0,0
Other	14,5	46,7	19,0	14,5	5,5	6,9	4,8	17,5	9,3	10,0	35,3	17,2	17,4	14,3	19,4	19,0

45.Administrative avoidable factors 2017-2019 per underlying cause

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
Lack of information	193	8	31	39	5	13	12	18	24	3	0	5	6	0	29	20
No avoidable factor	1597	76	259	445	42	87	75	141	229	30	16	57	44	12	84	58
Assessable cases	3096	101	429	697	108	181	149	498	537	72	24	93	61	19	127	76
% no avoidable factor	51,6	75,2	60,4	63,8	38,9	48,1	50,3	28,3	42,6	41,7	66,7	61,3	72,1	63,2	66,1	76,3
Avoidable cases	1499	25	170	252	66	94	74	357	308	42	8	36	17	7	43	18
Transport problem: Home to institution	59	1	5	4	1	1	0	23	18	0	0	0	1	0	5	3
Transport problem: Institution to institution	193	4	14	23	8	7	4	65	54	3	0	4	3	0	4	0
Lack of accessibility: Barriers to entry	37	0	6	8	0	0	2	10	8	1	0	1	0	0	1	0
Lack of accessibility: Other	22	0	8	3	1	1	0	4	2	0	0	1	1	0	1	0
Delay initiating critical care (Overburdened service)	198	3	28	26	13	17	18	44	35	5	1	2	2	1	3	0
Lack of health care facilities: ICU	258	6	28	62	9	26	16	31	68	4	2	3	0	1	2	0
Lack of health care facilities: Blood/blood products	96	1	2	5	4	8	5	56	10	2	1	1	1	0	0	0
Lack of health care facilities: Other	90	1	13	16	5	3	3	18	19	1	1	7	0	0	3	0
Lack of appropriately trained staff: Doctors	635	13	61	88	31	37	36	194	114	26	0	16	7	2	10	6
Lack of appropriately trained staff: Nurses	424	10	35	65	19	15	21	131	95	5	0	11	3	4	10	6
Communication problems: Technical	50	1	4	15	5	4	1	10	7	1	0	2	0	0	0	0
Communication problems: Interpersonal	93	3	18	21	1	6	3	21	11	2	1	2	2	0	2	0
Other	282	4	43	56	14	14	7	51	51	9	2	11	6	2	12	7
Total maternal deaths	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96

Proportion of assessable cases with avoidable factors	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
Transport problem: Home to institution	3,9	4,0	2,9	1,6	1,5	1,1	0,0	6,4	5,8	0,0	0,0	0,0	5,9	0,0	11,6	16,7
Transport problem: Institution to institution	12,9	16,0	8,2	9,1	12,1	7,4	5,4	18,2	17,5	7,1	0,0	11,1	17,6	0,0	9,3	0,0
Lack of accessibility: Barriers to entry	2,5	0,0	3,5	3,2	0,0	0,0	2,7	2,8	2,6	2,4	0,0	2,8	0,0	0,0	2,3	0,0
Lack of accessibility: Other	1,5	0,0	4,7	1,2	1,5	1,1	0,0	1,1	0,6	0,0	0,0	2,8	5,9	0,0	2,3	0,0
Delay initiating critical care (Overburdened service)	13,2	12,0	16,5	10,3	19,7	18,1	24,3	12,3	11,4	11,9	12,5	5,6	11,8	14,3	7,0	0,0
Lack of health care facilities: ICU	17,2	24,0	16,5	24,6	13,6	27,7	21,6	8,7	22,1	9,5	25,0	8,3	0,0	14,3	4,7	0,0
Lack of health care facilities: Blood/blood products	6,4	4,0	1,2	2,0	6,1	8,5	6,8	15,7	3,2	4,8	12,5	2,8	5,9	0,0	0,0	0,0
Lack of health care facilities: Other	6,0	4,0	7,6	6,3	7,6	3,2	4,1	5,0	6,2	2,4	12,5	19,4	0,0	0,0	7,0	0,0
Lack of appropriately trained staff: Doctors	42,4	52,0	35,9	34,9	47,0	39,4	48,6	54,3	37,0	61,9	0,0	44,4	41,2	28,6	23,3	33,3
Lack of appropriately trained staff: Nurses	28,3	40,0	20,6	25,8	28,8	16,0	28,4	36,7	30,8	11,9	0,0	30,6	17,6	57,1	23,3	33,3
Communication problems: Technical	3,3	4,0	2,4	6,0	7,6	4,3	1,4	2,8	2,3	2,4	0,0	5,6	0,0	0,0	0,0	0,0
Communication problems: Interpersonal	6,2	12,0	10,6	8,3	1,5	6,4	4,1	5,9	3,6	4,8	12,5	5,6	11,8	0,0	4,7	0,0
Other	18,8	16,0	25,3	22,2	21,2	14,9	9,5	14,3	16,6	21,4	25,0	30,6	35,3	28,6	27,9	38,9

46.Medical care avoidable factors per underlying cause

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
COMMUNITY HEALTH CENTRE																
Managed at this level	1528	28	198	341	33	51	72	290	315	37	12	40	38	6	67	36
Lack of information	115	6	18	31	2	6	5	17	13	0	0	2	4	1	10	6
Assessable cases	1413	22	180	310	31	45	67	273	302	37	12	38	34	5	57	30
No avoidable factor	876	17	124	156	23	38	46	171	162	28	10	32	24	4	41	25
% no avoidable factors	62,0	77,3	68,9	50,3	74,2	84,4	68,7	62,6	53,6	75,7	83,3	84,2	70,6	80,0	71,9	83,3
Cases with avoidable factors	537	5	56	154	8	7	21	102	140	9	2	6	10	1	16	5
Initial assessment	266	3	30	85	5	5	8	50	57	3	1	3	5	1	10	3
Problem with recognition / diagnosis	286	3	26	78	5	6	11	53	87	3	1	2	2	0	9	1
Delay in referring the patient	195	1	26	60	4	1	3	33	58	2	0	1	2	0	4	0
Managed at inappropriate level	95	1	16	14	1	0	1	20	35	2	0	0	1	0	4	0
Incorrect management (Wrong diagnosis)	52	0	5	11	2	1	2	11	17	0	0	0	0	0	3	0
Sub-standard management (Correct diagnosis)	131	2	8	36	3	0	2	21	50	2	0	2	2	0	3	1
Not monitored / Infrequently monitored	36	1	3	10	1	0	2	8	8	0	1	0	2	0	0	0
Prolonged abnormal monitoring with no action taken	50	0	4	9	0	0	2	10	23	0	0	0	0	0	2	0
Distribution of avoidable factors in avoidable cases																
Initial assessment	49,5	60,0	53,6	55,2	62,5	71,4	38,1	49,0	40,7	33,3	50,0	50,0	50,0	100,0	62,5	60,0
Problem with recognition / diagnosis	53,3	60,0	46,4	50,6	62,5	85,7	52,4	52,0	62,1	33,3	50,0	33,3	20,0	0,0	56,3	20,0
Delay in referring the patient	36,3	20,0	46,4	39,0	50,0	14,3	14,3	32,4	41,4	22,2	0,0	16,7	20,0	0,0	25,0	0,0
Managed at inappropriate level	17,7	20,0	28,6	9,1	12,5	0,0	4,8	19,6	25,0	22,2	0,0	0,0	10,0	0,0	25,0	0,0
Incorrect management (Wrong diagnosis)	9,7	0,0	8,9	7,1	25,0	14,3	9,5	10,8	12,1	0,0	0,0	0,0	0,0	0,0	18,8	0,0
Sub-standard management (Correct diagnosis)	24,4	40,0	14,3	23,4	37,5	0,0	9,5	20,6	35,7	22,2	0,0	33,3	20,0	0,0	18,8	20,0
Not monitored / Infrequently monitored	6,7	20,0	5,4	6,5	12,5	0,0	9,5	7,8	5,7	0,0	50,0	0,0	20,0	0,0	0,0	0,0
Prolonged abnormal monitoring with no action taken	9,3	0,0	7,1	5,8	0,0	0,0	9,5	9,8	16,4	0,0	0,0	0,0	0,0	0,0	12,5	0,0

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
DISTRICT HOSPITAL																
Managed at this level	1644	40	200	389	60	104	82	290	279	55	14	40	32	9	50	25
Lack of information	120	5	13	31	3	14	5	16	19	4	0	2	1	0	7	4
Assessable cases	1524	35	187	358	57	90	77	274	260	51	14	38	31	9	43	21
No avoidable factor	520	16	76	164	10	27	26	38	101	4	10	17	12	5	14	9
% no avoidable factors	34,1	45,7	40,6	45,8	17,5	30,0	33,8	13,9	38,8	7,8	71,4	44,7	38,7	55,6	32,6	42,9
Cases with avoidable factors	1004	19	111	194	47	63	51	236	159	47	4	21	19	4	29	12
Initial assessment	355	7	38	73	26	22	16	81	52	10	2	13	4	3	8	3
Problem with recognition / diagnosis	539	9	65	101	34	28	28	121	83	25	1	15	13	2	14	5
Delay in referring the patient	353	5	52	75	9	24	23	82	60	4	1	7	2	1	8	1
Managed at inappropriate level	297	7	46	59	9	18	14	64	51	7	1	7	3	2	9	1
Incorrect management (Wrong diagnosis)	185	4	21	22	17	15	3	44	38	6	1	4	2	0	8	4
Sub-standard management (Correct diagnosis)	466	6	32	83	15	37	20	141	68	32	2	10	7	2	11	6
Not monitored / Infrequently monitored	148	4	8	23	9	13	3	47	20	7	0	5	5	2	2	1
Prolonged abnormal monitoring with no action taken	172	1	13	29	10	11	9	53	29	9	1	4	1	0	2	0
Distribution of avoidable factors in avoidable cases																
Initial assessment	35,4	36,8	34,2	37,6	55,3	34,9	31,4	34,3	32,7	21,3	50,0	61,9	21,1	75,0	27,6	25,0
Problem with recognition / diagnosis	53,7	47,4	58,6	52,1	72,3	44,4	54,9	51,3	52,2	53,2	25,0	71,4	68,4	50,0	48,3	41,7
Delay in referring the patient	35,2	26,3	46,8	38,7	19,1	38,1	45,1	34,7	37,7	8,5	25,0	33,3	10,5	25,0	27,6	8,3
Managed at inappropriate level	29,6	36,8	41,4	30,4	19,1	28,6	27,5	27,1	32,1	14,9	25,0	33,3	15,8	50,0	31,0	8,3
Incorrect management (Wrong diagnosis)	18,4	21,1	18,9	11,3	36,2	23,8	5,9	18,6	23,9	12,8	25,0	19,0	10,5	0,0	27,6	33,3
Sub-standard management (Correct diagnosis)	46,4	31,6	28,8	42,8	31,9	58,7	39,2	59,7	42,8	68,1	50,0	47,6	36,8	50,0	37,9	50,0
Not monitored / Infrequently monitored	14,7	21,1	7,2	11,9	19,1	20,6	5,9	19,9	12,6	14,9	0,0	23,8	26,3	50,0	6,9	8,3
Prolonged abnormal monitoring with no action taken	17,1	5,3	11,7	14,9	21,3	17,5	17,6	22,5	18,2	19,1	25,0	19,0	5,3	0,0	6,9	0,0

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
REGIONAL HOSPITAL																
Managed at this level	1308	37	181	328	31	80	82	195	259	16	6	36	18	9	30	8
Lack of information	81	6	20	16	0	6	4	8	12	0	0	1	6	0	2	0
Assessable cases	1227	31	161	312	31	74	78	187	247	16	6	35	12	9	28	8
No avoidable factor	524	19	74	172	8	26	28	44	101	3	3	19	6	3	18	7
% no avoidable factors	42,7	61,3	46,0	55,1	25,8	35,1	35,9	23,5	40,9	18,8	50,0	54,3	50,0	33,3	64,3	87,5
Cases with avoidable factors	703	12	87	140	23	48	50	143	146	13	3	16	6	6	10	1
Initial assessment	162	1	22	36	8	15	10	27	27	2	1	3	2	3	5	1
Problem with recognition / diagnosis	311	7	43	65	12	21	19	54	63	5	1	6	5	1	9	1
Delay in referring the patient	101	2	21	21	5	7	9	12	18	1	0	0	0	2	3	1
Managed at inappropriate level	72	1	14	12	2	7	4	15	12	0	0	0	0	1	4	1
Incorrect management (Wrong diagnosis)	80	2	10	13	4	6	6	14	20	0	0	0	1	1	3	1
Sub-standard management (Correct diagnosis)	400	6	42	74	13	27	31	93	88	10	2	9	3	1	1	0
Not monitored / Infrequently monitored	114	2	7	18	4	8	7	30	28	1	0	1	5	1	2	0
Prolonged abnormal monitoring with no action taken	106	1	11	21	3	7	11	20	25	1	0	1	2	1	2	1
Distribution of avoidable factors in avoidable cases																
Initial assessment	23,0	8,3	25,3	25,7	34,8	31,3	20,0	18,9	18,5	15,4	33,3	18,8	33,3	50,0	50,0	100,0
Problem with recognition / diagnosis	44,2	58,3	49,4	46,4	52,2	43,8	38,0	37,8	43,2	38,5	33,3	37,5	83,3	16,7	90,0	100,0
Delay in referring the patient	14,4	16,7	24,1	15,0	21,7	14,6	18,0	8,4	12,3	7,7	0,0	0,0	0,0	33,3	30,0	100,0
Managed at inappropriate level	10,2	8,3	16,1	8,6	8,7	14,6	8,0	10,5	8,2	0,0	0,0	0,0	0,0	16,7	40,0	100,0
Incorrect management (Wrong diagnosis)	11,4	16,7	11,5	9,3	17,4	12,5	12,0	9,8	13,7	0,0	0,0	0,0	16,7	16,7	30,0	100,0
Sub-standard management (Correct diagnosis)	56,9	50,0	48,3	52,9	56,5	56,3	62,0	65,0	60,3	76,9	66,7	56,3	50,0	16,7	10,0	0,0
Not monitored / Infrequently monitored	16,2	16,7	8,0	12,9	17,4	16,7	14,0	21,0	19,2	7,7	0,0	6,3	83,3	16,7	20,0	0,0
Prolonged abnormal monitoring with no action taken	15,1	8,3	12,6	15,0	13,0	14,6	22,0	14,0	17,1	7,7	0,0	6,3	33,3	16,7	20,0	100,0

Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
TERTIARY HOSPITAL / ABOVE																
Managed at this level	1065	30	225	247	30	59	66	116	208	15	13	26	13	7	10	4
Lack of information	51	3	12	13	2	5	3	2	7	1	1	0	1	0	1	1
Assessable cases	1014	27	213	234	28	54	63	114	201	14	12	26	12	7	9	3
No avoidable factor	617	20	143	170	10	23	32	54	117	7	10	15	7	4	5	1
% no avoidable factors	60,8	74,1	67,1	72,6	35,7	42,6	50,8	47,4	58,2	50,0	83,3	57,7	58,3	57,1	55,6	33,3
Cases with avoidable factors	397	7	70	64	18	31	31	60	84	7	2	11	5	3	4	2
Initial assessment	52	1	5	8	2	3	7	8	11	1	0	0	2	2	2	0
Problem with recognition / diagnosis	146	4	30	29	6	9	19	18	17	0	1	4	3	3	3	1
Delay in referring the patient	9	0	1	3	1	1	0	0	2	0	0	0	0	1	0	0
Managed at inappropriate level	10	0	6	0	1	1	0	0	1	0	0	0	0	1	0	0
Incorrect management (Wrong diagnosis)	57	1	10	10	6	3	5	4	12	1	1	2	0	0	2	1
Sub-standard management (Correct diagnosis)	234	5	32	30	11	24	18	43	57	4	1	7	1	1	0	0
Not monitored / Infrequently monitored	46	0	4	5	4	4	1	11	9	2	1	1	2	0	2	0
Prolonged abnormal monitoring with no action taken	66	1	10	12	4	4	9	12	9	0	1	1	0	1	2	1
Distribution of avoidable factors in avoidable cases																
Initial assessment	13,1	14,3	7,1	12,5	11,1	9,7	22,6	13,3	13,1	14,3	0,0	0,0	40,0	66,7	50,0	0,0
Problem with recognition / diagnosis	36,8	57,1	42,9	45,3	33,3	29,0	61,3	30,0	20,2	0,0	50,0	36,4	60,0	100,0	75,0	50,0
Delay in referring the patient	2,3	0,0	1,4	4,7	5,6	3,2	0,0	0,0	2,4	0,0	0,0	0,0	0,0	33,3	0,0	0,0
Managed at inappropriate level	2,5	0,0	8,6	0,0	5,6	3,2	0,0	0,0	1,2	0,0	0,0	0,0	0,0	33,3	0,0	0,0
Incorrect management (Wrong diagnosis)	14,4	14,3	14,3	15,6	33,3	9,7	16,1	6,7	14,3	14,3	50,0	18,2	0,0	0,0	50,0	50,0
Sub-standard management (Correct diagnosis)	58,9	71,4	45,7	46,9	61,1	77,4	58,1	71,7	67,9	57,1	50,0	63,6	20,0	33,3	0,0	0,0
Not monitored / Infrequently monitored	11,6	0,0	5,7	7,8	22,2	12,9	3,2	18,3	10,7	28,6	50,0	9,1	40,0	0,0	50,0	0,0
Prolonged abnormal monitoring with no action taken	16,6	14,3	14,3	18,8	22,2	12,9	29,0	20,0	10,7	0,0	50,0	9,1	0,0	33,3	50,0	50,0

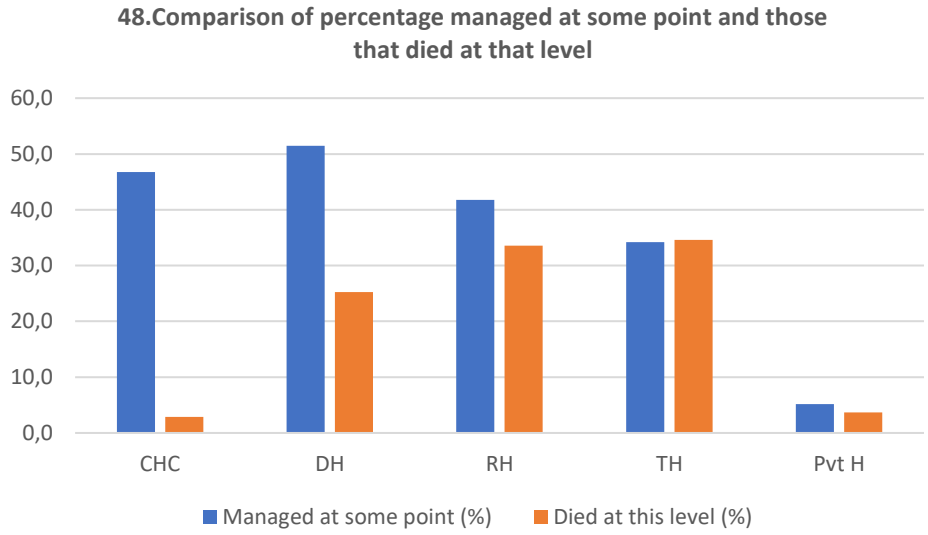
Description	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
PRIVATE HOSPITAL																
Managed at this level	168	5	33	18	5	6	11	28	32	6	0	9	1	3	11	5
Lack of information	28	2	7	3	0	3	2	3	4	1	0	0	0	1	2	1
Assessable cases	140	3	26	15	5	3	9	25	28	5	0	9	1	2	9	4
No avoidable factor	60	3	12	9	3	1	4	7	12	1	0	4	0	1	3	2
% no avoidable factors	42,9	100,0	46,2	60,0	60,0	33,3	44,4	28,0	42,9	20,0		44,4	0,0	50,0	33,3	50,0
Cases with avoidable factors	80	0	14	6	2	2	5	18	16	4	0	5	1	1	6	2
Initial assessment	33	0	9	1	0	2	2	8	5	0	0	2	1	1	2	0
Problem with recognition / diagnosis	43	0	10	2	1	2	2	8	9	1	0	4	0	1	3	0
Delay in referring the patient	11	0	1	0	1	0	0	4	3	0	0	0	0	0	2	1
Managed at inappropriate level	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Incorrect management (Wrong diagnosis)	6	0	1	0	1	1	0	2	1	0	0	0	0	0	0	0
Sub-standard management (Correct diagnosis)	40	0	6	3	0	1	1	12	11	4	0	1	0	1	0	0
Not monitored / Infrequently monitored	6	0	0	0	0	0	1	4	0	0	0	1	0	0	0	0
Prolonged abnormal monitoring with no action taken	12	0	1	1	0	0	0	5	1	0	0	1	0	1	2	0
Distribution of avoidable factors in avoidable cases																
Initial assessment	41,3		64,3	16,7	0,0	100,0	40,0	44,4	31,3	0,0		40,0	100,0	100,0	33,3	0,0
Problem with recognition / diagnosis	53,8		71,4	33,3	50,0	100,0	40,0	44,4	56,3	25,0		80,0	0,0	100,0	50,0	0,0
Delay in referring the patient	13,8		7,1	0,0	50,0	0,0	0,0	22,2	18,8	0,0		0,0	0,0	0,0	33,3	50,0
Managed at inappropriate level	2,5		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		0,0	0,0	0,0	33,3	50,0
Incorrect management (Wrong diagnosis)	7,5		7,1	0,0	50,0	50,0	0,0	11,1	6,3	0,0		0,0	0,0	0,0	0,0	0,0
Sub-standard management (Correct diagnosis)	50,0		42,9	50,0	0,0	50,0	20,0	66,7	68,8	100,0		20,0	0,0	100,0	0,0	0,0
Not monitored / Infrequently monitored	7,5		0,0	0,0	0,0	0,0	20,0	22,2	0,0	0,0		20,0	0,0	0,0	0,0	0,0
Prolonged abnormal monitoring with no action taken	15,0		7,1	16,7	0,0	0,0	0,0	27,8	6,3	0,0		20,0	0,0	100,0	33,3	0,0

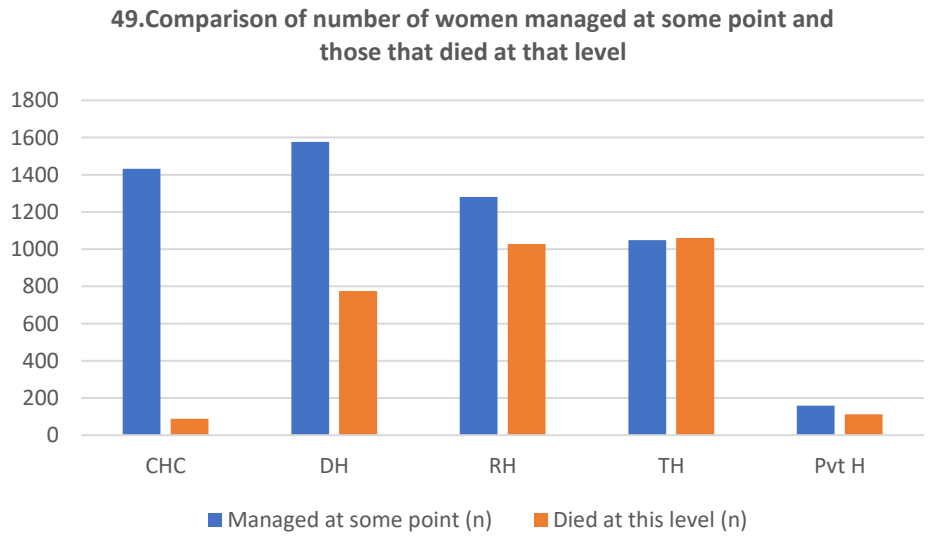
47.Resuscitation avoidable factors 2017-2019 per underlying cause

Resuscitation 2017-2019	All	Coin	M&S	NPRI	Ec	Miscar.	PRS	OH	HDP	AR	ADR	Emb.	AC	Mcell.	Unk.	Home
Lack of information	257	6	42	45	5	20	9	43	42	6	2	5	9	1	22	12
Not attempted	641	27	82	195	23	42	29	53	83	5	4	19	10	6	63	52
No avoidable factor	1523	53	244	369	37	79	84	182	277	20	14	56	37	10	61	30
Assessable cases where resuscitation attempted	2391	76	336	496	85	132	123	420	436	64	18	74	48	12	71	32
Avoidable cases	898	33	124	240	28	62	38	96	125	11	6	24	19	7	85	64
Airway problems	124	4	15	22	2	4	4	14	39	13	1	4	2	0	0	0
Breathing problems	296	9	49	81	8	14	10	22	66	17	2	9	5	1	3	1
Circulation problems	483	11	32	28	34	41	20	208	66	20	2	10	4	0	7	2
Drug problems	53	2	8	7	2	2	1	6	12	6	0	3	2	0	2	0
Investigation problems	67	4	2	20	3	3	6	15	8	0	1	4	0	1	0	0
Monitoring problems	134	6	8	15	9	6	6	43	23	10	0	2	0	2	4	0
Total	3289	109	460	736	113	194	161	516	561	75	24	98	67	19	156	96
Proportion of cases with avoidable fators	**37,6**	**43,4**	**36,9**	**48,4**	**32,9**	**47,0**	**30,9**	**22,9**	**28,7**	**17,2**	**33,3**	**32,4**	**39,6**	**58,3**	**119,7**	**200,0**
% of avoidable factors in avoidable cases																
Airway problems	13,8	12,1	12,1	9,2	7,1	6,5	10,5	14,6	31,2	118,2	16,7	16,7	10,5	0,0	0,0	0,0
Breathing problems	33,0	27,3	39,5	33,8	28,6	22,6	26,3	22,9	52,8	154,5	33,3	37,5	26,3	14,3	3,5	1,6
Circulation problems	53,8	33,3	25,8	11,7	121,4	66,1	52,6	216,7	52,8	181,8	33,3	41,7	21,1	0,0	8,2	3,1
Drug problems	5,9	6,1	6,5	2,9	7,1	3,2	2,6	6,3	9,6	54,5	0,0	12,5	10,5	0,0	2,4	0,0
Investigation problems	7,5	12,1	1,6	8,3	10,7	4,8	15,8	15,6	6,4	0,0	16,7	16,7	0,0	14,3	0,0	0,0
Monitoring problems	14,9	18,2	6,5	6,3	32,1	9,7	15,8	44,8	18,4	90,9	0,0	8,3	0,0	28,6	4,7	0,0

47. Level of care and avoidable factors

	Cases managed at some point		Cases died at this level	
	n	%		%
CHC	1433	46,8	89	2,9
DH	1576	51,4	774	25,3
RH	1280	41,8	1028	33,6
TH	1048	34,2	1060	34,6
Pvt H	159	5,2	113	3,7
TOTAL	3064		3064	





50. Avoidable factors and level of care

	All	CHC	DH	RH	TH	NC	Pvt H
MD at this level	3289	89	774	1028	643	417	113
PATIENT ORIENTED PROBLEMS							
- Avoidable factors identified	1669	51	392	535	348	191	37
- No avoidable factors	1405	34	351	444	260	199	57
- Lack of information	287	5	46	72	48	32	22
Assessable cases	3002	84	728	956	595	385	91
% no avoidable factors	46,8	40,5	48,2	46,4	43,7	51,7	62,6
ADMINISTRATIVE PROBLEMS	3289	89	774	1028	643	417	113
- Avoidable factors identified	1538	42	439	496	320	157	29
- No avoidable factors	1597	44	306	492	298	243	74
- Lack of information	193	4	39	51	33	21	12
Assessable cases	3096	85	735	977	610	396	101
% no avoidable factors	51,6	51,8	41,6	50,4	48,9	61,4	73,3
RESUSCITATION PROBLEMS	3289	89	774	1028	643	417	113
- Avoidable factors identified	1538	45	444	456	273	156	36
- No avoidable factors	1523	35	264	512	331	245	61
- Lack of information	257	10	80	64	46	18	16
Assessable cases	3032	79	694	964	597	399	97
% no avoidable factors	50,2	44,3	38,0	53,1	55,4	61,4	62,9
MEDICAL CARE - CHC							
- Managed at this level	1528	82	413	492	308	131	7
- Avoidable factors identified	556	46	154	180	113	39	1
- No avoidable factors	876	33	234	285	174	88	2
- Lack of information	115	6	29	32	25	5	4
Assessable cases	1413	76	384	460	283	126	3
% avoidable factors	39,3	60,5	40,1	39,1	39,9	31,0	33,3
MEDICAL CARE - DISTRICT HOSPITAL							
- Managed at this level	1644	15	753	328	309	164	7
- Avoidable factors identified	1057	9	589	188	157	70	4
- No avoidable factors	520	5	146	123	131	90	3
- Lack of information	120	1	46	26	30	9	0
Assessable cases	1524	14	707	302	279	155	7
% avoidable factors	69,4	64,3	83,3	62,3	56,3	45,2	57,1
MEDICAL CARE - REGIONAL HOSPITAL							
- Managed at this level	1308	8	51	983	144	89	5
- Avoidable factors identified	724	2	26	571	66	42	3
- No avoidable factors	524	6	20	377	66	42	2
- Lack of information	81	1	5	50	13	9	0
Assessable cases	1227	7	46	933	131	80	5
% avoidable factors	59,0	28,6	56,5	61,2	50,4	52,5	60,0
MEDICAL CARE - TERTIARY & ABOVE							
- Managed at this level	1065	5	27	30	591	393	2
- Avoidable factors identified	408	3	6	14	245	134	2
- No avoidable factors	617	1	15	15	332	245	0
- Lack of information	51	1	7	1	19	19	0
Assessable cases	1014	4	20	29	572	374	2
% avoidable factors	40,2	75,0	30,0	48,3	42,8	35,8	100,0
MEDICAL CARE - PRIVATE HOSPITAL							
- Managed at this level	168	4	7	17	11	10	110
- Avoidable factors identified	88	2	6	7	2	2	66
- No avoidable factors	60	2	1	8	6	7	33
- Lack of information	28	0	1	3	3	1	17
Assessable cases	140	4	6	14	8	9	93
% avoidable factors	62,9	50,0	100,0	50,0	25,0	22,2	71,0

51. Timing of emergency and timing death

TIMING OF EMERGENCY	All	CHC	DH	RH	TH	NC	Pvt H
- Early pregnancy	579	13	179	184	108	46	8
- Antenatal period: 20w +	1141	32	206	324	263	183	39
- Intrapartum period	348	8	94	118	69	41	13
- Postpartum period	1213	36	289	399	203	146	55
- Anaesthesia	43	0	14	11	8	8	2
TIMING OF DEATH							
- Early pregnancy	443	11	141	141	73	33	3
- Antenatal period: 20w +	585	28	145	145	107	61	15
- Intrapartum period	134	6	49	40	16	15	3
- Postpartum period	2064	44	417	684	439	298	87
- Anaesthesia	63	0	22	18	8	10	5

52. Suboptimal care and level of care

IMPACT OF SUBOPTIMAL CARE	All	CHC	DH	RH	TH	NC	Pvt H
- No suboptimal care identified	924	27	116	241	188	190	36
- Suboptimal care, no impact on outcome	312	10	67	105	69	43	8
- Suboptimal care, possible impact on outcome	1021	28	255	346	212	95	39
- Suboptimal care, probable impact on outcome	1032	24	336	336	174	89	30
	3289	89	774	1028	643	417	113

IMPACT OF SUBOPTIMAL CARE (%)	All	CHC	DH	RH	TH	NC	Pvt H
- No suboptimal care identified	28,1	30,3	15,0	23,4	29,2	45,6	31,9
- Suboptimal care, no impact on outcome	9,5	11,2	8,7	10,2	10,7	10,3	7,1
- Suboptimal care, possible impact on outcome	31,0	31,5	32,9	33,7	33,0	22,8	34,5
- Suboptimal care, probable impact on outcome	31,4	27,0	43,4	32,7	27,1	21,3	26,5

	All	CHC	DH	RH	TH	NC	Pvt H
Potentially preventable deaths	62,4	58,4	76,4	66,3	60,0	44,1	61,1

53.Community related Avoidable Factors per level of care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Lack of information	287	5	46	72	48	32	22
No avoidable factor	1405	34	351	444	260	199	57
Assessable cases	3002	84	728	956	595	385	91
% no avoidable factor	46,8	40,5	48,2	46,4	43,7	51,7	62,6
Number Avoidable cases	1597	50	377	512	335	186	34
No antenatal care	596	14	140	189	130	75	11
Infrequent antenatal care	204	8	48	58	38	34	4
Delay in accessing medical help	891	27	222	290	192	79	15
Declined medication/surgery/advice	257	6	57	86	57	28	8
Family problem	53	3	14	20	8	6	0
Community problem	17	1	3	3	5	2	0
Unsafe abortion	49	0	12	14	10	8	2
Other	232	13	51	82	36	32	3
Total cases	3289	89	774	1028	643	417	113
Distribution of avoidable factors							
No antenatal care	37,3	28,0	37,1	36,9	38,8	40,3	32,4
Infrequent antenatal care	12,8	16,0	12,7	11,3	11,3	18,3	11,8
Delay in accessing medical help	55,8	54,0	58,9	56,6	57,3	42,5	44,1
Declined medication/surgery/advice	16,1	12,0	15,1	16,8	17,0	15,1	23,5
Family problem	3,3	6,0	3,7	3,9	2,4	3,2	0,0
Community problem	1,1	2,0	0,8	0,6	1,5	1,1	0,0
Unsafe abortion	3,1	0,0	3,2	2,7	3,0	4,3	5,9
Other	14,5	26,0	13,5	16,0	10,7	17,2	8,8
Distribution in assessable cases							
No antenatal care	19,9	16,7	19,2	19,8	21,8	19,5	12,1
Infrequent antenatal care	6,8	9,5	6,6	6,1	6,4	8,8	4,4
Delay in accessing medical help	29,7	32,1	30,5	30,3	32,3	20,5	16,5
Declined medication/surgery/advice	8,6	7,1	7,8	9,0	9,6	7,3	8,8
Family problem	1,8	3,6	1,9	2,1	1,3	1,6	0,0
Community problem	0,6	1,2	0,4	0,3	0,8	0,5	0,0
Unsafe abortion	1,6	0,0	1,6	1,5	1,7	2,1	2,2
Other	7,7	15,5	7,0	8,6	6,1	8,3	3,3

54. Administrative Avoidable Factors per level of care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Lack of information	193	4	39	51	33	21	12
No avoidable factor	1597	44	306	492	298	243	74
Assessable cases	3096	85	735	977	610	396	101
% no avoidable factor	51,6	51,8	41,6	50,4	48,9	61,4	73,3
Accessible cases with avoidable factors	1499	41	429	485	312	153	27
Transport problem: Home to institution	59	3	21	15	7	4	1
Transport problem: Institution to institution	193	13	66	50	42	16	1
Lack of accessibility: Barriers to entry	37	0	11	13	10	0	0
Lack of accessibility: Other	22	0	8	10	2	2	0
Delay initiating critical care (Overburdened service)	198	4	42	71	53	27	1
Lack of health care facilities: ICU	258	1	34	90	79	52	1
Lack of health care facilities: Blood/blood products	96	2	39	35	8	6	4
Lack of health care facilities: Other	90	2	16	47	19	4	0
Lack of appropriately trained staff: Doctors	635	11	242	186	120	45	12
Lack of appropriately trained staff: Nurses	424	17	161	118	69	36	6
Communication problems: Technical	50	4	12	16	9	4	3
Communication problems: Interpersonal	93	4	22	39	20	3	4
Other	282	8	72	83	59	32	7
Number of DDPCP	3289	89	774	1028	643	417	113
Distribution of avoidable factors							
Transport problem: Home to institution	3,9	7,3	4,9	3,1	2,2	2,6	3,7
Transport problem: Institution to institution	12,9	31,7	15,4	10,3	13,5	10,5	3,7
Lack of accessibility: Barriers to entry	2,5	0,0	2,6	2,7	3,2	0,0	0,0
Lack of accessibility: Other	1,5	0,0	1,9	2,1	0,6	1,3	0,0
Delay initiating critical care (Overburdened service)	13,2	9,8	9,8	14,6	17,0	17,6	3,7
Lack of health care facilities: ICU	17,2	2,4	7,9	18,6	25,3	34,0	3,7
Lack of health care facilities: Blood/blood products	6,4	4,9	9,1	7,2	2,6	3,9	14,8
Lack of health care facilities: Other	6,0	4,9	3,7	9,7	6,1	2,6	0,0
Lack of appropriately trained staff: Doctors	42,4	26,8	56,4	38,4	38,5	29,4	44,4
Lack of appropriately trained staff: Nurses	28,3	41,5	37,5	24,3	22,1	23,5	22,2
Communication problems: Technical	3,3	9,8	2,8	3,3	2,9	2,6	11,1
Communication problems: Interpersonal	6,2	9,8	5,1	8,0	6,4	2,0	14,8
Other	18,8	19,5	16,8	17,1	18,9	20,9	25,9
Distribution of avoidable factors in assessable cases							
Transport problem: Home to institution	1,9	3,5	2,9	1,5	1,1	1,0	1,0
Transport problem: Institution to institution	6,2	15,3	9,0	5,1	6,9	4,0	1,0
Lack of accessibility: Barriers to entry	1,2	0,0	1,5	1,3	1,6	0,0	0,0
Lack of accessibility: Other	0,7	0,0	1,1	1,0	0,3	0,5	0,0
Delay initiating critical care (Overburdened service)	6,4	4,7	5,7	7,3	8,7	6,8	1,0
Lack of health care facilities: ICU	8,3	1,2	4,6	9,2	13,0	13,1	1,0
Lack of health care facilities: Blood/blood products	3,1	2,4	5,3	3,6	1,3	1,5	4,0
Lack of health care facilities: Other	2,9	2,4	2,2	4,8	3,1	1,0	0,0
Lack of appropriately trained staff: Doctors	20,5	12,9	32,9	19,0	19,7	11,4	11,9
Lack of appropriately trained staff: Nurses	13,7	20,0	21,9	12,1	11,3	9,1	5,9
Communication problems: Technical	1,6	4,7	1,6	1,6	1,5	1,0	3,0
Communication problems: Interpersonal	3,0	4,7	3,0	4,0	3,3	0,8	4,0
Other	9,1	9,4	9,8	8,5	9,7	8,1	6,9

55. Resuscitation Avoidable Factors and level of care

Description	CHC	DH	RH	TH	NC	Pvt H	All	Outside
Lack of information	10	80	64	46	18	16	257	23
Not attempted	19	185	154	115	39	8	641	121
Assessable cases	60	509	810	482	360	89	2391	81
No avoidable factor	35	264	512	331	245	61	1523	75
% unavoidable cases	58,3	51,9	63,2	68,7	68,1	68,5	63,7	92,6
Avoidable cases	25	245	298	151	115	28	868	6
Airway problems	7	40	40	21	15	0	124	1
Breathing problems	6	87	106	47	38	10	296	2
Circulation problems	11	147	161	76	67	17	483	4
Drug problems	1	26	11	10	1	1	53	3
Investigation problems	2	29	22	10	4	0	67	0
Monitoring problems	4	60	41	17	8	2	134	2
DDPCP	89	774	1028	643	417	113	3289	225
Distribution of avoidable factors								
Airway problems	28,0	16,3	13,4	13,9	13,0	0,0	14,3	16,7
Breathing problems	24,0	35,5	35,6	31,1	33,0	35,7	34,1	33,3
Circulation problems	44,0	60,0	54,0	50,3	58,3	60,7	55,6	66,7
Drug problems	4,0	10,6	3,7	6,6	0,9	3,6	6,1	50,0
Investigation problems	8,0	11,8	7,4	6,6	3,5	0,0	7,7	0,0
Monitoring problems	16,0	24,5	13,8	11,3	7,0	7,1	15,4	33,3

56. Medical care Avoidable Factors and Level of Care

Description	CHC	DH	RH	PTH	NCH	CHC	DH	RH	PTH	NCH
COMMUNITY HEALTH CENTRE	**89**									
Managed at this level	82	413	492	308	131					
Lack of information	6	29	32	25	5					
Assessable cases	76	384	460	283	126					
No avoidable factor	33	234	285	174	88					
% no avoidable factors	43,4	60,9	62,0	61,5	69,8					
						Distribution of avoidable				
Cases with Avoidable factors	**43**	**150**	**175**	**109**	**38**	**factors**				
Initial assessment	19	83	81	58	12	44,2	55,3	46,3	53,2	31,6
Problem with recognition / diagnosis	28	80	91	57	21	65,1	53,3	52,0	52,3	55,3
Delay in referring the patient	18	53	74	33	13	41,9	35,3	42,3	30,3	34,2
Managed at inappropriate level	19	30	22	18	4	44,2	20,0	12,6	16,5	10,5
Incorrect management (Wrong diagnosis)	11	15	10	11	1	25,6	10,0	5,7	10,1	2,6
Sub-standard management (Correct diagnosis)	17	34	46	19	8	39,5	22,7	26,3	17,4	21,1
Not monitored / Infrequently monitored	11	6	10	5	1	25,6	4,0	5,7	4,6	2,6
Prolonged abnormal monitoring with no action taken	5	10	14	12	3	11,6	6,7	8,0	11,0	7,9
DISTRICT HOSPITAL		**774**								
Managed at this level		753	328	309	164					
Lack of information		46	26	30	9					
Assessable cases		707	302	279	155					
No avoidable factor		146	123	131	90					
% no avoidable factors		20,7	40,7	47,0	58,1					
						Distribution of avoidable				
Cases with Avoidable factors		**561**	**179**	**148**	**65**	**factors**				
Initial assessment		205	56	58	18		36,5	31,3	39,2	27,7
Problem with recognition / diagnosis		327	83	72	33		58,3	46,4	48,6	50,8
Delay in referring the patient		154	85	75	26		27,5	47,5	50,7	40,0
Managed at inappropriate level		193	46	33	15		34,4	25,7	22,3	23,1
Incorrect management (Wrong diagnosis)		125	22	23	8		22,3	12,3	15,5	12,3
Sub-standard management (Correct diagnosis)		297	66	59	19		52,9	36,9	39,9	29,2
Not monitored / Infrequently monitored		112	13	8	10		20,0	7,3	5,4	15,4
Prolonged abnormal monitoring with no action taken		124	21	14	7		22,1	11,7	9,5	10,8
REGIONAL HOSPITAL			**1028**							
Managed at this level			983	144	89					
Lack of information			50	13	9					
Assessable cases			933	131	80					
No avoidable factor			377	66	42					
% no avoidable factors			40,4	50,4	52,5					
						Distribution of avoidable				
Cases with Avoidable factors			**556**	**65**	**38**	**factors**				
Initial assessment			120	19	13			21,6	29,2	34,2
Problem with recognition / diagnosis			251	23	17			45,1	35,4	44,7
Delay in referring the patient			54	23	18			9,7	35,4	47,4
Managed at inappropriate level			48	12	5			8,6	18,5	13,2
Incorrect management (Wrong diagnosis)			67	4	5			12,1	6,2	13,2
Sub-standard management (Correct diagnosis)			325	27	20			58,5	41,5	52,6
Not monitored / Infrequently monitored			97	5	10			17,4	7,7	26,3
Prolonged abnormal monitoring with no action taken			89	6	7			16,0	9,2	18,4

Description	CHC	DH	RH	PTH	NCH	CHC	DH	RH	PTH	NCH
TERTIARY HOSPITAL / ABOVE				**643**	**417**					
Managed at this level				591	393					
Lack of information				19	19					
Assessable cases				572	374					
No avoidable factor				332	245					
% no avoidable factors				58,0	65,5					
Cases with Avoidable factors				**240**	**129**	**Distribution of avoidable factors**				
Initial assessment				34	14				14,2	10,9
Problem with recognition / diagnosis				96	41				40,0	31,8
Delay in referring the patient				7	1				2,9	0,8
Managed at inappropriate level				7	0				2,9	0,0
Incorrect management (Wrong diagnosis)				36	17				15,0	13,2
Sub-standard management (Correct diagnosis)				140	79				58,3	61,2
Not monitored / Infrequently monitored				24	20				10,0	15,5
Prolonged abnormal monitoring with no action taken				31	30				12,9	23,3

57. Detailed analysis of major conditions, medical care avoidable facts and level of care (Brown, managed at that level and died, yellow transferred from that level to higher levels)

Died at this level	Obstetric Haemorrhage				Hypertensive disorders of pregnancy				Non-pregnancy related infection				Pregnancy related sepsis			
	20	157	177	119	20	97	184	220	8	187	277	234	2	19	64	65
	CHC	DH	RH	Tert H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H
COMMUNITY HEALTH CENTRE	**20**				**20**				**8**				**2**			
Managed at this level	20	106	89	64	17	66	111	107	7	98	130	97	2	11	32	23
Lack of information	1	4	5	6	2	4	3	3	0	9	14	7	0	2	0	2
Assessable cases	19	102	84	58	15	62	108	104	7	89	116	90	2	9	32	21
No avoidable factor	2	67	56	39	5	32	57	57	2	37	60	52	1	7	24	13
% Good care at that level	10,5	65,7	66,7	66,7	33,3	51,6	52,8	54,8	28,6	41,6	51,7	57,8	50,0	77,8	75,0	75,0
Number Assessable cases with AF	17	35	28	19	10	30	51	47	5	52	56	38	1	2	8	8
Initial assessment	4	23	11	11	4	15	19	18	1	35	26	21	1	1	3	3
Problem with recognition / diagnosis	12	14	15	9	3	23	31	29	3	24	27	22	1	1	4	4
Delay in referring the patient	9	8	10	3	4	14	21	19	3	16	27	14	0	0	3	0
Managed at inappropriate level	7	8	0	3	5	7	13	10	2	6	3	3	0	0	1	0
Incorrect management (Wrong diagnosis)	4	2	2	2	2	9	3	3	0	2	3	5	1	0	0	0
Sub-standard management (Corrrect diagnosis)	7	6	4	2	5	9	22	12	1	11	13	10	0	0	2	0
Not monitored / Infrequently monitored	3	2	2	0	4	1	2	1	2	1	3	2	0	1	0	1
Prolonged abnormal monitoring with no action taken	3	1	3	1	1	5	6	9	1	1	4	3	0	0	0	0
DISTRICT HOSPITAL		**157**				**97**				**187**				**19**		
Managed at this level		155	62	63		95	62	106		181	85	113		18	30	33
Lack of information		8	3	5		7	6	5		11	9	11		3	1	1
Assessable cases		147	59	58		88	56	101		170	76	102		15	29	32
No avoidable factor		4	15	16		18	27	52		64	40	56		3	8	15
% Good care at that level		2,7	25,4	27,6		20,5	48,2	51,5		37,6	52,6	54,9		20,0	27,6	46,9
Number Assessable cases with AF		143	44	42	0	70	29	49	0	106	36	46	0	12	21	17
Initial assessment		52	14	14		29	7	12		38	13	20		6	6	4
Problem with recognition / diagnosis		84	17	16		43	15	20		56	17	28		7	11	10
Delay in referring the patient		43	15	21		22	17	19		32	17	25		4	10	9
Managed at inappropriate level		42	11	10		33	6	10		38	11	9		5	6	3
Incorrect management (Wrong diagnosis)		27	9	7		25	5	6		16	1	5		0	2	1
Sub-standard management (Correct diagnosis)		95	22	23		33	12	16		53	12	14		8	6	6
Not monitored / Infrequently monitored		35	5	5		11	2	5		18	3	2		1	0	2
Prolonged abnormal monitoring with no action taken		38	4	9		17	9	2		21	3	5		4	2	2

Died at this level	Obstetric Haemorrhage				Hypertensive disorders of pregnancy				Non-pregnancy related infection				Pregnancy related sepsis			
	20	157	177	119	20	97	184	220	8	187	277	234	2	19	64	65
	CHC	DH	RH	Tert H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H
REGIONAL HOSPITAL			**177**				**184**				**277**				**64**	
Managed at this level			166	21			178	64			263	45			64	17
Lack of information			6	1			7	4			12	3			2	2
Assessable cases			160	20			171	60			251	42			62	15
No avoidable factor			33	9			64	32			135	23			21	7
% Good are at that level			20,6	45,0			37,4	53,3			53,8	54,8			33,9	46,7
Number accessible cases with AF			127	11			107	28			116	19			41	8
Initial assessment			22	2			19	7			29	7			6	3
Problem with recognition / diagnosis			46	5			47	9			53	9			13	6
Delay in referring the patient			9	2			11	7			14	7			3	6
Managed at inappropriate level			13	2			9	2			7	3			2	2
Incorrect management (Wrong diagnosis)			13	1			16	3			13	0			6	0
Sub-standard management (Correct diagnosis)			86	3			65	17			64	8			26	4
Not monitored / Infrequently monitored			27	3			21	6			17	1			4	2
Prolonged abnormal monitoring with no action taken			20	0			19	5			17	4			8	2
TERTIARY HOSPITAL / ABOVE				**119**				**220**				**234**				**65**
Managed at this level				106				197				225				62
Lack of information				1				6				10				3
Assessable cases				105				191				215				59
No avoidable factor				50				110				156				31
% Good are at that level				47,6				57,6				72,6				52,5
Number accessible cases with AF				55				81				59				28
Initial assessment				8				11				8				4
Problem with recognition / diagnosis				18				16				27				17
Delay in referring the patient				0				1				3				0
Managed at inappropriate level				0				1				0				0
Incorrect management (Wrong diagnosis)				3				12				8				5
Sub-standard management (Correct diagnosis)				39				55				26				17
Not monitored / Infrequently monitored				10				9				5				0
Prolonged abnormal monitoring with no action taken				12				9				10				8

58. Distribution (%) of Avoidable Factors

Died at this level	Obstetric Haemorrhage				Hypertensive disorders of pregnancy				Non-pregnancy related infection				Pregnancy related sepsis			
	20	157	177	119	20	97	184	220	8	187	277	234	2	19	64	65

OH	CHC	DH	RH	Tert H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H	CHC	DH	RH	Tert. H
COMMUNITY HEALTH CENTRE																
Initial assessment	23,5	65,7	39,3	57,9	40,0	50,0	37,3	38,3	20,0	67,3	46,4	55,3	100,0	50,0	37,5	37,5
Problem with recognition / diagnosis	70,6	40,0	53,6	47,4	30,0	76,7	60,8	61,7	60,0	46,2	48,2	57,9	100,0	50,0	50,0	50,0
Delay in referring the patient	52,9	22,9	35,7	15,8	40,0	46,7	41,2	40,4	60,0	30,8	48,2	36,8	0,0	0,0	37,5	0,0
Managed at inappropriate level	41,2	22,9	0,0	15,8	50,0	23,3	25,5	21,3	40,0	11,5	5,4	7,9	0,0	0,0	12,5	0,0
Incorrect management (Wrong diagnosis)	23,5	5,7	7,1	10,5	20,0	30,0	5,9	6,4	0,0	3,8	5,4	13,2	100,0	0,0	0,0	0,0
Sub-standard management (Correct diagnosis)	41,2	17,1	14,3	10,5	50,0	30,0	43,1	25,5	20,0	21,2	23,2	26,3	0,0	0,0	25,0	0,0
Not monitored / Infrequently monitored	17,6	5,7	7,1	0,0	40,0	3,3	3,9	2,1	40,0	1,9	5,4	5,3	0,0	50,0	0,0	12,5
Prolonged abnormal monitoring with no action taken	17,6	2,9	10,7	5,3	10,0	16,7	11,8	19,1	20,0	1,9	7,1	7,9	0,0	0,0	0,0	0,0
DISTRICT HOSPITAL																
Initial assessment		36,4	31,8	33,3		41,4	24,1	24,5		35,8	36,1	43,5		50,0	28,6	23,5
Problem with recognition / diagnosis		58,7	38,6	38,1		61,4	51,7	40,8		52,8	47,2	60,9		58,3	52,4	58,8
Delay in referring the patient		30,1	34,1	50,0		31,4	58,6	38,8		30,2	47,2	54,3		33,3	47,6	52,9
Managed at inappropriate level		29,4	25,0	23,8		47,1	20,7	20,4		35,8	30,6	19,6		41,7	28,6	17,6
Incorrect management (Wrong diagnosis)		18,9	20,5	16,7		35,7	17,2	12,2		15,1	2,8	10,9		0,0	9,5	5,9
Sub-standard management (Correct diagnosis)		66,4	50,0	54,8		47,1	41,4	32,7		50,0	33,3	30,4		66,7	28,6	35,3
Not monitored / Infrequently monitored		24,5	11,4	11,9		15,7	6,9	10,2		17,0	8,3	4,3		8,3	0,0	11,8
Prolonged abnormal monitoring with no action taken		26,6	9,1	21,4		24,3	31,0	4,1		19,8	8,3	10,9		33,3	9,5	11,8
REGIONAL HOSPITAL																
Initial assessment			17,3	18,2			17,8	25,0			25,0	36,8			14,6	37,5
Problem with recognition / diagnosis			36,2	45,5			43,9	32,1			45,7	47,4			31,7	75,0
Delay in referring the patient			7,1	18,2			10,3	25,0			12,1	36,8			7,3	75,0
Managed at inappropriate level			10,2	18,2			8,4	7,1			6,0	15,8			4,9	25,0
Incorrect management (Wrong diagnosis)			10,2	9,1			15,0	10,7			11,2	0,0			14,6	0,0
Sub-standard management (Correct diagnosis)			67,7	27,3			60,7	60,7			55,2	42,1			63,4	50,0
Not monitored / Infrequently monitored			21,3	27,3			19,6	21,4			14,7	5,3			9,8	25,0
Prolonged abnormal monitoring with no action taken			15,7	0,0			17,8	17,9			14,7	21,1			19,5	25,0
TERTIARY HOSPITAL / ABOVE																0,0
Initial assessment				14,5				13,6				13,6				14,3
Problem with recognition / diagnosis				32,7				19,8				45,8				60,7
Delay in referring the patient				0,0				1,2				5,1				0,0
Managed at inappropriate level				0,0				1,2				0,0				0,0
Incorrect management (Wrong diagnosis)				5,5				14,8				13,6				17,9
Sub-standard management (Correct diagnosis)				70,9				67,9				44,1				60,7
Not monitored / Infrequently monitored				18,2				11,1				8,5				0,0
Prolonged abnormal monitoring with no action taken				21,8				11,1				16,9				28,6

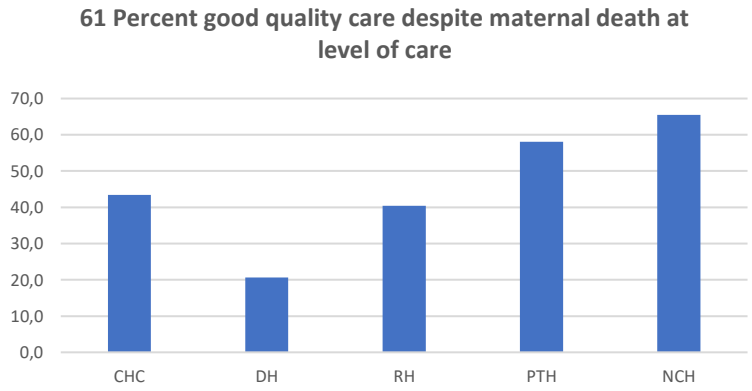
59. Primary health care facilities

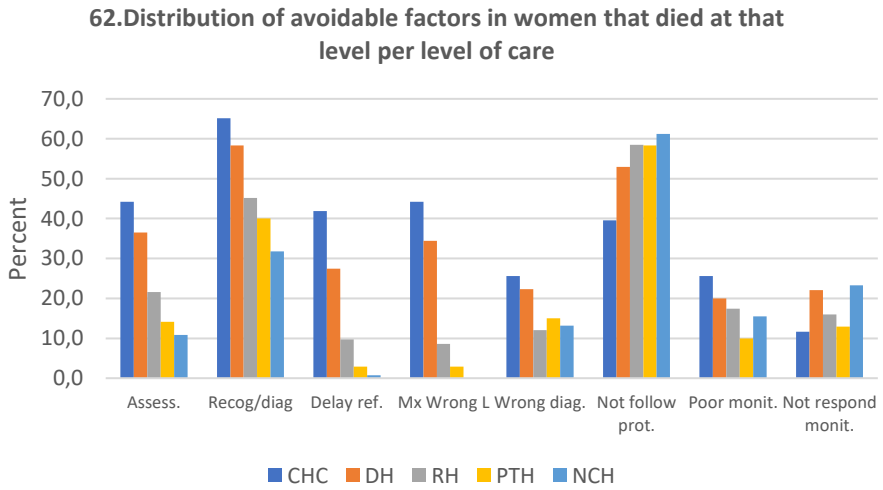
Deliveries in Primary care	Clinic n=874	Cumulative %	CHC n=257	Cumulative %	DH n=243	Cumulative %
<1/month (<12/year)	475	54,3	18	7,0		
<2/month (<24/year)	595	68,1				
<3/month (<36/year)	654	74,8				
<4/month (<48/year)	701	80,2				
<5/month (<60/year)	738	84,4				
<6/month (<72/year)	759	86,8				
<7/month (<84/year)	779	89,1				
<8/month (<96/year)	791	90,5				
<9/month (<108 year)	801	91,6				
<10/month (<120/year)	813	93,0				
>10/month (>120/year)	65					
>1/day (>365/year)	12					
<1/day (<365/year)	862		160	62,3	46	18,9
<2/day (<730/year)			200	77,8	87	35,8
<3/day (<1095/year)			227	88,3	117	48,1
<4/day (<1460/year)			240	93,4	136	56,0
<5/day (<1825/year)			251	97,7	158	65,0
>5/day (>1825/year)	1		6		85	
2000-2999/year	1		5		37	
3000-3999/year			1		17	
4000-4999/year			0		13	
5000+/year			0		6	

60. Medical care of pregnant women who died

Care of woman at site of death

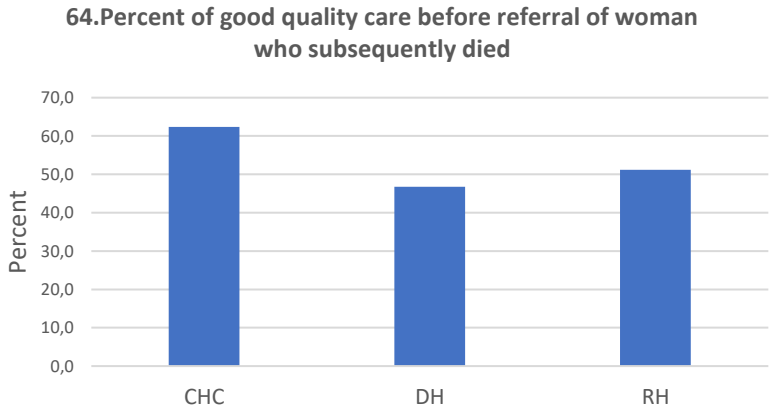
Description	CHC	DH	RH	PTH	NCH
Died at this level	89	774	1028	643	417
Managed at this level	82	753	983	591	393
Lack of information	6	46	50	19	19
Assessable cases	76	707	933	572	374
No avoidable factor	33	146	377	332	245
% no avoidable factors	43,4	20,7	40,4	58,0	65,5
Cases with Avoidable factors	43	561	556	240	129
Initial assessment	19	205	120	34	14
Problem with recognition / diagnosis	28	327	251	96	41
Delay in referring the patient	18	154	54	7	1
Managed at inappropriate level	19	193	48	7	0
Incorrect management (Wrong diagnosis)	11	125	67	36	17
Sub-standard management (Correct diagnosis)	17	297	325	140	79
Not monitored / Infrequently monitored	11	112	97	24	20
Prolonged abnormal monitoring with no action taken	5	124	89	31	30
Distribution of avoidable factors in women that died					
Initial assessment	44,2	36,5	21,6	14,2	10,9
Problem with recognition / diagnosis	65,1	58,3	45,1	40,0	31,8
Delay in referring the patient	41,9	27,5	9,7	2,9	0,8
Managed at inappropriate level	44,2	34,4	8,6	2,9	0,0
Incorrect management (Wrong diagnosis)	25,6	22,3	12,1	15,0	13,2
Sub-standard management (Correct diagnosis)	39,5	52,9	58,5	58,3	61,2
Not monitored / Infrequently monitored	25,6	20,0	17,4	10,0	15,5
Prolonged abnormal monitoring with no action taken	11,6	22,1	16,0	12,9	23,3

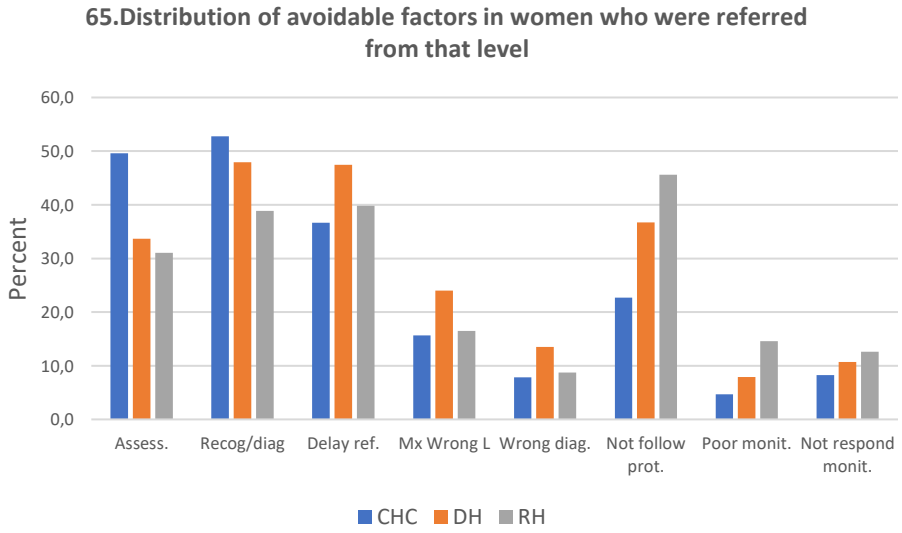




63.Care of woman prior to referral from site

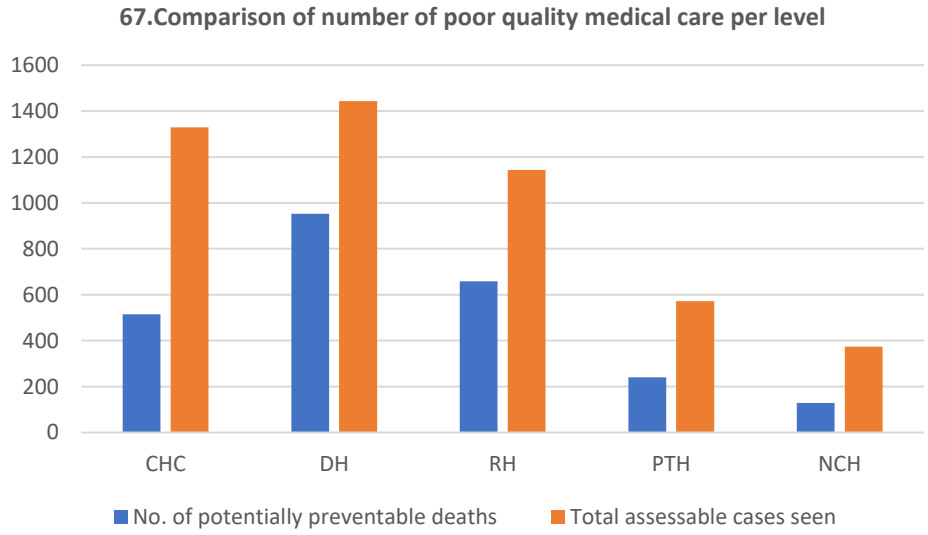
Description	CHC	DH	RH
Managed at this level prior to referral	1344	801	233
Lack of information	91	65	22
Assessable cases	1253	736	211
No avoidable factor	781	344	108
% no avoidable factors	62,3	46,7	51,2
Cases with Avoidable factors in referral	472	392	103
Initial assessment	234	132	32
Problem with recognition / diagnosis	249	188	40
Delay in referring the patient	173	186	41
Managed at inappropriate level	74	94	17
Incorrect management (Wrong diagnosis)	37	53	9
Sub-standard management (Correct diagnosis)	107	144	47
Not monitored / Infrequently monitored	22	31	15
Prolonged abnormal monitoring with no action taken	39	42	13
Distribution of Avoidable factors in referred cases			
Initial assessment	49,6	33,7	31,1
Problem with recognition / diagnosis	52,8	48,0	38,8
Delay in referring the patient	36,7	47,4	39,8
Managed at inappropriate level	15,7	24,0	16,5
Incorrect management (Wrong diagnosis)	7,8	13,5	8,7
Sub-standard management (Correct diagnosis)	22,7	36,7	45,6
Not monitored / Infrequently monitored	4,7	7,9	14,6
Prolonged abnormal monitoring with no action taken	8,3	10,7	12,6

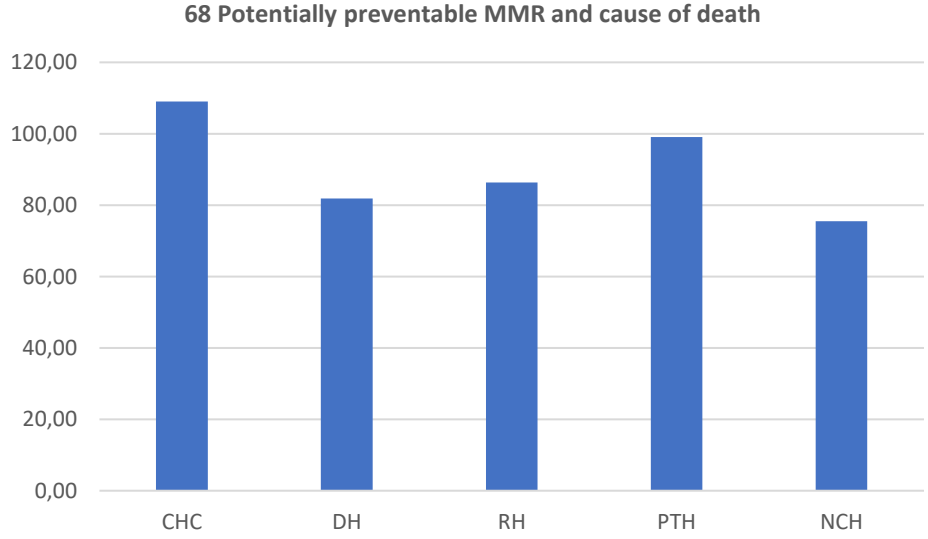




66. Maternity Workload at different levels of care

Medical care	Clinic/CHC	CHC	DH	RH	Tert. H
Died (triennium)	89	89	774	1028	1060
Managed (triennium)	1554	1554	1216	591	984
MD /year	30	30	258	343	353
MD managed at some point/year	518	518	405	197	328
MD Per facility died/year	0,026	0,115	1,062	7,615	16,061
MD per facility managed at some point/year	0,456	2,016	1,668	4,378	14,909
No. potentially preventable deaths (triennium)	515	515	953	659	369
Total assessable cases seen (triennium)	1329	1329	1443	1144	572
% potentially preventable deaths of assessable cases	38,8	38,8	66,0	57,6	64,5
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	109,0	141,2	81,9	86,4	89,3





69. Administrative avoidable factors and level of care

Description	All	CHC	DH	RH	TH	NC	Pvt H
Distribution of avoidable factors in assessable cases							
Lack of appropriately trained staff: Doctors	20,5	12,9	32,9	19,0	19,7	11,4	11,9
Lack of appropriately trained staff: Nurses	13,7	20,0	21,9	12,1	11,3	9,1	5,9
Distribution in potentially preventable deaths							
Lack of appropriately trained staff: Doctors	42,4	26,8	56,4	38,4	38,5	29,4	44,4
Lack of appropriately trained staff: Nurses	28,3	41,5	37,5	24,3	22,1	23,5	22,2

70. Non-pregnancy related infections medical care avoidable factors per level of care

Died at this level	8	187	277	234
	CHC	**DH**	**RH**	**Tert. H**
Managed at this level	7	181	263	225
Lack of information	0	11	12	10
Assessable cases	7	170	251	215
No avoidable factor	2	64	135	156
% Good care at that level	28,6	37,6	53,8	72,6
Number assessable cases with AF	5	106	116	59
Initial assessment	1	38	29	8
Problem with recognition / diagnosis	3	56	53	27
Delay in referring the patient	3	32	14	3
Managed at inappropriate level	2	38	7	0
Incorrect management (Wrong diagnosis)	0	16	13	8
Sub-standard management (Correct diagnosis)	1	53	64	26
Not monitored / Infrequently monitored	2	18	17	5
Prolonged abnormal monitoring with no action taken	1	21	17	10
Distribution of AF in assessable cases				
Initial assessment	20,0	35,8	25,0	13,6
Problem with recognition / diagnosis	60,0	52,8	45,7	45,8
Delay in referring the patient	60,0	30,2	12,1	5,1
Managed at inappropriate level	40,0	35,8	6,0	0,0
Incorrect management (Wrong diagnosis)	0,0	15,1	11,2	13,6
Sub-standard management (Correct diagnosis)	20,0	50,0	55,2	44,1
Not monitored / Infrequently monitored	40,0	17,0	14,7	8,5
Prolonged abnormal monitoring with no action taken	20,0	19,8	14,7	16,9

Transferred from	**CHC**	**DH**	**RH**
Managed at this level	325	198	45
Lack of information	30	20	3
Assessable cases	295	178	42
No avoidable factor	149	96	23
% Good care at that level	57,8	54,9	54,8
Number assessable cases with AF	146	82	19
Initial assessment	82	33	7
Problem with recognition / diagnosis	73	45	9
Delay in referring the patient	57	42	7
Managed at inappropriate level	12	20	3
Incorrect management (Wrong diagnosis)	10	6	0
Sub-standard management (Correct diagnosis)	34	26	8
Not monitored / Infrequently monitored	6	5	1
Prolonged abnormal monitoring with no action taken	8	8	4
Distribution of AF in assessable cases			
Initial assessment	56,2	40,2	36,8
Problem with recognition / diagnosis	50,0	54,9	47,4
Delay in referring the patient	39,0	51,2	36,8
Managed at inappropriate level	8,2	24,4	15,8
Incorrect management (Wrong diagnosis)	6,8	7,3	0,0
Sub-standard management (Correct diagnosis)	23,3	31,7	42,1
Not monitored / Infrequently monitored	4,1	6,1	5,3
Prolonged abnormal monitoring with no action taken	5,5	9,8	21,1

	Non-pregnancy related infections				
Medical care	**Clinic/CHC**	**CHC only**	**DH**	**RH**	**Tert. H**
Died (triennium)	8	8	187	277	234
Managed (triennium)	332	332	379	308	225
MD /year	3	3	62	92	78
MD managed at some point/year	111	111	126	103	75
MD Per facility died/year	0,002	0,010	0,257	2,052	3,545
MD per facility managed at some point/year	0,097	0,431	0,520	2,281	3,409
No. potentially preventable deaths (triennium)	151	151	188	135	59
Total assessable cases seen (triennium)	302	302	348	293	215
% potentially preventable deaths of assessable cases	50,0	50,0	54,0	46,1	27,4
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	31,97	41,41	16,15	17,69	14,28

Note: MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.

Interpretation: On average
A Clinic/CHC will see a woman who subsequently dies due to NPRI 0,1/year i.e. in 10 years the clinic/CHC will see one woman who subsequently dies
A CHC will see a woman who subsequently dies due to NPRI 0,4/year i.e. in 2 years the CHC will see one woman who subsequently dies
A district hospital will see a will see a woman who subsequently dies due to NPRI 0,4/year i.e. in 2 years the DH will see one woman who subsequently dies
A regional hospital will see will see a woman who subsequently dies due to NPRI 2/year i.e. in 6 months the RH will see one woman who subsequently dies
A tertiary hospital will see will see a woman who subsequently dies due to NPRI 3,5/year i.e. in 4-5 months the RH will see one woman who subsequently dies

Potentially preventable MMR per level
This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.
It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

Summary: For NPRI the Clinics/CHCs and DH clinicians very rarely see severely sick women with NPRI and at the clinics, when they do, the care is poor.

71. Pre-existing Medical and surgical conditions: medical care avoidable factors per level of care

Died at this level	**11 CHC**	**73 DH**	**120 RH**	**213 Tert. H**
Managed at this level	10	71	115	206
Lack of information	1	2	9	9
Assessable cases	9	69	106	197
No avoidable factor	4	11	49	135
% Good care at that level	44,4	15,9	46,2	68,5
Number assessable cases with AF	5	58	57	62
Initial assessment	4	15	15	4
Problem with recognition / diagnosis	5	31	34	28
Delay in referring the patient	1	22	7	1
Managed at inappropriate level	3	27	7	3
Incorrect management (Wrong diagnosis)	2	15	8	10
Sub-standard management (Correct diagnosis)	3	21	25	29
Not monitored / Infrequently monitored	1	7	6	4
Prolonged abnormal monitoring with no action taken	0	9	10	9
Distribution of AF in assessable cases				
Initial assessment	80,0	25,9	26,3	6,5
Problem with recognition / diagnosis	100,0	53,4	59,6	45,2
Delay in referring the patient	20,0	37,9	12,3	1,6
Managed at inappropriate level	60,0	46,6	12,3	4,8
Incorrect management (Wrong diagnosis)	40,0	25,9	14,0	16,1
Sub-standard management (Correct diagnosis)	60,0	36,2	43,9	46,8
Not monitored / Infrequently monitored	20,0	12,1	10,5	6,5
Prolonged abnormal monitoring with no action taken	0,0	15,5	17,5	14,5

Transferred from	**CHC**	**DH**	**RH**
Managed at this level	176	117	47
Lack of information	15	11	8
Assessable cases	161	106	39
No avoidable factor	113	60	21
% Good care at that level	70,2	56,6	53,8
Number assessable cases with AF	48	46	18
Initial assessment	24	21	6
Problem with recognition / diagnosis	21	29	5
Delay in referring the patient	24	27	11
Managed at inappropriate level	13	15	6
Incorrect management (Wrong diagnosis)	3	6	1
Sub-standard management (Correct diagnosis)	5	8	7
Not monitored / Infrequently monitored	2	1	1
Prolonged abnormal monitoring with no action taken	4	3	0
Distribution of AF in assessable cases			
Initial assessment	50,0	45,7	33,3
Problem with recognition / diagnosis	43,8	63,0	27,8
Delay in referring the patient	50,0	58,7	61,1
Managed at inappropriate level	27,1	32,6	33,3
Incorrect management (Wrong diagnosis)	6,3	13,0	5,6
Sub-standard management (Correct diagnosis)	10,4	17,4	38,9
Not monitored / Infrequently monitored	4,2	2,2	5,6
Prolonged abnormal monitoring with no action taken	8,3	6,5	0,0

	Medical and Surgical conditions				
Medical care	**Clinic/CHC**	**CHC only**	**DH**	**RH**	**Tert. H**
Died (triennium)	11	11	73	120	213
Managed (triennium)	186	186	188	162	206
MD /year	4	4	24	40	71
MD managed at some point/year	62	63	54	69	213
MD Per facility died/year	0,003	0,014	0,100	0,889	3,227
MD per facility managed at some point/year	0,055	0,244	0,222	1,526	9,682
No. potentially preventable deaths (triennium)	53	53	104	75	62
Total assessable cases seen (triennium)	170	170	175	145	197
% potentially preventable deaths of assessable cases	31,2	31,2	59,4	51,7	31,5
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	11,22	14,54	8,93	9,83	15,01

Note: MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.

Interpretation: On average
A Clinic/CHC will see a woman who subsequently dies due to M&S 0,05/year i.e. in 20 years the clinic/CHC will see one woman who subsequently dies
A CHC will see a woman who subsequently dies due to M&S 0,2/year i.e. in 5 years the CHC will see one woman who subsequently dies
A district hospital will see a will see a woman who subsequently dies due to M&S 0,2/year i.e. in 5 years the DH will see one woman who subsequently dies
A regional hospital will see will see a woman who subsequently dies due to M&S 1,5/year i.e. in 8 months the RH will see one woman who subsequently dies
A tertiary hospital will see will see a woman who subsequently dies due to M&S 10/year i.e. in 5 weeks the RH will see one woman who subsequently dies

Potentially preventable MMR per level
This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.
It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

Summary: For M&S the Clinics/CHCs and DH clinicians very rarely see severely sick women with M&S. The cases are mostly referred from the clinic/CHC and the care adequate. The care at the district hospital if the woman dies there is poor.

72. Hypertensive disorders of pregnancy: medical care avoidable factors per level of care

Died at this level	**20**	**97**	**184**	**220**
	CHC	**DH**	**RH**	**Tert. H**
Managed at this level	17	95	178	197
Lack of information	2	7	7	6
Assessable cases	15	88	171	191
No avoidable factor	5	18	64	110
% Good care at that level	33,3	20,5	37,4	57,6
Number assessable cases with AF	10	70	107	81
Initial assessment	4	29	19	11
Problem with recognition / diagnosis	3	43	47	16
Delay in referring the patient	4	22	11	1
Managed at inappropriate level	5	33	9	1
Incorrect management (Wrong diagnosis)	2	25	16	12
Sub-standard management (Correct diagnosis)	5	33	65	55
Not monitored / Infrequently monitored	4	11	21	9
Prolonged abnormal monitoring with no action taken	1	17	19	9
Distribution of AF in assessable cases				
Initial assessment	40,0	41,4	17,8	13,6
Problem with recognition / diagnosis	30,0	61,4	43,9	19,8
Delay in referring the patient	40,0	31,4	10,3	1,2
Managed at inappropriate level	50,0	47,1	8,4	1,2
Incorrect management (Wrong diagnosis)	20,0	35,7	15,0	14,8
Sub-standard management (Correct diagnosis)	50,0	47,1	60,7	67,9
Not monitored / Infrequently monitored	40,0	15,7	19,6	11,1
Prolonged abnormal monitoring with no action taken	10,0	24,3	17,8	11,1

Transferred from	**CHC**	**DH**	**RH**
Managed at this level	301	263	242
Lack of information	12	18	11
Assessable cases	289	245	231
No avoidable factor	151	97	96
% Good care at that level	54,8	51,5	53,3
Number assessable cases with AF	138	148	135
Initial assessment	56	48	26
Problem with recognition / diagnosis	86	78	56
Delay in referring the patient	58	58	18
Managed at inappropriate level	35	49	11
Incorrect management (Wrong diagnosis)	17	36	19
Sub-standard management (Correct diagnosis)	48	61	82
Not monitored / Infrequently monitored	8	18	27
Prolonged abnormal monitoring with no action taken	21	28	24
Distribution of AF in assessable cases			
Initial assessment	40,6	32,4	19,3
Problem with recognition / diagnosis	62,3	52,7	41,5
Delay in referring the patient	42,0	39,2	13,3
Managed at inappropriate level	25,4	33,1	8,1
Incorrect management (Wrong diagnosis)	12,3	24,3	14,1
Sub-standard management (Corrrect diagnosis)	34,8	41,2	60,7
Not monitored / Infrequently monitored	5,8	12,2	20,0
Prolonged abnormal monitoring with no action taken	15,2	18,9	17,8

	Hypertensive disorders of pregnancy				
Medical care	**Clinic/CHC**	**CHC only**	**DH**	**RH**	**Tert. H**
Died (triennium)	20	20	97	184	220
Managed (triennium)	321	321	360	426	220
MD / year	7	7	32	61	73
MD per at some point/year	107	107	120	142	73
MD Per facility died/year	0,006	0,026	0,133	1,363	3,333
MD per facility managed at some point/year	0,094	0,416	0,494	3,156	3,333
No. potentially preventable deaths (triennium)	148	148	218	242	81
Total assessable cases seen (triennium)	304	304	333	402	191
% potentially preventable deaths of assessable cases	48,7	48,7	65,5	60,2	42,4
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	31,33	40,59	18,72	31,71	19,61

Note: MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.

Interpretation: On average
A Clinic/CHC will see a woman who subsequently dies due to HDP 0,01/year i.e. in 10 years the clinic/CHC will see one woman who subsequently dies
A CHC will see a woman who subsequently dies due to HDP 0,4/year i.e. in 2 years the CHC will see one woman who subsequently dies
A district hospital will see a will see a woman who subsequently dies due to HDP 0,5/year i.e. in 2 years the DH will see one woman who subsequently dies
A regional hospital will see will see a woman who subsequently dies due to HDP 3/year i.e. in 4 months the RH will see one woman who subsequently dies
A tertiary hospital will see will see a woman who subsequently dies due to HDP 3/year i.e. in 4 months the RH will see one woman who subsequently dies

Potentially preventable MMR per level
This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.
It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

Summary: For HDP the Clinics/CHCs and DH clinicians very rarely see severely sick women with HDP and at the clinics, when they do, the care is poor. Management of women who die due to HDP at DH and RH also receive mostly poor care. The problems are mostly assessment and recognition at the clinics/CHCs and DH and not following standard protocols at DH and RH.

73.Obstetric Haemorrhage: medical care avoidable factors per level of care

Died at this level	**20**	**157**	**177**	**119**
	CHC	**DH**	**RH**	**Tert. H**
Managed at this level	20	155	166	106
Lack of information	1	8	6	1
Assessable cases	19	147	160	105
No avoidable factor	2	4	33	50
% Good care at that level	10,5	2,7	20,6	47,6
Number assessable cases with AF	17	143	127	55
Initial assessment	4	52	22	8
Problem with recognition / diagnosis	12	84	46	18
Delay in referring the patient	9	43	9	0
Managed at inappropriate level	7	42	13	0
Incorrect management (Wrong diagnosis)	4	27	13	3
Sub-standard management (Correct diagnosis)	7	95	86	39
Not monitored / Infrequently monitored	3	35	27	10
Prolonged abnormal monitoring with no action taken	3	38	20	12
Distribution of AF in assessable cases				
Initial assessment	23,5	36,4	17,3	14,5
Problem with recognition / diagnosis	70,6	58,7	36,2	32,7
Delay in referring the patient	52,9	30,1	7,1	0,0
Managed at inappropriate level	41,2	29,4	10,2	0,0
Incorrect management (Wrong diagnosis)	23,5	18,9	10,2	5,5
Sub-standard management (Correct diagnosis)	41,2	66,4	67,7	70,9
Not monitored / Infrequently monitored	17,6	24,5	21,3	18,2
Prolonged abnormal monitoring with no action taken	17,6	26,6	15,7	21,8

Transferred from	**CHC**	**DH**	**RH**
Managed at this level	259	125	21
Lack of information	15	8	1
Assessable cases	244	117	20
No avoidable factor	162	31	9
% Good care at that level	66,7	27,6	45,0
Number assessable cases with AF	82	86	11
Initial assessment	45	28	2
Problem with recognition / diagnosis	38	33	5
Delay in referring the patient	21	36	2
Managed at inappropriate level	11	21	2
Incorrect management (Wrong diagnosis)	6	16	1
Sub-standard management (Correct diagnosis)	12	45	3
Not monitored / Infrequently monitored	4	10	3
Prolonged abnormal monitoring with no action taken	5	13	0
Distribution of AF in assessable cases			
Initial assessment	54,9	32,6	18,2
Problem with recognition / diagnosis	46,3	38,4	45,5
Delay in referring the patient	25,6	41,9	18,2
Managed at inappropriate level	13,4	24,4	18,2
Incorrect management (Wrong diagnosis)	7,3	18,6	9,1
Sub-standard management (Correct diagnosis)	14,6	52,3	27,3
Not monitored / Infrequently monitored	4,9	11,6	27,3
Prolonged abnormal monitoring with no action taken	6,1	15,1	0,0

	Obstetric haemorrhage				
Medical care	**Clinic/CHC**	**CHC only**	**DH**	**RH**	**Tert. H**
Died (triennium)	20	20	157	177	119
Managed (triennium)	279	279	280	187	106
MD /year	7	7	52	59	40
MD managed at some point/year	93	93	93	62	35
MD Per facility died/year	0,006	0,026	0,215	1,311	1,803
MD per facility managed at some point/year	0,082	0,362	0,384	1,385	1,606
No. potentially preventable deaths (triennium)	99	99	229	138	55
Total assessable cases seen (triennium)	263	263	264	180	105
% potentially preventable deaths of assessable cases	37,6	37,6	86,7	76,7	52,4
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	20,96	27,15	19,67	18,08	13,32

Note: MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.

Interpretation: On average
A Clinic/CHC will see a woman who subsequently dies due to OH 0,1/year i.e. in 10 years the clinic/CHC will see one woman who subsequently dies
A CHC will see a woman who subsequently dies due to OH 0,35/year i.e. in 3 years the CHC will see one woman who subsequently dies
A district hospital will see a will see a woman who subsequently dies due to OH 0,4/year i.e. in 2 years the DH will see one woman who subsequently dies
A regional hospital will see will see a woman who subsequently dies due to OH 1,4/year i.e. in 9-10 months the RH will see one woman who subsequently dies
A tertiary hospital will see will see a woman who subsequently dies due to OH 1,8/year i.e. in 5 months the RH will see one woman who subsequently dies

Potentially preventable MMR per level
This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.
It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

Summary: For OH the Clinics/CHCs and DH clinicians very rarely see severely sick women with OH and at the clinics, when they do, the care is very poor. Management of women who die due to OH at DH and RH also receive mostly very poor care. The problems are mostly assessment and recognition at the clinics/CHCs and DH and not following standard protocols at DH and RH. Women transferred from DH with OH also had poor care.

74.Pregnancy related sepsis following a viable pregnancy: medical care avoidable factors per level of care

Died at this level	**2**	**19**	**64**	**65**
	CHC	**DH**	**RH**	**Tert. H**
Managed at this level	2	18	64	62
Lack of information	0	3	2	3
Assessable cases	2	15	62	59
No avoidable factor	1	3	21	31
% Good care at that level	50,0	20,0	33,9	52,5
Number assessable cases with AF	1	12	41	28
Initial assessment	1	6	6	4
Problem with recognition / diagnosis	1	7	13	17
Delay in referring the patient	0	4	3	0
Managed at inappropriate level	0	5	2	0
Incorrect management (Wrong diagnosis)	1	0	6	5
Sub-standard management (Correct diagnosis)	0	8	26	17
Not monitored / Infrequently monitored	0	1	4	0
Prolonged abnormal monitoring with no action taken	0	4	8	8
Distribution of AF in assessable cases				
Initial assessment	100,0	50,0	14,6	14,3
Problem with recognition / diagnosis	100,0	58,3	31,7	60,7
Delay in referring the patient	0,0	33,3	7,3	0,0
Managed at inappropriate level	0,0	41,7	4,9	0,0
Incorrect management (Wrong diagnosis)	100,0	0,0	14,6	17,9
Sub-standard management (Correct diagnosis)	0,0	66,7	63,4	60,7
Not monitored / Infrequently monitored	0,0	8,3	9,8	0,0
Prolonged abnormal monitoring with no action taken	0,0	33,3	19,5	28,6

Transferred from	**CHC**	**DH**	**RH**
Managed at this level	66	63	17
Lack of information	4	2	2
Assessable cases	62	61	15
No avoidable factor	44	23	7
% Good care at that level	75,0	46,9	46,7
Number assessable cases with AF	18	38	8
Initial assessment	7	10	3
Problem with recognition / diagnosis	9	21	6
Delay in referring the patient	3	19	6
Managed at inappropriate level	1	9	2
Incorrect management (Wrong diagnosis)	0	3	0
Sub-standard management (Correct diagnosis)	2	12	4
Not monitored / Infrequently monitored	2	2	2
Prolonged abnormal monitoring with no action taken	0	4	2
Distribution of AF in assessable cases			
Initial assessment	38,9	26,3	37,5
Problem with recognition / diagnosis	50,0	55,3	75,0
Delay in referring the patient	16,7	50,0	75,0
Managed at inappropriate level	5,6	23,7	25,0
Incorrect management (Wrong diagnosis)	0,0	7,9	0,0
Sub-standard management (Correct diagnosis)	11,1	31,6	50,0
Not monitored / Infrequently monitored	11,1	5,3	25,0
Prolonged abnormal monitoring with no action taken	0,0	10,5	25,0

Medical care	Clinic/CHC	Pregnancy related sepsis CHC only	DH	RH	Tert. H
Died (triennium)	2	2	19	64	65
Managed (triennium)	68	68	81	81	62
MD /year	1	1	6	21	22
MD managed at some point/year	23	23	27	27	21
MD Per facility died/year	0,001	0,003	0,026	0,474	0,985
MD per facility managed at some point/year	0,020	0,088	0,111	0,600	0,939
No. potentially preventable deaths (triennium)	19	19	50	49	28
Total assessable cases seen (triennium)	64	64	76	77	59
% potentially preventable deaths of assessable cases	29,7	29,7	65,8	63,6	47,5
Number live births (triennium)	472346	364632	1164308	763095	413064
No. facilities	1137	257	243	45	22
Births per facility/year	138	472	1597	5653	6259
Potentially preventable MMR	4,02	5,21	4,29	6,42	6,78

Note: MaMMAS cannot differentiate between a CHC and Clinic, one assumes most cases are from CHCs.

Interpretation: On average
A Clinic/CHC will see a woman who subsequently dies due to PRS 0,02/year i.e. in 20 years the clinic/CHC will see one woman who subsequently dies
A CHC will see a woman who subsequently dies due to PRS 0,1/year i.e. in 10 years the CHC will see one woman who subsequently dies
A district hospital will see a will see a woman who subsequently dies due to PRS 0,1/year i.e. in 10 years the DH will see one woman who subsequently dies
A regional hospital will see will see a woman who subsequently dies due to PRS 0,6/year i.e. in 20 months the RH will see one woman who subsequently dies
A tertiary hospital will see will see a woman who subsequently dies due to PRS 1/year i.e. in 12 months the RH will see one woman who subsequently dies

Potentially preventable MMR per level
This is a measure of quality of care of an emergency at the level. It is the number of potentially preventable deaths divided by the births at that level.
It is important to note that this does not take into account the volume of work a facility does; e.g. a PHC will see many diverse patients ranging from chronic diseases to child health and antenatal care.

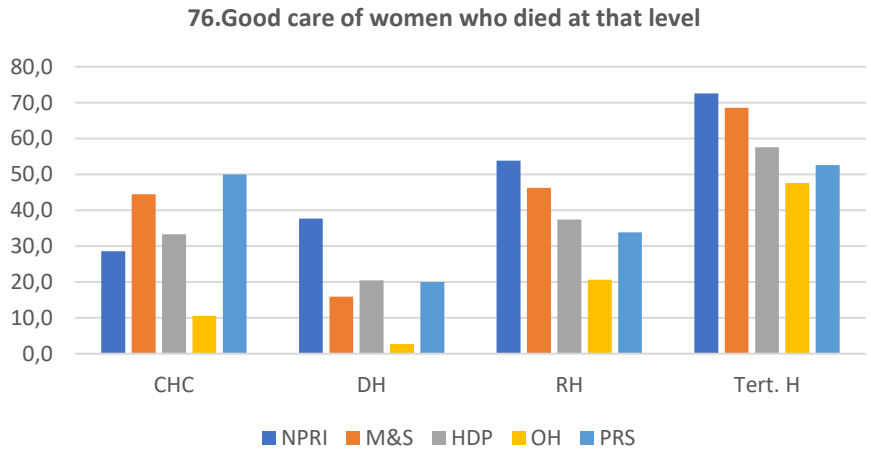
Summary: For PRS the Clinics/CHCs and DH clinicians very rarely see severely sick women with PRS and at the clinics, when they do, the care is very poor. Management of women who die due to PRS at DH and RH also receive mostly very poor care. The problems are mostly assessment and recognition at the clinics/CHCs and DH and not following standard protocols at DH and RH. Women transferred from DH with OH also had poor care.

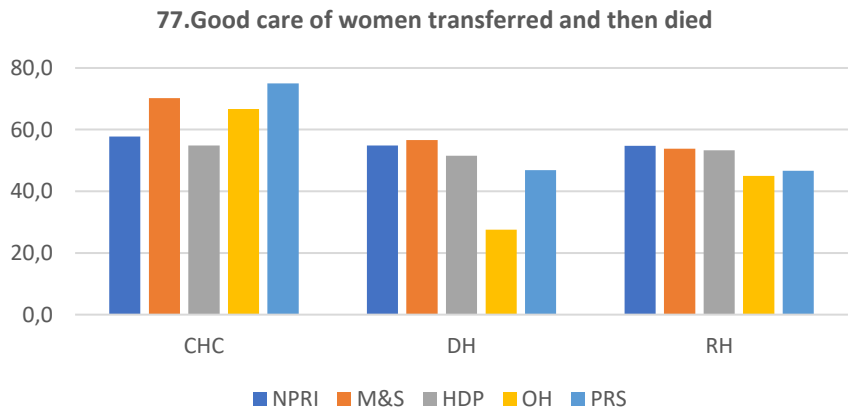
75. Good care at different levels of care

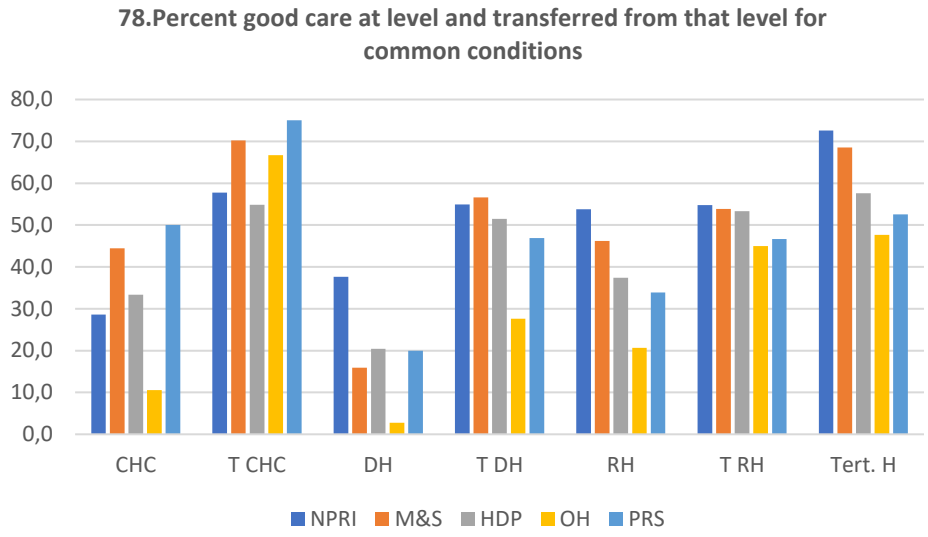
% Good care at that level where woman Died	CHC	DH	RH	Tert. H
NPRI	28,6	37,6	53,8	72,6
M&S	44,4	15,9	46,2	68,5
HDP	33,3	20,5	37,4	57,6
OH	10,5	2,7	20,6	47,6
PRS	50,0	20,0	33,9	52,5

% Good care at that level where woman Transferred and subsequently died	CHC	DH	RH
NPRI	57,8	54,9	54,8
M&S	70,2	56,6	53,8
HDP	54,8	51,5	53,3
OH	66,7	27,6	45,0
PRS	75,0	46,9	46,7

% Good care of pregnant women who died	CHC	Trans. CHC	DH	Trans. DH	RH	Trans. RH	Tert. H
NPRI	28,6	57,8	37,6	54,9	53,8	54,8	72,6
M&S	44,4	70,2	15,9	56,6	46,2	53,8	68,5
HDP	33,3	54,8	20,5	51,5	37,4	53,3	57,6
OH	10,5	66,7	2,7	27,6	20,6	45,0	47,6
PRS	50,0	75,0	20,0	46,9	33,9	46,7	52,5





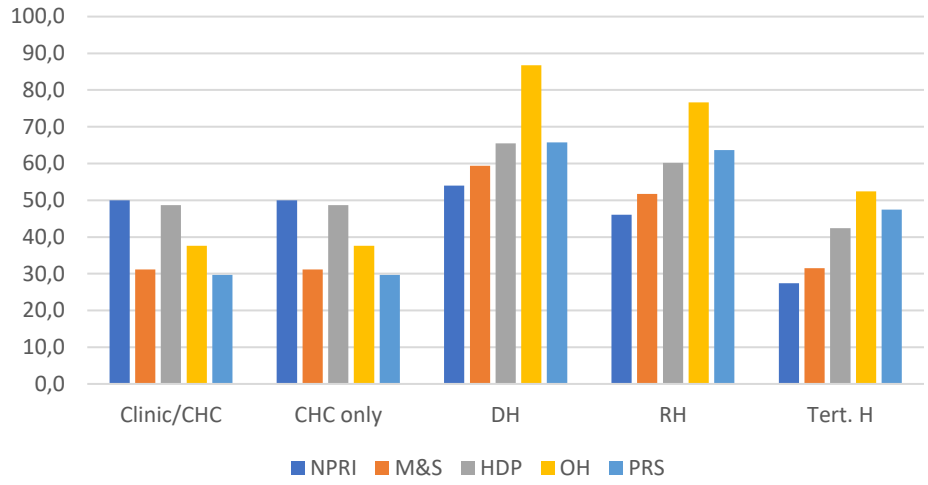

78.Percent good care at level and transferred from that level for common conditions
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
CHC
T CHC
DH
T DH
RH
T RH
Tert. H
NPRI
M&S
HDP
OH
PRS

79. Proportion potentially preventable deaths for major cause by level of care

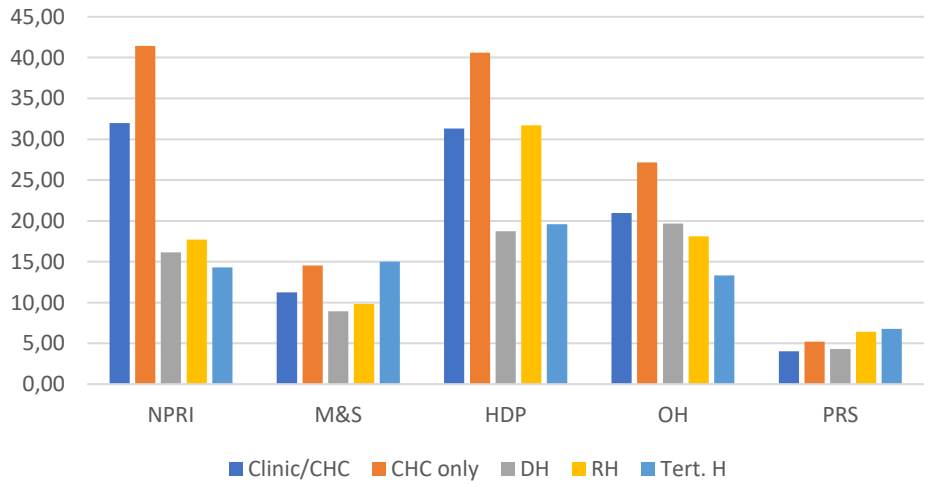
% potentially preventable deaths of assessable cases	Clinic/CHC	CHC only	DH	RH	Tert. H
NPRI	50,0	50,0	54,0	46,1	27,4
M&S	31,2	31,2	59,4	51,7	31,5
HDP	48,7	48,7	65,5	60,2	42,4
OH	37,6	37,6	86,7	76,7	52,4
PRS	29,7	29,7	65,8	63,6	47,5

Potentially preventable MMR	Clinic/CHC	CHC only	DH	RH	Tert. H
NPRI	31,97	41,41	16,15	17,69	14,28
M&S	11,22	14,54	8,93	9,83	15,01
HDP	31,33	40,59	18,72	31,71	19,61
OH	20,96	27,15	19,67	18,08	13,32
PRS	4,02	5,21	4,29	6,42	6,78

80.Percent potentially preventable deaths of assessable cases



81. Potentially preventable MMR of cases managed at that level



82. Maternity workload at different levels of care

Deliveries in Primary care	Clinic n=874	Cumulative %	CHC n=257	Cumulative %	DH n=243	Cumulative %
<1/month (<12/year)	475	54,3	18	7,0		
<2/month (<24/year)	595	68,1				
<3/month (<36/year)	654	74,8				
<4/month (<48/year)	701	80,2				
<5/month (<60/year)	738	84,4				
<6/month (<72/year)	759	86,8				
<7/month (<84/year)	779	89,1				
<8/month (<96/year)	791	90,5				
<9/month (<108 year)	801	91,6				
<10/month (<120/year)	813	93,0				
>10/month (>120/year)	65					
1>1/day (>365/year)	12					
<1/day (<365/year)	862		160	62,3	46	18,9
<2/day (<730/year)			200	77,8	87	35,8
<3/day (<1095/year)			227	88,3	117	48,1
<4/day (<1460/year)			240	93,4	136	56,0
<5/day (<1825/year)			251	97,7	158	65,0
>5/day (>1825/year)	1		6		85	
2000-2999/year	1		5		37	
3000-3999/year			1		17	
4000-4999/year			0		13	
5000+/year			0		6	

83. Maternal deaths per underlying cause and district 2017-2019

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD	Live births	iMMR	Total DHIS deaths	Diff
A Nzo	2	2	2	0	1	7	2	2	1	0	2	0		1	22	36504	60,27	22	0
Amatole + Buffalo City	17	17	1	2	3	9	10	4	0	7	2	0		3	75	64293	116,65	63	12
Chris Hani	3	15	0	1	3	11	4	0	1	0	3	1	1	1	44	33622	130,87	41	3
Joe Gqabi	0	1	0	1	0	3	2	0	1	0	0	0			8	13980	57,22	7	1
Nelson Mandela Bay	10	19	0	1	0	14	9	0	0	2	2	0			57	57020	99,96	67	-10
OR Tambo	24	34	2	7	13	26	36	2	2	4	4	1	1	2	158	87192	181,21	164	-6
Sarah Baartman	3	2	0	0	0	1	2	0	0	3	1	0			12	17519	68,50	14	-2
Eastern Cape	59	90	5	12	20	71	65	8	5	16	14	2	2	7	376	310130	121,24	378	-2
Fezile Dabi	1	4	3	4	0	4	12	3	0	1	0	0			32	21469	149,05	34	-2
Lejwelesputwa	2	16	3	5	0	13	9	1	0	0	0	0			49	29507	166,06	51	-2
Mangaung	17	10	0	8	6	11	20	3	0	0	0	0	1	2	78	47542	164,07	73	5
Thabo Mofutsanyane	7	5	0	4	7	15	13	2	0	2	1	0		1	57	39040	146,00	54	3
Xhariep	1	0	0	0	0	1	2	0	0	0	0	0			4	2446	163,53	3	1
Free State	28	35	6	21	13	44	56	9	0	3	1	0	1	3	220	140004	157,14	215	5
City JHB	38	36	6	18	12	22	46	4	1	7	6	2	1	2	201	206216	97,35	216	-15
City of Tshawne	47	52	12	12	4	25	45	4	2	0	2	1	0	0	206	178934	115,24	208	-2
Ekhruleni	17	63	4	17	12	37	43	1	3	4	9	1	1	0	211	183814	114,81	238	-27
Sedibeng	4	15	0	1	8	11	8	1	0	0	1	0	0	0	52	44949	114,99	53	-1
West Rand	8	9	6	4	5	11	6	1	0	2	1	0	1	0	55	47734	114,75	58	-3
Gauteng (adjusted)	117	173	29	52	40	105	149	12	6	13	19	5	4	2	725	661647	109,58	773	-48

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD	Live births	iMMR	Total DHIS deaths	Diff
Amajuba	2	11	2	1	1	4	5	1	0	1	0	0	1		29	27949	103,76	22	7
eThekwini	61	65	7	15	13	24	21	3	1	4	3	0	6	9	232	185955	124,76	181	51
Harry Gwala (Sisonke)	1	7	2	1	0	3	1	2	0	0	1	0		1	19	23586	80,56	17	2
iLembi	2	5	3	3	1	3	3	1	0	2	0	0		1	24	33624	71,38	24	0
King Cetshwayo	12	17	2	7	3	8	15	2	0	1	0	0	2	3	72	60143	119,71	74	-2
Ugu	5	7	1	7	1	4	4	2	0	0	0	0	1		32	40068	79,86	33	-1
uMgungundlovu	17	23	3	3	7	5	13	1	2	3	3	0	2		82	54450	150,60	75	7
Umkhanyakude	9	6	2	1	1	4	4	1	0	1	2	0			31	47055	65,88	32	-1
Umzinyathi	2	3	0	1	2	6	3	1	0	0	1	1		1	21	32786	64,05	17	4
Uthukela	4	9	0	0	2	5	6	2	0	1	1	0		2	32	36695	87,21	33	-1
Zululand	2	11	0	1	0	7	4	3	1	1	3	0		3	36	49271	73,07	36	0
Kwa-Zulu-Natal	117	164	22	40	31	73	79	19	4	14	14	1	12	20	610	591582	103,11	544	66
Capricorn	34	64	3	13	19	38	43	1	4	4	4	1	0	1	231	82856	278,29	192	39
Mopani	8	21	8	3	3	21	9	3	1	3	2	2	0	0	85	76822	110,05	76	9
Sekhekhune	5	14	3	3	1	22	14	0	1	8	2	0	0	0	75	76657	97,40	52	23
Vhembe	1	14	4	1	0	15	10	2	0	3	1	1	0	1	55	89626	61,25	66	-11
Waterberg	4	15	3	3	1	10	10	4	0	1	0	0	0	0	53	44620	118,12	44	9
Limpopo (Adjusted)	53	128	22	24	24	107	86	11	7	20	10	4	0	2	497	370581	134,22	430	67
Ehlanzeni	19	29	9	15	6	26	27	5	0	2	1	0	1	2	142	120896	117,46	110	32
Gert Sibande	3	17	1	0	1	14	11	3	0	1	0	0			51	56737	89,89	51	0
Nkangala	9	15	5	16	3	24	18	0	0	7	2	0			99	59869	165,36	84	15
Mpumalanga	31	61	15	31	10	64	56	8	0	10	3	0	1	2	292	237502	122,95	245	47
Bojanala Platinum	11	15	6	6	3	7	16	1	0	1	3	1			70	62633	111,76	60	10
Kenneth Kaunda Southern	13	18	4	7	6	10	13	0	1	0	0	1			73	38683	188,71	76	-3
RS Mompati	4	3	0	0	0	7	5	0	0	1	0	0			20	27827	71,87	15	5
NM Molema Central	7	22	1	3	5	16	22	2	0	2	2	0		1	83	45265	183,36	78	5
North West	35	58	11	16	14	40	56	3	1	4	5	2	0	1	246	174408	141,05	229	17

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD	Live births	iMMR	Total DHIS deaths	Diff
Francis Baard	6	10	1	2	0	5	6	1	0	3	0	1			35	24518	142,75	30	5
John Taolo Gaetsewe	0	1	1	3	0	6	7	2	0	0	0	0			20	13658	146,43	12	8
Namakwa	0	0	0	0	0	0	1	0	0	0	0	0			1	4385	22,81	1	0
Pixley Ka Seme	0	1	1	0	0	4	1	0	0	1	0	0		1	9	8589	104,79	5	4
ZFM	2	3	0	0	0	2	4	0	0	2	0	0			13	12639	102,86	12	1
Northern Cape	8	15	3	5	0	17	19	3	0	6	0	1	0	1	78	63789	122,28	60	18
Cape Winelands	4	6	1	0	3	4	4	0	0	2	0	1		1	26	46460	55,96	24	2
Central Karoo	0	1	0	1	0	1	0	0	0	0	0	0			3	2910	103,09	3	0
City of Cape Town	27	34	4	2	13	14	18	4	3	9	4	3	1		136	193680	70,22	117	19
Garden Route	3	6	0	0	0	2	1	0	0	4	0	1		1	18	28991	62,09	14	4
Overberg	1	0	1	0	1	0	1	0	0	0	1	0			5	11599	43,11	4	1
West Coast	0	2	0	0	0	0	1	1	0	1	0	0			5	12492	40,03	4	1
Western Cape	35	49	6	3	17	21	25	5	3	16	5	5	1	2	193	296132	65,17	166	27
South Africa	482	773	119	204	169	541	591	78	25	102	71	20	21	41	3237	2845775	113,76	3068	169

iMMR per underlying cause and district 2017-2019

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD
A Nzo	5,48	5,48	5,48	0,00	2,74	19,18	5,48	5,48	2,74	0,00	5,48	0,00	0,00	2,74	60,27
Amatole + Buffalo City	26,44	26,44	1,56	3,11	4,67	14,00	15,55	6,22	0,00	10,89	3,11	0,00	0,00	4,67	116,65
Chris Hani	8,92	44,61	0,00	2,97	8,92	32,72	11,90	0,00	2,97	0,00	8,92	2,97	2,97	2,97	130,87
Joe Gqabi	0,00	7,15	0,00	7,15	0,00	21,46	14,31	0,00	7,15	0,00	0,00	0,00	0,00	0,00	57,22
Nelson Mandela Bay	17,54	33,32	0,00	1,75	0,00	24,55	15,78	0,00	0,00	3,51	3,51	0,00	0,00	0,00	99,96
OR Tambo	27,53	38,99	2,29	8,03	14,91	29,82	41,29	2,29	2,29	4,59	4,59	1,15	1,15	2,29	181,21
Sarah Baartman	17,12	11,42	0,00	0,00	0,00	5,71	11,42	0,00	0,00	17,12	5,71	0,00	0,00	0,00	68,50
Eastern Cape	**19,02**	**29,02**	**1,61**	**3,87**	**6,45**	**22,89**	**20,96**	**2,58**	**1,61**	**5,16**	**4,51**	**0,64**	**0,64**	**2,26**	**121,24**
Fezile Dabi	4,66	18,63	13,97	18,63	0,00	18,63	55,89	13,97	0,00	4,66	0,00	0,00	0,00	0,00	149,05
Lejwelesputwa	6,78	54,22	10,17	16,95	0,00	44,06	30,50	3,39	0,00	0,00	0,00	0,00	0,00	0,00	166,06
Mangaung	35,76	21,03	0,00	16,83	12,62	23,14	42,07	6,31	0,00	0,00	0,00	0,00	2,10	4,21	164,07
Thabo Mofutsanyane	17,93	12,81	0,00	10,25	17,93	38,42	33,30	5,12	0,00	5,12	2,56	0,00	0,00	2,56	146,00
Xhariep	40,88	0,00	0,00	0,00	0,00	40,88	81,77	0,00	0,00	0,00	0,00	0,00	0,00	0,00	163,53
Free State	**20,00**	**25,00**	**4,29**	**15,00**	**9,29**	**31,43**	**40,00**	**6,43**	**0,00**	**2,14**	**0,71**	**0,00**	**0,71**	**2,14**	**157,14**
City JHB	18,22	17,65	2,85	8,54	5,69	10,82	22,20	1,71	0,57	3,42	2,85	1,14	0,57	1,14	97,35
City of Tshawne	26,41	28,81	6,60	6,60	2,40	13,81	25,21	2,40	1,20	0,00	1,20	0,60	0,00	0,00	115,24
Ekhruleni	9,05	34,09	2,09	9,05	6,26	20,18	23,66	0,70	1,39	2,09	4,87	0,70	0,70	0,00	114,81
Sedibeng	9,32	34,19	0,00	3,11	18,65	24,86	18,65	3,11	0,00	0,00	3,11	0,00	0,00	0,00	114,99
West Rand	15,75	18,00	13,50	9,00	11,25	22,50	13,50	2,25	0,00	4,50	2,25	0,00	2,25	0,00	114,75
Gauteng (adjusted)	**17,61**	**26,15**	**4,45**	**7,83**	**6,05**	**15,83**	**22,59**	**1,78**	**0,89**	**1,96**	**2,85**	**0,71**	**0,53**	**0,36**	**109,58**

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD
Amajuba	7,16	39,36	7,16	3,58	3,58	14,31	17,89	3,58	0,00	3,58	0,00	0,00	3,58	0,00	103,76
eThekwini	32,80	34,95	3,76	8,07	6,99	12,91	11,29	1,61	0,54	2,15	1,61	0,00	3,23	4,84	124,76
Harry Gwala (Sisonke)	4,24	29,68	8,48	4,24	0,00	12,72	4,24	8,48	0,00	0,00	4,24	0,00	0,00	4,24	19
iLembi	5,95	14,87	8,92	8,92	2,97	8,92	8,92	2,97	0,00	5,95	0,00	0,00	0,00	2,97	71,38
King Cetshwayo	19,95	28,27	3,33	11,64	4,99	13,30	24,94	3,33	0,00	1,66	0,00	0,00	3,33	4,99	119,71
Ugu	12,48	17,47	2,50	17,47	2,50	9,98	9,98	4,99	0,00	0,00	0,00	0,00	2,50	0,00	79,86
uMgungundlovu	31,22	42,24	5,51	5,51	12,86	9,18	23,88	1,84	3,67	5,51	5,51	0,00	3,67	0,00	150,60
Umkhanyakude	19,13	12,75	4,25	2,13	2,13	8,50	8,50	2,13	0,00	2,13	4,25	0,00	0,00	0,00	65,88
Umzinyathi	6,10	9,15	0,00	3,05	6,10	18,30	9,15	3,05	0,00	0,00	3,05	3,05	0,00	3,05	64,05
Uthukela	10,90	24,53	0,00	0,00	5,45	13,63	16,35	5,45	0,00	2,73	2,73	0,00	0,00	5,45	87,21
Zululand	4,06	22,33	0,00	2,03	0,00	14,21	8,12	6,09	2,03	2,03	6,09	0,00	0,00	6,09	73,07
Kwa-Zulu-Natal	**19,78**	**27,72**	**3,72**	**6,76**	**5,24**	**12,34**	**13,35**	**3,21**	**0,68**	**2,37**	**2,37**	**0,17**	**2,03**	**3,38**	**103,11**
Capricorn	41,08	76,86	3,98	15,90	22,53	46,38	51,68	1,33	5,30	5,30	5,30	1,33	0,00	1,33	278,29
Mopani	10,00	27,16	10,00	4,29	4,29	27,16	11,43	4,29	1,43	4,29	2,86	2,86	0,00	0,00	110,05
Sekhekhune	7,16	18,62	4,30	4,30	1,43	28,65	18,62	0,00	1,43	10,03	2,86	0,00	0,00	0,00	97,40
Vhembe	1,23	15,93	4,90	1,23	0,00	17,15	11,03	2,45	0,00	3,68	1,23	1,23	0,00	1,23	61,25
Waterberg	9,84	34,45	7,38	7,38	2,46	22,15	22,15	9,84	0,00	2,46	0,00	0,00	0,00	0,00	118,12
Limpopo (Adjusted)	**14,22**	**34,67**	**5,93**	**6,52**	**6,52**	**28,74**	**23,11**	**2,96**	**1,78**	**5,33**	**2,67**	**1,19**	**0,00**	**0,59**	**134,22**
Ehlanzeni	15,72	23,99	7,44	12,41	4,96	21,51	22,33	4,14	0,00	1,65	0,83	0,00	0,83	1,65	117,46
Gert Sibande	5,29	29,96	1,76	0,00	1,76	24,68	19,39	5,29	0,00	1,76	0,00	0,00	0,00	0,00	89,89
Nkangala	15,03	25,05	8,35	26,73	5,01	40,09	30,07	0,00	0,00	11,69	3,34	0,00	0,00	0,00	165,36
Mpumalanga	**13,05**	**25,68**	**6,32**	**13,05**	**4,21**	**26,95**	**23,58**	**3,37**	**0,00**	**4,21**	**1,26**	**0,00**	**0,42**	**0,84**	**122,95**
Bojanala Platinum	17,56	23,95	9,58	9,58	4,79	11,18	25,55	1,60	0,00	1,60	4,79	1,60	0,00	0,00	111,76
Kenneth Kaunda	33,61	46,53	10,34	18,10	15,51	25,85	33,61	0,00	2,59	0,00	0,00	2,59	0,00	0,00	188,71
RS Mompati	14,37	10,78	0,00	0,00	0,00	25,16	17,97	0,00	0,00	3,59	0,00	0,00	0,00	0,00	71,87
NM Molema	15,46	48,60	2,21	6,63	11,05	35,35	48,60	4,42	0,00	4,42	4,42	0,00	0,00	2,21	183,36
North West	**20,07**	**33,26**	**6,31**	**9,17**	**8,03**	**22,93**	**32,11**	**1,72**	**0,57**	**2,29**	**2,87**	**1,15**	**0,00**	**0,57**	**141,05**

Underlying Causes	M&S	NPRI	Ec	Misc	PRS	OH	HDP	AR	ADR	Emb	AC	Mcll	Unk	LI	Tot. MD
Francis Baard	24,47	40,79	4,08	8,16	0,00	20,39	24,47	4,08	0,00	12,24	0,00	4,08	0,00	0,00	142,75
John Taolo Gaetsewe	0,00	7,32	7,32	21,97	0,00	43,93	51,25	14,64	0,00	0,00	0,00	0,00	0,00	0,00	146,43
Namakwa	0,00	0,00	0,00	0,00	0,00	0,00	22,81	0,00	0,00	0,00	0,00	0,00	0,00	0,00	22,81
Pixley Ka Seme	0,00	11,64	11,64	0,00	0,00	46,57	11,64	0,00	0,00	11,64	0,00	0,00	0,00	11,64	104,79
ZFM	15,82	23,74	0,00	0,00	0,00	15,82	31,65	0,00	0,00	15,82	0,00	0,00	0,00	0,00	102,86
Northern Cape	**12,54**	**23,52**	**4,70**	**7,84**	**0,00**	**26,65**	**29,79**	**4,70**	**0,00**	**9,41**	**0,00**	**1,57**	**0,00**	**1,57**	**122,28**
Cape Winelands	8,61	12,91	2,15	0,00	6,46	8,61	8,61	0,00	0,00	4,30	0,00	2,15	0,00	2,15	55,96
Central Karoo	0,00	34,36	0,00	34,36	0,00	34,36	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	103,09
City of Cape Town	13,94	17,55	2,07	1,03	6,71	7,23	9,29	2,07	1,55	4,65	2,07	1,55	0,52	0,00	70,22
Garden Route	10,35	20,70	0,00	0,00	0,00	6,90	3,45	0,00	0,00	13,80	0,00	3,45	0,00	3,45	62,09
Overberg	8,62	0,00	8,62	0,00	8,62	0,00	8,62	0,00	0,00	0,00	8,62	0,00	0,00	0,00	43,11
West Coast	0,00	16,01	0,00	0,00	0,00	0,00	8,01	8,01	0,00	8,01	0,00	0,00	0,00	0,00	40,03
Western Cape	**11,82**	**16,55**	**2,03**	**1,01**	**5,74**	**7,09**	**8,44**	**1,69**	**1,01**	**5,40**	**1,69**	**1,69**	**0,34**	**0,68**	**65,17**
South Africa	**16,95**	**27,18**	**4,20**	**7,17**	**5,94**	**19,02**	**20,77**	**2,73**	**0,90**	**3,57**	**2,48**	**0,71**	**0,72**	**1,42**	**113,76**

84.Underlying causes of death 2008-2010

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	16	7	24	17	12	4	2	9	8	99
- MVA	2	1	10	5	3	2		3	1	27
- Other accidents			1	1	2					4
- Assault	3		1	3				1	3	11
- Herbal medicine	4	4	1	4	3		2			18
- Other	7	2	11	4	4	2		5	4	39
Medical and surgical disorders	**81**	**25**	**74**	**86**	**66**	**12**	**33**	**23**	**30**	**430**
- Cardiac disease	31	7	29	37	23	2	4	11	13	157
- Endocrine	1	2	5	4	3		1	2	2	20
- GIT	4	5	3	6	3	2	1		3	27
- CNS	6	4	3	8	5	2	2		6	36
- Respiratory	24	3	13	10	9	1	11	6	2	79
- Haematological	2	1	3	1	7	1	3	3		21
- Genito-urinary	1	1	2	4	1					9
- Auto-immune			2	1	6		3			12
- Psychiatric				5						5
- Neoplasm	1		4	4	5	1			2	17
- Other	11	2	10	6	4	3	8	1	2	47
Non-pregnancy-related infections	**280**	**157**	**310**	**544**	**219**	**157**	**153**	**58**	**91**	**1969**
- PCP pneumonia	41	26	38	39	51	29	28	8	1	261
- Other pneumonia	42	54	135	145	40	40	23	11	36	526
- TB	99	38	52	157	43	34	46	26	34	529
- Endocarditis									1	1
- UTI				3			1		1	5
- Appendicitis	1				1					2
- Malaria			2	1	1	2				6
- Cryptococcal meningitis	8	2	9	30	16	8	6		3	82
- Other meningitis	25	12	24	57	15	13	15	5	5	171
- Kaposi's sarcoma	4	1	3	6	2	3			3	22
- Toxoplasmosis				1						1
- Hepatitis	2	1	2	6	3	2	1			17
- Gastroenteritis	14	5	11	37	20	9	6	1		103
- Wasting syndrome	19	6	10	21	9	7	8			80
- Complications of antiretroviral therapy	5	9	11	24	11	3	5	2	3	73
- Other	20	3	13	17	7	7	14	5	4	90
Ectopic pregnancy	**5**	**3**	**20**	**14**	**10**	**6**	**7**	**6**	**4**	**75**
- Less than 20 weeks	5	3	20	11	8	3	6	6	3	65
- More than 20 weeks				3	2	3	1		1	10
Miscarriage	**10**	**13**	**43**	**66**	**24**	**12**	**9**	**4**	**5**	**186**
- Septic miscarriage	6	7	24	49	12	10	7	3	5	123
- Haemorrhage (non-traumatic)	3	4	13	13	8	1	1	1		44
- Uterine trauma			3	2	1					6
- GTD	1			2	1					4
- Following legal TOP		2	3		2	1	1			9
Hyperemesis gravidarum	**0**	**1**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**4**
Pregnancy-related sepsis	**40**	**21**	**62**	**49**	**22**	**23**	**23**	**4**	**14**	**258**
- Chorioamnionitis with ruptured membranes	1		1						1	3
- Chorioamnionitis without ruptured membranes	1	1	1		2	2				7
- Puerperal sepsis after NVD	19	8	29	25	14	11	19	1	5	131
- Puerperal sepsis after Caesarean section	19	12	31	22	6	10	4	3	8	115
- Bowel trauma at Caesarean section				2						2

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**102**	**61**	**130**	**99**	**107**	**77**	**78**	**13**	**21**	**688**
- Abruption with hypertension	7	5	8	10	3	7	3	1	3	47
- Abruption without hypertension	5	8	10	16	8	9	4	1	2	63
- Placenta praevia	2	1			7		3			13
- Other APH not specified	1	4	7	2	1	5	8		1	29
- Ruptured uterus with previous c/s	8	5	9	3	11	10	2		1	49
- Ruptured uterus without previous c/s	14	7	13	4	9	6	9		3	65
- Retained placenta	11		10	3	6	4	15	3		52
- Morbidly adherent placenta	4		7	5	2	1				19
- Uterine atony	4	2	7	10	7	4	9		1	44
- Vaginal trauma		2	2	2	1	1	1			9
- Cervical trauma	1		2		2	3	1	1	1	11
- Inverted uterus			1	1			2			4
- Bleeding during Caesarean section		4	11	4	4	3	2	1	1	30
- Bleeding after Caesarean section	22	9	35	31	25	13	4	4	7	150
- Other PPH not specified	23	14	8	8	21	11	15	2	1	103
Hypertension	**108**	**83**	**132**	**109**	**84**	**50**	**54**	**18**	**41**	**679**
- Chronic hypertension	5	5	12	1	4	1	3		3	34
- Proteinuric hypertension	30	36	28	27	27	10	18	4	19	199
- Eclampsia	56	26	79	71	35	32	22	11	15	347
- HELLP	14	15	10	9	18	7	11		2	86
- Liver rupture	2		3					3	1	9
- Acute fatty liver	1	1		1					1	4
Anaesthetic complications	**13**	**3**	**14**	**28**	**35**	**15**	**8**	**2**	**3**	**121**
- General anaesthetic	3	1	1	7	11	5	2	1	2	33
- Epidural anaesthetic				1						1
- Spinal anaesthetic	10	2	13	20	24	10	6	1	1	87
Embolism	**17**	**6**	**15**	**3**	**13**	**14**	**2**	**9**	**14**	**93**
- Pulmonary embolism	17	5	11	1	10	11	2	5	12	74
- Amniotic fluid embolism		1	4	2	3	3		4	2	19
Acute collapse - cause unknown	**23**	**18**	**37**	**29**	**10**	**5**	**5**	**6**	**15**	**148**
Unknown	**15**	**32**	**19**	**83**	**14**	**18**	**17**	**12**	**6**	**216**
- Death at home or outside health services	10	18	4	7	12	15	8	12	4	90
- No primary cause found	2	8	6	28	2		5		2	53
- Lack of information	3	6	9	48		3	4			73
										0
DDPCP	710	430	880	1129	616	393	392	164	252	4966

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Medical and surgical disorders	81	25	74	86	66	12	33	23	30	430
Non-pregnancy-related infections	280	157	310	544	219	157	153	58	91	1969
Ectopic pregnancy	5	3	20	14	10	6	7	6	4	75
Miscarriage	10	13	43	66	24	12	9	4	5	186
Hyperemesis gravidarum	0	1	0	2	0	0	1	0	0	4
Pregnancy-related sepsis	40	21	62	49	22	23	23	4	14	258
Obstetric haemorrhage	102	61	130	99	107	77	78	13	21	688
Hypertension	108	83	132	109	84	50	54	18	41	679
Anaesthetic complications	13	3	14	28	35	15	8	2	3	121
Embolism	17	6	15	3	13	14	2	9	14	93
Acute collapse - cause unknown	23	18	37	29	10	5	5	6	15	148
No primary cause found	2	8	6	28	2		5		2	53
Lack of information	3	6	9	48		3	4			73
Maternal deaths	684	405	852	1105	592	374	382	143	240	4777
Death at home or outside health services	10	18	4	7	12	15	8	12	4	90
Coincidental cause	16	7	24	17	12	4	2	9	8	99
TotaDDPCP	710	430	880	1129	616	393	392	164	252	4966
Total live births	359104	146332	580199	578245	366649	211979	169937	62005	287501	2761951

85. iMMR per sub-category cause of death, per province 2008-2010

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	**4,46**	**4,78**	**4,14**	**2,94**	**3,27**	**1,89**	**1,18**	**14,51**	**2,78**	**3,58**
- MVA	0,56	0,68	1,72	0,86	0,82	0,94	0,00	4,84	0,35	0,98
- Other accidents	0,00	0,00	0,17	0,17	0,55	0,00	0,00	0,00	0,00	0,14
- Assault	0,84	0,00	0,17	0,52	0,00	0,00	0,00	1,61	1,04	0,40
- Herbal medicine	1,11	2,73	0,17	0,69	0,82	0,00	1,18	0,00	0,00	0,65
- Other	1,95	1,37	1,90	0,69	1,09	0,94	0,00	8,06	1,39	1,41
Medical and surgical disorders	**22,56**	**17,08**	**12,75**	**14,87**	**18,00**	**5,66**	**19,42**	**37,09**	**10,43**	**15,57**
- Cardiac disease	8,63	4,78	5,00	6,40	6,27	0,94	2,35	17,74	4,52	5,68
- Endocrine	0,28	1,37	0,86	0,69	0,82	0,00	0,59	3,23	0,70	0,72
- GIT	1,11	3,42	0,52	1,04	0,82	0,94	0,59	0,00	1,04	0,98
- CNS	1,67	2,73	0,52	1,38	1,36	0,94	1,18	0,00	2,09	1,30
- Respiratory	6,68	2,05	2,24	1,73	2,45	0,47	6,47	9,68	0,70	2,86
- Haematological	0,56	0,68	0,52	0,17	1,91	0,47	1,77	4,84	0,00	0,76
- Genito-urinary	0,28	0,68	0,34	0,69	0,27	0,00	0,00	0,00	0,00	0,33
- Auto-immune	0,00	0,00	0,34	0,17	1,64	0,00	1,77	0,00	0,00	0,43
- Psychiatric	0,00	0,00	0,00	0,86	0,00	0,00	0,00	0,00	0,00	0,18
- Neoplasm	0,28	0,00	0,69	0,69	1,36	0,47	0,00	0,00	0,70	0,62
- Other	3,06	1,37	1,72	1,04	1,09	1,42	4,71	1,61	0,70	1,70
Non-pregnancy-related infections	**77,97**	**107,29**	**53,43**	**94,08**	**59,73**	**74,06**	**90,03**	**93,54**	**31,65**	**71,29**
- PCP pneumonia	11,42	17,77	6,55	6,74	13,91	13,68	16,48	12,90	0,35	9,45
- Other pneumonia	11,70	36,90	23,27	25,08	10,91	18,87	13,53	17,74	12,52	19,04
- TB	27,57	25,97	8,96	27,15	11,73	16,04	27,07	41,93	11,83	19,15
- Endocarditis	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,35	0,04
- UTI	0,00	0,00	0,00	0,52	0,00	0,00	0,59	0,00	0,35	0,18
- Appendicitis	0,28	0,00	0,00	0,00	0,27	0,00	0,00	0,00	0,00	0,07
- Malaria	0,00	0,00	0,34	0,17	0,27	0,94	0,00	0,00	0,00	0,22
- Cryptococcal meningitis	2,23	1,37	1,55	5,19	4,36	3,77	3,53	0,00	1,04	2,97
- Other meningitis	6,96	8,20	4,14	9,86	4,09	6,13	8,83	8,06	1,74	6,19
- Kaposi's sarcoma	1,11	0,68	0,52	1,04	0,55	1,42	0,00	0,00	1,04	0,80
- Toxoplasmosis	0,00	0,00	0,00	0,17	0,00	0,00	0,00	0,00	0,00	0,04
- Hepatitis	0,56	0,68	0,34	1,04	0,82	0,94	0,59	0,00	0,00	0,62
- Gastroenteritis	3,90	3,42	1,90	6,40	5,45	4,25	3,53	1,61	0,00	3,73
- Wasting syndrome	5,29	4,10	1,72	3,63	2,45	3,30	4,71	0,00	0,00	2,90
- Complications of antiretroviral therapy	1,39	6,15	1,90	4,15	3,00	1,42	2,94	3,23	1,04	2,64
- Other	5,57	2,05	2,24	2,94	1,91	3,30	8,24	8,06	1,39	3,26
Ectopic pregnancy	**1,39**	**2,05**	**3,45**	**2,42**	**2,73**	**2,83**	**4,12**	**9,68**	**1,39**	**2,72**
- Less than 20 weeks	1,39	2,05	3,45	1,90	2,18	1,42	3,53	9,68	1,04	2,35
- More than 20 weeks	0,00	0,00	0,00	0,52	0,55	1,42	0,59	0,00	0,35	0,36
Miscarriage	**2,78**	**8,88**	**7,41**	**11,41**	**6,55**	**5,66**	**5,30**	**6,45**	**1,74**	**6,73**
- Septic miscarriage	1,67	4,78	4,14	8,47	3,27	4,72	4,12	4,84	1,74	4,45
- Haemorrhage (non-traumatic)	0,84	2,73	2,24	2,25	2,18	0,47	0,59	1,61	0,00	1,59
- Uterine trauma	0,00	0,00	0,52	0,35	0,27	0,00	0,00	0,00	0,00	0,22
- GTD	0,28	0,00	0,00	0,35	0,27	0,00	0,00	0,00	0,00	0,14
- Following legal TOP	0,00	1,37	0,52	0,00	0,55	0,47	0,59	0,00	0,00	0,33
Hyperemesis gravidarum	**0,00**	**0,68**	**0,00**	**0,35**	**0,00**	**0,00**	**0,59**	**0,00**	**0,00**	**0,14**
Pregnancy-related sepsis	**11,14**	**14,35**	**10,69**	**8,47**	**6,00**	**10,85**	**13,53**	**6,45**	**4,87**	**9,34**
- Chorioamnionitis with ruptured membranes	0,28	0,00	0,17	0,00	0,00	0,00	0,00	0,00	0,35	0,11
- Chorioamnionitis without ruptured membranes	0,28	0,68	0,17	0,00	0,55	0,94	0,00	0,00	0,00	0,25
- Puerperal sepsis after NVD	5,29	5,47	5,00	4,32	3,82	5,19	11,18	1,61	1,74	4,74
- Puerperal sepsis after Caesarean section	5,29	8,20	5,34	3,80	1,64	4,72	2,35	4,84	2,78	4,16
- Bowel trauma at Caesarean section	0,00	0,00	0,00	0,35	0,00	0,00	0,00	0,00	0,00	0,07

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**28,40**	**41,69**	**22,41**	**17,12**	**29,18**	**36,32**	**45,90**	**20,97**	**7,30**	**24,91**
- Abruption with hypertension	1,95	3,42	1,38	1,73	0,82	3,30	1,77	1,61	1,04	1,70
- Abruption without hypertension	1,39	5,47	1,72	2,77	2,18	4,25	2,35	1,61	0,70	2,28
- Placenta praevia	0,56	0,68	0,00	0,00	1,91	0,00	1,77	0,00	0,00	0,47
- Other APH not specified	0,28	2,73	1,21	0,35	0,27	2,36	4,71	0,00	0,35	1,05
- Ruptured uterus with previous c/s	2,23	3,42	1,55	0,52	3,00	4,72	1,18	0,00	0,35	1,77
- Ruptured uterus without previous c/s	3,90	4,78	2,24	0,69	2,45	2,83	5,30	0,00	1,04	2,35
- Retained placenta	3,06	0,00	1,72	0,52	1,64	1,89	8,83	4,84	0,00	1,88
- Morbidly adherent placenta	1,11	0,00	1,21	0,86	0,55	0,47	0,00	0,00	0,00	0,69
- Uterine atony	1,11	1,37	1,21	1,73	1,91	1,89	5,30	0,00	0,35	1,59
- Vaginal trauma	0,00	1,37	0,34	0,35	0,27	0,47	0,59	0,00	0,00	0,33
- Cervical trauma	0,28	0,00	0,34	0,00	0,55	1,42	0,59	1,61	0,35	0,40
- Inverted uterus	0,00	0,00	0,17	0,17	0,00	0,00	1,18	0,00	0,00	0,14
- Bleeding during Caesarean section	0,00	2,73	1,90	0,69	1,09	1,42	1,18	1,61	0,35	1,09
- Bleeding after Caesarean section	6,13	6,15	6,03	5,36	6,82	6,13	2,35	6,45	2,43	5,43
- Other PPH not specified	6,40	9,57	1,38	1,38	5,73	5,19	8,83	3,23	0,35	3,73
Hypertension	**30,07**	**56,72**	**22,75**	**18,85**	**22,91**	**23,59**	**31,78**	**29,03**	**14,26**	**24,58**
- Chronic hypertension	1,39	3,42	2,07	0,17	1,09	0,47	1,77	0,00	1,04	1,23
- Proteinuric hypertension	8,35	24,60	4,83	4,67	7,36	4,72	10,59	6,45	6,61	7,21
- Eclampsia	15,59	17,77	13,62	12,28	9,55	15,10	12,95	17,74	5,22	12,56
- HELLP	3,90	10,25	1,72	1,56	4,91	3,30	6,47	0,00	0,70	3,11
- Liver rupture	0,56	0,00	0,52	0,00	0,00	0,00	0,00	4,84	0,35	0,33
- Acute fatty liver	0,28	0,68	0,00	0,17	0,00	0,00	0,00	0,00	0,35	0,14
Anaesthetic complications	**3,62**	**2,05**	**2,41**	**4,84**	**9,55**	**7,08**	**4,71**	**3,23**	**1,04**	**4,38**
- General anaesthetic	0,84	0,68	0,17	1,21	3,00	2,36	1,18	1,61	0,70	1,19
- Epidural anaesthetic	0,00	0,00	0,00	0,17	0,00	0,00	0,00	0,00	0,00	0,04
- Spinal anaesthetic	2,78	1,37	2,24	3,46	6,55	4,72	3,53	1,61	0,35	3,15
Embolism	**4,73**	**4,10**	**2,59**	**0,52**	**3,55**	**6,60**	**1,18**	**14,51**	**4,87**	**3,37**
- Pulmonary embolism	4,73	3,42	1,90	0,17	2,73	5,19	1,18	8,06	4,17	2,68
- Amniotic fluid embolism	0,00	0,68	0,69	0,35	0,82	1,42	0,00	6,45	0,70	0,69
Acute collapse - cause unknown	**6,40**	**12,30**	**6,38**	**5,02**	**2,73**	**2,36**	**2,94**	**9,68**	**5,22**	**5,36**
Unknown	**4,18**	**21,87**	**3,27**	**14,35**	**3,82**	**8,49**	**10,00**	**19,35**	**2,09**	**7,82**
- Death at home or outside health services	2,78	12,30	0,69	1,21	3,27	7,08	4,71	19,35	1,39	3,26
- No primary cause found	0,56	5,47	1,03	4,84	0,55	0,00	2,94	0,00	0,70	1,92
- Lack of information	0,84	4,10	1,55	8,30	0,00	1,42	2,35	0,00	0,00	2,64
DDPCP	**197,71**	**293,85**	**151,67**	**195,25**	**168,01**	**185,40**	**230,67**	**264,49**	**87,65**	**179,80**

Cause of death	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Medical and surgical disorders	22,56	17,08	12,75	14,87	18,00	5,66	19,42	37,09	10,43	15,57
Non-pregnancy-related infections	77,97	107,29	53,43	94,08	59,73	74,06	90,03	93,54	31,65	71,29
Ectopic pregnancy	1,39	2,05	3,45	2,42	2,73	2,83	4,12	9,68	1,39	2,72
Miscarriage	2,78	8,88	7,41	11,41	6,55	5,66	5,30	6,45	1,74	6,73
Hyperemesis gravidarum	0,00	0,68	0,00	0,35	0,00	0,00	0,59	0,00	0,00	0,14
Pregnancy-related sepsis	11,14	14,35	10,69	8,47	6,00	10,85	13,53	6,45	4,87	9,34
Obstetric haemorrhage	28,40	41,69	22,41	17,12	29,18	36,32	45,90	20,97	7,30	24,91
Hypertension	30,07	56,72	22,75	18,85	22,91	23,59	31,78	29,03	14,26	24,58
Anaesthetic complications	3,62	2,05	2,41	4,84	9,55	7,08	4,71	3,23	1,04	4,38
Embolism	4,73	4,10	2,59	0,52	3,55	6,60	1,18	14,51	4,87	3,37
Acute collapse - cause unknown	6,40	12,30	6,38	5,02	2,73	2,36	2,94	9,68	5,22	5,36
No primary cause found	0,56	5,47	1,03	4,84	0,55	0,00	2,94	0,00	0,70	1,92
Lack of information	0,84	4,10	1,55	8,30	0,00	1,42	2,35	0,00	0,00	2,64
iMMR	190,47	276,77	146,85	191,10	161,46	176,43	224,79	230,63	83,48	172,96
Death at home or outside health services	2,78	12,30	0,69	1,21	3,27	7,08	4,71	19,35	1,39	3,26
Coincidental cause	4,46	4,78	4,14	2,94	3,27	1,89	1,18	14,51	2,78	3,58
DDPCP	197,71	293,85	151,67	195,25	168,01	185,40	230,67	264,49	87,65	179,80
Total live births	359104	146332	580199	578245	366649	211979	169937	62005	287501	2761951

86. 2011-2013 sub-categories of underlying causes

Primary obstetric problems	EC	FS	Gau	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	**15**	**12**	**19**	**14**	**22**	**6**	**4**	**13**	**14**	**119**
- MVA	4	3	5	4	8	3	1	8	4	40
- Other accidents			1	2	1		1		1	6
- Assault	1			1	3	1		1	4	11
- Herbal medicine	1	2	2	2	6			1		14
- Other	9	7	11	5	4	2	2	3	5	48
Medical and surgical disorders	**76**	**40**	**100**	**114**	**66**	**20**	**24**	**14**	**39**	**493**
- Cardiac disease	27	10	39	49	17	5	2	6	14	169
- Endocrine		4	5	2	6		1	2		20
- GIT	2	4	6	10	7	5	1			35
- CNS	4	8	6	16	7	1	2	1	5	50
- Respiratory	21	5	9	13	7	3	8	2	3	71
- Haematological	1	3	6	3	5	2	3	1		24
- Genito-urinary			2	2	5					9
- Auto-immune				1	1				1	3
- Skeletal	1									1
- Psychiatric	1		1	7			1		1	11
- Neoplasm		4	6	7	6				9	32
- Other	19	2	20	4	5	4	6	2	6	68
Non-pregnancy-related infections	**199**	**85**	**276**	**404**	**228**	**126**	**86**	**33**	**67**	**1504**
- PCP pneumonia	22	14	45	53	47	24	17	2	2	226
- Other pneumonia	37	21	68	84	36	20	16	7	21	310
- TB	58	20	47	114	64	42	19	13	19	396
- Endocarditis	1		1	1					1	4
- UTI	1	3	1			1				6
- Malaria			5	3	4					12
- Cryptococcal meningitis	9	2	11	15	9	2	6		2	56
- Other meningitis	10	7	39	28	22	14	5	2	2	129
- Kaposi's sarcoma	6		3	8	4	1	2	1	2	27
- Hepatitis	2		2	3	10				2	19
- Gastroenteritis	9	2	8	20	8	6	6	2	2	63
- Wasting syndrome	23	3	11	8	3	9				57
- Complications of antiretroviral therapy	9	13	23	47	15	6	11	2	4	130
- Other	12		12	20	6	1	4	4	10	69
Ectopic pregnancy	**6**	**7**	**24**	**21**	**24**	**13**	**5**	**1**	**1**	**102**
- Less than 20 weeks	5	6	21	18	24	13	5	1	1	94
- More than 20 weeks	1	1	3	3						8
Miscarriage	**9**	**9**	**52**	**53**	**32**	**15**	**9**	**1**	**5**	**185**
- Septic miscarriage	6	7	23	35	23	8	8	1	4	115
- Haemorrhage (non-traumatic)	1	1	20	13	7	4	1			47
- Uterine trauma	2		2	1	1	3				9
- GTD		1	4	2					1	8
- Following legal TOP			3	2	1					6
Hyperemesis gravidarum	**0**	**2**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**5**
Pregnancy-related sepsis	**28**	**9**	**30**	**50**	**39**	**29**	**20**	**5**	**16**	**226**
- Chorioamnionitis with ruptured membranes	1		1	3	1		1		1	8
- Chorioamnionitis without ruptured membranes					2					2
- Puerperal sepsis after NVD	14	4	13	23	25	16	13	3	6	117
- Puerperal sepsis after Caesarean section	12	5	16	17	11	12	6	2	7	88
- Bowel trauma at Caesarean section	1			7		1			2	11

Primary obstetric problems	EC	FS	Gau	KZN	Lim	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**88**	**34**	**148**	**122**	**128**	**75**	**62**	**13**	**14**	**684**
- Abruption with hypertension	4	6	12	9	12	5	5	2	1	56
- Abruption without hypertension	11	3	16	8	8	5	2	1		54
- Placenta praevia	2	1	3	5	3		1		1	16
- Other APH not specified	3		3		2					8
- Ruptured uterus with previous c/s	2	3	11	10	15	7	4			52
- Ruptured uterus without previous c/s	9	2	15	7	7	5	6			51
- Retained placenta	3	3	9	6	7	8	8	1		45
- Morbidly adherent placenta	1	1	5	5	3	1			1	17
- Uterine atony	8	1	13	10	10	1	4		3	50
- Vaginal trauma			1	1	1		1			4
- Cervical trauma	4	1	5	1	4	2	3		1	21
- Inverted uterus	1		1	1	1	1				5
- Bleeding during Caesarean section	7	1	8	9	6	3	5		3	42
- Bleeding after Caesarean section	20	8	35	38	29	25	14	7	3	179
- Other PPH not specified	13	4	11	12	20	12	9	2	1	84
Hypertension	**106**	**48**	**116**	**79**	**119**	**70**	**52**	**14**	**36**	**640**
- Chronic hypertension	3	1	8	4	5	2	1		4	28
- Proteinuric hypertension	25	18	29	19	29	10	18	7	14	169
- Eclampsia	67	20	59	53	64	46	22	5	11	347
- HELLP	10	8	20		18	11	11	2	3	83
- Liver rupture	1			1	1	1			2	6
- Acute fatty liver		1			2				2	5
Anaesthetic complications	**15**	**4**	**9**	**21**	**34**	**18**	**3**	**0**	**1**	**105**
- General anaesthetic	1	1	1	7	11	6	2		1	30
- Spinal anaesthetic	14	3	8	14	23	12	1			75
Embolism	**12**	**12**	**23**	**11**	**8**	**10**	**7**	**9**	**10**	**102**
- Pulmonary embolism	12	11	17	9	7	9	5	8	5	83
- Amniotic fluid embolism		1	6	2	1	1	2	1	5	19
Acute collapse - cause unknown	**14**	**7**	**37**	**18**	**11**	**3**	**8**	**1**	**7**	**106**
Unknown	**25**	**12**	**15**	**55**	**38**	**14**	**12**	**6**	**4**	**181**
- Death at home or outside health services	20	11	5	4	24	11	8	5		88
- No primary cause found	2	1	3	15	6	1	1	1	4	34
- Lack of information	3		7	36	8	2	3			59
DDPCP	**593**	**281**	**849**	**964**	**750**	**399**	**292**	**110**	**214**	**4452**

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Medical and surgical disorders	76	40	100	114	66	20	24	14	39	493
Non-pregnancy-related infections	199	85	276	404	228	126	86	33	67	1504
Ectopic pregnancy	6	7	24	21	24	13	5	1	1	102
Miscarriage	9	9	52	53	32	15	9	1	5	185
Hyperemesis gravidarum	0	2	0	2	1	0	0	0	0	5
Pregnancy-related sepsis	28	9	30	50	39	29	20	5	16	226
Obstetric haemorrhage	88	34	148	122	128	75	62	13	14	684
Hypertension	106	48	116	79	119	70	52	14	36	640
Anaesthetic complications	15	4	9	21	34	18	3	0	1	105
Embolism	12	12	23	11	8	10	7	9	10	102
Acute collapse - cause unknown	14	7	37	18	11	3	8	1	7	106
No primary cause found	2	1	3	15	6	1	1	1	4	34
Lack of information	3		7	36	8	2	3			59
Maternal Deaths	558	258	825	946	704	382	280	92	200	4245
Death at home or outside health services	20	11	5	4	24	11	8	5		88
Coincidental cause	15	12	19	14	22	6	4	13	14	119
Death during pregnancy and puerperium	593	270	849	960	726	399	292	105	214	4408
Live births	362313	144373	613725	563446	381034	227304	173037	63752	281602	2810586

87.MMR per sub-categories of underlying causes 2011-2013

Primary obstetric problems	EC	FS	Gau	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	**4,14**	**8,31**	**3,10**	**2,48**	**5,77**	**2,64**	**2,31**	**20,39**	**4,97**	**4,23**
- MVA	1,10	2,08	0,81	0,71	2,10	1,32	0,58	12,55	1,42	1,42
- Other accidents	0,00	0,00	0,16	0,35	0,26	0,00	0,58	0,00	0,36	0,21
- Assault	0,28	0,00	0,00	0,18	0,79	0,44	0,00	1,57	1,42	0,39
- Herbal medicine	0,28	1,39	0,33	0,35	1,57	0,00	0,00	1,57	0,00	0,50
- Other	2,48	4,85	1,79	0,89	1,05	0,88	1,16	4,71	1,78	1,71
Medical and surgical disorders	**20,98**	**27,71**	**16,29**	**20,23**	**17,32**	**8,80**	**13,87**	**21,96**	**13,85**	**17,54**
- Cardiac disease	7,45	6,93	6,35	8,70	4,46	2,20	1,16	9,41	4,97	6,01
- Endocrine	0,00	2,77	0,81	0,35	1,57	0,00	0,58	3,14	0,00	0,71
- GIT	0,55	2,77	0,98	1,77	1,84	2,20	0,58	0,00	0,00	1,25
- CNS	1,10	5,54	0,98	2,84	1,84	0,44	1,16	1,57	1,78	1,78
- Respiratory	5,80	3,46	1,47	2,31	1,84	1,32	4,62	3,14	1,07	2,53
- Haematological	0,28	2,08	0,98	0,53	1,31	0,88	1,73	1,57	0,00	0,85
- Genito-urinary	0,00	0,00	0,33	0,35	1,31	0,00	0,00	0,00	0,00	0,32
- Auto-immune	0,00	0,00	0,00	0,18	0,26	0,00	0,00	0,00	0,36	0,11
- Skeletal	0,28	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04
- Psychiatric	0,28	0,00	0,16	1,24	0,00	0,00	0,58	0,00	0,36	0,39
- Neoplasm	0,00	2,77	0,98	1,24	1,57	0,00	0,00	0,00	3,20	1,14
- Other	5,24	1,39	3,26	0,71	1,31	1,76	3,47	3,14	2,13	2,42
Non-pregnancy-related infections	**54,92**	**58,88**	**44,97**	**71,70**	**59,84**	**55,43**	**49,70**	**51,76**	**23,79**	**53,51**
- PCP pneumonia	6,07	9,70	7,33	9,41	12,33	10,56	9,82	3,14	0,71	8,04
- Other pneumonia	10,21	14,55	11,08	14,91	9,45	8,80	9,25	10,98	7,46	11,03
- TB	16,01	13,85	7,66	20,23	16,80	18,48	10,98	20,39	6,75	14,09
- Endocarditis	0,28	0,00	0,16	0,18	0,00	0,00	0,00	0,00	0,36	0,14
- UTI	0,28	2,08	0,16	0,00	0,00	0,44	0,00	0,00	0,00	0,21
- Malaria	0,00	0,00	0,81	0,53	1,05	0,00	0,00	0,00	0,00	0,43
- Cryptococcal meningitis	2,48	1,39	1,79	2,66	2,36	0,88	3,47	0,00	0,71	1,99
- Other meningitis	2,76	4,85	6,35	4,97	5,77	6,16	2,89	3,14	0,71	4,59
- Kaposi's sarcoma	1,66	0,00	0,49	1,42	1,05	0,44	1,16	1,57	0,71	0,96
- Hepatitis	0,55	0,00	0,33	0,53	2,62	0,00	0,00	0,00	0,71	0,68
- Gastroenteritis	2,48	1,39	1,30	3,55	2,10	2,64	3,47	3,14	0,71	2,24
- Wasting syndrome	6,35	2,08	1,79	1,42	0,79	3,96	0,00	0,00	0,00	2,03
- Complications of antiretroviral therapy	2,48	9,00	3,75	8,34	3,94	2,64	6,36	3,14	1,42	4,63
- Other	3,31	0,00	1,96	3,55	1,57	0,44	2,31	6,27	3,55	2,46
Ectopic pregnancy	**1,66**	**4,85**	**3,91**	**3,73**	**6,30**	**5,72**	**2,89**	**1,57**	**0,36**	**3,63**
- Less than 20 weeks	1,38	4,16	3,42	3,19	6,30	5,72	2,89	1,57	0,36	3,34
- More than 20 weeks	0,28	0,69	0,49	0,53	0,00	0,00	0,00	0,00	0,00	0,28
Miscarriage	**2,48**	**6,23**	**8,47**	**9,41**	**8,40**	**6,60**	**5,20**	**1,57**	**1,78**	**6,58**
- Septic miscarriage	1,66	4,85	3,75	6,21	6,04	3,52	4,62	1,57	1,42	4,09
- Haemorrhage (non-traumatic)	0,28	0,69	3,26	2,31	1,84	1,76	0,58	0,00	0,00	1,67
- Uterine trauma	0,55	0,00	0,33	0,18	0,26	1,32	0,00	0,00	0,00	0,32
- GTD	0,00	0,69	0,65	0,35	0,00	0,00	0,00	0,00	0,36	0,28
- Following legal TOP	0,00	0,00	0,49	0,35	0,26	0,00	0,00	0,00	0,00	0,21
Hyperemesis gravidarum	0,00	1,39	0,00	0,35	0,26	0,00	0,00	0,00	0,00	0,18
Pregnancy-related sepsis	**7,73**	**6,23**	**4,89**	**8,87**	**10,24**	**12,76**	**11,56**	**7,84**	**5,68**	**8,04**
- Chorioamnionitis with ruptured membranes	0,28	0,00	0,16	0,53	0,26	0,00	0,58	0,00	0,36	0,28
- Chorioamnionitis without ruptured membranes	0,00	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,00	0,07
- Puerperal sepsis after NVD	3,86	2,77	2,12	4,08	6,56	7,04	7,51	4,71	2,13	4,16
- Puerperal sepsis after Caesarean section	3,31	3,46	2,61	3,02	2,89	5,28	3,47	3,14	2,49	3,13
- Bowel trauma at Caesarean section	0,28	0,00	0,00	1,24	0,00	0,44	0,00	0,00	0,71	0,39

Obstetric haemorrhage	**24,29**	**23,55**	**24,12**	**21,65**	**33,59**	**33,00**	**35,83**	**20,39**	**4,97**	**24,34**
- Abruption with hypertension	1,10	4,16	1,96	1,60	3,15	2,20	2,89	3,14	0,36	1,99
- Abruption without hypertension	3,04	2,08	2,61	1,42	2,10	2,20	1,16	1,57	0,00	1,92
- Placenta praevia	0,55	0,69	0,49	0,89	0,79	0,00	0,58	0,00	0,36	0,57
- Other APH not specified	0,83	0,00	0,49	0,00	0,52	0,00	0,00	0,00	0,00	0,28
- Ruptured uterus with previous c/s	0,55	2,08	1,79	1,77	3,94	3,08	2,31	0,00	0,00	1,85
- Ruptured uterus without previous c/s	2,48	1,39	2,44	1,24	1,84	2,20	3,47	0,00	0,00	1,81
- Retained placenta	0,83	2,08	1,47	1,06	1,84	3,52	4,62	1,57	0,00	1,60
- Morbidly adherent placenta	0,28	0,69	0,81	0,89	0,79	0,44	0,00	0,00	0,36	0,60
- Uterine atony	2,21	0,69	2,12	1,77	2,62	0,44	2,31	0,00	1,07	1,78
- Vaginal trauma	0,00	0,00	0,16	0,18	0,26	0,00	0,58	0,00	0,00	0,14
- Cervical trauma	1,10	0,69	0,81	0,18	1,05	0,88	1,73	0,00	0,36	0,75
- Inverted uterus	0,28	0,00	0,16	0,18	0,26	0,44	0,00	0,00	0,00	0,18
- Bleeding during Caesarean section	1,93	0,69	1,30	1,60	1,57	1,32	2,89	0,00	1,07	1,49
- Bleeding after Caesarean section	5,52	5,54	5,70	6,74	7,61	11,00	8,09	10,98	1,07	6,37
- Other PPH not specified	3,59	2,77	1,79	2,13	5,25	5,28	5,20	3,14	0,36	2,99
Hypertension	**29,26**	**33,25**	**18,90**	**14,02**	**31,23**	**30,80**	**30,05**	**21,96**	**12,78**	**22,77**
- Chronic hypertension	0,83	0,69	1,30	0,71	1,31	0,88	0,58	0,00	1,42	1,00
- Proteinuric hypertension	6,90	12,47	4,73	3,37	7,61	4,40	10,40	10,98	4,97	6,01
- Eclampsia	18,49	13,85	9,61	9,41	16,80	20,24	12,71	7,84	3,91	12,35
- HELLP	2,76	5,54	3,26	0,00	4,72	4,84	6,36	3,14	1,07	2,95
- Liver rupture	0,28	0,00	0,00	0,18	0,26	0,44	0,00	0,00	0,71	0,21
- Acute fatty liver	0,00	0,69	0,00	0,00	0,52	0,00	0,00	0,00	0,71	0,18
Anaesthetic complications	**4,14**	**2,77**	**1,47**	**3,73**	**8,92**	**7,92**	**1,73**	**0,00**	**0,36**	**3,74**
- General anaesthetic	0,28	0,69	0,16	1,24	2,89	2,64	1,16	0,00	0,36	1,07
- Spinal anaesthetic	3,86	2,08	1,30	2,48	6,04	5,28	0,58	0,00	0,00	2,67
Embolism	**3,31**	**8,31**	**3,75**	**1,95**	**2,10**	**4,40**	**4,05**	**14,12**	**3,55**	**3,63**
- Pulmonary embolism	3,31	7,62	2,77	1,60	1,84	3,96	2,89	12,55	1,78	2,95
- Amniotic fluid embolism	0,00	0,69	0,98	0,35	0,26	0,44	1,16	1,57	1,78	0,68
Acute collapse - cause unknown	**3,86**	**4,85**	**6,03**	**3,19**	**2,89**	**1,32**	**4,62**	**1,57**	**2,49**	**3,77**
Unknown	6,90	8,31	2,44	9,76	9,97	6,16	6,93	9,41	1,42	6,44
- Death at home or outside health services	5,52	7,62	0,81	0,71	6,30	4,84	4,62	7,84	0,00	3,13
- No primary cause found	0,55	0,69	0,49	2,66	1,57	0,44	0,58	1,57	1,42	1,21
- Lack of information	0,83	0,00	1,14	6,39	2,10	0,88	1,73	0,00	0,00	2,10
DDPCP	163,67	194,63	138,34	171,09	196,83	175,54	168,75	172,54	75,99	158,40

Primary obstetric problems	**EC**	**FS**	**GP**	**KZN**	**Lim**	**Mpu**	**NW**	**NC**	**WC**	**SA**
Medical and surgical disorders	20,98	27,71	16,29	20,23	17,32	8,80	13,87	21,96	13,85	17,54
Non-pregnancy-related infections	54,92	58,88	44,97	71,70	59,84	55,43	49,70	51,76	23,79	53,51
Ectopic pregnancy	1,66	4,85	3,91	3,73	6,30	5,72	2,89	1,57	0,36	3,63
Miscarriage	2,48	6,23	8,47	9,41	8,40	6,60	5,20	1,57	1,78	6,58
Hyperemesis gravidarum	0,00	1,39	0,00	0,35	0,26	0,00	0,00	0,00	0,00	0,18
Pregnancy-related sepsis	7,73	6,23	4,89	8,87	10,24	12,76	11,56	7,84	5,68	8,04
Obstetric haemorrhage	24,29	23,55	24,12	21,65	33,59	33,00	35,83	20,39	4,97	24,34
Hypertension	29,26	33,25	18,90	14,02	31,23	30,80	30,05	21,96	12,78	22,77
Anaesthetic complications	4,14	2,77	1,47	3,73	8,92	7,92	1,73	0,00	0,36	3,74
Embolism	3,31	8,31	3,75	1,95	2,10	4,40	4,05	14,12	3,55	3,63
Acute collapse - cause unknown	3,86	4,85	6,03	3,19	2,89	1,32	4,62	1,57	2,49	3,77
No primary cause found	0,55	0,69	0,49	2,66	1,57	0,44	0,58	1,57	1,42	1,21
Lack of information	0,83	0,00	1,14	6,39	2,10	0,88	1,73	0,00	0,00	2,10
iMMR	154,01	178,70	134,43	167,90	184,76	168,06	161,82	144,31	71,02	151,04
Death at home or outside health services	5,52	7,62	0,81	0,71	6,30	4,84	4,62	7,84	0,00	3,13
Coincidental cause	4,14	8,31	3,10	2,48	5,77	2,64	2,31	20,39	4,97	4,23
Death during pregnancy and puerperium	163,67	187,02	138,34	170,38	190,53	175,54	168,75	164,70	75,99	156,84
Live births	362313	144373	613725	563446	381034	227304	173037	63752	281602	2766213

88. 2014-2016 Sub-categories of underlying causes per province

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	**9**	**7**	**30**	**20**	**16**	**5**	**3**	**7**	**21**	**118**
- MVA	4	1	5	7	10	4	1	3	5	40
- Other accidents			1	2	2				3	8
- Assault	1	2	3	1	1	1		2	3	14
- Other	4	4	21	10	3		2	2	10	56
Medical and surgical disorders	**72**	**28**	**90**	**104**	**70**	**22**	**30**	**8**	**45**	**469**
- Cardiac disease	29	11	36	29	18	8	9	4	21	165
- Endocrine	1		8	2	3	1	3		1	19
- GIT	9	1	5	12	14	1	3	1		46
- CNS	4	6	6	14	5	1	2		4	42
- Respiratory	12	3	8	8	15	2	7		3	58
- Haematological	3		2	8	4	1	1	2	2	23
- Genito-urinary	1		3	4	1		1		1	11
- Auto-immune		2		3					1	6
- Skeletal				1						1
- Psychiatric				5						5
- Neoplasm	4	4	6	12	5	1	1		6	39
- Other	9	1	16	6	5	7	3	1	6	54
Non-pregnancy-related infections	**142**	**62**	**175**	**225**	**135**	**79**	**93**	**21**	**46**	**978**
- PCP pneumonia	18	22	36	37	32	12	15	2	4	178
- Other pneumonia	15	7	45	36	16	11	17	6	8	161
- TB	77	21	49	64	41	26	31	8	22	339
- Endocarditis				1					1	2
- UTI			2	2	1	1			1	7
- Appendicitis				1						1
- Malaria				3	8		2			13
- Cryptococcal meningitis	4	3	7	14	5	4	4	1	2	44
- Other meningitis	6	3	11	22	7	6	5	1	3	64
- Kaposi's sarcoma	4		3	6	1	2	2	1	1	20
- Toxoplasmosis				2						2
- Hepatitis	2		2	3	1		1			9
- Gastroenteritis	5	5	2	13	15	6	5			51
- Wasting syndrome	6	1	5	6	1	6	2			27
- Other	5		13	15	7	5	9	2	4	60
Ectopic pregnancy	**8**	**5**	**24**	**21**	**17**	**9**	**8**	**0**	**6**	**98**
- Less than 20 weeks	8	5	22	21	14	9	8		6	93
- More than 20 weeks			2		3					5
Miscarriage	**13**	**9**	**56**	**27**	**34**	**12**	**13**	**1**	**4**	**169**
- Septic miscarriage	8	7	34	18	19	8	12	1	4	111
- Haemorrhage (non-traumatic)	3	1	14	5	6	4				33
- Uterine trauma		1	5	1	2					9
- GTD	1		2		2					5
- Following legal TOP	1		1	3	5		1			11
Pregnancy-related sepsis	**25**	**13**	**56**	**37**	**38**	**10**	**12**	**1**	**13**	**205**
- Chorioamnionitis (ruptured membranes)	1	1	3		1					6
- Chorioamnionitis (intact membranes)					2					2
- Puerperal sepsis after NVD	10	7	24	17	23	6	3		5	95
- Puerperal sepsis after C/section	12	5	26	15	9	4	8	1	8	88
- Bowel trauma at C/section	2		3	5	3		1			14

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**86**	**37**	**142**	**86**	**124**	**72**	**49**	**18**	**21**	**635**
- Abruption with hypertension	5		6	8	5	4	8	1	2	39
- Abruption without hypertension	4	5	12	7	6	4	2	3		43
- Placenta praevia	2	2	6	3	1		2			16
- Other APH not specified	2		5		4		1	1		13
- Ruptured uterus with previous c/s	4	5	13	7	8	4	5	1	1	48
- Ruptured uterus without previous c/s	10	3	7	5	9	8	6	1		49
- Retained placenta	11	8	13	2	2	4			2	42
- Morbidly adherent placenta	2		6	4	1	2		1	1	17
- Uterine atony	6	2	13	6	16	8	5	3		59
- Vaginal trauma		1		2	4					7
- Cervical trauma	4	1	8	3	3	1	2	1		23
- Inverted uterus	2			1					1	4
- Bleeding during Caesarean section	4	1	12	5	12	11	5		4	54
- Bleeding after Caesarean section	20	7	31	28	37	21	9	6	9	168
- Other PPH not specified	10	2	10	5	16	5	4		1	53
Hypertension	**96**	**41**	**162**	**106**	**103**	**63**	**53**	**18**	**26**	**668**
- Chronic hypertension	3	3	13	5	10	4	1		1	40
- Proteinuric hypertension	31	8	50	32	19	14	16	4	8	182
- Eclampsia	55	21	76	60	55	36	29	9	10	351
- HELLP	6	9	19	9	18	9	7	5	5	87
- Liver rupture	1		4		1				2	8
Anaesthetic complications	**13**	**3**	**10**	**19**	**23**	**7**	**7**	**0**	**4**	**86**
- General anaesthetic	3		1	5	5	3	1			18
- Epidural anaesthetic			1							1
- Spinal anaesthetic	10	3	8	14	18	4	6		4	67
Adverse drug reactions	**5**	**2**	**9**	**18**	**8**	**8**	**2**	**1**	**1**	**54**
- ARV medication			7	8	4	5	2		1	27
- TB medication	1			1						2
- Other medication	2		2	4		1				9
- Herbal medication	2	2		5	4	1				14
- Blood transfusion reaction						1		1		2
Embolism	**17**	**6**	**32**	**12**	**18**	**6**	**5**	**4**	**13**	**113**
- Pulmonary embolism	17	6	28	10	15	5	4	3	13	101
- Amniotic fluid embolism			4	2	3	1	1	1		12
Acute collapse - cause unknown	**5**	**8**	**23**	**17**	**7**	**5**	**5**	**3**	**4**	**77**
Miscellaneous	**1**	**0**	**3**	**4**	**6**	**0**	**0**	**0**	**4**	**18**
- Hyperemesis gravidarum	1		1	3	4				1	10
- Acute fatty liver			2	1	2				3	8
Unknown	**14**	**13**	**24**	**50**	**27**	**12**	**19**	**5**	**8**	**172**
- Death at home or outside health services	11	7	19	15	24	4	12	5	4	101
- No primary cause found	1	3	2	15	2	4	4		3	34
- Lack of information	2	3	3	20	1	4	3		1	37
DDPCP	506	234	836	746	626	310	299	87	216	3860

Summary of categories

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Medical and surgical disorders	72	28	90	104	70	22	30	8	45	469
Non-pregnancy-related infections	142	62	175	225	135	79	93	21	46	978
Ectopic pregnancy	8	5	24	21	17	9	8	0	6	98
Miscarriage	13	9	56	27	34	12	13	1	4	169
Pregnancy-related sepsis	25	13	56	37	38	10	12	1	13	205
Obstetric haemorrhage	86	37	142	86	124	72	49	18	21	635
Hypertension	96	41	162	106	103	63	53	18	26	668
Anaesthetic complications	13	3	10	19	23	7	7	0	4	86
Adverse drug reactions	5	2	9	18	8	8	2	1	1	54
Embolism	17	6	32	12	18	6	5	4	13	113
Acute collapse - cause unknown	5	8	23	17	7	5	5	3	4	77
Miscellaneous	1	0	3	4	6	0	0	0	4	18
No primary cause found	1	3	2	15	2	4	4		3	34
Lack of information	2	3	3	20	1	4	3		1	37
Maternal Deaths	486	220	787	711	586	301	284	75	191	3641
Death at home or outside health services	11	7	19	15	24	4	12	5	4	101
Coincidental cause	9	7	30	20	16	5	3	7	21	118
DDPCP	506	234	836	746	626	310	299	87	216	3860
Live births 2014-2016	330703	129416	615013	566323	367532	223166	170178	64268	285507	2752106

iMMR for sub-categories of underlying causes per province 2014-2016

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Coincidental cause	**2,72**	**5,41**	**4,88**	**3,53**	**4,35**	**2,24**	**1,76**	**10,89**	**7,36**	**4,29**
- MVA	1,21	0,77	0,81	1,24	2,72	1,79	0,59	4,67	1,75	1,45
- Other accidents	0,00	0,00	0,16	0,35	0,54	0,00	0,00	0,00	1,05	0,29
- Assault	0,30	1,55	0,49	0,18	0,27	0,45	0,00	3,11	1,05	0,51
- Other	1,21	3,09	3,41	1,77	0,82	0,00	1,18	3,11	3,50	2,03
Medical and surgical disorders	**21,77**	**21,64**	**14,63**	**18,36**	**19,05**	**9,86**	**17,63**	**12,45**	**15,76**	**17,04**
- Cardiac disease	8,77	8,50	5,85	5,12	4,90	3,58	5,29	6,22	7,36	6,00
- Endocrine	0,30	0,00	1,30	0,35	0,82	0,45	1,76	0,00	0,35	0,69
- GIT	2,72	0,77	0,81	2,12	3,81	0,45	1,76	1,56	0,00	1,67
- CNS	1,21	4,64	0,98	2,47	1,36	0,45	1,18	0,00	1,40	1,53
- Respiratory	3,63	2,32	1,30	1,41	4,08	0,90	4,11	0,00	1,05	2,11
- Haematological	0,91	0,00	0,33	1,41	1,09	0,45	0,59	3,11	0,70	0,84
- Genito-urinary	0,30	0,00	0,49	0,71	0,27	0,00	0,59	0,00	0,35	0,40
- Auto-immune	0,00	1,55	0,00	0,53	0,00	0,00	0,00	0,00	0,35	0,22
- Skeletal	0,00	0,00	0,00	0,18	0,00	0,00	0,00	0,00	0,00	0,04
- Psychiatric	0,00	0,00	0,00	0,88	0,00	0,00	0,00	0,00	0,00	0,18
- Neoplasm	1,21	3,09	0,98	2,12	1,36	0,45	0,59	0,00	2,10	1,42
- Other	2,72	0,77	2,60	1,06	1,36	3,14	1,76	1,56	2,10	1,96
Non-pregnancy-related infections	**42,94**	**47,91**	**28,45**	**39,73**	**36,73**	**35,40**	**54,65**	**32,68**	**16,11**	**35,54**
- PCP pneumonia	5,44	17,00	5,85	6,53	8,71	5,38	8,81	3,11	1,40	6,47
- Other pneumonia	4,54	5,41	7,32	6,36	4,35	4,93	9,99	9,34	2,80	5,85
- TB	23,28	16,23	7,97	11,30	11,16	11,65	18,22	12,45	7,71	12,32
- Endocarditis	0,00	0,00	0,00	0,18	0,00	0,00	0,00	0,00	0,35	0,07
- UTI	0,00	0,00	0,33	0,35	0,27	0,45	0,00	0,00	0,35	0,25
- Appendicitis	0,00	0,00	0,00	0,18	0,00	0,00	0,00	0,00	0,00	0,04
- Malaria	0,00	0,00	0,00	0,53	2,18	0,00	1,18	0,00	0,00	0,47
- Cryptococcal meningitis	1,21	2,32	1,14	2,47	1,36	1,79	2,35	1,56	0,70	1,60
- Other meningitis	1,81	2,32	1,79	3,88	1,90	2,69	2,94	1,56	1,05	2,33
- Kaposi's sarcoma	1,21	0,00	0,49	1,06	0,27	0,90	1,18	1,56	0,35	0,73
- Toxoplasmosis	0,00	0,00	0,00	0,35	0,00	0,00	0,00	0,00	0,00	0,07
- Hepatitis	0,60	0,00	0,33	0,53	0,27	0,00	0,59	0,00	0,00	0,33
- Gastroenteritis	1,51	3,86	0,33	2,30	4,08	2,69	2,94	0,00	0,00	1,85
- Wasting syndrome	1,81	0,77	0,81	1,06	0,27	2,69	1,18	0,00	0,00	0,98
- Other	1,51	0,00	2,11	2,65	1,90	2,24	5,29	3,11	1,40	2,18
Ectopic pregnancy	**2,42**	**3,86**	**3,90**	**3,71**	**4,63**	**4,03**	**4,70**	**0,00**	**2,10**	**3,56**
- Less than 20 weeks	2,42	3,86	3,58	3,71	3,81	4,03	4,70	0,00	2,10	3,38
- More than 20 weeks	0,00	0,00	0,33	0,00	0,82	0,00	0,00	0,00	0,00	0,18
Miscarriage	**3,93**	**6,95**	**9,11**	**4,77**	**9,25**	**5,38**	**7,64**	**1,56**	**1,40**	**6,14**
- Septic miscarriage	2,42	5,41	5,53	3,18	5,17	3,58	7,05	1,56	1,40	4,03
- Haemorrhage (non-traumatic)	0,91	0,77	2,28	0,88	1,63	1,79	0,00	0,00	0,00	1,20
- Uterine trauma	0,00	0,77	0,81	0,18	0,54	0,00	0,00	0,00	0,00	0,33
- GTD	0,30	0,00	0,33	0,00	0,54	0,00	0,00	0,00	0,00	0,18
- Following legal TOP	0,30	0,00	0,16	0,53	1,36	0,00	0,59	0,00	0,00	0,40
Pregnancy-related sepsis	**7,56**	**10,05**	**9,11**	**6,53**	**10,34**	**4,48**	**7,05**	**1,56**	**4,55**	**7,45**
- Chorioamnionitis (ruptured membranes)	0,30	0,77	0,49	0,00	0,27	0,00	0,00	0,00	0,00	0,22
- Chorioamnionitis (intact membranes)	0,00	0,00	0,00	0,00	0,54	0,00	0,00	0,00	0,00	0,07
- Puerperal sepsis after NVD	3,02	5,41	3,90	3,00	6,26	2,69	1,76	0,00	1,75	3,45
- Puerperal sepsis after C/section	3,63	3,86	4,23	2,65	2,45	1,79	4,70	1,56	2,80	3,20
- Bowel trauma at C/section	0,60	0,00	0,49	0,88	0,82	0,00	0,59	0,00	0,00	0,51

Primary obstetric problems	EC	FS	GP	KZN	Lim	Mpu	NW	NC	WC	SA
Obstetric haemorrhage	**26,01**	**28,59**	**23,09**	**15,19**	**33,74**	**32,26**	**28,79**	**28,01**	**7,36**	**23,07**
- Abruption with hypertension	1,51	0,00	0,98	1,41	1,36	1,79	4,70	1,56	0,70	1,42
- Abruption without hypertension	1,21	3,86	1,95	1,24	1,63	1,79	1,18	4,67	0,00	1,56
- Placenta praevia	0,60	1,55	0,98	0,53	0,27	0,00	1,18	0,00	0,00	0,58
- Other APH not specified	0,60	0,00	0,81	0,00	1,09	0,00	0,59	1,56	0,00	0,47
- Ruptured uterus with previous c/s	1,21	3,86	2,11	1,24	2,18	1,79	2,94	1,56	0,35	1,74
- Ruptured uterus without previous c/s	3,02	2,32	1,14	0,88	2,45	3,58	3,53	1,56	0,00	1,78
- Retained placenta	3,33	6,18	2,11	0,35	0,54	1,79	0,00	0,00	0,70	1,53
- Morbidly adherent placenta	0,60	0,00	0,98	0,71	0,27	0,90	0,00	1,56	0,35	0,62
- Uterine atony	1,81	1,55	2,11	1,06	4,35	3,58	2,94	4,67	0,00	2,14
- Vaginal trauma	0,00	0,77	0,00	0,35	1,09	0,00	0,00	0,00	0,00	0,25
- Cervical trauma	1,21	0,77	1,30	0,53	0,82	0,45	1,18	1,56	0,00	0,84
- Inverted uterus	0,60	0,00	0,00	0,18	0,00	0,00	0,00	0,00	0,35	0,15
- Bleeding during Caesarean section	1,21	0,77	1,95	0,88	3,27	4,93	2,94	0,00	1,40	1,96
- Bleeding after Caesarean section	6,05	5,41	5,04	4,94	10,07	9,41	5,29	9,34	3,15	6,10
- Other PPH not specified	3,02	1,55	1,63	0,88	4,35	2,24	2,35	0,00	0,35	1,93
Hypertension	**29,03**	**31,68**	**26,34**	**18,72**	**28,02**	**28,23**	**31,14**	**28,01**	**9,11**	**24,27**
- Chronic hypertension	0,91	2,32	2,11	0,88	2,72	1,79	0,59	0,00	0,35	1,45
- Proteinuric hypertension	9,37	6,18	8,13	5,65	5,17	6,27	9,40	6,22	2,80	6,61
- Eclampsia	16,63	16,23	12,36	10,59	14,96	16,13	17,04	14,00	3,50	12,75
- HELLP	1,81	6,95	3,09	1,59	4,90	4,03	4,11	7,78	1,75	3,16
- Liver rupture	0,30	0,00	0,65	0,00	0,27	0,00	0,00	0,00	0,70	0,29
Anaesthetic complications	**3,93**	**2,32**	**1,63**	**3,35**	**6,26**	**3,14**	**4,11**	**0,00**	**1,40**	**3,12**
- General anaesthetic	0,91	0,00	0,16	0,88	1,36	1,34	0,59	0,00	0,00	0,65
- Epidural anaesthetic	0,00	0,00	0,16	0,00	0,00	0,00	0,00	0,00	0,00	0,04
- Spinal anaesthetic	3,02	2,32	1,30	2,47	4,90	1,79	3,53	0,00	1,40	2,43
Adverse drug reactions	**1,51**	**1,55**	**1,46**	**3,18**	**2,18**	**3,58**	**1,18**	**1,56**	**0,35**	**1,96**
- ARV medication	0,00	0,00	1,14	1,41	1,09	2,24	1,18	0,00	0,35	0,98
- TB medication	0,30	0,00	0,00	0,18	0,00	0,00	0,00	0,00	0,00	0,07
- Other medication	0,60	0,00	0,33	0,71	0,00	0,45	0,00	0,00	0,00	0,33
- Herbal medication	0,60	1,55	0,00	0,88	1,09	0,45	0,00	0,00	0,00	0,51
- Blood transfusion reaction	0,00	0,00	0,00	0,00	0,00	0,45	0,00	1,56	0,00	0,07
Embolism	**5,14**	**4,64**	**5,20**	**2,12**	**4,90**	**2,69**	**2,94**	**6,22**	**4,55**	**4,11**
- Pulmonary embolism	5,14	4,64	4,55	1,77	4,08	2,24	2,35	4,67	4,55	3,67
- Amniotic fluid embolism	0,00	0,00	0,65	0,35	0,82	0,45	0,59	1,56	0,00	0,44
Acute collapse - cause unknown	**1,51**	**6,18**	**3,74**	**3,00**	**1,90**	**2,24**	**2,94**	**4,67**	**1,40**	**2,80**
Miscellaneous	**0,30**	**0,00**	**0,49**	**0,71**	**1,63**	**0,00**	**0,00**	**0,00**	**1,40**	**0,65**
- Hyperemesis gravidarum	0,30	0,00	0,16	0,53	1,09	0,00	0,00	0,00	0,35	0,36
- Acute fatty liver	0,00	0,00	0,33	0,18	0,54	0,00	0,00	0,00	1,05	0,29
Unknown	**4,23**	**10,05**	**3,90**	**8,83**	**7,35**	**5,38**	**11,16**	**7,78**	**2,80**	**6,25**
- Death at home or outside health services	3,33	5,41	3,09	2,65	6,53	1,79	7,05	7,78	1,40	3,67
- No primary cause found	0,30	2,32	0,33	2,65	0,54	1,79	2,35	0,00	1,05	1,24
- Lack of information	0,60	2,32	0,49	3,53	0,27	1,79	1,76	0,00	0,35	1,34
iMMR	**153,01**	**180,81**	**135,93**	**131,73**	**170,33**	**138,91**	**175,70**	**135,37**	**75,65**	**140,26**

Summary categories 2014-2016

Primary obstetric problems	EC	FS	Gau	KZN	Lim	Mpu	NW	NC	WC	SA
Medical and surgical disorders	21,77	21,64	14,63	18,36	19,05	9,86	17,63	12,45	15,76	17,04
Non-pregnancy-related infections	42,94	47,91	28,45	39,73	36,73	35,40	54,65	32,68	16,11	35,54
Ectopic pregnancy	2,42	3,86	3,90	3,71	4,63	4,03	4,70	0,00	2,10	3,56
Miscarriage	3,93	6,95	9,11	4,77	9,25	5,38	7,64	1,56	1,40	6,14
Pregnancy-related sepsis	7,56	10,05	9,11	6,53	10,34	4,48	7,05	1,56	4,55	7,45
Obstetric haemorrhage	26,01	28,59	23,09	15,19	33,74	32,26	28,79	28,01	7,36	23,07
Hypertension	29,03	31,68	26,34	18,72	28,02	28,23	31,14	28,01	9,11	24,27
Anaesthetic complications	3,93	2,32	1,63	3,35	6,26	3,14	4,11	0,00	1,40	3,12
Adverse drug reactions	1,51	1,55	1,46	3,18	2,18	3,58	1,18	1,56	0,35	1,96
Embolism	5,14	4,64	5,20	2,12	4,90	2,69	2,94	6,22	4,55	4,11
Acute collapse - cause unknown	1,51	6,18	3,74	3,00	1,90	2,24	2,94	4,67	1,40	2,80
Miscellaneous	0,30	0,00	0,49	0,71	1,63	0,00	0,00	0,00	1,40	0,65
No primary cause found	0,30	2,32	0,33	2,65	0,54	1,79	2,35	0,00	1,05	1,24
Lack of information	0,60	2,32	0,49	3,53	0,27	1,79	1,76	0,00	0,35	1,34
IMMR	146,96	169,99	127,96	125,55	159,44	134,88	166,88	116,70	66,90	132,30
Death at home or outside health services	3,33	5,41	3,09	2,65	6,53	1,79	7,05	7,78	1,40	3,67
Coincidental cause	2,72	5,41	4,88	3,53	4,35	2,24	1,76	10,89	7,36	4,29
DDPCP	153,01	180,81	135,93	131,73	170,33	138,91	175,70	135,37	75,65	140,26
Live births	330703	129416	615013	566323	367532	223166	170178	64268	285507	2752106

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PRETORIA Town lands 351-JR
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Switchboard: 012 395 8000