Saving Mothers 2014-2016: Seventh triennial report on confidential enquiries into maternal deaths in South Africa:

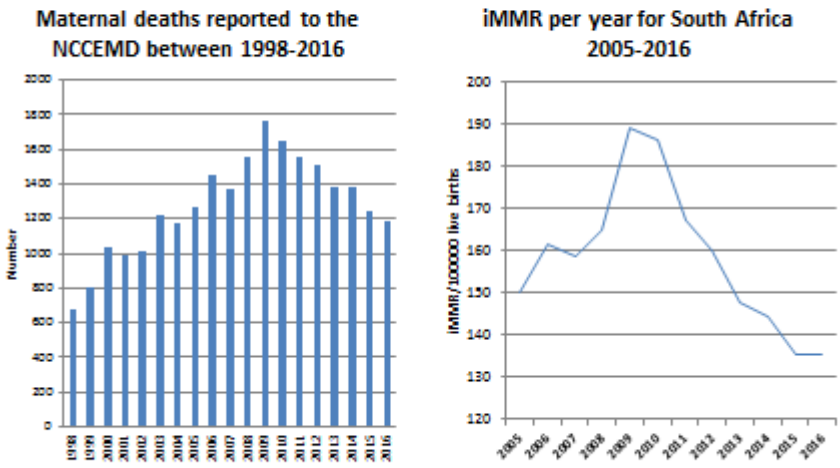
Executive summary

Key Findings

1. Reduction in mortality

- The number of maternal deaths continues to fall each triennium by 12.8% from 2008-2010 to 2011-2013 and 12.5% from 2011-2013 to 2014-2016, and an overall reduction of 24% from the peak in 2008-2010, an overall reduction of 1152 from 2008-2010 to 2014-2016.
- 339 fewer deaths in 2016 than 2011 and 580 fewer maternal deaths than at the peak in 2009.

Changes in mortality over time



2. There has been a slight improvement in quality of care

- Potentially preventable deaths are defined as those assessed by the assessors as being possibly or probably preventable at the end of their assessment of the case.
- The iMMR for potentially preventable deaths decreased from 100.0 per 100000 live births in 2008-2010, to 92.6 and then to 83.3 in 2011 in 2011-2013 and 2014-2016 respectively. This indicates a slow but steady decline in the number of potentially preventable deaths.

3. There has been a reduction in deaths related to HIV infection and obstetric haemorrhage but no change in deaths due to hypertensive disorders of pregnancy

- There has been a 47% reduction in NPRI and 22% reduction OH and from 2011 to 2016
- Increase of 14% in same time in deaths due to hypertensive disorders of pregnancy

4. Provincial tertiary hospitals have the highest iMMR

- The iMMR in provincial tertiary hospitals is 160% higher than regional and national central hospitals. There are 16 provincial tertiary hospitals that perform deliveries. Lower Umfolozi War Memorial Hospital (now Queen Nandi Hospital) is included as a provincial tertiary hospital as Ngwelezane Hospital in the same area does not have a maternity section and is a provincial tertiary hospital.

  Provincial tertiary hospitals conduct only 8% of births in the country but have 28% of the maternal deaths. Further they perform only 12% of the caesarean deliveries in the country but have 29% of the maternal deaths associated with a caesarean delivery. It is important to note that District hospitals perform 39% of the caesarean deliveries in the country but have 26% of the maternal deaths associated with caesarean delivery.

  Overall there were 880 maternal deaths in provincial tertiary hospitals of which 382 (43%) were seen in CHCs, 436 (50%) in district hospitals and 218 (25%) in regional hospitals before dying in provincial tertiary hospitals.

  There were 35% of cases in the CHCs, 57% in district hospitals, 44% in regional hospitals and 42% in provincial tertiary hospitals where there was health care professionals avoidable factors recorded in the deaths at the provincial tertiary hospitals.

  Provincial tertiary hospitals see a lot of cases from lower levels of care that die in their facilities and often the care prior to admission to the provincial tertiary hospital has been substandard. However, there is also a high proportion of deaths in the provincial tertiary hospital that also has substandard care in the provincial tertiary hospitals.

  The high mortality in provincial tertiary hospitals is probably due to a combination of cases referred in a poor condition from lower levels of care and poor quality of care in hospitals themselves.

5. There is still a way to go before Safe CD is available to all who need it

- In women who delivered a baby of more than 24 weeks gestation there were 1184 delivered were by CD and 1083 delivered vaginally; the iMMR for CD was 165 versus 53/100000 live births for vaginal delivery. The iMMR for CD was three time higher than for vaginal birth; however at primary level the iMMR per CD was 110 versus 25/100000 live births for vaginal deliveries (more than 4 times higher). This iMMR for CD at District hospitals would be much higher if the number of women having CD at district hospitals who developed complications and were referred to higher levels of care were counted. Thus safe CD at district hospitals must still be attained.
- Fortunately maternal deaths due to bleeding during or after CD (BLDACD) have stabilised but this category still represents 30% of all women who die due to OH.
- The following features were recorded in those cases dying due to BLDACD:
  a. Lack of skilled doctors in 33% cases
  b. Lack skilled nurse in 20% of case after CD; 14 of 50 cases in district hospitals
  c. In the 50 maternal deaths in DH, a lack skilled doctor was recorded in 25 cases; 14/43 cases in RH and 21/47 in PTHs.

d. In 7 of 16 cases that died due to bleeding during CD in DHs there was a lack of skilled doctors.
e. Only 32% of women who died from BLDACD had a hysterectomy. All should have had a hysterectomy and this indicates a skills gap.

- Fifty-six percent of anaesthetic related deaths occurred at DHs and the final cause of death in over half these cases was due to failure to protect the airway during the anaesthesia. It appears clinicians are giving spinal anaesthesia without the ability to give a general anaesthesia and protect the airway.

Full implementation of the safe CD programme will prevent a number of these deaths.

6. Referral problems have been identified as a major contributor to maternal deaths

- There was delay in referring and inter-facility transport problems in 32.5%, 55.2% and 79.9% in referrals from CHCs, district hospitals and regional hospitals respectively of women that subsequently died.
- Delay in inter-facility transport was thought to have contributed to the maternal death in 31% of ectopic pregnancies, 24% of obstetric haemorrhage, 19% of hypertensive disease, 20% of anaesthetic related and 18% of acute collapse cases requiring emergency transport between facilities.

7. Postnatal care, especially too early discharge of and lack of follow-up of patients was found to be a major problem, over looked in the past

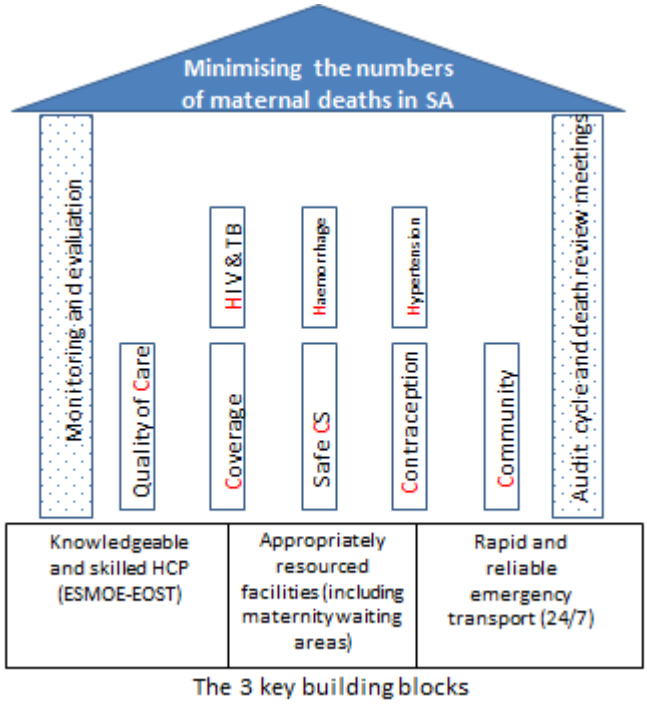
- Bradshaw et al., see short SMR 2014-2016 has shown that approximately 20% of maternal deaths (according to Stats SA death certificate data) occur outside of health care facilities. The causes of these deaths are similar to the causes of maternal deaths in facilities. Ninety-six percent of women in SA deliver in health care facilities (SADHS 2016), so most of the women who died outside of the facilities were either discharged too soon or developed complications later.
- In M&S conditions more than 36% of deaths occurred in the postpartum period. A considerable proportion of women who died were discharged home after delivery with abnormal vital signs. Assessors believed that 226 (48.4%) of deaths were potentially preventable.
- A mechanism must be found to ensure all women postpartum are visited; this should be done in conjunction with the Ward Based Outreach Teams.

8. General lack of knowledge and skills

- Lack of skilled doctors was recorded in 51% of women who died due to ectopic pregnancies, 33% due to miscarriages, 46% due to pregnancy related sepsis, 48% due to obstetric haemorrhage, 34% due to hypertension and 71% due to anaesthetic related cases
- Overall in 39% of all maternal deaths with avoidable factors, lack of knowledge and skills of doctors was thought to have been contributory.
- Overall in 25% of all maternal deaths with avoidable factors, lack of skilled nurses was thought to be contributory.

The ESMOE-EOST programme in priority districts has shown a significant reduction in iMMR overall of 29.3% and for direct causes of maternal death a 17.5% reduction and should be implemented widely.

Strategies for reducing maternal deaths



The 3 key building blocks

Reduction of maternal deaths can be achieved quickest by taking action to reduce deaths associated with HIV infection and those due obstetric haemorrhage and hypertensive disorders of pregnancy (the 3 Hs) by involving all levels of the health care system from policy makers to health care professionals to the community.

The strategies needed to achieve these reductions include clinicians being committed to providing quality care to all pregnant women (in all areas), safe caesarean deliveries, preventing unwanted pregnancies and engaging the community to ensure the women know what to do when pregnant (5 C's). This is built upon a health system that has knowledgeable and skilled health care professionals, facilities that have the appropriate resources and an effective emergency service to rapidly transport patients to the appropriate level of care. To ensure continued functioning of these strategies the service must continually be monitored and evaluated and where appropriate remedial action taken where appropriate.

The 5 Cs

Safe caesarean delivery

- A safe caesarean delivery (CD) service means having adequate resources including adequate numbers of **knowledgeable and skilled** staff who can manage surgical and anaesthetic

complications of CD. Criteria for accreditation of CD sites have been developed to ensure that hospitals provide a safe CD service. These need to be implemented, although this may result in the CD service being closed in some facilities and consolidation of health care professionals into viable working units, it will provide a safer service.

Contraception

- Our aim must be to prevent unwanted pregnancies.
- The post miscarriage and postnatal provide a captive audience for contraceptive counselling because 97% of women deliver in health facilities and 96% of women attend antenatal care. Counselling is particularly important at this time because if delivery of a subsequent baby is delayed till 24 months after the previous birth then there is a reduction in iMMR by 30% and perinatal deaths by 10% (PRICELESS).
- Long Acting Reversible Contraceptives (LARCs) are the most effective means of providing contraception for 15 months continuously.
- The best option for contraception in women on antiretroviral treatment is the IUCD
- Women with medical conditions often need special counselling for contraceptive use, but this is often forgotten by the physicians looking after the woman. Specialised contraception clinics need to be established in regional and tertiary hospitals to cater for these women.
- Community engagement about contraception is essential if unwanted pregnancies are to be prevented.
- The relationship between maternal age and underlying cause of death is discussed in section 2.5. The diagram below illustrates the high mortality in teenagers due to hypertensive disorders in pregnancy and stress the need for contraception in the teenager.

Commitment to quality of care (Professionalism and Creating a Culture of Caring)

- The assessors have regularly commented on the lack of professionalism shown by health care professionals. This problem is often under-reported.
- 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.
- Respectful care training programmes are available in the ESMOE programme.

Continuum of care

- The health system should ensure that no matter where the patient enters the system, she is followed-up appropriately, especially postnatally and antenatally. This has been illustrated by the number of deaths occurring outside of the health facilities.
- A system needs to be developed to ensure postnatal follow-up at home of all women by WBOTs
- Alleviating congestion can be achieved by down referral of patients; referral should be a two way street, one cannot just refer up there must be system to down refer.
- Checklists on discharge can ensure cases with problems are not discharged without solving the problems

Key Building Blocks

Referral system

- Our health care system is a primary health care system. This means we request women to enter the health system at the primary level of care and **we (health care system) undertake to ensure they will be seen and treated at the appropriate level of care** i.e. the transfer of patient's in the system is **our responsibility**. Data shown above indicates that this is lacking in a significant number of cases and this must be addressed.
- To improve our referral system we need:
  - Appropriate referral criteria
  - Stabilisation of the woman or baby before leaving and criteria when a professional nurse must accompany a patient.
  - To continue care in the ambulance, i.e. provide a continuum of care from facility to facility. The scope of practice of current EMS personnel is not sufficient to continue care of a pregnant woman in the ambulance as it does not include essential aspects like administration of oxytocin, antihypertensive drugs and magnesium sulphate.
  - The referring facility should have access to communicate directly with the receiving specialist to advise on treatment
  - The EMS management should audit and report on deaths in transit

Competencies

- A clear gap in the competencies of doctors and nurses has been demonstrated. This must start from undergraduate training but also persist in internship and beyond. Discussion with the various undergraduate bodies and HPCSA need to be conducted to rectify this.
- However, at present to ensure safe services some services, especially caesarean delivery, will have to be consolidated so that the knowledge and skills come together in a critical mass to enable the safe service to be delivered. This will mean reducing access to some people. Thus a balance is needed between safety and accessibility and the community needs to understand this. EMS is essential in ensuring that patients are in the institutions that provide the appropriate level of care, so emergency inter-facility transport is vital.
- Emergency drills have been shown to decrease mortality and must be enforced in all maternity units.

On-site Midwife-run Birthing Unit (OMBU) or Midwife Obstetric Unit on-site

- Many large regional and provincial tertiary hospitals are inundated with women in labour that are at low risk. The women chose to go to these hospitals for various reasons and the hospitals are often not in a position to transfer the women to other low risk units and must manage them. This puts strain on them and results in the sick women not getting enough attention.

  In the conventional model, in theory, low risk women in labour go straight to the local clinic with delivery facilities. In reality, many low risk women arrive at the hospital in labour and are either turned away and redirected to the clinic, or if this is not possible are admitted

inappropriately to the hospital labour ward. Sometimes women contrive to achieve this by arriving very late in labour, with the attendant risks of this strategy. The net result is that too many women give birth in the overcrowded hospital labour wards. One in three women redirected to the clinic end up with a sometimes disastrous trip back to the hospital in advanced labour.

- In the On-site Midwife birth Unit model, the primary care unit is located in the hospital, as close as possible to the labour ward. All women arriving at the hospital in labour are triaged to the correct level of care. The one in three who develops complications in the on-site Midwife Birth Unit are immediately transferred to the hospital labour ward. No emergency services personnel or ambulances are involved. Overall, more women give birth at the appropriate level of care, and the tragedies of delayed transfer are avoided.
- This OMBU model was accepted by the National Health Council on 24th November 2016 as a practical way of alleviating the major problems in overcrowding that the Provincial Tertiary Hospitals and Large Regional Hospitals are experiencing. Examples of the effect of these units are seen on Frere Hospital in East London and Dora Ngenza Hospital in Port Elizabeth. The WHO supports this concept, and it is now the preferred model for all obstetric units in developed countries.
- OMBUs need to be established in large regional and provincial tertiary hospitals.

Key topic specific messages to improve care (3 Hs)

HIV and TB

- TB is the most common cause of death in the Non-Pregnancy Related Infections group. All pregnant women (irrespective of HIV status) should be screened for TB. Pregnant HIV positive woman should be screened for TB at each health interaction during pregnancy and the postnatal period and given prophylaxis with Isoniazid or fast tracked for treatment if TB is demonstrated.
- Viral loads of HIV infected women must be available in all pregnant women to enable appropriate management

Haemorrhage

- Prevent anaemia by providing iron and folate supplementation to all pregnant women
- Ensure safe use of uterotonics in labour.
- New protocols for management of PPH, and the use of tranexamic acid, non-pneumatic anti-shock garment (NASG) and the locally manufactured balloon tamponade need to be introduced.
- The Safe CD programme needs to be implemented
- Practice emergency drills for haemorrhage; with a focus on problem recognition, resuscitation and practical procedures e.g. manual removal of the placenta, uterine compression sutures
- Ensure safe and adequate supplies of blood and blood products

Hypertensive Disorders of Pregnancy

- Have clear referral criteria for hypertensive disorders of pregnancy
- Screen all antenatal patients for hypertension and refer according to criteria (BANC Plus)
    - Note: With the increase in antenatal visits there has been a 60% increase in detection of women with hypertension.
- All pregnant women should be given calcium supplementation
- Practice emergency drills in complications of hypertensive disorders of pregnancy

Priority actions

The priority actions for 2018 are:

- Establishment of OMBUs
- Introduction of the new PPH protocols including NASG, balloon tamponade and tranexamic acid
- Reduce deaths due to hypertensive disorders of pregnancy by ensuring BANC Plus is fully implemented, and that all women detected with hypertension are managed according to the appropriate protocols.
- Ensuring Safe CD for all women
- Ensuring safe, rapid inter-facility transport of women with obstetric emergencies
- Maintaining and extending ARV coverage and effective TB treatment of pregnant women

Conclusion and recommendations

There has been a significant reduction in maternal deaths from 2011-2016 and this reduction is mostly due to a decrease in deaths due to NPRI, but also a significant reduction on obstetric haemorrhage. Unfortunately death due to hypertensive disorders of pregnancy has marginally increased over this time period. Over the last three triennia there has been a significant improvement in the quality of care of pregnant women; however much more still needs to be done. Assessors classified sixty-one percent of maternal deaths to be potentially preventable indicating mostly poor quality of care during the antenatal, intrapartum and postnatal periods. Implementing the actions given below will greatly reduce potentially preventable maternal deaths.

Areas for action (Recommendations)

Policy-makers, service planners, Health Professions Council, Nursing Council and Professional Organisations

- *Continue focus on HIV:* Two-thirds of the maternal deaths were HIV positive; although a reduction from the previous year, attention must still be focussed on screening and treatment of HIV positive women
- *Ensure safe caesarean delivery sites:* The mortality rate of women having caesarean deliveries s was three times higher than those having normal deliveries. More than half of the women dying of obstetric haemorrhage had caesarean deliveries . The Safe CD programme must be implemented. This programme ensures that facilities performing caesarean deliveries can do

so safely, and this requires adequate numbers of doctors with relevant accredited surgical and anaesthetic skills. Facilities which are unable to perform safe CD should not offer a CD service. Accreditation of facilities performing caesarean deliveries must be implemented.

- *Improve intern training:* Lack of appropriately trained doctors and nurses was thought to be a significant contributory factor in many maternal deaths. Lack of appropriately trained doctors was recorded as a significant factor in maternal deaths due to anaesthesia, obstetric haemorrhage, pregnancy related sepsis and complications of hypertensive disorders of pregnancy . The quality of intern training must be thoroughly examined and the hospitals training interns must be properly evaluated. All interns must complete the ESMOE course and its anaesthetic module before being registered as community service doctors. Before being allowed to manage maternity cases independently, a doctor's clinical competence, including competence in performing caesarean delivery, should be assessed and confirmed. Further training must be arranged for the doctor as required to attain competence.
- *Emergency Medical Services must prioritise transfer of maternity emergencies.* At least 1 in 10 maternal deaths were associated with transport delays.
- *Engage the community.* Mom Connect is a successful example of this and provides the essential knowledge on when and where to go to receive the appropriate care.
- *Explain to the community the balance between accessible services and safe services.* Currently we do not have the staff and knowledge and skills to provide a readily accessible service to all; knowledge and skills need to be consolidated to provide a safe service, but this means a less accessible service. To obviate that the EMS and maternity waiting homes need to be improved.

Chief Executive Officers (CEOs), District Managers, Clinical Managers, Heads of Maternity

- *Maternity units must have more than eighty percent of their staff trained in ESMOE:* Sixty percent of the maternal deaths were thought to be possibly or probably avoidable. ESMOE has been shown to improve knowledge and skills of health care professionals and has been associated with a reduction in maternal and neonatal deaths.
- *Obstetric and neonatal emergency drills (EOST exercises) must be conducted at least monthly:* Maternal deaths due to obstetric haemorrhage and hypertensive disorders of pregnancy were thought to be possibly and probably preventable in 89% and 67% of cases respectively
- *Contraceptives, including hormone tablets, barrier methods and long-acting reversible contraceptives must to be integrated into all relevant health contacts and through community engagement:* Preventing unwanted pregnancies and pregnancies in teenagers and women over 34 years will reduce the number of maternal deaths. The use of LARC will substantially help this by providing efficient mechanisms of providing continuous contraception for at least 15 months. Considerations should be given to implementing the Leading Safe Choices programme.
- *Ensure priority inter-facility emergency transport.* Efficient transport between facilities essential.
- *All hospitals must provide a safe caesarean delivery service:* This might involve consolidation of services within the district. This includes a safe anaesthetic service.
- *Attend maternal and perinatal death review meetings:* Action plans for preventing recurrence of maternal and perinatal deaths should be made at these meetings and must be followed up at the next meeting.

- *High risk antenatal clinics must be established and made accessible to all pregnant women requiring their services:* This will require innovations; such as specialist outreach clinics or family practitioners/advanced midwife run high risk clinics in rural areas.
- *Monitor implementation of the basic and comprehensive emergency obstetric and neonatal signal functions in their facilities:* District managers have to ensure pregnant women have access to the signal functions in the district.

District clinical specialist teams should facilitate

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- *Obstetric and neonatal emergency drills (EOST exercises) are conducted at least monthly:* Maternal deaths due to obstetric haemorrhage and hypertension were thought to be possibly and probably preventable in 89% and 67% of cases respectively
- *Negotiate for priority inter-facility emergency transport for pregnant women.* Efficient transport between facilities essential.
- *The introduction of the safe caesarean delivery package:* This might involve consolidation of services within the district. This includes a safe anaesthetic service.
- *Maternal and perinatal death review meetings:* Action plans for preventing recurrence of maternal and perinatal deaths should be made at these meetings and must be followed up at the next meeting.
- *Establishment of high risk antenatal clinics that are accessible to all pregnant women requiring their services:* This will require innovations; such as specialist outreach clinics or family practitioners/advanced midwife run high risk clinics in rural areas.
- *The monitoring of the implementation of the basic and comprehensive emergency obstetric and neonatal signal functions in their facilities:* District managers have to ensure pregnant women have access to the signal functions in the district.
- *The establishment of On-site Midwife run Birthing Units* at large regional and provincial tertiary hospitals.
- *The implementation of the new PPH protocol (including non-pneumatic anti-shock garments, balloon tamponade and tranexamic acid*

Doctors, nurses and allied health workers who work in or cover maternity service

- *Participate in obstetric and neonatal emergency drills*
- *Improve knowledge and skills by attending ESMOE courses*
- *Know and apply the latest HIV screening and treatment protocols*
- *Discuss contraception with all men and women of reproductive age at all relevant health interactions*
- *Engage in maternal and perinatal death review processes*