

**A CRITICAL ANALYSIS OF THE IMPLEMENTATION OF OBSTETRIC  
MANAGEMENT GUIDELINES, ON COMMON CAUSES OF  
MATERNAL DEATHS, AS APPLICABLE TO MIDWIVES**

by

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**Thesis submitted in fulfilment of the requirements for the Doctor of Nursing in  
the Faculty of Health Sciences at the Durban University of Technology**

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## **DECLARATION**

I declare that **A CRITICAL ANALYSIS OF THE IMPLEMENTATION OF OBSTETRIC MANAGEMENT GUIDELINES, ON COMMON CAUSES OF MATERNAL DEATHS, AS APPLICABLE TO MIDWIVES**, is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. The study has not been submitted previously in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

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## DEDICATION

*I dedicate this thesis to my dear loved ones that have passed on who  
would have been so proud of me*

*and*

*To my children Vittesh & Shriya- nothing is impossible to achieve*

*To my husband Penesh- perseverance made a difference*

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### **Jai Shree Raam**

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# ABSTRACT

## Background

Despite interventions by the United Nations which formulated the Sustainable Development Goals (SDGs), to replace the unmet targets of the Millennium Development Goals, the maternal mortality ratio (MMR) remains high in low-and-middle income countries including South Africa (SA). The goal 3 of the SDG aims to achieve less than 70 maternal deaths per 100 000 live births by 2030, globally. The slow but steady decline in the number of maternal deaths in SA with 339 deaths over the last 2014-2016 triennium falls short of the SDG targets (National Department of Health, 2017). The institutional MMR for potentially preventable maternal deaths in South Africa was 83.3 over the last triennium. The management of obstetric emergencies in SA is based on the interventions laid out in the Essential Steps in Managing Obstetric Emergencies (ESMOE) which was adapted from internationally recognised obstetric management guidelines that have proven to reduce MMR's if effectively implemented. The availability of a good clinical guideline is only part of the solution but ensuring **effective implementation** in the clinical environment is of greater significance to reduce preventable maternal deaths.

## Aim

The aim of this study was to analyse the impact of the implementation of the ESMOE guidelines by midwives on the management of the common causes of maternal deaths. This included identifying gaps, challenges and successes of its implementation by the midwife at the different levels of health care facilities with the ultimate aim of developing a practice framework to implement the interventions into midwifery training, to improve relevant knowledge and skills in providing quality emergency obstetric care.

## Methodology

A multi method data collection approach using quantitative and qualitative designs was implemented in four phases. This study was conducted in two of the eleven districts of KwaZulu-Natal. All level of hospitals and CHCs (eleven) in eThekweni (District A) and Ugu (District B) were chosen based on purposive sampling including

the districts health system's referral pattern. Data was collected by the researcher using self-designed data capturing sheets. Quantitative data was collected on resources and ESMOE training at all eleven selected facilities, as well as a retrospective chart review on a total of 17 maternal deaths that occurred over a specified period to assess the implementation of ESMOE interventions. Face to face interviews were conducted by the researcher with 14 ESMOE trained midwives to determine the barriers and challenges they experience that impedes successful implementation of the ESMOE interventions. To test for significant trends in the quantitative data, inferential statistics was applied, including Pearson's correlation, t-tests, Mann Whitney U test, Kruskal Wallis Test and Chi-square tests. Descriptive statistics included means and standard deviation as applicable. Relevant frequencies were represented in tables and graphs. Chi-square test of independence were used on cross-tabulations to see the significant relationships in resources at the various health facilities. The Kruskal Wallis test was used to compare specific variables across the different types of health facilities. The qualitative data was analysed using thematic content analysis. Finally, a Delphi Technique using ESMOE experts was employed to validate a practice framework to implement relevant ESMOE modules into midwifery training to enhance competencies of midwives and implementation of the guidelines.

## **Results**

The findings of this study indicated that many barriers and challenges exist that prevent successful implementation of ESMOE interventions which would further reduce maternal mortality rates in SA. Of the 11 facilities chosen 45.5% (n= 5) were community health centres, whilst 54.5% (n=6) were hospitals. In phase two the results revealed that the CHCs and DH did not meet the criteria of being fully BEmONC compliant, which resulted in increased referrals to regional and tertiary hospitals. This was evident by the significant difference in normal vaginal deliveries at combination hospitals as compared to CHC ( $p=.037$ ). An average of 2505 deliveries were conducted at combination/regional hospitals over a four- month period with averages of 1247 at a DH and 957 at a RH as compared to only 224 deliveries at a CHC. A general shortage of essential equipment was found across facilities. The CHCs had significant shortages of CTG machines and intravenous regulators. Staff with ESMOE training were insufficient to staff all the maternity units across the facilities. District A,

the bigger of the two districts with eight facilities had a significantly lower number of ESMOE trained advanced midwives (n=11) as compared to District B with three facilities (n=12). The number of maternal deaths that occurred over January 2016 to April 2016 at three combination hospital were 82% (n=14) as compared to 12% (n=2) at the regional hospitals and only 6% (n=1) that occurred at a District hospital and no deaths at a CHC. Deaths due directly to hypertension were 41% (n=7), HIV was 6% (n=1), whilst 53% (n=9) were from other causes not directly relevant to this study. A significant number of relevant maternal deaths 54.5% (n=6) were due to delays in seeking treatment and sub-standard care. Transport delays to the health facility contributed to 18.2% (n= 2) deaths, whilst non-compliance to treatment and poor record keeping were found in 27.3% (n=3) of the relevant maternal deaths. The interviews with the midwives in phase three yielded results that were suggestive of inadequate ESMOE training, lack of updates, lack of regular skills and drills exercises that contributed to lack of knowledge and skills in providing effective EmOC. Other challenges in effectively implementing emergency obstetric care included poor morale due to staff shortages, heavy burdens of workload, lack of motivation and support that contributes to sub-standard care. In the final phase the researcher took these findings and built on this by developing an algorithm that shows the need to improve midwifery clinical competencies. This algorithm was taken further to develop a practice framework that proposes to implement ESMOE interventions into the basic midwifery training to improve relevant knowledge and skills in managing obstetric emergencies effectively within a collaborative team approach.

## **Conclusion**

This study has shown that gaps in the implementation of ESMOE guideline interventions in the selected facilities in KZN could have contributed to sustained high MMR in the province. The midwives expressed the need for regular training and updates to continuously improve and maintain their knowledge, skills and competencies in providing effective obstetric care. The data allowed the development of an algorithm for improved emergency obstetric patient care and a practice framework for training of midwives to ensure optimal implementation of the guidelines.



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## LIST OF ACRONYMS

AIDS:	Acquired Immune Deficiency Syndrome
CHC:	Community Health Centre
CSL:	Clinical Skills Laboratory
DCST:	District Clinical Specialist Team
DH:	District Hospital
EmOC:	Emergency Obstetric Care
EOST:	Emergency Obstetric Simulation Training
ESMOE:	Essential Steps in Managing Obstetric Emergencies
HAART:	Highly Active Antiretroviral Therapy
HIV:	Human Immunodeficiency Virus
KZN:	KwaZulu Natal
LMIC:	Low-and-Middle Income Countries
MDG:	Millennium Development Goals
MgSO <sub>4</sub> :	Magnesium Sulphate
MMR:	Maternal Mortality Rate
NCCEMD:	National Committee for the Confidential Enquiries into Maternal Deaths
PHC:	Primary Health Care
RH:	Regional Hospital
SA:	South Africa
SDG:	Sustainable Development Goal

SMR: Saving Mothers Report  
TH: Tertiary Hospital  
UNFPA: United Nations  
WHO: World Health Organization

# CHAPTER 1: INTRODUCTION

## 1.1 INTRODUCTION

The World Health Organization (WHO) reported that 810 women died every day in 2017 from preventable causes of maternal deaths related to complications of pregnancy and childbirth, globally. This is equivalent to just over 33 deaths an hour (World Health Organization (WHO 2019a: 32). The prevalence of maternal deaths in some areas of the world reflects inequities in access to health services and indicates the gap between developed and developing countries. More than half of the global maternal deaths occur in Sub-Saharan Africa and one fifth occur in South Asia (WHO 2019a: 32-33).

The global maternal mortality ratio is required to reduce from 216 per 100,000 live births in 2015 to less than 70 per 100,000 live births by 2030 to achieve the targets of the Sustainable Development Goals (SDGs). This will require an annual rate reduction of at least 7.5%, which is more than triple the annual rate of reduction that was achieved between 1990 and 2015. Therefore, it is important to increase women's access to quality care before, during and after childbirth (Alkema *et al.* 2016: 4; WHO 2017a: 29).

Beek, McFadden and Dawson (2019: 1) believe that midwives have an essential role to play in providing sexual and reproductive health services due to their unique knowledge and skills as frontline providers of care to the communities they serve. However, there are considerable gaps in the international guidance that defines the scope of practice of midwives. Research informed guidelines and strategies are required to better align the scope of practice of midwives in ensuring that their potential is acknowledged and optimised in reducing maternal mortality rates. Dolamo (2018: 4118) agree that although the South African Nursing Council (SANC) has developed and reviewed the nursing/midwifery practice standards, but this process is incomplete, yet it is necessary to be in line with the current national health policy. Continued professional development frameworks to upgrade nurses and midwives/accouchers in

SA need to be developed and supported by SANC and put into practice by nursing and midwifery practitioners (Dolamo 2018: 4118).

## **1.2 BACKGROUND TO THE STUDY**

The United Nations (UN) had recognised and included maternal mortality as part of the eight Millennium Development Goals (MDGs). These eight MDGs were adopted in September 2000 by 189 UN member states, including South Africa (SA) (United Nations 2010). Millennium Development Goal 5 (MDG 5) proposed to improve maternal health, with a target of reducing the maternal mortality rate by 75% between 1990 and 2015. Despite this intent, maternal death rates higher than the benchmark remained a global challenge 25 years later as the target date ended in 2015 (WHO 2015a: 1).

The United Nations currently seeks to build on the MDGs and aims to complete what these MDG goals did not achieve. This led to the formation of the new Sustainable Development Goals (SDGs). The 2030 Agenda for Sustainable Development was adopted at the United Nations Sustainable Development Summit in September 2015 (United Nations 2015). There are currently 17 SDGs and 169 associated targets which were implemented in January 2016. Sustainable Development Goal number 3 which states “Ensure healthy lives and promote well-being for all at all ages”, is currently associated with maternal mortality. The new global target number, 3.1 under goal 3, aims to achieve a maternal mortality ratio (MMR) of less than 70 maternal deaths per 100 000 live births by 2030. A further 15 years from 2015 to 2030 are proposed with the SDGs to achieve these targets (United Nations 2015; WHO 2017a: 29; WHO 2019a: 44).

The WHO defines maternal death as the death of a woman during pregnancy or within 42 days of the termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management. The maternal mortality ratio is the number of maternal deaths per 100 000 live births in a given year (WHO 2015b, 2019a). The MMR is used to monitor the prevalence of maternal deaths.

In 2015, an estimated 303,000 maternal deaths occurred worldwide, compared to 523,000 in 1990. Maternal mortality rates have decreased by 40% globally from 1990 to 2015. However, this decrease is still 30% above the SDG target of reducing



maternal deaths by 70% by 2030 (WHO 2017a: 29). Many of these maternal deaths could have been prevented or treated with the necessary medical interventions which are available. The UN has identified the implementation of quality care before, during and after childbirth as one of the key challenges in reducing maternal mortality globally.

The WHO (2017a: 29) acknowledge that 99% of maternal deaths occur in developing countries and is the highest in young adolescents and women living in rural communities. The maternal mortality statistics (WHO 2018a: 2) further reports that the MMR in developing countries is 239 per 100 000 live births as compared to 12 per 100 000 in developed countries. Reports by Stokes *et al.* (2016: 2) and WHO (2019a) confirm that maternal mortality is higher in low-and-middle income countries (LMIC) as compared to developed countries.

In the United States of America and the United Kingdom, the mortality rates range between 12 and 28 per 100 000 live births per year respectively. In other developed countries like Sweden and Austria the maternal mortality rate is as low as 4/100000 live births. Comparatively in LMIC the highest maternal mortality rates are seen in Chad, Somalia and Sierra Leone with maternal mortality rates that range between 890 to 1,100 maternal deaths per 100 000 live births per year (Central Intelligence Agency 2012; United Nations Development Programme 2013; WHO 2016a: 1).

Sub-Saharan Africa and Southern Asia accounted for approximately 86% (254 000) of the estimated global maternal deaths in 2017. This high numbers of maternal deaths in some parts of the world shows the inequalities between the rich and the poor in accessing quality health care. The MMR in low income countries in 2017 was 462 per 100 000 live births verses 11 per 100 000 in high income countries (WHO 2019a: 33).

The institutional maternal mortality ratio (iMMR) in SA has decreased from 176.22 per 100000 live births in 2008-2010 triennium to 154.06 per 100000 live births in the 2011-2013 triennium which is a 12.6% decrease (Pattinson, Fawcus and Moodley 2013; National Department of Health [NDoH] 2011; 2014a). The Saving Mothers report (SMR) (NDoH 2017) for the 2014-2016 triennium indicates a steady but slow decline in potentially preventable maternal deaths to 83.3 in this last triennium. Despite these improved statistics reflected above, the reports reflect that the data may be inaccurate. Factors such as maternal deaths that occur at home are not captured as a maternal

death and institutional deaths occurring outside of a maternity unit are sometimes not included in the iMMR. These contribute to the inaccurate estimated MMR statistics. Therefore, it can be assumed that the maternal death rates may be even higher than the reported statistics provided in SA which indicates an even greater need for action in reducing maternal mortality rates. (Moodley *et al.* 2014; NDoH 2014a; WHO 2015a; NDoH 2017).

In comparing the MMR's of the last three trienniums in SA it is evident that there has been a steady decline in maternal deaths. According to Moran and Moodley (2011) and the Saving Mothers report for the 2011-2013 (NDoH 2014a) indicated that in KwaZulu-Natal (KZN) the highest number of maternal deaths (1129) occurred in 2010, which made up 23% of the total maternal deaths in South Africa. A further decrease in MMR is evident in the 2011-2013 trienniums where KZN had 964 (22%) maternal deaths during pregnancy and puerperium. Currently over the 2014-2016 triennium there was a 12.5% reduction in maternal deaths. These statistics that display a decline in MMR in SA on the whole is impressive, however, it is still below the SDG targets of achieving a MMR of 70/100 000 live births (NDoH 2014a, 2015a) (NDoH 2017: 2).

The above evidence indicates two important issues. Firstly, SA is still far from achieving the new proposed SDG targets and secondly it is evident that in developed countries maternal health is considerably better as compared to LMIC. Strategies and management interventions that have helped developed countries to achieve significant reductions in maternal mortality may be beneficial to African countries as well.

The implementation of available management guidelines to reduce maternal deaths are assumed to be in place but monitoring of those actions to assess its effectiveness and to ascertain where the problem areas are, is of great significance to improving maternal health care overall.

The WHO (2015b; 2019a: 8) recognises that maternal deaths are universally categorised as direct or indirect according to the causes. Direct causes result from obstetric complications of pregnancy, delivery or postpartum, whilst indirect causes are those resulting from existing diseases or those that develop during pregnancy. The most common direct causes of maternal deaths worldwide include obstetric haemorrhage, hypertension (pre-eclampsia and eclampsia), sepsis and obstructed

labour. The most prevalent cause of indirect maternal deaths is HIV and AIDS, followed by pre-existing medical conditions like cardiac disease (WHO 2015b; 2019a).

The causes of maternal deaths relevant to this study are the top three common causes of maternal deaths occurring in South Africa. These deaths include non-pregnancy related infections (mainly related to HIV infection), obstetric haemorrhage and pre-eclampsia as well as eclampsia. According to the SMR for 2011-2013 (NDoH 2014a), Non-Pregnancy Related Infections (NPRI) mainly due to HIV infection in pregnancy accounted for 34.7% of maternal deaths. The two other leading causes of maternal deaths were obstetric haemorrhage and hypertension which contributed to 30.4% of deaths. Comparatively, the last SMR, for the 2014-2016 triennium (NDoH 2014a; 2017), indicates a 47% reduction in NPRI and a 22% reduction in obstetrical haemorrhage from 2011 to 2016. However, there is an increase of 14% of maternal deaths due to hypertensive disease over the same period. These three causes of maternal deaths remain the biggest contributors of preventable maternal deaths in SA.

The South African NDoH together with other stakeholders have made progress in providing evidence based clinical guidelines, policies and protocols to address strategies to improve maternal health in South Africa (NDoH 2007; NDoH 2015a, 2018). The implementation of a good clinical guideline is only a part of the solution but ensuring effective implementation in the clinical environment is of greater significance to reduce preventable maternal deaths. Stokes *et al.* (2016: 1) agree with WHO (2015a) that the majority of maternal deaths occur in LMIC and most could have been prevented by interventions already demonstrated to be effective. A range of guideline implementation strategies have been shown to be effective although the evidence base for LMIC is limited. In the context of this study the role of the midwife in the implementation of the stipulated guidelines in managing obstetric emergencies is the key focus.

Several guidelines and programmes aimed at reducing maternal mortality have been implemented in South Africa. These include: Basic Antenatal Care (BANC), Prevention of Mother to Child Transmission (PMTCT) of HIV and AIDS, the Campaign to Accelerate Reduction in Maternal and Neonatal Mortality in Africa (CARMMA) and the Essential Steps in the Management of Obstetric Emergencies (ESMOE) The current clinical guideline that addresses the common causes of maternal deaths that

incorporates a step wise management guideline on these obstetrical emergencies is ESMOE. This guideline will be analysed and discussed in more detail in terms of its implementation by the midwife in the next chapter (NDoH 2012, 2015b).

Verschueren *et al.* (2019: 11) point out that staff engaged in direct service delivery during implementation of any policy must be consulted during formulation of the policy to ensure its effectiveness. Similarly, this should apply to the ESMOE management guideline. This guideline needs to be applied appropriately, communicated regularly and evaluated timeously to ensure successful implementation by the midwife in providing emergency obstetric care (EmOC) thereby further reducing maternal deaths.

Midwives are significant role-players in identifying high risk pregnancies. They implement the initial management interventions in order to prevent complications. The environment within which midwives' function, with available resources, clear guidelines and a supportive management team is critical to the midwives' success or failure in ensuring quality care (Verschueren *et al.* 2019: 11). This study focused on identifying the gaps related to the challenges and successes in the implementation of written management guidelines by the midwife in relation to reducing maternal deaths.

### **1.3 STATEMENT OF THE RESEARCH PROBLEM**

Reductions in maternal deaths have been noted globally; however, this remains a challenge in developing countries. These reductions were not significant enough to attain the MDG 5 target to reduce the MMR to 38 deaths per 100 000 live births. Twenty-five years later, from 1990 to 2015, the number of preventable maternal deaths have had a slow decline or in some instances have even increased (United Nations 2015; WHO. 2019a). However, an additional 15 years from 2015 to 2030 with the revised SDGs have been given to achieve a MMR of less than 70 maternal deaths per 100 000 live births. Urgent actions need to be implemented to reach the SDG 3.1 target as well as to establish why the policies and guidelines that were developed to reach this goal in SA was not achieved (WHO 2017a: 29; WHO 2019a: 44).

The ESMOE guideline has been specifically designed by specialist medical researchers to reduce the common causes of maternal mortality. This guideline has been developed from evidence-based practice that has shown some improvements in reducing MMR in SA. However, the improvements are of little significance in

comparison to the SDG 3.1 target. This creates the question: is the ESMOE guideline correctly implemented at all levels of health care in appropriately managing obstetric emergencies?

The researcher, being an advanced midwife, midwifery educator and ESMOE trainer, observed during clinical teaching visits that there are gaps in the implementation of the ESMOE guideline interventions in the clinical areas by the registered midwives in providing effective EmOC. According to literature related to the ESMOE guidelines, it is confirmed that when this guideline is implemented correctly the number of avoidable maternal deaths should decrease dramatically (Frank, Lombaard and Pattinson 2009; Makhanya, Moodley and Govender 2016: 16; Pattinson *et al.* 2015, 2019; NDoH 2017).

The SMR (NDoH 2017: 63), Makhanya, Moodley and Govender (2016: 16), Bhardwaj *et al.* (2018: 48) and Pattinson *et al.* (2019) concur that the most common healthcare-provider factor in preventing maternal deaths was not adhering to standard protocols. Studies such as those done by Ameh *et al.* (2019) and Pattinson *et al.* (2019) focus on the following areas: training and re-training of medical interns and midwives, the overall causes of maternal deaths and the need for further training of health care workers in order to improve emergency obstetric care. However, despite this above focus, there is little evidence that focuses on the midwife's role and areas of concern in implementation of the ESMOE guideline successfully in further reducing the MMR.

The implementation of this guideline by midwives needed to be analysed to ensure that challenges preventing midwives from delivering quality emergency obstetric care are addressed. Improvements in effective implementation of the ESMOE guideline by the midwife in reducing maternal deaths can only be made once the problems in the implementation process are identified and corrective actions are taken.

#### **1.4 AIM OF THE STUDY**

The aim of this study was to analyse the implementation of the ESMOE guidelines on the management of the common causes of maternal deaths. This included identifying the gaps, challenges and successes of its implementation by the midwife at the different levels of health care facilities, from Community Health Centre (CHC) level to the referral hospitals in selected districts of KZN.

## **1.5 OBJECTIVES OF THE STUDY**

The objectives of this study were to:

1. Describe the ESMOE guideline and identify its key and critical components relevant to the study as applicable to the midwife.
2. Determine what the maternal healthcare logistics are that midwives face at the different levels of health care facilities in KZN.
3. Determine whether the guideline is implemented as envisaged at the different levels of health care facilities.
4. Explore and describe the challenges confronting midwives in the implementation of management interventions specific to the ESMOE guideline.
5. Develop a tool that will assist the midwife with the implementation of the guideline in the management of the common causes of maternal deaths.

## **1.6 RESEARCH QUESTIONS**

The research was guided by the following questions:

1. Is the ESMOE guideline correctly applied at all levels of health care by the midwife?
2. What are the health care logistics that midwives are faced with at the different levels of health care facilities?
3. What are the challenges experienced by the midwives in the implementation of the ESMOE guideline?

## **1.7 SIGNIFICANCE OF THE STUDY**

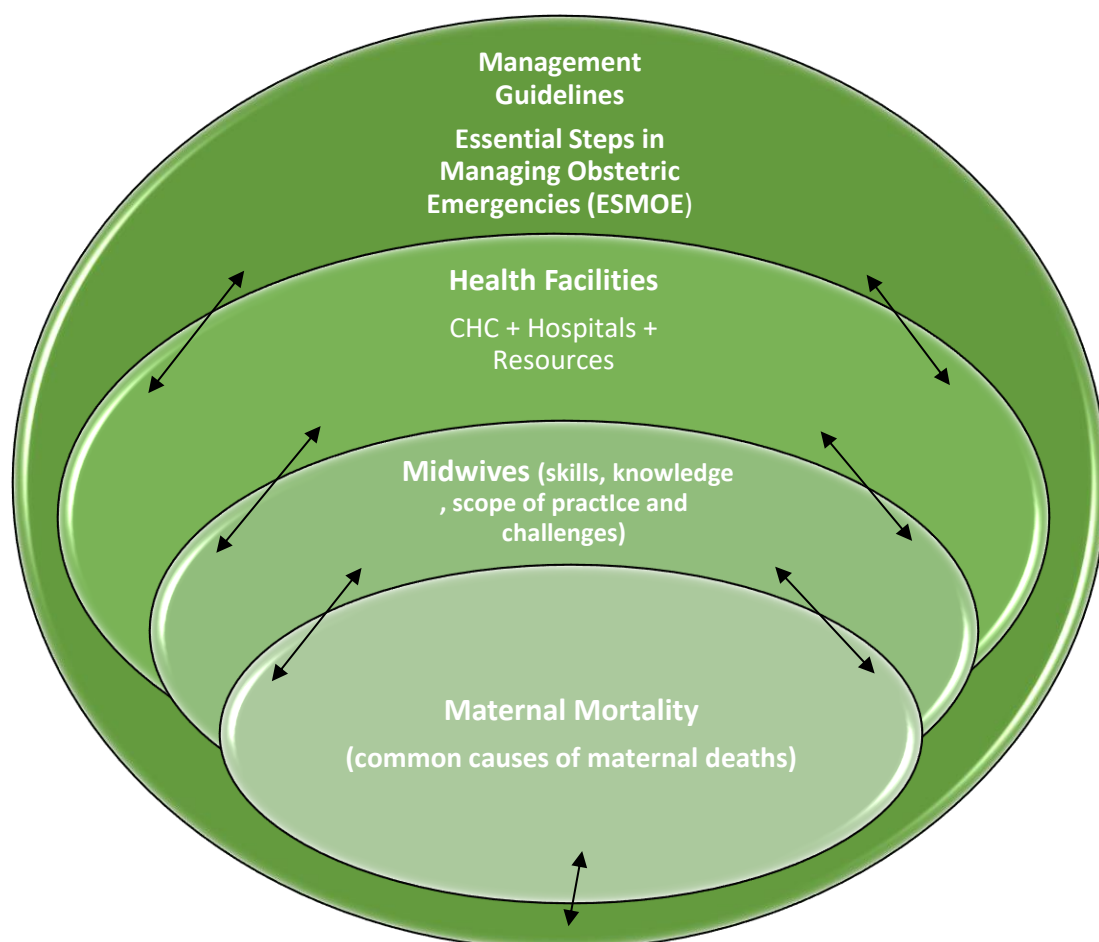
This study outlined the scope of practice of the midwife in comparison to her expectations in carrying out stipulated interventions from the ESMOE guideline. This would signify the importance of training skills and qualifications of midwives as well as addressing the planning of management guidelines for different skills. Appropriate recommendations could be made to the South African Nursing Council (SANC) to improve the curriculum for the training of midwives. This study articulates the

challenges that are experienced in the implementation of clinical guidelines, so that they can be addressed and rectified where possible.

By determining whether the guideline was implemented as planned, this study aimed to determine the need for further training of midwives. It identified factors that influence the implementation of the guidelines so that other strategies can be implemented alongside the guideline. This would contribute to improving the quality of care provided by midwives at all levels, resulting in a reduction of preventable maternal deaths.

## 1.8 CONCEPTUAL FRAMEWORK

The conceptual framework for this study focused on four main areas. These core areas were maternal mortality, the midwife, the health facility and the management guideline. The diagram in Figure 1.1 is arranged in a stacked, overlapping and circular model to indicate the relationship and the link between all four core areas.



**Figure 1.1: Conceptual Framework**

Maternal mortality which is the focus is on the top of the stack. The top three common causes of maternal deaths in KZN include hypertension (pre-eclampsia and eclampsia), haemorrhage and non-pregnancy related infections (HIV and AIDS). The management guidelines for these causes will be described in chapter two of this study. The overlap in the diagram indicates that to reduce the common causes contributing to a high MMR, the role of the midwife/accoucheur, the level of health facility he/she works in, available resources and how the ESMOE guidelines are implemented, all together play a vital role in attaining the targets of SDG 3.1. The two side arrows at each level of the diagram shows that each one affects the other and vice versa.

When analysing the midwife's role in achieving the SDG 3.1 target, the related factors of skills and knowledge, scope of practice and other challenges will reveal any problem areas. This will assist in a better understanding of the challenges associated with implementation of the management guidelines by the midwife. The diagram shows the midwife overlapping into the other areas which indicates that his/her role in implementation of the stipulated management guidelines in the clinical area will have a profound positive effect in reducing maternal mortality rates.

The health facilities included the CHCs, District and Regional hospitals in both rural and urban areas in KZN. The available resources include equipment, drugs, available maternity facilities and adequate health workers. The facilities chosen in this study provide maternal care with midwives playing a key role in managing obstetric emergencies especially in the CHC.

The basis of this diagram is the ESMOE guideline which is at the bottom and the other areas stacked and overlapping shows that this is the foundation and main area of focus in reducing MMR's. Proper implementation and evaluation of the management of the common causes of maternal deaths will contribute to improving quality care by the midwife at all health facilities.

The colour green chosen for the diagram is of significance as this is the colour that represents midwifery and the midwife. The role of the midwife in management of the common causes of obstetric emergencies by implementing the ESMOE guideline was the focus in the study.



## 1.9 OPERATIONAL DEFINITIONS

The following definitions apply to this study:

**Critical analysis** in this study refers to the necessity for opinions and comments on the implementation of the guideline in this study with the aim of reducing the high maternal mortality rates.

**Midwives** in this study refer to a responsible and accountable professional who works in partnership with women to give the necessary support, care and advice during pregnancy, labour and the postpartum period. This includes conducting births and providing care for the mother and new-born infant. This care includes preventative measures, the promotion of normal birth, the detection of complications in mother and child, the accessing of medical care or other appropriate assistance and the carrying out of emergency measures (International Confederation of Midwives 2019).

**Maternal death** refers to the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (WHO 2019a: 8).

**Common causes of maternal deaths** in this study refer to the top three cause of maternal deaths according to the Saving Mothers reports, which are hypertension (including pre-eclampsia and eclampsia), haemorrhage and non- pregnancy related infection namely, HIV and AIDS (NDoH 2017).

**Scope of practice** in this study refers to what can be done in the provision of nursing/midwifery care by the midwife as recognised and dictated by the statutory body in nursing (South African Nursing Council n.d.).

**ESMOE** is the acronym for Essential Steps in the Management of Obstetric Emergencies, which is the guideline that is referred to in this study. This guideline outlines the steps to be taken when managing complications in pregnancy, labour or puerperium. Further details on this guideline are explained in Chapter 2 of this study.

**Referral Hospital** could be a district hospital (level1) or a regional (level 2) hospital that can also be a combination hospital and a tertiary hospital (level 3) that a patient from a clinic can be referred to for further management (NDoH 2018).

**Combination hospital** in this study this refers to a regional hospital that functions on two or more levels. This means that it can be district and regional hospital, due to the absence of a district hospital in that area or a regional and tertiary hospital.

## 1.10 LAYOUT OF THE THESIS

This thesis is presented in eight chapters as outlined in Table 1.1 below.

**Table 1.1: Outline of thesis**

Chapter	Chapter title	Outline of content
1	Introduction	An overview of the study was outlined in this chapter, including the background to the study, problem statement, aims, objectives, and significance.
2	Discussion of the ESMOE management guideline (objective 1.)	The ESMOE guideline was discussed as a separate chapter intended to provide an understanding of the guideline. The modules relevant to the study were described pertaining to the common causes of maternal deaths. This chapter addressed the first objective which aimed to describe the ESMOE guideline and will not be included as part of the methodology in chapter 4.
3	Literature review	Various data bases were accessed to obtain relevant literature to guide the study. Literature pertaining to maternal mortality nationally and globally was compared to highlight the depth of the problem.
4	Research design and methodology	A detailed description of the materials and methods used to achieve the aims and objectives of the study. It includes a description of ethical considerations.
5	Presentation of Results	Results were presented under the relevant phases in this chapter in line with the above approaches used.
6	Discussion of results	Relevant literature was used where necessary to expound on findings that emerged from the study.
7	Development of a Practice framework	This chapter discussed and illustrated an algorithm and the practice framework that emerged from the findings of the study that proposed to implement ESMOE interventions into the basic midwifery training to improve relevant knowledge and skills.
8	Conclusions, Limitations and Recommendations	The conclusion and limitations of the study and appropriate recommendations were outlined in this final chapter.

## 1.11 SUMMARY OF THE CHAPTER

This chapter summarised the outline of the thesis including the aims, objectives, problem statement and significance of the study. An illustration and description of the conceptual framework of the study was also outlined. The next chapter describes the

ESMOE guideline in detail (Objective 1). A review of related ESMOE literature and the description of the management of the common causes of maternal deaths in accordance with the midwife's scope of practice are discussed.

# **CHAPTER 2: A DESCRIPTION AND REVIEW OF THE CRITICAL COMPONENTS IN THE CLINICAL GUIDELINES ON ESSENTIAL STEPS IN MANAGING OBSTETRIC EMERGENCIES (ESMOE) AND ITS INTRODUCTION AND PRACTICE IN SOUTH AFRICA**

## **2.1 INTRODUCTION**

In this chapter the guideline known as Essential Steps in Managing Obstetric Emergencies (ESMOE) is described. This chapter addresses the first objective of this study in order to contextualize the study. This description will not be repeated under the methodology section. It should be noted that this guideline is applied throughout the study and forms the foundation of the study. The management process discussed is in line with the midwife's scope of practice. This guideline is used in the management of obstetrical emergencies and complications that occur during pregnancy, labour, puerperium and in the neonate to reduce the maternal and infant mortality rates. An overview of the history, background, training and implementation of the ESMOE programme is outlined in this chapter. This study focusses only on those management guidelines related to the three common causes of maternal deaths that are relevant to the midwives' scope of practice. The detailed management of the relevant causes of maternal deaths can be obtained from the ESMOE guideline (NDoH 2015b).

## **2.2 HISTORY AND BACKGROUND OF ESMOE**

The Essential Steps in Managing Obstetric Emergencies (ESMOE) and Emergency Obstetric Simulation Training (EOST) training packages were developed in South Africa from the "Life Saving Skills-Essential Obstetric and Newborn Care (LSS-EOC)" training programme. This LSS-EOC programme was developed in the United Kingdom by the Liverpool School of Tropical Medicine (LSTM), the Royal College of Obstetricians and Gynaecologists (RCOG) and the WHO in 2006 (WHO 2009; Pattinson 2015: 3, 2019). In 2011 a three-day competency-based skills and drills

programme was delivered by LSTM in partnership with the Ministry of Health and Professional associations in more than 13 countries in Sub-Saharan Africa and Asia.

According to Pattinson (2015: 3, 2019) evaluation of the LSS-EOC training packages revealed that trained health care workers exhibited increased knowledge, skills, renewed enthusiasm motivation and good teamwork in providing emergency obstetric care (EmOC). In countries where this programme has been introduced, preliminary results reveal that trained health care workers are able to provide more emergency obstetric care signal functions and a better quality of care with a mean reduction in maternal deaths of 50% (Pattinson 2015: 3, 2019) (Frank, Lombaard and Pattinson 2009).

The content of the training package was adapted for each country in accordance with the structure of the country's health system and the causes of maternal and neonatal deaths. The LSS-EOC training package was adapted for use in South Africa (SA) in November 2007. It became known as the "Essential Steps in Managing Obstetric Emergencies (ESMOE) and Emergency Obstetric Simulation Training (EOST) training programmes" (Pattinson *et al.* 2015; Pattinson 2015: 3).

The ESMOE training programme was adapted for use by the NDoH in SA by specialist Obstetricians and Gynaecologists at the Nelson R Mandela School of Medicine, University of KwaZulu-Natal (UKZN) and the Medical Research Council in collaboration with the National Committee for Confidential Enquiries into Maternal Deaths (NCCEMD) (Moodley *et al.* 2014; Pattinson. 2015). The ESMOE training programme is funded by the Medical Education Partnership Initiative (MEPI) and is implemented by Obstetricians and midwives affiliated with the UKZN under the guidance of the ESMOE editorial board members (University of KwaZulu-Natal 2013).

The ESMOE training package is aimed at providing clinical guidelines and protocols for the management of the major causes of maternal mortality (NDoH 2007, 2014a). Since its inception as a pilot in 2007, this management guideline has undergone a series of changes and continues to change in keeping with evidence-based practice and updated research findings. The ESMOE board headed by Professor Pattinson and his team engages with all districts and health facilities to hold regular updates and refresher courses. This ensures that staff are continuously skilled in managing obstetric emergencies (NDoH 2015b; Pattinson 2015: 6).

### 2.3 IMPLEMENTATION OF ESMOE TRAINING PACKAGES

The initial target group for ESMOE training in South Africa included doctors and interns during their obstetrics and gynaecology modules of study. This was aimed at skilling them to function efficiently with limited supervision during their community service placements to build their confidence and competence in managing obstetric emergencies. However, with only doctors being trained, this was not as effective as was initially envisaged, because the midwives who are part of the health care team in maternity units are also involved in managing obstetric emergencies that contribute to reducing maternal mortality rates. The revised ESMOE training plan then included doctors and midwives from the different levels of health care facilities that work in maternity units (NDoH 2001; NDoH 2012: 55; Pattinson 2015).

The training programme on ESMOE involves training of a lead doctor and midwife from the relevant hospital and Community Health Centre (CHC). The trained staff is then expected to perform Emergency Obstetric Simulation Training (EOST) exercises (fire-drills) with other staff at their relevant institutions to equip them with the necessary skills of managing obstetric emergencies.

According to Grady *et al.* (2011) and Pattinson (2015: 7) results of the LSS-EOC training in other countries showed that this standard type of training may not be intensive enough and that it would be better that all staff involved in maternity care be trained resulting in saturation training. It was suggested that the saturation training be then followed up by EOST exercises at the relevant hospitals and CHCs. Saturation training for District Managers, District Clinical Specialist Teams (DCST) and local master trainers, organised by the Maternal and Infant Health Care Strategies unit of the University of Pretoria, commenced in KZN in 2014 (Grady *et al.* 2011; Pattinson. 2015).

Districts in which saturation training first commenced were chosen based on their high rates of maternal deaths. One of those districts was the Ugu district on the South Coast of KZN. Saturation training aimed to train 80% of health care providers involved in maternal and neonatal care (Pattinson 2015: 12, Pattinson *et al.* 2019: 3). Ugu was one of the districts that was used in this study for data collection, which was chosen on the basis of a sustained high institutional MMR of 299.5 over the 2008-2010 triennium (NDoH 2011).

The ESMOE training programme is delivered in the form of two workshops targeting different health care workers at different health facilities. The one workshop is conducted for doctors and midwives from district, regional and tertiary hospitals over three days and a two-day workshop is delivered to professional nurses and medical officers from the community health centres. The aim of the three-day workshop is to provide the skills and knowledge to recognise, stabilise and manage obstetric and neonatal emergencies, whereas the two-day workshop aims at recognising, stabilising and referring these emergencies. The trained staff are then requested to run EOST fire drill exercises on a monthly basis to reinforce the necessary skills and knowledge in managing obstetric emergencies among all other staff (Frank, Lombaard and Pattinson 2009; Grady *et al.* 2011; Pattinson *et al.* 2019: 4).

## **2.4 THE MODULES IN THE ESMOE TRAINING PACKAGE**

There are 13 training modules in the ESMOE guideline used in this study as per 2016 update which are outlined in Table 2.1. Updates on modules and related changes in management are communicated to all relevant staff through annual workshops. The training modules are run as interactive group training sessions that are facilitated by a “Master Trainer”. Each module which is approximately 90 minutes includes a short lecture, video presentations and demonstrations. Participants practice on mannequins according to various case scenarios and simulated role played. The emergency case scenario training is referred to as an obstetric fire drill or emergency obstetric scenario training (EOST). The guidelines are structured in a stepwise user-friendly format that can be implemented at the patient’s bedside. The management of obstetrical emergencies are also summarised in the form of algorithms for easier learning and implementation. The modules are continuously updated and revised in keeping with clinical practice and maternal death reports.

**Table 2.1: ESMOE training modules**

Module No.	Module Name
1	Maternal resuscitation
2	Neonatal resuscitation
3	Sepsis and shock
4	Pre-eclampsia and eclampsia
5	Obstetric haemorrhage
6	Miscarriage and sepsis
7	Assisted delivery
8	Partogram, Obstructed labour and fetal monitoring
9	Obstetric emergencies 1-Breech and Twin deliveries
10	Obstetric emergencies 2- Shoulder dystocia and cord prolapse
11	Surgical skills
12	Fetal monitoring and Cardio toco-graph
13	HIV in pregnancy

The modules that are discussed in this chapter are those key conditions that contribute to the highest MMR which include (a) pre-eclampsia and eclampsia; (b) obstetric haemorrhage and (c) HIV in pregnancy. These three modules have been selected in keeping with the common causes of maternal deaths according to the latest SMR (NDoH 2017: 2). Data from the latest triennial reports indicate that these modules chosen for this study are the highest contributors of preventable maternal deaths. Non-pregnancy related infections (mainly HIV), obstetric haemorrhage and hypertensive disorders (including pre-eclampsia and eclampsia) contributed to 66.3% of avoidable maternal deaths in KZN in 2012 and continue to increase. Comparative data from the SMR for trienniums 2011-2013 and 2014-2016 indicate an increase of maternal deaths in KZN due to hypertension and a decrease in maternal deaths related to HIV infection. (Pattinson, Fawcus and Moodley 2013; NDoH 2014b, 2015b; NDoH 2017).

## **2.5 A DESCRIPTION OF THE ESMOE MANAGEMENT GUIDELINE**

The management of all obstetric conditions are described below in Table 2.2. This is followed by an overview of the management of the common causes of maternal deaths relevant to this study according to the ESMOE guideline. The detailed management for the relevant conditions can be found in the comprehensive ESMOE guideline which is available on the ESMOE and Department of Health websites.



## 2.5.1 Specific steps to follow in management of all obstetric emergencies

The ESMOE training packages illustrates specific mnemonic and guidelines that must be applied to all emergency conditions. This is described in the Table 2.2.

**Table 2.2: Initial assessment and management of all obstetric emergencies**

Pneumonic/specific steps	Assessment and key reactions
1. <b>Shake and shout</b>	Assess the level of consciousness is the patient alert, responsive
2. <b>Call a CAB</b>	<b>C=Circulation</b> <ul style="list-style-type: none"> <li>- What is the Blood pressure and pulse?</li> <li>- If no circulation, start cardiopulmonary resuscitation</li> </ul> <b>A= Airway</b> <ul style="list-style-type: none"> <li>- Ensure an open airway</li> </ul> <b>B= breathing</b> <ul style="list-style-type: none"> <li>- Assess breathing and respiratory rate</li> </ul> Other expected actions: <ul style="list-style-type: none"> <li>- If patient not responsive, call for help and continue resuscitation or intubation</li> <li>- Insert two intravenous lines and administer ringers' lactate</li> <li>- Administer Oxygen using a 40% face mask</li> <li>- Insert a urinary catheter, monitor intake and output</li> </ul>
2. <b>Secondary survey includes:</b> <ul style="list-style-type: none"> <li>- <b>Big 5</b></li> <li>- <b>Forgotten 4</b></li> <li>- <b>Core 1</b></li> </ul>	<b>Big 5</b> <ul style="list-style-type: none"> <li>- Central Nervous system- is patient alert or not</li> <li>- Cardiovascular system- Blood pressure, pulse, heart sounds</li> <li>- Respiratory system- Respiratory rate, oxygen saturation</li> <li>- Hepatic and Gastrointestinal system- tenderness, pain, jaundice, bowel sounds</li> </ul> Renal system- urinary amount and abnormalities in urine, urea & creatinine levels <b>Forgotten 4</b> <ul style="list-style-type: none"> <li>- Haematological system- anaemia- is the patient pale, haemoglobin level, bruising, clotting profile, platelets</li> <li>- Endocrine system- assess blood sugar levels, thyroid, breasts, any sepsis</li> <li>- Musculoskeletal system- is patient dehydrated, obese, any deep vein thrombosis, thrombophlebitis, oedema</li> <li>- Immune system- temperature, HIV status</li> </ul>
	<b>Core 1</b> <p>Pregnancy and labour assessment- assess for abdominal tenderness, palpate for gestation, assess fetal condition and a vaginal examination is performed to assess for dilatation, presentation and if membranes are intact or not</p>
<b>Diagnosis</b>	A provisional diagnosis is made
<b>Further management</b>	<p>Further management will depend on the condition, diagnosis and level of care. The patient is stabilised, and referral is made if necessary, to a facility with a functioning theatre and laboratory facility</p> <p>In this study the specific management of the relevant common causes of maternal deaths are further detailed in this chapter</p> <p>Referrals are made using the <b>SBAR</b> form of communication, which includes:</p> <p><b>Situation-</b> The problem with the patient, including initial assessment of vital signs</p> <p><b>Background-</b> includes history of the patient and detailed information regarding gestation and risk factors</p> <p><b>Assessment-</b> identify the potential problem from relevant findings</p> <p><b>Recommendation-</b> what needs to be done or request for assistance</p>

Source: Adapted from the ESMOE fire drills checklists and ESMOE for CHCs (NDoH 2015d).

### 2.5.2 The Pre-Eclampsia and Eclampsia Module

To be able to manage a patient effectively it is important to screen the patients at antenatal clinic and make the correct diagnosis. The midwife must be able to diagnose and differentiate between hypertension, pre-eclampsia and eclampsia and manage or refer the patient appropriately. The diagnosis of the variations of hypertension in pregnancy is as follows:

- **Hypertension in pregnancy** is diagnosed after 20 weeks gestation with a Blood Pressure (BP)  $\geq 140/90$  mm Hg and  $< 160/110$  mm Hg without proteinuria.
- **Mild pre-eclampsia** is diagnosed after 20 weeks of gestation with two readings of diastolic blood pressure (dBP) of 90mmHg but not exceeding 110mmHg, with proteinuria of 2+ on urine analysis. The blood pressure must be taken four to six hours apart with the woman at rest.
- **Severe pre-eclampsia** is dBP of 110 mmHg or more, and 3+ of proteinuria, OR Mild pre-eclampsia with any one of the following symptoms as well:
  - Further worsening of the blood pressure to a diastolic of 110 mmHg or higher,
  - Further worsening of 3+ OR 4+ of proteinuria,
  - Upper right quadrant pain, severe frontal headache, blurred vision,
  - Pulmonary oedema and decreased urinary output (of less than 100mls over 4 hours).(NDoH 2012, 2015a).
- **Eclampsia:** is when a pregnant woman (after 20 weeks' gestation) or a woman who has recently given birth is found unconscious or having convulsions with a dBP of 110 mmHg or more and 2 or 3 + of protein in her urine (Marshall and Raynor 2014: 246; NDoH 2012).

### **2.5.2.1 An overview of the management of pre-eclampsia and eclampsia according to the ESMOE guidelines**

ESMOE basic principles of management include:

- Stabilise mother and then deliver fetus
- Treat and prevent fits by administration of magnesium sulphate (MgSO<sub>4</sub>)
- Treat raised blood pressure (BP) with appropriate antihypertensive drugs
- Management of fluid balance
- Prevent complications include Big 5, Forgotten 4 and Core1 (see table 2.2.)

Pre-eclampsia and eclampsia are currently the highest cause of maternal deaths in KZN (NDoH 2017: 3). The cure for pre-eclampsia and eclampsia is the delivery of the fetus and placenta. However, a rushed delivery in an unstable patient may result in complications and maternal death. Delivery can only be expedited if the hypertension is corrected and hemodynamic stability is achieved (NDoH 2012, 2015a).

The following are the main areas of focus in managing patients with pre-eclampsia or eclampsia.

#### **2.5.2.1.1 Assess and stabilise the mother**

- Admit and conduct a rapid assessment of patient using call a CAB principle and manage appropriately (see table 2.2).
- If the patient is at a clinic level, stabilise patient and refer immediately to the next level of care following administration of magnesium sulphate (MgSO<sub>4</sub>).
- Administer antihypertensive agents to reduce elevated blood pressure. The recommended drugs include hydralazine, nifedipine and labetalol. At a PHC any one of these antihypertensive drugs that are available is used prior to transfer.
- The referral hospital must be contacted, and transfer arrangements must be made. The SBAR forms must be filled out that provides relevant information about the patient and management commenced. This form must accompany the patient with all other records.

### **2.5.2.1.2 The use of magnesium sulphate in severe pre-eclampsia and eclampsia**

According to Makhanya, Moodley and Govender (2016: 13) magnesium sulphate ( $\text{MgSO}_4$ ) is the recommended drug used to prevent and treat seizures associated with severe pre-eclampsia and eclampsia. The ESMOE guideline suggests two regimens that are used for the administration of  $\text{MgSO}_4$  include intramuscular and intravenous routes. One of the regimens (Pritchard regimen) requires that a loading dose of 4g of a 20% solution of  $\text{MgSO}_4$  is administered intravenously using a 200 ml normal saline over a period of 10-15 minutes. This is followed by a deep intramuscular injection of 10g of a 50% solution of  $\text{MgSO}_4$ , which is administered as 5g into each side of the gluteus maximus muscle. Administration of  $\text{MgSO}_4$  is repeated four-hourly over a 24-hour period. If convulsions recur after 15 minutes, an additional dose of 2g of  $\text{MgSO}_4$  (20% solution) is administered intravenously for a period of 5 minutes. At a clinic level the patient is given the initial dose of  $\text{MgSO}_4$  and then transferred to the nearest referral hospital.

The second  $\text{MgSO}_4$  regimen is usually administered in a hospital and is prescribed by the attending doctor. This regimen requires that  $\text{MgSO}_4$  be administered as a loading dose of 6g  $\text{MgSO}_4$  in 200ml normal saline run for 20-30 minutes intravenously, followed by a maintenance dose of 8g of  $\text{MgSO}_4$  in 200 ml normal saline run intravenously at a rate of 54 millilitres per hour using an infusion pump. The maintenance dose must be repeated over a 24-hour period.

#### *Monitoring a patient that is receiving $\text{MgSO}_4$*

The midwife is required to observe the patient for signs of  $\text{MgSO}_4$  toxicity. These signs may include:

- An absent knee jerk reflex
- Urinary output of less than 100 millilitres over 4 hours
- Respiratory rate less than 16 breaths per minutes

If these  $\text{MgSO}_4$  toxicity signs are present the patient is not given any more doses of  $\text{MgSO}_4$ . A rapid injection of  $\text{MgSO}_4$  may cause respiratory failure or death. The antidote for  $\text{MgSO}_4$  is Calcium gluconate. Calcium gluconate 1g is administered intravenously for 10 minutes if respiratory depression occurs (Dippenaar, Da Serra

and Sellers 2012: 243; Cronjé, Cilliers and Pretorius 2011; NDoH 2012; Marshall and Raynor 2014: 252; NDoH 2015b).

*Drugs that can be used for eclamptic women if MgSO<sub>4</sub> is unavailable*

Lorazepam (Ativan) 1-2 mg intravenously

Clonazepam (Rivotril) 1mg intravenously-

Valium 10mg intravenously slowly and further 10mg IV slowly if convulsions recur.

#### **2.5.2.1.3 The eclamptic box**

The ESMOE management guideline stipulates that an “eclampsia box” must be available at all health facilities. This box must contain all the necessary equipment, materials and drugs required for the management of severe pre-eclampsia or eclampsia. This emergency eclamptic box with all required equipment and drugs prevents delays and complications in emergency management of an eclamptic patient. The midwife is to replenish all stock in the box after use. The eclamptic box is checked on a daily basis as part of the emergency equipment (NDoH 2012, 2015a; Dippenaar, Da Serra and Sellers 2012: 243).

It is important to continuously monitor the patient in terms of the following:

#### **2.5.2.1.4 Vital signs**

The patient is monitored closely and any adverse changes in her condition are reported immediately to the doctor. The monitoring of maternal vital signs includes checking the BP, pulse, temperature and respiratory rate. The BP is initially monitored every 15 minutes until it is stabilised which is then followed by hourly monitoring. The goal is to keep the diastolic BP between 90mmHg and 100mmHg to prevent cerebral haemorrhage (Cronjé, Cilliers and Pretorius 2011; Marshall and Raynor 2014: 250; NDoH 2015b).

#### **2.5.2.1.5 Fluid balance**

Two intravenous lines using Ringers Lactate is administered over 6-8 hours or 3ml/minute or 30 drops/minute.

Urinary output is monitored through a urinary catheter and all specimens are tested for abnormalities. The urinary amount should exceed 100mls over four hours (Cronjé, Cilliers and Pretorius 2011; NDoH 2015b).

#### **2.5.2.1.6 Progress of labour**

The patient is assessed for any signs of labour. For a patient in labour the doctor usually decides on the mode of delivery, irrespective of the gestational age. Delivery should take place as soon as the haemodynamic status of the patient is stabilised, which is normally 2-4 hours following admission. The doctor may order an induction of labour using an oxytocic agent if labour is not progressing well. An emergency caesarean section is performed if a vaginal delivery is not anticipated within 12 hours.

#### **2.5.2.1.7 Fetal condition**

The fetal heart rate is monitored using a continuous cardiotocograph (CTG) to detect any signs of fetal distress on viable pregnancies. A deviation from the normal fetal heart rate of 120-160 beats per minute or non-reactive CTG traces would require immediate delivery. Meconium present in the liquor would also indicate fetal distress.

#### **2.5.2.1.8 Blood screening**

A full blood screen is done on all high-risk patients. The bloods that are taken and sent to the laboratory include rhesus grouping, full blood count (FBC), urea and creatinine (U&E), liver function tests (LFT) and disseminated intravascular coagulation (DIC) screen. (Cronjé, Cilliers and Pretorius 2011; NDoH 2012; Dippenaar, Da Serra and Sellers 2012).

#### **2.5.2.2 Conclusion: Management of pre-eclampsia/eclampsia**

According to the last SMR (NDoH 2017) there has been a 14% increase in institutional maternal deaths from 2011 to 2016 related to hypertensive conditions. Most of these deaths occur at regional or tertiary hospitals due to the high number of referrals received. Early detection of pre-eclampsia in pregnancy together with prompt referral can save the life of both the mother and the baby. Pre-eclampsia can progressively get worse and result in eclampsia if untreated. The convulsion can occur for the first time in the post-natal period as well. Therefore, it is imperative to continue treatment and monitoring of all women with pre-eclampsia as high risk until the patient's

condition is stable. Pre-eclampsia and eclampsia are most often avoidable causes of maternal death if the correct management protocols are implemented early.

### **2.5.3 The Postpartum Haemorrhage Module**

Post-partum haemorrhage (PPH) is defined as excessive bleeding from the vaginal tract after a delivery. A blood loss of 500mls or more during a vaginal delivery or 1000mls during or after a caesarean section are considered as PPH. The management of postpartum haemorrhage in the ESMOE guideline is described in the form of an algorithm using a step wise approach directing appropriate management.

#### **2.5.3.1 Prevention of postpartum haemorrhage**

All high-risk women should be identified early in pregnancy and referred to hospital for delivery. The following are some of the important antenatal preventative measures that apply to PPH:

- Provide information on nutrition and a healthy lifestyle.
- Routine iron supplementation in pregnancy.
- At risk women include ante partum haemorrhage, haemorrhage in a previous labour or delivery, any presence of anaemia, prolonged labour, grand multiparous women and multiple pregnancy. These women should deliver in a district or regional hospital.
- Prolonged labour should be avoided as this can contribute to uterine atony (inability of uterine muscles to contract effectively due to loss of elasticity. (Cronjé, Cilliers and Pretorius 2011; Marshall and Raynor 2014: 407).
- Active management of the third stage of labour must be implemented.
- Routine post-partum monitoring of vital signs and blood loss.

#### **2.5.3.2 Basic steps in management of post-partum haemorrhage according to the ESMOE guideline**

The midwife must be vigilant in monitoring all women post-delivery to be able to detect PPH as early as possible. At a clinic level the midwife will implement emergency care and refer the patient to the next level of care (Pattinson 2017).

The assessment and resuscitation of all obstetric emergencies are the same as described in table 2.2 above as applicable to the condition. Other specific steps in management of PPH are outlined below.

#### **2.5.3.2.1 Active management of the third stage of labour**

Active management of the third stage of labour is described as the delivery of the placenta and membranes following the birth of the baby. This involves administration of an oxytocic agent to assist the uterus to contract thereby aiding in detachment of the placenta. A method involving controlled cord traction is used to deliver the placenta, which is taught in all midwifery programmes.

#### **2.5.3.2.2 Manual removal of the placenta**

In the event of the placenta being retained after an attempt to deliver it has failed, then a manual removal of the placenta is undertaken. The specific steps and technique of manual removal of the placenta is taught in post basic midwifery courses as well as in ESMOE training.

#### **2.5.3.2.3 Management of PPH after the placenta is delivered**

According to the ESMOE guideline the initial emergency management of all patients with PPH must include the following:

- The basic “call a CAB” principle is applied in all emergencies.
- The uterus must be rubbed up to aid in contraction and reduce the blood loss.
- Administer oxytocic agents, which include, syntocinon or syntometrine, ergometrine and misoprostol. The details of dosage and routes are described in the ESMOE guidelines.
- All vaginal and perineal tears that are bleeding must be sutured.
- All patients managed at clinics or a level one hospital with no theatre facilities must be referred to the next level of care following the implementation of the above management steps or if bleeding persists.
- Other interventions for an atonic uterus include bimanual compression, balloon tamponade or hydrostatic reduction as per the ESMOE guideline.
- Interventions carried out by a doctor in a hospital including taking the patient to theatre for a laparotomy, aortic compression, ligation of uterine artery, compression sutures or a hysterectomy.



### **2.5.3.3 Conclusion of the module on PPH**

Post-partum haemorrhage is the second highest preventable cause of maternal deaths in KZN. Prevention, early detection, prompt referral and competent emergency management by the midwife can contribute greatly to reducing maternal mortality from PPH. Referral of a patient from a clinic to a district hospital or from a district hospital to a regional hospital must be made timeously. Unnecessary delays and incompetence may result in the death of the woman with severe PPH.

### **2.5.4 Human Immunodeficiency Virus (HIV) infection in pregnancy**

HIV infection is classified as an indirect cause of maternal deaths under the category of non-pregnancy related infection (NPRI). According to the 2013 SMR 90% of women from the NPRI category tested HIV positive although, 40% of these cases were not on antiretroviral drugs. The ESMOE guideline includes the management of HIV in pregnancy with the aim of reducing this largest category of maternal deaths. The current 2015 antiretroviral treatment (ART) guideline is described in this study which was followed for pregnant women that are HIV positive and for the prevention of mother to child transmission of HIV/AIDS. The management of HIV and AIDS is continuously updated with treatment regimens changing all the time according to current research (NDoH 2015c).

#### **2.5.4.1 HIV counselling and testing (HCT)**

According to the National antiretroviral guideline (2015c), which is supported by the ESMOE guideline, all pregnant women attending antenatal clinic at all health care levels are offered HCT. The focus is to highlight the importance of prevention of mother to child transmission of HIV and to have a positive pregnancy outcome.

This is followed by individual HCT where the patient is offered HIV testing after the pre-test counselling is done. A woman that consents to an HIV test is then tested using the rapid test kit. Results are obtained immediately and the woman is taught to read her own results (NDoH 2012, 2013, 2015c).

#### **2.5.4.2 An HIV positive test result**

An HIV positive result is confirmed by a second test and post-test counselling and psycho-social support is provided. The initiation of ART for all HIV positive women is

commenced immediately, irrespective of CD4 cell counts. All women with HIV infections must be assessed for clinical staging according to the WHO guidelines.

Blood screenings are routinely done at three-month intervals during pregnancy for CD4 cell counts, full blood count and creatinine. These would indicate any adverse reactions to drugs and if there is a need to change drugs.

#### **2.5.4.3 An HIV negative test result**

The patient is advised on the window period and the need to retest in three months. Relevant health education is provided, and patients are encouraged to live a healthy positive lifestyle. Continuous provider-initiated counselling and testing (PICT) must be given to these women at every clinic visit (NDoH 2012, 2013, 2015c).

#### **2.5.4.4 Management of HIV in pregnancy**

The pregnant woman who is HIV positive and attends an antenatal clinic for the first time at any gestation is immediately commenced on ART. The ESMOE management guideline follows the same drug regimens as the South African ART guidelines (NDoH 2015c). Management of HIV is continuously updated in line with ongoing evidence-based practice. This study utilised the 2015 ART guidelines which was applicable at the time of this study.

#### **2.5.4.5 The standardised national ART regimens used in pregnancy**

The current antiretroviral drug of choice is the fixed dose combination (FDC). This is one drug that has a combination of Emtricitabine 200mg (FTC), tenofovir 300mg (TDF) and efavirenz 600mg (EFV). Other standard regimens that patients may still be using prior to the implementation of FDC are usually continued (NDoH 2015c).

The description of the current recommended regimens is available in the ART guidelines from the Department of Health. The specific ART regimes are not outlined in this chapter as the details of the drugs used are not necessary for the study.

#### **2.5.4.6 Specific management of HIV in labour**

- Limit the number of vaginal examinations and ensure aseptic techniques when performing any procedures on the HIV positive patient. Unnecessary infections are avoided for both the mother and baby.

- Keep the amniotic membranes intact for as long as is possible as this helps to prevent ascending infection to the fetus.
  - Avoid performing an episiotomy or any other invasive procedures. This reduces the risk of mother to child transmission (MTCT) of HIV/AIDS.
  - Avoid unnecessary suctioning of the neonate's airway. This can cause injury of the mucosa thereby opening an entry for the virus if breastfed.
  - Prophylactic antibiotics must be used in elective and emergency caesarean sections.
  - Ensure that the woman is adhering to her ART as prescribed.
  - Baby must receive NVP syrup within 72 hours of delivery.
- (Cronjé, Cilliers and Pretorius 2011; Dippenaar, Da Serra and Sellers 2012: 693; NDoH 2013, 2015c).

### **2.5.5 The benefits of the HIV module in reducing maternal mortality**

The HIV module is continuously updated, and new interventions and drug regimens are added in line with evidence-based practice. The PMTCT (Prevention of Mother to Child Transmission) programme is now offered in 98% of facilities and all health care workers must be committed to reducing new infections.

Antiretroviral therapy being offered to all HIV positive women has and continues to make a huge difference in the MMR (NDoH 2014a, 2015c). The latest SMR (NDoH 2017) indicates a further decline in MMR related to NPRI mainly HIV of almost 47% since 2011. Changes in drug regimens have shown a decline in maternal deaths from adverse ARV drug events from 130 (2011-2013) to 27 over the 2014-2016 triennium.

Compliance to ART in pregnancy has been made easier with only one drug (FDC) to take as a single daily dose at night. The reductions in MMR due to ART coverage in pregnancy are becoming more evident as indicated by the above statistics. The role of the midwife in initiating treatment and, more importantly in providing on going health education and support to the HIV positive woman and her partner and family is critical in achieving greater benefits.

## **2.6 SUMMARY OF THE CHAPTER**

This chapter described the origination of the ESMOE guideline and its introduction and practice in SA. The overall description of the management of the three common key

causes of maternal deaths aimed to provide an understanding of the role of the midwife in the implementation of ESMOE. This study was based on the implementation of the ESMOE guideline in managing the relevant obstetric complications, therefore it is important to understand the context of the guideline.

## **CHAPTER 3: LITERATURE REVIEW**

### **3.1 INTRODUCTION**

This chapter critically outlines the review of relevant literature to establish the maternal mortality ratios globally, nationally and locally. The global focus of maternal deaths, prevalence and causes as well as strategies in preventing maternal deaths and the scope of practice of the midwife in management of these causes were researched and outlined in this chapter. The current guideline on the essential steps on managing obstetric emergencies (ESMOE) which address the common causes of maternal deaths was applied where appropriate. A search of the literature was conducted using the following data bases: EBSCO Host; CINAHL; Medline; Pub-med; Government Gazette Index; Sabinet References; Google Scholar and Science Direct. Relevant findings will be referred to in this chapter.

### **3.2 GLOBAL FOCUS ON REDUCING MATERNAL MORTALITY**

The United Nations in collaboration with the international community developed eight Millennium Development Goals in 2000. Improving maternal health was one of the top eight priorities for this millennium which was goal number five. The target of Millennium Development Goal 5 (MDG 5) called for a three quarters reduction in maternal mortality ratios between 1990 and 2015. This was applicable to all countries and regions where the risk of maternal deaths remained unacceptably high in 1990. The implication of this target was that maternal mortality ratios (MMRs) should decline at an average rate of at least 5.5% per year over this 25-year interval (United Nations 2010, 2015; WHO 2019a: 44). However, this target was not met globally.

Over the last two and a half decades the progress towards reducing maternal mortality was slow, which called for new global targets to be set with an extended time frame. In April 2014 the UN agencies and country stakeholders met in Bangkok and reached consensus on new targets for the post-2015 maternal mortality reduction. This led to formation of the Sustainable Development Goals (SDGs), with 17 goals and 169 associated targets. The SDG target number 3.1. focuses on maternal mortality, like the previous MDG 5. This target aims to achieve an MMR of less than 70 maternal

deaths per 100 000 live births by 2030. The supplementary national target is that by 2030, no country should have an MMR greater than 140, a number twice the global target. To achieve the SDGs global target the reduction of MMR by 5.5% remains the same as the previous MDG 5 targets. These targets are aimed at attaining the ultimate goal of ending preventable maternal mortality (WHO 2015a:1).

The SDG global targets could be seen as being ambitious, considering that in the last 25 years little progress was achieved. With a further 15 years being given in the SDGs to achieve a similar global MMR to less than 70 per 100,000 live births will be a challenge. This calls for a determined and intensified action plan by all stakeholders if these targets are to be achieved.

However, setting ambitious targets as proposed by the MDGs and SDGs is important as they offer incentives for change.

Alkema *et al.* (2016:462) believe the ambitious SDG targets projected over the next 15 years can only be achieved by 2030 with rapid and sustained investment in maternal survival in the world's poorest countries, especially Sub-Saharan Africa.

The WHO (2017a: 29) concurs with Alkema *et al* (2016: 471) in the latest document on health statistics that despite the progress made during the MDG era, major challenges remain in terms of reducing maternal and child mortality within the current SDG agenda. The WHO together with global partners have made maternal health and ending preventable maternal mortality a key focus within the SDG targets.

### **3.3 PREVALENCE OF MATERNAL DEATHS**

Maternal mortality remains unacceptably high globally, with an estimated 303,000 woman dying each year as a result of pregnancy and childbirth- related complications. Global maternal deaths declined by 44% between 1990 and 2015 from 385 deaths to 216 deaths per 100 000 live births. This can be translated into an annual rate reduction of 2.3%. However, this achievement whilst being impressive fell far short of the 75% reduction and less than half of the 5.5% annual reduction rate set out by MDG 5. Therefore, to meet the similar 2030 SDG target in further reducing MMR, drastic improvements are needed including understanding the causes of maternal deaths in order to implement effective policy and programme decisions (Jolivet *et al.* 2018: 258.; WHO 2017a: 29).

According to WHO (2017a; 2019a: 33) every region has advanced; however, MMR remain unacceptably higher in Sub-Saharan Africa (SSA) where many countries still have more than 500 maternal deaths per 100,000 live births.

Maternal deaths vary drastically between developed and developing countries. The WHO (2016a) further confirms that only a few countries worldwide reached the target of a 75% reduction in MMR since 1990, indicating that change in maternal health is happening too slowly. Alkema, *et al.* (2016:471) proposes that in order to meet the SDG target, many of the world's poorest countries will have to improve maternal health outcomes at a rate far beyond that which occurred between 2000 and 2015 in any country (WHO 2019a: 33).

Following the end of the MDG era, in 2015 there were 25 countries still having a MMR of 420/100 000 live births or greater. Alkema *et al.* (2016: 467) and WHO (2018b) confirms that the lifetime risk of maternal death in high income countries is 1 in 3,300 as compared to 1 in 41 in low income countries. In Sub-Saharan Africa women face the highest lifetime risk of maternal deaths of 1 in 36, followed by South Asia with 1 in 200 risk of maternal deaths. The WHO (2018b, 2019a: 48) reported that an estimated 295 000 maternal deaths occurred over 2017, yielding an overall MMR of 211 maternal deaths per 100 000 live births across 185 countries.

In developed countries the MMR is 15/100 000 with a total of 1700 maternal deaths, whilst in the developing countries the number of maternal deaths is 131000 with a MMR of 440/100000 births. According to WHO (2019a: 33) the lowest maternal death counts were in Australia and New Zealand with only 26 maternal deaths. However, in Europe there was an estimated 740 maternal deaths in 2017.

According to Graven *et al.* (2012: 2) in Belize the MDG 5 target was achieved as early as 2011, five years ahead of the 2015 target date. One of the ways that this was achieved was by implementing an integrated patient-centred health information system. This system addressed the management interventions and best practices in prenatal, intrapartum and postpartum care.

Comparatively in low- and middle-income countries the challenges are greater, and these countries stand to benefit most from the revised SDG targets. The two regions, Sub-Saharan Africa and South Asia account for 86% of maternal deaths globally. Sub-

Saharan Africa accounted for 66% (196 000 maternal deaths) of the global maternal deaths whilst Southern Asia accounted for 20% (58 000) maternal deaths (WHO 2014; Alkema *et al.* 2016: 467; WHO 2019a: 33).

By contrast countries such as Nigeria achieved a 41% reduction in MMR during the MDG era, however due to the large population its over 40,000 estimated maternal deaths still account for 14% of the global mortality estimates. Countries like Nigeria, India, Ethiopia, Pakistan, Afghanistan and the Democratic Republic of Congo currently account for 50% of the global estimated MMR (WHO 2014, 2016a; Alkema *et al.* 2016: 467).

In South Africa (SA) the number of maternal deaths and the institutional mortality rates (iMMR) continue to show a decline. According to the SMR for the 2014-2016 triennium there was a 12.5% reduction in iMMR as compared to the 2011-2013 period. The iMMR during the previous 2011-2013 triennium was 154.06, with a total of 4333 maternal deaths as compared to the 2014-2016 triennium with an iMMR of 134.33 and a total of 3697 maternal deaths. This decline in maternal deaths is encouraging, however this is far from the SDG target of no country exceeding an MMR of 140 maternal deaths per 100,000 live births. Wabiri *et al.* (2016: 256) points out the inequalities in maternal health care across SA results in a varied MMR across provinces. This was indicated by the institutional MMR ranging from 69 in the Western Cape to 185 in the North West Province.

The SMR (NDoH 2017) and Moodley *et al.* (2014) confirm that the coverage of key maternal health interventions in SA are good when compared to the other countries in sub-Saharan Africa. There is a 92% of antenatal attendance coverage at least once in pregnancy and a 91% facility birth with a skilled birth attendant present. Although this can be an indirect indicator for emergency obstetric care (EmOC) it does not indicate the quality of care received. This may be the contributing factor to the slow decline in maternal mortality rates in SA.

### **3.4 CAUSES OF MATERNAL MORTALITY**

The WHO (2017b) admits that in reducing MMR it is imperative to assess background data and understand the causes of maternal deaths. This is vital to inform policies in improving maternal health globally.



Maternal death is defined as the death of a woman whilst pregnant or within 42 days of delivery or termination of pregnancy, from any cause related to, or aggravated by pregnancy or its management, but excluding deaths from incidental or accidental causes. This definition allows for the identification of maternal deaths according to their cause as either being direct or indirect (WHO 2019a: 8).

However, according to WHO (2015a, 2017b) collection of routine and complete information about causes of maternal deaths has not been possible because of inadequacies of data collection and absence of vital registration systems in most countries globally.

Maternal deaths are classified as being direct, indirect or incidental, which is based on the cause of the death.

#### **3.4.1 Direct causes**

Direct maternal deaths are those resulting from obstetric complications of pregnancy, delivery and postpartum. These include interventions, omissions, incorrect treatment or events that result from the above interventions. Direct causes of maternal death are obstetric haemorrhage, hypertension, ectopic pregnancy, miscarriage, pregnancy related sepsis, anaesthetic complications, embolism and acute collapse (NDoH 2017: 70; WHO 2019a: 8).

The WHO (2018b, 2019a) data on maternal mortality indicates that obstetric haemorrhage remains the leading cause of MMR accounting for 27% of deaths globally. There is a similar proportion of MMR from indirect causes (28%) related to pre-existing medical conditions that are aggravated by pregnancy. Hypertensive disorders especially eclampsia contribute to 14% of MMR globally.

However, in SA there was a decline in maternal deaths from obstetric haemorrhage and an increase in hypertensive related deaths. According to the SMR (NDoH 2017: 106) in SA there were a total of 648 maternal deaths due to direct causes of which 218 deaths were due to hypertensive disorders and 181 from obstetric haemorrhage.

#### **3.4.2 Indirect causes**

Indirect causes of maternal deaths are deaths that result from previously existing diseases or from diseases that developed during pregnancy and that were not due to

direct obstetric causes which are aggravated by physiological effects of pregnancy. These include non-pregnancy related infections (NPRI) such HIV and AIDS, and medical and surgical disorders like an existing cardiac or renal disease.

Sub-Saharan Africa accounted for the largest proportion of global (89%) HIV-related indirect maternal deaths in 2017 (WHO. 2019a: 50). In SA there was a total of 263 maternal deaths from NPRI in 2016 as compared to 310 in 2015, resulting in a reduction of 47 deaths. A total of 88.8% of the maternal deaths over 2014-2016 triennium were HIV positive (NDoH 2017: 62, 106).

### **3.4.3 Incidental causes**

The third classification is incidental or non-pregnancy related deaths such as a car accident, which is the lowest cause of maternal deaths.

## **3.5 STRATEGIES TOWARDS ENDING PREVENTABLE MATERNAL DEATHS**

A preventable maternal death is described as a death assessed by the assessors as being possibly or probably preventable at the end of the assessment of that case (NDoH 2017: 2).

The WHO (2017a) report on the Global Burden of Disease (GBD) acknowledges that with the beginning of SDG era it is imperative to provide a comprehensive account of global, regional and national progress towards MDG 5. This information is crucial to identify areas of success as well as challenges to frame policy discussions and continue to prioritize maternal and reproductive health for women in the SDG era. A secondary target of the previous MDG 5, called for universal access to reproductive health care with named sub-targets for contraception, adolescent pregnancy, antenatal care coverage and family planning services. However, these sub-targets did not include reproductive health services such as skilled birth attendance, in-facility delivery or emergency obstetric care (EmOC). The SDG sub-target 3.7 has included universal access to sexual and reproductive health services as part of the priority for 2030 agenda (WHO 2017a).

In addressing the lack of progress across all countries and to confirm the importance of the unfinished agenda of reducing maternal mortality in the SDG era, WHO released a report entitled “Strategies towards ending preventable maternal mortality (EPMM) in

2015. This report outlines eleven key themes, targets, and strategies for reducing maternal deaths worldwide which was adopted by the SDG framework in 2016 (Jolivet *et al.* 2018:259; WHO 2019a: 2).

These themes are grounded in a human rights-based approach to health in ensuring that reproductive, maternal and new-born health care is available and accessible to all who need it.

A study done in Malawi, based on the three delays model by Thaddeus and Maine (1994), was used to evaluate the circumstances surrounding maternal deaths. The study showed that women who died experienced all three types of delays according to the framework, which are 1) the decision to seek care, 2) reaching care (transport) and 3) receiving care. However, type 3 was evident in all maternal deaths. Contributing factors included long waiting times before receiving any care, non-availability of essential drugs, equipment, lack of skilled personnel and incorrect diagnosis. Maternal death reviews revealed health systems failure, health care provider factors and administrative failure (Mgawadere *et al.* 2017: 2).

Mgawadere *et al.* (2017: 7) further suggests that a well-functioning system is one that provides an enabling environment which includes enough human and financial resources, essential drugs and the necessary equipment.

The WHO (2018b; 2019a: 2) has made improving maternal health a key priority, by increasing research evidence, providing evidence based clinical and programmatic guidance, setting global standards and providing technical support to member states. The WHO also advocates for more affordable and effective treatments, design training materials and guidelines for health workers and support countries to implement policies and monitor progress.

In the 2017 report by WHO on Monitoring Health for the SDGs it points out that incomplete or incorrect information on maternal deaths that are registered reduces the usefulness of those data for tracking public health trends, planning measures to improve health and evaluating whether policies are working. Therefore, WHO is focusing on working with countries to strengthen health information systems and enable them to better track progress towards the SDGs (WHO 2017a).

However, in acknowledging the problem of misclassification of maternal deaths, countries like Kazakhstan, Republic of Kenya, United Kingdom, Ghana and South Africa have implemented specialised surveillance systems and conducted “confidential enquiries” into maternal deaths, which has improved the vital statistic system. These confidential enquiries are designed to improve maternal health by collecting data, identifying shortfalls in care provided and making recommendations to improve future care. The results of confidential enquiries are used to revise and strengthen clinical guidelines and support activities aimed at ending preventable maternal deaths (WHO 2017a; Magwadere *et al.* 2017: 7).

### **3.5.1 Reducing maternal deaths in South Africa**

South Africa has made great strides in addressing and ultimately reducing preventable maternal deaths. As early as 1997, the NDoH created the “National Committee for Confidential Enquiries into Maternal Deaths (NCCEMD) in SA. This is a ministerial committee consisting of experts in obstetrics, midwifery and anaesthesia with at least one representative from each of the nine provinces in SA. A report called the Saving Mothers Report (SMR) is published every three years which analyse data collected on every institutional maternal death. These triennial reports describe the magnitude of the problem, the pattern of diseases causing maternal deaths, the avoidable factors, missed opportunities and sub-standard care related to these maternal deaths (NDoH 2017; Pattinson 2015).

The NCCEMD has formulated key recommendations that address strategies to reduce preventable maternal deaths. Currently there are five key recommendations that are summarised as the 5H’s (HIV, Haemorrhage, Hypertension, Health worker, Health system). In each of these recommendations there are specific actions that need to be taken with each having a preventative and emergency care aspect. The ESMOE clinical guidelines include the specific actions and interventions required to manage obstetric emergencies. The five key recommendations are as follows:

#### Reducing maternal deaths due to HIV and AIDS

- Promote “know your status” and “plan your pregnancy” messages in communities and health sector and ensure non-judgemental approaches.
- All maternity facilities to screen for HIV infection and initiate highly active antiretroviral therapy and recognise and treat co infections

### Reducing deaths due to Haemorrhage

- Promote preventative interventions: prevent prolonged labour, prevent anaemia, safe methods of induction of labour and practice active management of the third stage of labour (AMTSL).
- Severe obstetric haemorrhage must have the status of “major alert”, requiring a team approach, finding the cause immediately, resuscitation and a stepwise approach in arresting the haemorrhage.

### Reducing deaths due to Hypertension

- All maternity facilities must provide calcium supplements to all women throughout antenatal care, and ensure early detection, referral and timely delivery of women with hypertension in pregnancy.
- Severe hypertension, imminent eclampsia, eclampsia and haemolysis, elevated liver enzymes, low platelet (HELLP) syndrome must be recognised as life threatening conditions (major alerts) requiring urgent attention. All facilities must be able to administer magnesium sulphate to prevent convulsions, administer rapid-acting anti-hypertensive agents, provide close monitoring before and after delivery and manage fluid balance safely.
- Promote family planning services in the population at large.

### Health worker training

- Train all health care workers involved in maternity care in ESMOE-EOST programme and obstetric anaesthetic module with emphasis on:
- Standardised observation and monitoring practices e.g. Use of early warning monitoring charts. These would enable earlier detection of haemorrhagic shock following a caesarean section (CS) and also enable early interventions for complicated pre-eclampsia.
- The skills of safe labour practices, use and interpretation of the partogram, AMTSL, use of uterotonic agents, safe CS and additional surgical procedures for complicated CS.
- To achieve competence in management of obstetric emergencies, e.g. PPH, eclampsia, acute collapse.

- Train all healthcare workers who deal with pregnant women in HIV advice, counselling, testing and support, initiating HAART, monitoring, and recognition, assessment and diagnosis and treatment of severe respiratory infections.

#### Health system strengthening

- Ensure 24-hour access to emergency obstetric care, both basic and comprehensive.
- Adequate and appropriately trained staff for acute areas like labour wards and theatres, also antenatal clinics and postnatal areas.
- Maternity dedicated inter-facility transport system within healthcare facilities
- Standardised referral criteria for set conditions, e.g. hypertension.
- Development of maternity waiting homes.
- Maternal mortality and morbidity audit meetings to occur regularly with minutes indicating plans for rectifying modifiable factors.
- Ensure accessible and appropriate contraceptive services for all women, which must be available on site for women post miscarriage and postpartum (NDOH 2012; Pattinson *et al.* 2013).

The SMR (2014-2016) shows a continued decline in both the number and mortality ratios of institutional maternal deaths. This reduction in iMMR is mainly due to changes in the treatment programmes for HIV positive pregnant women. Changes in antiretroviral drug regimens has resulted in an almost 47% decrease in maternal deaths due to non-pregnancy related infections, specifically from 130 deaths in the 2011-2014 triennium to 27 in this last 2014-2016 triennium (NDoH 2017).

### **3.5.2 The role of the midwife in reducing maternal mortality**

The definition of a midwife according to the International Confederation of Midwives (ICM 2016, 2019), and the SMR (NDoH 2017), “is a person who has successfully completed a midwifery education programme that is duly recognised in the country where it is located and that it is based on the ICM Essential Competencies for basic midwifery practice and the framework of the ICM Global Standards for midwifery education; who has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery and use the title ‘midwife’, and who demonstrates competency in the practice of midwifery”.

The ICM further describes midwifery as the profession of midwives, only midwives practice midwifery. It has a unique body of knowledge, skills and attitudes drawn from disciplines shared by other professions such as science and sociology but practised by midwives within a professional framework of autonomy, partnership, ethics and accountability (International Confederation of Midwives 2016, 2019).

The State of the World Midwifery Report (SoWMR) (UNFPA 2017a) reviewed 73 of the 75 low-and-middle-income countries (LMIC) including SA and established that 92% of the world's maternal and new-born mortalities occur in these 73 countries. However, only 42% of the world's medical, midwifery and nursing personnel are available to provide care in these countries (NDoH 2017; UNFPA 2017a; 2017b).

The WHO (2016a) concurs with SoWMR that health systems can only function with health workers which are dependent on four major healthcare elements, namely availability, accessibility, acceptability and quality. These elements are essential in enabling care for women and childbearing families and impacting on reducing maternal mortality. The WHO (2016a) further emphasises that mere availability of health workers is not enough, only when they are equitably distributed, accessible by the population, possess required competencies and motivated to deliver quality care that is appropriate and acceptable then only can theoretical coverage translate into effective service coverage.

The UNFPA annual report (2017a) proposes that midwives should be educated based on the essential competencies and regulated to international standards. However, midwives are not easy to identify in SA and there is no clear role or identity for the nurses/midwives. In addition, it is indicated that there is no accurate count for midwives nor nurse-midwives. The latest SoWMR report for East and Southern Africa states that SA has only 1284 registered midwives and 124 045 nurses (UNFPA 2017a). Shortage of nursing staff and midwives is a critical barrier that needs addressing urgently if the SDG goals are to be met by 2030.

The inability of SA to quantify and identify midwives, can be attributed to the fact that the current qualifications of registered professionals at either diploma or graduate levels leads to professional qualifications of registration in producing a multi skilled professional which took preference in ensuring a skill mix of staff rather than a specific speciality. In comparison with other LMIC, South Africa did not adapt to respond to the

healthcare needs by adding cadres like direct entry midwifery programme as was done in countries like Nepal, Ghana and Malawi where maternal health showed marked improvements (UNFPA 2017a; 2017b; UNDP 2013).

Recommendations from the SMR (NDoH 2017) propose that medical and midwifery programmes should work to collaborate their efforts by strengthening of education by regulation that complies with international standards. This would benefit maternal health care and achieve the goal of eliminating preventable maternal deaths. In addressing maternal healthcare, the focus is usually on the midwifery component, therefore pre-service and continuing education should be optimised. International Confederation of Midwives (2016) conclude that having midwives educated and regulated according to global standards can increase the autonomy of the profession that can enable midwives to reach those needing their evidence based, quality care based in a human rights approach (NDoH 2017). The UNFPA (2017a) concur with ICM (2016) that to improve the quality of midwifery, it is important to align the national midwives' curriculum to internationally agreed ICM and WHO standards, as well as to strengthen midwifery schools to improve competencies.

However, in addressing the availability and competence of the midwife it is essential to also ensure a positive practice environment if effective quality care is to be provided. Mgawadere *et al.* (2017) supports WHO (2016b; 2019b) that describes an 'enabling environment' as one that includes enough human and financial resources, essential drugs, necessary equipment and skills-based training to ensure all healthcare providers are competent in skilled birth attendance, emergency obstetric care and neonatal care.

The ESMOE-EOST programme has shown an overall 29.3% significant reduction in iMMR and continues to be implemented widely in all health facilities. However, despite there being a reduction in maternal deaths in SA over the 2014-2016 triennium, many of the deaths that did occur were still attributed to sub-standard care. Over the last triennium a total of 61% of maternal deaths were classified by the assessors as potentially preventable. The lack of skilled midwives was thought to be a contributory factor for 25% of maternal deaths with avoidable factors. UNFPA (2017a) confirms that one of the major factors in quality of care is the competence of health workers. Some of the current relevant recommendations proposed by the Saving Mothers



report (NDoH 2017) is to focus on the competencies of both doctors and midwives as well as to monitor the implementation of the basic and comprehensive emergency obstetric and neonatal signal functions in all health facilities in further reducing preventable maternal mortality.

### **3.5.3 Basic and comprehensive emergency obstetric and neonatal signal functions**

Tembo *et al.* (2017: 2) and Gelato *et al.* (2018: 183) agree that maternal mortality remains a global health burden that acutely affects developing countries, with the highest MMR being in Sub-Saharan Africa. However, several strategies have been redefined and new interventions adopted to address the ongoing problem of maternal mortality. Global health experts have identified signal functions for Emergency Obstetric and Newborn Care (EmONC) as the most effective medical interventions for managing direct obstetric complications and improving maternal survival.

Cranmer *et al.* (2018), Roy, Biswas and Chowdhury (2017: 2) and Pattinson *et al.* (2015) concur in describing the signal functions as a list of life saving interventions developed by WHO and agreed upon internationally by all United Nations organisations. There are seven basic emergency obstetric and newborn care (BEmONC) signal functions and nine comprehensive emergency obstetric and newborn care (CEmONC) signal functions. The CEmONC signal functions include the seven basic and 2 additional signal functions which are outlined in the Table 3.1. below.

Cranmer *et al.* (2018), Roy, Biswas and Chowdhury (2017: 2) and Pattinson *et al.* (2015) further explain that a reduction in maternal mortality rates can be achieved by ensuring that these lifesaving services as measured by the signal functions are made available, correctly used and accessible to the community. Tembo *et al.* (2017: 2) agree that EmONC can be an effective medical intervention if there are adequate drugs, supplies, equipment, infrastructure, trained staff to competently diagnose and treat complications and equitably distributed health facilities to cater for the needs of the population. However, despite evidence of signal functions as an effective medical intervention for managing obstetric complications, maternal mortality remains a challenge in many LMIC.

The United Nations recommends that there should be at least five EmONC facilities per 500,000 population, of which at least one should provide all the nine signal functions of CEmONC. However, Roy, Biswas and Chowdhury (2017: 7) point out that merely having adequate facilities does not necessarily ensure the availability of services. Therefore, population coverage of the signal functions for EmONC is considered an important indicator for preventing maternal deaths.

**Table 3.1: Signal functions used to identify basic and comprehensive emergency obstetric and neonatal care services**

<b>BEmONC services</b>	<b>CEmONC services</b>
1. Administer parenteral antibiotics	Perform signal functions 1-7 and
2. Administer parenteral uterotonic drugs (oxytocin)	8. Perform caesarean section
3. Administer parenteral anticonvulsants for pre-eclampsia and eclampsia e.g. Magnesium Sulphate (MgSO <sub>4</sub> )	9. Provide blood transfusions
4. Manual removal of retained placenta	
5. Remove retained products of conception (manual vacuum aspiration)	
6. Perform assisted vaginal deliveries (Vacuum)	
7. Perform basic neonatal resuscitation with bag and mask	

The basic maternal signal functions include three medical signal functions and three manual procedural functions. The medical signal functions include administration of parenteral antibiotics, oxytocin and anti-convulsant, whilst the three manual procedures include assisted vaginal deliveries, manual removal of retained placenta and removal of retained products of conception. Tembo *et al.* (2017: 2) observed that signal functions that are medical treatments are more likely to be performed rather than the procedures.

Signal functions must be available at a health facility 24 hours a day, every day of the week, must also meet the needs of every 500,000 population and be performed over a designated three-month period. Health facilities are classified as BEmONC if they have performed the first seven signal functions, whilst a CEmONC health facility, usually a hospital should have performed all nine signal functions. The BEmONC signal functions are also expected to be performed at primary health care level (Tembo *et al.* 2017: 2; Roy, Biswas and Chowdhury 2017: 2; Pattinson *et al.* 2015).

These signal functions are markers that indicate the ability of a specific facility in providing EmONC when complications occur during pregnancy, birth or postpartum. This knowledge is used to identify gaps in availability of essential obstetric care and to help make changes and improve the service in reducing preventable maternal deaths (Tembo *et al.* 2017: 2).

### **3.6 IMPLEMENTATION OF CLINICAL GUIDELINES IN PROVIDING EFFECTIVE EMERGENCY OBSTETRIC CARE**

Clinical guidelines provide clear guidance on managing common and serious conditions in obstetrics and gynaecology, which is developed by a team of clinicians and health professional with expertise in the subject matter.

The Royal College of Obstetricians and Gynaecologists (RCOG) has provided guidance on clinical matters over many years, which has evolved into the format of clinical guidelines. Internal RCOG guidelines were first produced in 1994 and have evolved from an opinion-based to an evidence-based approach, which is a method currently used globally in developing evidence -based guidelines (Royal College of Obstetricians and Gynaecologists 1997).

De Jonge *et al.* (2019: 2) and Stokes *et al.* (2016: 183) concur that evidence-based practice (EBP) has become the leading paradigm in healthcare since the 1990's. This EBP has been associated with better quality of care in many situations, but it has not been able to address the increasing need and demand in healthcare globally.

Verschueren *et al.* (2019: 2) admits that one of the most important steps to reduce maternal deaths in LMIC is by improving the quality of care provided to pregnant women. This can be achieved by using adapted national clinical guidelines, as international guidelines are often not directly applicable to LMIC due to the lack of personnel or resources.

The ESMOE guideline was developed from international care guidelines, including WHO in 2006 which is described in detail in chapter two. The clinical interventions were adapted for the South African population and relevant burden of diseases in 2006 (Pattinson 2015: 3). The steps of the guideline are based on the key interventions of the UN signal functions. The ESMOE training programmes utilises evidence-based learning methods including a “skills and drills” approach, which is in line with

international standards. According to Ameh and van den Broek (2015: 4) short competency-based or simulation-based EmOC training programmes based on adult learning methodology are more effective in improving professional practice than long didactic based-training.

Pattinson *et al.* (2019: 241) found that implementing skills and drills EmOC training packages was associated with a significant reduction in maternal deaths. However, training alone will not bring about the desired reduction to achieve the SDG target. Health systems strengthening is required to achieve optimal effectiveness of guideline implementation.

Having good clinical guidelines available is important but the impact its implementation has on the quality and efficiency of clinical care and patient outcomes is critical in reducing MMR. Verschueren *et al.* (2019: 2) found in LMIC where sharing of knowledge and experience-based decision making is used, the development and implementation of clinical guidelines are key to improve quality of evidence-based, respectful maternity care. This is supported by Okonofua *et al.* (2017: 9) that in Nigeria although some hospitals had standard treatment protocols; staff were not aware and could not show an example of a protocol that is taught to all health care providers. Therefore, without standard protocols, staff depended on individual knowledge and preferences in providing EmOC which contributes to the high MMR.

The guideline development approach used in LMIC that yielded success in the implementation of EBP was involving the end users from the earliest phase of developing guidelines. This is crucial for success, as merely the existence of international guidelines does not guarantee implementation (Verschueren *et al.* 2019: 11).

Several investigators concur that the common barriers that impede the successful implementation of EmOC guidelines include lack of adequate human resources, lack of adequate infrastructure, poor health system management, poor communication and teamwork and the lack of appropriate skills and knowledge of healthcare providers (Pattinson *et al.* 2019: 244; Oosthuizen, Bergh and Pattinson 2018: 913; Uneke *et al.* 2018: 104; Wabiri *et al.* 2016: 256).

The ESMOE interventions are taught using a skills and drills method that includes simulations, case studies and videos that represent clinical situations. The training is

done in teams that are representative of the clinical areas. For management of an obstetric emergency the guidelines require effective communication and teamwork. Kumar *et al.* (2017: 1) agree that interprofessional team-based, simulated training programmes have shown improved performance of clinical workforce and improved clinical outcomes in an emergency. Team members must be instantly engaged to achieve synergism in managing acute obstetric emergencies. Hence, acquisition of non-technical skills, such as effective communication and teamwork are just as important as mastering the clinical skills.

Pattinson *et al.* (2019: 243) conducted a study that looked at the before and after skills and drills saturation training in selected districts in SA. This study revealed that saturation training in emergency skills and drills had a major impact on reducing direct maternal deaths in the districts where it was conducted.

The ESMOE guideline interventions have shown reductions in maternal deaths across provinces in SA. However, the institutional MMR for potentially preventable maternal deaths in SA (89.3) remains above the SDG target of attaining less than 70/100 000 live births (NDoH 2017: 2). Having good clinical guidelines requires successful implementation to achieve the desired reduction in MMR. Therefore, this study focused on the implementation of the ESMOE guideline interventions by the midwife in providing effective EmOC in contributing to reductions in preventable maternal deaths.

### **3.7 SUMMARY OF THE CHAPTER**

This chapter outlined relevant databases used to obtain literature pertinent to the study. The global statistics, strategies used to end maternal deaths and the role of midwifery in obstetric care and the importance of guidelines was discussed in this chapter. The basic and comprehensive signal functions which are part of the ESMOE interventions were outlined and is referred to during discussion of the results of this study.

The next chapter describes the details of the methodologies used in this study.

## **CHAPTER 4: RESEARCH METHODOLOGY**

### **4.1 INTRODUCTION**

The study was undertaken in four phases using a multi-method data collection process. Each phase attempted to collect data on a specific objective of the study. Therefore, for each phase and stage the following aspects are described: the research design, setting, population, sampling strategy and size, data collection instruments, analysis of the data as well as the ethical considerations employed in this study. Each of the above sections were informed by the relevant literature.

### **4.2 RESEARCH PARADIGM**

A research paradigm as described by Guba and Lincoln (1994) and Denzin and Lincoln (2005) that paradigms are basic belief systems that guide decision making and the way research is conducted. Guba and Lincoln (2005) believe that a paradigm is based on an ontological, epistemological and methodological assumption or framework. According to Brooks (1979: 277) in the health care context, the researchers paradigmatic positioning relates to the understanding of the nature of reality (ontological standpoint) and the nature of knowledge (epistemological standpoint).

This research was conducted within an interpretivist or constructivist paradigm. The constructivist paradigm is not a fixed reality but rather a construction of different individual realities so there are multiple interpretations, which is therefore also known as an interpretivist paradigm (Cohen and Crabtree 2006).

The interpretivist approach to research has the intention of understanding the world of human experience. Creswell (2014) acknowledges that constructivist research which often combines interpretivism relies as much as possible on the participant's views of the situation being studied. He further states that the researcher's intent is to make sense of (or interpret) the meanings others have about the situation being studied. This can be attained with in-depth understanding and interpreting deeper meaning in a collection of personal narratives or observed behaviours. The interviews with the midwives in the relevant clinical areas of the study setting aimed to obtain descriptive

experiences and feelings related to the implementation of ESMOE. The constructivist/interpretivist paradigm using a descriptive design was best suited for this study as it aimed to describe the midwives' experiences and challenges in the implementation of the ESMOE guideline in their clinical practice.

#### **4.2.1 The paradigm framework**

The interpretivist paradigm framework is made up of traditions of ontology, epistemology and methodology. A description and application of these traditions to the study is described below.

**Ontology:** Scotland (2012: 9) proposes that the ontological position of interpretivism is relativism. Relativist ontology is of the view that reality is subjective and differs from person to person. Reality is individually constructed through the meanings and understandings developed socially and experientially, meaning that reality is created and discovered (Guba and Lincoln 1994; Cohen and Crabtree 2006). Participants in this study will individually interpret their experiences of the implementation of the ESMOE guideline in their practice. This contributed to multiple realities from different midwives in different health care settings.

**Epistemology:** The interpretive epistemology is one of subjectivism which is based on real world phenomena. Knowledge and reality are constructed by interaction with humans and their world. The social world can only be understood from the standpoint of individuals who are participating in it (Guba and Lincoln 1994; Scotland 2012). In this study subjectivist epistemology is appropriate as findings emerge through dialogue with participants who describe their perceptions of implementation of the ESMOE guideline. The purpose of this study was to gain a deeper understanding of the phenomenon related to implementation of this guideline by the midwife. The researcher aimed to negotiate the truth through conversations and through interaction with midwives in their natural setting.

**Methodology:** this refers to how knowledge is going to be discovered and what approach is being applied to the study. Scotland (2012: 11) confirms that interpretive methodology is directed at understanding phenomenon from an individual's perspective. Events are not reduced to simplistic interpretations, but new layers of understanding are uncovered as phenomena are thickly described. Interpretive theory

**Table 4.1: An overview of the research methodology**

<b>Study Phases</b>	<b>Research Objectives</b>	<b>Methodology</b>	<b>Sample</b>	<b>Data collection</b>	<b>Data Analysis</b>
<b>Phase 1</b>	1. Describe the guideline and identify its key and critical components	Retrospective document review of the ESMOE guidelines applicable to the midwives' scope of practice related to the common causes of maternal deaths.	Department of Health staff, ESMOE guidelines and other Published literature related to ESMOE	Description of the ESMOE guideline can be found in chapter two of the study	
<b>Phase 2 Stage 1</b>	2. Determine what the maternal health care logistics are that midwives face at the different levels of care in KZN	Quantitative descriptive design will be used to quantify the available resources, ESMOE training, referral patterns, number of deliveries and the number of maternal deaths at the various levels of health care	Districts in KZN, where a CHC, district hospitals, regional hospitals or combination hospital will be chosen from each district. See 4.4.3. for sampling strategy	Data capturing sheets	Descriptive statistical analysis
<b>Stage 2</b>	3. Determine whether the guideline was implemented as envisaged at the different levels of health care	Retrospective Quantitative chart review to obtain data from the different health facilities in the chosen districts that indicate the number of maternal deaths, causes and to evaluate the implementation of ESMOE guidelines applicable to those deaths	Patient records of all maternal deaths that occurred over a specific period at all the chosen facilities	Data capturing sheets	Descriptive and inferential statistical analysis
<b>Phase 3</b>	4. Explore and describe challenges confronting midwives in the implementation of the management interventions specific to ESMOE	Prospective Qualitative descriptive survey design will be used to explore and describe the experiences of midwives in the implementation of the ESMOE guideline	Midwives working in maternity units at the different levels of health care in the two districts • See 4.6.4. for sampling strategy	Interviews using a semi structured interview guide	Thematic content analysis
<b>Phase 4</b>	5. Develop a tool that assists the midwife with the implementation of the guideline in the management of the common causes of maternal deaths. <hr/>	Delphi technique to obtain expert opinions in developing an algorithm and practice framework to facilitate successful implementation of the ESMOE guidelines	Contributing editors of the ESMOE guideline and the Saving Mothers report (NDoH 2017). Facilitators and trainers of ESMOE from the university of KwaZulu Natal. • See 4.7.3. for sampling strategy	An algorithm was used as the tool to employ a decision Delphi technique to develop a practice framework	Content analysis and refinement by consensus



is usually inductive as it is generated from the data, not preceding it. A quantitative and qualitative multi method data collection approach was employed to collect data in four phases. Due to the length of the detailed description of the methodology a summarized view for each objective in different phases is presented in Table 4.1 above.

### **4.3. PHASE 1: DOCUMENT REVIEW**

This phase addressed objective 1. Pertaining document was described in detail in Chapter two of the study.

#### **Objective 1: To describe the guideline and identify its key and critical components applicable to the midwife**

A document review of published literature related to ESMOE and the current ESMOE guideline was analysed and described. The management of the common causes of maternal deaths, which are pre-eclampsia and eclampsia, postpartum haemorrhage and HIV and AIDS that is applicable to the midwives' scope of practice was described. A literature review to explain the ESMOE guideline was done in Chapter two.

#### **4.3.1. Sample**

Relevant literature that supports the management guidelines was sourced and critiqued. The ESMOE guidelines and related documents were obtained from the Department of Health website, from the ESMOE board, attendance of ESMOE workshops, accredited data bases and relevant literature.

#### **4.3.2. Procedure**

Literature related to management of obstetric emergencies, common causes of maternal deaths and the ESMOE guideline was sourced. An overview of the history and contents of the ESMOE guideline was highlighted globally and specifically in South Africa were reviewed. A description and specific management of the common causes of maternal deaths is described in detail in chapter two.

#### **4.3.3. Outcome**

The outcome of phase 1 was to create a clear understanding of the historical background of the ESMOE guideline and its applicability in SA. The second outcome

was to provide an understanding on the management of obstetric emergencies by the midwife in the context of the study.

#### **4.4. PHASE 2: QUANTITATIVE DESCRIPTIVE DESIGN**

Phase 2 was divided into 2 stages, each stage addressing objectives 2 and 3 respectively. These 2 objectives are addressed under phase 2 as they both require quantitative data from the relevant health facilities using data capturing sheets.

##### **4.4.1. Phase 2: Stage 1**

Stage 1 of phase 2 addresses objective 2 of the study which is described below

**Objective 2: To determine what the maternal health care logistics are that midwives face at the different levels of health care facilities in KZN**

In stage 1 of phase 2 the aim was to obtain data from each of the selected health facilities regarding resources, ESMOE training and delivery numbers.

##### **4.4.2. Design: Quantitative descriptive design**

Gray, Grove and Sutherland (2017: 200) and Polit and Beck (2012: 237) concur that a descriptive design used in non-experimental studies are designed to obtain more information about a phenomenon in a specific field, in order to provide an overall picture of the situation. These designs describe the variables to answer the research questions, without the need to establish a cause-effect relationship. Literature further states that descriptive designs are generally used to identify problems with current practice, to make judgements, justify current practice or to determine what other professionals are doing in similar situations (Polit and Beck 2017: 56). The use of a descriptive design in this study aimed to identify the availability of human and material resources, the adequacy of ESMOE trained staff, the patient outcomes and the impact these statistics have on the implementation of the ESMOE guidelines.

##### **4.4.3. Sampling of setting for the study**

The setting for the study described below applies to both phase 2 and phase 3 of this study.

Grove, Burns and Gray (2013: 373) describe the setting as the physical location and conditions where a study is conducted and in which data collection takes place in a study. The location for conducting research can be in the field or natural setting, or a controlled or highly controlled setting such as a laboratory. This study was conducted in two of the eleven districts of KwaZulu-Natal (KZN). The districts chosen were eThekweni (District A) and Ugu (District B). The purposive choices of the districts were made based on high maternal mortality rates and the ESMOE training and implementation. This study was limited to two districts which included Community Health Centres (CHC), District Hospitals (DH) and Regional Hospitals (RH) or a Combined Regional hospital. These different levels of health care facilities were chosen from each district that was utilised for a multi method data collection process.

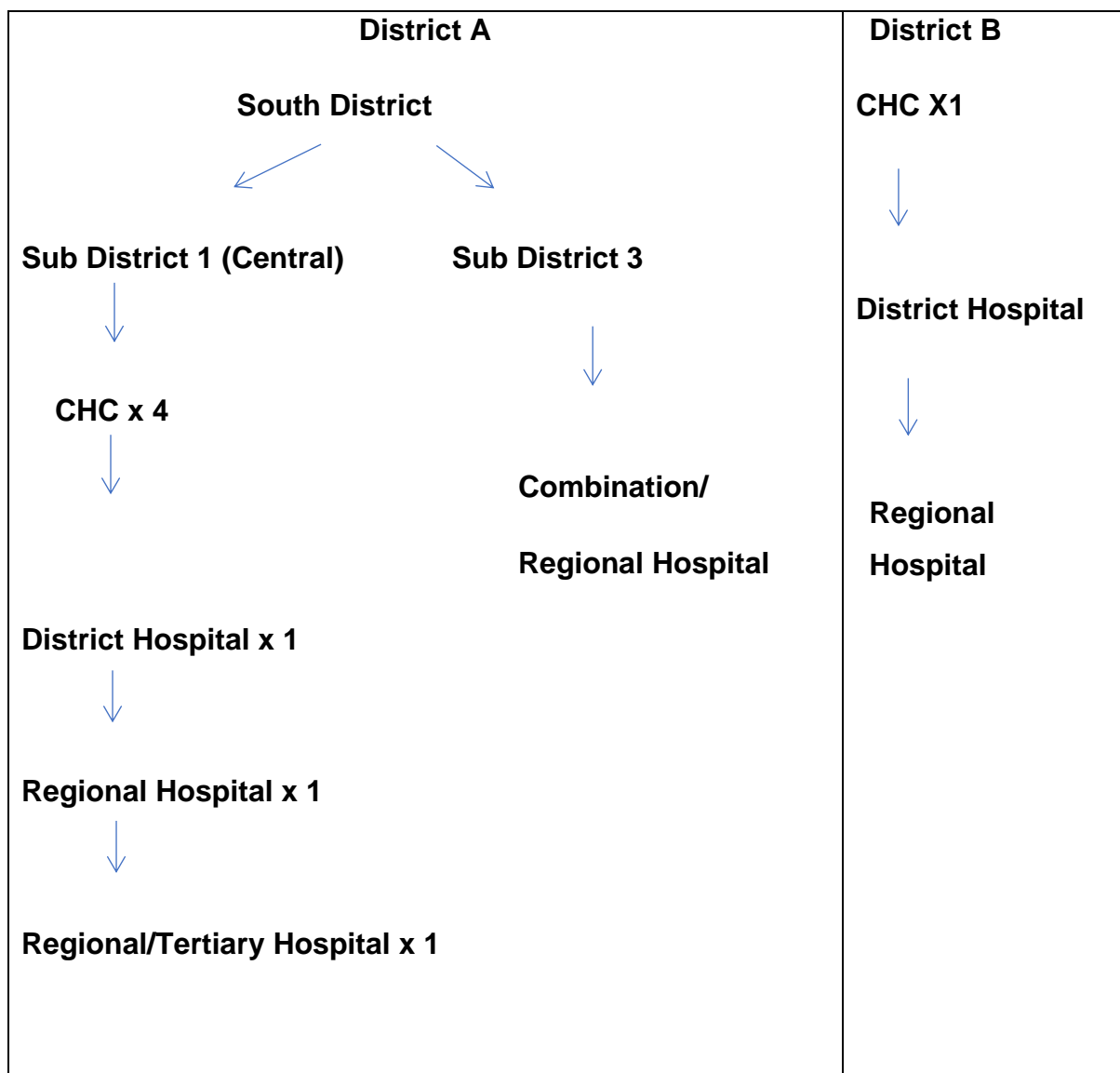
According to the KZN District Health Plan (2015-2016) the eThekweni district (District A) is a metropolitan health district comprising of urban, rural and peri-rural wards. District A has three large sub regions which are the south region with the greatest concentration of people (41%), the north (31%) and west (28%) regions (See figure 4.3.). These regions are further divided into smaller sub districts, with South region having eight sub districts, with the south central that has 15% of the district's population. Sub districts are smaller geographical areas within a larger district with health facilities available for the specific population in these sub districts. The eThekweni district municipal area covers a 2 297 square kilometre area from Umkomaas in the south, to Tongaat in the north and ends in Cato Ridge in the west. Despite being highly urbanised and densely populated, rural communities do exist on the outskirts of the west, south and north regions (KwaZulu-Natal Department of Health [KZN DoH] 2015a). The eThekweni district has a developing population of over 3.5 million people which is the largest of all 11 districts in the province of Kwa Zulu Natal. This district has the largest number of deliveries and an increasingly higher maternal mortality rate compared to other districts (KZN DoH 2018). The number of maternal deaths showed a steady increase from 123 maternal deaths in 2010/2011, followed by 127 maternal deaths in 2011/2012 and 128 deaths in 2012/2013 (NDoH 2014a, 2015a). The SMR for the 2014-2016 triennium reflects an iMMR of 127 for KZN and a rate of 134 for SA (NDoH 2017: 4).

The setting for this study was conducted in the south region of eThekweni district. The south region was purposively chosen as it has 41% of the population of the district.

The sub districts from the south region chosen include sub district 1 and sub district 3. Sub district 1 was chosen as the maternal death rate remained high over the 2014/2015 period. Health facilities are not equitably distributed within this sub district. There are only two regional and one district hospital and one CHC in this sub district. Despite this, sub district 1, which is seen in figure 4.3. as the central sub-district provides health services for 15% of the population of the district (KZN DoH 2015a, 2018: 12).

Sub district 3 was chosen as it is the second most densely populated township in the country with 16% of the district's population. Due to previously poor historical planning in the previous years there is only one regional hospital in this catchment area. This hospital serves as a combination hospital, which means that it functions as a district and regional hospital due to the absence of a CHC and a district hospital in this area. The eThekweni District Health Plan for 2014/2015 and 2017/2018 reports confirms that most maternal deaths occur at regional hospitals. Therefore, this second sub district in eThekweni was chosen as it is the only district that has a combination hospital that serves a large population. According to KZN DoH (2015a, 2018) maternal deaths are higher in the south region and in sub district 3, which contributed to choosing these sub districts and their health facilities.

The second district purposively chosen for the study was Ugu District (District B). Ugu is situated on the south coast of KZN. The population of Ugu is predominately rural with 86% of the population living in rural areas. The population of Ugu is approximately 768 000 people, which makes up seven percent of the total population of KZN. There are six sub districts in Ugu. The health facilities in this district include two CHCs, two DH and one RH. According to the Ugu District Health Plan (2014-2015) the institutional MMR was 155.9 for 2012/2013 period and estimated to be 170 for 2013/2014 period for the district (KZN DoH 2015b; NDoH 2014a). The increase in MMR resulted in this district being chosen for ESMOE saturation training, which included midwives and doctors from hospitals and clinics. This district was chosen for the study due to the increase in MMR as well as the fact that ESMOE saturation training was completed in 2014 (KZN DoH 2015b). A summary of the facilities chosen from both districts can be seen in Figure 4.1 below.



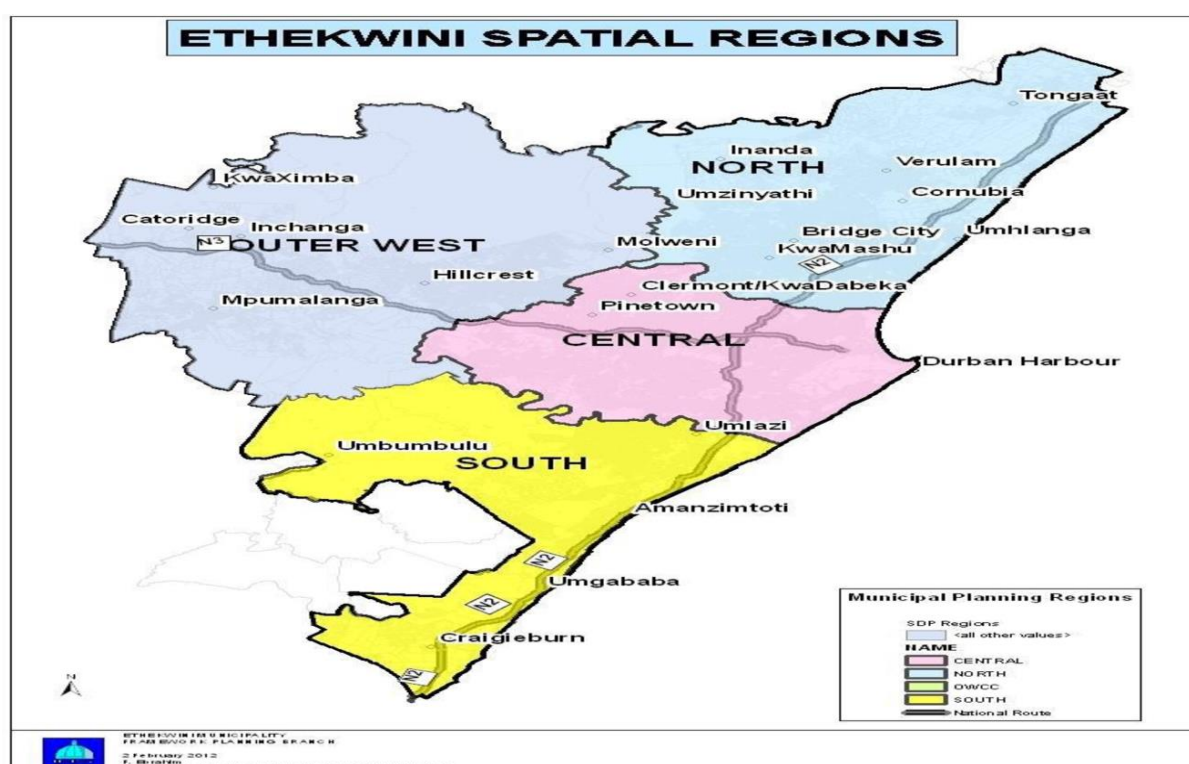
**Figure 4.1: Summary of the health facilities in District A (eThekweni) and District B (Ugu)**

Each district and sub district chosen as shown in Figure 4.1. are linked by the way of referrals. The KZN DoH (2018) and Mojaki *et al.* (2011) acknowledges that the South African public health sector follows a hierarchical referral system. The referral of patients from a clinic level is usually to the nearest district or regional hospital. District hospitals play a central role between clinics and regional or tertiary hospitals, thereby having a high delivery rate (KZN DoH 2018). The combination hospital in sub district three is the only hospital in that area and serves as both a district and regional hospital.



**Figure 4.2: Map of KwaZulu-Natal indicating the eThekweni and Ugu districts relevant to this study**

Source: District Health Plan (KZN DoH 2015a).



**Figure 4.3: Map of eThekweni illustrating the sub districts**

Source: eThekweni Municipality Planning branch (KZN DoH 2012)

#### 4.4.4. Population and sampling process

Population is described by Polit and Beck (2012: 306) as “the entire aggregation of cases in which the researcher is interested”. This is also referred to as the target population. The accessible population is composed of cases from the target population that are accessible to the researcher as study participants.

The study population used in this study included all the health facilities in the two selected districts namely eThekwini and Ugu districts as indicated in Figure 4.2 and Figure 4.3. This included those CHCs, district hospitals and regional hospitals or combination hospital that provide maternity care. A non-probability sampling design using a purposive sampling method was used in this study.

The facilities chosen within the eThekwini and Ugu sub districts (Table 4.2) provide maternity services which include antenatal care, delivery and post-partum care.

**Table 4.2: Numbers and types of health facilities in eThekwini and Ugu districts**

District	Regional/Combination Hospitals	District Hospitals	Community Health Centres
eThekwini	5	2	8
Ugu	1	3	3
Total	6	5	11
<b>Number and type of facilities included in this study</b>			
eThekwini	3	1	4
Ugu	1	1	1
Total	4	2	5

Source: Information obtained from the District Health Plan (2015a)

To be sampled the facilities had to meet the following criteria.

Inclusion criteria:

- Health facilities that are under the authority of the Department of Health.
- Health facilities must provide maternity services including antenatal, labour and postnatal services on a 24-hour basis.

Exclusion criteria:

- Health facilities that are under the municipality management.
- If there are no maternity services provided at the facility.

#### **4.4.4.1. Sample size**

The purposive sample selection process commenced with the selection of the CHCs that provide a 24-hour maternity service. The reason for including 24-hour operated clinics is that they provide comprehensive obstetric services including deliveries. In eThekweni district there are a total of eight CHC with four of these providing a 24-hour maternity service. The number of CHC for eThekweni that were eligible for the study was all four CHC identified as 24-hour operated services. The Ugu district has two CHC that provide 24-hour obstetric services and one was chosen for the study in line with the referral hospitals chosen.

The choice of the regional or tertiary and district hospitals was based on the referral system. Therefore, the district and regional hospitals included in both districts was linked to the CHC by way of referrals of complicated patients. Two of the regional hospitals chosen in eThekweni also function as combination hospitals due to the absence of a CHC and district hospital in the area.

#### **4.4.5. Data collection instrument**

Data capturing sheets developed by the researcher (Annexure 11) were used to obtain data on the resources available at each facility, shortages of resources, ESMOE training details, number of admissions and deliveries as well as number of maternal deaths. These sheets were validated through a pilot study conducted at a hospital that was not included in the study. The data collection tools were then edited appropriately and utilised in the study.

#### **4.4.6. Procedure**

Data collection processes commenced following ethics approval from the relevant authorities. This included ethical clearance from the Institutional Research Ethics Committee (IREC) of the Durban University of Technology (Annexure 1) as well as from the Department of Health ethics committee (Annexure 3). Ethical approval from the relevant district offices (Annexures 5 and 7) was also sought prior to data collection. Each identified facility was visited by the researcher and data regarding resources available, the number of ESMOE trained staff, delivery numbers and maternal death numbers was sought out from the managers and records for the period



of January 2016 to June 2016. This was achieved by making appointments with relevant managers who assisted the researcher in accessing required statistics.

#### **4.4.7. Data analysis**

Data analysis reduces, organises and gives meaning to the data. Furthermore, the analysis of quantitative data involves the use of descriptive and exploratory procedures to describe the study variables, statistical tests to identify relationships, and to make predictions (Polit and Beck 2017: 416).

Two types of statistical analyses were applied to the data: descriptive statistics and inferential statistics. Tables and graphs show frequencies and percentages and where applicable means (measure of central tendency) and standard deviations (measure of spread) of the descriptive data. To test for significant trends in the data, inferential statistics was applied. These included Pearson's correlation, t-tests, Mann Whitney U test, Kruskal Wallis Test and chi-square tests. Where the conditions are not met for the application of these tests, non-parametric equivalent tests were applied. Throughout, a p-value of 0.05 was used to indicate significance. The analysis was carried out using SPSS version 20. The assistance of a statistician was sought in the data analysis process (Annexure 14). Descriptive statistics included means and standard deviation as applicable. Relevant frequencies were represented in tables and graphs. Chi-square test of independence were used on cross-tabulations to see the significant relationships in resources at the various health facilities. Graphs were used to indicate the number and causes of maternal deaths. The Kruskal Wallis test was used to compare specific variables across the different types of health facilities.

#### **4.5. PHASE 2: STAGE 2**

Stage 2 of phase 2 addressed objective 3 of the study as outlined below.

##### **Objective 3: To determine whether the guideline was implemented as envisaged at the different levels of health care**

This stage aimed to obtain data from maternal death records on the causes of maternal deaths and to analyse the implementation of ESMOE prior to these maternal deaths at the selected facilities.

#### **4.5.1. Design: Retrospective chart reviews**

In retrospective studies both the proposed cause and the proposed effect have already occurred. Retrospective chart reviews begin with an effect and works backwards to establish what influenced this effect in the past (Grove, Burns and Gray 2013: 219). In retrospective studies the interventions, outcomes of interest and other relevant data measurements have already occurred before the investigator begins with the project. Details of the use, advantages and disadvantages of retrospective chart reviews are acknowledged and described by Vassar and Holzmann (2013) and (Connelly 2008).

In this study the medical records of maternal deaths that occurred over the period January 2016 to April 2016 at the selected hospitals was used. A data capturing sheet designed by the researcher (Annexure 12), following relevant literature reviews, was used to extract the relevant information pertaining to the management of these maternal deaths in accordance with the ESMOE guideline (Chapter 2). This reveals the extent to which the ESMOE guideline was implemented as it is envisaged.

#### **4.5.2. Setting of the study**

The hospitals in the two districts chosen to conduct the study were the same as in stage 1. The reason for choosing only the hospitals was that all high-risk patients are transferred to the nearest hospital for further management. All patient management at a CHC level was also recorded in the patient records that was analysed. According to the SMR for 2014-2016 (NDoH 2017), most maternal deaths occur at district and regional hospitals.

#### **4.5.3. Population and sampling**

The population in this study included the health facilities of both the eThekweni and Ugu districts (Table 4.2) and the files of mothers who had died. Within these two districts, selected sub districts with all three levels of health care facilities was chosen (Figure 4.3). The statistics regarding the resources and ESMOE trained staff was obtained from all health facilities included in the study.

Inclusion criteria: To be included in the study the following inclusion criteria applied for files for mothers who had died

- Maternal deaths that occurred over the specified period during data collection.

- Maternal deaths caused by the three common causes discussed in the study.

#### The exclusion criteria included

- Other causes of maternal deaths not applicable to the study.
- Maternal deaths that could not have been managed or prevented by implementing ESMOE.

A non-probability sampling design using a purposive sampling method as in stage 1 was employed in this stage.

The district, regional and combined hospitals of both districts as in stage 1 was used to conduct the retrospective chart reviews. The records of maternal deaths that occurred over the period January to April 2016 was reviewed to find the cause of death and the management of the woman prior to death in line with the ESMOE interventions. All deaths that occurred at the relevant facilities were reviewed, however, only the relevant causes of maternal deaths were analysed in detail relevant to the context of the study.

#### **4.5.4. Data collection instrument**

Data capturing sheets (Annexure 12) that was developed by the researcher was first piloted before it was used to obtain data regarding the midwifery management of women prior to their deaths. The form included management from the ESMOE guidelines to evaluate the implementation of it.

#### **4.5.5. Procedure**

Maternal death records were accessed from the institution's archives following appropriate ethical clearance processes and permission from the relevant health facilities. All deaths that occurred over the relevant study period was identified from the hospital's statistical records and the patient's hospital number was then used to locate the records from the archives. Elements of the data that was analysed included the causes of deaths, the midwives' role in management, and the implementation of ESMOE interventions as stipulated and if any challenges were experienced in managing these patients.

#### **4.5.6. Data analysis**

Descriptive and inferential analysis was applied with the assistance of a statistician which is detailed in chapter five. The demographic data, including pregnancy and obstetric histories of each case was then grouped together by identifying relationships that may have contributed to the deaths. Data from maternal deaths that occurred at the different hospitals was compared to identify commonalities in implementation of ESMOE. The inferential statistical analysis included the Chi-square test using cross-tabulations and Kruskal Wallis Test which were applied to see if a significant relationship existed between the maternal deaths and implementation of ESMOE.

#### **4.6. PHASE 3: QUALITATIVE RESEARCH**

Phase 3 addresses objective 4 of the study that employs a qualitative design.

**Objective 4: To explore and describe the challenges confronting midwives in the implementation of the management interventions specific to the ESMOE guideline.**

##### **4.6.1. Design: Qualitative descriptive design**

Denzin and Lincoln (2011) and Gray, Grove and Sutherland (2017: 65) describe qualitative research as being multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that the study is conducted in the natural setting, attempting to interpret phenomena in terms of the meanings people bring to them. Creswell (2014) agrees that qualitative research is an enquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. He further believes that the qualitative researcher builds a complex, holistic picture, analyses words; reports detailed views of informants and conducts the study in a natural setting.

By using a qualitative descriptive design, the researcher aimed to obtain accurate, rich and vivid descriptions from participants in their natural settings. The intention of this study was to gather data regarding the perspectives of the midwives in the implementation of the ESMOE guidelines and its contribution to reducing maternal mortality at the different levels of health care. Interviews with midwives was conducted

to obtain descriptive information of actual experiences in management of obstetric emergencies and challenges that were encountered.

#### **4.6.2. Setting**

The setting for phase 3 was the same as that of phase 2, which is described in 4.4.3. Midwives that are ESMOE trained that worked in a district, regional or tertiary hospital as well as a CHC was chosen from both the districts.

#### **4.6.3. Population**

The population included all midwives working in the maternity units of the health facilities in both districts chosen for this study.

Inclusion criteria: To be included in the study the midwives had to meet the following criteria

- Midwives that are employed at the maternity units of the selected health facility.
- Midwives that have either a basic midwifery diploma or an advanced midwifery diploma.
- The selected midwives must have knowledge of the ESMOE programme or has undergone ESMOE training.
- Must have more than one-year experience of working in a maternity unit.

Exclusion criteria included:

- Community service midwives with no experience in maternity.
- Student midwives.
  - Midwives that have no insight into the ESMOE guideline.

#### **4.6.4. Sampling**

A purposive sampling strategy was employed to select all the consenting midwives in maternity sections of the health facilities in the selected districts. Polit and Beck (2017: 133) describe purposive sampling as a sample based entirely on the judgement of the researcher, and which is composed of elements that contain the most characteristics representative of attributes of the population. Whitehead and Whitehead (2016: 112) found purposive sampling is a popular approach in qualitative research. Participants are recruited according to pre-selected criteria relevant to the research aims. This

sampling method is designed to provide information-rich cases as participants are those who have the experience and knowledge of interest to the researcher. The sampling in this study included all midwives across the relevant health facilities that had ESMOE training, with the intention to obtain their experiences with implementation of the ESMOE guidelines in EmOC.

#### **4.6.4.1. Sample size**

Whitehead and Whitehead (2016: 114) acknowledged that qualitative researchers do not always begin with a predetermined sample size. The richness of the data collected is far more important than the number of participants. This study did not have a predetermined number of participants. The principle of data saturation was adopted during the study. Sample size in qualitative research is determined by data saturation with no specific rules for sample size (Gray, Grove and Sutherland 2017: 133). This means that data collection continued until no new information was obtained.

#### **4.6.5. Data collection**

Data collection is a process whereby information pertaining to a phenomenon is sourced through instruments such as interview schedules and guides, questionnaires, records, artefacts, observations and field notes. Data collection in qualitative research refers to the collecting of information in the form of interviews because the researcher has interest in other people's stories, and the researcher then has the responsibility to create meaning from the data reflected by the participants (Polit and Beck 2017: 137). In this study the data collection methods included interviews, field notes and audio recordings.

##### **4.6.5.1. Face to face interviews**

Spoken 'narrative' is the basis of most qualitative data, where that narrative is most often gained through a direct encounter between the researcher and participant using in-depth interviews (Whitehead and Whitehead 2016: 116). A semi structured interview guide was used to direct the research (Annexure 10). Interviews are an important data collection technique for qualitative studies, since well-informed respondents can provide important insights into a situation (Gray, Grove and Sutherland 2017: 256).

In this study the researcher interviewed ESMOE trained midwives at the various health care facilities, using a semi structured interview guide to analyse the implementation of ESMOE.

#### **4.6.5.2. Field notes**

Grove, Burns and Gray (2013: 283) supports Miles and Huberman (1984) that 'memoing' is a form of writing field notes. These authors believe that field notes record what the researcher hears, sees, experiences and thinks in the process of data collection. Researchers can be easily absorbed in the data collection process and may fail to reflect on what is happening. However, field notes should have a balance between descriptive notes and reflective notes such as feelings, impressions and hunches. Miles and Huberman (1984) emphasise that field notes should be dated so that the researcher can later correlate them with the data. The researcher in this study wrote field notes during and immediately after each interview. This minimized the need to recall important information at a later stage which may have resulted in missing crucial facts.

#### **4.6.5.3. Audio records**

Audio recording using a voice recorder was done for each interview after obtaining permission from each participant. Each interview was assigned a code and dated, example: Participant 3, Health facility 1, and dated. The recording was transcribed verbatim as soon as possible after each interview. This data was written out, organised and filed according to the settings, participant code, date and time for easy retrieval using a Phillips voice-tracker Dictaphone. Data was securely kept locked by the researcher where no other person could gain access to any information.

#### **4.6.5.4. Data collection instrument**

A semi structured interview guide developed and used by the researcher to guide the interview process (Annexure 10). The guide had a section A that addressed the demographic details of each participant. Section B consisted of questions that asked for participant's description of the phenomenon and its context of this study. The grand tour question that was asked is: "What are the health care logistics and challenges that midwives experience in the implementation of the ESMOE guideline". Further questions focused on the participants' knowledge, understanding, application,

problems, successes, failures and views regarding the implementation of the guideline.

#### **4.6.6. Trustworthiness of the study**

Guba and Lincoln (1994) and Polit and Beck (2012: 490) agree that trustworthiness is the term used in qualitative research as a measure of the quality of the research. It is the extent to which the data and data analysis are believable and trustworthy. The main aim to ensure trustworthiness was by addressing ways to ward off researcher bias in the results of qualitative analysis. Qualitative data analysis requires clear, explicit reporting of data so that the reader will be confident of and can verify reported conclusions (Polit and Beck 2017: 149). Denzin and Lincoln (2005), Guba and Lincoln (1994), and Creswell (2014) suggest that the trustworthiness of qualitative research can be established by using four strategies: credibility, transferability, dependability and confirmability. They concur that these criteria are constructed parallel to the analogous quantitative criteria of internal validity, reliability and neutrality. The researcher takes cognisance of this statement and prefers to use the term trustworthiness in this study.

##### **4.6.6.1. Credibility**

This is concerned with the accuracy and truthfulness of scientific findings. The researcher asks: “Are the findings credible to the people I am studying as well as to my readers.” Credibility is analogous to internal validity, that is, how research findings match reality. Thus, from an interpretivist perspective, understanding is co-created and there is no objective truth or reality to which results of a study can be compared (Guba and Lincoln 1994; Polit and Beck 2017: 149).

Gray, Grove and Sutherland (2017) and (Polit and Beck 2017: 557) asserts that the techniques used to achieve credibility included the following:

- Prolonged engagement – remaining in the field over a long period. The researcher continued with data collection until data saturation occurred.
- Triangulation – using a variety of sources in data gathering. The researcher made field notes as well as tape recorded the interviews.



- Peer debriefing – where the researcher exposes herself to a disinterested peer who probes the researcher's biases and explored meaning.
- Member checking – where the research participants review, validate and verify the researcher's interpretations and conclusions. This was done by periodic feedback sessions, where the results of data collection were presented to participants to test if they agreed with the interpretation. The researcher reflected and summarized the information at the end of the interviews to confirm that the information was interpreted correctly.

#### **4.6.6.2. Transferability**

This is described as a degree to which the results of a study can be generalised to other settings. Transferability is analogous to external validity, which refers to the extent to which one can extend the study situation or population to other persons, times or setting than those directly studied (Khan 2014; Polit and Beck 2017: 557).

Transferability is considered a major challenge in qualitative research due to the subjectivity of the researcher as the key instrument. However, Merriam (2009) argues that a qualitative researcher can enhance transferability by detailing the research methods, contexts and assumptions underlying the study. This can be achieved by providing a detailed, rich description of the settings studied to provide the reader with enough information to be able to judge the applicability of the findings to other settings.

Thick description is a term used by qualitative researchers which refers to a rich and thorough description of the research setting and of observed transactions and processes (Polit and Beck 2012: 492; 2017: 149). This was achieved by ensuring that the study participants and the research design are described in detail. The demographic details, as well as the details of the interview and the details of the research design were described thoroughly.

#### **4.6.6.3. Dependability**

Polit and Beck (2017: 149) explains that dependability is concerned with consistency, stability and repeatability of the informant's accounts, as well as the researcher's ability to collect and record information accurately. Auditing for dependability requires that the data and descriptions of the research should be elaborate and rich. This may be

enhanced by altering the research design as new findings emerge during data collection (Merriam 2009). In this study the researcher ensured that the data quality was checked for bias and that adequate participant checking was done periodically to ensure authenticity. This was done by ensuring that consistency was maintained when questioning and recording the information during the interview. An external independent person was made available to check the voice-recording for reliability and ensured that the information is transcribed correctly.

#### **4.6.6.4. Confirmability**

This means that the findings, conclusions and recommendations are supported by the data and that there is internal agreement between the investigators' interpretation and the actual evidence (Polit and Beck 2017: 557). To ensure confirmability, the researcher ensured that the study data was retained and available for reanalysis by others. The voice recorder and notes were reviewed by an independent colleague that confirmed the data to be correct.

#### **4.6.7. Procedure**

Data collection commenced following ethical clearance from the relevant authorities. Midwives that were eligible for the study was given the letter of information and was required to sign the consent form after agreeing to be interviewed. Participation was voluntary. Interviews were conducted at the selected clinical sites in an available quiet room. Anonymity was adhered to by using numbers and no names. The researcher ensured that all information was kept confidential and safe by conducting the interviews face to face and keeping the tools used and data obtained safely locked up, which was only accessible to the researcher.

#### **4.6.8. Data analysis**

Qualitative data analysis can be described as the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relations (Gray, Grove and Sutherland 2017: 269).

In this study data was analysed using thematic content analysis. According to Polit and Beck (2017: 530), content analysis refers to the searching of text for recurring words or themes. More generally, content analysis is used to refer to any qualitative

data reduction and sense making effort that takes volumes of qualitative material and attempts to identify core consistencies and meanings. The core meanings found through content analysis are often called patterns or themes.

The interviews from the audio tapes were transcribed verbatim. This was compared to the field notes made for each interview and data was combined. The researcher analysed the transcriptions by reading the scripts over and over to seek meaning in the data. Data was then grouped into themes and categories.

#### **4.7. PHASE 4: DELPHI TECHNIQUE**

Phase 4 employed the Delphi technique to obtain expert opinions in addressing objective 5 of the study.

#### **Objective 5: To develop a tool to assist the midwife with implementation of the ESMOE guideline**

##### **4.7.1. Design: Decision Delphi technique**

(Linstone and Turoff (1975) define the Delphi technique as: 'A method for structuring a group communication process is that the process is effective in allowing a group of individuals to deal with a complex problem.'

Goodman (2017: 6) and Gray, Grove and Sutherland (2017: 418) concur that the Delphi technique is widely used as a research methodology to gather data from respondents within their domain of expertise.

In this study the Decision Delphi technique was employed to validate an algorithm developed to improve patient care and a training framework to improve the competence of midwives based on the data. This type of Delphi is used for decision making on social developments. Reality is created by a group of decision-makers rather than from the ad-hoc decision of only a small number of people. It is crucial that decision-makers involved in the problem participate in this type of Delphi. They are selected according to their position in the hierarchy of decision-makers and the aim is to structure thinking so that consensus can be achieved. The characteristics 'quasi-anonymity' was applied (where people with expertise are mentioned by name and known to everybody from the beginning but questionnaire responses are anonymous).

In this study the Delphi technique was used to structure thinking around the implementation of the ESMOE guideline so that consensus can be achieved in respect of overcoming challenges that the midwives are faced with its implementation. The study therefore adopted the approach of a 'Decision' Delphi.

#### **4.7.2. Paradigmatic assumptions underpinning the Delphi technique**

The aim of employing a Delphi technique is to achieve consensus through a process of iteration. The process itself is concerned with opinions, ideas and words. Marshall and Rossman (1995) and Lincoln and Guba (2000) suggest that the purpose of the methodology (to achieve consensus through group interaction) is in keeping with an interpretative paradigm. Group interaction in research is generally underpinned by an assumption that an individual's attitudes and beliefs do not form in a vacuum and that people need to listen to others' attitudes and understandings so that they can focus on their own (Marshall and Rossman 1995).

A key advantage of the Delphi technique is the potential to recognise and acknowledge the contribution of each participant which is central to this study. Lincoln and Guba (1985) believe that we are all constructivists and that the mind is active in the construction of knowledge. Within the Delphi technique, a process of individual feedback about group opinion, with opportunities for respondents to change their position, primarily based on that feedback, provides a close fit with the use of environmental inputs to build up internal representations.

This study sought to achieve individual reconstructions that coalesce around consensus through providing opportunities for knowledgeable participants to interact with each other in a structured way (Lincoln and Guba 1985). Thus, the ontological assumptions that there are multiple realities become evident in this study.

The interpretivist paradigm using a decision Delphi technique was applied to this study. The panel of experts chosen for this phase of the study was based on their knowledge of the ESMOE guideline. The group interaction with carefully chosen experts contributes to multiple opinions, ideas and decisions in developing a tool that will improve the implementation of the ESMOE guideline.

#### **4.7.3. Population and sampling**

The selection of subjects for a Delphi study is the most important step in the entire process as it influences the credibility of the results of the study. The Delphi technique focuses on eliciting expert opinions over a short period of time, the selection of subjects is dependent upon the disciplinary areas of expertise for the specific study (Linstone and Turoff 1975; Balasubramanian and Agarwal 2012). The number of participants recommended by Linstone and Turoff (1975) is 15 to 30 participants from the same discipline and five to fifteen per category from different professional groupings. However, Delbecq, Van de Ven and Gustafson (1975) suggest that researchers should use the minimally sufficient number of subjects and should seek to verify the results through follow up explorations. The researcher employed the suggested minimum number of 10 as the choices of experts were from different professional groupings that are experts in ESMOE.

The total population of experts that were eligible to participate in this study included:

- Contributing editors of the ESMOE guideline and the Saving Mothers report (NDoH 2017) were invited to participate. These included recognised Professors that are the editors of these documents and involved in ESMOE training nationally.
- District clinical specialist team (DCST) members from the selected districts. Each district has DCST that has an advanced midwife that is involved in ESMOE training and facilitation.
- Facilitators and trainers of ESMOE from the university of KwaZulu Natal. The facilitators are usually obstetricians, gynaecologists or midwives that assist with training, including train the trainers (TOT) that are involved in ESMOE training.
- Other specialist midwives involved in ESMOE/EOST training from clinical areas. All hospitals have midwifery clinical facilitators that are involved with teaching and training.

##### **4.7.3.1. Sample size**

Random sampling was utilised for the selection of the hospitals and the different categories of experts, thus giving them an equal and independent chance of being picked for the study. The number of hospitals selected is necessary so that the sample

size is not too large to work with. For each category and designation of experts eligible, a random number generator was designed. Each category was given a number in accordance with the total numbers available. This was written on a piece of paper and folded. Each category was done independently. Random selection of not more than two per category was chosen for inclusion in the study. Example: to select the hospitals a list of numbers from 1 to 10, which includes all categories of hospitals included in the study was generated. Each hospital was given a number, which was written down on a piece of paper and the papers were then folded. A random selection of three hospitals was made. The next stage involved the selection of the different categories of experts from these hospitals. A similar process was followed.

A maximum of ten experts from the different categories was selected, this included three professors directly involved in ESMOE training and or updating of relevant documents.

#### **4.7.4. Data collection**

The Delphi technique is used as a method for consensus- building by using a series of questionnaires to collect data from a panel of selected experts. The Delphi method employs multiple iterations which refer to the feedback process (Balasubramanian and Agarwal 2012; Gray, Grove and Sutherland 2017: 418). This process consists of a series of rounds. In each round all participants work through a questionnaire that is returned to the researcher who then edits it. A statement of the position of the whole group and the researchers own position about the research issue is then returned to each participant. Participants reassess their initial judgements about the information provided in previous rounds. Therefore, in a Delphi study, the results of previous iterations regarding specific statements can change or be modified by individual panel members in later iterations based on their ability to review the comments provided by other Delphi participants (Goodman 2017: 6). Theoretically the Delphi process can be continued until consensus is determined to have been achieved

A decision Delphi technique was used in this study that was modified using an algorithm as the data collection instrument. This was developed by the researcher based on the data that emerged from the findings of the study. This researcher contacted all experts via emails by sending an official invite to participate (Annexure 13).

#### **4.7.5. Steps in Delphi process**

The numbers of iterations discussed here include three rounds, but this was modified during the data collection process for this study. A description of what was expected in each round is outlined below.

##### **4.7.5.1. Round one**

This round traditionally begins with an open-ended questionnaire, which serves as a cornerstone of obtaining specific information on the area of discussion. However, it is acceptable and common to modify the Delphi process to use a structured questionnaire or tool in round one that is based on an extensive review of literature.

The tool used for the Delphi discussion in this study was an algorithm. This tool was administered using email to the selected experts that consented to participate in this study. The algorithm outlined the successes and barriers to successful implementation of the ESMOE guidelines. This was sent out to experts to comment and modify the algorithm.

##### **4.7.5.2. Round two**

The algorithm developed from the responses in round one was sent out to each participant. Delphi panellists were required to indicate through track changes on the document or email comments to establish priorities. This round usually identifies areas of agreement and disagreement (Gray, Grove and Sutherland 2017: 418). The algorithm led to the development of a practice framework that focused on improving the competencies of midwives to enable them to implement the ESMOE interventions successfully. This was positively acknowledged by the experts with few suggestions.

##### **4.7.5.3. Round three**

The questionnaire in this round included the items and ratings summarised by the researcher in round two. This was the final round which provides the opportunity to revise judgements and achieve consensus. The experts agreed to the final modifications made.

#### **4.7.6. Duration of the Delphi process**

Conducting a Delphi study can be time consuming, especially if the instrument consists of large number of statements. This will require that the participants spend more time completing the questionnaire. Delbecq, Van de Ven and Gustafson (1975) recommend that a minimum of 45 days for the administration of a Delphi study is necessary. The time management between iterations should include two weeks for Delphi subjects to respond. There were five experts that did not respond to the invite at all, whilst two experts that were invited to participate did not comment on the tools at all.

#### **4.7.7. Procedure**

The process employed a method for consensus- building by using a modified tool in the form of an algorithm to collect data from a panel of selected experts. The algorithm was developed by the researcher based on the results that emerged from the study to indicate the success and barriers of ESMOE implementation on reducing MMR. Experts involved in ESMOE training were invited. The selected experts were first invited to participate after being informed about the study and their consent was given via emails. The experts willing to participate were emailed the tool (algorithm) and worked through them and responded. The algorithm led to the development of a practice training framework to implement ESMOE guidelines into the training of midwives. All tools were edited by the researcher and the rounds continued until consensus was achieved by round three. The number of rounds was based on the consensus reached regarding the development of a practice framework.

#### **4.7.8. Data analysis**

Goodman (2017: 7) believes that a Delphi study is not predictive. The method used organises and direct group opinion. The iterative rounds of surveys create a virtual discussion on a topic, inviting participants to rank statements on what aspects or issues are important. It appears democratic and its anonymity means that decision making is influenced by the ideas alone and not who holds it.

In a Delphi study the data analysis requires that decision rules be established to assemble and organise the judgements and insights provided by Delphi subjects. Consensus on a topic can be decided if a certain percentage of votes falls within a



prescribed range. One criterion recommends that consensus is achieved by having 80 percent of subjects' votes falling within two categories on a seven-point scale. Another suggestion is that at least 70 percent of Delphi subjects need to rate three or higher on a four-point Likert-type scale and the median has to be at 3.25 or higher (Linstone and Turoff 1975; Gupta and Clarke 1996; Balasubramanian and Agarwal 2012).

In this study the number of experts that responded were limited which made the process shorter, with no data to analyse as the opinions of experts agreed with each other and with the researcher. The algorithm was used as the initial tool to open the discussions. The suggested practice framework was the outcome of the Delphi discussion. Relevant input from the experts were added and consensus was reached.

#### **4.7.9. Credibility of the Delphi technique**

Gupta and Clarke (1996:185) acknowledge that the Delphi technique has the following criticism: `Conceptual and methodological inadequacies, potential for sloppy execution, crudely designed questionnaires, poor choice of experts, unreliable result analysis, limited value of feedback and consensus, and instability of responses among consecutive rounds`. This critique indicates the potential for compromising credibility at all stages of the Delphi study.

Linstone and Turoff (1975) and Lincoln and Guba (2000) suggest that compromise to the validity and reliability of the study arise from the value-led nature of feedback and consensus and the instability of responses. These areas are influenced by the number of experts, their average expertise and the inter-correlation of their judgements. On the other hand, to ensure the credibility of the study it needs to be effective in aiding decision making.

In this study the researcher aimed to engage experts at different levels of management that are directly involved with the ESMOE guideline. The challenges experienced by the researcher, included time constraints, inability to access all the proposed experts and poor responses from some of the experts. However, the experts that did respond and participated included researchers, editors from the ESMOE board and clinical specialists that assisted in the modification of the algorithm and finalisation of the practice framework. These experts are those who propagate for training and

implementation of the ESMOE guideline across SA. This category of experts contributed to the credibility of this phase.

#### **4.8. ETHICAL CONSIDERATIONS OF THE STUDY**

The study was conducted according to the research ethics policy and guidelines of the Durban University of Technology. The data collection process only commenced upon receiving ethical clearance from the Institutional Research Ethics Committee (IREC) of the Durban University of Technology (Annexure 1), as well as from the Provincial Department of Health Ethics Committee (Annexure 3). Permission was sought from the two districts that apply to this study (Annexure 5 and 7). The ethics policy takes into consideration the anonymity, confidentiality, rights and voluntary participation of human subjects. The principles of beneficence and respect for human dignity were adhered to during this research. A letter of information (Annexure 8) and an informed consent (Annexure 9) was provided to all participants giving them an overview of the study. Participation was voluntary and withdrawal from participation could be made at any time with no negative consequences. The data gathered for the research was held safely and securely. The researcher also agreed not to disclose the name of the institutions in the report.

#### **4.9. SUMMARY OF THE CHAPTER**

This chapter described the multi method data collection process under four phases, with each phase addressing a specific objective of the study. A description of the design, sampling, data collection methods and analysis was discussed. The next chapter will present all the results for the relevant phases of data collection.

## **CHAPTER 5: RESULTS**

### **5.1. INTRODUCTION**

This chapter presents the results of the study. The findings of the relevant phases of data collection, in line with the methodologies used are presented.

Data from phases two, three and four that addressed specific objectives of the study are discussed in this chapter. Objective one that addressed the ESMOE guideline was done on its own in chapter two of the study. It must be emphasised that the data presented in this chapter only relates to the health facilities on which the study is based and cannot be generalised to all facilities.

### **5.2. PHASE 2 STAGE 1: STATISTICS OF THE RESOURCES, ESMOE TRAINING AND DELIVERY TYPES AND NUMBERS AT THE RELEVANT FACILITIES**

This phase addressed objective 2 of the study.

**Objective 2: Determine what the maternal healthcare logistics are that midwives face at the different levels of health care facilities in KZN**

The types of maternity facilities available at each facility, the number of midwives working in that facility, the number of deliveries conducted per month at each site, the number and causes of maternal deaths, ESMOE training data and the resources and equipment available at each site are presented below.

#### **5.2.1. Types of health facilities and maternity wards in each district**

The data below indicates the types of health facilities in the two districts and the different types of maternity wards and bed numbers available in each facility.

##### **5.2.1.1. Types of health facilities**

A total of eleven health facilities in the two districts (District A and District B)) responded to the invitation to participate in the study. In District A significantly more facilities (72.7% =8) participated which were four CHCs and four hospitals. The crosstabulation between the two districts are seen below in Table 5.1.

**Table 5.1: Types of institutions District Crosstabulation**

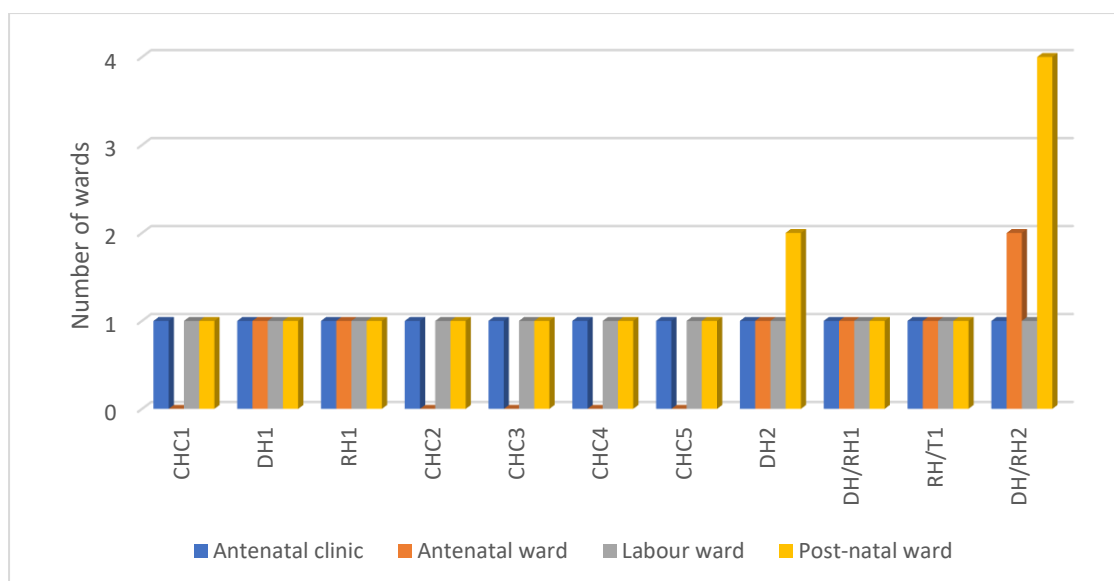
			District		Total
			A (eThekweni)	B (Ugu)	
Type institution	CHC	number	4	1	5
		% within type of institution	80.0	20.0%	100.0
		% within District	50.0	33.3	45.5
	Hospital	number	4	2	6
		% within type of institution	66.7	33.3%	100.0
		% within District	50.0%	66.7%	54.5%
Total	Number		8	3	11
	% within Type of institution		72.7	27.3%	100.0
	% within District		100.0	100.0	100.0

Of the 11 facilities, 45.5% (n= 5) were community health centres, whilst 54.5% (n=6) were hospitals. In UGU district there were 27.3% (n=3) health facilities chosen which included one CHC, a district and a regional hospital.

In both districts the health facilities chosen were based on the referral patterns from a CHC to the relevant district and or regional hospitals.

#### **5.2.1.2. Types of maternity wards in each facility**

Figure 5.1 shows a grouped response indicating the type of maternity wards in each facility that participated in the study. The first three facilities in the figure below are facilities in Ugu district then followed by the eight facilities from District A.



**Figure 5.1: Grouped response indicating the type of maternity wards in each facility**

The maternity section in each facility included an antenatal clinic, antenatal ward, labour wards and postnatal wards. The graph above depicts the number of wards in each health facility across the two districts. It is important to note that all five (n=5) CHCs did not have an antenatal ward. This is in line with the department of health policies as any patient that needs admission in an antenatal ward would most often be a high-risk patient. Therefore, any patient that is high risk seen at a CHC is referred immediately to the next level of care, hence there is no need for antenatal wards at CHCs. However, it is also important to note that the CHC had antenatal beds attached to the labour wards for patients who go into labour early without any risk factors.

All the other facilities had one of each of the relevant wards, except District Hospital (DH) 2 and DH/Regional Hospital (RH) 2. These two hospitals had more than one postnatal ward. Both these hospitals were in District A and had two and four postnatal wards respectively. These are two of the bigger hospitals in District A with significantly more deliveries (discussed under patient statistics in 5.4.4) therefore the need for more postnatal beds.

#### 5.2.1.3. Number of beds in each facility

Table 5.2. indicates the number of beds in each maternity unit at the 11 facilities. All five CHCs did not have any antenatal wards and only one CHC in district A had one

high care bed in the labour ward for any high-risk patient that needed management prior to transfer to a hospital.

**Table 5.2: Description of the number of beds in CHCs and Hospitals**

All Institutions	Antenatal clinic beds	Antenatal ward beds	Labour ward beds	High care beds	Post-natal beds
CHC1	4	0	5	0.	4
DH1	4	15	15	6	15
RH1	2	16	7	4	30
CHC2	3	0	4	0.	6
CHC3	3	0	2	1	7
CHC4	3	0	4	0.	6
CHC5	6	0	6	0.	8
DH2	14	20	6	0.	24
DH/RH1	7	41	7	6	33
RH/T1	8	59	18	5	70
DH/RH2	10	80	20	6	152
Total institutio	11	11	11	11	11
Sum	64	231	94	28	355

Significant differences in the average number of beds in some units across type of facility were noted ( $p=0.006$ ).

Significantly more beds, on average, are available in the antenatal ward ( $p=.004$ ), the labour ward ( $p=.008$ ) and the post-natal ward ( $p=.006$ ) in hospitals compared to CHCs

The lowest number of beds available in a hospital were those for high care which ranged from four to six beds. The postnatal wards (4) at a regional combination hospital had the highest number of beds (152 beds).

### **5.2.2. Categories of health care workers at all participating health facilities and across selected maternity units**

The data below in Tables 5.3 to 5.6 display grouped responses on the various categories of health care workers across the health facilities in selected maternity units.

**Table 5.3: Numbers of staff at antenatal clinics across all facilities**

All Institution	Advanced Midwife	Basic Midwife	Student Midwife	Enrolled Nurse	Enrolled Nurse Assistant	Other categories of staff	Doctors
CHC1	1	1	0	1	0	1 lay counsellor	0
DH1	2	2	0	1	0	1 lay counsellor	1
RH1	0	2	3	0	0		1
CHC	1	2	0	0	0	1 PMTCT counsellor	0
CHC3	1	3	3	0	1		0
CHC4	1	2	0	0	0		0
CHC5	2	3	2	2	1	1 Clinic orderly	0
DH2	0	3	3	0	0		1
	1	4	2	0	1	1 lay counsellor, 1 clerk; 1 reproductive health nurse; 1 PMTCT counsellor	3
DH/RH1							
RH/T1	3	3	4	2	2	1 lay counsellor	4
	5	5	4	3	4	1 lay counsellor & 1 data capturer	3
DH/RH2							

Significantly more medical officers worked in antenatal clinics at hospitals than at CHCs ( $p=.011$ ). All the CHCs had a doctor based only in the emergency and trauma department and no doctors in maternity units. There were fewer advanced midwives across most facilities as compared to basic midwives. Two of the hospitals had no advanced midwives in the clinic. The antenatal clinics at the hospitals had an average of five consulting rooms and most patients seen were referred high risk patients that would require a doctor rather than a midwife.

**Table 5.4: Numbers of staff at antenatal wards in hospitals on day duty**

Hospitals	Advanced Midwife	Basic Midwife	Students	Enrolled Nurse	Enrolled Nursing Assistant	Doctors
DH 1	2	4	0	3	1	1
RH 1	0	2	2	0	1	3
DH 2	0	2	2	0	0	0
DH/RH 1	3	4	4	2	0	2
RH/T 1	4	3	2	3	2	4
DH/RH 2	6	5	3	5	3	3
Total Facilities	6	6	6	6	6	6

There are significant differences in the number of advanced midwives in maternity units especially antenatal wards at District and regional hospitals. The number of advanced midwives ranged between zero to six in the respective type of facility, with two hospitals having no advanced midwife in the antenatal wards.

**Table 5.5: Numbers of staff in Labour ward day duty**

All institutions	Advanced Midwife	Basic Midwife	Student Midwife	Enrolled Nurse	Enrolled Nurse Assistant	Other categories of staff	Doctors
CHC1	2	1	0	2	1	1 lay counsellor	0
DH1	5	6	0	2	2	1 ward clerk & 1 PMTCT Counsellor	1
RH1	3	11	4	0	0	1 lay counsellor	5
CHC2	2	2	0	1	0		0
CHC3	4	3	2	1	0		0
CHC4	2	1	0	1	0	1 ward clerk & 1 data capturer	0
CHC5	2	2	3	1	0	1 clinical orderly	0
DH2	1	6	4	1	2		1
DH/RH1	4	7	4	0	0	1 ward clerk	4
RH/T1	10	10	2	2	4	1 data capturer	7
DH/RH2	8	14	4	4	0	1 data capturer	5

There are significantly more registered midwives ( $p=.006$ ), medical officers ( $p=.003$ ), consultants ( $p=.029$ ) and interns ( $p=.032$ ) in labour wards (day) at hospitals than at



CHCs. At all the CHCs the patients are managed only by midwives due to lack of doctors in maternity.

There are significantly more registered midwives ( $p=.009$ ) and medical officers ( $p=.008$ ) in labour wards at night in hospitals than at CHCs. Hospitals have a higher delivery rate and most patients that deliver at a hospital present with complications. This is evident by the large number deliveries by caesarean sections conducted in hospitals presented below.

**Table 5.6: Numbers of staff in post-natal ward day duty**

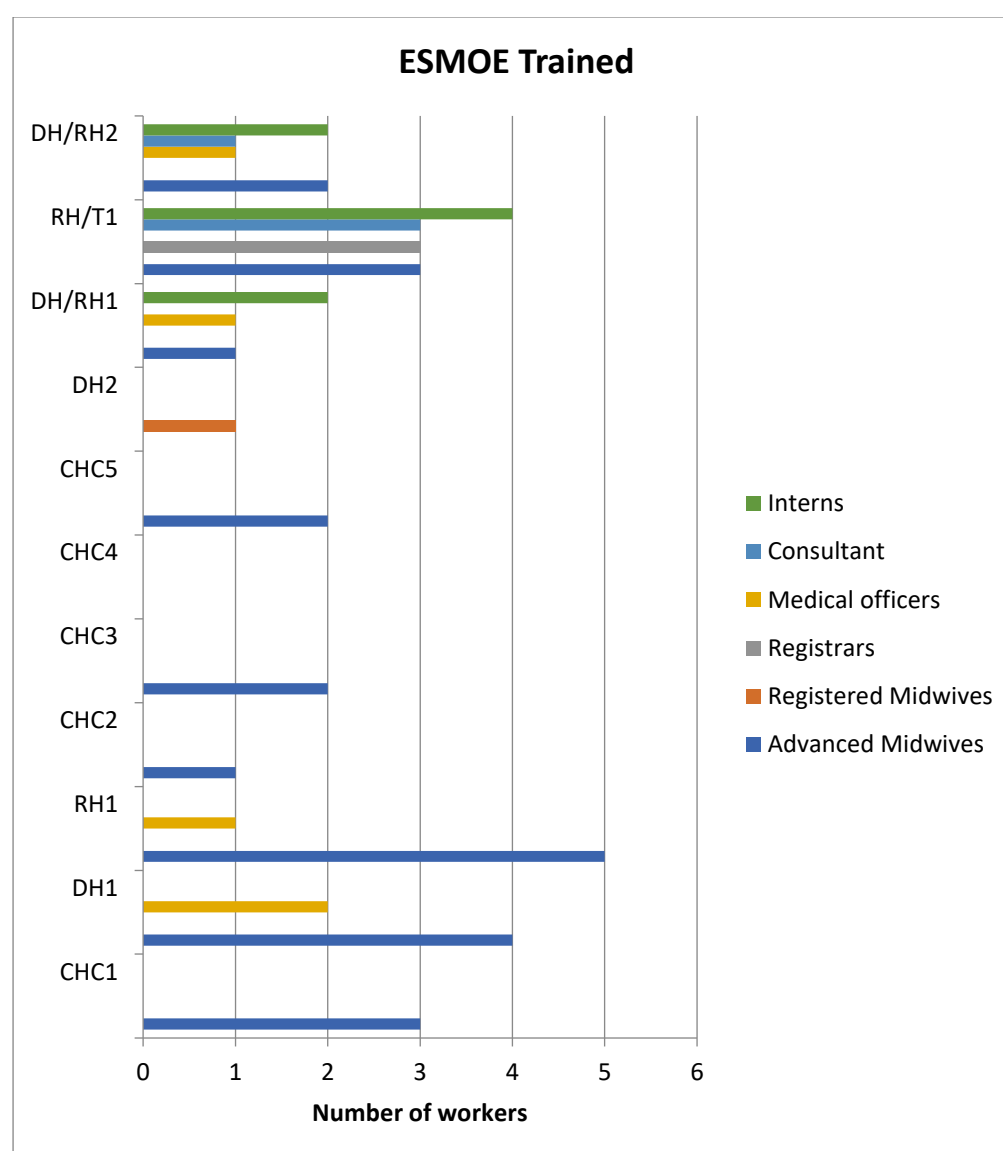
All institutions	Advanced Midwife	Basic Midwife	Student Midwife	Enrolled Nurse	Enrolled Nurse Assistant	Doctors
CHC1	1	0	0	0	0	0
DH1	2	4	0	2	0	1
RH1	0	3	3	6	2	1
CHC2	1	1	0	1	0	0
CHC3	0	2	0	0	0	0
CHC4	0	1	0	1	0	0
CHC5	1	2	3	0	0	0
DH2	0	2	0	1	0	0
DH/RH1	1	6	3	2	2	1
RH/T1	4	3	2	5	3	4
DH/RH2	2	19	4	12	8	4

There are significantly more registered midwives ( $p=.010$ ), enrolled nurses ( $p=.009$ ), enrolled nursing assistants ( $p=.034$ ) and medical officers ( $p=.029$ ) in post-natal wards (day) at hospitals than at CHCs. The one combination hospital had four postnatal wards that also contributes to a higher number of staff in postnatal wards.

There was generally a higher number of registered midwives than advanced midwives across facilities. Most facilities also had a significant number of enrolled nurses working in maternity units that are not midwifery trained.

The next step was to determine how many of the staff are ESMOE trained, as described below and illustrated in Figure 5.2.

### 5.2.3. ESMOE trained staff



**Figure 5.2: ESMOE trained staff**

District A, the bigger of the two districts with eight facilities had a significantly lower number of ESMOE trained advanced midwives (n=11) as compared to District B with three facilities (n=12). In district A, two of the health facilities (a Regional hospital and a CHC) had no ESMOE trained midwives at the time of data collection. It is also important to note that the CHCs and three of the hospitals in this district had no ESMOE trained doctors in the maternity units at the time of data collection. The three combination hospitals in District A had a range of two to four interns in maternity which was more than the other categories of doctors that had ESMOE training, although these hospitals were the only ones that had all categories of ESMOE trained doctors.

One of the regional hospitals in district B had the highest number of ESMOE trained advanced midwives (n=5), as this district also had ESMOE saturation training. More ESMOE trained medical officers were found in District A hospitals than in CHCs (p=.032)

Midwives that were available at the time of data collection were interviewed to assess the implementation of ESMOE in managing relevant patients. This is discussed in Phase 3.

#### **5.2.4. Patient statistics across the selected facilities**

The data below includes patient statistics related to the number of pregnant women seen, admitted, delivered or referred. The data includes statistics from January 2016 to April 2016 across the selected health facilities.

##### **5.2.4.1. Patients seen at antenatal clinics**

**Table 5.7: Categories of patients seen at antenatal clinics across facilities**

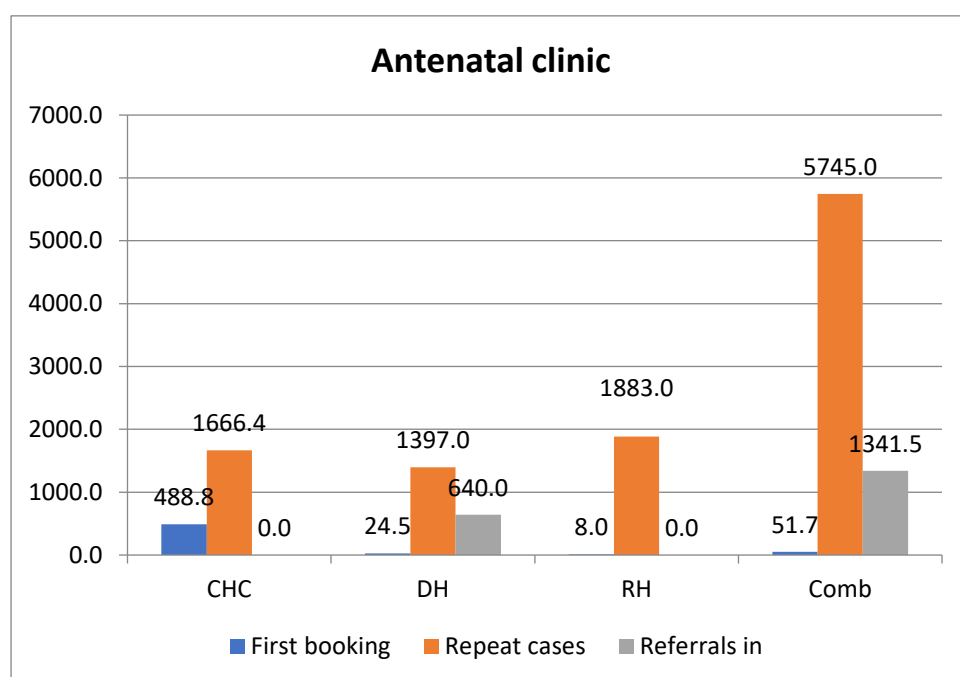
Facility	Total patients seen	First Bookings	Repeat cases	Referrals in	Referred out
CHC1	911	169	742	0	13
CHC2	1819	335	1484	0	86
CHC3	1799	380	1419	0	286
CHC4	2481	720	1761	0	277
CHC5	3766	840	2926	0	135
DH1	2037	0	1397	640	0
DH2	1446	49	1397	0	0
RH1	1891	8	1883	0	0
DH/RH1	5283	85	5198	0	0
RH/T1	5442	31	4852	559	0
DH/RH2	9348	39	7185	2124	0

As can be seen from Table 5.7, the total numbers of antenatal patients seen at four of the CHCs in District A were significantly higher than the regional and district hospitals. Combination hospitals had a significantly higher number of repeat cases which are usually all the high-risk patients that must be seen at hospitals. There is a significant difference in the number of first cases across type of facility,  $\chi^2 (3) = 7.939$ ,  $p=.047$ . All CHCs had a higher number of first bookings of antenatal woman as this is the first

entry level into the district health system. Most antenatal patients had an average of four antenatal visits.

The patients seen at the different health facilities were categorized and grouped which is presented below.

#### 5.2.4.2. Categories of patients seen at antenatal clinics across health facilities



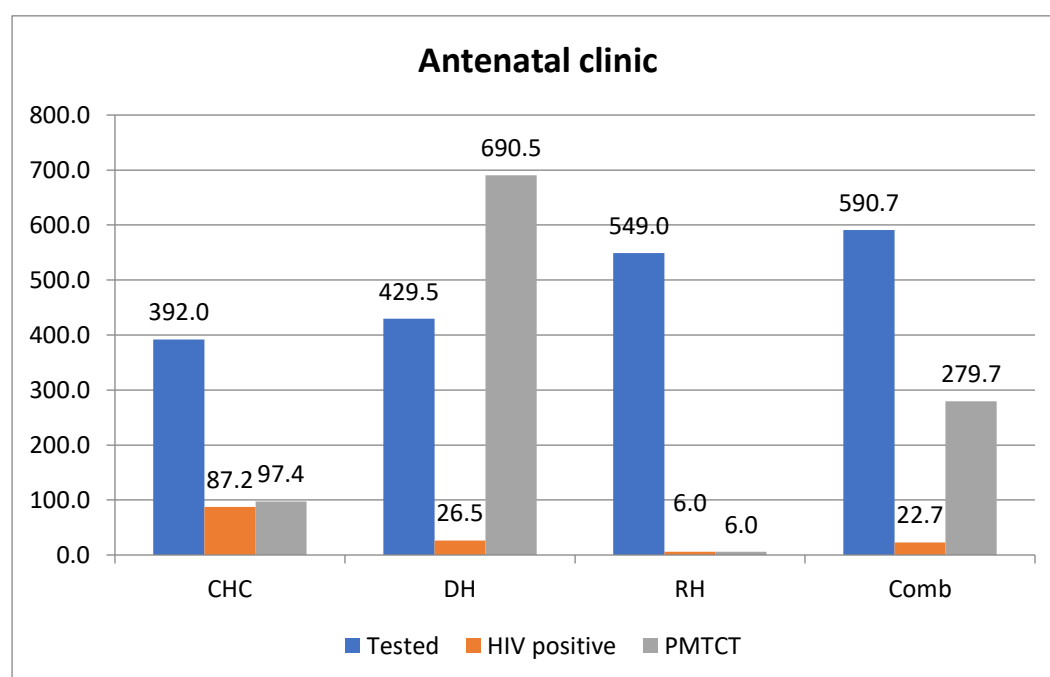
**Figure 5.3: Categories of antenatal patients seen at clinics across selected health facilities**

The analysis for referrals omitted a combination hospital and 1 DH due to lack of statistics available at the time of data collection

Figure 5.3 shows a significant difference in the average of first bookings at CHCs (488.8) as compared to 51.7 at the combination hospital ( $p=.047$ ). This is in line with district health policy in SA where patients are expected to go to the local clinics before being referred to a hospital (Department of Health 2015b, 2015d). Therefore, the number of referral-in of patients at the district and combination hospitals are higher, as these would be high-risk patients that need to be managed at a hospital rather than a CHC. The repeat cases seen at the three combination hospitals which were all in district A was high at 5745.0. This is also due to one of these hospitals not having a local CHC or District hospital in the area, which compels more patients being seen at the hospital, which includes low and high-risk patients.

### 5.2.4.3. Number of HIV positive patients across facilities

The number of HIV patients were not logged in some of the facilities and the data capturing tools for HIV patients differed in some facilities, despite there being a standardised format to collect data on HIV that is available from the department of health. This made it difficult to get accurate patient HIV statistics especially for PMTCT. Some of the facilities that had updated their HIV statistics had a data capturer, whilst those that did not have a data capturer did not keep comprehensive data due to staff shortages and data were not updated at the time of data collection.



**Figure 5.4: Numbers of HIV positive ANC patients by type of facility**

Figure 5.4 shows the average numbers of patients tested, found positive and PMTCT for HIV across the different types of facilities for a period of four months (January 2016-April 2016). There was a difference in the number of patients that were tested for HIV and the numbers found to be positive. From the available data the largest numbers of patients were tested at combination hospitals, with the highest number of PMTCT at district hospitals.

**Table 5.8: Availability of HIV stats**

	HIV stats available			
	January	February	March	April
DH1	Yes	Yes	Yes	Yes
DH2	No	No	No	No
RH1	Yes	Yes	Yes	Yes
DH/RH1	No	No	No	No
RH/T1	Yes	No	No	No
DH/RH2	Yes	Yes	Yes	Yes

HIV statistics were not available at all facilities for the relevant period. Table 5.8. shows that the data in Figure 5.4 is reflective of just about three of the six facilities included in the analysis.

#### 5.2.4.4. Number and types of deliveries at various health facilities

The numbers and types of deliveries at each of the facilities included in this study are presented below.

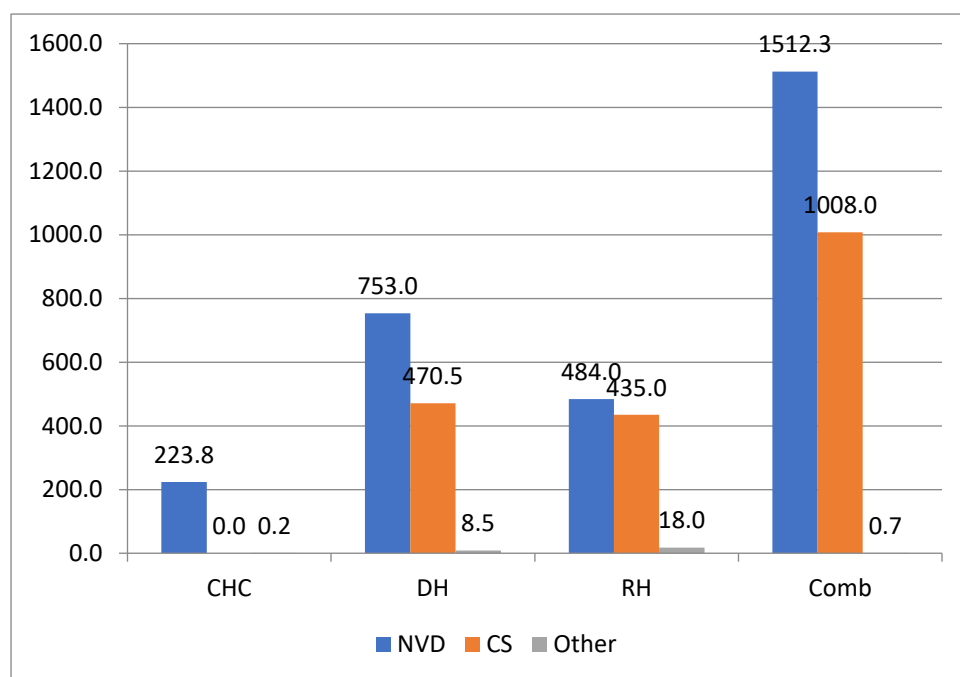
**Table 5.9: Number and type of deliveries at each facility**

Facility	Normal Vaginal Delivery	Caesarean Section	Other/assisted deliver	Born before arrival (BBA)
CHC1	156	0	1	12
CHC2	263	0	0	27
CHC3	244	0	0	19
CHC4	88	0	0	6
CHC5	368	0	0	39
DH1	530	444	0	20
DH2	976	497	17	21
RH1	484	435	18	17
DH/RH1	1223	772	2	60
RH/T1	973	964	0	47
DH/RH2	2341	1288	0	132

Table 5.9 indicates the types and total deliveries at each facility over the period of January 2016 to April 2016. The combination hospital conducts most deliveries as

compared to RH and CHC. A total of 12,084 deliveries occurred at all 11 facilities, with District A having 9,969 of the deliveries and 2,117 occurred in District B.

It is significant to note that of the 12084 total deliveries 7646 of this was normal vaginal deliveries and 4400 were caesarean sections with only 38 assisted deliveries and 400 women delivered outside a health facility and arrived as a born before arrival (BBA) case.



**Figure 5.5: Graphical representation of the types of deliveries**

The number of t deliveries that occurred at combination hospitals were higher than CHC, ( $p = .031$ )

Combination hospitals had the highest number of deliveries as compared to the regional hospitals. Grouped response indicates the hospitals conduct all C/S, with the combination hospitals having a significantly higher number as compared to DH and RH, ( $p=.021$ ).

It is important to note the high number of caesarean section deliveries at all hospitals (> 67%) of total hospital deliveries. Other deliveries would include assisted deliveries (vacuum and forceps) which is minimal numbers across hospitals with the highest (18) at the regional hospitals. There is a difference in NVD at combination hospitals as compared to CHC, ( $p=.037$ ).

There was a significant difference in the average number of deliveries across CHC verses hospitals. An average of 2505 deliveries were conducted at combination regional hospitals over a four- month period with averages of 1247 at a DH and 957 at a RH as compared to only 224 deliveries at a CHC.

Following presentation of the numbers and types of deliveries at the various facilities it was important to look at relevant equipment and its availability that is necessary to effectively manage patients.

### 5.2.5. Equipment available at the selected health facilities

In order to assess the support available to the staff the relevant equipment available at the various hospitals was investigated and presented below.

**Table 5.10: Types of equipment available at the participating health facilities**

Facility	Cardiotocograph	Delivery Packs	Forceps	Vacuums	Suturing Packs	Dinamaps Baumanometer	Ivac_regulators	Suction	Oxygen	Resuscitation trolley	Hb_Meter	Glucometer	Saturation monitor	Other
CHC 1	4	6	0	2	4	3	0	1	1	2	4	4	1	1
CHC 2	5	8	0	0	8	6	0	1	1	1	2	2	1	1
CHC 3	3	10	1	0	10	2	1	1	1	1	3	3	2	2
CHC 4	4	10	2	1	10	4	0	1	1	2	5	5	1	1
CHC 5	7	10	0	1	5	4	0	1	1	1	4	9	1	1
DH 1	9	14	2	2	7	7	8	1	1	6	6	6	1	2
DH 2	10	10	0	1	8	7	1	1	1	3	3	3	1	2
RH 1	8	12	2	2	8	6	8	1	1	6	4	5	1	2
DH/RH 1	8	12	2	2	8	7	5	1	1	4	4	6	1	1
RH/T 1	20	24	5	2	22	17	9	1	1	4	11	21	2	2
DH/RH 2	28	22	0	1	6	26	5	1	1	8	7	12	3	2

Specific equipment necessary for management of patients were inventoried (Table 5.10 above and Figure 5.6 below). All facilities indicated that equipment is not adequate to meet the demands. **Only one** of the five CHCs have regulators or infusion pumps to regulate fluid or intravenous medication. This is significant to note as certain drugs used within the ESMOE guideline require that the drug run as an infusion using a regulator or Ivac to administer a required number of drops per minute. The most



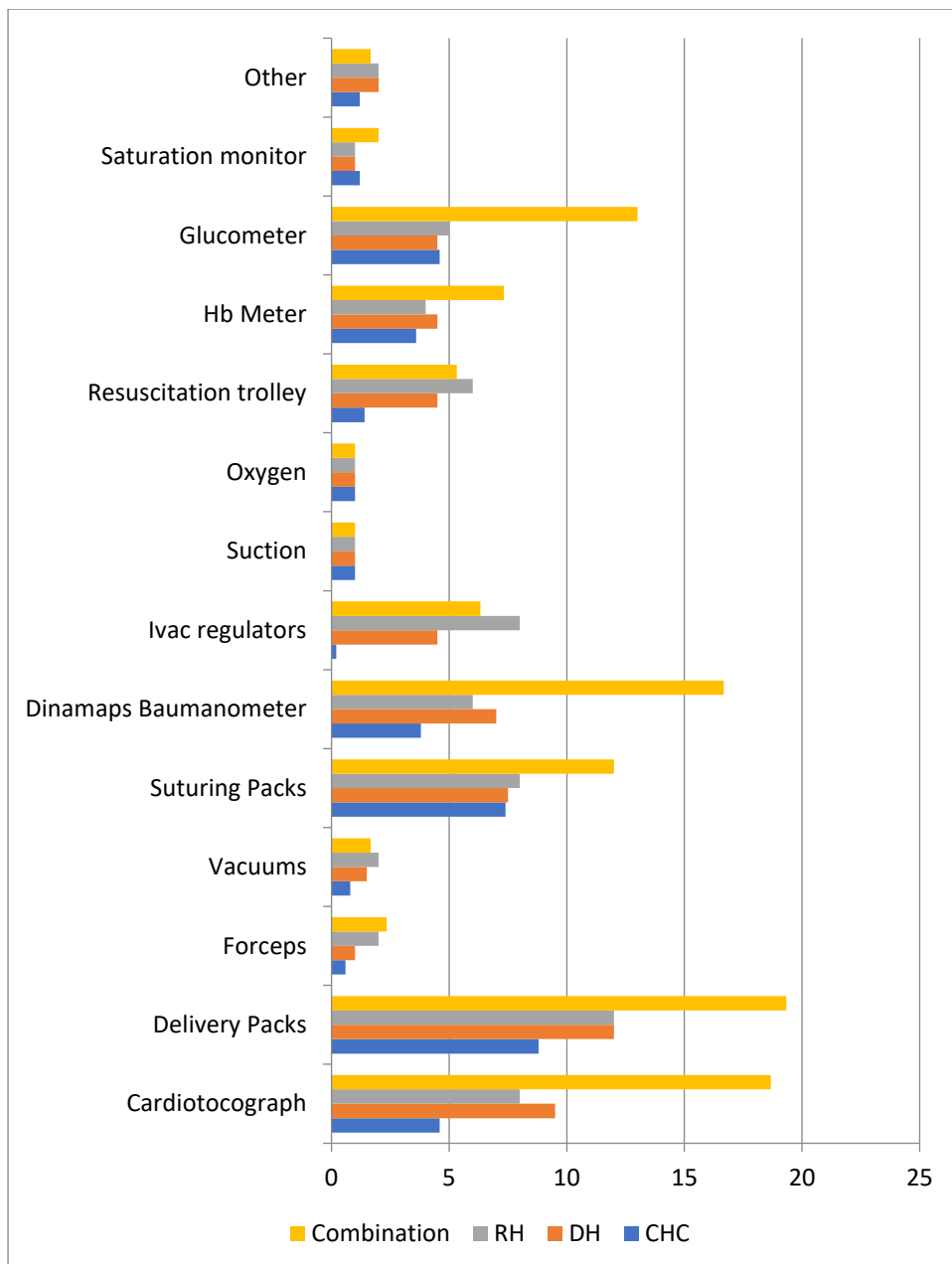
commonly used drugs in obstetric emergencies like oxytocic's and magnesium sulphate require to be administered through a regulator to control the amount.

Combination hospitals had more equipment than the other facilities as they are bigger hospitals that function as either district, regional or tertiary hospital. The bed status and number of patients admitted in these hospitals is also higher as indicated previously.

One of the district hospitals and a combination hospital both had no forceps and one vacuum which was not working. Assisted deliveries are usually performed in these hospitals to prevent unnecessary caesarean sections. The lack of such equipment prevents the safe delivery of a baby and the safety of the mother. Maternity managers at three of the hospitals stated that assisted deliveries are not done due to lack of skills in performing vacuums or forceps and doctors prefer to perform a caesarean section.

The oxygen and suction in most of the facilities were wall mounted, and one portable unit was available in majority of the facilities. One of the district hospitals in district B had no wall mounted suction and oxygen in postnatal and antenatal wards. Also, just one portable oxygen or suction is insufficient especially when it is required during the transfer of a patient.

Two facilities also mentioned that there was only one Dinamap available as others were sent for repairs. Another institution had no Hb meter to monitor patient's haemoglobin in any of the units which was also sent for repairs. One of the major challenges experienced by many of these facilities was the delays from companies to return equipment timeously.



**Figure 5.6: Inventory of availability of specific equipment at health facilities**

The number of Cardiotocographs (CTG) were significantly higher in combination hospitals than DH and CHC, ( $p=.045$ ). One of the CHC had only one CTG that was working to be shared amongst all relevant maternity areas.

Two to six Dinamaps were available at the CHC, whilst the hospitals in the study each had more than six, and up to 26 at a combination hospital ( $p= .037$ ). However, many facilities did not have all this equipment at hand as many are sent for repairs and not returned.

### 5.2.6. The availability of drugs across the health facilities

Drug availability was limited to those used in the ESMOE guidelines for the specific obstetric conditions relevant to this study.

**Table 5.11: Drugs available at facilities**

Name of Drugs	Available	Not available	Alternate drug
Oxytocin	all 11 facilities		
Misoprostol/Cytotec	8 facilities	3 CHCs	
Pethidine	all 11 facilities		
Magnesium Sulphate	all 11 facilities		
Rivotril	10 facilities	1 CHC	Valium
Antihypertensive	11 facilities		
Antiretroviral	11 facilities		
Calcium supplements	11 facilities		
Iron supplements	10 facilities	1CHC- no stock	
Local anaesthetics	11 facilities		
Calcium Gluconate	11 facilities		
Antibiotics	11 facilities		
Labour suppression drugs	11 facilities		

Of the 13 drugs listed in Table 5.11, 10 of them were available at all health facilities, except Misoprostol which was not available at three of the CHCs and Rivotril at one CHC. An alternate drug used in place of Rivotril was Valium at two CHCs and three of the hospitals. Although the above drugs were available at most facilities, some CHCs in the rural areas in both Districts experienced shortages or sometimes drugs were out of stock.

### 5.3. PHASE 2 STAGE 2: RETROSPECTIVE CHART REVIEWS

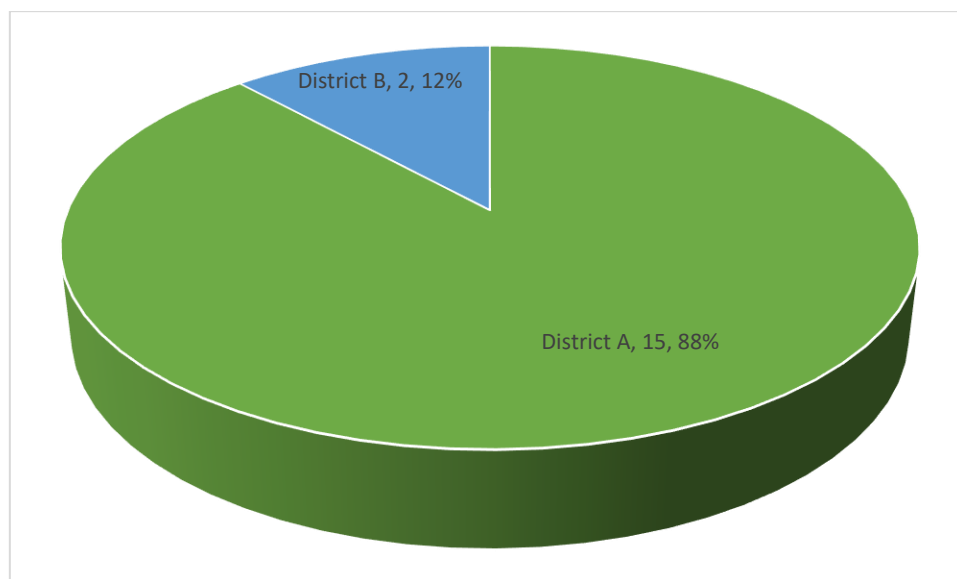
This phase addressed objective 3 of the study. The aim was to analyse maternal death records over the period January 2016 to April 2016. The objective was to determine if these patients were managed by appropriately implementing the steps of the ESMOE guideline.

**Objective 3: To determine whether the ESMOE guideline was implemented as envisaged at the different levels of health care**

This phase employed a quantitative approach using data capturing sheets to collect data on the number of maternal deaths at the hospitals. The deaths that were analysed

were limited to the causes relevant to this study. Maternal deaths occurred at the hospitals only and no deaths occurred at any of the CHCs in both districts. Data was analysed with the assistance of a statistician using descriptive and inferential statistical analysis.

### 5.3.1. Maternal deaths as per districts

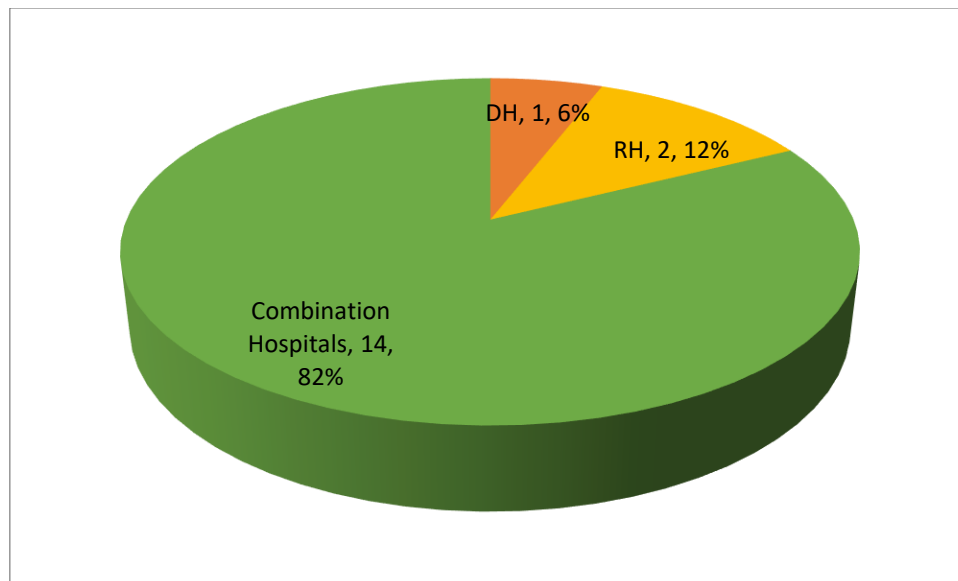


**Figure 5.7: Pie graph indicating the districts and percentage of maternal deaths**

Figure 5.7 indicates the number of maternal deaths per district. There was a total of 17 maternal deaths that occurred from a total of 12, 086 deliveries at the selected health facilities during the time of data collection for the specific period from January 2016 to April 2016. Maternal deaths are calculated per triennium as per SMRs. For the last triennium 2014-2016 (NDoH 2017) there was an iMMR of 13.33 with a total of 3697 maternal deaths in SA. These 17 maternal deaths are only those that occurred at the selected facilities over the specified period of data collection.

Of the 17 maternal deaths 88% (n=15) occurred in district A, which is the larger district, as compared to 12% (n=2) of maternal deaths that occurred in district B over January 2016 to April 2016.

### 5.3.2. Maternal deaths as per health facilities

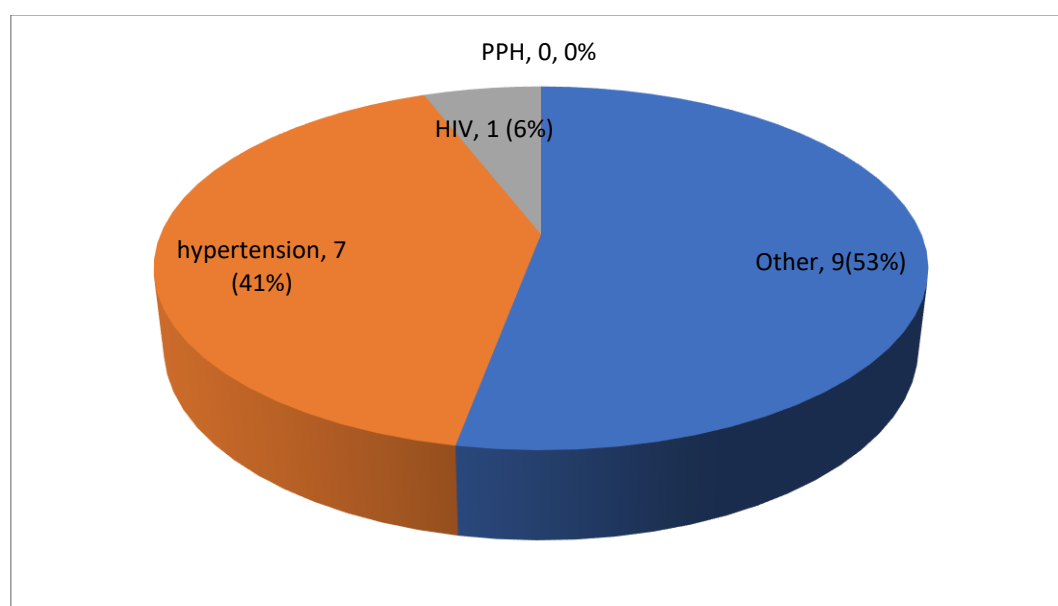


**Figure 5.8: Pie graph indicating types of health facilities where maternal deaths occurred**

Figure 5.8 indicates the type of hospitals where these 17 maternal deaths occurred. In district A there were 4 hospitals included in this study and 2 hospitals from district B. The combination hospitals indicated on this graph include three hospitals in district A that are classified as a district/ regional (DH/RH) or a regional/tertiary (RH/TH) hospital.

The number of maternal deaths that occurred at three combination hospital was 82% (n=14) as compared to (12%; n=2) at the regional hospitals and only (6%; n=1) that occurred at a district hospital

### 5.3.3. Causes of maternal deaths relevant to the study

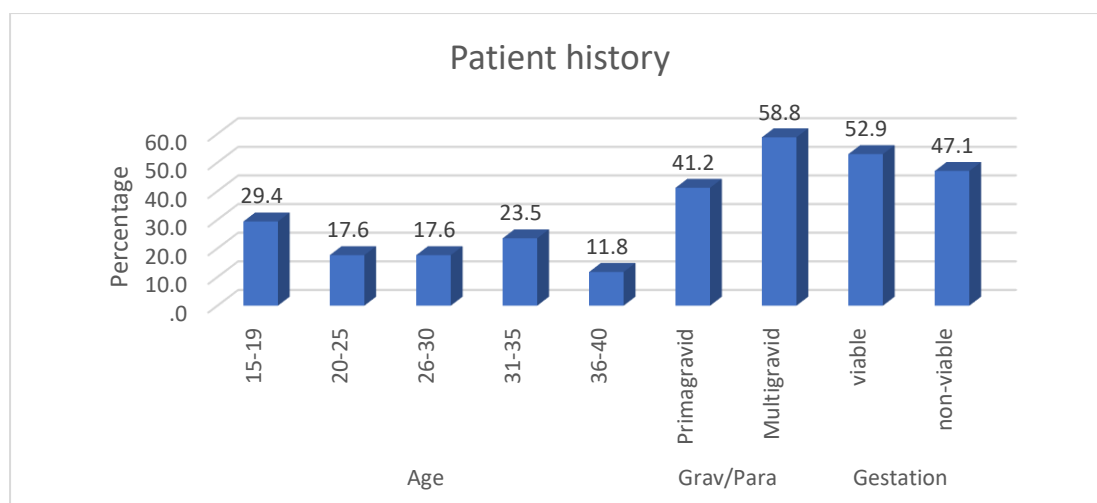


**Figure 5.9: Pie graph indicating the causes and percentage of maternal deaths**

As can be seen from Figure 5.9, the three major causes of maternal deaths relevant to this study were Hypertension/Pre- eclampsia, HIV and AIDS, and Post-partum Haemorrhage (PPH). Deaths that occurred over Jan 2016 to April 2016 were analysed for this study. There were no deaths that occurred from PPH over the specific period. Deaths due directly to hypertension were 41% (n=7), HIV was 6% (n=1), whilst 53% (n=9) were from other causes not directly relevant to this study. However, a total of nine patients were HIV positive but they were either gynae patients, died at home or on the way to hospital or were in a critical condition on arrival.

### 5.3.4. Demographic profiles and obstetric history of women that died.

The total population of maternal deaths is the same as the 2014-2016 triennium as the period of data collection was between January 2016 to April 2016. There was a total of 3697 maternal deaths in SA over this triennium and of this only 17 maternal deaths occurred over the specific period at the relevant institutions. Therefore, for this study the average of maternal deaths is limited to 0.46% of the total of 3697 maternal deaths across health facilities for the 2014-2016 triennium (Figure 5.10).



**Figure 5.10: Profile of patients who died. (n= 17 =0.46% of the total population of maternal deaths for 2014-2016 triennium)**

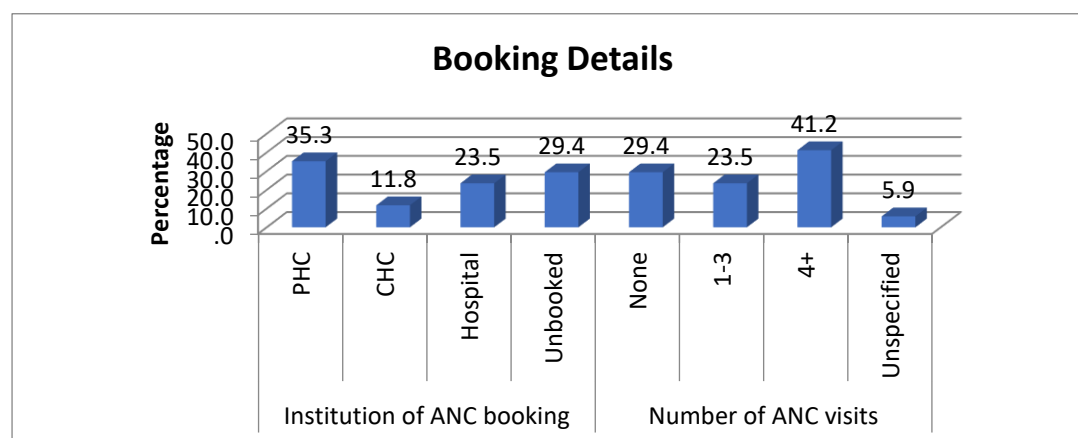
#### 5.3.4.1. Age and parity of women that died

A difference was evident in the ages of the woman that died across the relevant facilities. The highest number of maternal deaths occurred in teenaged women (29.4%). Two women that died were aged 36 to 40 years. Majority of women who died were multiparous (58.8%; n=10).

Majority of the maternal deaths occurred in obstetric patients as evident by the gestational ages of the fetus being above 26 weeks. There were (52.9%; n=9) viable pregnancies and (47.1%; n=8) that were gynae or non-viable patients.

#### 5.3.4.2. History of antenatal booking of patients who died.

Figure 5.11 indicates the antenatal booking history of all the women that died including the facility and the number of antenatal visits.

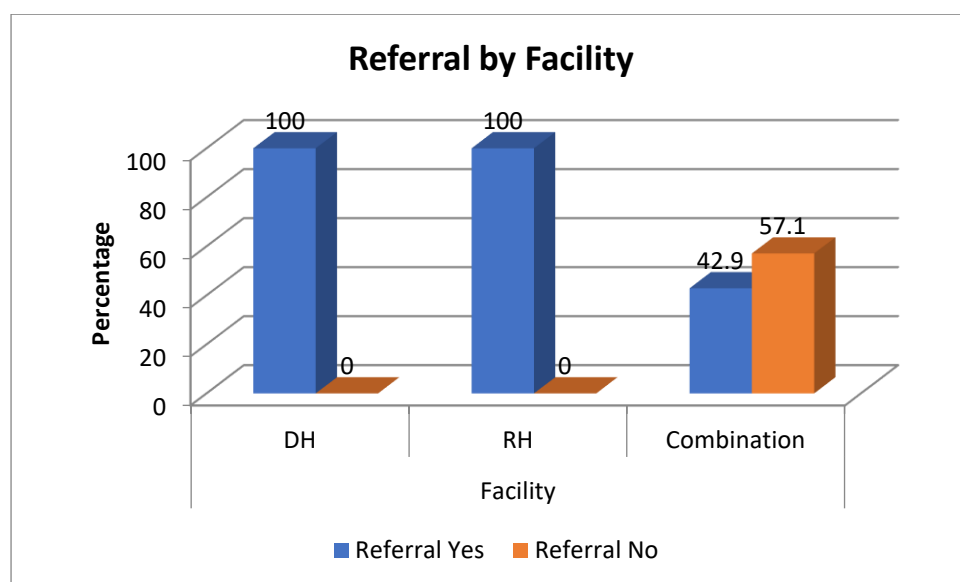


**Figure 5.11: Facility and antenatal history of patients who died.**

Majority of patients who died attended or booked at a PHC facility (35.3%), and (29.4 %) were unbooked.

The number of antenatal visits ranged from (41.2%; n=7) for patients with 4 visits or more and (23.5%; n=4) with one to three visits and one case visit was not specified.

#### 5.3.4.3. Referral of women to hospitals prior to death



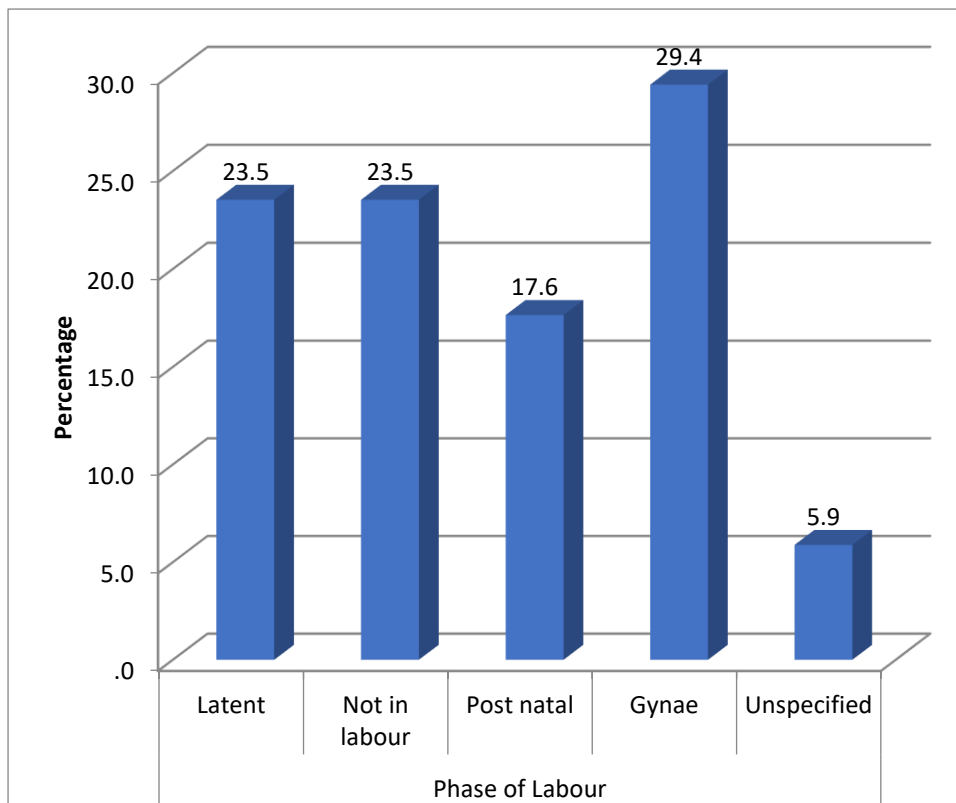
**Figure 5.12: Referral patterns of the deaths that occurred**

Figure 5.12 indicates that a total of (52.9%; n=9) patients that died were referred to the relevant hospitals from a CHC or PHC. The maternal deaths that occurred at both the DH and RH were both referrals in. However, at the combination hospitals (42.9%; n=8) of maternal deaths were referred in whilst (57.1%; n=9) were patients that were admitted directly to the hospital. It is significant to note that (76.5%; n=13) of the total of 17 maternal deaths were classified as critical on admission.

#### 5.3.4.4. Maternal deaths by obstetric classification

The women that died are classified in terms of their phase of labour and indicates the numbers that were post-delivery or had gynaecological problems (Figure 5.13).





**Figure 5.13: Categories of patients in labour and gynae**

Equal numbers of patients who died were not in labour or in the latent phase of labour.

About (18%; n=3) of the maternal deaths occurred post-delivery, which included those that delivered at home before coming into clinic or hospital.

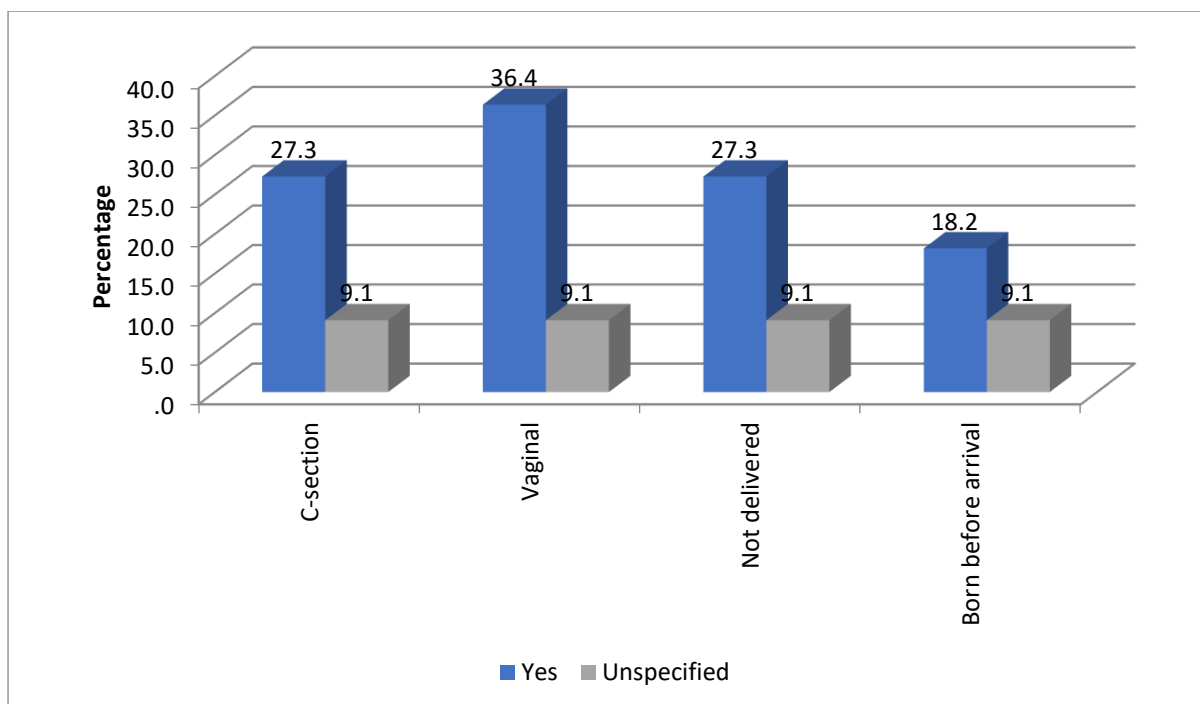
A significantly number (n=5) of maternal deaths, occurred in gynaecological patients that would not have been seen or managed by the midwife. About six percent of the deaths were unspecified.

Majority of deaths (63.6%; n=7) occurred in the labour ward, and (18.2%; n=2) occurred in a high care ward which is usually linked to the labour ward.

A significant number of maternal deaths (36.4%; n=4) occurred in the intensive care ward, whilst only one death occurred in the gynae ward. Two of the maternal deaths occurred at home.

#### **5.3.4.5. Modes of delivery relevant to the maternal deaths**

Figure 5.14 indicates the modes of deliveries as well as the averages of those not delivered or that delivered prior to coming into the health facility.



**Figure 5.14: Modes of delivery for the relevant maternal deaths (n = 11)**

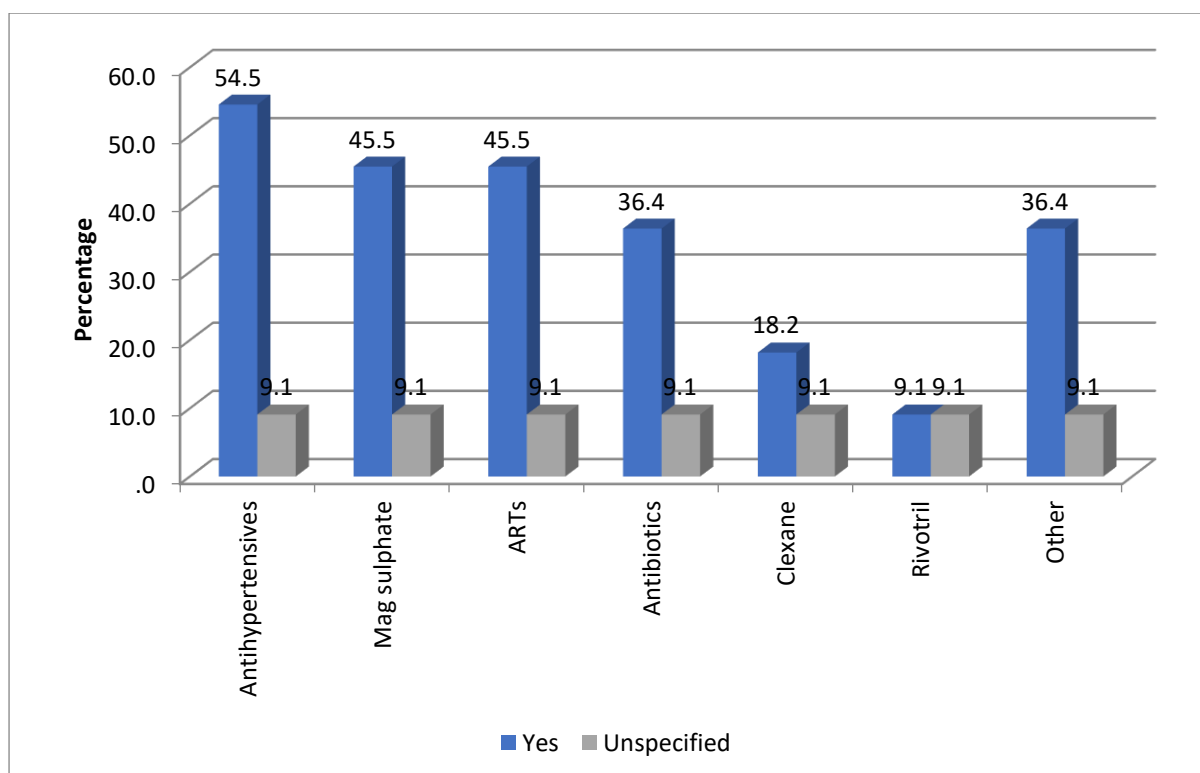
Majority of the maternal deaths relevant to the study (36.4%; n=4) were delivered vaginally. An equal percentage of (27.3; n=3) either had a caesarean section or were not delivered as they were patients with gynaecological problems. About (18%; n=2) of the patients delivered at home, referred to as born before arrival (BBA).

### 5.3.5. Management of women prior to deaths

Of the 17 maternal deaths, 13 of them were classified as critical on admission and required immediate emergency care. The majority patients (n=7) were seen in labour wards before going to either theatre, high care or intensive care wards (n=4). The management of the women prior to death in majority of the cases included general assessment, monitoring of vital signs, intravenous therapy, administration of drugs, monitoring of fetal condition and taking of bloods and one patient received blood transfusion. Specific management including ESMOE relevant drugs are discussed below.

#### 5.3.5.1. Types of drugs utilised in managing relevant maternal deaths

Figure 5.15 shows the usage of drugs to treat the patients who died in line with the ESMOE guideline.



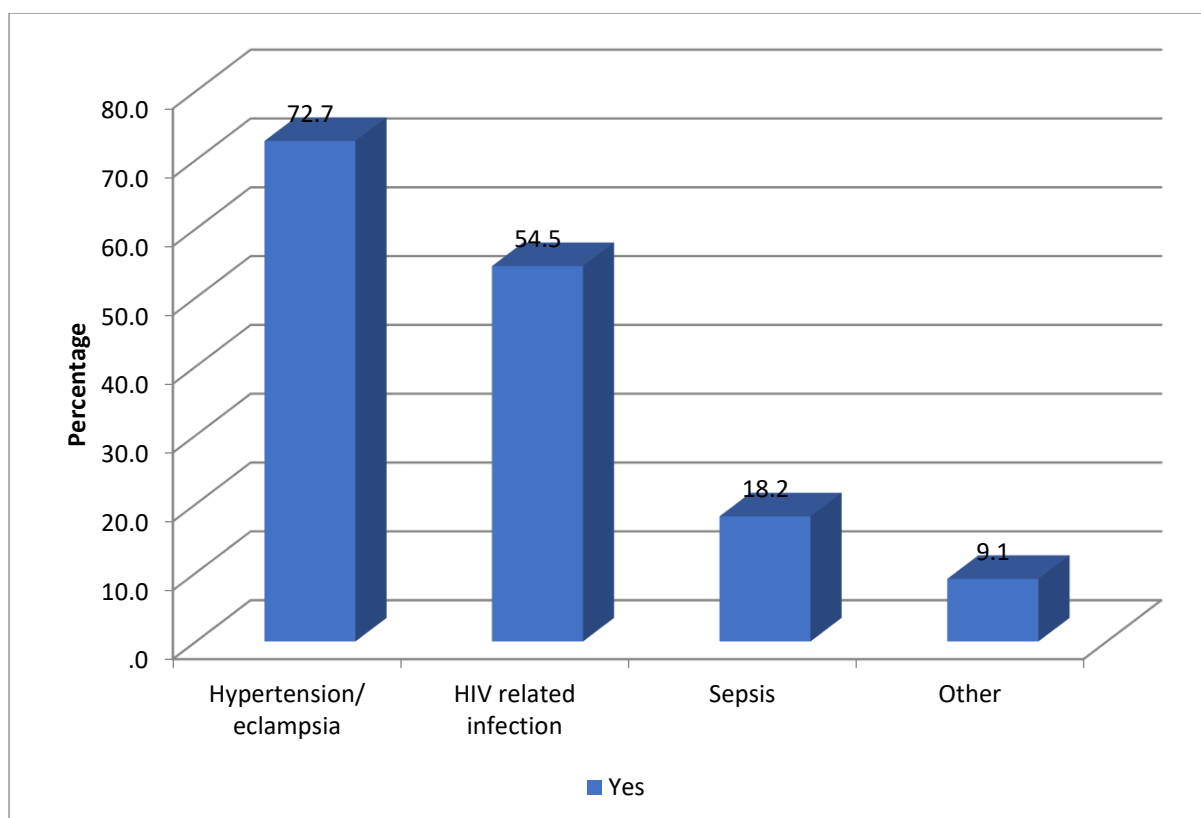
**Figure 5.15: Drugs used in management of patients prior to deaths**

Of the eleven relevant maternal deaths (54.5%; n=6) required antihypertensive drugs as majority of the maternal deaths were due to hypertension related causes. The number of patients (45.5%; n=5) received magnesium sulphate for pre-eclampsia and eclampsia.

Ten of the relevant maternal deaths were managed at a facility, of whom 45.5% were on antiretroviral therapy. This indicates that about 50% of the patients managed were HIV positive.

#### **5.3.5.2. Final diagnosis of the maternal deaths**

Following on the assessment, management and cause of deaths a final diagnosis was made on these women which is outlined in Figure 5.16.



**Figure 5.16: Final diagnosis of the maternal deaths**

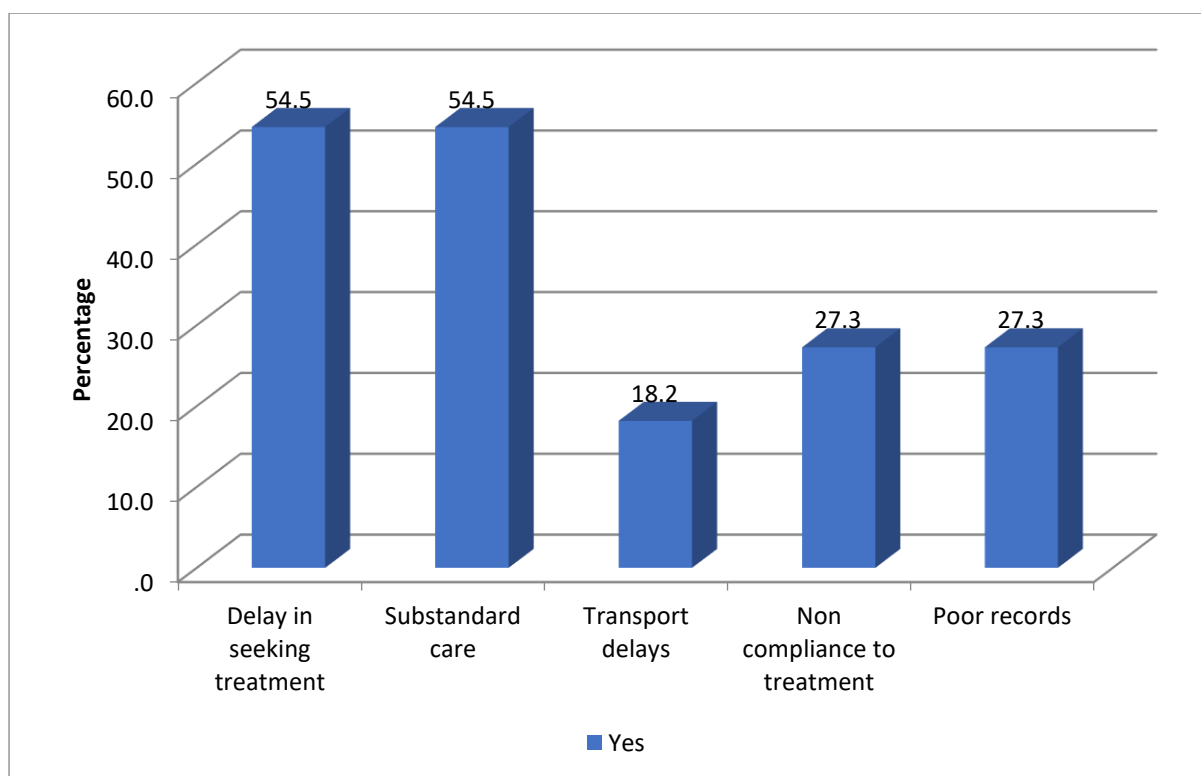
There was a total of 17 maternal deaths that occurred over the period of data collection, however only 11 of these deaths were relevant to the causes included in the study.

A number of maternal deaths (72.7%; n=8) were due to hypertensive diseases including pre-eclampsia and eclampsia. There was (54.5%; n=6) of maternal deaths that were due to HIV related infections.

All the patients had a midwife present on admission although (35.3%; n=6) had a doctor present as well. At the PHC there was (29.9%; n=5) of these maternal deaths that were assessed by a midwife prior to transfer. Majority of the patients who died arrived at the referral hospital (76.5%; n=13) in a critical condition and it was too late for successful interventions.

#### **5.3.5.3. Healthcare factors that contributed to maternal deaths**

Factors that contributed to maternal deaths included poor skills, sub-standard care, delays in seeking care and non-compliance to treatment.



**Figure 5.17: Contributory factors of relevant maternal deaths**

Figure 5.17 is relevant in indicating the contributory factors for the maternal deaths.

A number of relevant maternal deaths (54.5%; n=6) were due to delays in seeking treatment and sub-standard care. Transport delays to the health facility contributed to (18.2%; n= 2). Two patients had eclamptic seizures at home for a prolonged period before arriving at the hospital. One patient had eight seizures and lost consciousness, whilst another had seizures from 01h00 but only got to the hospital at 07h30 due to transport delays.

Both non-compliance to treatment and poor record keeping were found in (27.3%; n=3) of the relevant maternal deaths. Patients on both antiretrovirals and anti-hypertensive medications were non-compliant.

## 5.4. PHASE 3- INTERVIEWS WITH ESMOE TRAINED MIDWIVES

**Objective 4: Explore and describe the challenges confronting midwives in the implementation of management interventions specific to the ESMOE guideline**

### 5.4.1. Demographic profile of midwives

The sample was drawn from all the selected health facilities that had ESMOE trained midwives currently working in the maternity units.

Table 5.12 illustrates the demographic characteristics of the midwives (n=14) that were interviewed. The researcher continued with interviews until data saturation was reached and no new information was obtained. In this study data saturation was achieved by the 10<sup>th</sup> interview, however all ESMOE trained midwives that were available at the time of data collection were interviewed due to the limited number.

**Table 5.12: Demographic information of participants (n=14)**

Criteria	Characteristics	Number	Percentage
5.4.1.1. Age	25-35 years	1	7.14%
	36-45 years	6	42.85%
	46-55 years	6	42.85%
	56+ years	1	7.14%
5.4.1.2. Designation/ category	Advanced midwife (ADM)	13	92.85%
	Basic midwife	1	7.14%
	Charge nurse	9	64.28%
	Team leader	3	21.42%
5.4.1.3 Work experience	5-10years	1	7.14%
	11-15years	3	21.42%
	16-20 years	3	21.4%2
	21-29years	6	42.85%
	<30years	1	7.14%
5.4.1.4 ESMOE Training	• 13 ADM +1 Basic midwife	14	100%
	• Facilitator/train the trainer	3	21.42%
	• Last updates 2015 & 2016	7	50%
	• 2-and3-day saturation training	5	35.71%
5.4.1.5 Maternity unit that midwives were working in	Antenatal clinic	1	7.14%
	Antenatal ward	1	7.14%
	Labour ward	3	21.42%
	Postnatal ward	2	14.28%
	All maternity units (CHC)	4	28.57%
	Other(charge/manager)	2	14.28%

#### **5.4.1.1. Age**

The youngest midwife that was ESMOE trained was in the 25-35-year age group (n=1). This was the only basic midwife that had ESMOE training, which was at a district hospital in district A that had no advanced midwives in maternity.

There were an equal percentage of midwives (42.85%; n=6) that were in the 36-45-year age group and 46-55-year age groups. There was one midwife that was the maternity matron at a combination hospital in district A that was above 55 years old.

#### **5.4.1.2. Category or designation of midwife**

Majority of the midwives interviewed were advanced midwives (92.85%; n=13), whilst only one was a basic midwife that had a 2-day ESMOE training. One staff was a maternity matron that was not actually practicing ESMOE at a regional/tertiary hospital in district A. This data indicates that the majority of the ESMOE trained midwives were in charge positions in various maternity units.

#### **5.4.1.3. Work experience**

The data indicates that (42.85%; n=6) of advanced midwives had significant years of work experience between 21-29 years. One of the advanced midwives at a district hospital in district B was a trainer for Maternal, Child and Woman's Health (MCHW) that was also involved in ESMOE fire drill training at the institution.

#### **5.4.1.4. ESMOE training**

The interviews were conducted with 14 ESMOE trained midwives, with a varied duration of training. The 2-day saturation training was aimed at training more staff in a shorter time in 2014 which was held in specific districts. The other midwives had a 3 or 5-day training workshop in all the modules in the ESMOE guidelines. Train the trainer course equips the midwife to efficiently run fire drills and get all staff involved in implementation of the ESMOE guidelines. The last updates that only 50% of these midwives attended were either in 2015 or 2016.

#### **5.4.1.5. Maternity units that midwives were working in**

The midwives that were interviewed at four of the CHCs, (28.54%) rotated and managed all the maternity units including antenatal clinic, labour and postnatal wards.

The other maternity units had a range from one to three midwives in each unit, with the three working in labour and delivery.

#### 5.4.2. Data categories and themes

The data was organized into four categories with associated themes and sub-themes. Sub-themes were developed as the analysis proceeded and are presented in each theme.

Table 5.13 represents an overview of the organization of the data as it emerged during data analysis, illustrating the themes, sub-themes and categories. Discussion is based on the schematic condensation of data in the table which is strengthened with direct quotations from the participants.

**Table 5.13: Data categories and themes**

Category	Theme	Subtheme
5.4.2.1. ESMOE training experiences	5.4.2.1.1. Knowledge, skills and adequacy of ESMOE training experiences	<ul style="list-style-type: none"> <li>- Increased knowledge and skills in managing obstetric emergencies</li> <li>- Duration of training affects competencies</li> <li>- Lack of regular updates</li> <li>- Some modules and skills do not apply to the midwife</li> </ul>
5.4.2.2. Implementation of ESMOE and fire drills in the clinical setting	5.4.2.2.1. Clarity and availability of guidelines and algorithms  5.4.2.2.2. Conducting of fire-drills in the clinical area	<ul style="list-style-type: none"> <li>- Clear step by step approach that is easy to follow for some modules</li> <li>- Inaccessibility of algorithms or guidelines at bedside and units</li> <li>- Difficulty following chronological steps in real life emergency Lack of ESMOE trained staff to conduct drills</li> <li>Drills conducted infrequently</li> <li>Lack of motivation of staff</li> <li>Lack of time due to busyness</li> <li>Responsible persons to conduct drills, role of District Clinical Specialist Teams (DCST) in ESMOE</li> <li>Frequent movement and rotation of staff</li> </ul>
5.4.2.3. Challenges with successful implementation of ESMOE guidelines in reducing maternal deaths	5.4.2.3.1. Lack of resources  5.4.2.3.2. Limited scope of practice for midwives	Lack of advanced midwives, doctors and ESMOE trainers, overall staff shortages No training equipment and mannequins to conduct training Lack of essential drugs and equipment  Some skills are not practiced due to limited scope and lack of competency Lack of adequate standing orders to follow in emergency



	5.4.2.3.3. Poor infrastructure	<p>No space in wards to move between patients in emergencies</p> <p>Too few delivery cubicles in CHC</p> <p>Lack of available beds in hospitals for transfers from clinics</p> <p>Visibility of patients are poor due to infrastructure</p> <p>Wards and theatre on different floors</p>
	5.4.2.3.4. Patient factors that limit successful implementation of ESMOE	<p>Poor communication amongst health care workers and patients</p> <p>Non-compliance of patients to care and treatment</p> <p>No antenatal care.</p>
	5.4.2.3.5 Attitude of staff	<ul style="list-style-type: none"> <li>- Negative attitude from doctors towards midwife that do ESMOE training</li> <li>- Negativity from doctors in referral hospitals that delay transfer of patients</li> <li>- Lack of interest of staff in ESMOE training</li> </ul>
	5.4.2.3.6. Transport delays	<ul style="list-style-type: none"> <li>- Lack of obstetric ambulance</li> <li>- Long waiting time for ambulances</li> <li>- Paramedics not skilled in obstetric emergencies</li> <li>- Patients wait at home too long before coming to hospital/CHC</li> </ul>
5.4.2.4. Way forward in improving ESMOE training, skills and implementation	<p>5.4.2.4.1. Improve staffing and teamwork</p> <p>5.4.2.4.2. Compulsory ESMOE training &amp; updates for all obstetric midwives</p> <p>5.4.2.4.3. Implement formal ESMOE training into midwifery curriculums</p>	<ul style="list-style-type: none"> <li>- All maternity units must have advanced midwives that are ESMOE trained and trainers</li> <li>- Provide incentives to retain experienced midwives</li> <li>- Formal ESMOE training should be a requirement for all midwives as part of continuous professional development (CPD) points</li> <li>- Regular conducting of fire drills in the wards, include on the spot training and one on one training</li> <li>- Issue certificates for attendance to fire drills as a requirement for employee performance/bonus.</li> <li>- All midwifery lecturers to be ESMOE trained and updated to teach it</li> <li>- A formal 5-day training should be part of the midwifery curriculum</li> <li>- Students lack skills in obstetric emergencies</li> <li>- No time to teach student midwives and they used as part of workforce due to shortages</li> <li>- Midwifery training in 6 months is inadequate to learn all necessary skills and competencies</li> <li>- SANC to make ESMOE training a compulsory course in the curriculum for all midwifery programmes</li> </ul>

#### 5.4.2.1. ESMOE training experiences

All midwives unanimously felt that the ESMOE training positively benefited the patient by preparing the midwife or doctor to manage obstetric emergencies competently. However, some midwives felt that they needed more time to practice and improve certain skills.

#### 5.4.2.1.1. Knowledge, skills and adequacy of ESMOE training experiences

Participants (n=9) agreed that the ESMOE training contributes to improving maternal and neonatal mortality and morbidity, as it helps improve knowledge and skills of the staff. Many that had 5-days training acknowledged that the videos, simulations and roleplays enhanced their learning and made it easy to understand. The scenarios were relevant to real life cases and made learning practical with good teamwork.

However, there were a few midwives (n=4) that had a 2-day and one had 3-day saturation training that felt the time was too limited to practice skills. They also commented that the modules were rushed through and they did not understand clearly. There were three midwives that commented on the relevance of some of the modules and skills for the midwife. There are some modules that are specific to doctors and not applicable to midwives that have a limited scope of practice and must refer patients that cannot be managed.

Majority of the midwives (n=12) commented on the delays in receiving regular updates. The common points were that some did not attend any updates at all, whilst one had an update seven years later. They agree that updates should be annually as there may be changes that need to be known.

The above theme and sub themes are supported by the following responses:

*The 5-day training was intense which helps with managing obstetric emergencies and saves lives of mother and child. It provides clear guidelines which is related to clinical practice. (Midwife 5)*

*I attended 3-days training with too many modules to cover and some were not clearly explained and some of the basic midwives were lost. The time was too short and not adequate time to practice skills. (Midwife 6)*

*I had ESMOE training in 2009 while I was in labour ward and no update until last year in 2016, which is 7 years gap. So much changes and literature change all the time. They need to have regular updates every year especially for midwives, because the numbers are always limited. (Midwife/Matron 13)*

*I found some of the modules boring and irrelevant for me as a midwife, that is not in my scope and I have to refer to a doctor anyway. I think that midwives should be trained separately from doctors on specific obstetric emergencies that we can manage. We have to phone a doctor to give any emergency drug anyway and we are undermined. (Midwife 7)*

#### **5.4.2.2. Implementation of ESMOE in the clinical setting**

Midwives indicated varied responses regarding actual implementation of the guideline at the patients' bedside.

##### **5.4.2.2.1. Clarity and availability of guidelines and algorithms**

There was a significant number (n=7) that acknowledged that the guideline outlines a clear step by step approach in the form of algorithms that make most modules easy to follow. However, other responses included that the algorithms can be confusing and cannot be followed in a chronological order in the real-life emergency as patients' conditions differ. Another issue with implementation at the bedside was that algorithms are not visible at the bedside to recall the steps and some wards had no guidelines in the units.

The above theme and sub themes are supported by the following responses:

*The ESMOE training gave us information on theory and practical that guides us step by step how to manage certain obstetric emergencies. They even give us educational disks with all the information and procedures to teach other midwives. (Midwife 5)*

*I think the algorithms should be more visible at patients' bedside, because when you alone with junior midwives it is difficult to remember what to do. The ESMOE file is kept in the duty room. Sometimes in real life emergencies it is not possible to follow the guidelines exactly like we are taught because the situations are different. (Midwife 11)*

##### **5.4.2.2.2. Conducting fire drill training**

Midwives indicated that at several facilities the fire drills to practice ESMOE was not implemented as it should be due to shortage of staff, busy wards, lack of time, no

ESMOE trainers, lack of motivation and passion by junior midwives and frequent movement or rotation of staff. There were a few comments on the lack of time to do formal fire drill training and sometimes they used teachable moments. Responses as to who is responsible for conducting the fire drills included the ESMOE trained midwives, trainers and the District Clinical Specialist Teams (DCST). This is evident in the following responses:

*It is difficult to carry out fire drills as I am the only ESMOE trained staff and we are very busy. (Midwife 3)*

*The last ESMOE Drill we had was 4 months ago because the staff are not very interested and don't like to attend, and time is a big problem. Sometimes you train the staff then they leave and go for better jobs or staff rotate to other wards. (Midwife 2)*

*Why can't the DCST advanced midwife or doctor assist in conducting fire drills because we don't have the time. We don't really see them visit the facilities often enough, yet each district has a team. (Midwife 14)*

#### **5.4.2.3. Challenges with successful implementation of ESMOE**

Midwives working at a CHC indicated that implementation of the ESMOE guideline in obstetric emergencies were difficult due to being alone, with no other ESMOE trained staff and having no doctors on site for further orders. Midwives at the CHC find that they are limited with the management of an emergency and must refer patients as soon as possible to the nearest hospital.

##### **5.4.2.3.1. Lack of resources**

All the midwives had the same general complaint of both lack of staff and lack of equipment and materials at all the facilities. The lack of staff included lack of ESMOE trainers, too few doctors at hospitals, no obstetrician at the CHC and the shortage of advanced midwives across facilities and wards. The lack of equipment and materials included no mannequins to use to simulate fire drill training and lack of equipment and drugs. This is supported by the following responses:

*We have one medical officer that is based in outpatient and emergency area who is not ESMOE trained and not familiar with obstetric*

*emergencies. Sometimes he is too busy to come when we call him. I am the only advanced midwife in this clinic with ESMOE training and cannot be everywhere, it is too busy. (Midwife 1)*

*We had five advanced midwives that left and no posts were filled....it is very difficult when we don't have enough staff.... on night duty we have only one basic midwife and one staff nurse. (Midwife 1)*

*There are no mannequins to practice and even teach our students....so how can we have proper simulations and fire drills. (Midwife 8)*

*Equipment is a big problem, in this clinic we are sharing one CTG machine, sometimes the equipment goes for repairs and takes months and months to come back. (Midwife 4)*

*We have eight BP machines (Dinamaps) on stock but only one is available and working as the others are gone for repairs. (Midwife 5)*

#### **5.4.2.3.2. Limited scope of practice for midwives**

The midwives generally expressed concerns with their limited scope of practice in managing obstetric emergencies. Although the ESMOE training teaches skills like intubation, performing assisted delivery and management of postpartum haemorrhage, midwives expressed their lack of experience and skills in the real-life emergencies. Another concern was the administration of drugs in emergencies which was limited if there was no standard protocols or doctor available to prescribe certain drugs. However, some advanced midwives felt that the doctors undermine them when obstetric emergency situations arose.

*I had a patient with a retained placenta and there was no advanced midwife or doctor available. I did not feel competent to attempt a manual removal of the placenta and had to wait for a long time to arrange for a transfer of the patient, luckily the patient was okay. (Midwife 2).*

#### **5.4.2.3.3. Poor infrastructure**

There were a few similar comments on the lack of proper infrastructure at the CHC and hospitals. Some of the concerns were the lack of space between beds, too few

delivery cubicles and poor visibility of patients due to the layout of the wards. One of the district hospitals indicated that the antenatal and postnatal wards did not have piped wall oxygen and suction and had to use the portable cylinders.

*We have only three delivery cubicles that is very congested. If the mother needs resuscitation, we must move her to the lying-in ward. Also, in the wards the beds are too close and no space for free movement. (Midwife 4)*

*The ward layout is not ideal as this was previously used as a theatre and labour wards are closed off which makes it difficult to see patients in other rooms especially when one midwife has to oversee a few patients. The theatre for obstetrics is not functioning due to shortages so taking patients to main theatre can delay management. (Midwife 6)*

*Wards are small with poor spacing and are spread out with the labour ward and antenatal clinic on ground floor, nursery on 1<sup>st</sup> floor and postnatal on 4<sup>th</sup> floor, and this is not convenient and ideal to transfer patients quickly. (Midwife 7).*

#### **5.4.2.3.4. Patient factors that limit successful implementation of ESMOE**

Midwives explained that many patients were non-compliant to treatment with both taking of prescribed medication and keeping appointments. Another factor that prevented patients attending hospital timeously was affordability and accessibility. Midwives responses included that delays in seeking help contributed to obstetric emergencies that results in further complications or death of mother or baby. This is evidenced by the following responses:

*There are quite a lot of patients that are foreigners that come to the clinic that cannot speak or understand English well, so we have a problem explaining important things. Another big problem that we experience is patients do 'hospital shopping' where they will go to different hospitals or clinic because they sometimes don't believe their diagnosis or HIV status. This makes continuity of care very difficult. (Midwife 13)*

*Many of the obstetric emergencies are either unbooked patients or patients that did not comply with treatment, like taking antihypertensive drugs or antiretroviral drugs and then they come in when they complicate and need urgent referrals. (Midwife 9)*

#### **5.4.2.3.5. Attitude of staff**

There were a few midwives that commented on the negative attitude of both doctors and other midwives. Doctors were not keen to join in or assist with ESMOE training because they undermine the midwife. Other midwives displayed negative attitudes and reluctance to participate in fire drills and lacked interest.

*I have seen that the older registered midwives have a negative attitude to joining an update or fire drill because they feel they know more than me because I am younger, yet I am the only ESMOE trained advanced midwife here in labour ward. (Midwife 11)*

*Some of the doctors are very arrogant and feel that the midwife does not know how to manage emergencies. At the clinic we have a big problem to transfer patients to the hospital because the doctors undermine our assessment of an emergency, so this delays the transfer. (Midwife 4)*

#### **5.4.2.3.6. Transport delays**

One of the major challenges expressed by midwives from the CHC was the delays with ambulances to transfer patients to the referral hospitals. This leads to more complications and contributes to maternal and neonatal mortalities. Another concern was the lack of obstetric emergency skills by the paramedics in stabilising or continuity of care of women with complications. Some midwives stated that the patients arrive too late to the clinic or hospitals, either due to being too far from a facility or having to wait too long for an ambulance. These challenges were expressed by the following statements by midwives:

*One of our midwives had a retained placenta and she could not manage so she arranged for transfer of the patient and waited for over 4 hours for an ambulance to arrive. We are supposed to have obstetric ambulances but this is not really happening or they too few. (Midwife 10)*

*Patients wait too long at home before coming to a facility where one patient had a few seizures at home and the neighbour had to arrange to bring her to the hospital, but by then she had complicated and eventually died. So, you see it's the patients too either don't comply with treatment or don't recognise a problem early and come to hospital in time. (Midwife 12)*

*We had arranged to transfer an eclamptic patient to the regional hospital after trying to stabilise her and waited long for an ambulance. On the way the patient had a seizure and complicated and the paramedics could not manage this condition and brought the patient back. (Midwife 2)*

#### **5.4.2.4. Way forward in improving ESMOE training, skills and implementation**

During the interviews with the midwives they were asked for suggestions as to what they think can be done to help improve ESMOE training and implementation. This was grouped into the following categories discussed below:

##### **5.4.2.4.1. Improve staffing and teamwork**

One of the major challenges as indicated above was the shortage of staff across all facilities. Some of the common suggestions were the need for advanced midwives in each ward and on all shifts that are ESMOE trained and skilled to manage obstetric emergencies and teach other staff. However, a concern was that the attitude of midwives and doctors are not positive towards ESMOE training, conducting regular fire drills and participating actively in improving skills. A few midwives suggested that incentives including salary improvements would contribute to retention of staff in hospitals.

*We have a challenge in hospitals because advanced midwives with ESMOE training are leaving hospitals and getting charge nurse posts in outlying clinics because the salary is better. In the last year we had three advanced midwives that left. Also, the hospital is too stressful to work in because it is too busy and too few midwives. (Midwife 3)*



*The doctors don't like to participate in fire drills conducted by midwives and those that are ESMOE trained don't assist in conducting drills.*  
(Midwife 7)

#### **5.4.2.4.2. Compulsory ESMOE training & updates for all obstetric midwives**

Midwives suggested that ESMOE training be made compulsory for all staff working in maternity including doctors and midwives. This training should be accredited CPD points and should regular updates and fire drills should be required to renew annual licensing with relevant bodies like SANC for midwives. A few midwives also suggested that attendance to fire drills should be issued with certificates to motivate staff to participate.

*I think that ESMOE training and attending fire drills must be compulsory for all categories of staff. This is important skills for doctors and midwives and should be recognised by SANC.* (Midwife 11)

#### **5.4.2.4.3. Implement formal ESMOE training into midwifery curriculums**

Suggestions included training of midwifery lecturers and including ESMOE training into all midwifery curriculums. Midwives also suggested that ESMOE training must be a compulsory course accredited by SANC where all obstetric emergency skills are learnt that will help reduce maternal and neonatal deaths. The following responses outline this theme:

*If the midwifery lecturers are ESMOE trained then they can train the student midwives and also assist with running fire drills in the hospital.*  
(Midwife 8)

*As an advanced midwife we learn how to manage obstetric emergencies, but it is not the same as doing the ESMOE training which has specific modules and skills. I think ESMOE training for 5 to 10 days should be part of all midwifery curriculums just like the HIV/AIDS and IMCI courses. This should include practical's or fire drills in the wards.* (Midwife 11)

*The midwife from the 4-year course has no midwifery skills in basic and emergencies because you cannot learn midwifery in 6 months. There is many skills and competencies.* (Midwife 3)

## **5.5. SUMMARY OF THE CHAPTER**

This chapter presented all the relevant data that was collected under the different phases. The major challenges experienced by the midwives included lack of resources including staff shortages and lack of equipment and materials. Another shortfall for midwives is the limited scope of practice and lack of skills. Midwives suggested that all midwives be trained in detail in ESMOE and this be included in the midwifery curriculum. The next chapter discusses the results of these findings.

## CHAPTER 6: DISCUSSION

### 6.1. INTRODUCTION

In this chapter the important findings are discussed in relation to the research objectives and the theoretical framework outlined in chapter one. The conceptual framework focused on four main areas. These core areas are maternal mortality, the midwife, the health facility and the management guideline. Relevant literature was used where necessary to expound on findings that emerged from the study.

### 6.2. THE ESMOE GUIDELINE

The first objective in **phase one** of the study is aimed to critically review the midwife's ESMOE management interventions of three common causes of maternal deaths. The guideline specific to the role of the midwife in managing obstetric emergencies is applied throughout phase two and three as necessary.

The ESMOE guideline that was developed from international emergency care guidelines has shown reductions in maternal mortality rates across SA (Pattinson *et al.* 2019). Despite the last SMR (NDoH 2017: 3) indicating a 22% reduction in deaths due to obstetric haemorrhage, there was an increase of 14% in the same due to hypertensive diseases. The interventions included in the guideline follow current evidence-based practices in managing obstetric emergencies including practical algorithms that guide the steps of management. However, good guidelines without effective implementation in an emergency is not enough to reduce preventable maternal deaths and achieve the SDG target of less than 70 maternal deaths per 100 000 live births (WHO 2017a). Sanchis-Sanchez *et al.* (2019: 2) acknowledge that health care professionals consider implementation of clinical guidelines as an opportunity to keep updated and to incorporate evidence-based knowledge into daily practice.

For the midwife in this study the practicality of implementing the guidelines effectively in obstetric emergencies still poses challenges due the many barriers that exist. The ESMOE interventions require a team effort that helps share goals and knowledge. The lack of ESMOE trained staff in most clinics and district hospitals hinders the

collaborative effort that is needed in any emergency. This is supported by Haider *et al.* (2019: 11) who found that the most important interpersonal barrier to basic EmOC is teamwork, where a good team facilitates effective communication and mutual respect. These are essential factors needed in an emergency to render high performance quality care, as it is impossible for the midwife to manage an obstetric emergency on her own or with limited staff that may lack the necessary skills. Sanchis-Sanchez *et al.* (2019:9) agree that a collaborative attitude of professionals to use practice guidelines had a positive impact on the implementation process.

This study also revealed that many midwives despite having ESMOE training, still lack the skills, competencies and confidence in providing EmOC together with limited scope of practices, staff shortages and lack of resources. For effective implementation of the guideline interventions there needs to be an enabling environment with adequate resources and skilled staff.

Mgawadere *et al.* (2017: 2) and Uzabakiriho and Maswime (2019: 2) concur that many health care facilities in low-and-middle income countries are still under-resourced and unable to offer safe, effective care to women, with staff shortages and lack of supervision being a major problem. Sanchis-Sanchez *et al.* (2019: 9) suggest that nursing managers should participate actively in the organisation of clinical guideline implementation and have the relevant knowledge to be able to identify barriers and facilitators related to the health professional and the organisation.

### **6.3. RESOURCES, ESMOE TRAINING, DELIVERY TYPES AND NUMBERS AT THE RELEVANT FACILITIES**

The second objective of the study was to determine the health care resource constraints that midwives face at the different levels of care. This includes the type of facilities available, the resources available and the ESMOE trained staff in various facilities.

#### **6.3.1. Types of health facilities in each district**

The eThekweni district health plan (2018) indicates that eThekweni is the bigger of the two districts with more sub districts and a higher delivery percentage (30.65%) than the Ugu district that has under seven percent of the total deliveries in KwaZulu-Natal (KZN DoH 2018).

South Africa's transition towards a district health system (DHS), through re-engineering primary health care (PHC) services provides a framework for a uniform health system (NDoH 2018: 9; Bheekie and Bradley 2016: 242) This model focused on changing a largely curative high-cost hospital-based service to one that promotes cost-effective PHC services that are delivered as close to communities and households as possible, centred around health promotion, prevention and community involvement (NDoH 2018: 9).

Gray and Vawda (2017: 3) agree with Moosa, Derese and Peersman (2017: 7) that the SA healthcare system including PHC has seen relatively poor performance when compared to countries with similar income levels. They identify three major problems in the effective implementation of the PHC approach which include leadership, governance and management failures, lack of a fully functional district health system as the main vehicle for PHC delivery and the inability to deal decisively with the health workforce crises. Hence, Moosa, Derese and Peersman (2017: 6) recommended a review of the South African policy of re-engineering PHC, related to district management, roles and norms of staffing including formalisation of community health workers and their training. However, Burger and Christian (2018) highlight that although acceptability of PHC services may be high, there are lower levels of availability and affordability of health services especially for the vulnerable, poor and rural populations.

The inadequate number of CHCS and PHC facilities in heavily populated areas accompanied by the lack of skilled staff and poor resources remain a challenge in many districts (NDoH 2018: 15) Therefore, patients attend the nearest hospitals instead of clinics to deliver their babies, which increases the burden on the hospitals. This is supported by Mash and Howe *et al.* (2018: 1) who acknowledge that the African health system tends to be under-resourced and hospital centred with primary health care delivered by low-level and poorly trained health workers. Bresick, von Pressentin and Mash (2019: 109) found that only 50% of patients use primary care services as first contact with most patients being dissatisfied with the accessibility of PHC services. They admit that PHC may be under-utilised by patients due to the poor availability of services after hours and over weekends, which in turn forces them to use referral hospitals and the private sector.

### 6.3.2. Types of maternity units in each facility

Global health experts have identified signal functions (described in chapter three) as part of the provision of emergency obstetric and new-born care (EmONC). Health facilities are classified as basic EmONC (BEmONC) if they provide seven signal functions such as CHC and some district hospitals, whilst regional and tertiary hospitals provide comprehensive EmONC (CEmONC) as they have theatre facilities and blood transfusions services (Tembo *et al.* 2017: 2). The ESMOE guidelines is based on these signal functions and classifications to either manage obstetric emergencies at a basic level or to refer to a higher functioning health facility with a high care or intensive care unit and theatre facilities (NDoH 2018:19).

All six participating hospitals had the relevant maternity units as well as theatre facilities, with only one district hospital that had no high care ward. All CHCs have no theatre facilities and high care beds. The bed numbers were understandably higher at a hospital than a CHC across the relevant units. The difference in beds in the various wards in a CHC and hospital is expected as the CHC manages normal patients and refers any high- risk women to the next level of care if complications exist.

The health care system in SA is similar to that in Ghana with the three tiers of healthcare being primary, secondary and tertiary with the referral system being the link between them. Daniels and Abuosi (2020: 2) confirms that the referral system in Ghana requires patients to first access primary care and be referred to the next level when and if the need arises. Tertiary hospitals are the final referral points where care is given by specialists for complex cases.

The one combination hospital with 20 labour beds was the only hospital in eThekweni to have a midwives obstetric unit (MOU). This hospital functions as both a district and regional hospital due to the absence of a CHC in the area. Here midwives only manage uncomplicated deliveries increasing the burden on hospitals which is forced to manage low risk patients that could be managed at a CHC level.

The fact that none of the CHCs had any antenatal or high care wards or theatre facilities explains why patients that complicate at a CHC level should be stabilised and transferred immediately to the nearest referral hospital (NDoH 2016, 2015a). Daniels and Abuosi (2020: 2) confirm that the function of the referral system is important in

pregnancy and childbirth as potentially life-threatening complications require specialist management, skills and resources that are only available at higher levels of care.

Stones, Visser and Theron (2019: 2) acknowledge that intrapartum deaths in health facilities in low resource countries continue to contribute substantially to the burden of high rates of maternal morbidity and mortality. This is found mostly in referral hospital settings which is attributed to care within the facility rather than to the complications that led to the referral initially.

### **6.3.3. Categories of health care workers and ESMOE trained staff**

This study found significantly more registered midwives ( $p=.009$ ) and medical officers ( $p=.008$ ) in labour wards (night) at hospitals than at CHCs. Only one midwife was ESMOE trained at one of the district hospitals. According to Beek, McFadden and Dawson (2019: 2) there is a global shortage of health care workers in general including a global shortage of 2.4 million midwives in 57 countries which is below the threshold of 80% coverage of skilled birth attendance.

A mean of 3.9 advanced midwives were found in the labour wards on day duty across the facilities. One of the CHCs had no advanced midwife on their staffing plan at all. There was a significant difference in numbers and a general shortage of ESMOE trained staff across health facilities. The study also revealed that the number of ESMOE trained advanced midwives were insufficient to staff all the maternity units ranging from zero in a CHC and up to a maximum of five in a DH. The implementation of the ESMOE guidelines together with the resultant effect on maternal mortality was therefore compromised.

Subrahmanyam, Joseph and Abraham (2017: 2962) report that adequate knowledge, skills and clinical competence of a midwife helps with early recognition of obstetric emergencies, and a well-equipped obstetric unit can reduce maternal mortality by almost 35-40%. Since the midwife as a primary health care provider manages patients as a first contact practitioner, his/her skills and knowledge in managing obstetric emergencies is vitally important in contributing to reducing maternal mortality (Subrahmanyam, Joseph and Abraham 2017: 2962).

Significant differences in staffing (both doctors and midwives) were noted across the facilities. The WHO recommends at least 23 health care providers per 10,000 persons

to achieve 80% coverage for skilled health care worker attendance during deliveries (Than *et al.* 2017: 2). The current study showed that each of the CHCs that participated in the study was staffed only by a general medical officer in the emergency department. The medical officer (generalist) was called to manage obstetric emergencies in the labour ward only when required. Advanced midwives at two of the CHCs stated that obstetric emergencies were often managed by themselves as doctors were not available at the time. This was one of the challenges faced by midwives at the CHC.

Data revealed that the number of doctors, including interns, medical officers, registrars and consultants were higher in surveyed hospitals than CHC. The results also showed that some of the medical staff in six of the eleven facilities, including the five CHCs had no ESMOE training. Since there was no documented evidence of the actual numbers of doctors that were ESMOE trained at any facility, this data was obtained from managers during data collection.

The NDoH (2018: 3) in South Africa highlighted that one of the existing challenges includes the unavailability of specialised staff to perform specialist duties within certain health facilities. According to the NDoH (2018) the human resource challenge for doctors was being addressed by the Cuban doctors training programme where many Cuban trained medical graduates are placed at various health facilities, including PHCs across SA. However, this does not seem to resolve the shortages in specialised obstetric doctors to manage obstetric emergencies in line with ESMOE guidelines.

Stones, Visser and Theron (2019: 3) concur that staffing norms have been based on numbers of beds or facility type rather than on considerations of case mix and actual number of deliveries. The International Federation of Gynaecology and Obstetrics (FIGO) agree that the international standards for clinical staffing of delivery care in maternity units are currently lacking with resulting gaps in provision of care that lead to adverse outcomes and poor experiences of care for women and families (Stones, Visser and Theron 2019: 1-3).

Enrolled nurses and nursing assistants staffed most maternity wards in both hospitals and clinics (12 to 1 respectively). These categories of nurses do not receive any midwifery specific training or skills and lack the specific skills and competencies to identify and or manage complications.



Task shifting to Auxiliary Midwives (AMW) on selected essential maternal interventions has been recommended in Myanmar (Than *et al.* 2017). These AMW's are trained by the government to assist the trained midwives (Than *et al.* 2017: 8). In India auxiliary midwives were trained using a blended model to supplement conventional classroom teaching with virtual training in midwifery. (Balasubramaniam *et al.* 2018: 165). In SA even though basic midwifery training is not included in the enrolled nursing programmes or for any auxiliary midwives this cadre of nurse continues to work in maternity units to address the staffing shortage. Subrahmanyam, Joseph and Abraham (2017: 2962) explains that obstetric emergencies require institutional and staff preparedness with appropriate knowledge and skills to provide effective emergency services.

Stones, Visser and Theron (2019: 3) confirm that countries that have adopted the nurse-midwife model of professional education and licensure have tended to regard staff with midwifery skills as interchangeable with general nurses. As a result, there is frequent rotation of these staff between maternity and other clinical areas. According to some of the facility managers in this study, many advanced midwives were relocating or transferring to primary health care clinics for promotion posts and financial benefits. This contributed to a shortage of skilled staff at hospitals.

According to Stones, Visser and Theron (2019) FIGO recommended the number of skilled staff for birthing centres that provide BEmONC should have a minimum of two staff per shift in a unit. This applies to a unit with three labouring beds and an average of 1000 deliveries per year which is unattainable in low- and middle-income countries (WHO 2017a; Stones, Visser and Theron 2019). The KZN DoH faces a similar challenge where skilled ESMOE trained health care workers are scarce not only in the CHC but in some hospitals too.

In SA, midwifery is part of the basic training of a professional nurse. Despite this the SANC statistics show adequate staffing of maternity units by midwives. The fact that some nurses specialize and practice in other specializations has not been considered in determining maternity unit staffing (SANC website). Armour, Gilkison and Hunter (2018) explain that internationally, the clinical placement experiences of midwifery students demonstrate that while some placements offer optimal learning experiences supported by experienced and compassionate midwives, other placements are

stressful and unsupportive offering limited learning opportunities. This lack of practice support in the clinical setting has contributed to the attrition rates of midwifery students. This contributes to the lack of this specialty cadre of healthcare professionals across the country.

#### **6.3.4. Patient statistics across the selected facilities**

The number of pregnant women seen at antenatal clinics were significantly higher at the CHC than the district hospitals since this is their first port of call as per the NDoH protocol (NDoH 2015b). Similarly, this study found women that were seen for their first antenatal appointments were higher at the CHCs with an average of 488.8 patients. Only high-risk pregnancies are referred from the local PHC and CHC to a hospital. This was evident in this study by the high number (n=5745) of repeat antenatal visits at some of the combination hospitals.

Despite the NDoH's move to a re-engineered PHC system, the CHCs lack infrastructure, drugs, skilled staff including advanced midwives, ESMOE trained midwives and doctors and is therefore unable to manage high risk patients further than providing basic care and transferring these patients to the nearest referral hospital (Bresick, von Pressentin and Mash 2019: 110; NDoH 2018: 9). In addition, the numbers of patients that were HIV positive were significantly high across all facilities. A significant difference in the number of tested women to the number of women that were on the PMTCT programme was noted. The number of women that were HIV positive and on the PMTCT programme were higher at the hospitals (average = 690.5/month) compared to the CHC (average of 97.4/month). Patients with complications related to HIV infections were monitored at the hospitals where ARV drugs were more readily available than the CHC. Wabiri *et al.* (2016: 9) confirm that HIV infections remain the pre-eminent risk factor for MMR which is more prevalent in the rural poorer communities of SA due to inequalities in health care services.

Non pregnancy related infections remain the leading cause of maternal mortality in SA, despite a significant decrease in related maternal deaths by 52% from the 2011 to the 2016 trienniums (NDoH 2017: 62).

This study revealed that the CHC had the lowest average normal vaginal deliveries (n=224/month). More than 50% of deliveries (N=6527) take place in hospitals rather

than at primary health care facilities. The intention to alleviate congestion at hospitals through a downward referral of patients to the primary health care system or a PHC approach is not realized by the reality of the high number of patients that are referred to hospitals thereby increasing the delivery rates in hospitals. Therefore, a plan to identify and manage risks during pregnancy seems important in managing patient flow and referrals to hospitals (NDoH 2017: 11).

The WHO (2018a) recommends childbirth in health facilities through skilled health care professional and timely referrals if necessary. The WHO has noted that a substantial proportion of healthy pregnant women undergo at least one clinical intervention during labour and birth including inductions, oxytocin augmentation, caesarean section and operative vaginal births (WHO 2018a: 2).

This study shows that about 67% (N=4400) of the deliveries at the hospital were by caesarean section. According to the SMR for the 2014-2016 triennium (NDoH 2017), 56% of maternal deaths that occurred were related to anaesthetic complications during caesarean deliveries. This was attributed mainly to the lack of skilled doctors in protecting the airway during anaesthesia. This study revealed 27.3% maternal deaths following a caesarean section delivery. Bishop, Dyer, Maswime *et al.* (2019: 520) acknowledge that a maternal death after a caesarean delivery in Africa was 5.43 per 1000 operations mainly due to a scarce specialist coverage of 0.7 specialist per 100000 population. This results in African mothers being at least 50 times more likely to die after a caesarean delivery compared to mothers in high-income countries. The SMR (NDoH 2017: 6) confirmed that the institutional MMR over the 2014- 2016 triennium for caesarean delivery was three times higher than for vaginal birth.

#### **6.3.5. Equipment available at the selected health facilities**

This study showed limited or lack of basic equipment at most CHCs and some hospitals, such as Dinamaps, intravenous flow regulators and CTG machines which are essential equipment needed to manage any patient. Some of the CHCs lacked wall mounted suction units and oxygen at the patients' bedside that is critical in any obstetric emergency. Challenges with the lack of equipment included shortages, equipment not working and delays in equipment being returned after being sent for repairs. If the intention is to reduce maternal mortality rates, it is critical for professionally trained staff to be supported by the relevant infrastructure, drugs,

supplies and equipment as reported by other investigators (Roy, Biswas and Chowdhury 2017; Tembo *et al.* 2017: 2; Cranmer *et al.* 2018: 1; Khader *et al.* 2018: 439).

According to the ESMOE guidelines supported by the NDoH (2018) and the maternal care guidelines (2015: 20-22) CHCs and district hospitals should be able to provide the signal functions in line with BEmONC, whilst regional and tertiary hospitals should be able to provide comprehensive emergency obstetric and new-born care (CEmONC) signal functions. Tembo *et al.* (2017) agree with WHO (2016b) guidelines that to provide optimal quality care and for signal functions to be carried out effectively, there must be adequate drugs, supplies, equipment, infrastructure and trained staff to competently diagnose and treat complications.

#### **6.3.6. Drugs available at the selected health facilities**

Many of the rural hospitals and CHCs experienced a general shortage of drugs or the pharmacy had no stocks to supply the wards. Essential drugs such as misoprostrol and iron supplements required to treat/prevent haemorrhage and prevent anaemia respectively, were lacking at a few CHCs. Many CHCs also had a problem with ARV drugs and many patients were referred to the hospitals for continuation of treatment.

According to the BEmONC signal functions, the administration of parenteral antibiotics, anticonvulsants and uterotonics is part of the seven non negotiables. Thwala, Blaauw and Ssengooba (2018: 2) found that in one of the SA districts some CHCs performed a few of the seven signal functions which was not enough to earn the United Nations classification of an EmONC facility. This study indicates that this remains a challenge at most CHCs and some district hospitals due to the lack of drugs, the absence of a doctor to prescribe the drug and lack of equipment to correctly administer drugs. The CHCs are not fully compliant as a BEmONC provider as they do not provide all the signal functions such as assisted deliveries and manual removal of placentas. All complicated obstetric emergencies are referred to hospitals for further management.

This is supported by Nyamtema *et al.* (2016: 472) and Tembo *et al.* (2017: 2) who found similar challenges in studies done in Tanzania and Zambia respectively where magnesium sulphate as the drug of choice in treating pre-eclampsia and eclampsia

was not used as effectively in public health facilities due to the limited number of staff trained in its use. This inability of health facilities to manage women with hypertensive disorders was evident in the high numbers of women transferred to government hospitals for further treatment. They recommend that if factors such as replacement of essential supplies and drugs were provided by the government it would reduce unnecessary referrals for cases that can be managed at a health centre.

Thwala, Blaauw and Ssengooba (2018: 8) reported that none of the 25 facilities (SA hospitals & CHC) included in that specific study scored 100% for availability of emergency obstetric drugs and fluids, with an average drug availability score of 56.7%. Drugs such as parenteral antibiotics, syntometrine, diazepam and insulin were not available in many CHCs and limited quantities found in hospitals, with ergometrine not available at any facility.

According to Bheekie and Bradley (2016: 243) the traditional vertical role of pharmacies is not fully integrated into the district health system (DHS). They further explain that South Africa's quadruple burden of diseases redefines the role of the pharmacist in PHC prevention and treatment of conditions. According to the ESMOE guidelines essential drugs required to prevent and treat complications is crucial in preventing complications. However, when the lack of drugs, equipment or the lack of skilled staff is found at facilities especially at CHCs it becomes a challenge to appropriately manage high risk women and minimize the risk of increased maternal mortality.

The next phase of this study assessed the number of maternal deaths, details of women that died and the relevant causes of death of women that died over a specific period. This is discussed below under phase two stage two.

#### **6.4. PHASE 2 STAGE 2: RETROSPECTIVE CHART REVIEWS**

The third objective of the study was to determine if the women that died over the period January 2016 to April 2016 were managed by appropriately implementing the steps of the ESMOE guideline.

#### **6.4.1. Maternal deaths as per district and health facility**

During the period of data collection from January 2016 to April 2016 there were a total of 17 maternal deaths of which 15 occurred in district A (estimated population of 3.5 million people and is the largest district in KZN. The majority of women died at a combination hospital (DH/RH or RH/TH) with only one death at a district hospital in district A. There were no maternal deaths at any of the CHCs as all obstetric complications are transferred to a hospital. The South African Department of Health follows a hierarchical referral system. District hospitals play a central role between PHC clinics, CHCs, regional and tertiary hospitals. (NDoH 2018) Despite the community health worker in the re-engineered PHC model contributing to improved accessibility to healthcare and improved health outcomes at the community level, they lack specific competencies in maternal and neonatal care. The NDoH (2019) confirm that the professional nurses are a scarce resource in SA and many PHC settings use enrolled nurses as team leaders. This would confirm the increased referrals of all high-risk women from a PHC or CHC to the hospital, thus making it unlikely for maternal deaths to occur at a clinic level.

According to the SMR (NDoH 2017) it is significant to note that tertiary hospitals (TH) conducted only eight percent of the total births but had 28% of the maternal deaths over the 2014-2016 triennium. These hospitals also performed only 12% of caesarean deliveries in SA but had 29% of maternal deaths related to caesarean section deliveries. On the other hand, DH performed 39% of caesarean section births but had only 26% of related deaths in the country.

Over the 2014-2016 triennium there were 880 women that died in provincial TH in the country of which 43% were seen at a CHC, 50% seen at a DH and 25% seen at a RH before being transferred to a TH and dying. The majority of cases seen at various health facilities prior to transfer to a TH indicate health care professional avoidable factors recorded in the death records. Therefore, although the TH has a higher iMMR it is often related to the sub-standard care that was received at the lower level of care prior to transfer (NDoH 2017: 5). Gelato *et al.* (2018: 9) and Stokes *et al.* (2016: 7) agree that low intrinsic staff motivation can be a barrier to successful guideline and protocol implementation that can hamper provisions of appropriate EmOC.

#### 6.4.2. Causes of maternal deaths

Maternal deaths that occurred over the specific period of January to April 2016 were due to hypertension (pre-eclampsia and eclampsia), post-partum haemorrhage (PPH) and HIV/AIDS related deaths. This data is congruent with the trend in South Africa and Sub Saharan Africa (SSA) as cited by other studies (Banke-Thomas, Wright and Collins 2019: 2; Gelato *et al.* 2018: 2).

This study recorded 17 maternal deaths over the study period. These deaths were due to hypertension (41%; n=7), HIV (6%; n=1), and other causes not directly relevant to this study contributed (53%; n=9). It is also significant to note that nine of the total 17 maternal deaths were HIV positive although only one maternal death was due to direct complications of HIV/AIDS. There were no PPH related maternal deaths over this same period.

The number of maternal deaths in SA continued to fall each triennium with an overall reduction of 1152 deaths from 2008-2010 triennium to the 2014-2016 triennium. The iMMR for potentially preventable maternal deaths decreased nationally from 100.0 per 100 000 live births in 2010 to 83.3 in the 2014-2016 triennium, which indicates a steady decline in the number of potentially preventable maternal deaths (NDoH 2017: 2). However, Wabiri *et al.* (2016: 1) found that MMR varies between provinces, with the iMMR ranging from 69 in the Western Cape to 185 in the North West Province which is still too high. The three major common causes of maternal deaths in SA include HIV infection, obstetric haemorrhage and hypertensive disease in pregnancy which were also relevant to this study.

Mnyani *et al.* (2017: 8) found that women with an unknown HIV status frequently did not access antenatal care, suffered early pregnancy complications and some died soon after admission. However, the reduction in maternal deaths in SA for HIV positive pregnant women is due mainly to the changes in the treatment programmes. More specifically, the changes in antiretroviral drug (ARV) regimens has seen a decrease of almost 47% of maternal deaths due to non-pregnancy related infections (mainly HIV) and a decrease in deaths from adverse ARV drug reactions from 130 (2011-2014) to 27 (2014-2016) (Tlou 2018:5; NDoH 2017: 62). According to WHO (2018b) in a study that looked at reducing maternal deaths in SA it confirms that non pregnancy related infections (mainly pneumonia or tuberculosis in HIV infected pregnant women)

are a major cause of death during pregnancy in South Africa. The SMR (NDoH 2017: 62) acknowledge that the major cause of deaths in the last triennium remains respiratory infections including TB and PCP Pneumonia, whilst there was a reduction in deaths due to meningitis (52% reduction) and Kaposi Sarcoma (26% reduction). However, following the implementation of a new HIV programme in 2016 that included universal testing as well as free ARV treatment for all positive patients irrespective of CD4 count has had a drastic reduction in MMR in SA generally (WHO 2018b; NDoH 2017: 62; Wabiri *et al.* 2016: 8-10).

No obstetric haemorrhage deaths were noted in this study over the specific period. In SA there has been a 22% reduction of associated maternal deaths reported in the 2014-2016 trienniums which is thought to be due to implementation of recommendations made by the National Committee on the Confidential Enquiries into Maternal Deaths (NCCEMD) which focused on prevention and management of obstetric haemorrhage. Despite the decrease reported, a total of 624 maternal deaths due to obstetric haemorrhage with the majority occurring post caesarean sections (NDoH 2017: 68) were noted.

However, it is significant to note that over this same triennium there was an increase in maternal deaths due to hypertensive diseases in pregnancy (NDoH 2017: 70). This is relevant to the findings in this study which found that there were seven maternal deaths either due to pre-eclampsia or eclampsia which resulted in respiratory failure or pulmonary oedema. In SA there were a total of 661 deaths in the 2014-2016 triennium directly related to hypertensive disorders with an increase of 21 deaths from the previous triennium. There was a 30% death rate from pulmonary oedema even though the clinical guidelines indicate that there is no place for fluid overloading and that a standard fluid balance policy should be practiced (NDoH 2017: 70; Makhanya, Moodley and Govender 2016: 15).

According to WHO (2019a) Sub Saharan Africa and South Asia account for 88% of maternal deaths globally. Sub Saharan African has the highest MMR of 546 maternal deaths per 100 000 live births which is equivalent to 201 000 maternal deaths a year. This accounts for two-thirds (66%) of all maternal deaths worldwide. The statistics further reveal that haemorrhage remains the leading cause of maternal mortality with over one quarter (27%) of the deaths. A similar proportion of maternal deaths were



caused indirectly by pre-existing medical conditions aggravated by pregnancy, including hypertension, eclampsia, embolism and sepsis. In this study beside complications of hypertension and HIV contributing to most of the maternal deaths, 18.2% were due to sepsis.

Alkema *et al.* (2016: 462) concur with WHO (2019a) on maternal mortality statistics that MMR remain unacceptably high globally. They acknowledge that nearly 75% of the major contributory causes of maternal deaths include severe bleeding mostly after childbirth, unsafe abortions, infections including HIV and high blood pressure during pregnancy including pre-eclampsia and eclampsia. Uneke *et al.* (2018: 1) confirm that antepartum, intrapartum and postpartum haemorrhages and hypertensive disorders were responsible for the highest maternal mortalities in Western African countries. The WHO (2018a) concluded that most maternal deaths are preventable as the health care solutions to prevent or manage complications are well known globally.

According to WHO (2018b) a woman's lifetime risk of maternal death is 1 in 4900 in developed countries, versus 1 in 180 in developing countries. The risk for MMR is highest for adolescent girls and among women with low income and those living in rural areas versus high income and urban areas (WHO 2018b).

#### **6.4.3. Demographic profiles and obstetric history of women that died.**

According to WHO (2018b) the risk that a 15-year-old adolescent girl will die from complications in pregnancy and childbirth significantly contributes to the causes of deaths among young girls in developing countries.

##### **6.4.3.1. Age and parity of women that died**

This study showed that the highest number of relevant maternal deaths (29.4%) occurred in women between the ages of 15 to 19 years (n=5) and women aged between 31-35-years old (n=4). Govender, Naidoo and Taylor (2019: 928) found that in Ugu district in KZN, adolescent's knowledge of pregnancy and sexual reproductive health was deficient in first and repeat pregnancies. They recommended that health education on sexual reproductive health should use a digital platform that includes social media, multimedia and mobile phones which is popular among young people. The analyses of the maternal age in the <18years age group in the SMR (NDoH 2017: 29) indicated a high iMMR (28.69) due to hypertensive disorders in pregnancy. In the

older women >35 years there was a higher risk of haemorrhage with the iMMR ranging from 54.09 to 76.64. Conclusions indicate that as the maternal age increases the mortality risks also increase. The SMR (NDoH 2017: 68) suggests the importance for contraception for teenagers and women over 34 years due to the increased risk of maternal deaths in this age groups.

In this study most women who died were multiparous (58.8%; n=10). Again, in the last 2014-2016 triennium the maternal deaths were highest between the 25 to 39-year olds (in parity 1-3). Morris *et al.* (2018) confirm that for women aged  $\geq 35$  years, the presence of underlying medical conditions posed a greater risk for morbidity/mortality than age itself. For multiparous women, the effects of medical and obstetric history were additive.

#### **6.4.3.2. History of antenatal booking of patients who died.**

In this study of the 17 women that died (29.4%; n=5) had no antenatal visits whilst (64.7%; n=11) had attended antenatal clinics between one to four times. The importance of antenatal visits to circumvent maternal mortality and morbidity is clarified below.

The WHO (2016b) recommended an increase in the number of antenatal visits throughout pregnancy from four to eight visits with a health care provider. A higher frequency of antenatal contacts by women and adolescent girls with a health provider is associated with reduced mortality (WHO 2016b, 2018a). This allows more opportunities to detect and manage potential complications. The WHO guidelines indicate that eight or more contacts for antenatal care can reduce perinatal deaths by up to 8 per 1000 births as compared to four visits.

Machira and Palamuleni (2018: 26) point out that although maternal health services are provided, the utilisation of such services is still inadequate. This means that low utilisation of health services increases women's vulnerability of experiencing the worst health outcomes. The WHO (2016b) guidelines on antenatal care emphasise that a women's contact with her antenatal care provider should be more than a simple visit, but rather the provision of care and support throughout pregnancy.

In South Africa, Uzabakiriho and Maswime (2019: 2) found that a significant percent (38%) of maternal deaths occurred in women that were unbooked, i.e. women that did

not seek professional healthcare during pregnancy. This confirms that when unbooked women present in labour, the risk of poor maternal outcomes and perinatal mortality increases. Tlou (2018: 5) agrees that factors such as socio-economic status and the number of deliveries in rural SA has an influence on MMR. It was found that generally women from wealthier households have a higher probability of attending first and subsequent antenatal visits as opposed to poorer women.

#### **6.4.3.3. Referral of women to hospitals prior to death**

Although a higher number of women that died were seen at PHC (n=6) and CHC (n=2) antenatal clinics, there were no actual deaths at any of these relevant facilities due to the referrals to the relevant hospitals. The PHC system required women to enter the health care system at the primary level of care and then be referred to the next level of care if any risk factors are present (NDoH 2018: 19). Mahmood *et al.* (2018: 8) reported that in rural Indonesia the inadequate quality of care and inconsistent approach to manage high-risk women such as preeclampsia in PHC levels is a major factor in maternal mortality. Women that received suboptimal care during antenatal visits tend to return only when the medical condition has progressed to a critical stage. Similarly, in this study of the total 17 maternal deaths it is important to note that 13 of these women were already in a critical condition on admission to the hospitals.

According to the SMR (NDoH 2017: 11) it is recommended that no matter where the women enters the health care system, she should be followed up appropriately especially antenatally and postnatally. It is important to stabilize the women before transfer to a higher-level facility and a professional nurse should accompany the women during transit.

Pedrana *et al.* (2019: 31) admits that a well-functioning referral system should act as an early warning system for CEmONC facilities by ensuring the staff, supplies and equipment are fully prepared and available to provide emergency care 24 hours a day. The recommendations from the SMR (NDoH 2017) that referrals should be a two-way system which would include that high risk patients be referred to relevant hospitals and low risk patients from regional hospitals be referred down to lower level hospitals or clinics. This would reduce the burden on large regional and tertiary hospitals that are inundated with low risk women in labour. Pedrana *et al.* (2019: 38) agrees that

efficient management of non-complicated patients at CHC level and referring only complicated women to hospitals alleviates overcrowding.

The on-site Midwife-run Birthing Unit (OMBU) is one of the models that is suggested to be open in large regional and tertiary hospitals. This study revealed only one OMBU at a rural regional hospital. The OMBU is part of a primary care unit in the hospital close to the labour wards. All women in labour are triaged to the correct level of care. Should any women develop complications in the OMBU they are immediately transferred within the hospital to a labour room which prevents delays of transport and implementing emergency care immediately (NDoH 2017: 12).

The CHC lacked the resources or staff to provide such emergency care thus not meeting the United Nations BEmONC criteria which contributes to prompt referrals of all complications. This is supported by Thwala, Blaauw and Ssengooba (2018: 10) and Pattinson *et al.* (2019) who found that no CHC across some districts in SA provided BEmONC despite the national policy guidelines stipulating that all seven BEmONC signal functions should be available at CHCs.

Pattinson *et al.* (2019) agree that a rapid drop in mortality can be achieved by ensuring these life-saving signal function services are available, accessible and correctly used. However, other factors that further delay providing EmOC services immediately include delays within hospitals in rural health districts and the time taken for doctors to attend to patients (Makhanya Moodley and Govender 2016: 15). Seven of the maternal deaths (63.6%) occurred in the labour ward mostly in tertiary hospitals and 36.4% died after being transferred to intensive care units, whilst two women died at home before coming to hospital. It is significant to note that the women that died at home had attended antenatal care at a health facility. Machira and Palamuleni (2018: 26) found that women that had low utilisation of maternal health facilities perceived the postnatal care as being curative rather than preventative care as well as low understanding of the significance of utilisation of maternal health facilities. This leads to delays in recognising a health problem early and seeking medical care promptly.

#### **6.4.3.4. Maternal deaths by obstetric classification**

Most of the women who died (relevant causes to this study) had gynaecological problems and four of the five patients were also HIV positive (mean of 27.25 gestation

in weeks). Uzabakiriho and Maswime (2019: 2) reported that the leading cause of maternal deaths to be HIV related infections in 56% of cases, mostly in early pregnancy with ectopic pregnancies and miscarriages being more common in a Johannesburg hospital in SA.

This confirms similar data reported in the latest triennial report (2014-2016) where there were 260 early pregnancy deaths over this period. The major causes were from ectopic pregnancies (95) and 165 deaths from complications of miscarriages. There were 35% deaths from ectopic pregnancies that occurred more frequently at district hospitals. A significant number of these early deaths were also HIV positive. The avoidable factors included lack of antenatal care, delays in seeking medical attention and lack of appropriately trained doctors, resulting in incorrect diagnosis and therefore incorrect management as well as sub-standard care (NDoH 2017: 80).

#### **6.4.3.5. Modes of delivery relevant to the maternal deaths**

In this study a cumulative (81.9%; n=9) of these women were postpartum patients. Two women delivered at home and were brought to hospital in a critical state and due to complications could not be saved. Delays in accessing health care remains a major contributor of maternal deaths in SA. Of the seven women, four (36.4%) were normal and three (27.3%) were caesarean section deliveries. According to the SMR (NDoH 2017), at primary hospital levels the iMMR per caesarean delivery was 110 versus 25/100000 live births for vaginal deliveries. In KZN the rate of caesarean deliveries was the highest (30%) amongst the nine provinces in SA. Causes of deaths following caesarean births include sepsis, haemorrhage, venous thrombo-embolus and anaesthetic complications. Deaths related to bleeding during or after a caesarean delivery were related to the lack of skilled doctors and midwives. Most anaesthetic related deaths (56%) occurred at DH which was mainly attributed to failure to protect the airway during anaesthesia. The SMR (NDoH 2017) highlights that some of the maternal deaths from eclampsia were unrelated to the caesarean section as the mode of delivery which was merely a means of management of the condition, but deaths are more often related to the delay in accessing health care early prior to complications.

Mgawadere *et al.* (2017) confirmed similar findings in a study done in Malawi that shows most women that died in a health care facility occurred in the postnatal ward followed by labour ward. More than half of these women experienced more than one

type of delay, however, almost all of these women that died experienced type three delays (Thaddeus and Maine 1994) which included delays in immediate effective emergency care, shortages of supplies, staff and lack of competence in managing obstetric emergencies.

#### **6.4.4. Management of women prior to deaths**

The general management of women prior to death included steps from the ESMOE management guidelines, including assessment of vital signs, monitoring of fetal condition, taking of bloods, administration of drugs, insertion of intravenous therapy and referrals where appropriate. Most of the CHCs were unable to provide all basic EmOC due to the lack of ESMOE trained advanced midwives and doctors, lack of skills, limited scope of practice and insufficient resources.

Vigilant continuous monitoring of high-risk women was not done as stipulated due to the staff shortages in many facilities. The CHC and a DH lacked the following interventions as per ESMOE guidelines: eclamptic patient did not receive Rivotril, no antibiotics given to appropriate cases, women on MgSO<sub>4</sub> lacked continuous monitoring including testing of reflexes, giving repeated doses MgSO<sub>4</sub> as per guideline in eclampsia and the use of antihypertensive drugs simultaneously. Women could not have intravenous fluid intake monitored at many facilities due to the lack of intravenous regulators. Patients that were critical and needed transfer from a CHC were not accompanied by a professional midwife as recommended by SMR (NDoH 2017).

Makhanya, Moodley and Govender (2016: 16) confirm that lowering of blood pressure in hypertension, imminent eclampsia and eclampsia is critical to reduce cerebral haemorrhage. The suggested management at clinic level prior to transfer includes the administration of nifedipine as the antihypertensive drug of choice which would lower the blood pressure within 30 minutes.

##### **6.4.4.1. Types of drugs utilised in managing relevant maternal deaths**

Since most relevant maternal deaths that occurred in this study were due to hypertensive disorders (54.5%) the most commonly used drugs noted in this study based on the ESMOE guideline included MgSO<sub>4</sub>, ARTs and oxytocic drugs.

Midwives cannot administer certain drugs without a doctors' prescription or a hospital standing order, which delays timeous emergency interventions when no doctor is available.

The SMR (2017: 70) suggests that early detection of high blood pressure and immediate judicious lowering of severe systolic and /or diastolic blood pressure must be instituted. Many maternal death records show that health professionals use MgSO<sub>4</sub> for the prevention of seizures in eclampsia, however this is not indicated for lowering severe hypertension. Makhanya, Moodley and Govender (2016: 16) agreed that failure to prescribe and use rapid-acting antihypertensive agents immediately and not performing prerequisite investigations are factors indicating that clinical protocols are not being followed

Makhanya, Moodley and Govender (2016: 13) acknowledge that in SA the use of MgSO<sub>4</sub> is emphasised during ESMOE training as the prevalence of hypertensive disorders in pregnancy continue to be a major contribution to the high MMR especially in rural KZN. However, Tembo *et al.* (2017: 6) argue that whilst MgSO<sub>4</sub> is recommended for treating women with eclamptic seizures, it was found that its distribution and use in public health facilities in Zambia was restricted due to staff that are not adequately trained in its use. The WHO (2018a) agrees that pre-eclampsia should be detected and appropriately managed before the onset of eclampsia. The administration of MgSO<sub>4</sub> for pre-eclampsia can lower the risk of eclampsia and other life- threatening complications.

Oxytocic drugs were routinely used in the active management of the third stage of labour to aid with placental delivery, contract the uterus and prevent haemorrhage, which was evident in 36.4% of women in this study. The WHO (2018a) recommends oxytocin as a first-choice drug for prevention of excessive bleeding after childbirth. However, oxytocin must be stored at two to eight degrees Celsius and this may be hard to do in many countries due to the lack of refrigerators, which thus renders the drug ineffective because of heat exposure. An alternative drug called Carbetocin that is found to be safe and effective as oxytocin but does not require refrigeration and retains its efficacy for at least three years stored at 30 degrees Celsius (WHO. 2018a). This would be an ideal drug for remote areas with no fridges or where there are electricity challenges.

This study revealed that the majority of CHCs had no Rivotril, Misoprostol and Iron supplements available on stock. The patients that were on ART had to go to the hospitals for their treatments as most PHC had no stock of ART in their pharmacy. This resulted in many patients being non-compliant due to the lack of transport to hospitals that were far from where they lived. Pattinson *et al.* (2019) acknowledge that the simplicity of treatment of HIV positive women is uncomplicated with a single tablet treatment currently used that contributes to the reduced MMR due to NPRI. Amu and Nyarko (2016: 3) argue that at a public health facility in Ghana the availability of essential drugs was generally adequate and available, however the inadequacy of health care professionals and patient related factors contributed to most of the challenges in reducing MMR. These included women attending antenatal clinics too late and non-conformance to health education given.

#### **6.4.4.2. Healthcare factors that contributed to maternal deaths**

Factors that emerged in this study that contributed to the relevant maternal deaths included delays in seeking treatment and non-compliance to treatment, sub-standard care, delays in transportation and poor documentation which are discussed below.

##### **6.4.4.2.1. Non-compliance and delays in seeking treatment**

Of the eleven relevant maternal deaths there were six that died due to delays in seeking medical treatment. Had these women reached a health facility early they could have possibly been managed more effectively. Some of these women were first admitted at a PHC facility however, some of these facilities were not equipped to provide relevant emergency care and had to refer patients to the next level of care, which further delayed treatment. Patients admitted to district hospitals that did not have the infrastructure or resources such as theatres or competent practitioners for managing critical patients had to transfer these patients to a tertiary hospital.

Machira and Palamuleni (2018: 29) pointed out that some women complained that despite coming early to a health facility the level of attention was inadequate and they were not respected and sometimes yelled at by the health care provider. On the other hand, some women indicated that they deliberately delay seeking health care due to cultural influences, where they believe that a pregnancy must not be disclosed in the



first few months after conception for fear of being bewitched or harmed. This results in delays in seeking prenatal services up to six months of pregnancy.

Amu and Nyarko (2016: 6) acknowledge that late antenatal attendance, non-adherence to health education and delay in reporting complications on the part of patients pose a major challenge as a result some die upon reaching the hospital. However, Machira and Palamuleni (2018: 33) disagree with Amu and Nyarko (2016: 6) as they found that many women experienced low willingness to deliver at a health facility due to challenges of distance to a facility, lack of spousal support, lack of money to get to a facility and inadequate knowledge and experience to understand their pregnancy complications that caused delays in accessing health care.

The SMR (2017: 53) concurs that in addressing reasons why women hesitate in seeking prompt care, the factors of accessibility and acceptability of health facilities must also be considered. The socio-economic status of women especially in rural areas contribute to delays in accessing health care due to the distance of the nearest health facilities.

#### **6.4.4.2.2. Sub-standard care**

Signal functions for basic EmOC cannot be implemented independently by the midwife without a doctors' order or presence. Other factors included shortage of advanced ESMOE trained midwives whilst others lacked appropriate competencies. PHC centres had no obstetric doctor on site to manage complications so some patients received basic care and had to be transferred to the next level of care.

Mgawadere *et al.* (2017) found that delays in receiving emergency care at health care facilities were due to shortages of equipment, incorrect risk assessment, incorrect diagnosis and treatment were experienced equally at both hospitals and PHC. Another barrier to accessing care is the long waiting time before being attended to. This is supported by the Saving Mothers Lives report (Ministry of Health Kenya 2017) that found basic nursing interventions such as blood pressure measurements and urinalysis repeated at every visit improves the likelihood of early detection of pre-eclampsia. This report also confirms that eight out of ten women received sub-optimal care but had the management been more efficient the outcomes would have been different.

The Saving Mothers Lives report (Ministry of Health Kenya 2017: 71) confirms similar findings over the last triennium where many women were inadequately assessed initially that led to problems with diagnosis, delays in referral of complications or managing complications at an inappropriate level such as district hospitals.

Many patients with correct diagnosis but received incorrect management or sub-standard care were prevalent at both district (31.2%) and regional hospitals (30.3%) in SA over the last triennium. Another factor that continues to contribute to the high MMR is that monitoring of high-risk women is not done or done infrequently and abnormal findings were not appropriately acted upon. The lack of appropriately trained doctors and midwives was also thought to be a contributory factor in many maternal deaths. The SMR (2017: 7) and Tarimo *et al.* (2018: 11) commented that in rural Tanzania due to staff shortages of registered nurses and midwives, most tasks are performed by enrolled nurse midwives that lacked the competencies to deliver effective EmOC.

The number of maternal deaths is higher in tertiary hospitals which is often women that have been transferred from a lower level facility who received sub-standard care. This is supported by Pedrana *et al.* (2019: 31) that found an overall lack of readiness to respond to obstetric emergency complications at referring facilities contributes to delays in the provision of care. However, women that die at tertiary hospitals also often occur due to sub-standard care. The main contributory factor of sub-standard care and deaths were attributed to lack of skills of doctors and nurses (NDoH 2017).

Recommendations made from the last maternal death report (2014-2016) (NDoH 2017) include improving intern training, having 80% ESMOE trained staff and monthly emergency drills to enhance skills and competencies.

#### **6.4.4.2.3. Delays in transportation**

Women in rural areas that do not have their own transport or finance to get transportation poses a challenge to access care promptly. In this study two maternal deaths occurred due to transport delays where one of the patients waited many hours following an eclamptic fit before she got an ambulance to transfer her to a hospital. Another woman that died in transit to a referral hospital as the paramedic staff are not competent in managing obstetric emergencies and there is no available skilled staff to

accompany many patients that are transferred. The SMR (NDoH 2017: 11) indicated that the scope of practice of Emergency Medical Service personnel is insufficient to continue care in transit which lacks essential aspects like administration of oxytocin, antihypertensives and MgSO<sub>4</sub>.

Mgawadere *et al.* (2017) experienced similar transport delays in Malawi which included no ambulances available, late arrivals of ambulances, delays in calling an ambulance for referral and deaths during transit due to long distances to travel to a referral hospital.

The SMR (2017: 82) recommends that deaths in transit and shortly after arrival can be reduced by improving skills in district hospitals before transfer, ensuring emergency transport to be on site for prompt transfers and managing patients during transfer.

#### **6.4.4.2.4. Poor record keeping**

The ESMOE guidelines suggest that the communication within institutions and between referral facilities should adopt the SBAR method. This means that the patients' condition is described as follows: **Situation**- The problem with the patient, including initial assessment of vital signs, **Background**- includes history of the patient and detailed information regarding gestation and risk factors, **Assessment**– identify the potential problem from relevant findings and **Recommendation**- what needs to be done or request for assistance. The form that is filled based on SBAR that should accompany patients' records. Shahid and Thomas (2018: 11) concur that SBAR is a reliable and validated communication tool which reduces adverse events in a hospital setting, improves communication among health professionals and promotes patient safety.

However, there are many challenges with records not being completed fully, or not sent with the patients as well as records that go missing. One of the maternal death records in this study from a regional hospital was not found, despite many attempts to visit the medical records department. Another challenge is that available notes are very scanty and in-complete with legibility often being a problem. Institutional maternal and perinatal mortality meetings which are held monthly in hospitals focus on identifying and correcting errors in management of preventable deaths, improvement of skills and the importance of meticulous record keeping.

Currently many countries utilise the National Committee for Confidential Enquiries into Maternal Deaths (NCCEMD), including SA. This has improved the documentation system where the causes of deaths and challenges are highlighted with the aim of future preventions where possible. However, the enquiry is predominantly facility based and the institutional MMR has consistently been lower than the WHO country estimates. This discrepancy is likely to be due to the home or non-facility deaths that are not notified to NCCEMD. The SMR (NDoH 2017: 47) identified that the vital registration data and the NCCEMD data both have limitations and discrepancies. They recommend that efforts are needed to improve medical certification of deaths and to ensure that all relevant deaths are registered including deaths occurring outside health facilities. Another recommendation by the SMR (NDoH 2017) is that the ambulance personnel should also be responsible to audit and report on deaths that occur in transit.

The WHO (2017b: 1) acknowledges that almost half of the deaths that occur globally are now recorded with a cause. New data from WHO now highlights improvements that countries have made on collecting statistics and monitoring progress towards SDGs. Incomplete or incorrect information on those deaths that are registered also reduce the usefulness of those data for tracking public health trends, planning measures to improve health and evaluating if policies are working. The strengthening of health information systems globally needs to be improved in order to better track progress towards achieving SDGs.

In Kenya the Saving Mothers Lives (Ministry of Health Kenya 2017), the first confidential report into maternal deaths has recommended that to safeguard and ensure anonymity of case notes is to scan the notes and email within the review team and relevant patient details can be blocked out in the notes. However, this needs clear guidelines and appropriate resources to make this process electronic.

The next phase below describes the face to face interviews with midwives.

### **6.5. PHASE 3- INTERVIEWS WITH ESMOE TRAINED MIDWIVES**

A total of 14 ESMOE trained midwives from the selected CHC, district and regional hospitals were interviewed. The demographic data and the categories and themes that emanated from the study are discussed below.

### **6.5.1. Demographic data of midwives**

The midwives interviewed were senior staff with 42.85% being in the age group of 36 to 55 years with 50% having over 21 years' experience as a practising midwife. Despite (92.85%; n=13) of the midwives being advanced midwives, two health facilities had no advanced midwife or ESMOE trained staff in any of the maternity wards. There were only three midwives that completed the "train the trainer" course which could impact on their involvement of providing regular fire drills to maintain all staff competencies.

Ameh *et al.* (2019: 2) found that staff may lack competency to provide all EmOC signal functions and that this lack of knowledge and skills is the key reason why beneficial evidence-based practices are still not in place. Comparatively Filby, McConville and Portela (2016: 8) found that barriers in LMIC such as in Indonesia and Niger included women seeking care from traditional birth attendants rather than midwives because they were experienced, trustworthy and respected for their cultural practices. In Nigeria midwifery personnel were found to be young, single and inexperienced in childbirth with little social connections within the community.

### **6.5.2. Data categories and themes**

A discussion of the categories and themes that emerged from the study is presented below.

#### **6.5.2.1. ESMOE training experiences**

This category revealed one major theme with several subthemes where midwives expressed the barriers and facilitators of their ESMOE training experiences.

##### **6.5.2.1.1. Knowledge, skills and adequacy of ESMOE training experiences**

The main issue that arose in this study was that the short training durations (especially the two-day) was insufficient to gain the necessary competence and practice relevant skills as some obstetric modules that are doctor specific were included. Midwives recommended that they need regular updates for all staff in maternity units and that they be trained on specific modules in groups of midwives only to be able to master relevant competencies. Midwives that had five-day training were satisfied with the duration as they managed to have ample time to practice.

Ameh *et al.* (2019: 10) argue that there is limited data to suggest what the optimum length of a training package on EmOC should be, however longer training programmes were associated with greater improvement in skills compared to shorter training. It is found that peer support and on-the-job supervision contributed to improved skills in the longer version of the training packages. Another finding included that skills decline at a faster pace than knowledge, therefore repeat training and updates will enhance retention of skills and knowledge. They agree that EmOC training allow health care workers in maternity areas to recognise complications in pregnancy or birth thereby preventing complications effectively and reducing MMR.

In SA saturation training on ESMOE and Emergency Obstetric Simulation Training (EOST) based on skills and drills was implemented off site across districts to get majority of the health care providers in emergency obstetric and neonatal care to be trained. Oosthuizen, Bergh and Pattinson (2018) acknowledged that big scale up programmes have its own challenges including the cost factor and organising master trainers as compared to on-site training being cheaper. Saturation training requires a robust logistical system that enables all health care professional to attend the training.

The WHO (2016a) concurs with Pattinson (2015) that the majority of midwives across the globe acknowledged that the introduction of BEmONC and ESMOE in SA improved knowledge and skills and significantly contributed to the reduction in maternal and new-born deaths. Other findings however included the lack of adequate pre-and in-service midwifery education and professional development. This seems to impact negatively on preparation for the midwifery role and the building of personal autonomy, resulting in low levels of skill and confidence. The SMR (NDoH 2017: 81) recommended that 80% staff working in maternity units should be trained in ESMOE

#### **6.5.2.2. Implementation of ESMOE in the clinical setting**

##### **6.5.2.2.1. Clarity and availability of guidelines and algorithms**

Whilst most midwives commended the ESMOE guideline to be clear with an easy step by step approach to providing EmOC, some found that wall charts were not accessible at the patients' bedside and the algorithms were sometimes difficult to follow chronologically in an emergency. This negatively impacted the successful implementation of the guideline interventions. This is supported by Graham *et al.*

(2015) that states guidelines should be known and may be rarely consulted within clinical settings. However, many clinicians reported that the most frequent use of guidelines on the job was when they were visible as wall charts. They agree that maternal and child health care guidelines are instrumental in filling the implementation gap between evidence of quality, cost effective health interventions and their full implementation.

Despite strong evidence of their benefits many guidelines fail due to poor implementation. Oosthuizen, Bergh and Pattinson (2018) relates poor implementation of high impact maternal interventions to poorly functioning health systems, local health systems barriers, unequitable coverage and problems with political leadership.

#### **6.5.2.2.2. Conducting of fire-drills in the clinical area**

Majority of the midwives reported that fire-drills are not performed as often as it should due to shortage of trained ESMOE facilitators, lack of time, and lack of motivation of staff.

The Emergency Obstetric Simulation Training (EOST) is referred to as fire-drills and is part of the ESMOE training package. Usually a lead doctor and advanced midwife that has undergone the “train the trainer” course in ESMOE and EOST in a health facility are expected to conduct on site fire-drills training for other staff. Ameh *et al.* (2019: 10) confirm that combinations of lectures (small amount of content) and simulation-based skills and drills participatory training results in improved communication within obstetric teams, improved knowledge, skills and confidence than didactic teaching alone. This is supported by Siaulys *et al.* (2019: 24) that in Brazil, simulation-based obstetric emergency team training can reduce adverse maternal outcomes by improving knowledge of healthcare professionals on managing the main causes of maternal mortality. Pattinson *et al.* (2019) acknowledges that initial training with regular refreshers should be followed up with supportive supervision and mentoring as part of health system strengthening.

Thus, the SMR (NDoH 2017: 81) recommends that emergency drills and EOST exercises on specific modules should be done monthly. However, this remains a challenge due to the lack of trained staff, lack of time and motivation. The role of the District Clinical Specialist Team (DCST) in monitoring and providing ESMOE and

EOST training is also pivotal in ensuring essential competencies and skills drills are conducted regularly at all health facilities.

#### **6.5.2.3. Challenges with successful implementation of ESMOE**

There were many challenges that emerged from this study that interferes with successful implementation of ESMOE guidelines that are discussed below. It is significant to note that some of the themes that emerged from phase three overlapped with healthcare system challenges from the retrospective review on maternal deaths. Factors such as staff shortages, lack of resources and transport delays indicate the vast extent of this problem across South African healthcare facilities in providing quality EmOC services.

##### **6.5.2.3.1. Lack of resources**

The effective implementation of the ESMOE guidelines requires many factors to be available in contributing to a reduction in MMRs. Without the physical resources, adequate human resource and motivation, it is impossible to implement effective EmOC which are supported by numerous studies (Amu and Nyarko 2016: 25; Stokes *et al.* 2016: 8; Thwala, Blaauw and Ssengooba 2018: 10; Tarimo *et al.* 2018: 11; Pattinson *et al.* 2019).

Global health experts have identified signal functions for EmOC as the most effective medical interventions for managing direct maternal complications thereby reducing MMRs. This is supported by Cranmer *et al.* (2018: 1) that suggest multiple resources are required simultaneously for practical clinical management. For example, in hypertensive emergencies you need resources to identify and treat the emergency such as sphygmomanometers, stethoscopes and urine testing strips. They found that due to inadequate stocks of the antihypertensive drug hydralazine it was not administered simultaneously with MgSO<sub>4</sub> to lower the blood pressure as per guideline.

This study revealed that the CHCs experienced drastic shortages as evident by the lack of intravenous regulators and pumps that are necessary for monitoring the infusion of fluids and certain medication. This is supported by the SMR (NDoH 2017: 70) that recommends that women with severe pre-eclampsia and eclampsia should not be fluid overloaded and fluid input should be monitored closely.



Despite having a lack of resources, the midwife as an independent practitioner must have the knowledge and skills and the autonomy to be able to identify an emergency and provide effective EmOC.

#### **6.5.2.3.2. Limited scope of practice for midwives**

The midwives agreed that some of the essential skills and competencies required from the ESMOE guidelines are either not in their scope of practice or they lacked the skills in performing them. One of the reasons for this is inadequate skills drills and lack of regular updates of training as discussed previously.

The scope of practice of a basic midwife is limited to normal pregnancy, labour and postpartum care and obstetric complications are merely identified and referred. The advanced midwives undergo a specialised training programme that allows this category of midwife to function at a higher level in obstetric emergencies especially when doctors are unavailable. Ngxongo (2015: 184) agrees that advanced midwives are more likely to provide a higher standard of care because of the added skills and knowledge. The absence of this category of staff at clinics could have a negative impact on the quality of antenatal care rendered.

Although the advanced midwife is exposed to EmOC in their training, without regular practice and continuous updates the clinical skills and knowledge becomes sub-optimal. Further ESMOE training would enhance existing competencies in providing effective EmOC for both cadres of midwives thereby reducing MMR. In ESMOE training the use of drugs including uterotonics, antihypertensives, MgSO<sub>4</sub> and antibiotics are required to be administered. These drugs often need a doctors' prescription or a standing order, which limits the midwife administration at a CHC without a doctor available leading to delays in emergency management.

Midwives that are ESMOE trained are often undermined by the doctors during an emergency, despite them having the clinical experience and skills. Lundgren *et al.* (2019: 9) agree that midwifery knowledge is still not visible to other professions and can be the reason why it is not being implemented in the clinical care. Midwives face the difficulty of practicing in a medical dominant model which does not value the intuitive and grounded knowledge that is essential in midwifery as opposed to midwifery care models. This lack of recognition of midwifery is supported by Healy,

Humphreys and Kennedy (2017: 372) who acknowledge how midwifery in a culture of risk and medicalization is side-lined to a peripheral position that makes midwives reluctant to take action to make changes.

The confidence and competence of midwives can be strengthened through evidence-based training in EmOC that is recognised globally. The WHO (2019b) supported by the International Confederation of Midwives (ICM) agree that midwives educated to international standards of midwifery are better equipped to provide the full scope of interventions necessary when they are licensed, regulated and integrated into a well-functioning health system. These midwives are trained to work as autonomous professionals that provide knowledgeable, skilled and respectful care to all women. Comparatively, Hildingsson *et al.* (2016: 2) report that midwives in New Zealand and Sweden have a strong professional identity and sense of empowerment that is a result of working in more autonomous ways within a health system that is primary health care focused. Jolivet *et al.* (2018: 8) believe that essential clinical interventions at the bedside (e.g. administration of uterotonics) are highly dependent on factors such as adequate workforce (e.g. density of midwives) and enabling policies (e.g. midwives are authorised to deliver basic emergency obstetric care). It is not enough for the midwife alone to provide quality emergency obstetric care. There needs to be other factors in place including a supportive environment with the appropriate infrastructure.

#### **6.5.2.3.3. Poor infrastructure**

The challenges with infrastructure that were highlighted in this study included, inadequate number of beds, poor spacing between beds to access patients in emergency and poor visibility of patients due to infrastructure. The maternity wards and theatre were on different floors, which delayed transfer of emergencies. Some areas in CHCs lacked wall mounted suctions and oxygen. The CHCs had only one portable oxygen and suction apparatus.

To provide optimal quality EmOC services at all levels of care and across the globe it requires multitude of factors to be addressed and improved. This is supported by Gelato *et al.* (2018: 8) who identified health systems failure and administrative failure as the major contribution to maternal deaths. Mgawadere *et al.* (2017: 7) agree with Gelato *et al.* (2018: 8) that barriers to access and utilization of EmOC at some health facilities in Sub-Saharan Africa included shortages of utilities such as insufficient beds,

shortage of labour and postnatal rooms, lack of operation theatres, intensive care units and irregular supply of electricity and water contributed to delayed service provision. In developing countries, the lack of blood supply and insufficient utilities was found to affect the length of time in providing EmOC services.

Jolivet *et al.* (2018: 258) also support the idea that the focus of ending preventable maternal mortality strategies addresses not only the essential clinical interventions necessary to save lives but also important is the political, social, economic and health system determinants of maternal health and survival. These factors are essential to create an enabling environment and high performing health systems needed to ensure good quality clinical care.

#### **6.5.2.3.4. Patient factors that limit successful implementation of ESMOE**

The patient related factors that impede successful EmOC include lack of access to health facilities, late recognition of emergencies, communication barriers and non-compliance to treatment. In SA there are many foreign immigrants that access health care. One of the major barriers with managing such patients is the communication barrier as was evident in this study. Explaining the risk factors, the importance of medication compliance and antenatal attendance is difficult when communication is the impediment. Financial challenges and accessibility to health care remains a global problem for low-and-middle income countries. This is supported by Gelato *et al.* (2018: 183) that admits most women were unable to recognise symptoms of complications due to lack of knowledge about obstetric danger signs. Delays in seeking care were thus found more commonly in uneducated women.

The WHO (2018b) confirm that in high-income countries, virtually all women have at least four antenatal visits and are attended by skilled health care workers during childbirth and in post-partum. Comparatively in low-income countries about 40% women had the recommended antenatal care visits. The WHO (2018b) acknowledge that other factors that prevent women from receiving or seeking care during pregnancy and childbirth include poverty, distance, lack of information, inadequate services and cultural practices. This is in keeping with Thaddeus and Maine (1994) three delays model with the first being the delay in decision to seek care which points out that the actual decision-making process is determined by the reluctance of the patients to seek healthcare.

Kemp and Knight (2016) argue that maternal mortality in the United Kingdom face similar challenges which include a general absence of pre-conception care or treatment optimization for women with chronic disease. There is a tendency for women to alter treatment plans and stop medication when pregnant.

The WHO (2019b) agree that lack of quality care has a negative impact on access to care by women and can delay or prevent women seeking help. Access to a facility does not in itself improve outcomes where the workforce lacks the competencies needed. It was found that facilities can be a source of injury and pain from neglect and abuse that commonly occur in low-, middle- and high-income countries. This further contributes to women not attending a health facility for care. The WHO (2016b) recommends that for women to use antenatal services and come back to deliver their baby they must receive good quality care that respects their dignity.

However, Sina and Adekeye (2019) argue that a major factor of under-utilisation of healthcare facilities is socio-cultural factors. Socio-economic and cultural beliefs of women have been identified as an important predictor in the utilisation of healthcare facilities which dictates whether to attend antenatal clinics, how often to attend and where should they deliver. Women of low socio-economic status had more trust in traditional birth attendants and faith-based organisations rather than the hospital. An important recommendation is that women also need to be educated on any harmful cultural practices that may affect them. This is supported by Gelato *et al.* (2018: 183) who found that women prioritize their privacy hence, they visit a traditional healer where privacy is maximised. Women with complications also fear unwelcome procedures such as surgical interventions at health facilities that contributes to lack of seeking timeous health care.

Another major factor is the attitude of the health care professional plays in building a trust relationship and make women want to come back for health care.

#### **6.5.2.3.5. Attitude of staff**

The attitude of both doctors and midwives were found to be negative and undermining of each other and towards patients. Midwives at the CHC experienced problems with doctors at the referral hospital when arranging transfer of patients due to being undermined and disrespected as a midwife.

Negative attitudes of staff are also compounded by increased workload, unsafe working conditions and lack of support from superiors. Filby, McConville and Portela (2016: 13) indicate that the psychological impact of an overwhelming workload and not being able to care for their patients was associated with significant low morale, burn out and moral distress.

The ESMOE training and skills and drills exercises requires a team approach. This team of healthcare professionals is made up of doctors and midwives which simulates the clinical area during an obstetric emergency. Ameh *et al.* (2019: 10) confirm that multidisciplinary training is effective in improving healthcare knowledge, skills, communication and teamwork.

The WHO (2019a) in partnership with UNFPA, UNICEF AND ICM concur that inter-professional learning and respectful collaboration is essential to promote effective and efficient teamwork to ensure the best quality of care. Respectful collaboration is essential to overcoming institutionalized hierarchies of power that would prevent constructive communication. This is supported by Betran *et al.* (2018) who believe that the power between doctors, midwives and other maternity care providers and childbearing women strongly influenced the willingness of each party to engage or not to engage in the improvement of the ethos of the organisation.

Improvement in staff attitudes, support and respect among all health care professionals improves the working environment which in turn improves the quality of care that is provided.

#### **6.5.2.3.6. Transport delays**

Transport delays is a major challenge across SSA that results in delays of patients accessing care timeously as well as delays with inter facility transfers. This is similar to the three delays model developed by Thaddeus and Maine (1994) that explains that the distance to the nearest healthcare facility, travel time, cost of transportation and road conditions all contribute to type two delays. This delay in accessing timeous care in obstetric emergencies is a major contribution to why women die. (Gelato *et al.* 2018: 2; Mgawadere *et al.* 2017: 2). This study indicated the delay of more than four hours of waiting to transfer a patient from a CHC to a hospital for a retained placenta.

This is supported by Nyamtema *et al.* (2016) who reported that maternal and perinatal deaths in SSA were often attributed to lack of accessibility to comprehensive emergency obstetric and neonatal care services. This included poor roads, long distances, financial and or transport problems. Some women that were referred died or lost their babies before or after reaching the facility. Some women due to their complications arrived at the facility in critical states that was too late for successful interventions.

Similar transport problems are experienced in SA especially for the rural remote geographic areas. The SMR (NDoH 2017) recommend that monitoring of high-risk women must be continuous while waiting for transfer as well as during transit.

#### **6.5.2.4. Way forward in improving ESMOE training, skills and implementation**

The recommendations made by midwives on ways to improve effective implementation of ESMOE interventions in the workplace emerged into three main themes with appropriate subthemes.

##### **6.5.2.4.1. Improve staffing and teamwork**

The challenges experienced by the midwives included lack of advanced midwives, doctors, ESMOE trained staff, communication issues and poor teamwork. The lack of motivation and incentives to retain midwives was also recognised as a barrier that contributes to the shortages and high staff turnover. Amu and Nyarko (2016) found inadequate number of health care professionals is a major challenge that contributes to the lack of emergency preparedness. Consequently, when maternal emergency cases come into the facility it becomes difficult to manage.

Midwives in this study recommended that incentives, motivation and support from senior management will retain and attract staff especially in the rural health facilities.

Tarimo *et al.* (2018: 2) and Tembo *et al.* (2017: 5) agree that Sub-Saharan Africa (SSA) faces the biggest challenge of shortage of skilled health care workers which is most common in rural areas. Although the region bears over 24% of the global burden of diseases, it has only three percent of the global health workforce. Common factors that take health workers away from jobs are the lack of incentives, amenities and limited opportunities for career growth.

This is supported by Gelato *et al.* (2018) who confirm that poor management of EmOC included a lack of supportive supervision, delayed patient referral system, lack of teamwork and poor staff motivation. Findings also showed there was a heavy workload at health facilities due to high staff turnover as a result of a poor management system. This leads to patient overcrowding and poor communication systems among providers. Vedam *et al.* (2018: 2) acknowledged that when professionals collaborate on decision making and coordinate patient care, fewer intrapartum, neonatal and maternal deaths occur during critical obstetric events. Oosthuizen, Bergh and Pattinson (2018) agrees that irrespective of where women give birth, the interprofessional teamwork linking different levels of the health system should provide one standard of care.

Lundgren *et al.* (2019) pointed out that midwives' experiences found that obstetricians often thought they were responsible for everything and thus interfere and do not acknowledge the midwife's responsibility and knowledge especially on normal birth. Managers expressed that doctors and midwives should have the same approach and distinct guidelines to be followed by all professionals. The ESMOE guidelines requires teamwork for successful patient outcomes.

#### **6.5.2.4.2. Compulsory ESMOE training & updates for all obstetric midwives**

This was another theme that emerged from the recommendations by the midwives. The sub themes included regular ESMOE training and updates for all midwives to be part of continuous professional development and issuing of certificates for attendance of fire drills. This compulsory attendance and or participation in updates and fire drills should be a requirement for employee performance/bonus.

The SMR (NDoH 2017) agree that maternity units must have more than 80% of their staff trained in ESMOE and obstetric and neonatal emergency drills must be conducted monthly. Another recommendation includes that Chief Executive Officers, managers and heads of maternity units must monitor implementation of basic and comprehensive emergency obstetric and neonatal signal functions at all their facilities. District managers must ensure that pregnant women have access to the signal functions in the district.

Tembo *et al.* (2017) found that a higher proportion of health facilities had provided basic emergency obstetric care with availability of staff identified as a significant predictor for readiness to provide EmOC. Thus, the use of signal functions was highly dependent on the level of EmOC skill possessed by staff.

Khader *et al.* (2018) acknowledged that providing up-to-date evidence-based practices according to WHO recommendations can significantly reduce the number of deaths and improve the outcomes of women and new-borns during labour and early postnatal period. This study found that the lack of guidelines and protocols in many hospitals contributed to poor maternal and new-born care thus resulting in high rates of morbidity and mortality.

#### **6.5.2.4.3. Implement ESMOE training into midwifery curriculums guidelines training**

One of the themes that emerged in this study was the recommendation from midwives to implement the ESMOE interventions into training of basic midwives. This would equip the midwife with the relevant competencies in line with current management practices. Mahmood *et al.* (2018) admit that inadequate knowledge and skills and failure to follow best practice guidelines are a major factor contributing to maternal deaths.

Ameh *et al.* (2019:2) suggest that building the capacity of healthcare providers via in-service or on the job training has become a common approach across different settings. Regular training has become mandatory to ensure continued accreditation of healthcare providers. Many intervention programmes for maternal and new-born health in LMIC include training of healthcare providers in EmOC as a significant component of their workplan.

This theme was implemented as part of the Delphi in this study which is discussed in detail in the next chapter.

### **6.6. PHASE 4 – DELPHI TECHNIQUE**

A Delphi technique was employed to address the last objective of this study which was to develop a tool to assist the midwife with implementation of the ESMOE guideline. The tool was developed in two parts, one being an algorithm to improve competence



in implementing ESMOE guidelines by midwives and the second part was the development of a practice framework for the integration of specific ESMOE modules into midwifery training for all midwives. This will be described in the next chapter in detail.

## **6.7. SUMMARY OF THE CHAPTER**

This chapter discussed the results of each of the phases of data collection. Appropriate literature sources were employed throughout to enhance the discussion and compare other relevant studies. The development of an algorithm and a practice framework was the outcome of the study findings which is discussed in the next chapter.

## **CHAPTER 7: DEVELOPMENT OF A PRACTICE FRAMEWORK**

### **7.1. INTRODUCTION**

This chapter discusses and illustrates the practice framework that emerged from the findings of the study. The midwives that were interviewed expressed both their challenges in implementing ESMOE effectively as well as shared their suggestions to improve the implementation of this guideline.

The researcher took these findings and built on this by developing an algorithm that shows the need to improve midwifery clinical competencies. This algorithm was taken further to develop a practice framework that proposes to implement ESMOE interventions into the basic midwifery training to improve relevant knowledge and skills.

### **7.2. THE DELPHI DISCUSSION**

All ESMOE experts as stipulated in chapter four were invited to participate. However, only a few responded positively and contributed to the Delphi discussions, whilst some did not respond at all. The experts that participated included two professors and two midwives that are involved in management of ESMOE training across SA. The input from these experts were invaluable and effective in refining the relevant tools.

The Delphi process was modified due to the limited participants. There was no data to be analysed as the algorithm that was proposed initially was agreed upon with a few modifications. Communication was conducted via email to the experts. The process was done over three rounds when consensus was reached, and the tools were appropriately modified and finalised. The algorithm illustrated in Figure 7.1 below indicates the implementation of ESMOE guidelines by midwives illustrating both the positive effects followed by the challenges that impede its implementation. The solution to address the challenges from poor implementation resulted in the development of the practice framework. The framework is based on the proposed implementation of ESMOE training into the basic midwifery curriculum.

### 7.3. An algorithm to improve competence in implementing ESMOE guidelines by midwives

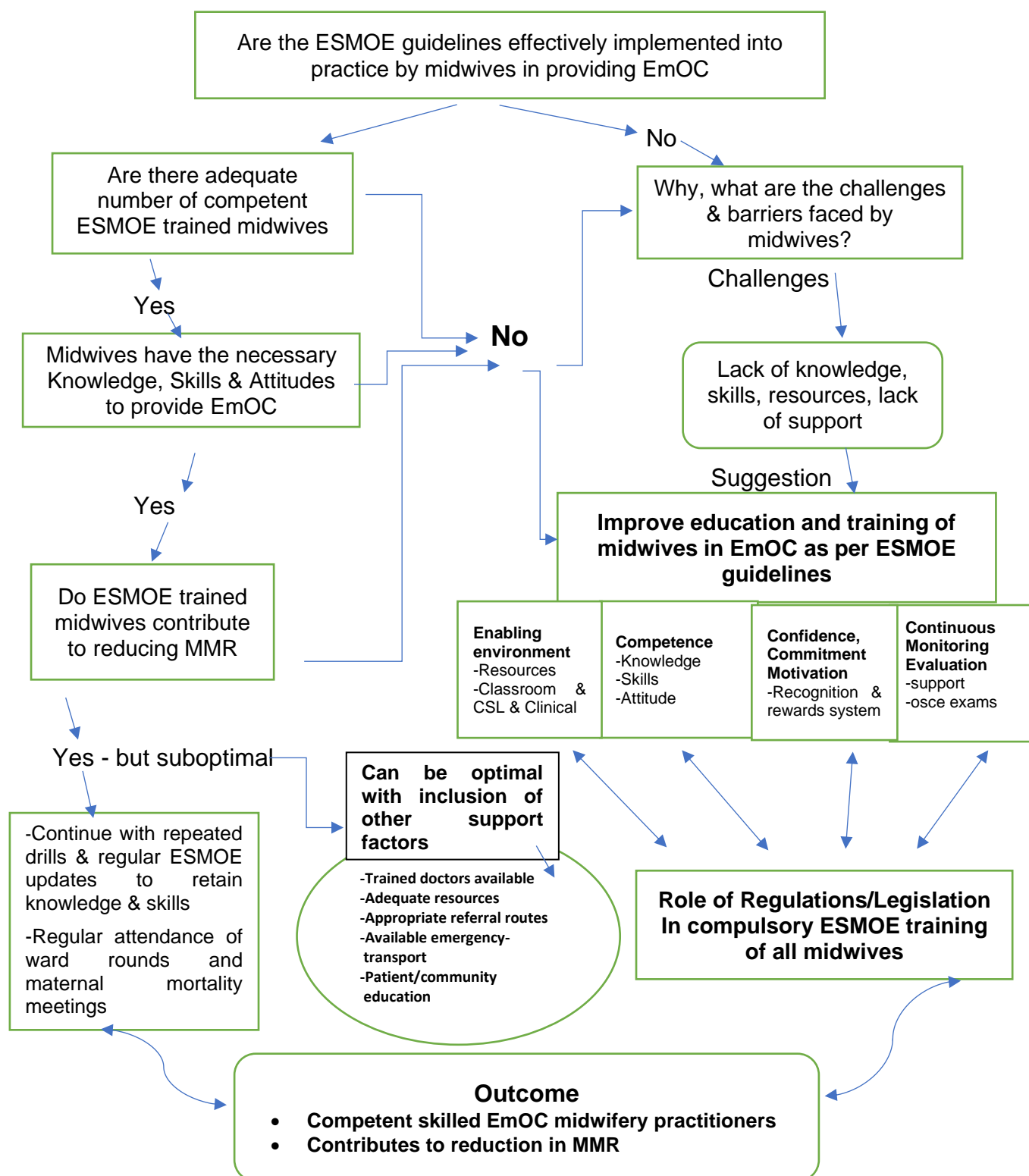


Figure 7.1: An algorithm for implementation of ESMOE into midwifery training

### **7.3.1. Explanation of the above algorithm**

The purpose of the above algorithm is based on the main idea of this study which was to analyse the effective implementation of the ESMOE guidelines by the midwives in providing effective emergency obstetric care (EmOC) to reduce maternal mortality.

The algorithm addresses the basic question that needed to be answered namely: is the ESMOE guideline effectively implemented by midwives as it was envisaged? Based on the main question there is a follow up question as to whether there are adequate number of trained ESMOE midwives to implement this guideline? Thereafter it is simple to follow the arrows that further look at whether these midwives have the necessary knowledge, skills and attitudes. However, for a reduction in the number of maternal deaths to be effectively seen, it needs multiple factors to be in place in the health system, not merely education and training of midwives. These other factors include adequate number of trained doctors available, available resources (drugs and equipment), appropriate referral routes, available emergency transport and patient and community education in accessing health care timeously.

Literature has shown that ESMOE management and training has contributed to a reduction in MMR across SA. However, to achieve the SDG target of a reduction of less than 70 per 100 000 live births is still farsighted. This study focused on the role of the midwife in effectively implementing the ESMOE guidelines in reducing MMR's. Therefore, continued training, repeated fire drills and updates for midwives as the frontline emergency obstetric care providers is essential in contributing to further reduce the current MMR and help achieve these SDG targets. Midwives regular attendance of ward round discussions and maternal mortality meetings will give them insight into management of various conditions and what could have been improved in those maternal deaths and how to avoid preventable deaths.

On the other hand, when the answer to the same question is No, then this needs further clarity as to why can't EmOC be provided efficiently and what are the barriers or challenges that midwives experience in effectively implementing the ESMOE guidelines into practice. There were a few challenges that emerged in this study that the midwives highlighted that are described below.

#### **7.3.1.1. Challenges and barriers observed in the study**

The main subthemes that arose from the challenges experienced by midwives included limited scope of practice and lack of clinical competence, inadequate ESMOE training of all midwives, limited resources that include staff shortages, no training equipment and lack of adequate drugs and equipment needed for provision of EmOC, lack of motivation and poor attitudes of staff. Other factors included patient factors in terms of not seeking care timeously and transport delays.

The discussions with midwives resulted in majority agreeing that midwives need to improve their knowledge, skills and attitudes in providing effective EmOC. Out of the 14 midwives that were interviewed 50% (n=7) agreed that a specific training course on relevant modules from the ESMOE guidelines should be implemented into the basic training of all student midwives. This will equip newly qualified midwives to go into the clinical area with the required knowledge and skills in implementing ESMOE interventions.

#### **7.3.1.2. Improve education and training of midwives in EmOC as per ESMOE guidelines**

One of the suggestions to improve midwifery training was to implement a one to two-week training course on EmOC based on the ESMOE guidelines within the midwifery curriculum for all midwifery students. This allows them to come into the clinical areas with the basic knowledge and competencies and are better prepared to practice and participate more confidently in managing obstetric emergencies. Many of the basic midwives (35.71%; n=5) explained that they had attended a two-day saturation training on ESMOE and felt it was inadequate to practice skills and attain relevant competence. Therefore, a training course on specific ESMOE training modules relevant to midwives should be made compulsory within the midwifery curriculum.

In the algorithm for training to be implemented there needs to be an enabling environment such as skilled teachers, training equipment, clinical skills laboratories and clinical mentors. The next requirement is for the midwife to achieve relevant competencies including the knowledge, skills and attitudes in the relevant ESMOE modules necessary for all midwives. For the training to be effective there should be adequate monitoring and evaluations of the training in the training school and in the

clinical areas. Also, there is a need for appropriate approval and governance for any education and training of nurses and midwives. Therefore, SANC as the regulatory body would have to authorise and control the training course with appropriate regulations.

The outcome of training midwives in EmOC that is based on ESMOE would result in competent midwifery practitioners as well as contribute in reducing maternal mortality rates. Following on this algorithm, a practice framework that further explains the outline of the suggested training course based on ESMOE training for student midwives is suggested.

#### **7.4. A PRACTICE FRAMEWORK FOR THE INTEGRATION OF SPECIFIC ESMOE MODULES INTO MIDWIFERY TRAINING FOR ALL MIDWIVES**

##### **7.4.1. The purpose of the practice framework**

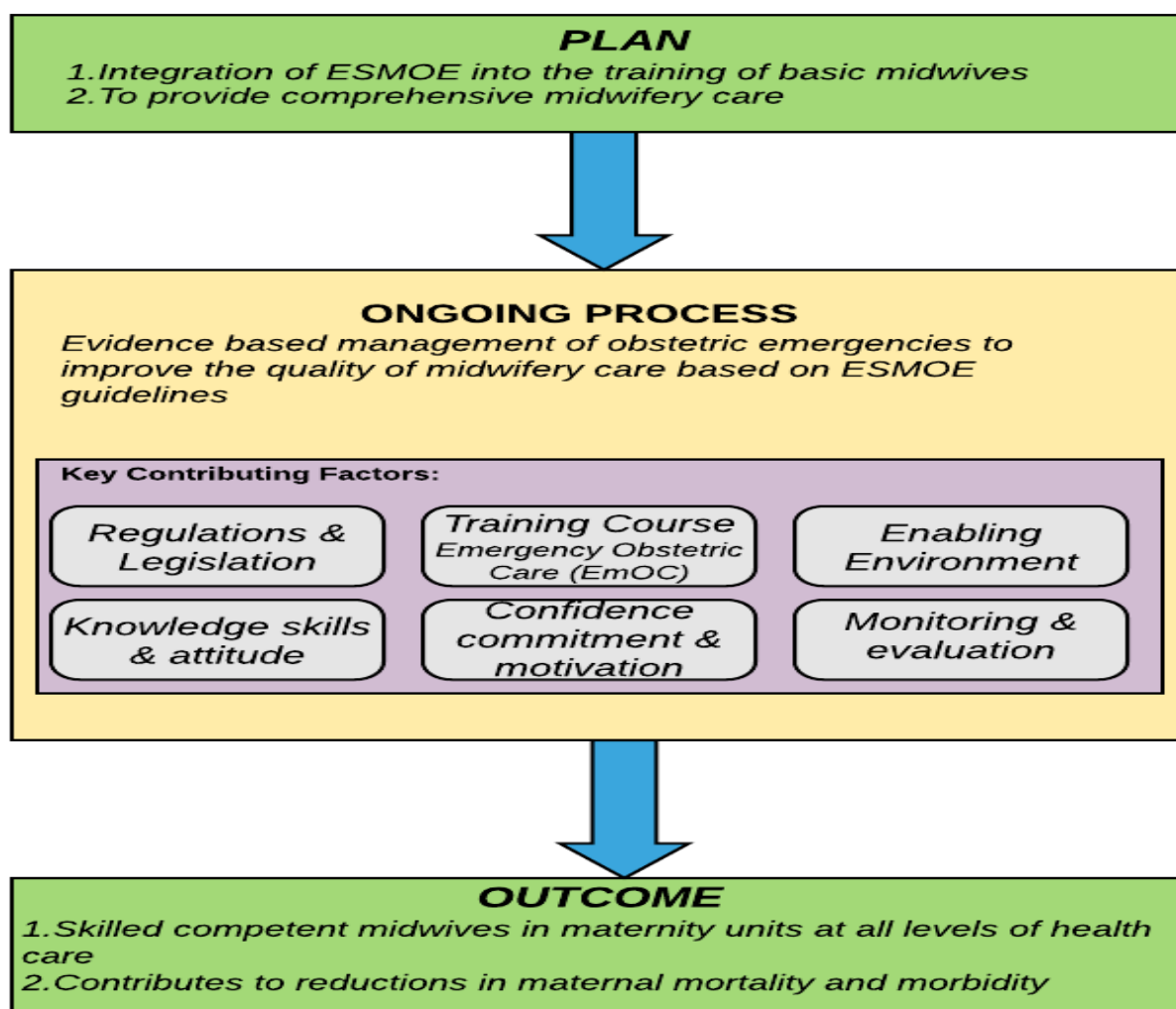
In the current midwifery training curriculum obstetric emergencies are included, however it is theory based with limited practice time and it is not as effective as the ESMOE training that is currently implemented for Doctors and Advanced midwives.

Therefore, the implementation of a specific course in basic midwifery training on management of obstetric emergencies based on the ESMOE guidelines would build their knowledge, skills, competencies and equip them to better understand and manage obstetric emergencies. Preparing student midwives from the beginning to become critical thinkers and manage obstetric complications in line with evidenced based practice is essential to reducing the MMR. The proposal of training midwives based on the same principles of the ESMOE management guidelines allows for continuous curriculum updates and relevance as these guidelines are always current and relevant. Furthermore, regular ESMOE training and updates after qualification would enhance and build on midwives' existing knowledge and competencies which would greatly contribute to reducing maternal mortalities.

The main purpose of this framework is to enhance the implementation of the ESMOE management guidelines into the competency-based midwifery training curriculum for student midwives.

The algorithm and practice frameworks were finalised following a Delphi discussion with experts in ESMOE that helped to improve the proposed plans.

The framework based on the algorithm is outlined and discussed in detail in Figure 7.2. below.



**Figure 7.2: The practice framework for integration of ESMOE into Midwifery training.**

#### **7.4.2. Outline of the proposed framework**

The framework in Figure 7.2 is designed to enhance ESMOE knowledge and skills in a competency-based midwifery curriculum which is expected to result in a desired outcome. The framework aims to implement, develop and assess specific indicators

that would continuously improve clinical competences of midwives in ultimately contributing to reducing maternal mortality and morbidity.

#### **7.4.3. Description of concepts in the practice framework**

The concepts in the framework include the plan which is to integrate ESMOE into midwifery training. The contributory factors to ensure successful implementation should include a regulatory body that controls midwifery training (e.g. SANC), an enabling teaching and learning environment, building the knowledge, skills and attitudes of midwives and appropriate monitoring and evaluation of the training in order to produce competent midwives. The training will be based on the skills and drills of the ESMOE guidelines that will produce midwives with the necessary knowledge of managing obstetric emergencies from their first midwifery qualification attained. Thereafter, continuous skills training and regular updates in ESMOE would reinforce and maintain competencies, which would result in reductions in MMR.

##### **7.4.3.1. Regulations and legislation**

This has been placed as the first factor in the framework as it is the first step needed for all training courses to be approved. Regulations are important in providing legislative guidance that is imperative for the practice of midwifery. A proposal to the regulatory body that controls education and training of midwives is necessary prior to implementing a training course on Emergency Obstetric Care (EmOC) as part of the Midwifery curriculums. The South African Nursing Association (SANC) is the accrediting and regulatory body that would approve midwifery programme development. The new qualifications currently implemented for midwifery training in SA is a one-year competency-based curriculum. Adding a specific 2-week course on EmOC as a compulsory requirement to attain the midwifery qualification would allow these new midwives to work independently, competently and with the required knowledge and skills at all levels of health care.

A further proposal to the ESMOE Board of Directors to provide their expertise for the specific modules from the ESMOE guidelines to be implemented in basic midwifery training once the proposed course is accepted. The basic knowledge on management of obstetric emergencies are currently included in the modules but are not implemented the same way as the ESMOE training is done. Consensus on training on



emergencies obstetric care is important to be aligned to the ESMOE guidelines as this has proven to be successful in reducing maternal mortalities across SA.

The scope of practice of midwives are based on the International Confederation of Midwives (ICM) essential competencies for basic midwifery. However, the ESMOE guidelines build on these competencies that prepare midwives to manage obstetric emergencies independently in the absence of doctors and prior to referral. The prompt initial care by the frontline midwife at all levels of care contributes to prevention of complications and contributes to saving lives.

The midwife undergoes specific competencies that differs significantly from that of a nurse. However, midwives are not given that recognition as a unique cadre of skilled health care providers. This is supported by Beek, McFadden and Dawson (2019) who believe that there is ambiguity in the delineation of roles between midwives, doctors and other health care workers, which is underpinned by the inconsistent use of the term “midwife” to not only refer to a fully trained and regulated midwife as per the ICM but is also used for lesser skilled workers.

Midwives trained to international standards and competencies are associated with improved quality of care. Hakimi *et al.* (2019) agree that a competency- based education in midwifery and in-service training is an efficient approach in managing obstetric emergencies that result in reducing maternal and neonatal mortalities. Thus, the involvement of SANC is imperative to assist with implementation of a specific course in these areas.

The following proposals to the SANC will help with implementing an EmOC Course into the training of all midwives:

- A two-week course on emergency obstetric care based on the ESMOE training guidelines relevant to midwives as a compulsory requirement to complete the midwifery training and to attain a qualification in Midwifery.
- To revisit the scope of practice of midwives and ensure that it is aligned to BEmONC Signal functions and the ICM.
- To provide certification for the course and accredit it as part of Continuous Professional Development (CPD) points on successful completion.

- To renew annual licensure as a midwife there should be relevant CPD points in either ESMOE training/updates or current certification of the proposed 2-week course to obtain renewal.
- A practical exam (OSCE) or like the skills drill as in the ESMOE guidelines can be conducted in a clinical skills laboratory or in the clinical area to evaluate midwifery skills & competencies prior to awarding a certification.
- In cooperating the management of specific obstetric emergencies or conducting fire-drills relevant to midwives as part of the clinical logbook requirements to ensure application of practice in obtaining competency.
- On completion of this midwifery qualification the midwives must be placed in maternity facilities across the various levels of health care.

The WHO (2019b) emphasises that continuous professional development should be built-in from the beginning for student midwives so that once they qualify, they can maintain international standards in practice.

#### **7.4.3.1.1. Training course on management of obstetric emergencies**

The proposed course aims to implement training on emergency obstetric care for student midwives and basic midwives as a 2-week training course within the midwifery curriculum. The focus is on knowledge, skills and attitude related to management of obstetric emergencies based on the ESMOE guidelines. This plan outlines the overview of the need and layout of integration of ESMOE into midwifery training.

The training course is proposed as part of the midwifery Diploma and is outlined below.

#### **7.4.3.2. Outline of the proposed framework of the training course**

<b>Name of training Course:</b> Emergency Obstetric Care (EmOC)
<b>Qualification obtained on completion:</b> Advanced Diploma in Midwifery (EmOC to be a part of the current SANC qualification in midwifery)
<b>Duration:</b> 2 full weeks, comprising of Theory, Skills and clinical competency
<b>Modules to be covered:</b> Maternal resuscitation including shock, Pre-eclampsia and eclampsia, neonatal resuscitation, postpartum haemorrhage, Partogram and obstructed labour, shoulder dystocia, cord prolapse, Active management of 3 <sup>rd</sup> stage and retained

products of conception, fetal monitoring and CTG as well as including Covid-19 in pregnancy

**Credits:** to be included into the 120 credits of the diploma programme

**Instructors:** Certified ESMOE trained facilitators/midwifery lecturers or District Clinical Specialist Teams (DCST)

**Purpose of the training**

- The primary purpose of this training course in emergency obstetric care is to prepare the midwife from initial training to engage in problem solving, become critical thinkers and function as independent competent practitioners.
- To apply the fundamental and core midwifery knowledge and skills in advancing their potential and practice in providing comprehensive quality midwifery care within a legal and ethical framework across a wide range of facilities.
- The successful completion of all clinical competencies within this course contributes to attaining an advanced midwifery qualification as per SANC requirements.
- Provide midwives with a wide range of skills, knowledge, responsibilities and attitudes enabling them to function as change agents in contributing to a meaningful, sustained and improved midwifery profession.

**Rationale of the training course**

This course will enable the midwife to practice as a competent clinically focused midwifery practitioner in providing evidence based comprehensive care from antenatal to the post-partum period for all women, families and communities.

The midwife at all levels of care is the frontline health care worker that the patient first encounters. The WHO (2019b) confirm that majority of emergency obstetric interventions are first provided by midwives through the PHC level. It is therefore imperative for midwives' to be knowledgeable and competent in identifying, managing and referring patients as necessary. Upon graduation basic midwives are placed in the forefront in maternity health care facilities across various levels and are faced with obstetric emergencies that require their skills in effectively managing problems. However, the midwifery training received currently is not focused on competencies on managing obstetric emergencies as set out in the ESMOE guidelines.

Pattinson *et al.* (2019) acknowledged that the off- site skills and drills ESMOE saturation training held in specific districts contributed to a reduced maternal mortality. However, ESMOE training courses has its limitations including limited training sessions, cost factors, need for master trainers to conduct training, senior staff attending first, especially advanced midwives and general shortages of midwives to attend especially if the training is held off site. These limitations leave the new midwifery graduate without knowledge of ESMOE training and yet she is expected to manage all high-risk and low-risk maternity cases post-graduation. Therefore, an initial course focused on preparing midwives in their basic training will enable them to have the know-how and apply relevant ESMOE related competencies effectively in managing all high-risk women as well as participate actively in fire drills in order to keep updated.

Ameh *et al.* (2019) confirm that short competency-based courses in emergency obstetric care results in significant improvements in the knowledge, skills and change in clinical practice for the care provider thereby resulting in improved health outcomes. Beek, McFadden and Dawson (2019) agree that there is an urgent need to scale-up all midwifery training to address two important aspects one being the staff shortages and also to ensure that midwives have the necessary knowledge and skills to function to their full potential in both emergency and non-emergency obstetric management.

Oosthuizen, Bergh and Pattinson (2018) summarise that a well-structured training programme (as in ESMOE) improves quality of care and reduces maternal deaths. They believe that building both confidence and capacity of health care workers will enable them to deliver effective emergency obstetric care which will reduce MMR.

Therefore, a training course specifically designed for midwives on EmOC with supportive supervision and close mentoring will contribute to responsible, accountable and competent future midwives.

In the WHO (2019b) document on strengthening quality of midwifery education UNFPA, UNICEF and ICM concur that midwives should be educated and trained to international standards and enabled to legally practise to their full scope of midwifery.

Evidence-informed midwifery education and training should focus on both clinical and theoretical competency while also ensuring educators remain practitioners that can fully support midwives to provide their full scope of practice.

The conceptual framework for quality of care in maternal health services by WHO (2019b) proposes an education program that prepares midwives for service in both rural and urban communities as evidence shows that midwives based in the community can make a difference to reproductive health especially where the health care infrastructure is less developed.

#### **7.4.3.3. Enabling environment**

For learning to take place effectively the environment needs to be conducive for both theory and clinical practice to meet the learning objectives and outcomes of the course. An enabling environment includes the physical infrastructure, competent educators, current curricula and adequate current teaching and learning resources.

According to WHO (2019b) one of the steps in the conceptual framework for quality maternal and new-born care emphasise the need for experienced, educated and well supported midwifery educators in both the classroom and clinical setting and ensure that their teaching is evidenced based and context specific. They recommend the use of innovative technology including e-learning packages especially for rural remote settings, videos and simulation for life threatening events that happen less often.

Filby, McConville and Portela (2016) agree that a barrier in improving midwifery training includes the lack of investment in faculty who are competent in education, theory and clinical practice. Similarly, in Jordan midwifery was being taught by nurse educators or doctors with little knowledge of the midwifery model of care. Lecturers across LMIC's including Africa were found to be disconnected from the clinical area, with no resources to update their clinical knowledge thereby causing midwives to graduate with outdated practices. It is therefore imperative for midwifery lecturers who teach EmOC training courses to be competent in ESMOE and updated in order to teach current evidence-based practices.

The WHO (2019b) and ICM (2019) support Hakimi *et al.* (2019) who point out that development of competence requires an environment that nurtures the learner and allows the learner to make mistakes with minimal or no consequences. The ideal

environment would therefore be a well set up clinical skills laboratory (CSL) with appropriate training mannequins and equipment and the availability of internet access.

The ESMOE training package uses a skills and drills teaching strategy in off-site settings with high fidelity mannequins and expert trained facilitators. Thus, the training institute should have a well-equipped clinical skills laboratory with training mannequins and ESMOE trained lecturers for simulated learning and competencies on emergency obstetric care to be achieved successfully. Hakimi *et al.* (2019) agree that learners training by using mannequins in a quiet environment before entering the hospital setting can decline stress and enhance self- confidence and self-efficacy.

#### **7.4.3.4. Knowledge, skills and attitudes of midwives**

Student midwives must be taught to recognize, manage and refer obstetric emergencies effectively and demonstrate competency in life saving skills in order to make a difference in maternal health. Hakimi *et al.* (2019) admit that the competency-based educational approach is one of the active learner centered methods which increases the ability to perform skills through practice and repetition. The WHO (2019b) believe that a competency-based curriculum involves students to be engaged in their own learning throughout the education and training program and allows them to learn to recognise and manage complications effectively and be competent in life saving skills. This is appropriate for EmOC training as midwives can focus on their own learning needs and build individual competencies.

Chabeli, Malesela and Nolte (2016) agree that awareness of the need for critical analysis of personal practices is essential in order to identify the need for acquisition of knowledge, skills and attitudes (KSA) required to engage in interactive processes to facilitate best practice during intrapartum care. Midwifery care is dynamic and evolving and it is important for midwives to keep up with new developments. Upskilling clinical programmes such as ESMOE should be made available to midwives which would bring about clinical expertise. Obstetric emergencies such as shoulder dystocia, bimanual compression of the uterus, manual removal of the placenta and management of PPH are some of the modules taught in the ESMOE guidelines. Hakimi *et al.* (2019) agree that these are some of the common obstetric emergencies that midwives need to achieve competency in managing before being exposed to it in the clinical areas which will help reduce maternal mortality.

Currently the ESMOE training is done as short courses that range from 2 to 3 days for a mix of health care personnel including doctors and midwives. This has proven to be effective in reducing MMR as the midwives are involved in clinical EmOC and have already acquired clinical experience and skills and the 2-3-day courses serves as an update of existing skills. However, a training course on EmOC implemented into the training of new student midwives will require a longer session of a suggested 2-weeks to ensure that all the relevant knowledge, skills and changes in behaviour are acquired to demonstrate competency. Midwives with the relevant fundamental knowledge and skills in EmOC will be better equipped with relevant insight from the beginning when placed in the clinical areas to effectively manage normal and emergency cases. Within these 2-weeks students will be able to practice in a simulated CSL in the relevant modules and be prepared to engage effectively in the clinical areas. Thereafter the clinical placement within the curriculum will include specific competencies based on EmOC as part of work integrated learning. In the clinical areas the midwives must be encouraged to attend regular ward rounds where the patients' condition and management is discussed in detail which would increase their knowledge. Compulsory attendance of maternal mortality meetings is another suggestion to improve the midwives' insight into what was done incorrectly and what could have been done differently in avoiding those preventable maternal deaths.

Ameh *et al.* (2019) and Subrahmanyam, Joseph and Abraham (2017) concur that health care worker preparedness to provide EmOC is a critical element in the provision of quality care by having the necessary knowledge, skills and change in clinical practice to be able to recognise an emergency and then respond appropriately.

Strengthening of education by regulation that complies with international standards would benefit maternal health care. Quality of care would be further strengthened by licensing or re-licensing systems that require the midwifery workforce to demonstrate continued professional development. In SA we need to redefine midwifery to comply with the new international definition of midwifery as per International Confederation of Midwives (ICM) (2019) which includes a unique body of knowledge, skills and professional attitude, who practice within a professional framework of autonomy, partnership, ethics and accountability (NDoH 2017; International Confederation of Midwives 2019; WHO 2019b).

#### **7.4.3.5. Confidence, commitment and motivation**

Pre-training in EmOC that is based on the skills and fire drills of ESMOE that is implemented into the basic training of midwives will prepare them for the clinical areas to effectively manage relevant emergencies.

Midwives that are prepared in a simulated skills laboratory during training on managing obstetric emergencies will enhance both their KSA's and their confidence levels thereby motivating them to practice these acquired skills. Subrahmanyam, Joseph and Abraham (2017) agree that midwives who are confident in EmOC are likely to have had prior experience and have been prepared to respond promptly and effectively. Gaps in such preparedness should be identified and corrected to safeguard the life of pregnant women.

The focus on adequately exposing midwives to obstetric emergencies in a simulated CSL allows the student to assess their own learning needs and develop confidence and competencies. This is supported by Moores *et al.* (2016) who found in a study assessing the practice of midwifery graduates that majority midwives reported that they did not have enough time in the clinical areas to practice their skills and needed longer rotations to build confidence. However, other graduates found they were not given the time to practice during clinical placement as the medical students, residents and medical officers were given priority over midwives to practice procedures.

Therefore, a course specific to midwives based on EmOC would allow them to practice, build individual skills and boost their confidence levels which would result in motivating them to keep on learning and practicing. Supervisors and management that show midwives appreciation and recognizes good performance will help further motivate and build their confidence.

Moores *et al* (2016) confirm that midwives that acquire new EmOC skills felt motivated that they were contributing to a decrease in maternal mortality. They also found that women were motivated to attend a health facility in response to the improved midwifery care they received.

Chabeli, Malesela and Nolte (2016) concur with Moores *et al* (2016) that motivation improves in the presence of innovative workplace practices which is directed by a



visionary leader. A motivated midwife also enhances the organisation's achievement and maintenance of best care practices.

#### **7.4.3.6. Monitoring and evaluation**

The WHO (2019b) believe that there are great benefits to both midwives and mothers and babies when midwives are supported and supervised in clinical practice by their supervisors. This allows the midwife to provide a higher level of care when they are nurtured, developed and empowered. It is important that the role of the supervisor includes continuous monitoring the practice of midwives to ensure that safe standards are maintained whilst encouraging continuous personal educational development.

Evaluation of relevant competencies based on EmOC are imperative to ensure that learning has taken place which can be done in a CSL or in the clinical environment. However, Hakimi *et al.* (2019) believe that using objective structured clinical examinations (OSCE) is a valid method in measuring students' competency and performance. This educational approach is currently applied in nursing and midwifery training programmes across SA. The goal with a specific EmOC training course is to improve and focus on obstetric emergencies as a separate evaluation to enhance the relevant knowledge, skills and attitudes of midwives in preparing them for the clinical environment.

Oosthuizen, Bergh and Pattinson (2018) concur that high- quality obstetric care can be brought back into communities through health systems strengthening and the improvement of midwifery skills and capabilities. To achieve this, it also requires supportive leadership, clinical governance and accountability at micro, meso and macro levels.

#### **7.4.4. Outcome**

The purpose of integrating the ESMOE guideline into the practice framework for midwifery training is to produce competent midwives that can provide effective EmOC at all levels of care. Midwives are placed at both rural and urban health facilities and are the primary care providers. The shortages of doctors especially at the PHC levels makes the midwife the frontline care provider that faces the emergency on her own. Therefore, it is imperative that this midwife is knowledgeable, skilled and a competent care provider for both low risk and high- risk obstetric women.

Early recognition and prompt management, appropriate referral and efficient emergency transport is essential in managing obstetric emergencies. Effective comprehensive obstetric care requires teamwork, adequate number of trained doctors and available resources to provide quality care thereby contributing to a reduced MMR.

## **7.5. SUMMARY OF THE CHAPTER**

The development of an algorithm and a practice framework was the outcome of the study and findings, with the focus on improved implementation of the ESMOE guidelines in practice by midwives.

The following final chapter concludes the study and highlights the limitations and recommendations for future research.

## **CHAPTER 8: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS**

### **8.1. INTRODUCTION**

This final chapter concludes the study based on the aims and objectives presented in chapter one. The limitations of this study and recommendations including future research proposals were highlighted.

This study focused on the implementation of the obstetric management guidelines by midwives in reducing maternal mortality in SA. The guideline that is referred to and that is currently used at all health facilities providing maternal and new-born care is Essential Steps in Managing Obstetric Emergencies (ESMOE).

The ESMOE guidelines has been in place in SA in managing obstetric emergencies. Although the implementation of this guideline has shown improved reductions in MMR, it is still inadequate in attaining the SDGs goal of the reduction of less than 70 maternal deaths per 100 000 live births by 2030. With under ten years to go in achieving this target, there must be major improvements in the implementation of ESMOE in drastically reducing MMRs in SA. Thus, this study aimed to analyse the implementation of this guideline by midwives.

### **8.2. A DESCRIPTION OF THE CRITICAL COMPONENTS OF THE ESMOE GUIDELINE AND THE RELEVANT MODULES AS APPLICABLE TO THE MIDWIFE**

The focus of this objective was to allow readers that are unfamiliar with ESMOE to have an overview of the relevant modules in the ESMOE guidelines and understand the critical steps necessary in managing these relevant obstetric emergencies. It also allows the reader to understand the history and adaptation of EmOC based on international standards to the development of the ESMOE guideline. This guideline was modified and adapted to meet the maternal health needs of the South African population. Although the ESMOE guidelines has 13 modules, this study limited the modules to specific common causes of maternal deaths. The management of the

common causes of maternal deaths, which were pre-eclampsia and eclampsia, postpartum haemorrhage and HIV and AIDS that is applicable to the midwives' scope of practice was described.

### **8.3. IDENTIFICATION AND DESCRIPTION OF THE MATERNAL HEALTH CARE LOGISTICS THAT MIDWIVES FACE AT THE DIFFERENT LEVELS OF HEALTH CARE FACILITIES IN KZN**

The constraints faced by midwives at all relevant health facilities were identified. There was only one combination district/regional hospital that had a midwifery obstetric unit run by midwives with low risk labouring women. All hospitals had a theatre and high care facilities which the CHC lacks. All health facilities had shortages of staff, lack of appropriate equipment, inadequate supply of certain drugs, a lack of ESMOE trained staff and lack of advanced midwives especially at the CHC and district hospitals (DH). There are more than five maternity wards in all hospitals and having five and less ESMOE trained staff is significantly inadequate to staff all the wards on both day and night duties. Two of the eleven health facilities did not have any ESMOE trained midwife, one being a CHC and one DH. The general shortages of obstetricians at hospitals and absence of ESMOE trained doctors at the CHC was evident in this study. This is significant to note that institutions that had few or no ESMOE trained staff in the maternity units would result in the ESMOE guideline either not being implemented at all or ineffectively due to lack of relevant skills and competencies.

The shortages of equipment and drugs, high patient numbers and shortages of competent staff resulted in sub optimal care. The CHCs and DH usually transferred all high-risk obstetric emergencies to regional or tertiary hospitals. However, the implementation of EmOC in line with the ESMOE guidelines prior to and during transfers were already compromised due the lack of resources such as ambulances, delays in transfers and lack of skills and competence resulting in sub-standard care. Thus, many of the maternal deaths that were transferred to RH/TH arrived in critical conditions and subsequently died at these referral hospitals. This creates a significant burden on the referral hospitals. Although there is an upward referral system in place there seems to be a lack of a downward referral of low risk patients to a DH or CHC.

Despite the CHC having had the highest number of first antenatal bookings as compared to the hospitals, the average number of normal deliveries were the lowest

at CHCs. More than 50% of deliveries took place in hospitals rather than at primary health care facilities. This indicates the high number of patients that are referred to hospitals thus increasing the delivery rates in hospitals. The ESMOE guidelines recommends that obstetric emergencies that are seen at a CHC or DH should be stabilised, emergency management implemented followed by prompt transfer of the patient to the nearest referral hospital. The referral pattern is in line with the District Health System where all PHCs and CHCs have their own geographic referral District, Regional or Tertiary hospitals. The hospitals had a 67% caesarean section rate of the total deliveries, which is due to all the complications and high-risk women admitted to hospitals.

The lack and shortages of basic equipment and drugs was a general challenge in many facilities, with the CHCs most affected. At a clinic the maternity department had a minimum of three wards sharing one cardiotocograph as this was the only one in working order. This kind of shortage of essential equipment poses a real threat to effective quality care provision. The lack of intravenous flow regulators and monitors at most facilities significantly affects management of obstetric emergencies. These are essential equipment used to control the rate and flow of intravenous fluid and medication. This affects the rates of intravenous intake and medication administration which can lead to fluid overload with further complications and poor health outcomes. The lack of both human and physical resources was a major challenge that added to the provision of optimal care, which was further compounded by the lack of skills and competencies in most doctors and midwives in efficiently managing emergency obstetric care.

This is supported by the SMR (NDoH 2017) that believe that 61% of maternal deaths over the last triennium was potentially preventable and attributed to mostly poor-quality care during the antenatal, intrapartum and postnatal periods. Recommendations included improving ESMOE training for doctors and midwives and monitoring the implementation of basic and comprehensive emergency obstetric and neonatal signal functions at all facilities.

#### **8.4. DETERMINING WHETHER THE GUIDELINE WAS IMPLEMENTED AS ENVISAGED AT THE DIFFERENT LEVELS OF HEALTH CARE**

The period from January 2016 to April 2016 reported 17 maternal deaths of which eleven were applicable to the causes relevant to this study.

Majority of the causes of deaths were related to complications of hypertensive disorders and HIV/AIDS. There was no death in these facilities that was due to obstetric haemorrhage. The management of hypertensive patients included administration of antihypertensive drugs and MgSO<sub>4</sub> as per ESMOE guidelines. The use of MgSO<sub>4</sub> without appropriately repeating the required doses and vigilant monitoring for toxicity was evident in this study. The concurrent use of antihypertensive drugs with MgSO<sub>4</sub> to lower the blood pressure in pre-eclamptic and eclamptic women contributed to poor health outcomes.

The findings revealed that the main contributory factors that contributed to these maternal deaths included delays in seeking health care, sub-standard care, non-compliance to treatment, poor records and delays in transport to reach a health facility.

#### **8.5. EXPLORING AND DESCRIBING THE CHALLENGES CONFRONTED BY MIDWIVES IN IMPLEMENTING THE INTERVENTIONS OF ESMOE**

There were four major categories that emerged from the interviews, namely.

- ESMOE training experiences,
- Implementation of ESMOE in the clinical setting,
- Challenges with successful implementation of ESMOE guidelines in reducing maternal deaths,
- Way forward in improving ESMOE training, skills and implementation.

Each of these provided valuable insights that allowed for the development of an algorithm and EmOC training framework for midwives to improve their knowledge and skills in providing optimal quality care to women in reducing maternal mortality.

##### **8.5.1. ESMOE training experiences**

Midwives generally felt that the benefit of ESMOE training improves knowledge and skills. However, the duration of training on relevant modules should be increased to

practice the relevant skills and gain competency. The training should be followed up by regular updates such as skills and drills exercises to maintain clinical competencies that are needed by midwives to perform efficiently in emergency situations.

#### **8.5.2. Implementation of ESMOE in the clinical setting**

The challenges of successful implementation of the ESMOE interventions included: the clarity and availability of guidelines and algorithms and the infrequent conducting of skills and drills exercises. Midwives found that the guidelines were clear with a step by step approach for most modules, however the visibility of the algorithms at the patients' bedside was a barrier to effective implementation. The ability to follow the guidelines in a chronological order was not always possible in emergency situations and different case scenarios. The guidelines emphasise the effectiveness of teamwork and collaboration in an emergency situation. This was a major challenge due to staff shortages, inexperienced staff and lack of skills and competencies. At the CHC, teamwork in an obstetric emergency was almost impossible as often there was no ESMOE trained staff on duty to assist.

According to the stipulations of ESMOE training the lead doctor and midwife are responsible to conduct skills and drills simulations exercises of various obstetric emergencies at least once a month. However, the challenges that impedes regular simulation exercises in the clinical environment included lack of ESMOE trained staff to conduct drills, lack of motivation of staff, lack of time due to busyness and frequent movement and rotation of staff. Staff felt overworked with the high turnover of patients and shortages of skilled staff with no time or motivation to conduct training. The lack of training mannequins in many facilities further prevents running of regular fire-drills.

The other concern was the role of District Clinical Specialist Team (DCST) in ESMOE training, monitoring and conducting of skills and drills exercises. Midwives generally felt that there was poor visibility of the DCST members in their facilities. They expressed the need for DCST to be more involved in assisting with fire-drills exercises, monitoring and evaluation of training activities and to provide support and motivation for staff in the clinical areas.

### **8.5.3. Challenges with successful implementation of ESMOE guidelines in reducing maternal deaths**

The main theme that emerged from this category included health systems failures. This included lack of resources, poor infrastructure, patient factors and transport challenges that contributed to poor implementation of ESMOE.

This study revealed that these challenges re-emerged throughout the relevant phases of the results. These findings were consistent to many other studies that were referred to within the study, which shows that these are common challenges across SA and other LMIC.

The limited scope of practice of midwives impedes the implementation of comprehensive emergency obstetric care signal functions. This is further challenged by the lack of adequate knowledge, skills and attitudes in providing efficient quality EmOC. It was found that some of the district hospitals and the CHCs were not fully compliant with the seven signal functions of BEmONC provision.

Thaddeus and Maine (1994) three-delays model was evident in this study that contributed to delays in implementation of EmOC. The three-delays included: delay in deciding to seek care, delays in reaching a healthcare facility and delays in receiving care at a health facility. Patients came to hospital too late and in critical conditions which made the ESMOE interventions a futile effort. Transport delays were highlighted throughout the study, which included lack of ambulances, cost factors, poor roads, inaccessibility to areas and long distances to referral health facilities. Paramedics that lacked the skills in managing obstetric emergencies during transit also resulted in further complications and maternal deaths.

Communication barriers between staff and foreign patients created a lack of understanding of danger signs in the high-risk women that results in delay in seeking care.

For the successful implementation of the ESMOE guidelines there must be relevant knowledge, skills, attitudes and collaboration amongst all health care professionals within an enabling environment to execute optimal care.



#### **8.5.4. Way forward in improving ESMOE training, skills and implementation**

Midwives made recommendations to enhance the implementation of ESMOE interventions in the clinical settings. The themes that emerged included improving staffing and teamwork, compulsory ESMOE training & updates for all obstetric midwives and implementing formal ESMOE training into midwifery curriculums.

The ESMOE training course is recommended to be done in groups of health care workers that roleplay relevant clinical case scenarios based on the clinical team in the ward. Similarly, to conduct regular simulated skills exercises in the wards there needs to be appropriately trained staff and numbers to conduct or attend training. This lack of skilled staff was a common challenge across facilities. Staff that are ESMOE trained should be retained through incentives and support to avoid high attrition of skilled staff.

ESMOE training should be compulsory and available to all health care workers in all maternity units at all facilities. Midwives requested that they have regular training and updates as well as time to practice skills on modules that are relevant to them.

Another theme that emerged from the interviews was that ESMOE training should be modified and implemented into the midwifery training of all basic midwives. This will allow them to go into the clinical areas post qualification having the basic knowledge, skills and competencies in EmOC. Currently the midwifery training focuses on normal low risk pregnancy, labour and postpartum with little emphasis on the obstetric emergencies. The idea of having EmOC training as a compulsory course within the basic midwifery training programme would enhance the competencies of the midwife. Conducting training using the skills and drills simulation methods of ESMOE will encourage active learning and build individual competencies of midwives. The concept of this training was implemented as part of the Delphi technique to develop a practice framework which was discussed in detail in chapter seven.

#### **8.6. AN ALGORITHM AND PRACTICE FRAMEWORK TO INTEGRATE ESMOE INTO THE BASIC MIDWIFERY TRAINING PROGRAMMES**

The study identified key shortcomings in the implementation of ESMOE by midwives.

An algorithm and practice framework were developed through a Delphi Technique. The idea of integrating ESMOE as a two-week course within the midwifery training

emerged from the study results. The input of ESMOE experts helped refine the algorithm and the practice framework. (presented in Chapter 7).

***The practice framework focuses on achieving evidence-based management of obstetric emergencies to improve the quality of midwifery care based on ESMOE guidelines.***

## **8.7. LIMITATIONS**

The major limitation of this study was the number of districts sampled to allow generalizability of the study. This was due mainly to logistics, time and cost in conducting a large comprehensive study which aims to address a significant and challenging health problem identified not only by WHO but also by the provincial and national departments of Health.

The findings of this study cannot be generalised to any KwaZulu Natal district as the health facilities were purposively chosen in two districts which were linked by the referral systems of patients. All health facilities in these districts were not included in the study.

Another limitation was that midwifery educators' voices are silent in this study with regards to their understanding and knowledge of the ESMOE guidelines and its implementation in the teaching of midwifery. The practice framework developed forms the basis to integrate ESMOE into midwifery training as a two- week course. This proposed model will need to be refined, tested and approved before it can be implemented.

## **8.8. RECOMMENDATIONS**

Despite the few limitations of the study, the following recommendations with special reference to midwifery practice, midwifery education and future research are based on the findings of the study.

### **8.8.1. Midwifery practice**

Despite ESMOE training being scaled up in SA, a shortage of trained midwives remains a challenge at all health facilities and all maternity wards. A recommendation is for ESMOE training to be used as part of the SANC continuous professional

development system and be made a requirement to renew annual licensing to practice. Clinical managers and supervisors need to take on a more committed role of monitoring and evaluating clinical competence and ensuring that this is updated regularly for all clinical midwives.

It is recommended that district and hospital managers need to ensure adequate skilled staff, resources and other relevant necessities are in place to provide effective quality obstetric care.

### **8.8.2. Midwifery education**

The younger midwife with basic midwifery education is usually not the first person chosen to attend ESMOE training, unlike her counterpart the advanced midwife. Despite the clinics and hospitals being staffed by many basic midwives that are expected to manage both low and high-risk obstetric patients. This often leaves the basic midwife with lack of skills and competencies in EmOC provision which contributes to the sub-standard care and ultimately increased MMR. The practice framework that emerged from this study is a recommendation to enhance the implementation of ESMOE training into the midwifery programmes. This is proposed as a modified two -week course for the basic midwife on selected ESMOE modules. An enabling environment to provide training includes the infrastructure, resources and competent ESMOE trained educators that also have clinical experience and a midwifery speciality that will enhance teaching. This will ultimately prepare the midwife with the knowledge, skills and relevant competencies in efficiently implementing EmOC successfully at the patients' bedside. A recommendation to get this course accredited and regulated by SANC will enhance the credibility of the training.

The proposed practice framework could assist curriculum planners to improve and implement this course successfully into midwifery training. The micro curriculum based on the selected ESMOE modules will be the next step in the implementation of such a framework.

### **8.8.3. Future research**

The results of the study revealed specific challenges faced by midwives that impedes successful implementation of the ESMOE interventions in selected districts. There are limited studies that look at the midwife and their successes and barriers in the provision

of safe EmOC. Hence, this study could be expanded by comparing districts or provinces with high MMR to those with lower MMR to identify what strategies are more effective in providing EmOC related to midwives. Another recommendation could include a qualitative study to assess the experiences of midwifery educators in teaching and evaluating emergency obstetric and neonatal care and management among student midwives. With regards to the healthcare logistics which was a major challenge in this study and in other similar studies the researcher recommends that a study should be conducted to analyse the gaps regarding the continuum of care from the CHC setting through to the referral hospital.

The year 2020 is associated with the Coronavirus pandemic (COVID -19). This pandemic is affecting and infecting millions of people across the entire world with an escalating mortality rate. Currently as of the end June 2020 the infection rate is just over ten million infections and over half a million deaths globally (WHO 2020). The WHO and other health agencies have provided preliminary guidelines to assist with potential prevention and management that is still in its' trial stages. Research is ongoing in preventing and managing COVID-19 in pregnancy and the potential for vertical transmission to the fetus. Global research is necessary in providing evidence-based guidelines in successfully preventing and managing Covid-19 infections in pregnancy, labour and postpartum. Hence, the recommendation of an additional module on this current pandemic be included in the ESMOE guideline to provide standardized interventions to follow in line with the global infection prevention and control measures.

## **8.9. SUMMARY OF THE CHAPTER**

This study attempted to analyse the implementation of the ESMOE guideline by midwives in reducing MMR. It was evident that the knowledge, skills and competencies of the midwives in efficiently managing obstetric emergencies was inadequate and needs to be improved. The findings of the study led to the development of an algorithm and practice framework that proposes to implement this guideline into the midwifery training as a specific course for student midwives in providing efficient quality EmOC.

An ESMOE training course completed within the midwifery training will allow the young midwife to embark on his/her midwifery journey into the clinical area with the knowledge, skills and insights of the importance of EmOC in reducing MMR's in SA

and globally. Building the midwives training on the foundations of the ESMOE guidelines will not only develop her knowledge, skills and attitudes, but her acceptance, motivation and confidence to continue developing her competencies.

The ESMOE guidelines has proven to be the most crucial evidence-based practice tool in reducing MMR's in SA. However, further efforts not only by health administrators and managers but by the clinical specialists at the bedside is needed to enhance the implementation of the ESMOE guideline in achieving the SDG target of less than 70 maternal deaths per 100 000 before 2030 and beyond.

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# ANNEXURES

## Annexure 1: DUT Ethics approval



27 October 2016

IREC Reference Number: **REC 44/16**

Ms A Sewnunan  
52 Scott Place  
Northdene  
4093

Dear Ms Sewnunan

**A critical analysis of the implementation of obstetric management guidelines, on common causes of maternal deaths, as applicable to midwives**

The Institutional Research Ethics Committee acknowledges receipt of your final data collection tools for review.

We are pleased to inform you that the questionnaires have been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letters.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Yours Sincerely,

Professor J K Adam  
Chairperson: IREC



## **Annexure 2: Letter requesting permission from the KwaZulu-Natal Department of Health**



Department of Health  
Health Research & Knowledge Management sub-component  
Private bag X 9051  
Pietermaritzburg  
3200

Date: 01 March 2016

Dear Sir/Madam

### **Re: Request for permission to conduct Research at CHCs, District Regional and Combination hospitals in the Ugu and eThekweni districts**

I am currently undertaking a study for the qualification as a Doctor of Nursing at the above institution. My proposed study is entitled “A critical analysis of the implementation of obstetric management guidelines on common causes of maternal deaths, applicable to midwives”. The management guideline referred to in this study will be the Essential Steps in Management of Obstetric Emergencies (ESMOE).

This study will employ a quantitative and qualitative design with a multi method data collection approach. To do this I require permission from the department to: Access health facilities including selected CHCs, district, regional and combination hospitals for data collection in eThekweni and Ugu districts in KZN. The data needed from these institutions will include:

- Statistical data on the resources available, number of deliveries and maternal deaths and ESMOE training data for the period January 2016 to April 2016.



- Patient records for a retrospective analysis of maternal deaths that occurred during January 2016 to April 2016.
- Conducting of interviews with midwives at the different facilities
- Consulting with experts from the districts and institutions to develop a tool to assist midwives with ESMOE implementation.

I therefore kindly request permission from your department to access these facilities, employees and records for research purposes. All ethical principles including anonymity and confidentiality will be strictly adhered to.

A copy of the proposal is attached for your perusal. I will greatly appreciate your permission to conduct this study in this Province.

Kind Regards

---

Asha Sewnunan

DUT student No: 21552862

Contact no. Cell: 083 783 1864

Research Supervisor: Dr. PM Basson\_\_\_\_\_

Contact no. (W) 031-3732687

Co-supervisor: Professor T Puckree\_\_\_\_\_

Contact no. (W) 031 3732967

## Annexure 3: Approval letter Department of Health



health

Department:  
Health  
PROVINCE OF KWAZULU-NATAL

330 Langalibalele street,  
Private Bag X9051 PMB, 3200  
Tel: 033 395 2805/3189/3123 Fax: 033 394 3782  
Email: [hkrm@kznhealth.gov.za](mailto:hkrm@kznhealth.gov.za)  
[www.kznhealth.gov.za](http://www.kznhealth.gov.za)

DIRECTORATE:

Health Research & Knowledge  
Management (HKRM)

Reference: HRRKM277/16  
KZ\_2016RP50\_344

19 September 2016

Dear Mrs A Sewnunan  
(Durban University of Technology)

**Subject: Approval of a Research Proposal**

1. The research proposal titled '**A critical analysis of the implementation of obstetric management guidelines, on common causes of maternal deaths, as applicable to midwives**' was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

The proposal is hereby **approved** for research to be undertaken at the selected facilities at eThekweni and Ugu Health Districts.

2. You are requested to take note of the following:
  - a. The study must only commence when the DUT Research Ethics Committee has acknowledged and approved amendments made on the data collection tools.
  - b. Make the necessary arrangement with the identified facility before commencing with your research project.
  - c. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.
3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to [hkrm@kznhealth.gov.za](mailto:hkrm@kznhealth.gov.za)

For any additional information please contact Ms G Khumalo on 033-395 3189.

Yours Sincerely

Dr E Lutge /  
Chairperson, Health Research Committee  
Date: 28/09/16.

Fighting Disease. Fighting Poverty. Giving Hope

#### **Annexure 4: Request for permission to conduct research in District A**



The District Manager  
eThekweni District  
P/bag X 54318  
Durban 4000

Date: 01 March 2016

Dear Sir/Madam

**Re: Request for permission to conduct Research at CHCs, District, Regional and Combination hospitals in the eThekweni district**

I am currently undertaking a study for the qualification as a Doctor of Nursing at the above institution. My proposed study is entitled “A critical analysis of the implementation of obstetric management guidelines on common causes of maternal deaths, applicable to midwives”. The management guideline referred to in this study will be the Essential Steps in Management of Obstetric Emergencies (ESMOE).

The maternal mortality rates remain high in KZN, with eThekweni district having had the highest number of maternal deaths of 128 women that died in 2012/2013. ESMOE training is offered to all health care facilities which focus on reducing maternal mortality rates. This study aims to evaluate the implementation of this guideline by the midwife and to identify what challenges may be present to ensure its effectiveness in further reducing maternal deaths.

This study will employ a quantitative and qualitative design with a multi method data collection approach. To do this I require permission from the department to: Access health facilities including selected CHCs, district, regional and combination hospitals for data collection in eThekweni district. The data needed from these institutions will include:

- Statistical data on the resources available, number of deliveries and maternal deaths and ESMOE training at each facility for the period January 2016 to April 2016.
- Patient records for a retrospective analysis of maternal deaths that occurred during January 2016 to April 2016.
- Conducting of interviews with midwives at the different facilities
- Consulting with experts from the districts and institutions to develop a tool to assist midwives with ESMOE implementation

I therefore kindly request permission from your department to access these facilities, employees and records for research purposes. All ethical principles including anonymity and will be strictly adhered to.

A copy of the proposal is attached for your perusal. I will greatly appreciate your permission to conduct this study in your district.

Yours sincerely

---

Asha Sewnunan

DUT student No: 21552862

Contact no. Cell: 083 783 1864

Research Supervisor: Dr. PM Basson\_\_\_\_\_

Contact no. (W) 031-3732687

Co-supervisor: Professor T Puckree\_\_\_\_\_

Contact no. (W) 031 3732967

## Annexure 5: Approval letter from eThekweni District

ANNEXURE 3B: Approval letter from eThekweni District



**health**

Department:  
Health  
PROVINCE OF KWAZULU-NATAL

Physical Address : 83 King Cetshwayo Highway, Mayville, Durban, 4001  
Postal Address: P Bag X54318, Durban 4000  
Tel: 031 - 2405308 Fax: 031 2405555 Email: [somaroo@ukzn.ac.za](mailto:somaroo@ukzn.ac.za)

DIRECTORATE:

eThekweni District Office

16 August 2016

Dear Ms Sewnunan

**Re: A critical analysis of the implementation of obstetric management guidelines, on common causes of maternal deaths, as applicable to midwives.**

I have pleasure in informing you that your application to conduct research in EtheKweni district has been approved at the following health care facilities:

- I. Cato manor CHC
- II. Hlengisizwe CHC
- III. Kwa Dabeka CHC
- IV. Kwa Mashu CHC
- V. King Edward Hospital
- VI. St Mary Hospital
- VII. RK Khan Hospital
- VIII. Addington Hospital
- IX. Prince Mshiyeni Memorial Hospital

Please note the following:

- i. All research activities must be conducted in a manner that does not interrupt clinical care at the health care facility,
- ii. logistical details must be arranged with the CEO/ medical manager of the facility,
- iii. this research project should only commence after final approval by the KwaZulu-Natal Health Research and Knowledge Unit, and full ethical approval, has been granted, and
- iv. a report of your findings should be forwarded to the EtheKweni district office on completion of your project.

Yours sincerely

H Somaroo (Dr)  
Public Health Medicine Specialist

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## **Annexure 6: Request for permission to conduct research in District B**



The District Manager  
Ugu District  
P/Bag x 735  
Port Shepstone  
4240

Date: 01 March 2016

Dear Sir/Madam

### **Re: Permission to conduct Research at CHCs, District, Regional and Combination hospitals in the Ugu district**

I am currently undertaking a study for the qualification as a Doctor of Nursing at the above institution. My proposed study is entitled “A critical analysis of the implementation of obstetric management guidelines, on common causes of maternal deaths, applicable to midwives”.

The management guideline referred to in this study will be the Essential Steps in Management of Obstetric Emergencies (ESMOE).

Ugu district has had a maternal mortality rate of 155.9 for 2012/2013 period and is estimated to increase to 170 for the next triennium 2013/2014. ESMOE saturation training has been conducted in this district which included all health care facilities. The aim of this training is focused on reducing maternal mortality rates. This study aims to evaluate the implementation of this guideline by the midwife and to identify what challenges may be present to ensure its effectiveness in further reducing maternal deaths.

This study will employ a quantitative and qualitative design with a multi method data collection approach. To do this I kindly require permission from the department to: Access health facilities including selected CHCs, district, regional and combination hospitals for data collection in Ugu district. The data needed from these institutions will include:

- Statistical data on the resources available, number of deliveries and maternal deaths, ESMOE training at each facility for the period January 2016 to April 2016.
- Patient records for a retrospective analysis of maternal deaths that occurred for the period January 2016 to April 2016.
- Conducting of interviews with midwives at the different facilities
- Consulting with experts from the districts and institutions to develop a tool to assist midwives with ESMOE implementation

I therefore kindly request permission from your office to access these facilities, employees and records for research purposes. All ethical principles including anonymity and confidentiality will be strictly adhered to.

A copy of the proposal is attached for your perusal. I will greatly appreciate your permission to conduct this study in your district.

Yours sincerely

---

Asha Sewnunan

DUT student No: 21552862

Contact no. Cell: 083 783 1864

Research Supervisor: Dr. PM Basson\_\_\_\_\_

Contact no. (W) 031-3732687

Co-supervisor: Professor T Puckree\_\_\_\_\_

Contact no. (W) 031 3732967

## Annexure 7: Approval from Ugu District

ANNEXURE 4B: Approval from UGU District



**health**

Department:  
Health  
PROVINCE OF KWAZULU-NATAL

Physical Address: 41 Bisset Street, Nelson Mandela Drive  
Postal Address: P/Bag X 735 Port Shepstone 4240  
Tel: 0396883000 Fax: 0396826296 Email: ntokozi.mkhize@kznhealth.gov.za  
[www.kznhealth.gov.za](http://www.kznhealth.gov.za)

**DIRECTORATE:**  
**OFFICE OF THE DISTRICT**  
**MANAGER**

Enquires : Mrs N.C Mkhize

Date: 21/07/2016

To :  
Ms A Sewnunan

### PERMISSION TO CONDUCT RESEARCH IN UGU DISTRICT

Dear Ms Sewnunan

I have pleasure in informing you that permission has been granted to you by Ugu District Office to conduct research on "A critical analysis of implementation of obstetrics management guidelines, on common causes of maternal deaths, as application to midwives"

Please note the following:

- a) Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health.
- b) This Research will only commence once this office has received full approval and confirmation from the Health Research and Knowledge Management Committee in the KZN Department of Health.
- c) Please ensure that this Office is informed before you commence with your research.
- d) The District Office/ Facility will not provide any resources for this research.
- e) You will be expected to provide feedback on your findings to the District Office/ Facility.

Thank You

N.C Mkhize  
Ugu District Manager



## **Annexure 8: Letter of information**



**Dear participant,**

I am currently undertaking a study for the qualification as a Doctor of Nursing at the above institution. I kindly request your consideration in participating in this study. The details of the study are outlined below.

**Title of the research study:** “A critical analysis of the implementation of obstetric management guidelines, on common causes of maternal deaths, applicable to midwives”.

**Principal researcher:** Asha Sewnunan

**Supervisor and Co supervisor:** Dr PM Basson and Prof T Puckree

### **Brief introduction and purpose of the study:**

The target of the Sustainable Development Goal 3 (SDG 3) aims to reduce maternal mortality rates to 70 maternal deaths per 100 000 live births by 2030. This has replaced the previous Millennium Development Goals that was not achieved by the 2015 target date. The guideline on Essential Steps in Management of Obstetric Emergencies (ESMOE) has been designed to address the common causes of maternal deaths by implementing specific management principles. The midwives' implementation and adherence to these management guidelines are critical to the outcome of the patient's condition, as he/she is the first person that usually sees the patient. Therefore, the initial preventative strategy including early detection, referral as well as emergency obstetric management is of key importance to prevent complications and death.

This study therefore aims to analyse and describe the implementation of this guideline by the midwife. The researcher intends to obtain experiences directly from the midwife in the implementation of the ESMOE guideline and to identify if there are any barriers preventing the implementation process.

**Outline of the Procedures:** Midwives with ESMOE training from all levels of health care providing maternity services will be invited to be interviewed. Individual interviews, on a face to face basis, will be conducted by the researcher at a time and place convenient to you. A consent form will need to be signed prior to the interview. The process will commence with broad questions, followed by probing by the researcher to obtain descriptions about personal experiences in implementation of the ESMOE guideline. Interviews will be recorded and it is anticipated not to take longer than an hour. The data collected will be analysed and written up in a doctoral thesis.

**Risks and discomforts to the participants:** No risks or discomforts are anticipated.

**Benefits:** There are no immediate benefits to participants, but potential benefits would include:

- The development of a tool that will assist midwives in assessing the implementation of ESMOE.
- Recommendations to SANC on changes to the midwifery curriculum and training of midwives as per findings of the study, and if found to be necessary.
- The benefit for the researcher would be a Doctoral qualification on successful completion of the study.

**Participation:** Your participation is voluntary, and you are not under any obligation to participate. You may withdraw from the study at any time without giving a reason.

**Remuneration:** There is no remuneration for participants, either in cash or other form.

**Costs of the study:** There are no costs for participants in this study.

**Confidentiality:** All participants will be given a number with which they will be identified. No names of participants or institutions will be used in the study. The writing up of the thesis will be indicated as Midwife 01/Institution A.

All data obtained will be used by the researcher and kept in a secure lockable cupboard. All data will be shredded or deleted after a period of five years.

**Persons to contact in the event of any problems:**

Any questions or queries that you may have at any stage of the study can be addressed to: the researcher (Asha Sewnunan) on cell 083 783 1864 or email [asha.sewnunan@gmail.com](mailto:asha.sewnunan@gmail.com) ; the supervisor (Dr Petro Basson) on 031-3732687 and the co-supervisor (Prof T Puckree) on 031- 3732967

## Annexure 9: Consent form



### Statement of agreement to participate in the research study:

- I hereby confirm that I have been informed by the researcher, **Asha Sewnunan** about the nature, conduct, benefits and risks of this study – Research Ethics Clearance Number: IREC 44/16.
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, name and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had enough opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

\_\_\_\_\_  
Full name of participant

\_\_\_\_\_  
Date/ Time

\_\_\_\_\_  
Signature/Right thumbprint

I **Asha Sewnunan** hereby confirm that the above participant has been fully informed about the nature, conduct and risks of the study.

\_\_\_\_\_  
Asha Sewnunan

\_\_\_\_\_  
Full name of researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Full name of witness

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

## Annexure 10: Semi structured interview guide



### A. Demographic Data

1. Age	< 25 Years	25-35 Years	36-45 Years	46-55 Years	56+Years

2. Category	Advanced Midwife	Basic Midwife

Charge Nurse	Team Leader	Other

### 3. Work Experience in maternity

Less 5Yrs	5-10Yrs	10-15Yrs	16-20Yrs	21-29Yrs	<30Yrs

### 4. ESMOE Training

4.1. ESMOE Training		Year	
4.2. Facilitator/Trainer		Year	
4.3. Update		Year	

### 5. Area currently working in:

ANC	ANW	LW	PNW	Other

## **B. Semi Structured Interview Guide**

1. How would you describe your knowledge and understanding of ESMOE?

.....  
.....  
.....

2. Was the training you had on ESMOE-EOST adequate? Explain?

.....  
.....  
.....

3. What were some of the obstetric emergencies you experienced that contribute to the high maternal mortality rates?

.....  
.....  
.....

4. Describe your experiences in implementing the ESMOE guideline in your clinical area/ward in management of an obstetric emergency

.....  
.....  
.....  
.....

5. Are the guidelines/algorithms available and easy to implement at the patient's bedside? Explain?

.....  
.....  
.....

6. Describe any challenges or barriers and successes that you experienced in implementing the ESMOE guideline to your practice.

Challenges.....

.....  
.....  
.....

Successes.....

.....  
.....

7. Are there any other factors including staffing/ patient/infrastructure issues that may affect the successful implementation of ESMOE? Explain?

.....  
.....  
.....

8. How often are midwives exposed to fire drills and updates on ESMOE?

.....  
.....  
.....  
.....

9. Whose responsibility do you think it should be to conduct fire drills? How often?

.....  
.....  
.....

10. How else can all midwives be taught or skilled on the ESMOE guidelines?

.....  
.....  
.....  
.

11. Do you have any suggestions or comments that you think may benefit the midwife to improve the implementation of the ESMOE guideline in saving mothers lives?

.....  
.....  
.....  
.....

\*Follow up probes to the above questions will be applied where relevant, depending on responses received.

**Thank you for your support**

# Annexure 11: Data capturing sheet – Resources (Facilities/Staff/Patient stats/Equipment/Drugs)



Date: \_\_\_\_\_

District: \_\_\_\_\_

Type of Institution: \_\_\_\_\_

Code: \_\_\_\_\_

## 1. Maternity facilities available

Type of ward/unit	Facility available		No. of wards	No. of beds	High care	Other	Comments
	Yes	No					
1.1. Antenatal Clinic							
1.2. Antenatal Ward							
1.3. Labour Ward							
1.4. Post-natal Ward							
1.5. Theatre							

## 2. Health Care Worker Statistics

Maternity unit		Advanc ed Midwife s	Register ed Midwife s	Student Midwife s	Enrolled Nurses	Enrolled Nursing assistan ts	Other	Registra rs	Medical officers	Consult ant	Interns	Comme nts
2.1. Antenatal Clinic												
2.2. Antenatal Ward	Day											
	Night											
2.3. Labour Ward	Day											
	Night											
2.4. Post Natal Ward	Day											
	Night											
2.5. ESMOE Trained												

## 3. Patient Statistics

### 3.1. Antenatal Clinic

Month/Year		Category of patients available				HIV Stats available			Other/Comments
	Total patients seen	First booking	Repeat Cases	Referrals		Tested	Positive results	PMTCT	
Jan 2016									
Feb 2016									
Mar 2016									
Apr 2016									



### 3.2. Antenatal Ward

Month/Year		Category of patients available			HIV Stats available		Maternal Deaths	Other	Comments
		Yes	No	Description	Y/N	Description			
	No. of Admissions								
Jan 2016									
Feb 2016									
Mar 2016									
Apr 2016									

### 3.3. Labour Ward

Month/Year		Type of Deliveries			Maternal Deaths		HIV Stats	Other	Comments
		NVD	CS	Other	No.	Causes			
	No. of Deliveries								
Jan 2016									
Feb 2016									
Mar 2016									
Apr 2016									

### 3.4. Post-natal Ward

Month/Year	No. of Admissions	Categories if available			Maternal Deaths	HIV Stats	Comments
		NVD	CS	Other			
Jan 2016							
Feb 2016							
Mar 2016							
Apr 2016							

## 4. Equipment

Unit	Cardiotocograph	Delivery Packs	Forceps	Vacuums	Suturing packs/Material	Dinamaps/Baumanometer	Ivac/regulators	Suction	Oxygen	Resuscitation trolley	Hb Meter	Glucometer	Saturation monitor	Other	Comments
4.1. ANC															
4.2. ANW															
4.3. LW															
4.4. PNW															



5.8. Calcium supplements				
5.9. Iron supplements				
5.10. Local anaesthetics				
5.11. Calcium Gluconate				
5.12. Antibiotics				
5.13. Labour suppression drugs				
5.14. Other				

## 6. General Comments/Challenges


## Annexure 12: Data capturing Sheet: Retrospective chart reviews



Date: \_\_\_\_\_

Type of institution: \_\_\_\_\_ Code: \_\_\_\_\_

District: \_\_\_\_\_

**Maternal Death No/Code:** \_\_\_\_\_

### 1. Patient History

Age	Grav/Para	Gestation	Date of Admission	Date of Death	Booking Details				
					Booked	Institution	No. of ANC Visits	Risk Factors	Referral
Other Comments									

## 2. Admission Details

Date	Institution	Reason	Initial Diagnosis	Risk Factors	General Condition	Initial Care Provider			Referral if necessary
						Dr	Mid	Adv. Mid	
Comments									

## 3. Assessment

Blood results						Vital Signs				Urine
Rhesus	Syphilis	HIV	CD4	Haemoglobin	Other	BP	Pulse	Temp	Other	
Comments										

## 4. Pregnancy and Labour Assessment

Date	Palpation	Examination					Fetal Condition		Other
		Dilatation	Presentation	Contractions	Liquor	Phase	CTG	FHR	

## 5. Management

Date	Intravenous Therapy			Bloods done			Drugs		Delivery			
	Type	Amount	Other	Type	Results	Other	Type	Reason	Date	Mode	Institution	Outcome

<b>Post Delivery care:</b>

**6. Details of Death**

Date of Death	Institution	Ward/Unit	Final Diagnosis	Contributory Causes	Preventable
<b>Other:</b>					

**7. Other Relevant Details**


## Annexure 13: Invitation and information to Delphi participants



02/02/2020

Dear Colleague

**Re: Invitation to participate in a Delphi study to refine a practice framework to implement ESMOE guidelines within the basic midwifery training**

Greetings,

Greetings, I am a final year Doctoral student at the Durban University of Technology (Student no. 21552861). My study which critically reviewed the ESMOE guidelines in theory and practice has demonstrated the need for an ESMOE **training course** within the midwifery curriculum. This forms the final part of my doctoral work.

The title of my thesis is: **A critical analysis of the implementation of management guidelines, applicable to midwives, on common causes of maternal deaths.**

I am proposing a practice framework that refines ESMOE training specific to midwives that emanated from my study and implement it as a **separate course within the midwifery training**. A proposed 2-week course will be able to cover all relevant modules for midwives within the midwifery training.

I humbly invite you as an expert in the field to participate in a Delphi study to assist in refining the proposed practice framework related to implementing ESMOE training specific for midwifery programmes.

I require expert advice and input from relevant persons such as yourself as a member of ongoing ESMOE training and updates with current relevant information. Please, see attached summary of study and overview. I will send the draft framework proposed as soon as I have your response and consent to participate in my study. Your acceptance/ email response will be much appreciated.

I look forward to your expertise and your support in assisting my study.

Thank you  
Kind Regards

Asha Sewnunan

Mobile: +966 580109548    Skype: asha\_sewnunan

Email: asha.sewnunan@gmail.com



**Annexure 14: Statistician certificate**

**Gill Hendry** B.Sc. (Hons), M.Sc. (Wits), PhD (UKZN)

**Mathematical and Statistical Services**

Cell: 083 300 9896

email : hendryfam@telkomsa.net

---

21 August 2017

Re: Assistance with statistical analysis

Please be advised that I have assisted Asha Sewnunan (Student number 21552861), who is presently studying for a D: Nursing at DUT, with the analysis of the data for her study.

Yours sincerely

Gill Hendry (Dr)

## Annexure 15: Editing certificate

### **DR RICHARD STEELE**

BA, HDE, MTech(Hom)

#### **HOMEOPATH**

Registration No. A07309 HM

Practice No. 0807524

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### **EDITING CERTIFICATE**

Re: **ASHA SEWNUNAN**

Doctoral thesis: **A CRITICAL ANALYSIS OF THE IMPLEMENTATION OF OBSTETRIC MANAGEMENT GUIDELINES, ON COMMON CAUSES OF MATERNAL DEATHS, AS APPLICABLE TO MIDWIVES**

I confirm that I have edited the references of thesis and edited the formatting and layout. Due to time constraints the text has not been edited. I returned the document to the author with track changes so correct implementation of the changes is the responsibility of the author. I am a freelance editor specialising in proofreading and editing academic documents. My original tertiary degree which I obtained at the University of Cape Town was a B.A. with English as a major and I went on to complete an H.D.E. (P.G.) Sec. with English as my teaching subject. I obtained a distinction for my M.Tech. dissertation in the Department of Homoeopathy at Technikon Natal in 1999 (now the Durban University of Technology). I was a part-time lecturer in the Department of Homoeopathy at the Durban University of Technology for 13 years.

Dr Richard Steele

**2020-06-25**

*per email*