Measuring Skilled Attendance in the uThungulu District, KwaZulu-Natal, in 2008

A dissertation submitted to the

Department of Public Health Medicine
Nelson R. Mandela School of Medicine

University of KwaZulu-Natal
Durban, South Africa

In partial fulfilment of the requirements for the Master in Public Health

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March 2010

“As the candidate’s supervisor I agree/do not agree to the submission of this dissertation”

Supervisor: ……. **Date: …….**

Dedication

I dedicate this work to my Lord Jesus Christ author and finisher of my faith, author of life, my every thing. Thank you for the gift of time and life.

To my family, thank you for your love, support and belief in me.

Acknowledgements

I would like to thank:

The University of KwaZulu-Natal Scholarship Committee for supporting my studies throughout the years

The KwaZulu-Natal Provincial Department of Health Research Office and the uThungulu Health District for granting permission to conduct this study

All hospital managers in the study hospitals (Catherine Booth, Ekombe, Eshowe, Nkandla and St Mary's hospitals) for supporting this study

All midwives for taking part in the obstetric knowledge and skills test

The Department of Public Health Medicine

Prof Anna Coutsoudis for introducing me to the university community
Prof Eddie Mhlanga (Department of Obstetrics and Gynaecology), Prof Hugh Philpott and Ms Zo Mzolo (Centre for Rural Health) for your input toward the implementation of this study

Dr Anna Voce, my supervisor, for showing interest in the study and for providing constructive advice and active support. Her patience and encouragement have helped me achieve more than I thought I could

All my MPH colleagues

Friends at Glenridge Church International, Bridget Thomas, Emma Anyachebelu, Bukky Adejumo, Celdi Luzolo for your friendship and spiritual support.

Declaration

I Solange Mianda declare that:

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Abstract

Background

The Millennium Development Goals call for two-third and three-quarter reductions in Perinatal Mortality Rates and Maternal Mortality Ratios. The main strategy towards achieving these reductions is to increase access to skilled attendance. However, it cannot be confirmed that all health professionals are skilled in managing women in labour, nor that they are functioning in enabling environments. To measure the provision of skilled attendance, this study was undertaken in five Level 1 Hospitals in the uThungulu Health District of KwaZulu-Natal. The objectives of the study were:

1. To establish perinatal outcomes for each Level 1 Hospital in uThungulu Health District.
2. To evaluate the quality of intrapartum care provided in Level 1 Hospitals in uThungulu Health District.
3. To evaluate the obstetric knowledge of health workers attending births in Level 1 Hospitals in uThungulu Health District.
4. To evaluate the obstetric skills of health workers attending births in Level 1 Hospitals in uThungulu Health District.
5. To evaluate the environment in which births are attended in Level 1 Hospitals in uThungulu Health District.
6. Compare the quality of care, the knowledge, skills and environment with perinatal outcomes.

Methods

Perinatal outcomes (PNMR, FSBR, ENNDR and PCI) were calculated for each hospital; maternity case records of women who have delivered in these Level 1 Hospitals were audited to assess the quality of intrapartum care; obstetric knowledge and skills of midwives were assessed; as was the enabling environment within which midwives worked, which included a measurement of their workload. A correlation between perinatal outcomes and the quality of intrapartum care, knowledge and skills and the enabling environment was performed to determine whether variables were associated.

Results

The overall PNMR for five hospitals in uThungulu Health District was 31 per 1000 births. Three hospitals demonstrated PNMRs below 30 per 1000, while the other two showed rates above 45 per 1000. The combined FSBR for the five hospitals was 6 per 1000 births, the combined ENNDR was 12 per 1000 live births. The PCI in all hospitals ranged between 3 and 4.

An audit of maternity case records revealed that all hospitals have a high overall mean percentage score per record. However, analysis of subsets showed good performance in recordings on the labour graph, but poor performance in the admission assessment and in the management of labour. The Kruskal-Wallis Non-Parametric Test showed a statistically significant difference in overall scores amongst hospitals ($p=0.01$), suggesting differences in performance in all five hospitals in terms of the quality of care provided.

Overall, all hospitals scored poorly on tests of obstetric knowledge and skills. There were no statistically significant differences in the overall knowledge median scores and subsets median scores amongst hospitals ($p=0.07$), indicating that all five hospitals performed on a similar level in terms of obstetric knowledge. However, all hospitals performed differently in relation to obstetric skills, as there was a statistically significant difference in the overall skill median scores amongst hospitals ($p=0.002$).

Three hospitals met the enabling environment standard. All hospitals but one scored poorly on referral, and the availability of supervision on both shifts. One hospital scored poorly on drugs and supplies. Overall no hospitals reported the presence of all the elements of the enabling environment. Three hospitals had acceptable workloads.

No association could be detected between variables. However, there were trends that can be traced in different hospitals.

Conclusions

In South Africa, from the Demographic and Health Survey, 84% of deliveries are assisted by skilled attendant. While an attendant may be present, one cannot say that skilled attendance has been provided, as it has been shown for uThungulu Health District.

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Definition of Terms

Early neonatal death rate	The number of live born infants that die in the first week of life per 1000 live born infants (PEP 2008, p47).
Level 1 Hospital	A health facility that provides basic obstetric, surgical, medical, paediatric and psychiatric care. Includes anaesthetic facility (Voce 2005, pxii).
Maternal mortality ratio	A maternal death is "the death of a woman while pregnant or within 42 days of the 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 incidental or accidental causes" (WHO 1992, p4). The maternal mortality ratio is the number of maternal deaths in a given time period per 100 000 live births during the same time period (AbouZahr and Wardlaw 2004, p4).
Midwife	A person who has successfully completed the prescribed course of studies in midwifery and acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery (WHO/ICM/FIGO 2004, p7).
Partograph (partogram)	The partograph is a simple chart to record and monitor the progress of labour and other essential maternal and fetal observations. It can provide an early indication that emergency obstetric care is needed (UNFPA 2004a, p19).
Perinatal index care	The ratio of the perinatal mortality rate to the low birth weight rate (PEP 2008, p50).
Perinatal mortality rate	Number of all perinatal deaths per 1000 total births. Perinatal deaths include all stillbirths that weigh more than 500 grams and early neonatal deaths (PEP 2008, p40).
Skilled attendant	Health professional providing care during childbirth (WHO/ICM/FIGO 2004, p7). This professional needs to have a set of skills, defined as core midwifery skills, to provide effective care during childbirth. A skilled attendant needs to be able to conduct normal deliveries and recognize, manage and refer obstetric complications (WHO/ ICM/FIGO 2004, p7).

Skilled attendance	The process by which women are provided with adequate care during labour, delivery and the early postpartum period and requires both skilled attendant and the enabling environment (WHO/ICM/FIGO 2004, p7).
Stillbirth	Refers to an infant born dead after 6 months of intra-uterine life (PEP 2008, p43). Stillbirth is divided in stillbirth that occurs before the onset of labour (macerated stillbirth) and those that occur during labour (fresh stillbirth) (PEP 2008, p45). The stillbirth rate is the number of stillborn infants per 1000 total births (PEP 2008, p44).

Acronyms

DEPAM	Decentralised Programme for Advanced Midwives
FIGO	International Federation of Gynaecology and Obstetrics
ICM	International Confederation of Midwives
MDG	Millennium Development Goals
RCOG	Royal College of Obstetricinas and Gynaecologists
SERA	Southern Education and Research Alliance
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

List of abbreviations

Adm	Admission
ANC	Antenatal care
BP	Blood pressure
Dg	Diagnosis
DOH	Department of Health
EmOC	Emergency obstetric care
ENNDR	Early neonatal death rate
FC	Fetal condition
FHR	Fetal heart rate
FSBR	Fresh still birth rate
HIV	Human immuno-deficiency virus
Hrly	Hourly
MC	Maternal condition
MCQ	Multiple choice questions
MMR	Maternal mortality ratio
Mx	Management
OSCE	Objective structured clinical examination
PCI	Perinatal care index
PIH	Pregnancy induced hypertension
PNMR	Perinatal mortality rate
PPH	Post-partum haemorrhage
Resus	Resuscitation
T°	Temperature

1. Background

1.1 Introduction

Every year women and babies die during childbirth and 98% of these deaths occur in the developing world (WHO 2005, p7-9). Global efforts place maternal and perinatal mortality at the centre of their activities and this is evidenced in the Millennium Development Goals (MDG-4 and MDG-5) that call for a two-third reduction in under-five mortality and a three-quarter reduction in maternal mortality ratio (MMR) by the year 2015 using the year 2000 as a baseline (Lawn et al 2006, p1474; Pattinson 2006, p1).

The estimated perinatal mortality rate in 2000 for the world is 47 per 1000 births (WHO 2006, p18), and the estimated maternal mortality ratio in the same year is 400 per 100 000 live births (AbouZahr and Wardlaw 2004, p12). The highest numbers of perinatal deaths occur in the developing world (WHO 2006, p20), and the highest numbers of maternal deaths are almost equally shared between Africa and Asia (AbouZahr and Wardlaw 2004, p10; UNFPA 2004a, p12).

While perinatal and maternal mortality estimates are still high mainly in Africa and Asia, South Africa has made considerable progress in monitoring these deaths with the introduction of the Confidential Enquiry into Maternal Deaths and the implementation of the Perinatal Problem Identification Programme, resulting in the publication of the Saving Mothers and Saving Babies reports (Pattinson 2006, piv). These reports reflect on the causes of perinatal and maternal deaths and provide appropriate recommendations on how to avoid them (Pattinson 2006, piv). Despite national efforts towards alleviating maternal and child deaths, perinatal mortality in South Africa is still high across the country (Pattinson 2006, piv). The South African perinatal mortality rate estimate in 2000 is 33 per 1000 births and the PNMR for KwaZulu-Natal in the same year is 40 per 1000 births (Vella 2003, p15).

The tables below give some figures of maternal mortality for the year 2000 for different regions of the world (AbouZahr and Wardlaw 2004, p22-26) and provide information on the South African and the KwaZulu-Natal perinatal mortality rate over a three-year period (HST 2006, p4).

Table 1. 1: MMR estimates per 100 000 live births by Region in 2000.

Regions	Maternal mortality ratio per 100 000 live births	Perinatal mortality per 1000 births
Global estimates	400	47
Africa	830	62
Sub-Saharan Africa	920	-
South Africa	110	33

Table 1. 2: KwaZulu-Natal and South Africa estimated PNMR 2003-2005 per 1000 births.

Year	Perinatal mortality	
	KwaZulu-Natal	South Africa
2003	50.7	38.4
2004	41.3	38.2
2005	40.3	34.9

The estimates in Table 1.1 show high maternal mortality ratios in Africa as a whole but particularly in sub-Saharan Africa. The table also shows a high maternal mortality ratio for South Africa. Table 1.2 shows slight decreases in perinatal mortality over a three-year period, demonstrating a slow move towards the MDG-4 target of a two-third reduction in perinatal mortality. The decreases shown in perinatal mortality may suggest that the quality of care provided by maternity units in the country is improving. Achieving the MDG-4 target in the remaining five years is challenging but still possible.

In order to monitor MDG- 4 and- 5, three indicators are defined for measuring progress towards the reduction of perinatal/maternal mortality. The first is the under five-mortality rate (United Nations 2008, p20), which refers to the probability of dying between birth and exactly five years of age. The second is the maternal mortality ratio, referring to the number of maternal deaths for every 100 000 live births (Lawn et al 2006, p1474; UNFPA 2004a, p13; United Nations 2008, p24). Due to the lack of accurate data on maternal deaths especially in developing countries, the United Nations selected another indicator to monitor the process of reducing maternal and perinatal mortality: the proportion of births attended by skilled health personnel (WHO 2007, p3; UNFPA 2003, p14). The choice of this indicator is based on the evidence of the relationship between having a skilled health worker at delivery and the reduction of maternal and perinatal mortality (Graham et al 2001, p118-124). With few exceptions, almost all countries where skilled attendance is more than 80% have low MMRs and PNMRs (UNFPA 2004a, p15). The proportion of deliveries attended by skilled health personnel, therefore, is a key indicator for MDG- 4 and- 5.

Reductions in perinatal mortality are also dependent on the availability of skilled attendance. Perinatal deaths may be easier to monitor than maternal deaths, which are relatively infrequent events (Akalin et al 1997, p330). Therefore perinatal outcomes are used as an outcome measure of skilled attendance in the present study.

1.2 Problem statement

The MDGs call for two-third reductions in PNMR and three-quarter reductions in MMR. The main strategy towards achieving these reductions is to increase access to delivery by a skilled attendant. Having experienced and skilled medical help during childbirth is important and a critical intervention to reduce maternal and perinatal mortality. Therefore health workers must be trained and provided with essential skills, knowledge, supplies and equipment, to attend delivery effectively, especially in poor and rural areas (Mengsteab 2006, p15; Bell et al 2003, p228; MacDonald and Starrs 2002, p3).

Globally, trends in delivery assisted by skilled attendants are shown to be rising. Results from household surveys report an increase in women who can access professional care. Despite these results, there are still women left without care, particularly in developing countries, thus leading to maternal and perinatal deaths (Koblinsky et al 2006, p1377). In sub-Saharan Africa and south-Asia, skilled attendance is shown to be more accessible in urban areas than rural areas mainly (Koblinsky et al 2006, p1377).

Although significant efforts have been made to increase skilled attendance, maternal and perinatal mortality are still high in many countries. For example, in South Africa, 92% of deliveries occur in health facilities (DoH 2004, p14). This should mean that women and their babies have access to a skilled attendant. But the Saving Mothers report 2002-2004 shows that 41.2% of maternal deaths are associated with sub-standard care in level 1 hospitals and 32.1% are associated with administrative problems (NCCEMD 2005, p10, 12). The Saving Babies 2006-2007 report shows that 16% of all perinatal deaths are health care worker related and 12% associated with administrative problems (Pattinson et al 2009, p25-26).

In Benin, Jamaica, Ecuador and Rwanda, studies have shown that though skilled attendants were available, they have inadequate knowledge and skills in managing obstetric life threatening conditions (Koblinsky et al 2006, p1380). In Ghana and Cote D'Ivoire, a third of

hospital births were attended by unqualified midwifery assistants without any form of supervision (Koblinsky et al 2006, p1380).

These observations are indications that the provision of skilled attendants (both with regard to the attendant and the enabling environment) is problematic. Therefore an exploratory study measuring skilled attendance was required to establish the provision of skilled attendants in terms of the quality of care provided, the obstetric knowledge and skills of health providers, and the enabling environment within which they work.

1.3 Relevance of the study

The study is placed within the context of MDGs 4-5, which call for a reduction of the Perinatal and Maternal Mortality. Worldwide, skilled attendance is recognized as the critical factor towards achieving MDGs 4-5 and it is used as one of the indicators to measure the attainment of these goals. Currently, evidence exists in favour of skilled attendance, confirming the relationship between having a skilled health worker at delivery and the reduction of maternal and perinatal mortality.

Although the percentage of women attended by health professionals may be increasing worldwide and in South Africa in particular, PNMR and MMR are not being reduced in South Africa. Many of these deaths could have been avoided, as most of them were health provider and administrative related (Pattinson et al 2009, p25-26). Despite the publication of the Saving Mothers and Saving Babies reports, it has been noticed that the avoidable factors reported in the first report are the same as reported in recent editions (Pattinson 2006, pv). This is an indication of no progress and a lack of the implementation of the recommendations provided in the reports.
Moreover, there is very little information about the competence of skilled attendants (their knowledge and skills) as well as the elements that contribute to the enabling environment within which they work. The ‘proportion of deliveries with skilled attendance’ is used as a proxy measure for skilled attendance indicating only the presence of a health professional at delivery (Hussein et al 2004, p161). Therefore, in order to explore the issue of skilled attendance, this study is designed to establish the level of skilled attendance in uThungulu Health District, one district in rural KwaZulu-Natal.

1.4 Scope of the study

This study is an exploratory pilot study, exploring the relationship between perinatal outcomes, the quality of care provided, the obstetric knowledge and skills of midwives and the enabling environment. The study comprises five level one hospitals in the uThungulu Health District. This study setting is selected because there is an existing quality improvement initiative in the district as part of the Area Three Learning Complex initiated by the Centre for Rural Health (CRH 2007). Results from this study will add to the interventions required to improve learning activities for health care workers in this district.

Midwives were selected as a focus in the study because they are mostly responsible for the conduct of normal deliveries and refer in case of complications, especially in rural settings (Harvey et al 2007, p783).

1.5 Research aim and objectives

1.5. 1 Study aim

The aim of the study is to measure the provision of skilled attendance in Level 1 Hospitals in uThungulu Health District.

1.5.2 Objectives of the study

1. To establish perinatal outcomes for each Level 1 Hospital in uThungulu Health District.
2. To evaluate the quality of intrapartum care provided in Level 1 Hospitals in uThungulu Health District.
3. To evaluate the obstetric knowledge of health workers attending births in Level 1 Hospitals in uThungulu Health District.
4. To evaluate the obstetric skills of health workers attending births in Level 1 Hospitals in uThungulu Health District.
5. To evaluate the environment in which births are attended in Level 1 Hospitals in uThungulu Health District.
6. Compare the quality of care, the knowledge, skills and environment with perinatal outcomes.

1.6 Structure of the dissertation

Chapter 1 has presented the background of the study, the statement of the problem, relevance and scope of the study, and the aim and objectives of the study. Chapter 2 reviews existing literature on skilled attendance, describes different methods used to measure skilled attendance, and presents the conceptual framework used in the study. Chapter 3 outlines the methodology adopted to assess the provision of skilled attendance, the study instruments, the ethical considerations and study limitations. Chapter 4 presents the findings of the research in various formats: statements, tables and graphs. Chapter 5 discusses the main findings of the study and makes concluding remarks and recommendations to improve skilled attendance at birth. The appendices present letters of permissions and the study instruments used for data collection (Appendices I through VIII).

2. Literature review

2.1 Introduction

This chapter draws together the information obtained from the literature that applies to skilled attendance at birth and its measurement. It starts with defining skilled attendance and provides the rationale for skilled attendance at birth. This is followed by the description of different methods identified in the literature for the assessment of skilled attendance, and the challenges in, and interventions for, ensuring skilled attendance. The chapter closes with conceptual frameworks for skilled attendance identified in the literature and the conceptual framework used in the study.

Relevant literature was identified as follows:

- Electronic databases (MedLine-PubMed, Science Direct and Google Scholar) and electronic journals (the International Journal of Gynaecology and Obstetrics, Reproductive Health Journal, South African Medical Journal, Midwifery; Tropical Doctor and The Lancet.com) were searched using the following key words: Skilled attendance at birth AND maternal health; skilled attendance at delivery AND quality maternal care; skilled attendance AND assessment; skilled attendance AND measurement; competency assessment AND health care AND skilled attendance AND perinatal mortality; Perinatal care AND skilled care; perinatal mortality AND health workers; midwives AND knowledge; midwives AND skill; skilled attendance AND clinical competence.
- The World Health Organisation website was searched.
- Experts in the field of maternal health were consulted and additional information was obtained from them.
- The reference list at the end of identified literature was used to identify further literature.
- Articles provided during the Master of Public Health Maternal and Newborn Health module were also used.

The literature was limited to English documents.

The referencing system used is the Harvard referencing style.

2.2 What is skilled attendance?

Skilled attendance comprises the presence of a skilled attendant and the enabling environment in which skilled attendance may be provided (MacDonagh 2005, p4; Graham et al 2001, p100).

2.2.1 Skilled attendants

'Skilled attendants' refers to health professionals providing care to women during childbirth (WHO/ICM/FIGO 2004, p7). These professionals need to have a set of skills, defined as core midwifery skills, to provide effective care during childbirth. For example, they need to be able to conduct normal deliveries and recognize, manage and refer obstetric complications (WHO/ ICM/FIGO 2004, p7).

Depending on the level of care (level 1 or 2) or geographic location (urban versus rural) the skills required might vary in order to respond to the needs of a particular population. However, universally, all skilled attendants are expected to perform the core midwifery functions defined by the United Nations (Carlough and McCall 2005, p201; Graham et al 2001, p102-104)

1. Safely conduct a normal delivery using aseptic technique
2. Implement active management of the third stage of labour
3. Provide immediate care of the newborn, including resuscitation
4. Manage most postpartum haemorrhage through the use of parenteral oxytocics, controlled cord traction and abdominal massage of the fundus of the uterus
5. Manually remove the placenta
6. Manage eclampsia through the provision of parenteral antihypertensives
7. Recognize and manage postpartum infection through the use of parenteral antibiotics
8. Perform assisted vaginal delivery through the use of a vacuum extractor
9. Manage incomplete abortions with manual vacuum aspiration (MVA)
10. Know how to refer women to the next level of care and stabilize them for their journey.

The types of skilled attendants identified in the literature (WHO/ICM/FIGO 2004, p7) comprise:

– Midwife: a person who has completed the prescribed courses in midwifery and has acquired the license to practice midwifery;
– Nurse with midwifery skills: a nurse who has acquired knowledge and skills in midwifery;

- Doctor: a doctor who has acquired midwifery skills through training;
- Obstetrician: a medical doctor who has specialized in the medical management and care of pregnancy and childbirth.

2.2.2 Enabling environment

The enabling environment refers to conditions in which skilled attendants work to provide women with care during childbirth. The elements of the enabling environment identified in the literature include the availability of sufficient health professionals, essential equipment, essential drugs, supervision, referral systems/transport and a manual of protocols for obstetric management (Graham et al 2001, p97; WHO/ICM/FIGO 2004, p14).

In order to be provided with effective care during childbirth, women need the assistance of health professionals in numbers proportional to the deliveries in each facility. For example, the Royal College of Obstetricians and Gynaecologists (RCOG) recommend 1.15 midwives per woman in labour (RCOG 1999, p34).

In South Africa, the health system faces many human resource problems, especially a shortage and a maldistribution of healthcare workers. The South African Department of Health has attempted to address the shortage of health professionals by implementing various interventions, including increasing salaries, introducing scarce skills and rural allowances and upgrading clinics and hospitals. Despite these efforts, the supply and distribution of health professionals in the country has not improved (Kotzee and Couper 2006, p288). Intrapartum birth asphyxia is responsible for high perinatal mortality in South Africa and adequate fetal monitoring during labour is a key task to prevent these deaths. However, due to serious staff shortages faced by the country, especially of midwives, it is difficult for each labour to be effectively monitored and prevent neonatal deaths (Bamford et al 2006, p52; Velaphi and Pattinson 2007, p100-102, Buchmann and Pattinson 2006, p8-10; Pattinson et al 2005, p6).

Not only is there need for enough midwives conducting deliveries, there is also need for other elements of the enabling environment: a labour ward should be provided with essential equipment and facilities to assist midwives in their work. These include: delivery bed with wedge, trolley-bed with cot sides, sphygmomanometer, stethoscope, clinical thermometer, haemoglobinimeter, hand-held Doppler instrument, cardiotocograph, basic ultrasound scanner,

intravenous infusion pump, vacuum extractor and suction, obstetric forceps, delivery repair pack, cervical removal pack, cusco vaginal speculum, symphysiotomy knife, fully equipped resuscitation trolley, defibrillator. The number required of each item depends on the level of care, the size of the labour ward as well as the number of patients treated (Bartlett et al 2006, p58).

UNICEF/WHO/UNFPA (1997, p26) propose that the availability of drugs be checked by whether the signal drugs of injectable antibiotics, injectable oxytocics and injectable anticonvulsants are available. Oxytocics are mainly used to reduce the risk of maternal postpartum haemorrhage, whereas injectable antibiotics are used to control mild infections, and injectable anticonvulsants to manage patients with severe pre-eclampsia and eclampsia.

Obstetric haemorrhage is the main cause of maternal mortality in the world (WHO 2005, p63). Therefore, timely access to safe blood products (red blood cells, platelets, plasma and cryoprecipitate) is a life saving measure to prevent severe anaemia in women with obstetric haemorrhage (NCCEMD 2005, p72; WHO 1991, p80; Padmanabhan et al 2009, p125; WHO 2008, p17). In sub-Saharan Africa, the lack of blood for transfusion is shown to be a contributing factor to maternal mortality. The reason for this deficiency is poverty and a lack of donors (Bates et al 2008, p1333, NCCEMD, 2005, p81). In Latin America, to avoid the lack of blood for transfusion, a campaign was implemented in the general population to encourage voluntary blood donation. The provision of quality services to donors was also ensured (Cruz 2007, p293).

For complications beyond the capacity of the health facility, midwives are expected to refer to the next level of care for appropriate management. To do so, there is a need for an effective referral system and an equipped ambulance within an hour of call (NCCEMD 2005, p22). Transport between facilities is problematic in South Africa, accounting for 9.7% of all maternal mortality and 1.5% of perinatal mortality due to birth asphyxia (NCCEMD 2005, p11; Bamford et al 2006, p54). Cost and long distance between institutions are other reasons hindering effective use of the referral system (Jahn and De Brouwere, 2001, p229).

For the management of obstetric complications, the use of drugs and referral routes should be according to protocols of management defined for each level of care. In South Africa, cases of perinatal and maternal deaths were recorded as a result of failure to comply with existing protocols (Bamford et al 2006, p68; NCCEMD 2006, p115). Ensuring compliance to a manual

of protocols for obstetric management is therefore imperative. This can be achieved through supportive supervision. It has been shown that regular supervision motivates staff and helps maintain high standards of care (UNFPA 2006, p12-13; Maclean 2003, p165). In South Africa, the National Department of Health has published Maternity Care Guidelines that serve as a basis for protocols of obstetric management at local level (DoH 2002, p31-104; DoH 2007).

2.3 Why skilled attendance at birth?

Across the developing world, women and children die unnecessarily as a result of pregnancy and childbirth. Globally, countries including South Africa are committed to reducing maternal and perinatal mortality. Towards the attainment of the millennium development goals, increasing the proportion of deliveries assisted by skilled attendants is the key strategy towards these reductions (Pattinson 2006, p1; WHO/ICM/FIGO 2004, p1; United Nations 1999, p31).

In both developed and developing countries a number of effective interventions can be performed by skilled attendants to decrease maternal and perinatal mortality. In order to effectively manage the main obstetric complications and causes of maternal mortality (postpartum haemorrhage, obstructed labour, sepsis and pregnancy related induced hypertension) (WHO 2005, p63; UNFPA 2004a, p9) skilled attendants must able to recognize these conditions and manage them appropriately (Maclean Undated, p31). Their competency could lead to high percentage reductions in maternal mortality as reflected in Table 2.1. (WHO/UNFPA/UNICEF/World Bank 1999, p50).

Table 2. 1: Minimum skills required of skilled attendants in identifying and managing obstetric complications.

Causes of maternal mortality	What skilled attendants do to prevent maternal mortality	What skilled attendants can do to manage obstetric complications	% of deaths preventable by skilled attendants
Postpartum haemorrhage	Active management of third stage of labour	Oxytocics, uterine massage, manual removal of placenta, fluids and blood.	30%
Obstructed labour	Use of partograph	Caesarean section, symphysiotomy	70%
Sepsis	Use of aseptic technique	Antibiotics, removal of infected material	50%
Pregnancy induced hypertension	Early identification and management of pre-eclampsia	Magnesium sulphate, anti-hypertensives, delivery.	20%

The underlying causes of perinatal mortality are, in most cases, the same factors as those leading to maternal mortality, and include poor health during pregnancy and inadequate intra- and postpartum care (Maclean Undated, p37). It has been shown that traditional birth attendants are unable to treat complications leading to maternal and perinatal death and should rather be equipped to refer (Carlough and McCall 2005, p201, De Bernis et al 2003, p39-57).
Hence, adequate skilled care during pregnancy and in the intra- and postpartum period could help reduce up to 63% of all perinatal deaths and 35-50% of neonatal deaths. The breakdown of skilled care interventions that help reduce neonatal mortality by cause of death is described in Table 2.2 (Darmstadt et al 2005, p1, 5). Through effective maternal and fetal monitoring, skilled attendants can prevent birth asphyxia. In the case of birth asphyxia they can resuscitate/ventilate the baby or apply cardiac massage where needed. They can also diagnose preterm birth and refer for proper care (Maclean Undated, p37).

Table 2. 2. Skilled care interventions in reducing neonatal deaths by cause of death.

Period of intervention	Skilled care interventions	% of deaths preventable by cause of neonatal deaths		
		Infections	Birth asphyxia	Prematurity
Pregnancy	– Family care	20-50%	-	-
Intrapartum	– Skilled maternal and immediate neonatal care	10-20%	30-45%	5-10%
	– Emergency obstetric care (Mx of complications)	-	20-60%	-
	– Antibiotics for premature rupture of membranes	3-9%	-	-
	– Antenatal corticosteroids for preterm labour		-	25-50%
Postpartum	– Extra care for low birth weight babies (extra warmth, hygiene and feeding)	1-10%	-	20-50%
	– Case Mx for pneumonia	20-55%	-	-
	– Emergency neonatal care: Mx of serious illness (infections, asphyxia, prematurity and jaundice)	30-70%	0-5%	15-40%

2.4 Measuring skilled attendance

Considerable evidence exists on the association between skilled birth attendance and maternal/perinatal mortality. It is clear that the presence of life saving skills is essential in the reduction of maternal/perinatal mortality (UNFPA 2006, p3; Chowdhury et al 2007, p1320).

Moreover, skilled birth attendance at birth is being used as an indicator to measure the attainment of the Millennium Development Goals (Hussein et al 2004, p161; Harvey et al 2007, p783). However this measure reflects only on the presence of health care providers at delivery, not on their competencies nor on the environment within which they work. It cannot be confirmed that all health professional are skilled in managing women in labour unless their skills have been assessed (Hussein et al 2004, p161; MacDonagh 2005, p9).

The assessment of skilled attendance at delivery has been slow and difficult in many countries (Koblinsky et al 2006, p1379). This is due to the confusion between the terms attendance and attendant. For example, the World Health Organization's Making Pregnancy Safer Initiative focuses on the skilled attendant (health professional with midwifery skills), whereas the Skilled Care Initiative in Burkina Faso, Kenya and Tanzania considers the entire concept of skilled attendance, including the care provider and the enabling environment (Hussein & Clapham 2005, p296-297). Apart from terminology issues, there is also a lack of consistency in the definition of skilled attendance. For example, in Malawi, ward attendants are considered as part of skilled attendants, and in Nepal, traditional birth attendants were earlier included in the estimates of the proportion of births by a skilled attendant, but excluded later on (Graham et al 2001, p100; Hussein & Clapham 2005, p296-297).

Therefore, in order to distinguish the elements of skilled attendance, various methods are being used. These include: measuring the presence of skilled attendants (doctors, midwives, and nurses), measuring the knowledge and skills of attendants, and measuring the enabling environment.

2.4.1 Measuring the presence of skilled attendants

To be able to achieve two-third and three-quarter reductions in perinatal and maternal mortality, enough skilled professionals conducting deliveries are required, and they need to be accessible. A crude measure of the presence of skilled attendants is the proportion of deliveries attended by a skilled attendant. To determine the presence of skilled attendants, household surveys are used. In these surveys women are asked what type of health professional assisted in their most recent delivery. Results are presented as the percentage of deliveries by category of skilled attendant: doctor, midwife, nurse and other. These surveys do not give any indication of the knowledge or skills of attendants (Harvey et al 2007, p783).

A more sophisticated measure has been proposed for the measurement of skilled attendants at birth: the partnership ratio (Graham et al 2001, p124). This refers to the ratio of deliveries attended by a doctor versus a midwife. From analysing the association between partnership ratios and maternal mortality, the ideal partnership ratio (PR) is 15, 85: where 15% of deliveries are attended by doctors and 85% of deliveries are attended by midwives (Graham et al 2001, p124; UNFPA 2003, p12). This is in line with the estimate that 15% of all deliveries will result in a complication, and will require higher-level care (Maine et al 1997, p24).

2.4.2 Measuring the knowledge and skills of attendants

In order to maintain and improve high standards of care, a health system needs regular assessment of the performance of health professionals. This will help to identify gaps in the knowledge and skills of providers and the need for training. Methods to measure the performance of health providers include: written tests, computerised tests, review of medical records and simulations, as reflected in Table 2.3 (Kak et al 2001, p10-11).

Table 2. 3: Methods to assess the performance of health professionals attending births.

Method	What is assessed	How administered	Advantages	Disadvantages
Written test	Abilities, traits and knowledge.	Case studies.	– Standardisation of questions. – Low cost. – Objectivity in scoring.	– Skills cannot be measured.
Computerised test	Clinical decision making skills.	Case studies.	– Consistency of the cases. – Objectivity in scoring.	– Inability to evaluate competencies involving physical actions – High cost
Review of medical records	Competence.	Record audit.	– Providers are not aware. – Low cost.	– Incompleteness of records. – Missing records – Poor quality of records.
Anatomic models	Competency in physical actions.	Stations.	– Standardised testing.	– Inability to simulate.

2.4.3 Measuring the enabling environment

The measurement of the enabling environment must include the measurement of the factors that are essential elements for health worker performance. The assessment can be done by using methods described in Table 2.4 (Kak et al 2001, p11; McCaw-Binns et al 2004, p11, 12).

Table 2. 4: Methods used to measure the enabling environment.

Method	What is assessed	How administered	Advantages	Disadvantages
Review of medical records	Performance of health providers in managing normal delivery and obstetric complications.	Record audit.	– Providers are not aware – Low cost.	– Incompleteness of records – Missing records – Poor quality of records.
Survey of health care workers	To assess the level of supervision, training, and motivation.	Free listing of elements contributing To the performance of health care workers.	– Assess many items at the same time.	– Time consuming – Complex and difficult to analyse.
Inventory of health care facilities	Availability of essential drugs, equipment and supplies in each hospital.	Structured Checklists observation.	– Low cost.	– Difficult to have a one-size fits all checklist.

2.5 Studies on the measurement of skilled attendance

Although the percentages of deliveries attended by skilled attendants have increased worldwide, not every health professional can be considered a skilled attendant (Hussein et al 2004, p161). Some studies measuring skilled attendance were identified in the literature; however it seems that most studies measure one or other dimension of attendance. Few, with the exception of Hussein et al (2004), attempt to measure the full dimensions of attendance. Details on identified studies measuring the dimensions of skilled attendance are presented in Table 2.5.

Table 2. 5: Studies on the measurement of skilled attendance.

Study	Target group	Methods used	Description of the study	Results
McCaw-Binns et al 2004.	Skilled birth attendants.	– Written test – Self assessment – Anatomic models – Observation checklist – Survey of providers – Inventory of maternity services.	Assess: – The competence/ performance of skilled attendants – The enabling environment.	– There is little correlation between provider's self assessment and current skills and knowledge. – Inadequate monitoring of labour in most cases – Infrequent performance of some newborn postpartum care key tasks.
Carlough and McCall 2005	Maternal and child health workers (MCHW).	– Anatomic models	– Assess whether MCHW could achieve the minimum level of competence required to meet the definition of skilled attendant.	– After adequate training, MCHW may be considered to be skilled attendant.
Hussein et al 2004	Maternity records.	– Clinical records – Skilled birth attendance index	– Measure the extent of skilled attendance at birth.	– Few records meet the criteria for skilled attendance.
Harvey et al 2007	Health providers attending births (doctors, medical students and nurses).	– Written test – Anatomic models.	– To assess whether health personnel enumerated in household surveys fit the WHO definition of skilled attendant.	– There is a wide difference between provider's current competence and the WHO standards.

2.6 Challenges in ensuring skilled attendance

This section presents some of the challenges encountered in ensuring skilled attendance.

Globally, the provision of skilled attendance is slow. There are still gaps in coverage between developing and developed countries, rich and poor and those living in urban and rural areas (Koblinsky et al 2006, p1379, 1389; UNFPA 2006, p3). Long distance and several hours or days of walking are strong hindrances to accessing skilled attendance. The provision of skilled attendance is hampered by health professional shortages, mostly in rural areas of sub-Saharan Africa and south-Asian countries. This is mainly due to health professional migration to countries like the United Kingdom or the United States of America (Koblinsky et al 2006, p1379; UNFPA 2004b, p18). Other factors affecting access to skilled attendance are expensive health services and poor attitude of health care workers (Thaddeus and Maine 1994, p1091-1100).

An analysis of maternal and perinatal deaths shows substandard care in the intrapartum period, and a lack of basic obstetric knowledge and skills. This finding suggests that a review is necessary of the education and training received by medical and midwifery students (Moran et al 2006, p37). This corroborates the findings by Harvey et al (2004, p207), and Koblinsky et al (2006, p1380). Thus even if the proportion of deliveries attended by a skilled professional have increased, few are receiving care of adequate standard.

In places where skilled attendance is accessible, there are women who remain out of reach of maternal services for other reasons; for example, due to gender disparities and lack of decision-making power, where the husband as the head of household, decides on the type of care and provider required for the wife (Yesudian 2004, p1). Other factors hindering access to skilled attendance are lack of education, customs and traditional beliefs, age and marital status (Koblinsky et al 2006, p1381; Mpembeni et al 2007, p5; Chowdhury et al 2007, p1323).

2.7 Interventions to increase skilled attendance

To address the factors hindering the provision of skilled attendance, different strategies have been adopted around the world.

The WHO has passed resolutions requesting member countries to develop plans that will promote retention of health care workers. For example, the Kampala Declaration urges member countries to ensure adequate incentives and a safe working place for health care workers. It also recommends an equitable distribution of health workers across urban versus rural areas (WHO-OECD 2008, p20-21; MacDonagh 2005, p20, 21).

Upgrading health workers' skills is essential to ensuring women and babies have access to skilled attendance. This can be achieved by: training nurses in midwifery skills; training of general practitioners in obstetric surgery; or training nurses and midwives in anaesthetic skills (De Bernis et al 2003, p39-57). For example, in Tunisia all medical practitioners have a compulsory four-month training in obstetrics and gynaecology; in Botswana there has been a focus on developing additional skills in midwives and doctors; in Malaysia all doctors working at district hospitals have four to seven months training in obstetrics, including obstetric emergencies; and in Sri Lanka midwifery training has been compulsory for doctors since 1915 (MacDonagh 2005, p13). In Zambia, the Democratic Republic of the Congo and Ghana, the category of midlevel health professional has been created to provide anaesthesia, assisted deliveries or surgery, especially in rural areas (MacDonagh 2005, p21; Maclean 2003, p164)

Education and exposure to mass media have been shown to be factors that empower women towards the utilization of skilled attendants. Education enhances women's status in society through knowledge and exposure to the modern world (Yesudian 2004, p10; MacDonagh 2005, p13).

2.8 Conceptual frameworks for skilled attendance

A number of authors have presented conceptual frameworks to describe the relationship between different elements of skilled attendance. This section presents the models identified in the literature and the subsequent section presents the conceptual framework used in the current study.

Table 2. 6: Conceptual frameworks for skilled attendance at delivery.

Conceptual frameworks	Description	Focus
WHO/UNFPA/UNICEF/ World Bank, 1999	Considers the partnership between different health professionals able to care for normal and complicated deliveries, and the enabling environment.	Health professionals and the enabling environment.
WHO, 1994	Places skilled attendants in the context of a health care centre supported by the district hospital as the referral hospital in case of emergency.	Skilled attendants and level of care.
Safe Motherhood Inter Agency Group (Koblinsky 2000)	Places skilled attendants in the context of district hospitals	Skilled attendants and level of care.
Bell et al 2003	Places skilled attendants in the context of the entire health system and explores the relationship between different elements of the health system that play a role in reducing maternal and perinatal mortality and morbidity.	Skilled attendants and the health system.
Skilled Attendance For Every One (Hussein et al 2004)	Places skilled attendants in the context of the community, supported by an enabling environment, to provide maternal health care, and by a referral system in cases of emergency.	Skilled attendants, community, enabling environment and referral system.

2.9 Conceptual framework used in the study

The conceptual framework used in this study is reflected in Figure 2.1 and draws on the frameworks described above. It presents skilled attendance in the context of the health system and within a community. The health system constitutes the enabling environment that provides essential support to meet the community's needs for delivery care. At the centre of the diagram, midwives are presented as the principal element without which the needs of the community will

not be met. On the left side are represented the elements (knowledge and skills, protocols of management for obstetric complications, drugs and supplies, equipment, supervision and referral system/ transport and midwife workload) considered as essential for midwives to render good quality care during normal deliveries and complicated deliveries. On the right side are represented the perinatal outcomes as the result of the combination of different components of skilled attendance.

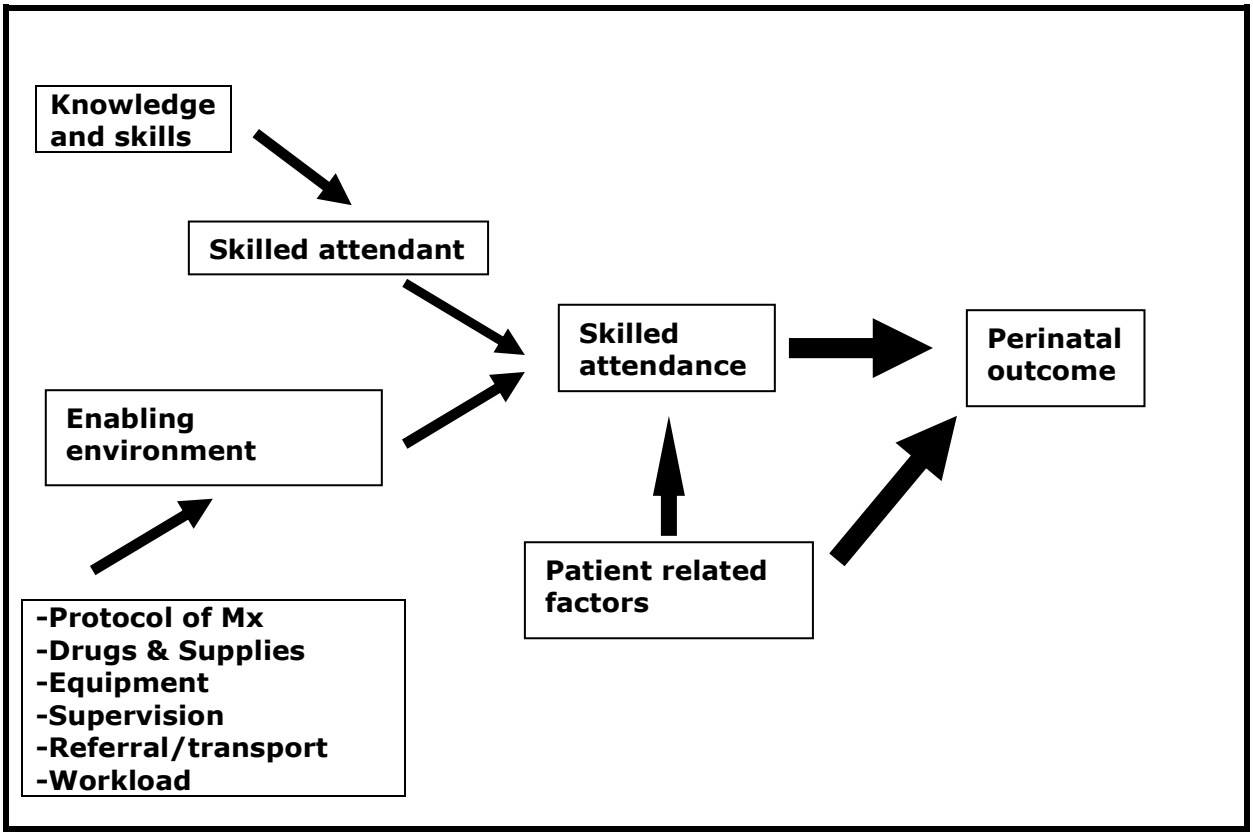


Figure 2. 1: Conceptual framework used in the study.

2.10 Conclusion

This chapter has provided an overview of the existing literature on skilled attendance at birth in general. It has presented the rationale for skilled attendance, providing evidence that skilled attendants operating within an enabling environment lead to major decreases in maternal and perinatal mortality. It has also presented measures of skilled attendance and difficulties in the measurement of skilled attendance. Challenges in ensuring skilled attendance and interventions to increase skilled attendance were also discussed. Finally conceptual frameworks for skilled attendance and the conceptual framework used in the study were discussed.

3. Methodology

3.1 Introduction

This chapter describes the methodology used to measure the provision of skilled attendance in Level 1 Hospitals in uThungulu Health District. The chapter starts by restating the study aim and objectives, and proceeds to present the study site, the research design, the study period, the study population and sampling, the variables measured in the study, the data collection procedures and instruments, the measures taken to ensure study validity, data management and storage processes, data analysis, and the ethical considerations in this study. Finally, the study limitations are discussed.

3.2 Research aim and research objectives

The aim of the study was to measure the provision of skilled attendance in Level 1 Hospitals in uThungulu Health District, with the following objectives:

1. Establish perinatal outcomes for each Level 1 Hospital in uThungulu Health District.
2. Evaluate the quality of intrapartum care provided in Level 1 Hospitals in uThungulu Health District.
3. Evaluate the obstetric knowledge of health workers attending births in Level 1 Hospitals in uThungulu Health District.
4. Evaluate the obstetric skills of health workers attending births in Level 1 Hospitals in uThungulu Health District.
5. Evaluate the environment in which births are attended in Level 1 Hospitals in uThungulu Health District.
6. Compare the knowledge, skills, environment and quality of care with perinatal outcomes.

3.3 The study site

The study was implemented in the uThungulu Health District, located in rural KwaZulu-Natal. Its main commercial centre is the port town of Richards Bay. It is bordered by the Zululand Health District in the north, the iLembe Health District in the south, the uMkhanyakude Health District in the east and the uMzinyathi Health District in the west.

UThungulu Health District has a population of 898 913 and comprises six local authority areas (KZN DoH 2008). The Health District has two Level 2 Hospitals, six Level 1 Hospitals, 44 Fixed Clinics and 14 Mobile Clinics, which visit 256 points. The Health District also has six local authority clinics (KZN DoH 2008). As other typical rural districts, uThungulu is isolated geographically, with poor transport and infrastructure and difficult communication (CRH 2007).

The Level 1 Hospitals in uThungulu Health District are (KZN DoH 2008):

- Catherine Booth Hospital, which is a 170-bed hospital, with a catchment population of approximately 200 000 people.
- Ekombe Hospital, situated in a deeply rural area in the Nkandla Magisterial District, off the Kranskop and Silutshana main road in the midlands of KwaZulu-Natal. It has 6 residential clinics and 3 mobile clinics with 30 visiting points, and serves a catchment population of 85 000 people.
- Eshowe Hospital, with 460 beds serving a largely rural population estimated to be around 300 000.
- Mbongolwane Hospital, built by Catholic missionaries in 1937, has 176 usable beds and supports 5 clinics. It provides health care to an approximate catchment population of 69 000 in the community of Oyaya and its surroundings.
- Nkandla Hospital, a 212-bedded hospital in the Nkandla Municipality. It has 11 community services clinics that operate 24-hours and serves a catchment population of about 98 617.
- St Mary's KwaMagwaza Hospital situated in the Mtonjaneni Municipality. It has 141 authorized beds and 3 fixed clinics. It serves a catchment population of 60 000 people. The hospital was taken over by the Department of Health from the Anglican Diocese of Zululand on 1 November 2000.

Some of these hospitals are difficult to access due to poor roads. They are under-resourced, with poor staffing and with poor prospects of recruiting more health care workers because of being located in isolated areas (CRH 2007).

3.4 Research design

This study was an observational descriptive study, which was conducted in two phases:

1) A retrospective phase, which assessed:
   - Perinatal outcomes, utilising data from the maternity/delivery register.
   - The quality of intrapartum care, through an audit of maternity case records.

2) A cross-sectional phase, which evaluated:
   - The obstetric knowledge of health workers attending deliveries in Level 1 Hospitals, utilising a multiple-choice questionnaire (MCQ).
   - The obstetric skills of health workers, using an objective structured clinical examination (OSCE).
   - The enabling environment, using a maternity unit review form.

3.5 Study period

The protocol of the study was submitted to the Postgraduate Education Committee in November 2007 and approval was granted on the 7th March 2008 (Appendix 1.1). It was submitted to the University's Biomedical Research Ethics Committee (BREC) (ref BEO41/08) on the 13th March 2008 and full ethical approval was obtained on the 10th July 2008 (Appendix 1.2). The protocol was also submitted to the Provincial Department of Health's Research Management division (ref HRKM05/07) in August 2007 and permission for the study to proceed was received in July 2008, subsequent to obtaining full ethical approval from BREC (Appendix 1.3).

Permission to undertake the study in each hospital was sought from hospital managers and this was obtained between March and June 2008 (See Appendix 1.4).

Data was collected from 15th July to 19th September 2008 as presented in Table 3.1.

Table 3. 1: Data collection time schedule.

Month (2008)	Hospital				
	C. Booth	Ekombe	Eshowe	Nkandla	St Mary
July	n/a	n/a	15th	16th	17th -18th
August	n/a	8th	n/a	n/a	25th
September	3rd -4th	5th	15th-16th	18th-19th	n/a

3.6 Study population and Sampling

3.6.1 Study population/Units of analysis

This study was located within Level 1 Hospitals in the uThungulu Health District. In order to meet the objectives of the study there were different units of analysis:

1. To establish perinatal outcomes, the unit of analysis consisted of births in Level 1 Hospitals.
2. To assess the quality of intrapartum care, the unit of analysis consisted of maternity case records of women who delivered in Level 1 Hospitals.
3. To assess the obstetric knowledge and skills of health workers, the unit of analysis consisted of all registered midwives working in labour wards in Level 1 Hospitals. Midwives were used in this study because most women in labour in public Level 1 Hospitals in South Africa are attended by registered midwives, who conduct normal deliveries and refer in case of complications.
4. For the assessment of the enabling environment, the unit of analysis was the labour ward in Level 1 Hospitals.

3.6.2 Sampling strategy

A multi-stage sampling approach was implemented. Firstly, all Level 1 Hospitals in uThungulu Health District were selected for study: Catherine Booth, Ekombe, Eshowe, Mbongolwane, Nkandla and St Mary's KwaMagwaza hospitals. Thus no sampling was applied to select the hospitals. Further sampling strategies are described in Table 3.2.

Table 3. 2: Sampling strategy per study population/unit of analysis.

Objective	Study Population/ Unit of Analysis	Sampling Strategy
To assess perinatal outcomes	Births	Convenience sampling – all births recorded in the delivery register of each hospital for the 12-month period prior to the commencement of the study (July 2007-June 2008)

Table 3. 2: Sampling strategy per study population/unit of analysis (cont.)

To assess the quality of intrapartum care	Maternity case records	Convenience sampling – maternity case records of all women who delivered in the Level 1 Hospitals in the month prior the commencement of the study (June 2008). Included were all women admitted with a cervical dilatation of less than 8cm, Excluded were women with a cervical dilatation of 8cm or more (because this would have not allowed the monitoring of labour from the onset of labour), and women admitted for elective caesarean section.
To assess obstetric knowledge and skill	Registered Midwives	Convenience sampling - all registered midwives working in labour wards in Level 1 Hospitals, present on the day of data collection, both on the day and night shift.
To assess the enabling environment	Labour wards	All labour wards were assessed, thus no sampling was applied.

3.6.3 Sampling size

All 6 Level 1 Hospitals in uThungulu Health District were included in the study. Mbongolwane Hospital did not return signed permission for the study, and thus the study was not implemented in this hospital (see Appendix 1.5). Thus the total number of Level 1 Hospitals studied was five (5), as were the total number of labour wards assessed with regards to evaluating the enabling environment. Table 3.3 presents the size of the study sample by unit of analysis.

Table 3. 3: Size of the study sample by unit of analysis.

	Hospitals				
	C.Booth	**Ekombe**	**Eshowe**	**Nkandla**	**St Mary**
Births (July 2007-June 2008)	368	722	2520	1592	1335
Maternity case records (June 2008)	18	30	83	112	56
Midwives (on day of data collection)	3	2	6	9	5

With regard to the selection of the maternity case records, all maternity case records of women admitted with cervical dilatation less than 8cm in the month prior to the commencement of the study were selected. All maternity case records of women with cervical dilatation of 8cm or more, and of women admitted for elective caesarean section were excluded. When actually

retrieving from the hospital archives the patient files that held the maternity case records, some files were missing and some had the maternity case records missing. Thus Table 3.4 presents explanatory data on the actual sample size of maternity case records audited in each Level 1 Hospital. The table presents the number of deliveries in each hospital for June 2008, the total number of records for inclusion, the number of records excluded by reason for exclusion, and the number of records missing.

Table 3. 4: Explanatory data on the actual sample size of maternity case records audited in each Level 1 Hospital in uThungulu Health District.

	Hospitals				
	C.Booth	Ekombe	Eshowe	Nkandla	St Mary
Number of admissions	32	58	183	168	146
Records for inclusion	18	30	83	130	56
Admitted early not monitored	0	0	25	2	16
Total records excluded	14	28	75	36	74
Excl: Cervical dil.>8cm	6	12	26	19	14
Excl: BBA	2	7	19	8	16
Excl: C/S	6	3	6	9	12
Excl: Missing files	0	0	24	0	32
Total records reviewed	18	30	83	112	56

With regard to the selection of registered midwives, the total sample size includes midwives present on the day of data collection, both on the day and night shift. Table 3.5 presents the number of midwives on the day and night shift per hospital.

Table 3. 5: Number of midwives on day and night shift per hospital.

Hospital	Number of midwives per shift		Total
	Day	Night	
C.Booth	2	1	3
Ekombe	1	1	2
Eshowe	4	2	6
Nkandla	7	2	9
St Mary	3	2	5

3.7 Variables measured

This section describes the parametric and non-parametric variables that were measured in the study, by study objective.

The perinatal outcomes were the outcomes measured in the study, representing the end presumed effect of skilled attendance. The variables selected to measure perinatal outcomes

were numerical dependent variables. Data was extracted from the maternity register where the rates were calculated as follow:

- Perinatal mortality rate (PNMR): the number of all perinatal deaths were counted and added and then divided by the total number of births and multiplied by 1000.
- Fresh stillbirth rate (FSBR): the number of all fresh stillbirths were counted and added and then divided by the total number of births and multiplied by 1000.
- Early neonatal death rate (ENNDR): the number of all early neonatal deaths were divided by the total number of live births and multiplied by 1000.
- Perinatal index care: the perinatal mortality rate was divided by the percentage of low birth weight babies.

The non-parametric independent variables (representing dimensions of skilled attendance) that were measured were quantitative, numerical variables and are summarized in Table 3.6 as follow:

Table 3. 6: Non-parametric variables.

Area assessed	Variables	Type of variable
Quality of intrapartum care	Score for: - Admission assessment - Labour graph - Labour management	Quantitative numerical, independent
Health worker knowledge	Knowledge score of midwives for how to deal with: - Normal delivery - Obstetric complications - HIV in pregnancy	Quantitative numerical, independent
Health worker skills	Skill score of midwives to: - Correctly interpret information plotted on a labour graph - Correctly plot information on a labour graph - Correctly diagnose and manage PPH	Quantitative numerical, independent
Enabling environment	Enabling environment score based on availability of: - Protocols of management - Protocol for referral system - Essential drugs - Essential equipment - Acceptable midwife workload - Supervision	Quantitative numerical, independent

3.8 Data collection methods, instruments and procedures

This section describes the data collection methods, instruments and procedures used in the study, by study objective. Table 3.7 describes the variables, data items, data sources, and data collection tools.

Perinatal outcomes were obtained by extracting data from maternity registers in each hospital, through the use of a data extraction form (see Appendix 2). The researcher herself counted the total births above 500g, total fresh stillbirths, total macerated stillbirths, total early neonatal deaths and the total low weight births for each month under review. These were recorded on the data extraction form by month and then totalled for the 12-month period under study.

The quality of intrapartum care was assessed by auditing maternity case records with the use of the original Philpott/Voce Labour Record Review Checklist (DoH 2007, p159) (See Appendix 3).

The obstetric knowledge of midwives was assessed through the use of a 30-question Multiple Choice Questions (MCQ) (see Appendix 4), which covered seven topic areas: Normal labour, cord prolapse, prolonged labour, postpartum haemorrhage, pregnancy induced hypertension, HIV and puerperal sepsis. Questions were adapted from the 2005 Perinatal Education Program (PEP 2005). All midwives in each hospital were tested simultaneously to prevent those finishing a test from discussing it with colleagues not yet tested. The knowledge test was administered in written form. The midwives recorded their answers on an answer sheet and each correct answer was awarded one point.

The obstetric skills of midwives were assessed through the administration of an Objective Structured Clinical Examination (OSCE) (see Appendix 5). Three instruments developed by the Decentralised Programme for Advanced Midwives were used to test the ability of midwives to: (1) use the partograph as a decision-making tool in labour and delivery; (2) plot information on a partograph; and (3) manage postpartum haemorrhage. The OSCE was conducted with each midwife individually. The answers to the OSCE were recorded on a marking sheet (see Appendix 5) and marked against a model answer. One point was awarded for each correct answer.

In order to assess whether the environment was enabling, the Voce/Philpott facility review Checklist was used (see Appendix 6), which measured the presence or absence of written protocols for the management of obstetric complications, the availability of key drugs, equipment and supplies, which are referred to as "essential elements" of obstetric care. Midwives workload was also assessed. The checklists in each hospital were completed by the researcher, who reviewed the labour ward with the help of the midwife-in-charge.

Table 3. 7: Summary of data collected, data source and data collection tools.

Variables	**Data items**	**Data source**	**Data collection tools**
PNMR FSBR ENNDR PCI	Total births Total FSB Total MSB Total ENND Total Births <2.5kg	Delivery register	Data extraction form (see Appendix 2)
Score for: Admission assessment Labour graph Labour management.	Twenty five items Covering admission, labour graph, labour management	Maternity case records	Philpott/Voce Labour Record Review Checklist (see Appendix 3)
Knowledge score for midwives' ability to: 1. Conduct normal delivery 2. Manage obstetric complications 3. Manage HIV in pregnancy.	30 questions on seven topics (normal labour, cord prolapse, prolonged labour, PPH, HIV, PIH and puerperal sepsis).	Midwives	MCQ answer sheet (see Appendix 4).

Table 3. 7: Summary of data collected, data source and data collection tools (cont).

Skill score for Midwives' ability to: 1. Correctly interpret information on a labour graph.	Exercise involving midwives in interpreting information on a labour graph: this covered, risk factors, diagnosis of prolonged labour and Mx.	OSCE station	Mark sheet (see Appendix 5.1)
2. Correctly plot information on a labour graph.	Exercise involving midwives in plotting information on a labour graph. This covered FHR, moulding, caput, cervical dilation, descent of head, fetal position, uterine contractions, maternal information, drugs, maternal BP& pulse, maternal T^0, urine output.	OSCE station	Mark sheet (see Appendix 5.2)
3.Correctly diagnose and managing PPH.	Station where midwives diagnosed PPH and described the Mx of PPH.	OSCE station	Mark sheet (see Appendix 5.3).
Enabling environment score based on the availability of: - Protocols of Mx - Protocol for referral - Essential drugs - Essential equipment - Supervision - Midwives' workload	List of items considered as essential supplies, equipment and infrastructure for Level 1 Hospitals.	Observation	Voce/Philpott Facility Review checklist (see Appendix 6).

3.9 Measures taken to ensure study validity and control for potential biases

This section deals with the potential biases in this study and how they were controlled for.

1. Selection bias

This could have been introduced in the study design phase. The research utilized convenience sampling by selecting:

- All births in the twelve-month period preceding the commencement of the study (based on the assumption that births occurring in a facility in a twelve-month period would not be different from births occurring in any other twelve-month period.

- Midwives on duty on the day of data collection (it was assumed that their presence on the day of data collection was random; this does not represent a complete picture of obstetric knowledge and skills of midwives in each hospital).
- The district within which the study was located. The study site was not randomly selected; the choice of the district was made in relation to the existing quality improvement initiative in the district, part of the Area Three Learning Complex initiated by the Centre for Rural Health.

Selection bias could have also been introduced in the study implementation phase. The researcher might have omitted records meeting the inclusion criteria or might have included those not meeting the inclusion criteria while selecting maternity case records for review.

How controlled for

- All Level 1 Hospitals were included in the study. However Mbongolwane hospital chose not to participate.
- All midwives on duty on the day of data collection were included in the study.
- The information obtained from the study (knowledge and skills) will not be generalised but will be treated as pilot study with the prospect for further investigations on a larger scale (including a representative sample of midwives attending births in Level 1 hospitals and a representative sample of Level 1 hospitals in KwaZulu-Natal for instance).

2. Information bias

This might have been introduced in the study design phase by selecting:

- Maternity case records: data are stored differently in hospitals with some being more organized than others. In some hospitals, the maternity case records were incomplete, in some they were missing.
- All midwives on duty on the day of data of data collection: not representative of all midwives in the district, this will not give the real picture of the knowledge and skills of midwives in each hospital.

How controlled for

- Incomplete records were not included in the study.
- The researcher herself collected and analysed data, to avoid information bias.

- Midwives and hospitals were identified using a code to avoid mixing of results or to avoid attributing results wrongly. (For example: symbols identified hospitals, numbers identified midwives on day shift and letters midwives on night shift).
- The information obtained from the study will not be generalized but will be treated as pilot study with the prospect for further investigations on a larger scale.

3. Management bias

Introduced in the study analysis phase, when data is manually captured from questionnaires and tests, errors may occur.

How controlled for

All data were stored, captured and analysed in a similar way to avoid management bias. Data were doubly entered in Excel and the Statistical Package for the Social Sciences® (SPSS) version 15.0 to control for capturing errors.

4. Measurement bias

Introduced in the study design phase; more than one measurement instruments was used, adapted from previous studies, whose validity and reliability were not reported.

How controlled for

- The labour record review form was first piloted at Ekombe Hospital on the 15th of July to test its applicability. No revision was needed on the study instrument as it could easily be used.
- The multiple-choice questionnaires and OSCE questions were piloted at St Mary's Hospital to test their applicability. No revision was needed for the multiple-choice questionnaire.

3.10 Data management and data storage

Double data entry was performed by the researcher, using Microsoft Excel and the Statistical Package for the Social Sciences® (SPSS) version 15.0. A. No discrepancies between data were noted.

Data was stored on a personal computer, using a password to prevent unauthorized access. Back-up copies of the data were saved on a personal flash disc. The paper tools were kept

safely in a personal case. Data will be kept in a safe place until the results of the study are published.

3.11 Data analysis

The data was analysed using SPSS version 15.0. The descriptive analytical analyses performed are described below.

3.11.1 Perinatal outcomes

Perinatal outcomes were calculated as described in Section 3.7.

3.11.2 Analysis of the quality of intrapartum care

To assess the quality of intrapartum care, maternity case records of women who delivered in the month prior to the commencement of the study were reviewed. Twenty-five items covering the admission assessment, labour graph and labour management were assessed using the original Philpott/Voce Labour Record Review Checklist (DoH 2007, p159). To obtain a percentage score of the quality of intrapartum care, the total number of completed items on the Philpott/Voce checklist were summed and divided by the total number of items on the maternity case record, and finally multiplied by one hundred. Scores were also obtained for sub-sets by dividing the number of completed items in each subset divided by the total number of items in the sub-set. Kruskal Wallis Non-Parametric Test (equivalent of ANOVA test) was used to determine differences in mean scores and median subset scores between hospitals. The level of significance was set at 0.05 (5%). Seventy percent (70%) was used as an acceptable score. This was adapted from acceptable scores of performance suggested in the Perinatal Education Programme manual.

3.11.3 Knowledge assessment

In calculating the obstetric knowledge score of midwives, one point was awarded for each correct answer. To calculate midwives' individual knowledge scores, points were summed up and individual scores were divided by the total number of questions (30) and multiplied by one hundred, to obtain a percentage score. An exploratory analysis of the distribution of the overall knowledge scores was performed to determine whether the data was normally distributed. It was found that most of the data was negatively skewed, thus the median and interquartile ranges were used as summary statistic measures. Scores for each of the six topic areas (sub-

sets) were also calculated by dividing the total points earned for each sub-set, by the number of questions in each sub-set and multiplied by one hundred. Kruskal Wallis Non-Parametric Test was used to determine differences in knowledge median scores between hospitals. The level of significance was set at 0.05 (5%). Eighty percent (80%) was used as passing mark. This was adapted from acceptable scores of performance suggested in the Perinatal Education Programme manual.

3.11.4 Skills assessment

In calculating the obstetric skill score of midwives, one point was awarded for each correct answer. To calculate midwives' individual total skill scores, individual scores were summed and divided by the total number of questions and multiplied by one hundred, to obtain a percentage score. As this data was also negatively skewed, the median and interquartile ranges were used as summary statistic measures. Scores for each of sub-sets were also calculated by dividing the points earned for each sub-set, by the number of questions in each sub-set and multiplied by one hundred. Kruskal Wallis Non-Parametric Test was used to determine differences in skills median scores between hospitals. The level of significance was set at 0.05 (5%). Eighty percent (80%) was used as passing mark. This was adapted from acceptable scores of performance suggested in the Perinatal Education Programme manual.

3.11.5 Enabling environment assessment

Checklists in each hospital were completed by the researcher with the help of the midwife in charge. The items were dichotomous variables 'yes – no'. One point was awarded to 'yes' responses and a score was obtained for each hospital by summing up the number of items that scored 'yes' divided by the number of items on the checklist multiplied by one hundred, to obtain a percentage score for the enabling environment. Seventy five percent (75%) was used as the acceptable overall score for the enabling environment. This was adapted from the study by Voce (2005).

3.11.6 Association between perinatal outcomes and quality of intrapartum care, obstetric knowledge and skills, and the enabling environment

Due to the skewed data, Spearman's correlation was used to determine the relationship between the dependant and independent variables.

The dependent variables were parametric numerical variables defined as:

- Perinatal Mortality Rate (PNMR): the number of all perinatal deaths were counted and added and then divided by the total number of births and multiplied by 1000.
- Fresh Stillbirth Rate (FSBR): the number of all fresh stillbirths were counted and added and then divided by the total number of births and multiplied by 1000.
- Early Neonatal Death Rate (ENNDR): the number of all early neonatal deaths were divided by the total number of live births and multiplied by 1000.
- Perinatal Care Index: the perinatal mortality rate was divided by the percentage of low birth weight babies.

The independent variables were non-parametric quantitative, numerical variables. They are listed and defined below:

- Quality of intrapartum care
  The Score for: Admission assessment, Labour graph, Labour management
- Health worker knowledge
  The knowledge score of midwives for how to deal with: Normal delivery, Obstetric complications, HIV in pregnancy.
- Health worker skills
  The skill score of midwives to: Correctly interpret information, plotted on a labour graph, correctly plot information on a labour graph, correctly diagnose and manage PPH
- Enabling environment
  The enabling environment score based on the availability of: Protocols of management, Protocol for referral system, Essential drugs, Essential equipment, Acceptable midwife workload, Supervision.

3.12 Ethical considerations

3.12.1 Ethical approval and permissions

All the necessary approvals and permissions were obtained (see section 3.5). However Mbongolwane Hospital did not return a signed form, not confirming nor declining their participation in the study. A letter was sent on the 9th October 2008 to the Mbongolwane Hospital Manager stating that the consent form had not been received, and that this would be

regarded as declining participation in the study unless otherwise communicated by the Hospital Manager. No reply was received. In the letter it was stressed that non-participation would not carry any negative consequences for the hospital (see Appendix 1.5).

3.12.2 Ethical principles supported by the study

To ensure good quality research, the following ethical principles were observed in the design of the study protocol and its implementation:

- **Principle of Autonomy:** all the necessary information pertaining to the research was made available and discussed with all hospital managers and midwives, and written informed consent was obtained from each hospital and midwife (See Appendix 1.6).

- **Principal of beneficence:** no overt harm was inherent in the design of this study. The research was designed with the intent of determining the quality of skilled attendance in Level 1 Hospitals. Revealing a poor quality of skilled attendance may carry unintended negative consequences for the hospitals and midwives that participated in the study, for example if hospital, district or provincial managers use the results of the study in a negative way. An attempt to manage this will be made in the way that feedback on the study is provided and in providing recommendations arising from the study. The feedback will include identifying opportunities for supervision and in-service training.

- **Confidentiality:** the information gathered from delivery registers, maternity case records and midwives remained institutional and not personal: no record was kept of the maternity case records reviewed. Midwives and hospitals were identified using symbolic, alphabetical and numerical coding to ensure their anonymity (e.g. $ (A) and A1 for the first midwife).

- **Obligation to feedback:** the results of the study will be fed back to each hospital and to the district on completion of the examination process.

3.13 Limitations of the study

Given logistical and budgetary limitations, this study can only be considered as a pilot study. This exploratory study cannot be considered as representative of hospitals and health care workers in the province of KwaZulu-Natal.

The study covered five of the six Level 1 Hospitals in the uThungulu Health District. It would have been of greater value if Mbongolwane Hospital had agreed to participate in the study. Their non-inclusion in the study does not allow a complete picture of skilled attendance in Level 1 Hospitals in the uThungulu Health District as a whole.

In the audit of maternity case records, there were missing files and incomplete records particularly at Eshowe, Nkandla and St Mary's Hospitals. This limited the proportion of records that could actually be reviewed.

Due to the shortage of midwives in Level 1 Hospitals, the knowledge and skills tests were administered in the midst of normal duty. Some labour wards were very busy. This may have affected the quality of response by midwives.

Convenience sample of midwives was used in the study rather than a survey. This may have affected the internal validity of the study. It is not possible to determine to what degree midwives in this sample are representative of all midwives in each Level 1 Hospital in the uThungulu Health District. Furthermore, the study could not control for potential confounders such as: differences in training, years of experience between midwives and within hospitals.

3.14 Conclusion

This section described the methodology used in this study. It restated the study aim and objectives. It presented the research aim and objectives, the study site, the study design, the study period, the study population and sampling. It went on to describe the variables measured in the study, the data collection procedures and instruments, the measures taken to ensure study validity, data management and storage processes, data analysis, and the ethical considerations in this study. Finally, it discussed the study limitations.

4. Results

This chapter presents the results of the study according to the study objectives. The main aim of the study was to measure the provision of skilled attendance in Level 1 Hospitals in uThungulu Health District, with the following objectives:

1) Establish perinatal outcomes for each Level 1 Hospital in uThungulu Health District.
2) Evaluate the quality of intrapartum care provided in Level 1 Hospitals in uThungulu Health District.
3) Evaluate the obstetric knowledge of health workers attending births in Level 1 Hospitals in uThungulu Health District.
4) Evaluate the obstetric skills of health workers attending births in Level 1 Hospitals in uThungulu Health District.
5) Evaluate the environment in which births are attended in Level 1 Hospitals in uThungulu Health District.
6) Compare the quality of care, the knowledge, skills and environment with perinatal outcomes.

The chapter starts by presenting the perinatal outcomes calculated for each hospital, and then proceeds to present the quality of intrapartum care, the results of the knowledge and skills tests, and the results on the enabling environment and workload of midwives. Finally, the association is measured between perinatal outcomes and quality of care, obstetric knowledge and skills, and the enabling environment.

4.1 Perinatal outcomes

Table 4.1 presents raw perinatal data (total number of births, live births, fresh stillbirths, macerated stillbirths and low birth-weight births) by hospital, from July 2007 to June 2008.

Table 4. 1: Perinatal data by Level 1 Hospital uThungulu Health District, July 2007 to June 2008.

Hospital	Total births	Total live births	FSB	MSB	ENND	LBW
C.Booth	368	358	1	9	7	42
Ekombe	722	701	11	10	13	97
Eshowe	2520	2472	22	26	17	257
Nkandla	1592	1572	1	19	26	168
St Mary	1335	1309	3	23	13	133
Total	6537	6412	38	87	76	697

From these data perinatal outcome indicators were calculated and presented in Table 4.2. The perinatal mortality rate (PNMR) for the five hospitals combined was 31 deaths per 1000 births and ranged from 26 in Eshowe to 47 per 1000 births in Ekombe. The fresh stillbirth rate (FSBR) for the five hospitals was 6 deaths per 1000 births and ranged from 1 in Nkandla to 15 per 1000 births in Ekombe. The early neonatal death rate (ENNDR) for the five hospitals was 12 deaths per 1000 live births and ranged from 7 in Eshowe to 20 per 1000 live births in Catherine Booth. The perinatal care index (PCI) for the five hospitals was 3 and ranged from 3 in Eshowe, Nkandla and St Mary to 4 in Catherine Booth and Ekombe.

Table 4. 2: Perinatal outcomes by Level 1 Hospital in uThungulu Health District, July 2007 to June 2008.

Hospital	PNMR	FSBR	ENNDR	PCI
C.Booth	46	3	20	4
Ekombe	47	15	19	4
Eshowe	26	9	7	3
Nkandla	29	1	17	3
St Mary	29	2	10	3
Total	31	6	12	3

4.2 Quality of intrapartum care

To assess the quality of intrapartum care, maternity case records were reviewed of women who delivered in the month immediately prior to the commencement of the study. A total of 587 maternity case records were selected in the district, but only 299 (51%) maternity case records were reviewed: 18 (6%) from Catherine Booth Hospital, 30 (10%) from Ekombe Hospital, 83 (28%) from Eshowe Hospital, 112 (37%) from Nkandla Hospital and 56 (19%) from St Mary's

Hospital. The breakdown of records reviewed by hospital is presented in Table 3.4 and is reproduced in Table 4.3 below.

Table 4. 3: Explanatory data on the actual sample size of maternity case records audited in each Level 1 Hospital in uThungulu Health District.

	Hospitals				
	C.Booth	**Ekombe**	**Eshowe**	**Nkandla**	**St Mary**
Number of admissions	32	58	183	168	146
Records for inclusion	18	30	83	130	56
Admitted not monitored	0	0	25	2	16
Total records excluded	14	28	75	36	74
Excl: Cervical dil.>8cm	6	12	26	19	14
Excl: BBA	2	7	19	8	16
Excl: C/S	6	3	6	9	12
Excl: Missing files	0	0	24	0	32
Total records reviewed	18	30	83	112	56

In the following section, the results of the maternity case record review are presented: firstly, presented is the overall percentage of maternity case records with each item recorded, and secondly, the score per subset in the maternity case record, by Level 1 Hospital. The details are reflected in Tables 4.4 and 4.5.

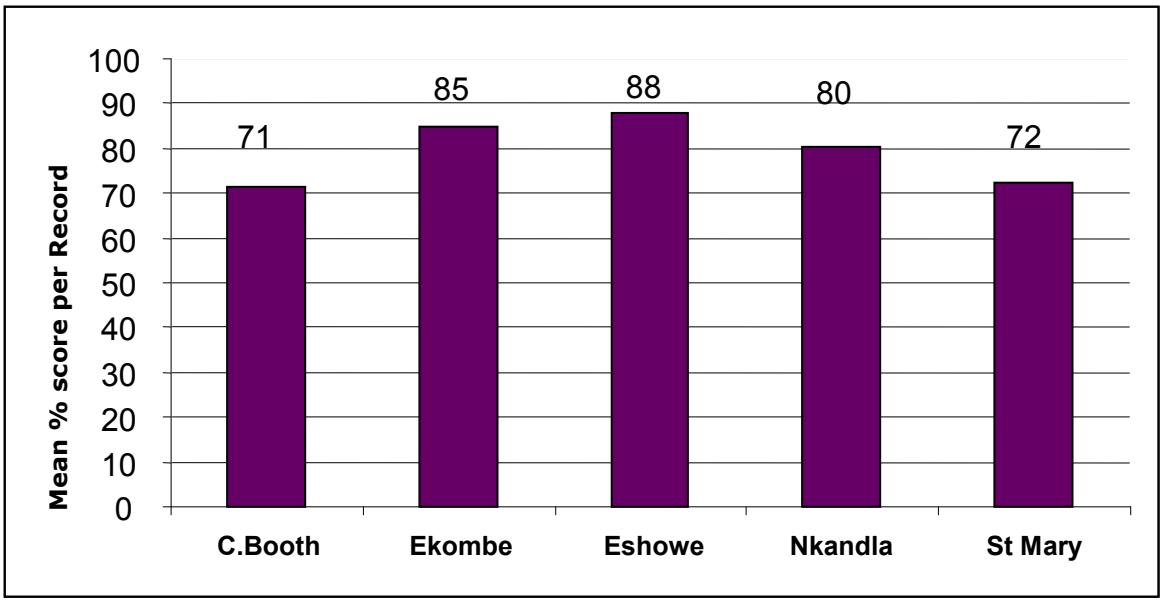
Table 4. 4: Percentage of maternity case records with each item recorded, by Level 1 Hospital in uThungulu Health District, June 2008.

	Items	**C.Booth n=18**	**Ekombe n=30**	**Eshowe n=83**	**Nkandla n=112**	**St Mary n=56**	**Total n=299**
Admission assessment	ANC card reviewed	22	83	89	74	64	74
	Adm. form complete	61	93	100	100	100	97
	Diagnosis & Mx	61	93	100	99	98	96
	Adm. double checked	0	0	0	0	0	0
Labour graph	Risk factors recorded	55	93	98	95	73	90
	FHR ½ hrly	88	100	100	99	91	97
	State of liquor	83	100	100	99	89	97
	Degree of moulding	83	100	100	100	85	96
	Contractions ½ hrly	100	100	100	100	96	99
	Dilatation	100	100	100	100	100	100
	Dil.-correct plotting	100	100	100	100	100	100
	Level of head 4 hrly	94	100	100	100	100	99
	Maternal BP	94	96	100	99	80	95
	Maternal T^0	94	96	98	94	78	91
	Record of drugs & fluids	61	70	72	98	50	72

Table 4. 4. Percentage of maternity case records with each item recorded, by Level 1 Hospital in uThungulu Health District, June 2008 (cont).

	Items	C.Booth n=18	Ekombe n=30	Eshowe n=83	Nkandla n=112	St Mary n=56	Total n=299
Mx of labour form	Mx recorded after PV	83	93	92	75	66	81
	Summary of FC	77	93	92	76	66	81
	Summary of labour	77	93	92	76	66	81
	Summary of MC	77	93	92	76	66	81
	Decision on further Mx	77	93	92	77	66	81
	Time of next review	33	83	84	6	10	38
	Mx Double checked 4hly	0	0	0	0	0	0
Newborn	Form completed	100	50	98	97	98	91
Final summary	Active Mx of 3rd stage	72	93	92	71	64	78
	Summary of labour	100	100	97	86	98	94
Overall score		71	85	88	80	72	79

Figure 4.1 shows the overall mean percentage score[1] per record by Level 1 Hospital. It highlights that the hospitals have high mean overall percentage scores per record. Comparison with the Kruskal Wallis Non-Parametric Test shows that there is a statistically significant difference in scores amongst hospitals (p=0.014).



[1] To obtain the overall mean percentage score per record, the number of records with completed items were summed up and divided by the number of items on the maternity case records multiplied by one hundred.

Figure 4. 1: Mean overall percentage score per record, by Level 1 Hospital in uThungulu Health District, June 2008.

Table 4.5 presents maternity case records subset scores by Level 1 Hospital in uThungulu Health District. The subsets include: the admission assessment, the labour graph and the management of labour. The labour graph was further divided into the monitoring of fetal condition (FC), monitoring of labour progress (LP) and monitoring of maternal condition (MC). The table shows variable median scores between hospitals in the admission assessment (range 36%-72%) and in the scores for the management of labour (range 49%-79%). The range is narrower in the overall subset score for the labour graph (86%-99%). However, more careful analysis of the components of the labour graph reveal that the range is narrower for the monitoring of fetal condition (85%-100%), almost non-existent for the monitoring of labour progress (99%-100%), and a very wide range for the monitoring of maternal condition (range 56%-99%). Comparison of subset scores with of Kruskal Wallis Non-Parametric Test shows statistically significant differences in the median subset scores between hospitals, as reflected in Table 4.5.

Table 4. 5: Maternity case record review: Subset scores and difference in median subset scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth n=3	Ekombe n=2	Eshowe n=6	Nkandla n=9	St Mary n=5	Chi-square	p-value
Adm. assessment	36	67	72	68	65	45.5	<0.001
Labour graph	85	96	97	98	85	50.8	<0.001
Monitoring FC	85	100	100	99	88	37.9	<0.001
Monitoring LP	98	100	100	100	99	9.7	0.045
Monitoring MC	77	96	99	96	55	42.5	<0.001
Mx of labour	66	78	78	55	48	111.8	<0.001

4.3 Obstetric knowledge of health care workers.

In order to assess the obstetric knowledge and skills of health workers, the unit of analysis consisted of all registered midwives working in labour wards of Level 1 Hospitals in the uThungulu Health District.

A total of twenty-five midwives from the five hospitals completed the knowledge test: three from Catherine Booth, two from Ekombe, six from Eshowe, nine from Nkandla and five from St

Mary's. The breakdown of the number of midwives who participated in the study is presented in Table 3.5 in Chapter 3.

Figure 4.2 shows the median, maximum and minimum values and inter-quartile range for the overall knowledge test scores by hospital. It highlights differences in scores between providers within and amongst hospitals. The lowest individual knowledge score (32%) is recorded at Eshowe Hospital and the highest individual scores (60%; 59%) at Catherine Booth and St Mary's hospitals respectively. The lowest overall median score (48%) is recorded at Nkandla Hospital and the highest overall median score (59%) at St Mary's Hospital. Kruskal Wallis Non-Parametric Test shows no statistically significant difference in the overall knowledge scores between hospitals (p=0.07).

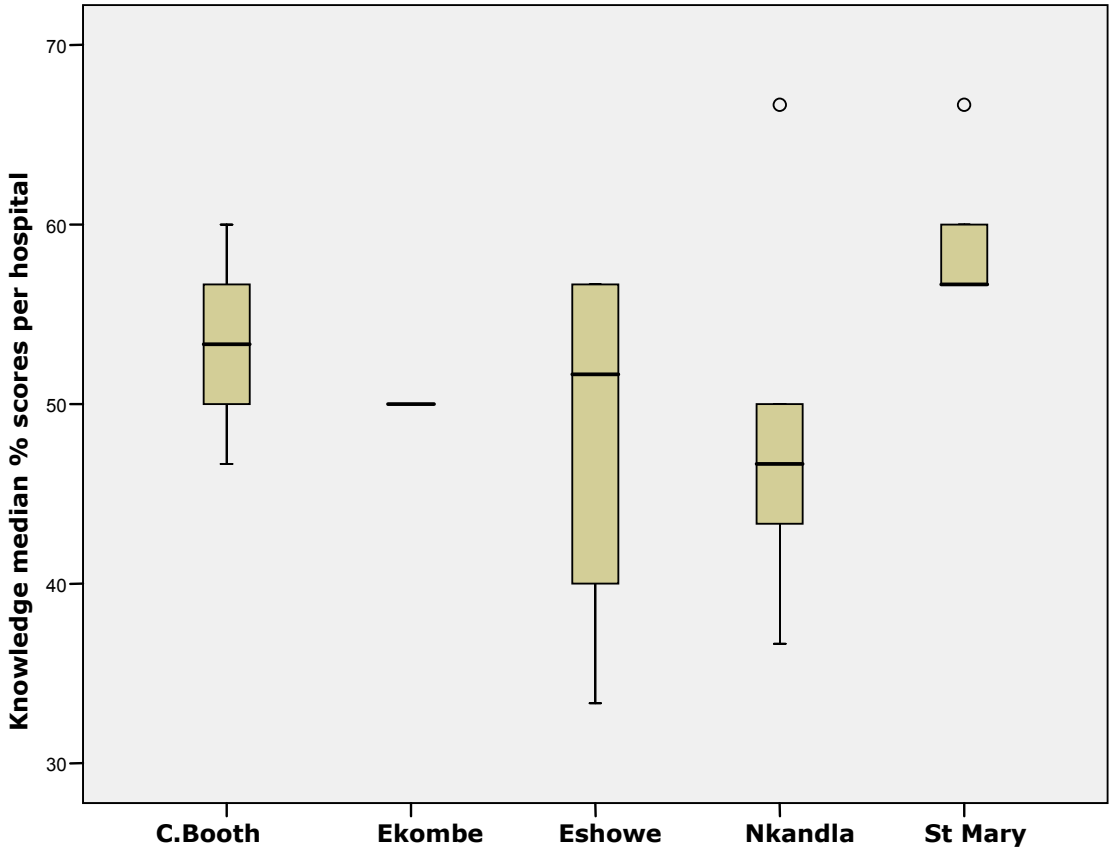


Figure 4. 2: Knowledge median percentage scores by Level 1 Hospital in uThungulu Health District, June 2008.

Table 4.6 presents the knowledge median subset scores by hospital, expressed as a percentage. It also presents the difference in knowledge median subset scores by means of Kruskal Wallis Non-Parametric Test, which shows no statistically significant differences in the knowledge median subset scores amongst hospitals.

Table 4. 6: Overall knowledge median subset scores and difference in knowledge median subset scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth n=3	Ekombe n=2	Eshowe n=6	Nkandla n=9	St Mary n=5	Chi-square	P-value
Normal labour	42	43	43	42	52	4.1	0.38
Prolapsed cord	67	50	58	39	50	1.88	0.75
Prolonged labour	100	75	75	72	80	2.87	0.57
PPH	44	50	33	56	73	4.30	0.36
HIV	78	83	72	74	80	0.44	0.97
PIH	67	33	28	37	60	7.09	0.34
Sepsis	33	50	67	44	50	4.44	0.38

4.4 Obstetric skills of health care workers

Twenty-five midwives from the five hospitals completed the test of obstetric skills. The breakdown of the number of midwives by hospital is presented in Table 3.5 in Chapter 3. Participants were evaluated on two partograph exercises and a postpartum haemorrhage (PPH) station. The results are first presented as a median aggregated skill score[2] per hospital, then per individual exercise.

4.4.1 Aggregated skill score

Table 4.7 shows the median aggregated skill score by Level 1 Hospital. The highest score (63%) is recorded at St Mary's Hospital. A statistically significant difference was found in the median aggregated skill score amongst hospitals (p=0.002).

Table 4. 7: Median aggregated skill score and difference in median aggregated skill score, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth n=3	Ekombe n=2	Eshowe n=6	Nkandla n=9	St Mary n=5	Chi square	P-value
Skill score	57	57	54	56	62	17.4	0.002

[2] The skill scores for each hospital were obtained by summing up the number of correct answers divided by the total number of questions multiplied by one hundred.

4.4.2 Labour Graph Exercise I

The first exercise assessed midwives' ability to interpret information already plotted on a labour graph. The results are presented in Figure 4.3. The lowest individual skill score (46%) was recorded at Eshowe Hospital; whilst the highest individual skill score (72%) was recorded at Nkandla Hospital. The median skill scores are above 50% in four out of five hospitals. The lowest median score (48%) was recorded at Nkandla Hospital whilst the highest median score (65%) was recorded at St Mary's Hospital. Kruskal Wallis Non-Parametric Test shows no statistically significant differences in the overall Labour Graph Exercise I median scores between the five hospitals (p=0.560).

Table 4.8 shows the Labour Graph Exercise I median subset scores and differences in the median subset scores per hospital. St Mary scored highest on identification of risk factors (76%), Catherine Booth on diagnosis (69%) and Ekombe on management (50%). There are statistically significant differences in the median scores for the identification of risk factors (p=0.025) and diagnosis (p=0.001).

Table 4. 8: Labour Graph Exercise I subset median scores and differences in subset median scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth n=3	Ekombe n=2	Eshowe n=6	Nkandla n=9	St Mary n=5	Chi square	p-value
Risk factors	69	57	61	69	76	11.1	0.025
Diagnosis	100	50	100	50	50	17.6	0.001
Mx	14	50	37	37	42	6.10	0.192

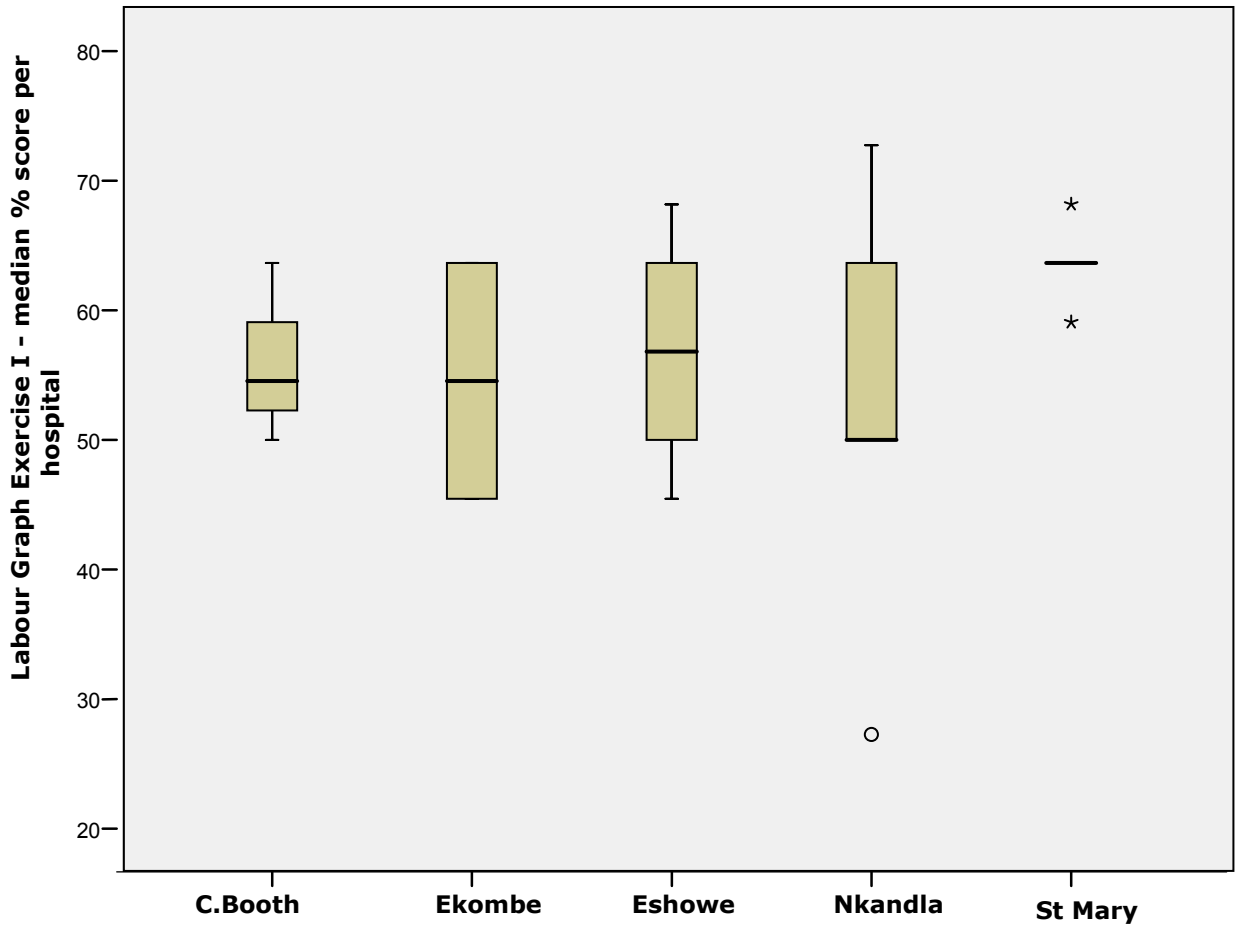


Figure 4. 3: Labour Graph Exercise I median percentage score by Level 1 Hospital in uThungulu Health District, June 2008.

4.4.3 Labour Graph Exercise II

The second partograph exercise assessed the abilities of midwives to correctly plot information on a labour graph.

Figure 4.4 shows the scores for Labour Graph Exercise II: the lowest individual score (53%) was recorded at Eshowe Hospital, and the highest individual skill score (80%) at Nkandla Hospital. The highest median score (78%) was recorded at St Mary's Hospital and the lowest median score (65%) at Eshowe Hospital. Overall Kruskal Wallis Non-Parametric Test shows no statistically significant difference in the Labour Graph Exercise II amongst the five hospitals.

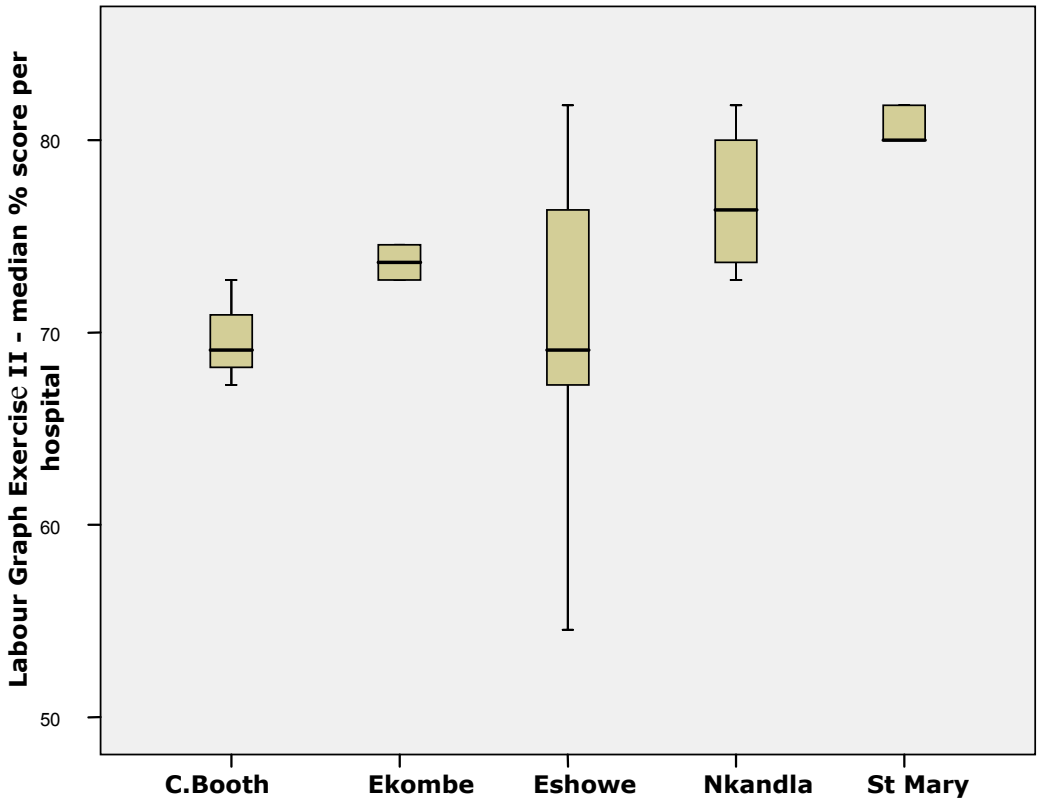


Figure 4. 4: Labour Graph Exercise II – median percentage score by Level 1 Hospital in uThungulu Health District, June 2008.

The Labour Graph Exercise II subset scores are presented in Table 4.10. It shows high scores in all five hospitals in different subsets. It also shows no statistically significant difference in median subset scores amongst hospitals.

Table 4. 9: Labour Graph Exercise II- median subset scores and differences in median subset scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth n=3	Ekombe n=2	Eshowe n=6	Nkandla n=9	St Mary n=5	Chi square	p-value
Fetal condition	63	67	63	70	73	9.57	0.48
Progress of labour	80	80	66	80	80	6.11	0.19
Maternal condition	75	67	80	100	80	5.40	0.24

4.4.4 Post- partum haemorrhage station

Figure 4.5 shows differences in scores recorded for the PPH station, for midwives within and amongst hospitals. The lowest individual PPH score (31%) was recorded at St Mary's hospital and the highest individual score (78%) was recorded at Nkandla Hospital. The highest median score (75%) was recorded at Nkandla Hospital and the lowest median score (43%) at St Mary's Hospital.

Kruskal Wallis Non-Parametric Test shows a statistically significant difference in the median scores recorded for the PPH Station amongst hospitals (p=0.008).

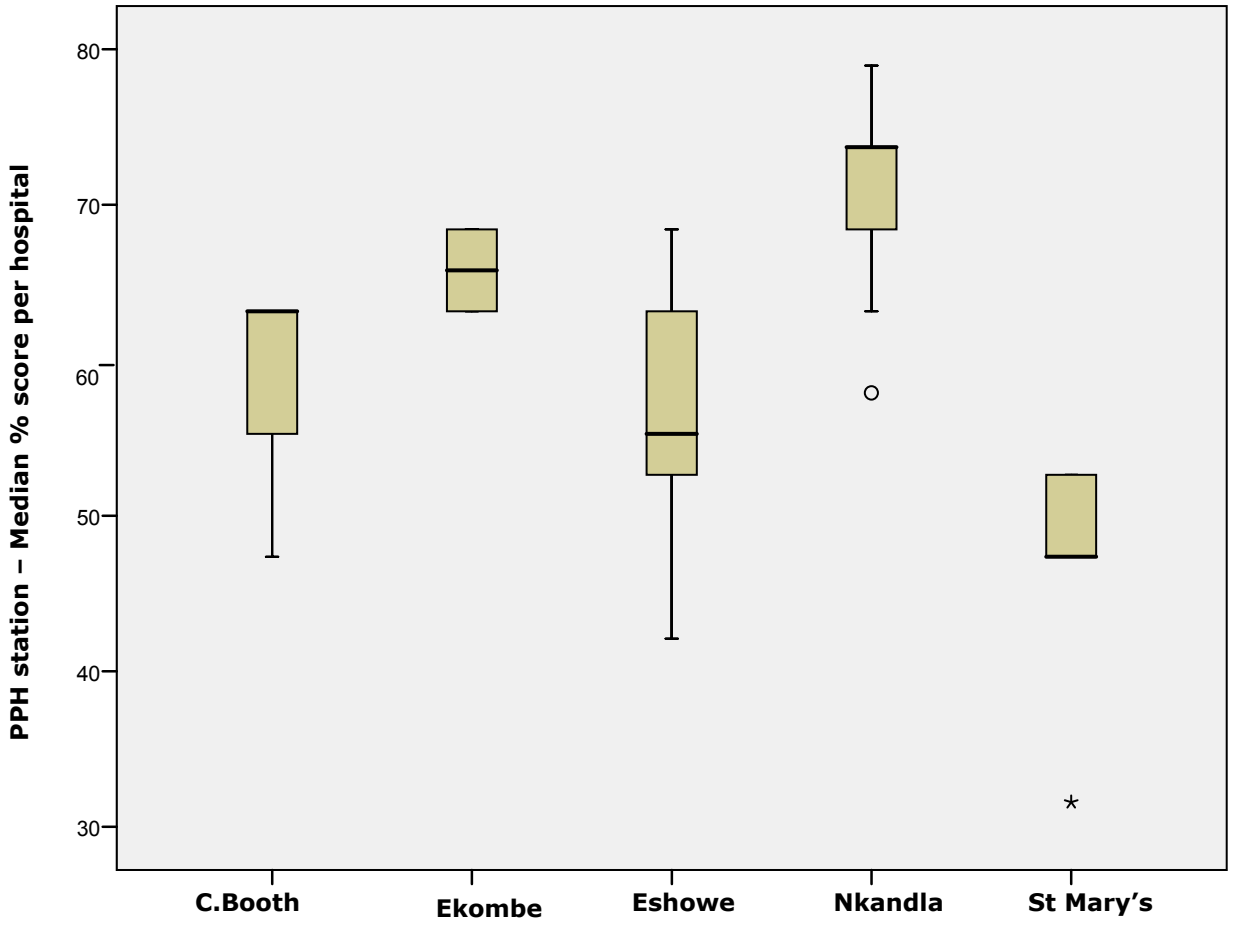


Figure 4. 5: PPH Station - Overall median percentage score, by Level 1 Hospital in uThungulu Health District, June 2008.

4.5 Enabling environment

For the assessment of the enabling environment, the unit of analysis was the labour ward in Level 1 Hospitals. Table 4.10 shows the availability of essential equipment and supplies in each study hospital[3]. The overall uThungulu Health District enabling environment score is 74%. The lowest enabling environment score (57%) is recorded at Nkandla Hospital and the highest enabling environment score (84%) at Eshowe and St Mary's Hospital.

Table 4. 10: Enabling environment scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth	Ekombe	Eshowe	Nkandla	St Mary	Total
Protocols of management	1	1	1	1	1	100
Emergency response	0	0	1	0	0	20
Packed cells	1	0	0	1	1	40
Freeze dried plasma	0	0	1	1	1	60
Injectable antibiotic	1	1	1	1	1	100
Injectable anti- convulsants	1	0	1	1	1	80
Injectable oxytocics	1	1	1	1	1	100
At least 2 BP machines	1	0	0	0	1	40
At least 2 CTG machines	1	0	1	1	1	80
At least 2 stethoscopes	1	1	1	1	1	100
Fetoscope	1	1	1	0	1	80
Doptone	0	0	0	1	1	60
At least 2 Vacuum extractor	1	1	1	0	1	80
Neonatal resus. facilities	1	1	1	1	1	100
Operating theatre	1	1	1	1	1	100
Supervision on both shifts by m/w	1	1	1	0	1	80
Supervision on day shift by ADM	1	1	1	0	1	80
Supervision on night shift by ADM	0	1	0	0	0	20
Acceptable workload	1	1	0	0	1	40
Total	15	12	16	11	16	14
%	78	63	84	57	84	74

Table 4.11 presents the enabling environment subset scores by hospital. The subsets include: referral, drugs and supplies, equipment, supervision and workload. The table shows variable scores between hospitals in the referral subset (50%-100%), in the scores for drug and supplies (40%-100%), supervision and workload (0%-100%). However, the table shows that the range is narrower for the equipment subset (62%-100%).

[3] To obtain the overall enabling environment score for each hospital all items available in each hospital were summed up then divided by the total number of items on the checklist multiplied by one hundred.

Table 4. 11: Enabling environment subset scores, by Level 1 Hospital in uThungulu Health District, June 2008.

	C.Booth	Ekombe	Eshowe	Nkandla	St Mary
Referral	50	50	100	50	50
Drugs and supplies	100	40	80	100	100
Equipment	87	62	75	62	100
Supervision	33	100	33	0	33
Workload	100	100	0	0	1

Table 4.12 presents midwives' workload[4] by hospital for June 2008. Three out of five hospitals have an acceptable workload ratio (1.15 midwives per woman in the labour ward) as recommended by the RCOG (1999, p34).

Table 4. 12: Midwife workload, by Level 1 Hospital in uThungulu Health District, June 2008.

	Number of deliveries June 2008	Average number of deliveries/24-hour day	Number of midwives/24-hour day	Midwife/delivery ratio
C.Booth	36	1.5	4	2.66
Ekombe	59	2.4	9	3.75
Eshowe	183	7.6	5	0.65
Nkandla	131	5.4	6	1.11
St Mary	114	4.7	7	1.48

4.6 Association between perinatal outcomes and quality of intrapartum care, obstetric knowledge and skills, and the enabling environment

Spearman correlation was used to determine the relationship between the dependent (perinatal outcomes) and independent (quality of intrapartum care, obstetric knowledge and skills and the enabling environment) variables. Overall there was no significant correlation detected between

[4] To calculate midwives workload an average of deliveries per midwives per day was obtained by dividing the number of deliveries in June 2008 and divided by the number of midwives in each Level 1 Hospital in uThungulu District on both shifts (day/night) divided by the number of days (30 days) in the month. To obtain the acceptable workload the number of midwives was divided by the average number of deliveries per 24-hour day. The standard of 1.15 midwives to one woman set by the Royal College of Obstetricians and Gynaecologists (RCOG) was used as standard acceptable workload (RCOG 1999, p34).

perinatal outcomes and the quality of intrapartum care, the obstetric knowledge and skills and the enabling environment. Table 4.13 shows the Spearman's correlation coefficients and p-values. All were neither clinically nor statistically significant.

Table 4. 13: Spearman's correlation between dependent and independent variables.

	Quality of intrapartum care		Obstetric knowledge		Obstetric skills		Enabling environment	
	rho	p	rho	p	rho	p	rho	p
PNMR	-0.35	0.55	0.10	0.87	0.00	1.00	-0.20	0.74
FSBR	0.50	0.39	0.10	0.87	0.60	0.28	-0.10	0.84
ENNDR	-0.60	0.28	0.60	0.28	-0.50	0.39	-0.20	0.74

4.7 Conclusion

This chapter has presented the findings of the study, analysed using descriptive and inferential statistics. Overall and subset scores were calculated where appropriate. Descriptive statistics were used to provide indicators of perinatal care, a summary of the quality of intrapartum care (revealing high mean overall scores in the different hospitals), the obstetric knowledge and skills of midwives (showing variable median scores between hospitals) as well as the enabling environment and the workload of midwives.

Kruskal-Wallis Tests was used to determine differences in median labour record subset between hospitals showing statistically significant differences of scores amongst hospitals. Kruskal-Wallis Test was used to determine differences in knowledge and skill median scores amongst hospitals, showing no statistically significant difference in the overall knowledge scores amongst hospitals. However, a statistically significant difference was detected in the median overall skill score amongst hospitals.

Spearman correlations were used to determine relationships between perinatal outcomes, the quality of intrapartum care and obstetric knowledge and skills of midwives and the enabling environment and no correlation between variables was found.

5. Discussion

The main aim of the study was to measure the provision of skilled attendance in Level 1 Hospitals in the uThungulu Health District. Perinatal outcomes were assessed as indicators of the effectiveness of skilled attendance and as a measure of the quality of intrapartum care. The dimensions of skilled attendance that are discussed include: the quality of intrapartum care, the knowledge and skills of midwives, and the enabling environment. The overall provision of skilled attendance is also discussed. Implications for practice, interventions in the health system and for further research are identified.

5.1 Perinatal outcomes

There is controversy as to whether perinatal mortality rates can be used as proxy measures for maternal mortality. Maternal deaths are infrequent and cannot therefore be used effectively for measuring the impact of skilled attendance. A high proportion of perinatal mortality can be averted by the provision of skilled attendance at birth. Therefore perinatal care indicators remain effective measures of the quality of care, particularly the perinatal care index (Pattinson et al 2009, p5).

Overall the PNMR (31 per 1000 births) for the five hospitals in the uThungulu Health district compares well with the national rate (38.8 per 1000 births) for district hospitals and with the provincial rate (41.2 per 1000 births) reported in the Saving Babies 2006-2007 report (Pattinson et al 2009, p5). Three hospitals (Eshowe, Nkandla and St Mary) all demonstrated PNMRs below 30 per 1000, while the other two (Ekombe and Catherine Booth) have rates above 45 per 1000.

The combined FSBR for the five hospitals is 6 per 1000 births. It is difficult to compare this with national rates, as the Saving Babies 2006-2007 report (Pattinson et al 2009, p5) includes an indicator of Fresh Still Births + Early Neonatal Deaths (Day 1) rate while the previous Saving Babies 2003-2005 report (MRC Research Unit for Maternal and Infant Health Care Strategies et al Undated, p?) reports on the overall Still Birth Rate. The more comparable index may be the FSB+ENND (D1) rate, which is reported to be 16.2 per 1000 for district hospitals nationally (Pattinson et al 2009, p5). The FSBR (15 per 1000) for Ekombe hospital approximates this, while the FSBR for all four other hospitals is below 10 per 1000 births, with three (Catherine Booth, Nkandla and St Mary) showing FSBRs of less than 5 per 1000.

The combined ENNDR for the five hospitals is 12 per 1000 live births. Compared with the national (12.5 per 1000 live births) and provincial rate (15.4 per 1000 live births) (Pattinson et al 2009, p5) most hospitals perform poorly, with Catherine Booth, Ekombe and Nkandla hospitals all showing ENNDRS of 17-20 per 1000 live births.

A more helpful analysis of early neonatal deaths would be separating those that die on Day 1 post delivery versus those that die later in the first week of life. Deaths on Day 1 are measure of the quality of intrapartum care and deaths from day 2-7 are a measure of the quality of newborn care. The Saving Babies report 2006-2007 proposes a new index for measuring the quality of intrapartum care: the FSB+ENND (1d) (Pattinson et al 2009, p4). It must be assumed that higher ENNDRs in the uThungulu District Hospitals, in the light of very low FSBRs, represent a high proportion of early neonatal deaths on day one. This may apply in Catherine Booth, Nkandla and St Mary's hospitals. However, in Ekombe Hospital, both the FSBR and the ENNDR are very high, indicating both poor intrapartum and newborn care. In Eshowe Hospital, both rates are low, indicating good intrapartum and newborn care.

The PCI in all hospitals ranged between 3 and 4, and the combined PCI reported for the hospital in the district is 3. All hospitals performed poorly when compared with the national (2.1) and provincial (1.8) index (Pattinson et al 2009, p5). "The perinatal care index is a true measure of the quality of intrapartum care" (Pattinson et al 2009, p5) and poor performance against this index suggests that a high proportion of babies of good weight are dying. These deaths could be averted.

From the measure of perinatal outcomes in the uThungulu Health District, it appears that three hospitals (Eshowe, Nkandla and St Mary) are performing generally well. But the PCI still indicates a poor quality of care and thus all have deaths that could be avoided. Further research is recommended to study the causes and avoidable factors in these deaths. National surveys (Pattinson et al 2009, p 15) show that in district hospitals, just over 20% of deaths could be associated with the health care provider and just under 15% with administrative problems, indicating problems both with the skilled attendants and the enabling environment.

5.2 Quality of intrapartum care

Maternity case records are the main source of information in the labour ward. They contain antenatal, intrapartum and postpartum information of women admitted in labour. Many times information on care is recorded in maternity case records but not performed. However, there are cases where care is not documented but was performed (Sandin-Bojo et al 2006, p?). When auditing the quality of care, if the information is not recorded, it must be assumed that the procedure was not performed (Hussein et al 2004, p166).

All hospitals have high overall mean percentage scores per record. In the study by Voce (2005) scores of 70% were only reached after an intervention was implemented; whereas in the study by Hussein et al (2004) most items of the maternity record were not recorded, although they did not measure the same parameters used in the current study. The Kruskal-Wallis Non-Parametric Test showed a statistically significant difference in scores amongst hospitals, suggesting that all five hospitals do not perform at a similar level in terms of the quality of care provided.

Poor scores on the admission assessment suggest that any risk factors present during antenatal care may not be recognized on admission and the appropriate plan for delivery may not be made. This calls for further research to investigate the relationship between the quality of admission assessment and perinatal outcomes. This may result in the need for in-service training and the need for a supervision intervention.

All hospitals scored similarly well on the recording of findings on the labour graph. This is not consistent with the findings by Hussein et al (2004): their study reports only 15.4% of completed labour graphs.

It is noted that in all hospitals, the management of labour scored most poorly. This is consistent with the findings by Gbangbade et al (2003) and McCaw-Binns et al (2004): their studies report labour monitoring to be inadequate in most records reviewed. Poor scores on the management of labour suggest that findings recorded on the labour graph are not being interpreted to inform the ongoing management of labour. Further research is required to investigating the relationship between the interpretation of findings on the labour graph and perinatal outcomes. This may also

result in need for training and supervision interventions to improve the capacity of midwives to interpret findings and make management decisions.

Comparison of the subsets with Kruskal-Wallis Non-Parametric test shows statistically significant differences in scores amongst hospitals. This suggests that labour monitoring is not performed at the same level in all five hospitals.

5.3 Obstetric Knowledge

Overall, all hospitals scored poorly on the knowledge test. No hospital met the PEP standard of 80%. These results compare with Harvey et al (2007), Gbangbade et al (2003) and McCaw-Binns et al (2004): their studies report midwives' inadequate obstetric knowledge in Jamaica, Rwanda, Ecuador and Benin. All hospitals performed better on prolonged labour and HIV but scored poorly on each of the other subsets. There were no statistically significant differences in the overall knowledge median scores and subsets median scores amongst hospitals, indicating that all hospitals perform on a similar level in terms of obstetric knowledge. The results suggest that midwives in Level 1 Hospitals do not comply fully with the definition of skilled attendant as provided in section 2.2.1 and do not have the minimum knowledge required of midwives in identifying and managing obstetric complications.
Poor knowledge scores suggest inadequate knowledge in midwives to monitor, manage and supervise labour and call for training initiatives for midwives in the management of labour.

5.4 Obstetric Skills

The overall skill scores amongst hospitals were poor and did not meet the set standard (80%). This is consistent with the findings by Harvey et al (2004): their study shows midwives' skills scores around 48.2%.
Three of five hospitals have high scores on plotting information on the labour graph, consistent with the findings of the labour record review. These results are not consistent when compared to the study by Harvey et al (2004). In their study, midwives scored poorly on plotting information on the labour record. However, high scores were recorded on midwives' ability to interpret information on a labour graph. Whereas in the current study, all hospitals had similarly poor

scores in interpreting information on a labour graph. This is consistent with the findings of the labour record review where low scores were found on the management of labour.

Overall, there was not a statistically significant difference in median scores on the Labour Graph Exercise I and II amongst hospitals, indicating that midwives' obstetric skills (in plotting and interpreting information on a labour graph) in the study hospitals are similar. However, there was a statistically significant difference in the post-partum haemorrhage median scores amongst hospitals suggesting that hospitals perform on a different level in terms of the management of post-partum haemorrhage.

Increasing the proportion of deliveries assisted by skilled attendants is the key strategy towards reductions in maternal and perinatal mortality. There are a number of interventions that can be performed by skilled attendants to decrease maternal and perinatal mortality and these are listed in section 2.3 (Table 2.1). However, the above results demonstrate that there is a need for reviewing the education and training received by midwives, as suggested by the literature in section 2.6. Poor scores on plotting and interpreting information on a labour graph suggest that there are difficulties in the ability of midwives to transfer knowledge to skills. It also indicates differences in abilities to record versus interpret findings on the partograph for the management of labour. This has similar implications as the poor scores in the management of labour: there is a need for training and supervision interventions to improve the capacity of midwives to interpret findings and make management decisions.

5.5 The enabling environment

Three hospitals met the enabling environment standard. All hospitals but one scored poorly on referral, and the availability of supervision on both shifts. One hospital scored poorly on drugs and supplies. Overall no hospitals reported the presence of all the elements of the enabling environment. Studies by Gbangdade et al (2003) and McCaw-Binns et al (2004) looked at the enabling environment; however no details on their results were reported. The enabling environment refers to conditions in which skilled attendants work to provide women with care during childbirth.The elements of the enabling environment identified in the literature are listed

and defined in section 2.2.2. Results from theLevel 1 Hospitals in uThungulu Health District suggest that the environment is not fully enabling, thus the need for quality improvement initiatives to address the availability of drugs, equipment maintenance and ineffective supervision.

Three hospitals had acceptable workloads. Compared with perinatal outcomes two hospitals that have acceptable workload have high PNMR and high PCI (4) and do less than 100 deliveries per month. This suggests that staff shortages may play less of a role as determinants of poor quality of care than is usually attributed by health workers. The South African health system suffers an overall shortage of and maldistribution of healthcare workers. Though staff shortages may play less of a role in the determination of the quality of care, a gap still exists in the coverage of health professionals in rural areas. This calls for a review of policies pertaining to the deployment of healthcare workers in the country to ensure an equitable distribution of health professionals between urban versus rural areas.

5.6 Association between perinatal outcomes with the quality of intrapartum care, the obstetric knowledge and skills and environment.

No association could be detected between variables. However, there are trends that can be traced in different hospitals. For example, all hospitals reported a high PCI, an indication of poor quality of care, and poor scores in knowledge and skills of midwives. This could suggest a relationship between these variable that was however not shown in the study. Perinatal outcomes in two (Catherine Booth and Ekombe) of the five hospitals were worse and the PCI reported in these hospitals were high 4, suggesting a relationship between poor perinatal outcomes and poor quality of care.

The lack of association between variables might have been as a result of:

- Data analysed and presented at hospital level rather than individual level.
- Other factors influencing perinatal outcomes not measured in this study. For example: women related factors (poor health, poor nutrition, and delay in seeking health care), socio-economic factors (poverty), and causes of perinatal mortality.

5.7 Conclusion

This section looks at the strengths and weaknesses in each hospital with regards to the provision of skilled attendance and presents a conclusive remark.

Overall, all hospitals tend to share a similar pattern on perinatal outcomes, the quality of intrapartum care, obstetric knowledge and skills and the enabling environment.

Catherine Booth and Nkandla hospitals performed similarly poorly on PNMR, ENNDR and PCI, but have good FSBR. Ekombe performed poorly on all perinatal outcomes and this is consistent with poor PCI. Eshowe and St Mary's performed well on all perinatal outcomes but did poorly on PCI.

Catherine Booth, Nkandla and St Mary's hospitals have an overall high mean percentage score for the completion of labour records, which is an indication of good quality care. However, they performed poorly on the admission assessment and the management of labour, indicating a lack of appropriate plan for the labour. When most hospitals performed poorly on the management of labour, Ekombe performed relatively well. Eshowe is the only hospital that performed well on all record review subsets. This result however, is not consistent with poor PCI.

All hospitals share the same pattern with regard to obstetric knowledge with very poor overall scores. Similarly, all hospitals scored poorly on normal labour, prolapsed cord, PPH, PIH and sepsis, an indication of inadequate obstetric knowledge across all hospitals. They all scored well on prolonged labour and HIV.

All hospitals performed poorly on overall skill scores. Catherine Booth and Eshowe hospitals performed poorly on all skills subset; Ekombe, Nkandla and St Mary are performed well on plotting information on a labour graph.

St Mary's and Catherine Booth hospitals both have an acceptable enabling environment and acceptable workload, whereas Nkandla hospital has neither an acceptable enabling environment nor an acceptable workload. Ekombe hospital does not have an acceptable enabling environment but acceptable workload. Eshowe hospital has an acceptable enabling environment but not an acceptable workload.

With few exceptions, almost all countries where skilled attendance is more than eighty percent (80%) have low MMRs and PNMRs. In South Africa, from the Demographic and Health Survey, eighty four percent (84%) of deliveries are assisted by a skilled attendant. However, while an attendant may be present, one cannot say that skilled attendance is provided. This has been shown in uThungulu Health District, as reflected in poor quality of care, inadequate obstetric knowledge and skills of midwives and a lack of an enabling environment across different hospitals.

Relatively low perinatal mortality rates in three hospitals while the quality of care provided is poor might be the result of doctors' interventions. Health care workers include doctors and midwives; however doctors were not included in the study. Further research is required to evaluate the partnership ratio of deliveries solely attended by midwives versus those attended by doctors. There may be a need to investigate the patient profile: low risk deliveries may be self-referring to Level 1 Hospitals and high risk to Level 2 Hospitals.

Despite of quality improvement initiatives being implemented in Eshowe, Nkandla and St Mary's hospitals, their performance is far from being satisfactory. The differences between the hospitals reported in the summary above may indicate that initiatives to improve the quality of care must be tailored to the specific problems in each hospital.

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Appendices

Appendix 1. Letters of approval and permission.

Appendix 1. 1: Postgraduate Education Committee Approval.

UNIVERSITY OF
KWAZULU-NATAL

07 March 2008

Dear Dr Anna Voce

PROTOCOL: "Measuring skilled attendance in the uThungulu District, KwaZulu-Natal in 2008. (S Mianda) 204520254- Master of Public Health

The Postgraduate Education Committee ratified the approval of the abovementioned study on 04 March 2008

Please note:

- the Postgraduate Education Committee must review any changes made to this study.
- the study may not begin without the approval of the Ethics Committee.
- the study may not begin without the approval of the Biomedical Research Ethics Committee.

May I take this opportunity to wish the student every success with the study.

Yours sincerely

PROFESSOR P MOODLEY
Chair : Postgraduate Education Committee

c.c. S Mianda

Postgraduate Education Administration
Medical School Campus

Postal Address: *Private Bag 7, Congella, 4013, South Africa*

Telephone: *+27 (0)31 260 4327* ***Facsimile:*** *+27 (0)31 4401* ***Email:*** *heslopd@ukzn.ac.za* ***Website:*** *www.ukzn.ac.za*

Appendix 1. 2*:* Biomedical Research Ethics Committee Approval.

UNIVERSITY OF KWAZULU-NATAL

BIOMEDICAL RESEARCH ETHICS ADMINISTRATION
Research Office
Room N40 - Govan Mbeki Building
University Road, WESTVILLE CAMPUS
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 260-4769/1074 - Fax: 27 31 260-4609
Email: ngwenyap@ukzn.ac.za - Website: www.ukzn.ac.za

10 July 2008

Ms Solange Mianda
Department of Public Health Medicine
Nelson R. School of Medicine
University of KwaZulu- Natal

PROTOCOL: Measuring skilled attendance in the uThungulu District KwaZulu-Natal in 2008. Solange Mianda. Department of Public Health Medicine. Ref No: BE041/08

A sub-committee of the Biomedical Research Ethics Committee has considered and noted your application received on 11 March 2008 and your responses dated 04 July 2008 to queries raised on 21 May 2008. **We acknowledge receipt of the approval letter from the hospital Manager of Ekombe Hospital.**

The study is given full ethics approval and may begin as at today's date: **10 July 2008**

This approval is valid for one year from **10 July 2008.** To ensure continuous approval, an application for recertification should be submitted a couple of months before the expiry date. In addition, when consent is a requirement, the consent process will need to be repeated annually.

I take this opportunity to wish you everything of the best with your study. Please send the Biomedical Research Ethics Committee a copy of your report once completed.

The sub-committee's decision will be RATIFIED at a full sitting of the Biomedical Research Ethics Committee meeting to be held on **12 August 2008.**

Yours sincerely

PROFESSOR D WASSENAAR
Chair: Biomedical Research Ethics Committee

Appendix 1. 3: Permission from the Provincial Health Research and Knowledge Management Division.

HEALTH
KwaZulu-Natal

Health Research & Knowledge Management sub-component
10 – 103 Natalia Building, 330 Langalibalele Street
Private Bag x9051
Pietermaritzburg
3200
Tel.: 033 – 395
Fax.: 033 – 394 3782
Email.: @kznhealth.gov.za
www.kznhealth.gov.za

Reference : HRKM057/07
Enquiries : Mrs G Khumalo
Telephone : 033 – 395 3189
02/07/2008

Dear Ms Mianda

Subject: Approval of a Research Proposal

The research proposal titled **'Measuring skilled attendance in the uThungulu District of KwaZulu Natal'** was reviewed by the KwaZulu-Natal Department of Health. The proposal is hereby **approved** for research to be undertaken at the following hospitals:

- KwaMagwaza
- Ekombe
- Catherine Booth
- Nkandla
- Eshowe

1. You are requested to undertake the following:
   a. Seek permission from Mbongolwane Hospital Manager before commencing your study at Mbongolwane Hospital.
   b. Make the necessary arrangement with identified facilities before commencing with your research project.
   c. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

2. 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 gugu.khumalo@kznhealth.gov.za

For any additional information please contact Mrs G Khumalo on 033-3953189.

Yours Sincerely

Dr. S.S.S. Buthelezi
Chairperson: Provincial Health Research Committee
KwaZulu-Natal Department of Health

Appendix 1. 4: Hospital permission/Support Letters.

Solange Mianda
University of KwaZulu Natal
DURBAN

Dear Solange

Your email received yesterday refers.

Permission is thus granted for you to conduct your research study in this hospital as requested.
Conditions will apply as per the ethical guidelines applicable on research studies accordingly, and please keep this office posted on the proposed date of your visit.

Thank you.

L.B.VUNDLA
C E O: CBH

Mr. L.B. Vundla
Chief Executive Officer
Catherine Booth Hospital
Tel: 035 - 474 8402
Fax: 035 - 474 7694
Cell: 078 78230 74

DEPARTMENT OF HEALTH

PROVINCE OF KWAZULU-NATAL

EKOMBE HOSPITAL
Private Bag x203
Kranskop, 3268
Tel.: 035, 834 2000 Fax. 035 8342076
Date: 13/06/08

Enquiries: D.M.Mchunu

Department of Public Health Medicine
Nelson R. School of Medicine
University of Kwa-Zulu Natal

Dear Ms Solange Mianda

PERMISSION TO CONDUCT THE RESEARCH STUDY AT EKOMBE DISTRICT HOSPITAL.

Permission is hereby granted for to conduct the research at our institution for two days, that is one in July and one in August as discussed.

People that will also be participating in you study have also signed.

Hoping your goal will be achieved and we are looking forward to meet and help you.

Yours truly,

D.M.Mchunu (for hospital Manager)

PERMISSION TO CONDUCT A RESEARCH STUDY/TRIAL

This must be completed and submitted to the Medical Superintendent/s / Hospital Manager/s for signature.

For King Edward VIII Hospital (KEH) and Inkosi Albert Luthuli Central Hospital (IALCH) studies please submit the document together with the following:

1. Research proposal and protocol.
2. Letter giving provisional ethical approval.
3. Details of other research presently being performed by yourself in the employ of KEH, (individually or as a collaborator).
4. Details of any financial or human resource implications to KEH, including all laboratory tests, EEGs, X rays, use of nurses, etc. (See Addendum 1)
5. Declaration of all funding applications / grants, please supply substantiating documentation.
6. Complete the attached KEH Form - *"Research Details"*

Once the document has been signed it should be returned to Mrs S Buccas: Biomedical Research Ethics Administrator, Room N40, Govan Mbeki Building, Westville Campus, University of KwaZulu-Natal.

To: Chief Medical Superintendent / Hospital Manager

Permission is requested to conduct the above research study at the hospital/s indicated below:

Site 1 address:
Eshowe Hospital
035 4744914 (fax)

Investigator/s:
Principal: Solanga Miahda
Co-Investigator: 031 260 4421 (fax)
Co-Investigator: 013 384 4995 (cell)

Signature of ~~Chief Medical Superintendent~~/Hospital Manager:

Date: 02/07/2008

Site 2 address:

Investigator/s

Principal:

Co-Investigator:

Co-Investigator:

Signature of Chief Medical Superintendent / Hospital Manager:

Date:

NB: Medical Superintendent/s / Hospital Manager/s to send a copy of this document to Natalia

Received Time 2 Jun. 13:12

HEALTH
KwaZulu-Natal

NKANDLA HOSPITAL
Mbatha lane, Nkandla 3855
Private Bag x 102, Nkandla 3835
Tel: 035 – 8330283 (direct telephone line)
Fax: 035 – 8330054
E-mail:mbuso.mntambo@kznhealth.gov.za
www.kznhealth.gov.za

Date: 30/05/2008

SOLANGE M IANDA

SURVEY : MEASURING SKILLED BIRTH ATTENDANCE

Your request to conduct a study in Uthungulu hospitals refers.

Nkandla hospital supports your intended study and we look forward to receiving the protocol, provincial permission and data collection tools.

Please advise us in advance about the intended date for data collection.

Yours sincerely

Electronically signed

Mr M. Mntambo
Hospital Manager

Fighting Disease, Fighting Poverty, Giving Hope / Silwa Nezifo, Silwa Nobubha, Sinika Ithemba".

PERMISSION TO CONDUCT A RESEARCH STUDY/TRIAL

This must be completed and submitted to the Medical Superintendent/s / Hospital Manager/s for signature.

For King Edward VIII Hospital (KEH) and Inkosi Albert Luthuli Central Hospital (IALCH) studies please submit the document together with the following:

1. Research proposal and protocol.
2. Letter giving provisional ethical approval.
3. Details of other research presently being performed by yourself if in the employ of KEH, (individually or as a collaborator).
4. Details of any financial or human resource implications to KEH, including all laboratory tests, EEGs, X-rays, use of nurses, etc. (See Addendum 1)
5. Declaration of all funding applications / grants, please supply substantiating documentation.
6. Complete the attached KEH Form - *"Research Details"*

Once the document has been signed it should be returned to Mrs S Buccas: Biomedical Research Ethics Administrator, Room N40, Govan Mbeki Building, Westville Campus, University of KwaZulu-Natal.

To: Chief Medical Superintendent / Hospital Manager

Permission is requested to conduct the above research study at the hospital/s indicated below:

Site 1 address:
KwaMagwaza Hospital
P/Bag 208
Melmoth 3835

Investigator/s:
Principal: _____
Co-Investigator: _____
Co-Investigator: _____

Signature of Chief Medical Superintendent/Hospital Manager:
_____

Date: 2008-06-09

Site 2 address:
_____
_____
_____

Investigator/s
Principal: _____
Co-Investigator: _____
Co-Investigator: _____

Signature of Chief Medical Superintendent / Hospital Manager:
_____

Date: _____

NB: Medical Superintendent/s / Hospital Manager/s to send a copy of this document to Natalia

Appendix 1. 5: Letter to Mbongolwane Hospital.

Mrs. Jafta, Mbongolwane Hospital Manager
P/Bag X126, Kwapett 3820
Fax number: 0354766380

Dear Mrs Jafta

My name is Solange Mianda. I am a Master of Public Health student at the University of KwaZulu-Natal. I am undertaking my final year research project on: **Measuring skilled attendance at birth in Level 1 Hospitals in the uThungulu District.**
I have attempted to contact you several times to obtain permission to conduct the study at Mbongolwane Hospital. I tried to contact you by e-mail (on 22/05/2008 and 24/06/2008) and also by facsimile (13/03/2008 and 02/06/2008). I also have spoken personally to your secretary who gave me the assurance that you would revert to me. However to date I have not yet received your permission to go ahead with the study.

I do not want to assume that Mbongolwane Hospital does not want to participate in the study. Please sign the attached form and send to me either by mail (at somianga@yahoo.fr) or fax (031 260 4211 – for my attention) to indicate whether you wish for Mbongolwane Hospital to participate in the study or not.

If I do not hear from you by Monday 13th October 2008 I will assume that you do not wish for Mbongolwane Hospital to participate in the study. Rest assured that if you do not wish for Mbongolwane Hospital to participate there will be no negative consequence, nor penalty involved, nor any loss of benefits to which the hospital may be entitled.
Kinds regard
Solange Mianda

Appendix 1. 6: Informed Consent form.

Greeting: Hello

My name is Solange Mianda I am a Master of Public Health student Health student at the University of KwaZulu-Natal. I am undertaking my final year research on: **Measuring skilled attendance at birth in Level 1 hospitals in the uThungulu District.**

You have been asked to participate in a research study involving you in responding to a multiple choice test and OSCE stations.

You have been informed about the study by ……. .

You may contact Solange at 0733844995 any time if you have questions about the research or if you are injured as a result of the research.

You may contact the **Biomedical Research Ethics Office** on **031-260 4769 or 260 1074** if you have questions about your rights as a research participant.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop at any time.

If you agree to participate, you will be given a signed copy of this document and the participant information sheet which is a written summary of the research.

The research study, including the above information, has been described to me orally. I understand what my involvement in the study means and I voluntarily agree to participate. I have been given an opportunity to ask any questions that I might have about participation in the study.

_____ _____

Signature of Participant **Date**

_____ _____

Signature of Witness **Date**
(Where applicable)

_____ _____

Signature of Translator **Date**
(Where applicable)

Appendix 2: Perinatal outcomes data extraction form

Source of data – Maternity/delivery register

Name of hospital: **……** **Date of data collection: ……**

	July 2007	Aug 2007	Sep 2007	Oct 2007	Nov 2007	Dec 2007	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	June 2008	Total
Total deliveries													
Total births													
Live births													
FSB													
MSB													
ENND													
LBW													

Appendix 3: MATERNITY CASE RECORD REVIEW FORM.
Source of data – Maternity case records
Name of hospital: **…… Date of data collection: …….**

INSTRUCTIONS

- **For each Yes answer, score 1 point**
- **If the item is incomplete or missing, score 0**
- **Record the score on the summary sheet form**

Admission assessment form

1) Is there evidence that the health worker has reviewed and summarized the ANC record and listed the maternal and fetal risk factors?
2) Check the items on the admission form. Are all completed?
3) At the end of the form, is there a decision on diagnosis and management?
4) Were the admission findings checked and counter-signed by an Advanced Midwife (or doctor or experienced midwife if no ADM available)?

Labour graph

5) Is the list of risk factors recorded at the top of the labour graph?
6) Has the fetal heart rate been recorded half-hourly?
7) Has the state of the liquor (as recognized by a pad check) been recorded at least 4-hrly?
8) Has the degree of moulding been recorded when a PV has been done?
9) Have the contractions been recorded hourly?
10) Has the cervical dilatation been recorded at least 4-hourly during the latent phase and at least two-hourly in the active phase?
11) Has the cervical dilatation been plotted in relation to the lines drawn for the latent and active phases, and for the alert and action lines?
12) Has the level of the head in relation to the brim of the pelvis been recorded at least 4-hourly since admission?
13) Have the maternal BP and pulse been recorded at least hourly?
14) Have the maternal temperature and urinary output been recorded at least 4-hourly?
15) Is there a record of drugs and IV fluids given?

Management of Labour form (on a separate page from the labour graph)

16) Is this recorded after doing each vaginal examination, or at least 4-hourly?
17) Is the summary of fetal condition recorded?
18) Is the summary of labour progress recorded?
19) Is the summary of maternal condition recorded?
20) Is the decision on further action recorded?
21) Is the time of next intended review stated?
22) Were these assessments checked 4-hourly by an ADM (or doctor or senior midwife)?

Assessment of the newborn

23) Is the new born assessment form completed

Final summary

24) Is there evidence of active management of the 3rd stage of labour?
25) Is the summary form completed?

Labour record review form

Name of hospital:

Date of review:
Name of reviewer:

	Item #		Record # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total(hor)
Admission assessement	1	ANC record reviewed																					
	2	Admission from completed																					
	3	Diagnosis and mgt																					
	4	Admission double checked																					
Labour graph	5	Risk factors recorded																					
	6	FHR 1/2 hrly																					
	7	State of liquor																					
	8	degree of molding on PV																					
	9	Contarctions 1/2 hrly																					
	10	Dilatation:LP 4hrly AP 2hrly																					
	11	Dilatation plotted correctly																					
	12	Level of head 4 hrly																					
	13	Maternal BP and pulse hrly																					
	14	Maternal T* and urine hrly																					
	15	Record drugs and fluids																					
Management of labour	16	Mgt recorded after PV																					
	17	Summary of fetal condition																					
	18	Summary of labour progress																					
	19	Summary of mat. Condition																					
	20	Decision of further action																					
	21	Time of next review																					
	22	Double checking 4 hrly																					
	23	Is the form completed																					
Newborn assessment	24	Evidence 3rd stage mgt																					
Summary	25	Completed																					
		Total of Score add vertically																					

Appendix 4: Knowledge Test.

Data source Multiple-Choice questionnaire.

Please choose one, most correct answer to each question or statement and complete on the sheet provided.

1. The latent phase of the first stage of labour is:

a) The period of time the cervix takes to dilate from 3 cm to full dilatation.
b) The period of time from the onset of labour to full cervical dilatation.
c) The period of time from the onset of labour to 3 cm cervical dilatation.
d) The period of time during which the cervix becomes effaced.

2. A patient presents in established labour with regular contractions and ruptured membranes. On vaginal examination the cervix is 5 cm dilated. Where should her cervical dilatation be noted on the partograph?

a) On the alert line opposite 5 cm cervical dilatation.
b) At the beginning of the latent phase of labour opposite 5 cm cervical dilatation.
c) At the end of the latent phase of labour opposite 5 cm cervical dilatation.
d) On the vertical line at the beginning of the active phase of labour opposite 5 cm cervical dilatation.

3. You should be satisfied with the progress of labour during the active phase when:

a) The cervical dilatation falls on or to left of the alert line together with progressive engagement of the head.
b) The cervix dilates at a rate of 2 cm per hour.
c) Cervical dilatation falls on or to the left of the alert line together with improvement in the station of presenting part as assessed on vaginal examination.
d) There is progressive dilatation and effacement of the cervix.

4. When does a patient have adequate and effective uterine contractions?

a) If she has 2 or more contractions every 10 minutes with each contraction lasting 30 seconds or longer.
b) If she has 3 or more contractions every 10 minutes with each contraction lasting 60 seconds or longer.
c) If she progresses normally in labour.
d) If she has pain with every contraction.

5. A patient at term presents after having been in labour at home for some time. On admission 3/5 of the fetal head is palpable above the pelvic brim, and on vaginal examination 3+ moulding is detected, with cervical dilatation at 10 cm. What is the correct further management of this patient?

a) An oxytocin infusion should be started.

b) A caesarean section should be done.
c) The patient should be given pethidine and hydroxyzine (ATERAX).
d) The patient should be reassured that she will labour and deliver normally.

6. A patient presents in labour at term. She is having 2 contractions of 35 seconds each every 10 minutes. The cervix is 3 cm dilated and the membranes have ruptured. Her cervical dilatation is plotted on the alert line. Four hours later the cervix is 4 cm dilated and her other observations are unchanged. There are no signs of cephalopelvic disproportion. What is the correct management?

a) An oxytocin infusion should be started.
b) A caesarean section should be done.
c) She should be given pethidine and hydroxyzine (ATERAX).
d) The doctor should be called to examine the patient.

7. Which of the following patient is at high risk of cord prolapse?

a) A patient with a breech presentation.
b) A patient with cephalic presentation.
c) A patient with post term pregnancy.
d) A patient who ruptured her membranes when the fetal head is still palpable 3/5 above the pelvic brim.

8. What should be done first if a patient, who has a cervix 6 cm dilated, presents with a prolapsed cord?

a) Immediately replace the umbilical cord into the vagina and take steps to lift the presenting part off the cord.
b) An oxytocin infusion should be started in order to deliver the infant as soon as possible.
c) Give the patient Oxygen by face mask in order to ensure that the fetus receives enough oxygen.
d) The patient must be rushed to theatre for an emergency caesarean section.

9. How many fifths of the fetal head will be palpable above the pelvic brim when engagement has taken place?

a) 5/5
b) 4/5
c) 3/5
d) 2/5

10. What position should the patient adopt when she delivers?

a) She should lie on the back.
b) She should lie on her side.
c) She should squat upright.
d) She should choose whichever position she prefers as long as it is practical under the clinical circumstances.

11. What is the correct management if there is no progress in the second stage of labour and there are signs of cephalopelvic disproportion?

a) The patient must not bear down but should be evaluated by a doctor as a caesarean section is needed.
b) An episiotomy should be done to speed up delivery.
c) An oxytocin infusion should be started to increase the strength of the contractions.
d) The patient should continue bearing down for 30 minutes in a primigravida and 45 minutes in a multigravida before any further management is carried out.

12. What should be the initial management of impacted shoulders (i.e. shoulder dystocia)?

a. The patient buttocks should be moved to the end of the bed in order to allow good posterior contraction on the infant's head.
b. Arrangement must be made for an emergency caesarean section.
c. An immediate attempt must be made to deliver the infant's posterior arm.
d. Pressure should be applied to the fundus of the uterus in order to deliver the infant quickly.

13. The third stage of labour starts when:

a) The cervix is fully dilated.
b) The anterior shoulder of the infant is delivered.
c) The infant is born.
d) The placenta is delivered.

14. The active management of the third stage of labour includes:

a) Giving an oxytocic drug, after a second twin has been excluded, and then waiting for the uterus to contract.
b) Waiting for signs of placental separation and then pulling on the umbilical cord while pushing the uterus upwards.
c) Pulling on the umbilical cord while pushing the uterus upwards immediately after the infant has been delivered.
d) Giving an oxytocic drug, after the signs of placental separation have appeared and then pulling on the umbilical cord while pushing the uterus upwards.

15. Which of the following signs will confirm the diagnosis that the placenta has separated?

a) Lengthening of the umbilical cord.
b) The fundus of the uterus moves from below to above the umbilicus.
c) A sudden gush of blood runs out of the vagina.
d) Suprapubic pressure does not result in shortening of the umbilical cord when the uterus is pushed upwards.

16. Which of the following is a contra-indication to giving SYNTOMETRINE during the third stage of labour?

a) An atonic uterus
b) Hypertension after delivery.
c) Any of the hypertensive disorders of pregnancy.
d) Factors during pregnancy that result in a large uterus.

17. Which Oxytocic drug should be given if there is a contra-indication of the use of SYNTOMETRINE?

a) Ergometrine
b) A combination of oxytocin and ergometrine.
c) Oxytocin.
d) Prostaglandin E_2.

18. What is the advantage of using the active method of managing the third stage of labour?

a) Retained placenta is uncommon.
b) An assistant is not needed.
c) As the oxytocic drug is given after delivery of the placenta, complications with a second twin are avoided.
d) Blood loss during the third stage is reduced.

19. What is the management of a retained placenta following the active management of the 3rd stage of labour?

a) Pethidine and diazepam (Valium) must be given intravenously and manual removal of the placenta done in the labour ward.
b) An intravenous infusion with 20 units of oxytocin should be started to ensure a well-contracted uterus and then the patient should be referred to hospital for manual removal under general anesthesia.
c) Allow a further 30 minutes of observation before referring the patient.
d) Apply fundal pressure together with traction on the cord to deliver the placenta.

20. What should be the first step in the management of post-partum haemorrhage when the placenta has already been delivered?

a) The uterus must immediately be rubbed up.
b) A rapid intravenous infusion of 20 units of oxytocin should be started.
c) The patient's bladder must be emptied.
d) The cause of the bleeding must be looked for.

21. Which signs suggest that the bleeding is caused by an atonic uterus?

a) The vaginal bleeding consists of a continuous stream of bright red blood.
b) The membranes are not complete.
c) The vaginal bleeding is intermittent and consists of dark red clots.
d) No uterus can be palpated on abdominal examination.

22. Which of the following is the most likely cause of post-partum haemorrhage due to an atonic uterus?

a) Abruptio placenta.
b) The use of oxytocin during the first stage of labour.
c) Multiple pregnancy
d) A uterus full of blood clots.

23. HIV in pregnancy is

a) The commonest cause of mortality
b) Is not prevented by the use of condoms after pregnancy,
c) A cause of concern, as it affects up to 40% of ANC patients in the public sector
d) Responsible for the change in the midwifery practice

24. In women who are HIV positive, the membranes should:

a) Be ruptured as soon as possible to speed up the labour.
b) Be ruptured when the cervix reaches 4 cm dilated
c) Only be ruptured when the cervix is 8 cm dilated.
d) Not be artificially ruptured unless there is good clinical indication.

25. The following procedures may increase the risk of mother to child transmission of HIV:

a) Elective caesarean section
b) Active management of the third stage of labour.
c) Vaginal examination.
d) Routine episiotomy

26. Pregnancy induced hypertension

a) Is associated with eclampsia if the diastolic pressure is above 110mm Hg.
b) Is never causes convulsions when it is less than 150/90 mm Hg.
c) Is common in pregnancies less than 20 weeks gestation.
d) Is associated with abruptio placenta.

27. The management of eclampsia includes all the following except:

a) Ensuring clear airway, circulation and breathing.
b) Measuring urine output strictly every 4 hours.
c) Delivery of the fetus within 6 hours.
d) Prevention of further convulsions.

28. The following are bad signs in eclampsia:

a) Yellow diluted urine with yellow sclera.
b) Bleeding from ruptured sites.
c) Convulsions in a very young woman.
d) Convulsion in woman not in labour.

29. Puerperal sepsis may be caused by:

a) Prolonged labour.
b) Repeated internal examinations in labour.
c) Urinary tract infection before labour.
d) Pneumonia.

30. The management of severe endometritis post- delivery includes the following:

a) Intravenous fluids.
b) Intravenous antibiotics.
c) Ultrasound examination only.
d) Evacuation of the uterus using a manual vacuum extractor.

Multiple choice questions model answer.

HOSPITAL CODE:
DATE: ……
HEALTH WORKER CODE: …….……..…..

1	a	b	**c**	d
2	a	b	c	d
3	a	b	c	d
4	a	b	c	d
5	a	b	c	d
6	a	b	c	d
7	a	b	c	d
8	a	b	c	d
9	a	b	c	d
10	a	b	c	d
11	a	b	c	d
12	a	b	c	d
13	a	b	c	d
14	a	b	c	d
15	a	b	c	d
16	a	b	c	d
17	a	b	c	d
18	a	b	c	d
19	a	b	c	d
20	a	b	c	d
21	a	b	c	d
22	a	b	c	d
23	a	b	c	d
24	a	b	c	d
25	a	b	c	d
26	a	b	c	d
27	a	b	c	d
28	a	b	c	d
29	a	b	c	d
30	a	b	c	d

MULTIPLE CHOICE QUESTIONS ANSWER SHEET

HOSPITAL CODE[5]: @, &, $, #, *
DATE: ……
HEALTH WORKER CODE[6,7]: …….....

Please mark with a cross the one most correct answer to each question or statement.

1	a	b	c	d
2	a	b	c	d
3	a	b	c	d
4	a	b	c	d
5	a	b	c	d
6	a	b	c	d
7	a	b	c	d
8	a	b	c	d
9	a	b	c	d
10	a	b	c	d
11	a	b	c	d
12	a	b	c	d
13	a	b	c	d
14	a	b	c	d
15	a	b	c	d
16	a	b	c	d
17	a	b	c	d
18	a	b	c	d
19	a	b	c	d
20	a	b	c	d
21	a	b	c	d
22	a	b	c	d
23	a	b	c	d
24	a	b	c	d
25	a	b	c	d
26	a	b	c	d
27	a	b	c	d
28	a	b	c	d
29	a	b	c	d
30	a	b	c	d

[5] Symbols are used to identify hospitals
[6] Numbers are used to identify day shift health care workers
[7] Letters are used to identify night shift health care workers

APPENDIX 5: OSCE STATIONS

APPENDIX 5. 1: LABOUR GRAPH EXERCISE I

DATA SOURCE – OSCE STATION

HOSPITAL CODE:
DATE OF ASSESSMENT:
HEALTH WORKER CODE:

Objectives:

- To assess health care worker's ability to interpret the labour graph

Station design

A writing station

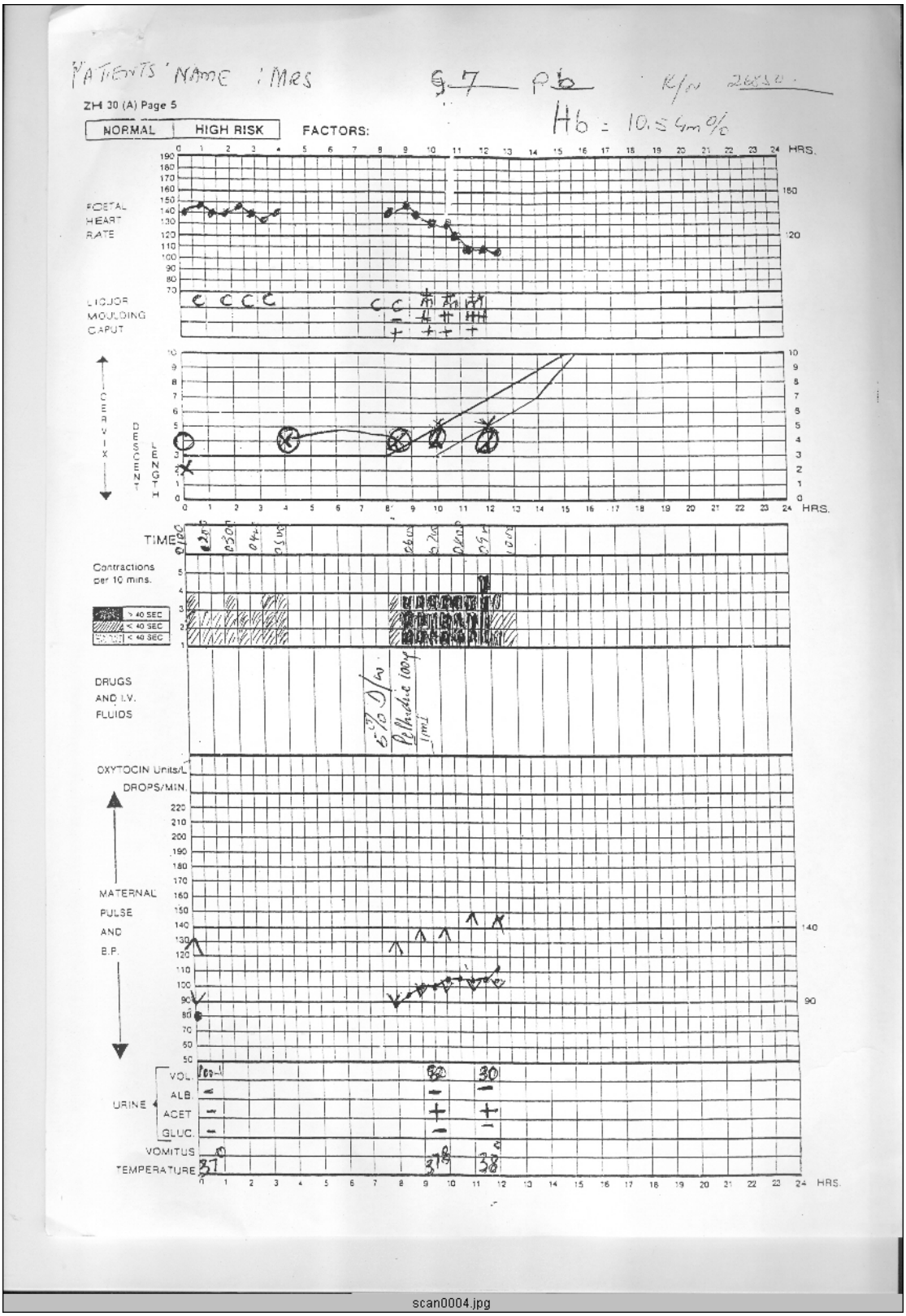
Presentation

- Desk and chair
- Writing paper
- Labour graph plotted from patient admitted in labour ward
- Container for answer sheets.

INSTRUCTION

You are the midwife in charge of labour ward. You come on duty at 4 o' clock and find patient Zodwa in labour:
Study her labour graph carefully and tell the researcher the following:

- **The risk factors you have identified on the labour graph,**
- **Your diagnosis,**
- **How you would manage the patient.**


PATIENTS NAME : Mrs
ZH 30 (A) Page 5
NORMAL
HIGH RISK
FACTORS:
Hb = 10.54m%
HRS.
FOETAL HEART RATE
LIQUOR MOULDING CAPUT
CERVIX
DILATATION
TIME
Contractions per 10 mins.
> 40 SEC
< 40 SEC
< 40 SEC
DRUGS AND I.V. FLUIDS
OXYTOCIN Units/L
DROPS/MIN.
MATERNAL PULSE AND B.P.
URINE
VOL.
ALB
ACET
GLUC.
VOMITUS
TEMPERATURE
scan0004.jpg

Labour graph exercise I model answer

Risk factors		
1	Grand multipara.	1
2	Decelerations of FH.	1
3	Meconium grade 2.	1
4	Caput +.	1
5	Moulding 4 +.	1
6	Persistent OP position.	2
7	Poor rate of cervical dilatation.	1
8	Poor descent of head.	1
9	Decreasing strength of contractions.	1
10	Rising pulse and BP.	2
11	Poor urinary output.	1
12	Ketonuria	1
13	Pyrexia	1
Diagnosis		
14	Maternal distress.	1
15	CPD due to persistent OP position.	2
Immediate management		
16	Explain the situation to the patient.	1
17	Turn her on the left side.	1
18	Give oxygen by mask.	1
19	Put up IVI (Ringer's Lactate).	1
20	Pass Foley catheter.	1
21	Obtain informed consent for C/S.	1
22	Prepare for C/S.	1
TOTAL		**25**

Labour Graph Station I mark sheet

HOSPITAL CODE
DATE OF ASSESSMENT:
HEALTH CARE WORKER CODE:

Instruction: Each column represents the responses to questions for each individual health workers.

- Day shift health workers are identified by numbers.
- Night shift health workers are identified by letters.

H/W	1	2	3	4	5	6	7	A	B
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
Total									

Appendix 5. 2: LABOUR GRAPH EXERCISE II

Data source – OSCE station

HOSPITAL CODE: ……..
DATE OF ASSESSMENT: ……..
HEALTH WORKER CODE: …….

Objectives:

- To assess health care workers skills to plot information of a patient on a labour graph

Station design

A writing station

Presentation

- Desk and chair
- Patient admitted in labour ward information
- Empty labour graph
- Container for answer sheets

INSTRUCTIONS

Ms Mthembu 30 year old Para 3 Gravida 4 admitted in the active phase of labour at 05h00. BP 110/80 T37 P80 FH 124 Cephalic presentation 4/5 Moderate contractions 3 in 10 mins Cervical dilatation 4cm Moulding: OP + PP +
Intact membranes

PLEASE RECORD HER INFORMATION ON THE LABOUR GRAPH PROVIDED.

07h00
BP 120/70 Temp 37.2 Pulse 80
FH 130 Presenting part 4/5
Moderate contractions 3 in 10 mins Cervical dilatation 6cm OP ++ PP +

09h00
BP 130/80 Temperature 37.0 Pulse 84
FH 132 Head Presenting part 3/5
Moderate contractions 2 in 10 mins
Cervix dilation 7cm
OP ++ PP +

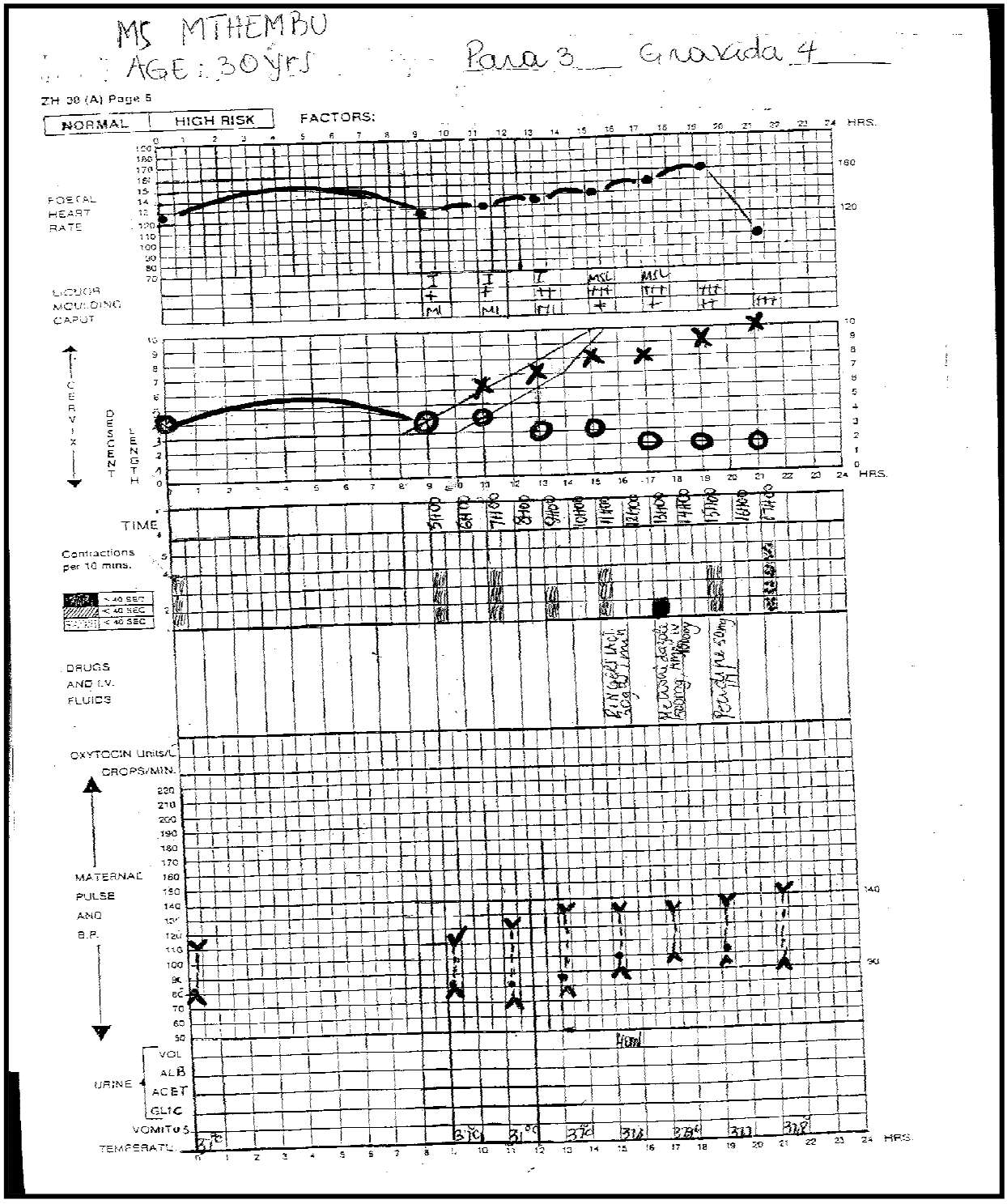
11h00
BP 130/90 Pulse 100 Temperature 37.3 Urine output 40mls
FH 140 MSL
Head 3/5
Moderate contractions 3 in 10 minutes
Cervical dilation 8cm
Caput 1+
Moulding OP+++ PP++

13h00
BP 130/100 T 37.7
FH 150 regular MSL
Head 2/5
Strong contractions
Cervical dilation 8cm Caput 1+ Moulding OP+++ PP++

15h00
BP 135/95 Pulse 100 Temperature 37.7
FH 160
Head 2/5 LOA
Moderate contractions 3 in 10 minutes
Cervical dilation 9cm Caput 2+
Moulding OP+++ PP+++

17h00
BP 140/90 Pulse 110 Temperature 37.8
FH 100 Liquor not seen
Head 2/5? Position Mild contractions 4 in 10 minutes
Cervical dilation 10cm Caput 3+ Difficult to feel moulding.

Model answer



LABOUR GRAPH EXERCISE II MARKING GUIDE

		Points
1	Maternal identity	5
2	Fetal heart rate	5
3	Moulding and liquor	2
4	Caput	5
5	Descent of fetal head	5
6	Cervical dilatation	1
7	Fetal position	5
8	Uterine contractions	4
9	Drugs	2
10	Pulse and BP	5
11	Temperature	5
12	Urine out put	1
TOTAL		**45**

MARKING SHEET

HOSPITAL CODE
DATE OF ASSESSMENT:
HEALTH CARE WORKER CODE:

Instruction: Each column represents the responses to questions for each individual health workers.

- Day shift health workers are identified by numbers.
- Night shift health workers are identified by letters.

	1	2	3	4	5	6	7	A	B
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
Total									

APPENDIX 5. 3: PPH STATION

DATA SOURCE – OSCE STATION

HOSPITAL CODE:

HEALTH WORKER CODE:

Objectives:

- To assess health care workers skills to diagnose and manage PPH

Station design

Description station

Presentation

- **Desk and chair**
- **Relevant equipments**

INSTRUCTIONS FOR PPH STATION

A patient with prolonged labour has just been delivered in your labour ward; 30 minutes after placental separation the patient has vaginal bleeding.

Describe step by step to the examiner how you would manage this patient.

PPH station Model answer

1	Call for assistance	1
2	Do not leave the patient alone	1
3	Act quickly	1
Resuscitation		
4	Send blood for cross match	1
5	Site 2 large bore intravenous canulae	1
6	Put Ringers Lactate or blood	1
7	Monitor vital signs, Urine output	1
Placenta delivered		
8	Step 1: the uterus must be immediately rubbed up.	
9	Step 2: A rapid intravenous infusion of 20 units oxytocin in a litre of intravenous fluids must be started. Once again, make sure the uterus is well contracted.	1
10	Step 3: the patient's bladder must be emptied. If the uterus remains atonic, IV or IM 0.5 mgs of ergometrine, can be given if the patient is not hypertensive.	1
11	Step 4: Suture any vaginal or perinatal tears that are bleeding.	
12	Step 5: Review the initial diagnosis of the causes of bleeding.	1
13	Consider the possibility of retained product of conception.	1
14	Intractable uterine atony.	1
15	Cervical tears or uterine rupture.	1
16	Suspect coagulopathy secondary to massive haemorrhage.	1
17	Step 6: Cross match extra blood and other fresh plasma.	1
18	Assign the responsibility for resuscitation to one staff member who will also documents events	1
19	Step 7: Theatre	1
TOTAL		**19**

HOSPITAL CODE:…….

DATE OF ASSESSMENT:……..
HEALTH WORKER CODE:……

Instruction: Each column represents the responses to questions for each individual health workers.

- Day shift health workers are identified by numbers.
- Night shift health workers are identified by letters.

	1	2	3	4	5	6	7	A	B
1									
2									
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13									
14									
15									
16									
17									
18									
19									
Total									

APPENDIX 6: MATERNITY UNIT REVIEW
DATA SOURCE – MATERNITY SERVICE

Period under review:

INSTRUCTIONS

- This form has been designed to assist with the collection of the availability of the enabling environment in the maternity unit of a level 1 hospital in the district
- This form has to be filled together with the unit manager

Name of the reviewer	
1. Name of the Hospital:	
2. Date of Assessment	

3. Protocol of management

Check in the labour ward and tick the appropriate box		
Is a manual of protocols of obstetric management immediately accessible	Yes	No

4. Referral

Ask the midwife in charge of the labour ward	
If you have to refer an obstetric emergency how long does it take for the ambulance to arrive? **Maximum:……** **Minimum:……..**	
Which is your referral hospital?	
How far is your referral hospital in (km)?	

5. Blood

Check the availability of the following items				
Item	**Available**		**How many units?**	**Kept where?**
	Yes	**No**		
Packed cells				
Freeze Dried Plasma				

Check the availability of the following drugs		
Drugs	**Yes**	**No**
Injectable Antibiotics		

6. Drugs

Injectable Anticonvulsants.		
Injectable Oxytocics.		

7. Equipment

Check the labour ward for availability and functionability of the following items				
Item	**Available**		**Functional**	
	Yes	**No**	**Yes**	**No**
At least 2 Sphygmo/Dynamaps				
At least 2 CTGs				
Stethoscope				
Fetal stethoscope				
Dop tone				
At least 2 vacuum extractors				
Neonatal Resuscitation facility				
Operating theatre				

Comment on equipments:

8. Supervision of staff

Ask the midwife in charge of the labour ward on the availability of the following		
	Yes	No
Midwife in charge of every shift in the labour ward in last month		
Advanced midwife in a supervisory capacity on day shift last month		
Advanced midwife in a supervisory capacity on night shift last month		

10. Staff and delivery

Ask the midwife in charge of the labour ward on the following		
Number of admission in the previous month		
Number of deliveries in the previous month		
Number of Midwives on day duty + ADM		
Number of Midwives on night duty + ADM		