FACTORS CONTRIBUTING TO HIGH PERINATAL MORBIDITY RATES IN MANKWENG-POLOKWANE COMPLEX OF THE CAPRICORN DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA

by

MATHEBULA MPHO GIFT

DISSERTATION

Submitted in fulfilment of the requirements for the degree of

MASTER OF NURSING SCIENCE

in the

FACULTY OF HEALTH SCIENCES

(School of Health Care Sciences)

at the

UNIVERSITY OF LIMPOPO

SUPERVISOR: Dr MK Thopola

CO-SUPERVISOR: Prof ME Lekhuleni

2016

DECLARATION

I, Mathebula Mpho Gift, declare that "**Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn district, Limpopo province, South Africa"** is my own work, has never been submitted by me for any degree at this or any other institution, and all the materials used have been acknowledged both in the text and list of references.

Mathebula Mpho Gift: ……

Date signed: ……

DEDICATION

This study is dedicated to:

My father, Madimetja Johannes and mother, Modjadji Merriam Moratho, for their love, encouragement and support.

My beloved sons, Delton and Elton Mathebula, for their support and understanding.

My sisters, Tebogo, Khutso, Faith and Lerato, for their love and caring for my sons when I was held up in my studies.

My brothers, Nelles, Josias, Karabo, Chegofatso and Ebenezer,for their encouragement and support.

My sister in-law, Fortunate Mathebula, for her love and support.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank the Almighty God for granting me the strength and courage to commence and complete this study; regardless of the challenges I encountered (*Psalm 89: 13*)

I also want to thank the following people for their respective contributions to this dissertation:

- Dr MK Thopola, my supervisor for her guidance, encouragement, guidance and support throughout this study.
- Prof ME Lekhuleni, my co-supervisor for her assistance, encouragement and support throughout this study.
- University of Limpopo Research Ethics Committee for approval of this study.
- The Limpopo Department of Health, for granting me permission to conduct the study in two tertiary hospitals in the Capricorn District, Limpopo Province.
- Mankweng-Polokwane Complex management for the permission granted to conduct the study.
- The Unit Managers of Neonatal Intensive Care Unit and Labour Unit in Mankweng Campus as well as Unit managers of Labour unit and Neonatal Unit in Polokwane Campus.
- To all my friends and colleagues who contributed, supported and encouraged me throughout the study.
- All registered midwives of the Mankweng-Polokwane Complex for their willingness to participate in the study
- Mrs R Olwagen, the statistician who helped me with data analysis.
- Mr M.M Mohlake, the language editor, for editorial assistance.

ABSTRACT

Perinatal morbidity is a public health indicator of the level of equality in a country. Its prevention has major medical, social and economic costs. The aim of this study was to describe factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn district, Limpopo Province, South Africa.

A quantitative, descriptive cross-sectional research method was used to describe factors contributing to high perinatal morbidity. The study population comprised 80 registered midwives. Simple random sampling was used to select the 66 respondents. Data were collected using a self-developed questionnaire. Questionnaires were completed and returned, and only one questionnaire was not returned, and two were spoiled as they were incomplete, then 63 questionnaires were analysed. Ethical clearance was obtained from Medunsa Research and Ethics Committee, Limpopo Province Department of Health Ethics Committee and Hospital management. The Statistical Package for Social Sciences (SPSS, version 22) was used for data analysis. Descriptive statistics were used to analyse and describe and summarise data whereby the findings were presented in the form of distribution tables and graphs. Inferential statistics were used based on probability and allowed judgement to be made about the variables. The study revealed that shortage of staff, absenteeism, resignation, bad staff-patient ratio and overcrowding of patients, long waiting periods for caesarean sections, long waiting period for babies operation, work overload of staff, lack of equipment and supplies, congenital anomalies, perinatal asphyxia, prematurity and neonatal sepsis were contributory factors to high perinatal morbidity rates. The study recommended that all staff should be able to resuscitate newborn babies, be able to use Partograph effectively, further research on factors contributing to high perinatal morbidity and education training on speciality qualifications.

Key-words: Factors, High, Perinatal, Morbidity rates

ABBREVIATIONS

BMI	Body Mass Index
CDC	Centres for Disease Control and Prevention
ESMOE	Essential Skills in Managing Obstetric Emergency
HBB	Help Babies Breath
IDA	Iron Deficiency Anemia
IUGR	Intrauterine Growth Restriction.
IUTs	Intrauterine Blood Transfusions
MDGs	Millennium Developmental Goals.
MREC	Medunsa Research and Ethics Committee.
NEC	Necrotizing Enterocolitis.
NICU	Neonatal Intensive Care Unit.
LINC	Limpopo Initiative for Neonatal Care
PEP	Perinatal Education Programme
PIH	Pregnancy Induced Hypertension
ROP	Retinopathy of Prematurity.
STI's	Sexually Transmitted Infections.
TTTS	Twin – to -Twin Transfusion Syndrome
WHO	World Health Organisation

DEFINITION OF CONCEPTS

Factors

Factors are defined as the influence that contributes to a result (Oxford English Dictionary, 2006). In this study factors will be acts or omissions during pregnancy from the beginning of viability of the foetus, labour, delivery, until the end of the seventh day after birth.

Perinatal

Perinatal is the period from the 24th week of pregnancy, which is the approximate time of infant viability, to the end of the first week of life (Harrison, 2008). In this study perinatal will be a period from 24th week of pregnancies and sick babies less than 8 days of life.

Morbidity

Morbidity is defined as the number of complications and long-term health problems that result from pregnancy and birth (Sellers, 2012). In this study morbidity will be all pregnancies and neonatal related diseases and complications.

TABLE OF CONTENTS **Page**

LIST OF FIGURES **Page**

LIST OF TABLES **Page**

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 Introduction and Background

Perinatal morbidity is a public health indicator of the level of equality in a country. Its prevention has major medical, social and economic costs. Perinatal morbidity is defined as a disorder in the neonatal, child or family, which occurs as a result of side effect influences of treatment acting either on a foetus during pregnancy or new-born during the first week of life (Young, 2012). According to, Salinu, Duan, Nabukera, Mbau and Alio (2011) it was reported that the rates of perinatal morbidity in the United States for mothers in the ages of 15-17 years, 18-19 years, and 20-24 years are 51%, 32%, 7%, respectively, higher than those for women aged 25-29 years. In the developing countries, the risk of perinatal morbidity is six times greater than in the developed countries; in the least developed countries it is over eight times higher. In the United States, legal and illegal drug use during pregnancy is a significant public health problem with potentially significant perinatal morbidity. A comprehensive assessment of pregnant women who use substances is important to identify their diverse treatment needs (Haug, Duffy & McCaul, 2014).

According to, a study conducted by Martinez-Nadal, Demestre, Raspall, Alvarez, Elizari, Vila and Sola (2014) in the last decade, perinatal morbidity has increased significantly in the developing countries. The progressive increase in the number of elective caesarean-section deliveries in the past years has been accompanied by perinatal morbidity. However, Cloke and Pasupathy (2013) commended that perinatal morbidity is a global problem and estimated that 98% of all adverse perinatal outcomes occur in countries of low income, and perinatal morbidity rates is roughly five times greater than that of wealthier states. Within Europe, the Netherlands has been reported to have one of the highest rates of perinatal morbidity (Jonge, Baron, Westerneng, Twisk & Hutton, 2013).

The regional estimates suggest that countries in Sub-Saharan Africa have among the highest perinatal morbidity rates in the world (Engmann, Matendo, Kinoshita,

Ditekemena, Moore, Goldenberg, Tshefu, Carlo, McClure, Bose & Wright, 2009). The World Health Organisation (WHO 2008) states that most perinatal morbidity occurs in Asia, which is where most babies are born (WHO 2008). Nyamtema; Urassa; Massawe, Lindmark and Van Roosmalen (2008) concluded that, in Tanzania, perinatal morbidities are problems of public health importance, and have been linked to the shortage of skilled staff. There was severe shortage of essential categories of perinatal care in all institutions. According to, the (WHO 2008), Pakistan accounts for 35% of perinatal infection, 28% of preterm birth and 23% of perinatal asphyxia. Bangladesh is one of the several developing countries on track to achieve the Millennium Development Goal (MDG) 5, to improve perinatal morbidity. The maternity services hold a unique position in influencing current and future perinatal health and midwives play a vital role.

Perinatal morbidity refers to the presence of disease in a new-born baby; it is determined by the general health of the pregnant woman and midwifery practice (Harrison, 2008). Perinatal morbidity should be monitored by registered midwives, obstetricians, health service administrators, government and national levels as the health improvement of perinatal care. High perinatal morbidity rates cause sub-optimal outcomes, which are common, and may impair subsequent developmental milestones of children or sound function of families, and might increase health care cost. Several factors are stated as possible explanations for high perinatal morbidity, namely, perinatal asphyxia, prematurity, congenital anomalies, Pre-eclampsia, maternal age and gestational diabetes (WHO, 2008).

Perinatal asphyxia is amongst the top five causes of under-five morbidity rates. Globally, studies have shown that prematurity was observed to be a challenge and contributes to 40–80% of perinatal morbidity. According to, a study conducted by Rizwan, Reuf, and Fathan-Uddin (2013) pre-eclampsia continues to be a problem, particularly in low-resource countries such as Pakistan, where it contributes significantly to high perinatal morbidity. Infants with IUGR have been reported to feature 5-10 fold higher rates of morbidity, during the neonatal period and have a higher risk for neurological deficiencies (von Beckerath, Kollmann, Rotky-fast, Karpf, Lang and Klaritsch, 2013). Hernandez-Rivas, Flores-Le Roux, Benaiges, Sagarra, Chillaron, Paya, Pulg-de-Dou, Goday, Lopez-Vilchez and Pedro-Botet (2013)

indicated that gestational diabetes mellitus occurs in 3-9% of pregnancies in the Spanish population and is associated with high perinatal morbidity. According to, a study conducted by Adegoke, Atiyaye, Abubakar and Aboda (2015) Nigeria is one of the 57 countries experiencing shortage of human resources for health and one of the countries with severe shortage of midwives. Early recognition of these factors is very critical for the prevention of perinatal morbidity. Avenant (2009) believed that identifying and correcting factors that contribute to perinatal care are of utmost importance.

South Africa has more than one million births occurring annually in the public health sector. The maternity and neonatal units should be staffed with advance midwives, midwives with additional training in perinatal care, doctors, and specialist obstetricians to provide quality patient care. According to, a study conducted by Davidge (2013) perinatal morbidity rates in South Africa is very high. Macdonald (2009) stated that it is estimated that prematurity is responsible for 21.8% of adverse perinatal outcomes per year in South Africa. Perinatal health care is accessible in South Africa as part of the public sector and safer motherhood policy. Currently, perinatal health care and care of children under five are free in the public sector. Perinatal care provided within the first few minutes of life might play a major role in the reduction of perinatal morbidity (Sellers, 2012).

Maternal health care plays a major role in the perinatal health and outcome. South Africa has followed the WHO (2008) guidelines and other countries in gathering information to determine the rates and causes of adverse perinatal outcome. Sibeko and Moodley (2006) indicated that high rates of perinatal morbidity in South Africa remain a major problem. According to, a study conducted by Ramaboea (2014), on factors contributing to high neonatal and morbidity in Limpopo Province, perinatal asphyxia, perinatal infections and prematurity were the leading causes of perinatal morbidity. Prematurity accounts for 21% of perinatal morbidity worldwide and perinatal asphyxia is at 16%.

1.2 Problem Statement

The perinatal morbidity rates continue to increase despite the advancing maternal and neonatal care services in the Capricorn District, Limpopo Province. Regardless of both the Millennium Developmental Goals 5 and 6 (MDGs), the Limpopo Initiative for New-born Care (LINC) established in 2003, and free management of pregnant women and children under 6 years of age the risk of perinatal morbidity rates remains a concern in the Limpopo Province. South Africa has an unacceptable high perinatal morbidity rates, accounting for 35%. It is one of the few countries battling to reach the MDGs 2015 deadline to reduce child morbidity and improve neonatal health (Boulch, 2006).

The University of Limpopo's final year B Cur students during their midwifery seminar as quality improvement project held in 2012, addressed factors contributing to high perinatal morbidity and mortality rates in Limpopo Province. Their findings revealed contributory factors such as meconium aspiration, eclampsia, cord prolapse, loss of health and emergency responses. Therefore, in the context of this study, the researcher was interested in investigating factors that contribute to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

1.3 Theoretical Framework

This study departed from the theoretical framework of the Health Promotion Model of Pender (Pender, Murdaugh & Parsons, 2006).

1.3.1 Health Promotion Model

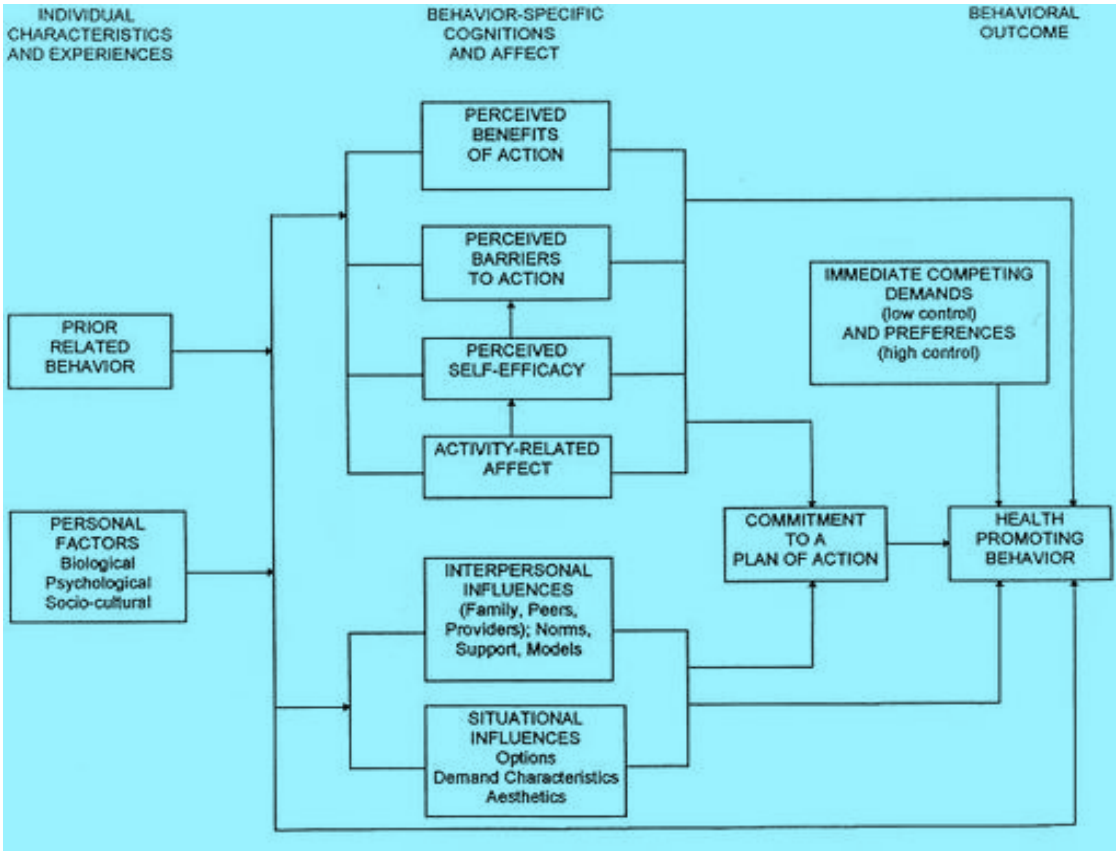

Figure 1.1 Health Promotion Model (revised) (Adopted from, Pender, Murdaugh & Parson, 2006).

The Health Promotion Model guided the researcher throughout the study (Pender et al., 2006). The focus of the Health Promotion Model is on individual characteristics and experiences of prior related behaviour and personal factors; behavioural-specific cognitions and affect, including perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences; commitment to a plan of action, immediate competing demands,

and preferences, and lastly the behavioural outcome, hoped to be health-promoting behavioural.

- **Individual Experiences and Characteristics**

  The individual characteristics and experiences are divided into prior-related behaviour and personal factors.

  - The prior-related behaviours might be important because, often, the best predictor of future behaviour is the frequency of the same behaviours in the past. As Pender et al. (2006) states, direct effect of prior behaviour is possibly that of habit formation since each time behaviour is performed, the habit is strengthened.
  - The personal factors are described as biological, psychological and sociocultural. The Health Promotion Model can be a useful guide to nursing care in relation to assisting the recipients of nursing care in choosing and carrying out behaviours.

    The combination of individual characteristics and experience is unique to each, and the importance of any characteristic, experience, or combination of them varies with the behaviour under consideration (Pender et al., 2006).

- **Behavioural-Specific Cognitions and Affect**

Behavioural-specific cognitions and affect are viewed as of major motivational importance and are considered the core for intervention. These cognitions and affect include, perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influence and situational influences, all of which lead to a commitment to a plan of action and consideration of immediate competing demands and preferences. The indirect effects of prior-related behaviours are associated with perceptions of self-efficacy, perceived benefits and barriers, and positive or negative activity-related affect (Pender et al., 2006).

Perceived benefits might moderate behaviour both directly and indirectly (Pender et al., 2006) as follows:

- Perceived barriers might influence action directly by blocking that action or indirectly by decreasing any commitment to act. Barriers might relate to the degree of availability of access or resources, costs in money and time, and the degree of perceived difficulty.
- Perceived self-efficacy, or one's judgement of one's ability to carry out an identified action, relates not to a person's skills but to that person's judgement about what can be accomplished with those skills.
- Activity related affect is the subjective feeling, state or emotions occurring prior to, during and following a specific health behaviour.
- Interpersonal influences are the person's thoughts or beliefs about the behaviours, attitudes, and beliefs of others and may or may not accurately reflect those behaviours, attitudes or beliefs. Sources of these influences include family, peers, and health-care providers as primary sources and also norms or expectation of significant others, social support from others, and modelling
- Situational influence (demand characteristics and aesthetics) are the perceptions of the compatibility of the life context or the environment with engaging in specific health behaviour. The options may include to participate or not to participate in a variety of ways.
- Commitment to a plan of action is the intention to carry out particular health behaviour.The underlying cognitive processes are a commitment to carry out a specific action at a given time and place and with specified persons or alone, irrespective of competing preferences and identification of specific strategies for carrying out and reinforcing the behaviour.
- Commitment to a plan of action then, all of this cognitions and affect when dealt with results into the health promoting behaviour.

- **Behavioural Outcome- Health Promoting Behaviour**

Immediate competing demands and preferences are alternative behaviours that intrude into consciousness as possible courses of action just prior to the intended

occurrence of planned health-promoting behaviour. Competing demands are behaviours over which the person has little control, such as work or family responsibilities, and are situations in which a failure to respond may have very negative consequences for the person or significant others. Competing preferences are behaviours over which the person has a high degree of control and that are powerfully reinforcing (Pender et al., 2006).

The desired behavioural outcome is health-promoting behaviour of health decision-making and preparation for action.
The purpose of the health-promoting behaviour is for the client to realize positive health outcomes such as improved functional ability or improved quality of life. The intention is that, by carrying out the plan of action, health-promoting behaviour, as identified in the plan of action will lead to better health for the client. Health-promoting behaviour might involve increasing health behaviours already in place, replacing risky or unhealthy behaviours, or both of these (Pender et al., 2006).

The individual characteristics and experiences from this Model addressed by the study were age, gender and educational level. Individual characteristics should not be viewed in isolation and need to be considered in terms of the complex inter-relations with other systems such as social environment. Behaviour-Specific Cognition and affect – the persons can modify cognition, affect, interpersonal influence and situational influences to create incentives for health promoting behaviour. Behavioural Outcome intention is that by carrying out the plan of action, health-promoting behaviour, as identified in the plan of action, will lead to reduction in perinatal morbidity rates.

1.4 Aim of the Study

The aim of this study was to determine factors contributing to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

1.5 Research Question

What are factors contributing to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa?

1.6 Objective of the Study

The objective of this study was to:

- Identify factors that contribute to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

1.7 Research Methodology

A quantitative research method was used as an approach that emphasizes the collection of numerical data (Brink, van der Walt & van Rensburg, 2011). The descriptive cross-sectional design was used in this study. In a descriptive cross-sectional design, the researcher should not manipulate any variable or even determine the relationship between variables (Brink et al., 2011). The target population of this study was 80 registered midwives allocated in Neonatal Intensive Care Unit and Labour Unit of the Mankweng-Polokwane Complex. Simple random sampling was used to select 66 registered midwives who participated in the study. Data were obtained from registered midwives through a self-developed questionnaire (Burns & Grove, 2009).

Content validity was ensured by presenting the questionnaire to experts in the field of study for evaluation. Face validity was ensured by submitting the questionnaire to the statistician and the supervisors, to be assessed for its ability to measure what it was expected to measure (Goodman & Moule, 2014). Reliability was ensured by conducting a pilot study. The Statistical Package for Social Sciences (SPSS) version 22 for Windows was used to analyse numerical data. Descriptive and inferential statistics were used to obtain frequencies, percentages, standard deviations and measures of central tendency such as median. The details of research methods are discussed in Chapter 3.

1.8 Significance of the Study

The findings of the study could contribute towards the improvement of understanding factors that contribute to high perinatal morbidity rates among student midwives and registered midwives in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. The findings could have positive impact on the policy and training of midwives and students in the Limpopo Province hospitals.

1.9 Outline of Subsequent Chapters

Chapter 2: Literature Review

Covers the literature review on perinatal morbidity.

Chapter 3: Research Methodology

Presents the research methodology, research design, study sites, population and sampling, data collection method, data analysis, validity and reliability and ethical considerations.

Chapter 4: Results and Discussion

Deals with reports on the research findings in the context of the aim and objectives of the study.

Chapter 5: Summary, Limitations, Recommendations and Conclusion

Discusses the summary, limitations, recommendations and conclusion. Recommendations are based on the findings of the study in relation to factors contributing to high perinatal morbidity.

1.10 Conclusion

This chapter presented an overview of the research study, introduction and background, problem statement, aim of the study, research question, theoretical framework, methodology and description of research design and the significance of the study. The next chapter will focus on literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on literature relevant to factors contributing to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. The researcher conducted literature review from books, articles, journals, reports, and downloads from Google.

2.2 Purpose of the Literature Review

The literature review is aimed at contributing to a clearer understanding of the nature and meaning of the problem that has been identified (De Vos, Strydom, Fouche & Delport, 2011). The literature review creates a foundation based on existing related knowledge (De Vos et al., 2011). It determines what is already known about the topic so that the researcher can obtain a comprehensive picture of the state of knowledge (Brink et al., 2011). The purpose of literature in this study was to obtain information on factors that contribute to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. Literature assisted the researcher to have insight with regard to better factors contributing to high perinatal morbidity rates.

2.3 Perinatal Asphyxia and Sexually Transmitted Infections

Among the indicators of perinatal asphyxia commonly used to diagnose this conditions which are: neonatal respiratory distress, delayed onset of spontaneous respiration, low Apgar score, need for resuscitation or ventilation and metabolic acidosis (Khattab, 2015). Perinatal asphyxia is higher in complicated pregnancies and deliveries, it might result in immediate foetal or neonatal death, or a period of recovery during which there is organ dysfunction, and temporary or permanent brain injury. Perinatal asphyxia is amongst the top-five causes of perinatal morbidity rate in Africa. Ramos; Brotschi, Bernet, Wagner and Hagmann (2013) agree that perinatal asphyxia leading to

neonatal encephalopathy is associated with a high morbidity and it might be a major cause of neurodevelopmental impairment in survivors. Lawn, Lee, Kinney, Sibley, Carlo, Paul, Pattinson and Darmstadt (2009) and Davidge (2013) stated that intrapartum–related perinatal asphyxia is a leading cause of perinatal morbidity globally. Romero, Muniz, Tornatore, Holubiec, Gonzalez, Barreto, Gueiman, Lillig, Blanco and Capani (2014) agree that perinatal asphyxia is a serious complication with high morbidity.

Evi, Antonia, Johan, Vles, Boris, Eveline and Pilar (2013) and Kudreviciene, Bosevicius, Lukosewcius, Laurynaitiene, Marmiene, Nedceisliene, Buinauskiene, Stoniene and Tameliene (2014) assert that perinatal asphyxia is one of the most common causes of perinatal morbidity in most countries of the world. Furthermore, Higgins, Raju, Edwards, Azzopardi, Bose, Clark, Guillet, Gunn, Hagberg, Hirtz, Inder, Jacobs, Jenkins, Juul, Laptook, Lucey, Maze, Palmer, Pfister, Robertson, Rutherford and Shankaran (2011) proposed that perinatal hypoxic-ischemic encephalopathy, a subset of neonatal encephalopathy, is associated with high, severe long-term neurologic morbidity.

Perinatal asphyxia is an important cause of perinatal morbidity in developing countries and it continues to present a major clinical problem. Worldwide, approximately one million new-born infants are affected annually. Perinatal asphyxia is an important cause of preventable perinatal morbidity in developing countries, such as Tanzania and India. For example, of the 26 million births each year in India, 4-6% of new-borns fail to establish spontaneous breathing at birth. According to, Risso, Serpero, Zimmermann, Gavilanes, Frulio, Michetti, Florio, Bashir, Iskander, Mufeed, Aboulgar and Gazzolo (2012) perinatal asphyxia and its major complication, hypoxic-ischemic encephalopathy, are important causes of morbidity in full-term new-borns. Hypoxic-ischemic brain injury occurring during the perinatal period is still a major cause of morbidity (Letourneur, Freret, Roussel, Boulouard, Divoux, Toutain, Bernaudin, Schumann-Bard; Bouet & Touzani, 2012).

According to, Richens, Mayaud and Mabey (2014) Sexually Transmitted Infections (STIs) are a major cause of perinatal morbidity in developing countries. Syphilis in pregnancy is a significant cause of perinatal morbidity in South Africa. Yet, despite

universal screening for all antenatal women, it has been reported to be endemic in Kwazulu-Natal (Devjee, Moodley & Singh, 2006).

2.4 Prematurity

Globally, about 20 million infants are born with low birth-weight (LBW), thus increasing perinatal morbidity. Moreover, all LBW infants, approximately 95%, are born in developing countries, as suggested by Imdad and Bhutta (2013). Prematurity is neonatal condition in which the neonate would need assistance establishing cardiorespiratory-function at birth, so all such births should take place in the level 3 hospitals. Prematurity is one of the leading causes of perinatal morbidity globally. Prematurity occur at less than 37 weeks of gestational age, account for more than half the long-term morbidity. Five (5) to 25% of births worldwide and 12-13% of all births in the United States are preterm (Neggers, 2015).

Prematurity is the leading cause of perinatal morbidity and leads to significant health-care costs annually. Despite numerous advances in the care of obstetrical patients, the incidence of prematurity in the United States is at an all-time high and may be on the rise given current trends of advancing maternal age, maternal medical conditions and assisted reproductive technology (Abramovici, Cantu & Jenkins, 2012). According to, a study conducted by Van Baaren, Peelen, Schuit, van der Post, Mol, Kok and Hajenius (2015), prematurity is the most important issue in obstetric care in the developed world because of its adverse perinatal outcomes and associated health-care costs, and it is a major cause of perinatal morbidity.

Owen and Mancuso (2012) concluded that prematurity continues to be among the most problematic obstetrical issues, with an annually increasing incidence, now approaching 13% in the United States. Prematurity has been a consistent complication of pregnancy in the United States for the past several decades. Because of the known morbidity associated with prematurity, a major concern has become whether these deliveries are indicated (Cyamfi-Bannerman, 2011).

Prematurity has higher rates of respiratory morbidity, Retinopathy of Prematurity (ROP) and Necrotizing Enterocolitis (NEC) King and Warren (2006), (Zeitlin, Ayoubi,

Jarreah, Draper, Blondel, Kunzel, Cuttini, Kaminski, Gortner, Van Reempts, Kollee & Papiernik, 2010), Engle (2011), Davidge (2013) and Romero, Yeo, Chaemsaithang and Chaiworapongsa (2014) indicated that prematurity is the leading cause of perinatal morbidity worldwide. Preterm infants (34-36 weeks gestation) have a morbidity rate significantly higher than those born at term. Prematurity is the primary cause of perinatal morbidity in developed countries. Although they are a high-risk group, few routine interventions have been established to reduce their higher rates of morbidity (Serrano, Plana, Morales, Perea, & Bragado, 2014). Teune, Van Wassenaer, Van Buuren, Mol and Opmeer (2012) observe that high rates of respiratory morbidity have been reported in survivors born prematurely.

According to, Host and Garnier (2008) spontaneous preterm labour and preterm births are still the leading causes of perinatal morbidity in developed world. Wax, Cartin and Pinette (2010) are of the view that preterm birth is the leading cause of perinatal morbidity in developed nations. In industrialised countries, preterm birth is responsible for 75% of perinatal morbidity and contributes to long-term neurodevelopmental problems (Roescher, Hitzert, Timmer, Verhagen, Erwich, & Bos, 2011). Premature infants require a prolonged stay in NICU to allow sufficient organ maturation.Grisaru-Granovsky,Reichman, Lerner- Geva, Boyko, Hammerman, Samueloff and Schimmel (2012) state that premature infants at any gestational age are at risk of increased morbidity. According to, Shinwell (2005) advances in perinatal and neonatal care in recent years have resulted in dramatic improvements in the rate of intact survival of premature infants.

Laptook (2013) maintains that major morbidities of prematurity reflect both organ-system immaturity and trigger events such as infection, inflammation and nutritional state, and are the basis of multiple medical problems that very preterm and extremely preterm infants encounter and need to navigate for survival. Preterm delivery or low birth-weight infants (<2500g) remains an important cause of perinatal morbidity throughout the world (Vergnes & Sixou, 2007). According to, Macdonald, (2009) preterm labour and preterm premature rupture of membranes, both defined as occurring spontaneously before 37 completed weeks gestation, have long been recognized as a major contributor to perinatal morbidity.

2.5 Pre-eclampsia

The hypertensive disorders of pregnancy, including chronic hypertensive, gestational hypertension and pre-eclampsia, are of great concern to clinicians because of the associated adverse foetal and neonatal outcomes (Payne, Magee & van Dadelszen, 2011). Pre- eclampsia is a condition during pregnancy characterized by high blood pressure and proteinuria. It usually occurs after the 20th week of gestation. Pre-eclampsia in pregnancy is known to have adverse effects on foetal growth through placental insufficiency and is implicated in a significant proportion of intrauterine growth restriction (Griveli, Dodd & Robinson, 2009). Despite decades of research, hypertensive disorders in pregnancy remain the most significant and intriguing unsolved problems in obstetrics.

Pre-eclampsia is the major cause of foetal morbidity worldwide, and is the leading cause of perinatal morbidity (Singh, 2013). Pre-eclampsia complicates approximately 3-5% of pregnancies and remains a major cause of perinatal morbidity (Cleary & Contantine, 2014). Deadelszen, Ansermino, Dumont, Hofmeyr, Magee, Mathai, Sawchuck, Teela, Donnay and Roberts (2012) believe that the hypertensive disorder of pregnancy complicates 5%-10% of pregnancy and can lead to serious perinatal morbidity, especially in low and middle income countries. As Raghuraman, March, Hacker, Modest, Wenger, Narcisse, David, Scott and Rana (2014) stated, when pre-eclampsia is diagnosed, a timely delivery is recommended to optimize perinatal health. This study concluded that adequate obstetric care, including optimal timing for delivery in high-risk pregnancies, could improve pregnancy outcomes. In low-income countries such as Haiti, access to perinatal care remains limited, resulting in little screening for pre-eclampsia and missed opportunities for timely delivery.

According to, a study conducted by Hlimi (2015) the number of pregnant women suffering from pre-eclampsia in developing countries is not as easily ascertainable but is substantial compared to the rate of 15-20% in developed countries like the United States. Naljayam and Karumanchi (2013) believe that pre-eclampsia affects 3% to 5% of all pregnancies and is a major cause of perinatal morbidity worldwide. Staff, Sibai and Cunningham (2015) contends that pre-eclampsia is a major cause of perinatal morbidity worldwide and, especially in developing countries, and the prevention of

hypertensive disorders of pregnancy has been an area of research interest. Preeclampsia is a significant cause of perinatal morbidity, affecting an average of 3.45% of pregnancies globally (Vanderlelie & Perkins, 2011).

Tuuli and Odibo (2010) and Zeitlin et al. (2010) strongly argue that pre-eclampsia is a major contributor to perinatal morbidity rates. Pre-eclampsia is a common complication of pregnancy and remains a major cause of perinatal morbidity (McCarthy & Kenny, 2012). Zhang, Grewal, Roosen-Runge, Betran Lazga, Souza, Widmer and Merialdi (2012) state that pre-eclampsia during pregnancy contributes greatly to perinatal morbidity in developing countries. Both pre-eclampsia and gestational hypertension were associated with perinatal morbidity, but pre-eclampsia was associated with a considerable higher risk (Villar, Carroli, Wojdyla, Abalos, Giordano, Ba'ageel, Farnot, Bergsjo, Bakketeig, Lumbiganon, Campodonico, Al-Mazron, Lindheimer & Kramer, 2006).

Rosser and Katz (2013) agree with Firoz, Sanghvi, Merialdi and Deadelszen (2011) that pre-eclampsia may progress rapidly and it is the leading cause of perinatal morbidity worldwide. Ananth and Friedman (2014) mention that pre-eclampsia is a serious obstetric complication that constitutes the syndrome of ischemic placental disease and accounts for a disproportionate degree of perinatal morbidity. Sibai (2006) claimed that pre-eclampsia is the most common medical disorder during pregnancy and it is also a major cause of perinatal morbidities.

Fergus and Louise (2009) and Tooher, Chiu, Thornton, Lupton, O'Loughlin, Makris, Hennessy, Lind, Korda, Ogle and Horvath (2012) comment that pre-eclampsia is a common complication of pregnancy and remains a major cause of perinatal morbidity worldwide. According to, a study conducted by Sawchuck and Wittmann (2014) pre-eclampsia is a major cause of perinatal morbidity, mostly in low and middle income countries, and it is responsible for most of the preterm births. Pre-eclampsia in pregnancy accounts for increased perinatal morbidity when compared with low-risk pregnancies.

2.6 Intrauterine Growth Restriction

Foetal growth restriction is a condition wherein the baby has physical and behavioural problems. IUGR is an important and often under-diagnosed complication of pregnancy with important implications for perinatal health (Griveli et al., 2009). According to, Hung et al. (2013) foetal growth restriction – defined as suboptimal growth of the foetus, preventing achievement of its genetically determined potential size - is a major cause of perinatal morbidity. A complex and dynamic interaction of maternal, placental and foetal environment is involved in ensuring normal foetal growth. An imbalance or lack of co-ordination in this complex system may lead to IUGR. Foetal growth and development are dependent upon an adequate provision of oxygen and substrates from maternal circulation to the foetus through the placenta (Sankaran & Kyle, 2009).

IUGR is associated with increased perinatal morbidity as shown more recently, also with long-term morbidity and predisposition for development of chronic disease in adult age (Marshal, 2009). According to, Olusanya (2010) every year, about 14 million infants worldwide are born at term (>37 weeks gestation) with low birth weight (<2500g) due to intrauterine growth restriction(IUGR), representing 11% of all new-borns in developing countries, a rate six times higher than in developed countries.

IUGR is a major cause of foetal and neonatal morbidity, it is also associated with increased risk of premature birth, increased morbidity among premature new-borns, including Necrotizing Enterocolitis, hypoxic brain injury, need for respiratory support and chronic lung disease (Marton, 2009). Tuuli and Odibo (2010) and Zeitlin et al., (2010) suggested that intrauterine growth restriction (IUGR) is a major contribution to perinatal morbidity rates. According to, Mousa and Laughna (2008) foetal growth restriction is a major cause of perinatal morbidity and is associated with an increased risk of adult diseases including diabetes and cardiovascular diseases. Sankaran and Kyle (2009) believe that IUGR is one of the most significant causes of perinatal morbidity in both first and subsequent pregnancies. Peyter, Delhaes, Baud, Vial, Diaceri, Menetrey, Hohifeld and Tolsa (2014) concluded that intrauterine growth restriction affects 8% of all pregnancies and is associated with major perinatal morbidity, and with an increased risk to develop cardiovascular disease in adulthood. According to, Ananth and Friedman (2014) IUGR is a serious obstetric complication

that constitutes the syndrome of ischemic placental disease and accounts for a disproportionate degree of perinatal morbidity. IUGR remains a complex management problem in modern obstetric practice; it is a major cause of perinatal morbidity in South Africa as well as in the developed world, and it is a cause of great concern for the patient, her family and doctor (Du Plessis & Chauke, 2008). Foetal growth restriction, caused by maternal, foetal and placental pathologies, is associated with significant perinatal morbidity.

The aim of identifying growth-restricted foetuses in pregnancy is to improve perinatal outcomes through intensive sonographic foetal surveillance and optimal trimming in delivery (O'Dwyer,Burke,Unterscheider,Daly,Geary,Kennelly,McAuliffe, O'Donoghne, Hunter, Morrison, Dicker, Tully & Malone, 2014). IUGR remains one of the main challenges in maternity care, and it is associated with perinatal morbidity (Figueras & Cardosi, 2011). Cardosi (2009) concedes that IUGR is found to be a frequent antecedent of perinatal morbidity, pointing to the need to improve its timely antenatal detection as a mainstay of management and prevention.

2.7 Gestational Diabetes

Gestational diabetes remains a major contributor to perinatal morbidity; it is the most common and important metabolic condition affecting the health of both pregnant women and infants. Adequate information about perinatal morbidity as a consequence of diabetes in pregnancy is scarce. Despite improvements in services for people with diabetes and an increased focus on care of diabetes in pregnancy, there has been no significant reduction in perinatal morbidity (Hawdon, 2011). Many studies have reported the increased risk for adverse perinatal outcome among women with gestational diabetes (Lawrence, 2011). Meur and Mann (2007) concluded that perinatal morbidities remain elevated in these pregnancies despite significant improvements in obstetric and neonatal care. Parsons (2014) stated that the rising prevalence of diabetes among pregnant women continues to rise despite the significant improvements in screening and treatment, particularly gestational diabetes mellitus, which makes this an important contributor to perinatal morbidity.

Plagemann (2011) indicated that women with gestational diabetes, just as pre-gravid diabetic women (type 1 & type 2), are classified as risk pregnancies, and their offspring

show increased perinatal morbidity. Thus pregnancy in women with type 1 diabetes continues to be associated with an increase in adverse foetal and perinatal outcome. According to, a study conducted by Temple and Murphy (2010), type 2 diabetes' compared to type 1 diabetes, rates of perinatal morbidity, including preterm birth and macrosomia, appeared to be similar.

Globally, the incidence of respiratory complications in infants of mothers with gestational diabetes mellitus is as high as 34% with 4-6% incidence of RDS. Of all the perinatal complications associated with gestational diabetes mellitus, neonatal respiratory complications are one of the commonest and potentially the most serious and life-threatening morbidity that may be encountered. The risk of Transient Tachypnea of the Newborn (TTN) is also increased 2-3 times compared to infants delivered from non-diabetic pregnancies (Fung, Chan, Ho, To, Chan & Lao, 2014).

According to, a study conducted by Chirayath (2006) diabetes in pregnancy is associated with significant perinatal morbidity and its prevalence is rising dramatically worldwide, with major health implication. Griveli et al. (2009) believe that insulin-dependent diabetes is associated with large-for-gestational age babies, congenital malformations and increased perinatal morbidity (Griveli et al., 2009).

2.8 Maternal Age

Pregnancy among adolescents represents a major public-health issue and a major contributor to perinatal morbidity. Some pregnancies might be planned and wanted, but some are the results of sexual abuse, which are more likely to occur in poor, uneducated and rural communities. Adolescence pregnancies, planned or unplanned, are usually regarded as high risk, because they have been associated with an increased risk of adverse perinatal outcomes (WHO, 2014). However, studies from both developed and developing countries have been inconsistent in their findings, as such; the effect of adverse perinatal outcomes on a teenage mother is not well established (Suparp & Ratsiri, 2011).

Adolescence pregnancy might have a negative social and economic impact on girls, their families and the communities. According to, a study conducted by Ventura,

Ventura-Laveriano and Nazario-Redondo (2012) the level of pregnancy during adolescence is particularly problematic in low-income countries. In the USA, the adolescence birth rate is 42 per 1000 individuals, while in the UK the rate is around 27 per 1000 individual: which is the highest birth rate among adolescents residing in Western Europe. The United Kingdom has the highest rate of adolescent pregnancy in Western Europe. These young women have poorer access to adverse outcomes; they have poorer long-term health and are more likely to be socially excluded (Whitworth & Cockerill, 2014).

According to, Gupta, Kiron and Bhal (2008) teenage pregnancy is a worldwide social problem and its incidents show marked variation among developed countries. Adam, Elhassan, Amhed and Adam (2009) noted significant medical, nutritional, social and economic risks among pregnant teenagers, and concluded that teenage pregnancies are associated with increased risks for adverse perinatal outcome. Adolescence pregnancy remains a challenge for the health professionals as it has the potential to lead to life-threatening obstetrical and medical complications.

Potential obstetrical complications include PIH (Pregnancy Induced Hypertension) and diabetes that lead to placental abruption and prematurity (James, van Rooyen & Strumpher, 2010). Conde-Agudelo, Beliza and Lammers (2005) agreed with Salinu et al. (2011) that adolescence pregnancy has been associated with an increased incidence of several adverse maternal and perinatal outcomes, such as LBW, preterm delivery, Small for Gestational Age (SGA) infants and eclampsia. Adolescent pregnant women have substantially higher perinatal morbidity than older women (Keskinoglu, Bilgic, Picakciefe, Giray, Karakus & Gunay, 2007).

Teenage pregnancies continue to be a major health burden in Thailand and other low-income countries where around 85% of them occur and 25% of the mothers are in their teens. Thailand has the second-highest rate of teenage pregnancies in the world; a ranking that may be due to environmental degradation, low family income, a poorly educated population, and lack of familial warmth and care (Chantrapanichkul, 2013). As Cooke, Mills and Lavender (2012) stated, advanced maternal age is associated with increased perinatal morbidity. A recent study from Canada reported on adverse outcomes among the new-borns of nulliparous adolescents; 19 years and younger,

and among the new-born of nulliparous women aged 20 through 39 years. According to, a study conducted by Verma (2008) women older than 35 years have traditionally been termed as of “advanced maternal age” and considered to have higher incidence of obstetric complications and adverse pregnancy outcomes than younger pregnant women. Advanced maternal age and parity are well-known confounding factors for adverse perinatal outcomes; it is associated with higher perinatal morbidity (Morcel, Lavoue, Beuchee, Le Lannou, Pouled & Plady, 2010). Carolan and Frankowska (2011) differed with Salinu et al. (2011) by stating that rates of adverse perinatal outcome are linked to maternal age 35-39 years.

2.9 Anaemia

Maternal anaemia is a common occurrence, particularly among women living in low-income countries. Adverse perinatal outcomes have been observed among women with moderate or severe anaemia (Gonzales, Tapia, Gasco, Carrillo & Fort, 2012). Anaemia during pregnancy, defined as haemoglobin concentration less than 10g/dL, is a universal problem. Several studies performed in developing as well as developed countries, documented sub-optimal foetal and perinatal outcome, in particular low birth weight and preterm delivery (Levy et al., 2005). The prevalence of anaemia among pregnant women is 55.9% worldwide and varies between 35% and 100% in developing countries (Patray, Pasrija, Trivedi & Purim, 2005).

Lee and Okam (2011) observe that anaemia is a global problem affecting nearly half of all pregnant women worldwide. High foetal demands for iron render iron deficiency the most common cause of anaemia of pregnancy, with other micronutrient deficiencies contributing less frequently. Goonewardene, Shehata and Hamad (2012) stated that nutritional Iron Deficiency Anaemia (IDA) is associated with increased perinatal morbidity and long-term adverse effects in the new-born. Shah, Fawole, M’Imunya, Amokrane, Naflow, Wolomby, Mugerwa, Neves, Nguti, Kublikkas and Mathai (2009) agree with Goonewardene et al. (2012) when stating that IDA, one of the most devastating nutritional alterations, affects the physical growth and mental development of babies and increases the perinatal morbidity. Steiner and Gallagher (2007) noted that anaemia is a commonly encountered problem in the foetal and neonatal period, and can lead to significant morbidity.

Hoque, Hoque and Kader (2009) said that anaemia in pregnancy is a major public health problem in developing countries; it is associated with increased risk of perinatal morbidity. A high rate of anaemia in pregnancy in the rural population of Kwazulu-Natal (30% according to, national and 57% according to, WHO (2008) definition of anaemia in pregnancy) is observed. The WHO (2008) estimates that more than 40% of pregnant women in Sub-Saharan Africa, India, Iran and Bangladesh are anaemic, compared to 5-19% of women in the west (Hlimi, 2015). According to, a study conducted by Patray et al. (2005) anaemia is a major health problem among women of reproductive age, particularly in developing countries. Pregnant women with sickle-cell anaemia experience an increased incidence of medical and pregnancy-related complications leading to high perinatal morbidity (Maryam, Kahtani, Mohammad, Mashael, Mohamed, Ashraf & Naji, 2012).

2.10 Multiple Pregnancies

Multiple pregnancy is when a woman is pregnant with two or more foetuses in her uterus. Young (2012) state that perinatal morbidity in twin pregnancy is 3 to 7 times of singletons and high order multiples (triplets or more) have more than ten times the risk. Whereas Kawaguchi, Ishii, Yamamoto, Hayashi, and Mitsud (2013) note that the infants of multiple pregnancies are reported to have high morbidity rates primarily because of preterm birth and low birth weight, as compared to infants of singleton pregnancies. Ville and Kareb (2008) proposed that twins are associated with increased risks of perinatal morbidity as compared to singletons: these risks are 3-to-10 fold higher in monochorionic than in dichorionic twins.

Sentilhes, Oppenheimer, Bouhours, Normand, Haddad, Descamps, Marpeau, Goffinet and Kayem (2015) assert that twin delivery remains a challenging event in daily obstetric practice, and this challenge is still more difficult in cases of very preterm birth. Oyelese, Ananth, Smulian and Vintzileos (2005) comment that multiple pregnancies are commonly delivered prematurely and contribute disproportionately to perinatal morbidity. Twin pregnancies are associated with numerous complications that include pre-eclampsia, growth abnormalities, gestational diabetes mellitus, twin-

twin transfusion syndrome, increased perinatal morbidity rates and preterm delivery (Soucie, Yang, Wen, SKee Fung & Walker, 2006).

According to, a study conducted by Dadd and Crowther (2008) low birth-weight is associated with an increase in the risk of perinatal morbidity, and it is more common in monochorionic twin pregnancies. The epidemic of multiple births has translated into a marked rise in very low birth-weight infants, who are at risk of major perinatal morbidity (Shinwell, 2005). As Diehl, Diemert and Hecher (2014) state that a significant proportion of perinatal morbidity among twins is due to the high incidence of preterm delivery and the added complications of twin-to-twin transfusion syndrome (TTTS) in monochorionic twins. Lopriore, Oepkes and Walther (2011) indicate that TTTS is a severe complication of monochorionic twins pregnancies associated with high perinatal morbidity. Lopriore et al. (2011) agree with Blickstein (2013) and Van Meir, Slaghekke, Loprore and Wijngeerde (2010) when stating that monochorionic twins are at increased risk for perinatal morbidity.

Hack, Nikkels, Koopman-Esseboom, Derks, Elias, van Gemert and Visser (2008) indicated, perinatal morbidity is higher in monochorionic twin pregnancies than in dichorionic twin pregnancies. Multiple births are much more common today than they were in the past. Qazi (2011) noted that multiple pregnancies have high perinatal complications, especially preterm delivery, which increases the risk of significant perinatal morbidity. Monochorionic twin pregnancies particularly are at increased risk for growth restriction and subsequent increased risk of perinatal morbidity (Griveli et al., 2009). Twin and triplet pregnancies are a high-risk situation, with increased risk of perinatal morbidity. It is therefore essential that high-quality antenatal care is provided to optimise outcomes and identify and manage complications effectively (Bricker, 2014). Twins and higher-order multiples are at increased risk of perinatal morbidity (Shinwell, 2005).

2.11 Conclusion

This chapter discussed literature review on factors that contribute to high perinatal morbidity in Maternity and Neonatal Units. The literature review included perinatal asphyxia and STIs, prematurity, pre-eclampsia; intrauterine growth restriction, gestational diabetes; maternal age, anaemia and multiple pregnancies. Chapter 3 discusses the research methodology used for the study, the data collection instruments, pretesting of data collection instruments, as well as ethical considerations.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the research method and design that were used to conduct this research study. A quantitative research method was used in this study. A self-developed questionnaire was used to collect data regarding the factors contributing to high perinatal morbidity rates in the Mankweng-Polokwane Complex, of the Capricorn District, Limpopo Province, South Africa.

3.2 Study Site

South Africa comprises nine provinces of which Limpopo Province is one of them. Limpopo Province is situated in the far north part of the country and is dominated by rural areas. It is divided into five districts, namely, Capricorn, Mopani, Sekhukhune, Waterberg and Vhembe as well as 24 municipalities. It has a population of 5.4 million people. Polokwane city is situated in the Capricorn District of the Limpopo Province. The Capricorn District consists of eight public hospitals; six of which are level 1 hospital, namely: Botlokwa, Helen Franz, W.F Knobel, and Lebowakgomo, Seshego, and Zebediela hospitals. The level 3 hospitals situated in the Capricorn District are the Polokwane-Mankweng Complex. Capricorn District comprises five local municipalities, namely: Aganang, Blouberg, Lepelle-Nkumpi, Molemole and Polokwane.

The Polokwane Hospital Campus is situated in the northern site of the Polokwane city whereas the Mankweng Hospital Campus is situated in Sovenga Township 30km East of Polokwane city. The two referral hospitals, which form the Polokwane-Mankweng Complex, provide secondary and tertiary health care services respectively**,** to all levels 1 and 2 hospitals in the Limpopo Province. The major study was conducted in the Neonatal Intensive Care Unit (NICU) of the Polokwane-Mankweng Complex. The Mankweng Labour Unit was 45 bedded and NICU was 48 bedded, while Polokwane Labour Ward was 38 bedded and NICU. These NICUs cater for all the public hospitals

in the Capricorn District. The number of sick neonates admitted in NICU ranges between 70 to 100 neonates per month. The number of high-risk mothers admitted in Labour Ward ranges between 100 and 130 per month.

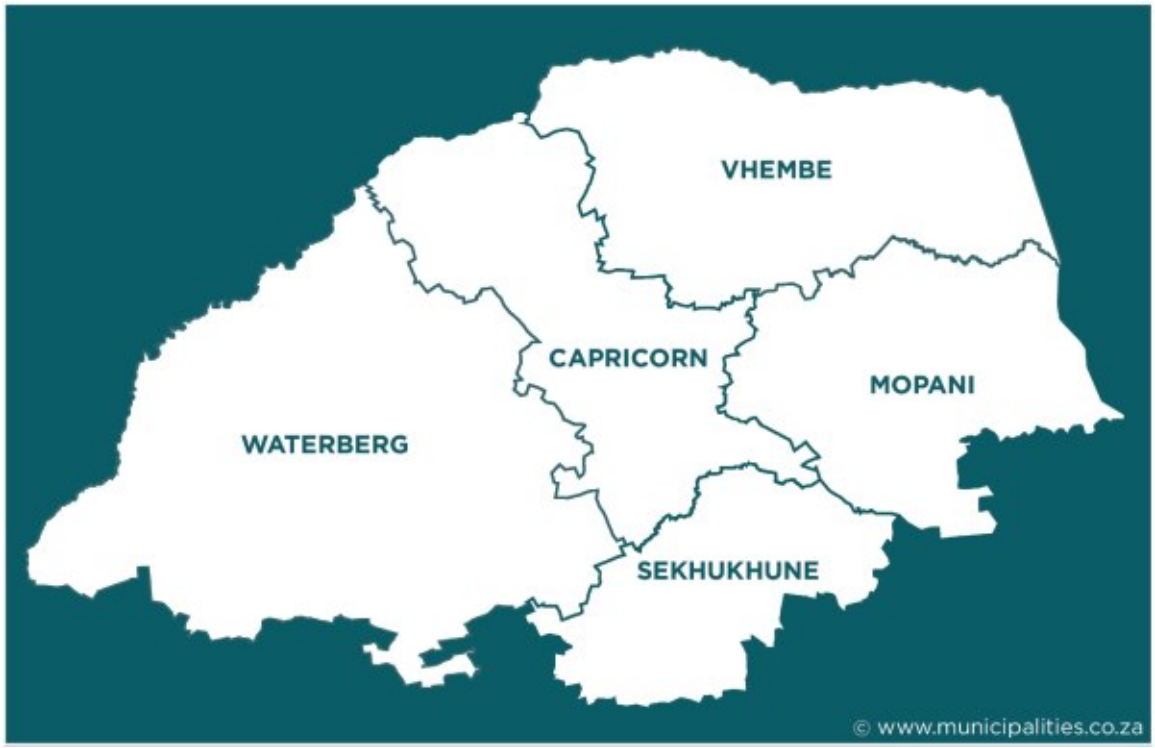

Figure 3.1: Map of Limpopo Province

3.3 Quantitative Research Method

In this study, quantitative research method was used in order for the researcher to describe factors contributing to high perinatal morbidity rates in the Mankweng-Polokwane Complex, of the Capricorn District, Limpopo Province, South Africa. Brink et al. (2011) explain that quantitative research method is an approach that emphasizes the collection of numerical data and the statistical analysis of hypothesis proposed by the researcher. Quantitative research focuses on a small number of concepts and strives to generalise research results to larger contexts (Botma, Greeff, Mulaudzi & Wright, 2010). In the context of this study, the researcher used the quantitative research method to obtain information about factors contributing to high perinatal morbidity rates. The researcher distributed copies a self-developed questionnaire to registered midwives to describe factors contributing to high perinatal morbidity rates

in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

3.4 Research Design

Research design involves a set of decisions regarding what topics to be studied among what population with what research methods and for what purpose (Babbie & Mouton, 2011; de Vos et al., 2011). It is the process of focusing your perspective for the purpose of a particular study. Research design focuses on end product and all the steps in the process to achieve the outcome anticipated. The purpose of research design is to ensure that the evidence that gets collected answers the research question. Babbie and Mouton (2011); de Vos et al. (2011) define design in the quantitative context as the step in the process that follows problem formulation and precedes data collection. According to, Babbie Mouton (2011); de Vos et al. (2011) research design refers to all the decisions we make in planning the study, decision not only about what overall type or design to use, but also about sampling, sources and procedures for collecting data, measurement issues and data analysis plans. In this study, the researcher used a quantitative, descriptive cross-sectional design as a methodological approach.

3.4.1 Cross-Sectional Research Design

The cross-sectional design involved obtaining data from a cross-section of the population at a point in time, indicating that data are gathered once from a specific sample (Brink et al., 2011; and Burns & Grove, 2011). The cross-sectional design was used by collecting data from registered midwives in the Mankweng NICU and Labour Unit as well as registered midwives in the Polokwane NICU and Labour Unit.

3.4.2 Descriptive Research Design

Descriptive design was used in this study. In descriptive design, the researcher must not manipulate any variables and must determine relationship between variables. The researcher searches for accurate information about characteristics of a single subject (Brink et al., 2011). Descriptive design was used to describe the factors contributing

to high perinatal morbidity rates in the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. In this study, registered midwives were used in order to describe the factors contributing to high perinatal morbidity rates.

3.5 Population and Sampling

3.5.1 Population

Population is defined by Brink et al. (2011) as a complete set of persons who possess some common characteristics that are of interest to the researcher. According to, Botma et al. (2010) the target population is the entire set or aggregation of objects, persons, behaviour or events, or any other single unit of a study sometimes called elements or sampling units, that meet the sampling criteria.

In this study, the target population was 80 registered midwives allocated in both the Labour Unit and NICU of the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. The target group was selected because each met the criteria of this study, which was registered midwives with one-year and above experience and those who gave consent to participate in the study, allocated in both the Labour Unit and NICU of the Mankweng-Polokwane Complex of the Capricorn District.

3.5.2 Sampling

Sampling is a process in which representative units of a population are selected for inclusion in a research investigation (Schneider, Whitehead & Elliott, 2007). According to, Brink et al. (2011) sample is a subset of a large set selected by the researcher to participate in a research study. Simple random probability sampling was used in this study to ensure that all registered midwives have an equal chance of being included in the study. The researcher sampled 66 registered midwives using Krejcie and Morgan's formula for determining the sample size as follows:

$$S = x^2 NP (1-P) \div d^2 (N-1) + X^2 P (1-P)$$

S = the required sample size

X^2=the table value of Chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = population size

P = population proportion (assumed to be 0.5 to provide the maximum sample size).

D = the degree of accuracy expressed as a proportion (0.05)

$$S = \frac{X^2 NP\,(1-P)}{d^2(N-1) + X^2\,P(1-P)}$$

$$S = \frac{3.841(40)(0.5)(0.5)}{(0.05)^2(80-1)+3.841(0.5)(0.5)} \approx 66.3$$

Sample size = 66

The researcher assigned consecutive numbers to units of the population, and started at any point on the table of random numbers and read consecutive numbers in any direction horizontally as guided by Schneider et al. (2007).

3.5.3 Inclusion Criteria

Inclusion criteria were:

- Registered midwives allocated in both the Labour Unit and NICU of the Mankweng- Polokwane Complex of the Capricorn District, Limpopo Province, South Africa;
- Registered midwives with one-year and above experience allocated in both the Labour Unit and NICU of the Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

3.5.4 Exclusion Criteria

Exclusion criteria were:

- Registered midwives with less than one-year experience, as well as community service professional nurses allocated in both the Labour Unit and NICU of the

Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa;

- Registered midwives who were on leave and off duty during data collection.

3.6 Data collection

A self-developed 5-point Likert scale questionnaire was used for data collection and it comprised of 123 closed ended questions in the following sections: Section A: Socio-demographic data consisting of 9 questions; Section B: Staffing consisting of 4 questions; Section C: Staff development consisting of 7 questions; Section D: Workload consisting of 6 items; Section E: Main causes for babies to become sick; Section F: Equipment and supplies consisting of 27 items; Section G: Material resources consisting of 10 items; and Section H: Infection prevention and control consisting of 36 items.
The respondents were asked to indicate their agreement or disagreement and never, hardly ever, sometimes, often, always with one or more statements (Goodman & Moule, 2014).

The questionnaires were delivered to the 66 respondents by the researcher at both the Mankweng Hospital Campus and Polokwane Hospital Campus. The respondents completed the questionnaires on their own in a private room in the presence of the contact person. However, the researcher was available in case clarity was needed. Data were collected from June to August 2015 as registered midwives are shift workers. The duration for completion of questionnaires was 35-45 minutes. Questionnaires were completed and returned and only one questionnaire was not returned, and two were spoiled as they were incomplete, then 63 questionnaires were analysed.

3.6.1 Pilot Study

The pre-test included experts in the field of study who are knowledgeable regarding questionnaire construction. The questionnaire was evaluated for content-related validity and face validity by experts. The questionnaire was tested on 10 registered midwives 5 Labour Ward and 5 NICU, all of whom did not form part of the main study.

A pilot study was performed to:

- Determine the clarity of questions;
- Correct ambiguous instructions and wording;
- Improve the success and effectiveness of the instrument; and
- Determine the completeness of the response sets and the time required to complete the questionnaire, and also to test the data-gathering techniques (Botma et al., 2010).

All questionnaires were completed and returned. The pilot study helped the researcher to make some improvements on the questionnaire before the main study (Brink et al., 2011).

3.6.2 Pilot Study Results

All questionnaires were coded and analysed, but some respondents did not answer all the questions; apparently because instructions were not clear.These ten respondents used during pre-testing did not form part of the main study. Only 1 (10%) was male and 9 (90%) were female registered midwives; not surprising given that nursing is female dominant. The respondents did not answer all the questions as some instructions were not clear. Accordingly, it was later refined before being distributed for the major study. For instance, the instruction “Tick the correct answer according to the keys below” was refined to “Tick answer on the availability of the following in your unit, according to the keys below”.

3.7 Data analysis

Descriptive statistics was used, which included a frequency distribution table and percentages of the respondents (Brink et al., 2011). The collected data were coded. Data were captured on Microsoft Office Excel 2010 by the researcher and later the statistician assisted with analysis. The SPSS version 22 was used to analyse data, with the assistance of the statistician. A total of sixty-three questionnaires were coded and analysed, but some respondents did not answer all the questions.

The cross-tabulation was used to examine whether the variables relate. The variables include age; gender; nursing qualification; work experience; staffing; workload; equipment and supplies; material resources; and infection prevention and control. Descriptive statistics was used to analyse the data collected from the socio-demographic part of the questionnaire (Burns & Grove, 2011). Descriptive statistics was used to examine whether socio-demographic data had an influence on main causes for babies to become sick.

Inferential statistics refers to a group of statistics that is concerned with the characteristics of populations and that uses sample data to make an inference about the population. This permits the researcher to infer that particular characteristics in a sample exist in the larger population. They help the researcher to determine whether the difference that is found between two groups, such as experimental and a control group is a genuine difference, or whether it is merely a chance difference that occurs because a non-representative sample is chosen from the population. Inferential statistics facilitates the statistics which include the t-test, analysis of variance, and analysis of co-variance, factor analysis and multi-variate analysis (Brink et al., 2011). Inferential statistics was used based on probability and allow judgements to be made about the variables (Burns & Grove, 2011).

3.8 Validity

According to, Babbie and Mouton (2011); and De Vos et al., 2011) validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration.

3.8.1 Content Validity

Content validity is an assessment of how well the instrument represents all the components of the variable to be measured. Validity was ensured by the components with which items covered the important areas of perinatal morbidity (Brink et al., 2011; de Vos et al., 2011). The researcher based the claim on a literature review when constructing data collection instrument (Brink et al., 2011). Validity of the instrument

was ensured by conducting intense literature review on factors contributing to high perinatal morbidity rates. Validity was ensured when the self-developed questionnaire was presented to the study supervisor, co-supervisor, the statistician and the research committee in the field of study for evaluation of content validity of the instrument. All the items of the questionnaire were evaluated (Babbie & Mouton, 2011; Brink et al., 2011).

3.8.2 Face Validity

Face validity is a subjective determination that an instrument is adequate for obtaining the desired information. On the surface or the 'face', the instrument appears to be an adequate means of obtaining the desired data (Brink et al., 2011; de Vos et al., 2011). The questionnaire was submitted to the supervisor, senior degree panel and the statistician, to be checked for the ability to measure what it is expected to measure. The instrument was checked whether it contained the relevant items to be measured; it had instructions and headings that guided the respondents (Goodman & Moule, 2014).

3.9 Reliability

Reliability refers to the degree to which the research instrument can be depended upon to yield consistent results if used repeatedly over time on the same person, or if used by two researchers (Brink et al., 2011; de Vos et al., 2011). The reliability of the instrument was established by pre-testing the questionnaire on 10 respondents; who did not form part of the study (Brink et al., 2011; de Vos et al., 2011). The pilot study was done to investigate the feasibility of the study and to detect unclear instructions and wording (Brink et al., 2011).

3.10 Bias

Bias is any influence that produces a distortion or misrepresentation of an outcome of a particular finding of a study (Brink et al., 2011). The researcher avoided asking respondents leading questions. The participation was determined randomly using random number generator before the study begun to ensure that there is no systemic

bias in either group. The researcher avoided too small or too large a sample in order to get accurate answers. The researcher ensured that respondents understand all questions and also clarified questions that were not clear to the respondents.

3.11 Ethical Considerations

Ethical clearance was granted by the Medunsa Research and Ethics Committee (MREC). Permission to conduct the study was obtained from the Limpopo Province Department of Health Ethics Committee. Permission to collect data from Mankweng-Polokwane Complex was granted by the hospital management.

- **Informed consent**

  A respondent voluntarily agrees to participate in a research study in which he or she has full understanding of the study before the study begins (Brink et al., 2011). The researcher ensured informed consent by explaining to the respondents what was going to be investigated, the expected duration of the respondent's involvement, the procedures that were to be followed during the investigation, the possible advantages, disadvantages and dangers to which respondents may be exposed (Brink et al., 2011; de Vos et al., 2011). The researcher informed the respondents that the information shared between the respondents and the researcher is not going to be divulged to anyone who is not involved with the study.

  The respondents were informed that they had the liberty to withdraw from the study at any time without being harmed (De Vos et al., 2011). The respondents signed a Consent Form as evidence of granting the researcher permission. The researcher ensured that the signed Consent Forms were treated with utmost discretion and stored away in a correct manner so that a particular form can easily be found if the need arises (De Vos et al., 2011).
  The researcher explained the data collection method used, namely, questionnaires (Brink et al., 2011).

- **Autonomy**

  Autonomy emphasizes the right of an individual to make decisions for him/ herself (Verklan & Walden, 2010). Autonomy was ensured by explaining to respondents that they had the right to decide whether or not to participate in the study without prejudicial treatment (Botma et al., 2010). The respondents were informed that they had the right to withdraw from the study at any time, to refuse to give information or to ask for clarity about the purpose of the study (Brink et al., 2011). The researcher did not force the respondents to participate in the study, given that respondents are to participate voluntarily (Babbie & Mouton 2011; de Vos et al., 2011).

- **Confidentiality**

  Brink et al. (2011); and LoBiondo-Wood and Haber (2010) defined confidentiality as the researcher's responsibility to prevent all data gathered during the study from being divulged or made available to any other person. The researcher assured the respondents that the information about the respondents would not be made available to anyone who was not involved with the study, by keeping the completed Consent Forms in a locked cupboard together with completed questionnaires. The researcher instructed the respondents not to write their surnames, but to put names only on the Consent Form. The researcher ensured that the names of the respondents were not used on the questionnaires, instead codes were used to trace in cases of entry error. The respondents were informed that they had the right to withdraw from the research investigation at any point if they wished to. The respondents also had the right to refuse to answer any question asked and to have the confidentiality of their data protected (Brink et al., 2011; LoBiondo-Wood & Haber (2010).

- **Anonymity**

Anonymity means that no one, including the researcher, should be able to identify any respondents afterwards (De Vos et al., 2011). Anonymity was ensured by keeping the respondents' identity unknown, even to the investigator. The respondents were informed not to write their names on the questionnaires. The respondents were also assured that neither their names nor their hospital names would appear on the research report to avoid revealing any identity. The researcher informed the respondents that the collected data will be entered into the computer using codes. Codes were used during data analysis. A contact person was used during data collection, so that the respondents could remain anonymous to the researcher.

- **Privacy**

According to, De Vos et al. (2011) privacy is to keep to oneself that which is normally not intended for others to observe or analyse. Privacy was ensured by having session in a private place where there was only the contact person and the respondents, so as to avoid disturbances (Brink et al., 2011; LoBiondo-Wood & Haber 2010).

The respondents in the Labour Unit and NICU of the Mankweng-Polokwane Complex completed the questionnaires at different times. The contact person was instructed not to allow discussion between the respondents. The researcher did not use a video recorder, camera or any kind of media during data collection to ensure privacy.

- **Beneficence**

According to, Botma et al. (2010) the Principle of Beneficence is grounded on the premises that a person has the right to be protected from harm and discomfort and one should do good and, above all, no harm. The Principle of Beneficence was ensured by protecting the respondents from physical and/or

emotional harm and discomfort as Botma et al. (2010) stated. The respondents were informed beforehand about the potential impact of the investigation.

3.12 CONCLUSION

This chapter describe the research methodology and design in details. Ethical principles were observed throughout as the respondents' names remained anonymous. Chapter four discusses the results of the research.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discusses the results of data collected from the respondents. Data were analysed using SPSS version 22 with the help of the statistician. Descriptive statistics such as frequencies, percentages and cross tabulation, Means, were used for closed-ended questions. Inferential statistics provided a way for the researcher to look at the data in a study and decide how easily the results can be generalized to the population.

4.2 Presentation of Results

Data collected were presented with the aid of tables and figures. The following keys were used for tables and figures:

- Mankweng Complex = MNKC
- Polokwane Complex = PLKC

4.2.1 Section A: Socio-Demographic Data

Socio-Demographic Data included the following items:

- Age, gender, marital status, residential area, nursing qualification, speciality qualification and work experience of the registered midwives.

Units and number of beds registered midwives were allocated in.

- **4.2.1.1 Age of the respondents**

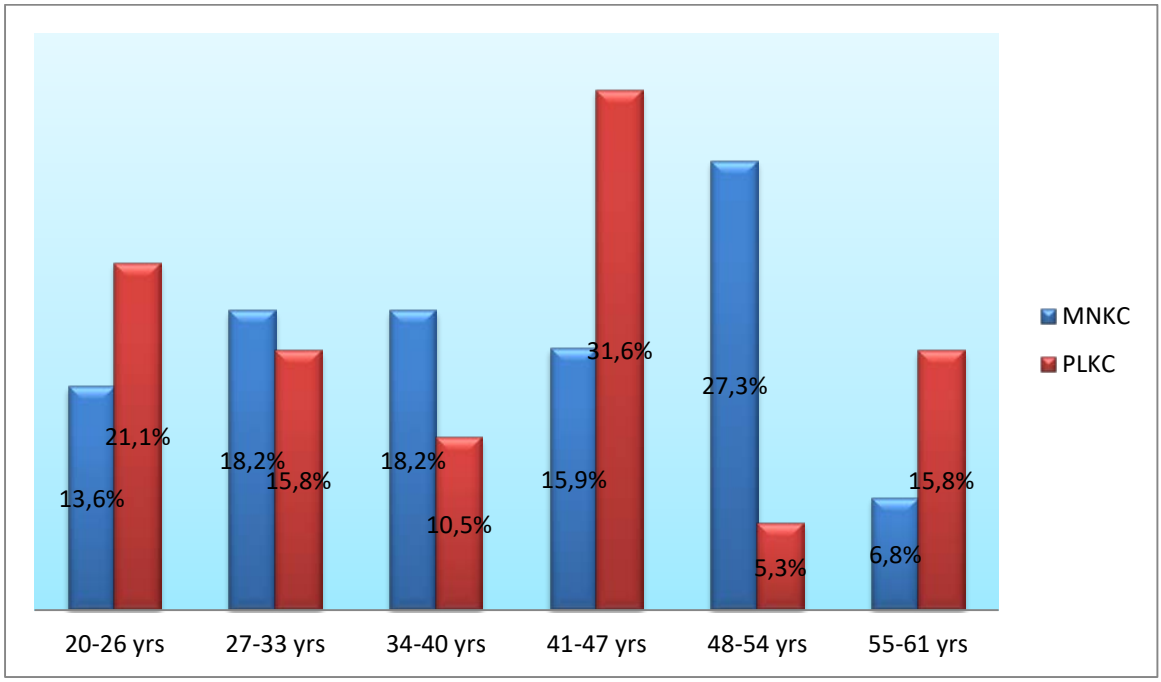

Figure 4.1: Age of the respondents

Figure 4.1 indicates that the majority of the respondents in the Polokwane Campus were young, aged between 20-26 years 4(21.1%) versus 20-26 years old 6(13.6%) in Mankweng Campus. The majority of the older midwives were in the Mankweng Campus, aged between 48-54 12(27.3%) as compared to Polokwane Campus with 1(5.3%). Equal response rate for the respondents aged between 27-33 years and 34-40 representing 8(18.2%) in the Mankweng Campus, while in the Polokwane Campus those aged 41-47 year-old represented 6(31.6%), and 55-61 years in Mankweng Campus represented 3(6.8%) and 3(15.8%) in Polokwane Campus.

4.2.1.2 Gender of the respondents

Gender was studied to ensure that both males and females were included in the study, 18(94.7%) of the respondents were females in Polokwane Campus and were 44(100%) of Mankweng Campus. Only 1(5.3%) of the respondents in Polokwane Campus was a male against 0(0%) in Mankweng Campus.

4.2.1.3 Marital Status of the respondents

Marital status was studied in order to ensure that the sample represented all groups. More than half of the respondents were married in Polokwane Campus 11(57.9%) and 20(45.5%) of Mankweng Campus; followed by single respondents 6(31.6%) in Polokwane versus 18(40.9%) of Mankweng Campus. Only one respondent in Mankweng Campus 1(2.3%) and 1(5.3%) in Polokwane Campus were separated. Divorced respondents were 2(4.5%) in Mankweng Campus and 0(0%) in Polokwane Campus, while 3(6.8%) in Mankweng Campus and 1(5.3%) were widowed.

4.2.1.4 Residential Area of the respondents

Residential area was studied in order to ensure that the sample represented all types of residential areas. Close to half of the respondents in the Mankweng Campus were from rural areas representing 18(41.9%) and 1(5.3%) of Polokwane Campus. The majority of the respondents in Polokwane Campus were from urban area 13(68.4%) and 11(25.6%) of Mankweng Campus. The respondents from semi-rural areas represented 14(32.6%) in Mankweng Campus and 5(26.5%) in Polokwane Campus, and 1(2.3%) ignored this item.

4.2.1.5 Nursing Qualifications of the respondents

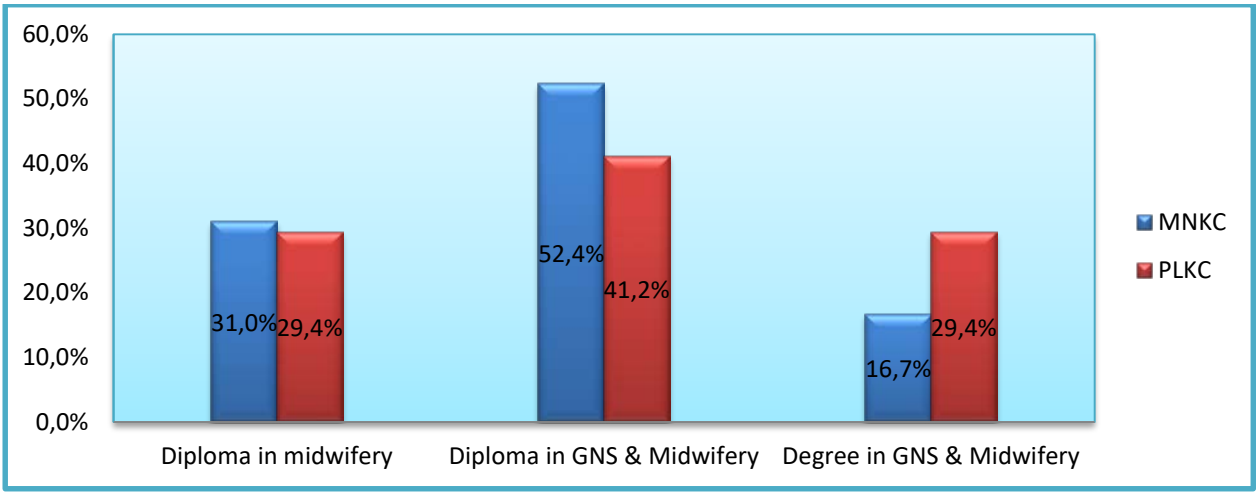

Figure 4.2: Nursing Qualifications

Figure 4.2 shows that 22(52.4%) of the respondents in Mankweng Campus obtained a diploma in (General Nursing, Community, Psychiatry) Midwifery and 7(41.2%) of Polokwane Campus, followed by Diploma in Midwifery 13(31%) in Mankweng Campus and 5(29.4%). Degree in (General Nursing, Community, Psychiatry) Midwifery, represented 7(16.7%) in Mankweng Campus and 5(29.4%) of the Polokwane Campus, 2(4.5%) of the respondents in Mankweng Campus and 2(10.2%) in Polokwane Campus did not indicate their response to this item.

4.2.1.6 Speciality Qualification of the respondents

Speciality qualification was studied to ensure that the sample represented all levels of speciality qualifications. More than half of the registered midwives obtained Advanced Midwifery and Neonatal Nursing Science, 5(55.6%) on the Mankweng Campus and 6(100%) on the Polokwane Campus; and 4(44.4%) of the registered midwives from the Mankweng Campus obtained Diploma in Neonatal Intensive Care Nursing and 0(0%) in Polokwane Campus, and 35(79.5%) in Mankweng Campus and 13(68.4%) did not respond to this item.

4.2.1.7 Work Experience of the respondents

Table 4.1: Work Experience of the respondents in Mankweng Polokwane Complex

Work experience	Mankweng Registered Midwives f %	Polokwane Registered Midwives f %
1. 1-5 years	14(31.8%)	6(31.6%)
2. 6-10 years	11(25.0%)	2(10.5%)
3. 11-15 years	3(6.8%)	3(15.8%)
4. 16-20 years	3(6.8%)	2(10.5%)
5. 21-25 years	3 (6.8%)	4(21.1%)
6. 1.6 26+ years	10 (22.7%)	2(10.5%)
Total	100%	100%

Table 4.1 indicates that less than half of the respondents had 1-5 years' experience on the Mankweng and Polokwane Campuses, representing 14(31.8%) and 6(31.6%),

respectively. Of all the respondents on the Mankweng Campus, 6-10 years represented 11(25.0%) and 26+ years 10(22.7%). In Polokwane, 11-15 years represented 3(15.8%) and 21-25 years 4(21.1%).

4.2.1.8 Unit Respondents Allocated in at Present

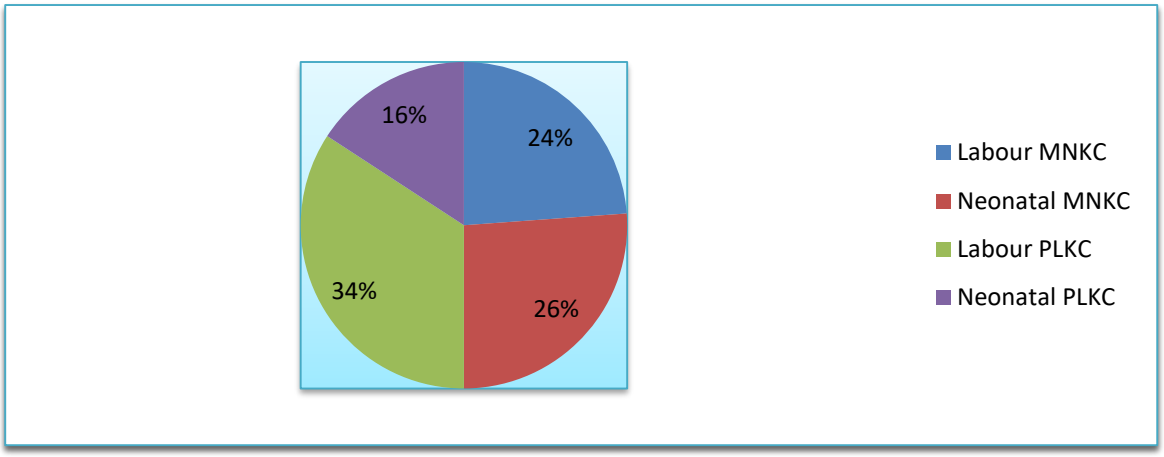

Figure 4.3: Unit Respondents Allocated in at Present

Figure 4.4 shows that 21(47.7%) of the respondents were allocated in the Labour Unit of the Mankweng Campus versus 13(68.4%) of Polokwane Campus. Of the respondents, 20(52.3%) of the respondents were allocated in the NICU of Mankweng Campus against 6(31.6%) of Polokwane Campus.

4.2.1.9 Number of Beds in the Unit Allocated in at Present

Table 4.2: Number of Beds in the Unit Allocated in at Present

	Mankweng Registered Midwives	Polokwane Registered Midwives
Number of Beds	**f %**	**f %**
1. 8 beds	8(20.5%)	1(5.6%)
2. 9-14 beds	7(17.9%)	8(44.4%)
3. 15-19 beds	0 (0%)	2(11.1%)
4. 20-24 beds	2(5.1%)	1(5.6%)
5. 25 + beds	22(56.4%)	6(33.3%)
Total	100%	100%

Table 4.2 indicates that more than half 22(56.4%) of the respondents in the Mankweng Campus were allocated in 25+ bedded and 6(33.3%) of the Polokwane Campus, followed by 7(17.9%) in Mankweng Campus against 8(44.4%) of the Polokwane Campus.

4.2.2 Section B: Staffing

4.2.2.1 Staffing

Table 4.3: Staffing in Labour and Neonatal Intensive Care Unit

	Mankweng-Polokwane Registered Midwives							
Item	n	Never f %	Hardly ever f %	Sometimes f %	Often f %	Always f %	No Response f (%)	Total
1. Shortage of staff of staff in my unit was high in the past 8 months	63	1(1.6%)	3(4.8%)	7(11.1%)	12(19.0%)	37(58.7%)	3(4.8%)	100%
2. Absenteeism was high in my unit in the past 8 months	63	8(12.7%)	6(9.5%)	24(38.1%)	11(17.5%)	7(11.1%)	7(11.1%)	100%
3. Resignation was high in the past 8 months	63	8(12.7%)	5(7.9%)	11(17.5%)	17(27.0%)	17(27.0%)	5(7.9%)	100%
4. Staff-patient ratio good	63	35(55.6%)	6(9.5%)	10(15.9%)	3(4.8%)	3(4.8%)	6(9.5%)	100%

Table 4.3 indicates that only 1(1.6%) of the respondents indicated that shortage of staff was never a problem in their units in the past 8 months, 3(4.8%) indicated it was hardly ever a problem, 7(11.1%) of the respondents stated that it was a problem sometimes, 12(19.0%) responded that it was often a problem, whereas 37(58.7%) indicated that it was always a problem, and 3(4.8%) did not respond to this item. Of the respondents, 8(12.7%) indicated that absenteeism in their units was never high in the past 8 months, 5(7.9%) responded that it hardly ever high, 11(17.5%) indicated that it was high sometimes, and 7(11.1%) indicated that it was always, and 7(11.1%) ignored this item.

The respondents 8(12.7%) indicated that resignation was never high in their unit in the past 8 months, 5(7.9%) showed that it was hardly ever high, 11(17.5%) indicated that it was high sometimes, and there was equal response for often and always which represented 17(27.0%), and 5(7.9%) did not respond to this item. More than half of

the respondents indicated that staff-patient ratio was never good, 6(9.5%) stated that it was hardly ever good, 10(15.9%) responded that it was good sometimes, and there was equal response for often and always which represented 3(4.8%), and 6(9.5%) ignored this item.

4.2.3 Section C: Staff Development

4.2.3.1 Staff Development of the Registered Midwives in Mankweng-Polokwane Complex

Table 4.4: Staff Development of the Registered Midwives in Mankweng-Polokwane Complex

	Mankweng–Polokwane Registered midwives				
Item	n	Yes f %	No f %	No Response f %	Total
1. Are you LINC trained?	63	23(36.5%)	38(60.3%)	2(3.2%)	100%
2. Have you done ESMOE?	63	27(42.9%)	34(54.0%)	2(3.2%)	100%
3. Have you done HBB program?	63	45(71.4%)	17(27.0%)	1(1.6%)	100%
4. Do you think there is any Pre and post training change?	63	31(49.2%)	25(39.7%)	7(11.1%)	100%

Table 4.4 shows that of all the respondents, 38(60.3%) indicated that they were not LINC trained, 23(36.5%) were trained, while 2(3.2%) did not respond to this item. With regard to ESMOE 34(54.0%) indicated that they were not trained, while 27(42.9%) were trained, and 2(3.2%) ignored this item. Those not HBB trained were 17(27.0%), 45(71.4%) were trained, only 1(1.6%) did not respond to this item. With regard to 31(49.2%) of the respondents indicated that there was pre and post training change, while 25(39.7%) indicated that there was no change, and 7(11.1%) ignored this item.

4.5.3.2 Duration Trained

Table 4.5: Registered Midwives' duration of Training

Mankweng-Polokwane Registered Midwives							
Item	n	Never f %	Past 1 year f %	Past 2-3 years f %	Past4+ years f %	No Response f %	Total
1. When were you LINC trained?	63	38(60.3%)	0(0.0%)	8(12.7%)	13(20.6%)	4(6.3%)	100%
2. When were you HBB trained	63	17(27%)	21(33.3%)	19(30.2%)	4(6.3%)	2(3.2)	100%
3. When were you ESMOE trained?	63	32(50.8%)	20(31.7%)	4(6.3%)	3(4.8)%	4(6.3%)	100%

Table 4.5 indicates that 21(33.3%) of the respondents were LINC trained in the past 2-3 years, and past 4+ years, representing 8(12.7%) and 13(20.6%), respectively. Regarding HBB training 44 (69.8%) were trained the past 1 year 21(33.3%); past 2-3 years 19(30.3%) and past 4+ years 4(6.3%). With regard to ESMOE training 27(42.2%) of respondents were trained the past 1 year 20 (31.7%) the past 2-3 4(6.3%) and the past 4+ years 3(4.8%).

4.2.4 Section D: Workload

4.2.4.1 Workload of the Registered Midwives in Mankweng-Polokwane Complex

Table 4.6: Workload of the Registered Midwives in Mankweng-Polokwane Complex

Mankweng-Polokwane Registered Midwives							
Item	n	S. Agree f %	Agree f %	Disagree f %	S. Disagree f %	No response f %	Total
1. Working conditions are good	63	4(6.3)%	16(25.4%)	19(30.2%)	23(36.5%)	2(3.2%)	100%
2. Doctors are enough	63	11(17.5%)	20(31.7%)	19(30.7%)	11(17.5%)	2(3.2%)	100%
3. Registered midwives are enough	63	4(6.3)%	9(14.3%)	20(31.7%)	28(44.4%)	2(3.2%)	100%
4.Workload is manageable	63	6(9.5)%	19(30.2%)	18(28.6%)	18(28.6%)	2(3.2%)	100%

5. Shortage of staff presently	63	34(54.0%)	14(22.2%)	4(6.3)%	9(14.3%)	2(3.2%)	100%
6. Difficult to cope with workload	63	26(41.3%)	19(30.2%)	11(17.5%)	6(9.6%)	1(1.6%)	100%

Table 4.6 indicates that 42(66.7%) of respondents disagreed that working conditions were not good, and 20(31.7%) agreed, while 2(3.2%) ignored this item. Almost half the respondents 30(48.2%) disagreed that doctors were enough, while 31(49.2%) agreed, and 2(3.2%) did not respond to this item. About 48(76.1%) of the respondents disagreed that registered midwives were enough and 13(20.6%) agreed, while 2(3.2%) ignored this item. Of all the respondents, 36(57.2%) disagreed that workload was manageable, whereas 25(39.7%) agreed, and 2(3.2%) did not respond to this item. The majority of the respondents 48(76.7%) agreed that there was shortage of staff in the unit they were working in, and 13(20.6%) disagreed, while 2(3.2%) ignored this item. The respondents 45(71.4%) agreed that it was difficult to cope with workload in the unit they were allocated in, while 17(27.1%) disagreed, and 1(1.6%) did not respond to this item.

4.2.5 Section E: Main causes for babies to become sick

4.2.5.1 Main causes for babies to become sick

Table 4.7: Main Causes for Babies to Become Sick

	Mankweng-Polokwane Registered midwives							
Item	n	Never f %	Hardly ever f %	Sometimes f %	Often f %	Always f %	No response f %	Total
1.Negligence of nurses	63	25(39.7%)	8(12.7%)	26(41.3%)	2(3.2%)	0(0.0%)	2(3.2%)	100%
2.Unskilled nurses	63	23(36.5%)	11(17.5%)	19(30.2%)	4(6.3%)	5(7.9%)	1(1.6%)	100%
3. Inexperience nurses	63	17(27.0%)	11(17.5%)	21(33.3%)	6(9.5%)	5(7.9%)	3(4.8%)	100%
4.Overcrowding of patients	63	2(3.2%)	3(4.8%)	19(30.2%)	11(17.5%)	26(41.4%)	2(3.2%)	100%
5.Delayed doctors response	63	19(30.2%)	9(14.3%)	19(30.2%)	10(15.9%)	2(3.2%)	4(6.3%)	100%
6.Long waiting periods for caesarean section	63	7(11.1%)	10(15.9%)	20(31.7%)	14(22.2%)	7(11.1%)	5(7.9%)	100%

7.Long waiting periods for babies operation	63	14(22.2%)	5(7.9%))	18(28.6%)	11(17.5%)	9(14.3%)	6(9.5%)	100%
8.Poor staff orientation	63	22(34.9%)	11(17.5%)	13(20.6%)	9(14.3%)	4(6.3%)	4(6.3%)	100%
9.Work overload of staff	63	3(4.8%)	1(1.6%)	12(19.0%)	17(27.0%)	28(44.4%)	2(3.2%)	100%
10.Shortage of staff	63	3(4.8%)	1(1.6%)	8(12.7%)	20(31.7%)	30(47.6%)	1(1.6%)	100%
11.Lack of medication	63	11(17.5%)	7(11.1%)	26(41.3%)	10(15.9%)	7(11.1%)	2(3.2%)	100%
12.Lack of equipment and supplies	63	7(11.1%)	1(1.6%)	19(30.2%)	18(28.6%)	15(23.8%)	3(4.8%)	100%

Table 4.7 reveals that 2(3.2%) of the respondents indicated that overcrowding never contributed to high perinatal morbidity rates, 3(4.8%) indicated that it hardly ever contributed, 19(30.2%) responded that it sometimes contributed, 11(17.5%) stated that it often contributed and 26(41.3%) indicated it always contributed, while 2(3.2%) ignored this item. Of the respondents, 7(11.1) indicated that long waiting periods for caesarean section never contributed to high perinatal morbidity rates, 10(15.9%) indicated that it hardly ever contributed, 20(301.7%) stated that it sometimes contributed, 14(22.2%) showed it often contributed, 7(11.1%) indicated that it contributed always, and 5(7.9%) did not respond to this item. Of the respondents, 14(22.2%) stated that long waiting periods for babies operation contributed to babies becoming sick, 5(7.9%) indicated it hardly ever contributed, 18(28.6%) responded that it sometimes contributed, 11(17.5%) stated that it often contributed, 9(14.3%) indicated that it contributed always, and 6(9.5%) ignored this item.

The respondents 3(4.8%) indicated workload never contributed to high perinatal morbidity rates, only 1(1.6%) responded that it hardly contributed, 12(19.0%) indicated that it sometimes contributed, 17(27.0%) stated that it often contributed, 28(44.4%) indicated it always contributed. Of the respondents, 3(4.8%) responded that shortage of staff never contributed to high perinatal morbidity rates, 1(1.6%) indicated that it hardly ever contributed, 8(12.7%) stated that it sometimes contributed, 20(31.7%) indicated it often contributed, 30(47.6%) showed that it always contributed, and only 1(1.6%) did not respond to this item. According to, 7(11.1%) of the respondents, lack of equipment and supplies never contributed to high perinatal rates morbidity, only

1(1.6%) stated that it hardly ever contributed, 19(30.2%) responded that it contributed sometimes, 18(28.6%) indicated that it often contributed, 15(23.8%) stated it contributed always.

4.2.5.1 Main causes for babies to become sick

Continuation of Table 4.7 Main causes for babies to become sick

Item	Mankweng-Polokwane Registered midwives							
	n	Never f %	Hardly ever f %	Sometimes f %	Often f %	Always f %	No Response f(%)	Total
13. Congenital anomalies	63	3(4.8%)	2(3.2%)	35(55.6%)	8(12.7%)	13(20.6%)	2(3.2%)	100%
14. Birth asphyxia	63	2(3.2%)	4(6.3%)	33(52.4%)	13(20.6%)	7(11.1%)	4(6.3%)	100%
15. Aspiration	63	15(23.8%)	13(20.6%)	27(42.9%)	4(6.3%)	3(4.8%)	1(1.6%)	100%
16. Prematurity	63	1(1.6%)	3(4.8%)	12(19.0%)	21(33.3%)	25(39.7%)	1(1.6%)	100%
17. Neonatal Sepsis	63	7(11.1%)	9(14.3%)	20(31.7%)	11(17.5%)	14(22.2%)	2(3.2%)	100%
18.Gastro-intestinal diseases e.g. Necrotizing enterocolitis	63	15(23.8%)	9(14.3%)	21(33.3%)	14(22.2%)	2(3.2%)	2(3.2%)	100%
19.Cardiac diseases of the newborn	63	13(20.6%)	10(15.9%)	29(46.0%)	6(9.5%)	3(4.8%)	2(3.2%)	100%
20.Metalic diseases e.g. hypoglycaemia of the baby	63	11(17.5%)	11(17.5%)	28(44.4%)	11(17.5%)	1(1.6%)	1(1.6%)	100%
21.Hypothermia	63	13(20.6%)	13(20.6%)	24(38.1%)	11(17.5%)	0(0.0%)	2(3.2%)	100%
22.Labour complications e.g. Shoulder dystocia	63	8(12.7%)	23(36.5%)	24(38.1%)	6(9.5%)	1(1.6%)	1(1.6%)	100%
23. Obstetric emergencies	63	6(9.5%)	7(11.1%)	27(42.9%)	11(17.5%)	6(9.5%)	6(9.5%)	100%
24.Other-specify	63	0(0.0%)	0(0.0%)	3(4.8%)	1(1.6%)	1(1.6%)	58(92.0%)	100%

Of the respondents, 3(4.8%) responded that congenital anomalies never contributed to high perinatal morbidity rates, 2(3.2%) indicated that it hardly ever contributed,

35(55.6%) stated that it sometimes contributed, 8(12.7%) stated that it often contributed, 13(20.6%) indicated that it contributed always, and 2(3.2%) did not respond to this item. Of the respondents, 2(3.2%) indicated that perinatal asphyxia never contributed to high perinatal morbidity rates, 4(6.3%) responded that it hardly ever contributed, 33(52.4%) indicated that it sometimes contributed, 13(20.6%) stated that it often contributed, 7(11.1%) responded that it contributed always, and 4(6.3%) ignored this item. Only 1(1.6%) indicated that prematurity never contributed to high perinatal morbidity rates, 3(4.8%) stated that it hardly ever contributed, 12(19.0%) indicated that it sometimes contributed, 21(33.3%) responded that it often contributed, 25(39.7%) indicated that it contributed always, and only 1(1.6%) did not respond to this item. About 7(11.1%) indicated that neonatal sepsis never contributed to high perinatal morbidity rates, 9(14.3%) stated that it hardly ever contributed, 20(31.7%) responded that it sometimes contributed, 11(17.5%) stated that is often contributed, 14(22.2%) indicated that it contributed always, and 2(3.2%) ignored this item.

4.2.6 Section F: Availability of Equipment and Supplies

4.2.6.1 Availability of Equipment and Supplies

Table 4.8: Availability of Equipment and Supplies

Item	Mankweng-Polokwane Registered midwives							
	n	Never f %	Hardly ever f %	Sometimes f %	Often f %	Always f %	No Response f %	Total
1. Stethoscope	63	12(19.0%)	4(6.3%)	13(20.6%)	9(14.3%)	20(31.7%)	5(7.9%)	100%
2. Fetoscope	63	10(15.9%)	5(7.9%)	8(12.7%)	7(11.1%)	29(31.7%)	4(6.3%)	100%
3. Cardiotocograph machine	63	9(14.3%)	1(1.6%)	14(22.2%)	11(17.5%)	23(36.5%)	5(7.9%)	100%
4. Mechanical ventilator	63	14(22.2%)	2(3.2%)	9(14.3%)	5(7.9%)	26(41.3%)	7(11.1%)	100%
5. Nasal Continuous Positive Airway Pressure	63	16(25.4%)	2(3.2%)	9(14.3%)	10(15.9%)	18(28.6%)	8(12.7%)	100%
6. Non Stress Test	63	15(23.8%)	4(6.3%)	19(30.2%)	6(9.5%)	15(23.9%)	6(9.5%)	100%
7. Pulse oximeter	63	4(6.3%)	3(4.8%)	11(17.5%)	6(9.5%)	34(54.0%)	4(6.3%)	100%
8. Blood gas machine	63	21(33.3%)	9(14.3%)	11(17.5%)	7(11.1%)	12(19.0%)	3(4.8%)	100%
9. Ultrasound machine	63	7(11.1%)	3(4.8%)	8(12.7%)	9(14.3%)	33(52.4%)	3(4.8%)	100%
10. Infusion pumps machines	63	3(4.8%)	3(4.8%)	8(12.7%)	9(14.3%)	36(57.1%)	4(6.3%)	100%
11. Glucose meter	63	3(4.8%)	4(6.3%)	6(9.5%)	13(20.6%)	33(52.4%)	4(6.3%)	100%
12. Haemoglobin meter	63	11(17.5%)	7(11.1%)	10(15.9%)	10(15.9%)	20(31.7%)	5(7.9%)	100%

13. Vaginal examination packs	63	11(17.5%)	4(6.3%)	6(9.5%)	10(15.9%)	28(44.4%)	4(6.3%)	100%
14. Basic packs	63	7(11.1%)	2(3.2%)	10(15.9%)	8(12.7%)	32(50.8%)	4(6.3%)	100%
15.Stitch packs	63	5(7.9%)	4(6.3%)	10(15.9%)	9(14.3%)	30(47.6%)	5(7.9%)	100%
16.Delivery packs	63	9(14.3%)	1(1.6%)	6(9.5%)	5(7.9%)	37(58.7%)	5(7.9%)	100%

Table 4.8 shows the responses on the availability of equipment and supplies in the units. Never, hardly ever and sometimes were regarded as negative responses, while often and always were regarded as positive responses. Of the respondents, 12(19.0%) indicated that stethoscopes were never available, 4(6.3%) stated that they were hardly ever available, 13(20.6%) responded that they were sometimes available, 9(14.3%) indicated they were often available, 20(31.7%) stated that they were always available, and 5(7.9%) ignored this item. About 10(15.9%) indicated that Fetoscopes were never available, 5(7.9%) stated that they were hardly ever available, 8(12.7%) indicated they were available sometimes, 7(11.1%) responded that they were often available, 29(46.0%) stated that they were always available, and 4(6.3%) did not respond to this item.

Of the respondents, 9(14.3%) indicated that Cardiotocograph machines were never available, only 1(1.6%) stated that they were hardly ever available, 14(22.2%) indicated they were available sometimes, 11(17.5%) responded that they were often available, 23(36.5%) stated that they were always available, and 5(7.9%) ignored this item. About 14(22.2%) of the respondents indicated that mechanical ventilators were never available, 2(3.2%) indicated they were hardly ever available, 9(14.3%) stated that they were available sometimes, 5(7.9%) responded that they were often available, 26(41.3%) indicated that they were always available, and 7 ignored this item.

Of the respondents, 15(23.8%) responded that Non stress test machines were never available, 4(6.3%) indicated they were hardly ever available, 19(30.2%) stated that they were sometimes available, 6(9.5%) indicated that they were often available, 15(23.9%) responded that they were always available, and 4(6.3%) did not respond to this item. About 21(33.3%) indicated that blood gas machine was never available, 9(14.3%) stated that it was hardly ever available, 11(17.5%) responded that it was sometimes available, 7(11.1%) indicated that it was often available, 12(19.0%) stated that it was always available, while 3(4.8%) ignored this item. Of the respondents,

11(17.5%) indicated that haemoglobin meter was never available, 7(11.1%) stated that it was hardly ever available, 10(15.9%) responded that it was sometimes available, 10(15.9%) showed it was often available, 20(31.7%) indicated that it was always available, and 5(7.9%) did not respond to this item.

4.2.6.1 Availability of Equipment and Supplies

Continuation of Table 4.8 Availability of Equipment and Supplies

	Mankweng-Polokwane Registered midwives							
Item	n	Never f (%)	Hardly ever f (%)	Sometimes f (%)	Often f (%)	Always f (%)	No Response	Total
1. Cribs	63	6(9.5%)	1(1.6%)	5(7.9%)	9(14.3%)	38(60.3%)	4(6.3%)	100 %
2. Incubators	63	3(4.8%)	1(1.6%)	7(11.1%)	11(17.5%)	35(55.6%)	6(9.5%)	100 %
3.Suction apparatus	63	1(1.6%)	3(4.8%)	10(15.9%)	8(12.7%)	37(58.7%)	4(6.3%)	100 %
4.Phototherapy lamps	63	8(12.7%)	1(1.6%)	9(14.3%)	10(15.9%)	30(47.6%)	5(7.9%)	100 %
5. Portable oxygen cylinder	63	2(3.2%)	2(3.2%)	9(14.3%)	11(17.5%)	34(54.0%)	5(7.9%)	100 %
6.Laryngoscopes blades	63	2(3.2%)	1(1.6%)	5(7.9%)	11(17.5%)	41(65.1%)	3(4.8%)	100 %
7.Laryngoscope handle	63	1(1.6%)	1(1.56	7(11.1%)	10(15.9%)	41(65.1%)	3(4.8%)	100 %
8. Batteries	63	2(3.2%)	1(1.6%)	17(27.0%)	12(19.0%)	26(41.3%)	5(7.9%)	100 %
9.Oxygen cylinders	63	3(4.8%)	1(1.6%)	9(14.3%)	12(19.0%)	35(55.6%)	3(4.8%)	100 %
10. Neo-puffs	63	12(19.0%)	1(1.6%)	10(15.9%)	7(11.1%)	30(47.6%)	3(4.8%)	100 %
11.Ambu-bags	63	6(9.5%)	2(3.2%)	7(11.1%)	6(9.5%)	39(61.9%)	3(4.8%)	100 %

About 8(12.7%) indicated that phototherapy lamps were never available, only 1(1.6%) stated that they were hardly ever available, 9(14.3%) responded that they were sometimes available, 10(15.9%) indicated that they were often available, 30(47.6%) stated that that they were always available, while 5(7.9%) ignored this item. Of the respondents, 2(3.2%) indicated that batteries were never available, only 1(1.6%)

responded that they were hardly ever available, 17(27.0%) indicated that they were sometimes available, 12(19.0%) stated that they were often available, 26(41.3%) indicated that they were always available, and 5(7.9%) did not respond to this item. About 12(19.0%) responded that neo-puffs were never available, only 1(1.6%) indicated that they were hardly ever available, 10(15.9%) stated that they were sometimes available, 7(11.1%) responded that they were often available, 30(47.6%) indicated that they were always available, and 3(4.8%) ignored this item.

4.2.7 Section G: Availability of Material Resources

4.2.7.1 Availability of Material Resources

Table 4.9: Availability of Material Resources

Item	Mankweng-Polokwane Registered midwives							
	n	Never f(%)	Hardly ever f(%)	Sometimes f(%)	Often f(%)	Always f(%)	No Response	Total
1.Linen	63	2(3.2%)	6(9.5%)	25(39.7%)	14(22.2%)	13(20.6%)	3(4.8%)	100%
2.Urine dipsticks	63	1(1.6%)	3(4.8%)	16(25.4%)	11(17.5%)	29(46.0%)	3(4.8%)	100%
3.Blood glucose sticks	63	0(0.0%)	2(3.2%)	15(23.8%)	20(31.7%)	23(36.5%)	3(4.8%)	100%
4.Blood glucose-meter	63	1(1.6%)	2(3.2%)	11(17.5%)	15(23.8%)	31(49.2%)	3(4.8%)	100%
5.Suction catheters	63	2(3.2%)	1(1.6%)	10(15.9%)	10(15.9%)	37(58.7%)	3(4.8%)	100%
6.Closed suctioning catheters	63	5(7.9%)	3(4.8%)	8(12.7%)	14(22.2%)	26(41.3%)	7(11.1%)	100%
7. Endo tracheal tubes	63	2(3.2%)	0(0.0%)	14(22.2%)	16(25.4%)	26(41.3%)	5(7.9%)	100%
8.Cord clamps	63	2(3.2%)	1(1.6%)	10(15.9%)	14(22.2%)	33(52.4%)	3(4.8%)	100%
9. Syringes	63	1(1.6%)	1(1.6%)	7(11.1%)	9(14.3%)	42(66.7 %)	3(4.8%)	100%
10.Ward Hb meters	63	8(12.7%)	7(11.1%)	14(22.2%)	8(12.7%)	23(36.5%)	3(4.8%)	100%

Table 4.9 indicates that linen was never available according to 2(3.2%) of the respondents, 6(9.5%) stated that it was hardly ever available, 25(39.7%) indicated that it was sometimes available, 14(22.2%) responded that it was often available, 13(20.6%) stated that it was always available, and 3(4.8%) ignored this item. Only

1(1.6%) of the respondents indicated that urine sticks were never available, 3(4.8%) responded that urine sticks were hardly ever available, 16(25.4%) stated that urine sticks were sometimes available, 11(17.5%) responded that urine sticks were often available, 29(46.0%) indicated that urine sticks were always available, and 3(4.8%) did not respond to this item. About 8(12.7%) of the respondents indicated that ward Hb meters were never available, 7(11.1%) responded that they were hardly ever available, 14(22.2%) indicated that they were sometimes available, 8(12.7%) stated that they were often available, 23(36.5%) responded that they were always available, and 3(4.8%) ignored this item.

4.2.8 Section H: Infection Prevention and Control in Your Unit

4.2.8.1 Infection Prevention and Control in Your Unit

Table 4.10: Infection Prevention and Control in Your Unit

Item	Registered midwives							
	n	Never f (%)	Hardly ever f (%)	Sometimes f (%)	Often f (%)	Always f (%)	No Response	Total
1.Antiseptic hand scrub	63	0(0.0%)	0(0.0%)	11(17.5%)	12(19.0%)	38(60.3%)	2(3.2%)	100%
2. Hand soap available	63	2(3.2%)	3(4.8%)	10(15.9%)	11(17.5%)	35(55.6%)	3(4.8%)	100%
3. Hand towels available	63	0(0.0%)	4(6.3%)	25(39.7%)	13(20.6%)	19(30.2%)	2(3.2%)	100%
4.Alcohol swabs available	63	0(0.0%)	0(0.0%)	17(27.0%)	12(19.0%)	29(46.0%)	5(7.9%)	100%
5. Mothers &visitors comply on hand washing	63	4(6.3%)	4(6.3%)	16(25.4%)	9(14.3%)	26(41.3%)	4(6.3%)	100%
6.Visitors are limited	63	2(3.2%)	5(7.9%)	7(11.1%)	6(9.5%)	39(61.9%)	4(6.3%)	100%
7.Cord care done 3 hourly	63	3(4.8%)	2(3.2%)	12(19.0%)	13(20.6%)	29(46.0%)	4(6.3%)	100%
8.Single use materials are used once and discarded	63	5(7.9%)	1(1.6%)	7(11.1%)	3(4.8%)	43(68.3%)	4(6.3%)	100%
9.I wash hands after touching 2 to 3 patients	63	6(9.5%)	0(0.0%)	9(14.3%)	13(20.6%)	33(52.4%)	2(3.2%)	100%
10. I use antiseptic hand scrub between patients	63	0(0.0%)	0(0.0%)	10(15.9%)	13(20.6%)	38(60.3%)	2(3.2%)	100%
11. Dump dusting is done on daily basis	63	1(1.6%)	4(6.3%)	10(15.9%)	12(19.0%)	32(50.8%)	4(6.3%)	100%
12.Bed linen are changed on daily basis	63	7(11.1%)	1(1.6%)	14(2.2%)	15(23.8%)	24(38.1%)	2(3.2%)	100%
13.Bed linen are chanced only when necessary	63	6(9.5%)	2(3.2%)	16(25.4%)	12(19.0%)	25(39.7%)	2(3.2%)	100%

14.Patients share beds when there are no beds available	63	38(60.3%)	6(9.5%)	7(11.1%)	3(4.8%)	7(11.1%)	2(3.2%)	100%
15.Mothers change the hospital attire on daily basis	63	15(23.8%)	6(9.5%)	16(25.4%)	10(15.9%)	14(22.2%)	2(3.2%)	100%
16.There is overcrowding in the unit where I am working in now	63	11(17.5%)	4(6.3%)	11(17.5%)	8(12.7%)	26(41.3)	3(4.8%)	100%
17. Incubators and cribs are cleaned thoroughly before and after use of	63	3(4.8%)	1(1.6%)	17(27.0%)	16(25.4%)	22(34.9%)	4(6.3%)	100%
18.Laryngoscope blades and mygills forceps are autoclaved after use	63	9(14.3%)	5(7.9%)	17(27.0%)	9(14.3%)	19(30.2%)	4(6.3%)	100%

Table 4.10 reveals that 4(6.3%) of the respondents stated that mothers and visitors never complied with hand washing, 4(6.3%) responded that they hardly ever complied, 16(25.4%) indicated that they sometimes complied, 9(14.3%) stated that they often complied, 26(41.3%) responded that they always complied available, and 2(3.2%) ignored this item. About 3(3.2%) indicated that cord care was never done 3 hourly, 2(3.2%) responded that it was hardly ever done, 12(19.0%) stated that it was sometimes done, 13(20.6%) indicated that it was often done, 29(46.0%) responded that it was always done, 4(6.3%) did not respond to this item. Of the respondents, 15(23.8%) indicated that mothers never changed the hospital attire on daily basis, 6(9.5%) stated that they hardly ever changed attire on daily basis, 16(25.4%) responded that they sometimes changed the attire on daily basis, 10(15.9%) indicated that they often changed the hospital attire on daily basis, 14(22.2%) stated that they always changed hospital attire on daily basis, and 2(3.2%) ignored this item.

About 11(17.5%) indicated that there was never overcrowding in the unit respondents were working in, 4(6.3%) stated that there was hardly ever overcrowding, 11(17.5%) responded that sometimes there was overcrowding, 8(12.7%) indicated that there was often overcrowding, 26(41.3%) stated that there was always overcrowding, and 3(4.8%) did not respond to this item. Of the respondents, 3(4.8%) indicated that incubators and cribs were never cleaned thoroughly before and after use, only 1(1.6%) responded that they were hardly ever cleaned, 17(27.0%) state that they were sometimes cleaned, 16(25.5%) indicated that they were often cleaned, 22(34.9%) responded that there were always cleaned, 4(6.3%) ignored this item. About 11(17.5%) of the respondents stated that laryngoscope blades and mygills forceps were never autoclaved after use, 12(19.0%) indicated they were hardly ever

autoclaved, 9(14.3%) responded that they were sometimes autoclaved, 6(9.5%) indicated they were often autoclaved, 21(33.3%) indicated that they were always autoclaved, and 4(6.3%) did not respond to this item.

4.2.8.2 Infection Prevention and Control in Your Unit

Continuation of Table 4.10 Infection Prevention and Control in Your Unit

	Mankweng-Polokwane Registered midwives							
Item	n	Never f(%)	Hardly ever f(%)	Sometimes f(%)	Often f(%)	Always f(%)	No Response	Total
1.X-ray plates are cleaned before use	63	10(15.9%)	10(15.9%)	10(15.9%)	6(9.5%)	19(30.2%)	8(12.6%)	100%
2.I maintain sterility during invasive procedures	63	0(0.0%)	0(0.0%)	9(14.3%)	9(14.3%)	43(68.3%)	2(3.2%)	100%
3.Patients with infectious diseases are isolated	63	0(0.0%)	1(1.6%)	11(17.5%)	5(7.9%)	43(68.3%)	3(4.8%)	100%
4.Isolation rooms are scrubbed after discharge of patient with infectious disease	63	10(15.9%)	4(6.3%)	9(14.3%)	11(17.5%)	25(39.7%)	4(6.3%)	100%
5.I use alcohol swab to wipe Injection port before administering medication	63	1(1.6%)	0(0.0%)	10(15.9%)	8(12.7%)	42(66.7%)	3(4.8%)	100%
6.I wipe multi use vial top with alcohol swab before withdrawing medication	63	0(0%)	2(3.2%)	11(17.7%)	13(20.6%)	37(58.7%)	0(0%)	100%
7.I change intravenous lines c after every 3 days	63	4(6.3%)	5(7.9%)	22(34.9%)	12(19.0%)	17(27.0%)	3(4.8%)	100%
8. I change nasogastric tubes after every 3 days	63	5(7.9%)	3(4.8%)	22(34.9%)	12(19.0%)	16(25.4%)	5(7.9%)	100%
9.Skin bruises are covered with sterile gauze, secured	63	0(0.0%)	1(1.6%)	7(11.1%)	12(19.0%)	38(60.3%)	5(7.9%)	100%
10.I wear facial mask when I have upper respiratory infections	63	0(0.0%)	1(1.6%)	6(9.5%)	11(17.7%)	43(68.3%)	2(3.2%)	100%
11.I don't go to work when I have upper respiratory infections	63	14(22.2%)	5(7.9%)	26(41.3%)	4(6.3%)	12(19.0%)	2(3.2%)	100%
12.Feeding utensils for babies are soaked in a sterilising solution	63	5(7.9%)	3(4.8%)	13(20.6%)	9(14.3%)	28(44.4%)	5(7.9%)	100%
13.I wash my hands after answering my phone, before touching the patient	63	10(15.9%)	3(4.8%)	19(30.2%)	8(12.7%)	21(33.3%)	2(3.2%)	100%

14.Transport incubators are cleaned before & after patient transporting	63	6(9.5%)	5(7.9%)	13(20.6%)	12(19.0%)	22(34.9%)	5(7.9%)	100%
15.Stretchers are cleaned before & after transporting patients	63	9(14.3%)	5(7.9%)	17(27.0%)	9(14.3%)	19(30.2%)	4(6.3%)	100%
16.Each and every patient have his/her own pulse oximeter probe	63	26(41.3%)	11(17.5%)	11(17.5%)	3(4.8%)	9(14.3%)	3(4.8%)	100%
17.Pulse oximeter probes cleaned between patients	63	8(12.7%)	7(11.1%)	16(25.4%)	9(14.3%)	20(31.7%)	3(4.8%)	100%
18.Each and every patient have his/her own blood pressure cuff	63	34(54%)	6(9.5%)	11(17.5%)	2(3.2%)	7(11.1%)	3(4.8%)	100%

There was equal response rate of the respondents, on the item H19 which indicated that X-ray plates were never cleaned before use, hardly ever and sometimes cleaned, represented by 10(15.9%), 6(9.5%) stated that they were often cleaned, 19(30.2%) responded that they were always cleaned, 8(12.7%) ignored this item. Of the respondents, 10(15.9%) responded that isolation rooms were never scrubbed after discharge of the patient with infectious disease, 4(6.3%) indicated they were hardly ever scrubbed, 9(14.3%) stated that they were sometimes scrubbed, 11(17.5%) responded that they were often scrubbed, 25(39.7%) indicated that they were always scrubbed, and 4(6.3%) did not respond to this item.

About 12(19.0%) indicated that they always went to work when they had upper respiratory infections, 4(6.3%) responded that they often went to work, 26(41.3%) indicated that they sometimes went to work, 5(7.9%) stated that they hardly ever went to work, 14(22.2%) indicated that they never went to work when they have upper respiratory infections, 2(3.2%) ignored this item. Of the respondents, 10(15.9%) indicated that they never washed their hands after answering their phones, before touching the patients, 3(4.8%) responded that they hardly ever wash their hands, 19(30.2%) stated that they sometimes wash their hands, 8(12.7%) indicated that they often wash their hands, 21(33.3%) responded that they always wash their hands, and 2(3.2%) did not respond to this item.

About 6(9.5%) of the respondents indicated that transport incubators were never cleaned before and after transporting patients, 5(7.9%) responded that they were

hardly ever cleaned, 13(20.6%) indicated that they were sometimes cleaned, 12(19.0%) stated that they were often cleaned, 22(34.9%) responded that they were always cleaned, and 5(7.9%) ignored this item. Of the respondents, 9(14.3%) responded that stretchers were never cleaned before and after transporting patients, 5(7.9%) stated that they were hardly ever cleaned, 17(27.0%) indicated that they were sometimes cleaned, 9(14.3%) responded that they were often cleaned, 19(30.2%) indicated that they were always cleaned, and 4(6.3%) did not respond to this item. Of the respondents, 26(41.3%) stated that patients never had their own pulse oximeter probes, 11(17.5%) indicated they hardly ever had, 11(17.5%) responded that they sometimes have, 3(4.8%) stated that they often had, 9(14.3%) indicated that they always had, and 3(4.8%) ignored this item.

About 8(12.7%) of the respondents stated that pulse oximeter probes were cleaned between patients, 7(11.1%) indicated they were hardly ever cleaned, 16(25.4%) responded that they were sometimes cleaned, 9(14.3%) responded that they were often cleaned, 20(31.7%) indicated that they were always cleaned, and 3(4.8%) did not respond to this item. Of the respondents, 34(54%) indicated that patients never had their own blood pressure cuff, 6(9.5%) responded that they hardly ever had, 11(17.5%) stated that they sometimes had, 2(3.2%) indicated that they often had, 7(11.1%) responded that they always had, and 3(4.8%) ignored this item.

4.3 Discussion of Results

- **Socio-Demographic Data**

The results revealed that majority of the older registered midwives were in Mankweng Campus, they have knowledge and skills but they are no longer active. Literature did not reveal this, but it was supported by a study conducted by Voit and Carson (2014) indicated that older midwives had a wealth of experience, but they struggle with the late nights, long shifts and physical strain of delivering and caring for the babies. Mankweng had 100% of female registered midwives and almost all registered midwives in Polokwane Campus were females; because the nursing profession is female dominant, Ngidi (2007) agreed.

Many of the respondents in Polokwane Campus were from urban areas, and in Mankweng Campus were from rural areas. Polokwane Campus is situated in Polokwane city, surrounded by urban areas whereas Mankweng Campus is situated in Mankweng Township surrounded by rural areas. Registered midwives prefer to serve their communities. According to, the Health Promotion Model demographic data is regarded as personal factors which are described as biological, psychological and sociocultural. Moreover biological factor include age and strength, psychological are self-motivation and perceived health status (Pender et al., 2006).

- **Education Training**

Both Mankweng and Polokwane Campuses had an equal percentage of registered midwives with Diploma in Midwifery, and Polokwane Campus had a large number of registered midwives as compared to Mankweng Campus. Diploma in midwifery is funded by the Department of Health in the nursing schools. In Polokwane Campus no registered midwives had a speciality on Neonatal intensive care, in both Mankweng and Polokwane Campuses there were registered midwives with advanced midwifery neonatal nursing science. All of the registered midwives with advanced midwifery were old, young midwives did not have speciality qualifications. This was supported by the Health Promotion Model by Pender et al. (2006) when showing that perceived barriers may influence action directly by blocking that action or indirectly by decreasing any commitment to act.

- **Work Load and Job Satisfaction**

The p-values of (0.43) indicate that, shortage of staff, absenteeism, resignation and bad staff-patient ratio are the factors that contributed to high perinatal morbidity rates. The results reveal that registered midwives were not satisfied with the high percentage of shortage in their units. Warmelink et al. (2015) showed that in Tanzania, perinatal morbidities are problems of public health importance, and have been linked to the shortage of skilled staff. More than half of the respondents indicated that absenteeism

was never high in their units; nevertheless 28.6% of the negative responses could impact quality patient care posing a challenge.

According to, Mudaly (2015) absenteeism in nursing is a concern because it disorganises the work routine, overburden workers that are present, consistently lowering the quality of patient care. Almost half of registered midwives indicated that there were not satisfied with resignation rates in their units, as it results in shortage of staff. Warmelink et al. (2015) noted that job satisfaction plays an important part in any decision to leave the job. Pender et al. (2006) Health Promotion Model states that activity-related affect vary from mild to quite strong and will be cognitively labelled, remembered, and continue to be with thoughts about the particular behaviour. The affect should be considered before the action, during the action and after the action (Pender et al., 2006).

- **In-Service Training**

The results indicate that almost half of the registered midwives were not LINC and ESMOE trained. More than half of the registered midwives from Polokwane Campus were HBB trained and the few in Mankweng Campus. The provision of skilled birth attendants is another intervention that can reduce perinatal morbidities in developing countries Ganatra & Zaidi (2010) supported. Close to half of the respondents who were trained the past year were older ones. Respondents who were trained in the past 2 to 3 years, majority were the older midwives whereas the newer midwives were few.

Limited number of respondents were trained the past 4+ years and almost all were older. This shows that the management concentrates more on training older midwives than newer ones. Voit and Carson (2014) agree that older midwives are able to mentor and support newer, younger midwives, but they won't be around in the Maternity and Neonatal Units forever. The Health promotion Model by Pender et al. (2006) indicates that perceived self-efficacy, or one's judgement of one's ability to carry out an identified action, relates not to a person's skills but to that person's judgement about what can be accomplished with those skills.

- **Working Conditions**

The results show that registered midwives were not satisfied with the working conditions. Almost half of the registered midwives indicated that doctors were not enough to cover the unit work. Respondents disagreed that the registered midwives were enough to cover the work on daily basis, very few agreed. Registered midwives 57.2% indicated that they were not capable of managing the workload; this means they were not satisfied with the workload. Mudaly (2015) agree that midwives endured increased workload, resulting in burnout and absenteeism. Registered midwives were not satisfied with the high rates of shortage in their units.

Nigeria is regarded as one of the 57 countries experiencing critical shortage of health workers and one of the 73 countries with severe shortage of midwives. Adegoke et al. (2015) support that there were an inadequate number of midwives to support the perinatal health, with 78% of the countries facing serious shortage in the midwifery workforce, which can result in avoidable perinatal morbidity. Moreover Adegoke et al. (2015) concluded that without significant action to address workload, health system will not be able to render the care required to meet the MDG by the year 2015. Registered midwives showed that it was difficult to cope with the workload in the units allocated in. This was supported by the Health Promotion Model of Pender et al. (2006) which states that situational influences include the options that are perceived as being available, demand characteristics, and environmental features.

- **Neonatal, Maternal and Human Resource Factors**

The t-test yielded p-values of less than 5%(0.05) indicate that, overcrowding of patients, long waiting periods for caesarean sections, long waiting period for babies operation, work overload of staff, shortage of staff, lack of equipment and supplies, congenital anomalies, perinatal asphyxia, prematurity and neonatal sepsis are the factors that contributes to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn district, Limpopo Province, South Africa. This indicates that registered midwives were not satisfied with overcrowding of patients, which overload them with work as well.

Provision of equipment and supplies did not satisfy a large number of registered midwives, also showed that they were not satisfied with the long waiting periods for patients to be attended by doctors. This was supported by Velaphi and Pattison, (2007) when stated that most factors in South Africa are health-system related they include unavailability of health service like equipment. The Health Promotion Model shows that the intention of the health-promoting behaviour is for the client to realize positive health outcomes such as improved quality of perinatal health (Pender et al., 2006).

- **Provision of Equipment and Supplies**

The results reveal that there was lack of equipment and supplies, such as stethoscopes, Fetoscopes, Cardiotocograph machine, Non Stress Test machine, mechanical ventilators, blood gas machines, Hb meters, phototherapy lamps, batteries and neo-puffs. This shows that registered midwives manage the pregnant women with inadequate equipment and supplies, moreover it is expected that quality patient care be delivered. Matlala and van der Westhuizen, (2012) agree that inadequate equipment and supplies hinders provision of quality patient care, high perinatal morbidity results.

- **Provision of Material Resources**

The results show that the following materials were not always available: linen, urine sticks and haemoglobin meter. This shows that registered midwives were not satisfied with provision of material resources. Urine sticks and haemoglobin meter are needed in Maternity and Neonatal Units for quality patient care to be rendered, and reduce high perinatal morbidity. These findings align with the perceived barriers to action in the Health Promotion Model.

- **Prevention and Control of Infection**

The results indicate that the following infection prevention and control measures were not complied with: mothers and visitors did not comply with hand washing, cord care

was not done 3 hourly, mothers did not changed hospital attire on daily basis, there was overcrowding observed by the respondents in the units, poor cleaning of incubators and cribs, lack of autoclaving of laryngoscope blades and mygills forceps, cleaning of X-ray plates before use, inadequate scrubbing of isolation rooms after the discharge of the patients with infectious diseases, poor hand washing after phone answering before touching the patient, lack of cleaning of transport incubators, cleaning of stretchers before and after transporting the patients.

Cleaning of pulse oximeter probes between patients. The Health Promotion Model is a useful guide to perinatal care in relation to assisting the patients in carrying out behaviours (Pender et al., 2006).

4.4 Strategies to Reduce Perinatal Morbidity Rates

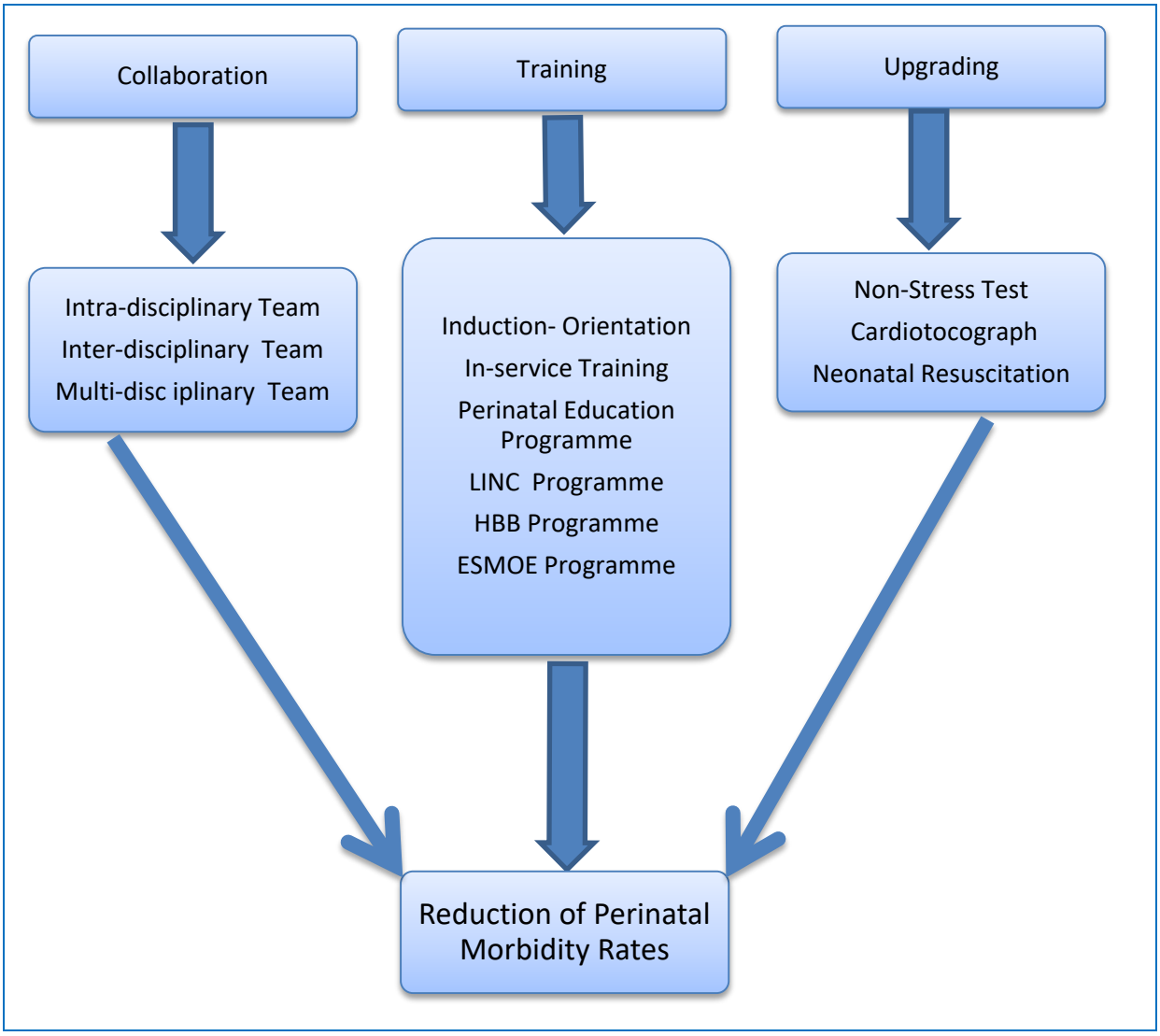

Figure 4.4 Strategies to Reduce Perinatal Morbidity Rates

4.4.1 Collaboration

There should be the collaboration of intra-disciplinary team, inter-disciplinary team and multidisciplinary team.

- **Intra-disciplinary Team**

  - Advanced midwives, midwives and Neonatal ICU trained midwives should be able to work harmoniously and share information within their discipline.
  - Consensus to be reached in forms of referral criteria to Neonatal Intensive Care Unit and Maternity Unit.

- **Inter-disciplinary Team**

  - Inter-disciplinary team integrate knowledge and skills from different discipline. The team should work together to share expertise, knowledge and skills to impact on comprehensive neonatal care. Neonatologists, paediatricians and midwives should work together and share information from their different disciplines.

- **Multi-disciplinary Team**

  - Multi-disciplinary team approach should be ensured in order for enhancement of quality neonatal and maternity care.
  - Paediatricians, obstetricians, neonatologists, midwives and advanced midwives should communicate information and problem solved in a systematic manner among the members, during team meetings.

4.4.2 Training

- Induction of all the newly qualified midwives and professional nurses should be emphasised to keep them abreast.

- Opportunities should be given to all those who want to pursue advanced midwifery and Neonatal Intensive Care Nursing.
  Perinatal Education Programme should be sustained for midwives to have confidence in utilising gained skills.
- LINC, HBB and ESMOE programmes should be attended by all midwives, professional nurses, obstetricians, and neonatologists.

4.4.3 Upgrading

- Non stress test machine and Cardiotocograph should be always available and in a good working condition for monitoring the fetal well-being.
- All midwives and obstetricians should be able to analyse and interpret the test strip for anticipating the outcome of labour.
- All midwives, obstetricians and neonatologist, including intern doctors and student midwives should be competent in resuscitation of the newborn babies.

4.5 Conclusion

This chapter dealt with the results of the research study in relation to the statistical analysis performed using SPSS version 22 with the help of a statistician. Descriptive statistics such as frequencies, percentages, were used for closed-ended questions. In this chapter, analysed data were presented in graphs and tables. Chapter five gives the summary and recommendation.

CHAPTER 5

SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The chapter presents the summary, limitations, recommendations and conclusion of the study. The aim of this study was to determine factors contributing to the high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.

5.2 Achievement of the Objective

Chapter 1 of the study outlined the objective of the study and the researcher managed to achieve the set objective. The objective was to identify factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn district, Limpopo Province, South Africa. This objective was achieved as registered midwives identified factors that contributed to high perinatal morbidity rates in Mankweng-Polokwane Complex.

5.3 Summary

The descriptive cross-sectional quantitative method was used to determine factors that contributed to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa. The study population included the registered midwives allocated in Labour Unit and NICU of the Mankweng-Polokwane Complex. Simple random sampling was used to ensure that all registered midwives had an equal chance of been included in the study. Respondents were randomly selected from the duty roasters of both Labour Unit and NICU.

Questionnaires were used to collect data from the registered midwives allocated in Labour Unit and NICU. Data were collected by the researcher with the aid of the contact person to ensure privacy and confidentiality and avoid bias. Analysis and interpretation of data were presented in frequency tables and graphs. The findings

were congenital anomalies, perinatal asphyxia, prematurity and neonatal sepsis, absenteeism, resignation, delayed doctor's response, long waiting periods for caesarean section and long waiting periods for babies operations, shortage of staff, overcrowding of patients and workload, working environment which were not good.

5.4 Limitation of the Study

The study was conducted at the Mankweng-Polokwane Complex in the Capricorn District, Limpopo Province. Therefore, the findings of the study cannot be generalized to other public hospitals situated in Limpopo Province. The implications of the research may not be applicable to registered midwives working in other units of the Mankweng-Polokwane Campuses.

5.5 Recommendations

Recommendations are arranged according to the points based on the results presented in chapter 4. The study revealed that there are still many gaps existing, which needs to be closed.

5.5.1 NICU Practice

- All registered midwives working in Neonatal Unit should attend perinatal morbidity review and audit meetings. Audit process should also highlight good outcomes, particularly where a situation has an unexpectedly good outcome. This will improve the moral of the health care professionals which will lead to improvements in providing quality patient care.
- Perinatal morbidities to be well recorded in perinatal and hospital morbidity data collection.

5.5.2 Midwifery Practice

- All midwives should utilize the Partograph effectively and efficiently when monitoring pregnant women in labour.

- Midwives should be encouraged to attend the perinatal review meetings in order to share information.

5.5.3 Education Training

- The training institutions and hospitals should include the importance of perinatal audit in undergraduate and postgraduate education programme for health workers of all disciplines.
- Strengthening of short courses and workshops for enhancement of their knowledge and skills.

5.5.4 Policy Makers

- Developing; reviewing and updating of policies, guidelines and protocols that enable health professionals to upgrade their skills.

5.5.5 Research

- Further research to be conducted on factors contributing to high perinatal morbidity rate that can investigate the larger scale so that results can be generalized.
- Research on the study in which neonates records and Partograph must be utilized.

5.5. Conclusion

High perinatal morbidity rates remain and are still a burden to many countries. In this study, it was found that most of the registered midwives regarded shortage of staff, work overload, and prematurity as the leading causes of high perinatal morbidity. From the results of the analysis of collected data, outstanding variables are, namely, shortage of staff, workload, overcrowding of patients. The study showed that high perinatal morbidity rates are still a burden to many countries worldwide.

REFERENCES

Abramovici, A., Cantu, J & Jenkins, S.M. 2012. Tocolytic therapy for acute preterm labour. *Obstetrics and Gynaecology Clinics of North America,* 39(1): 25-33.

Adam, G.K., Elhassan, E.M., Amhed, M.A & Adam, I. 2009. Maternal and perinatal outcomes in teenage pregnancies in Sudan. *International Journal of Gynaecology and Obstetrics,* 105(2): 170-171.

Adegoke, A.A., Atiyaye, F.B., Abubakar, A.S., Auta, A & Aboda, A. 2015. Job satisfaction and retention of midwives in rural Nigeria. *Midwifery,* 32(10): 946-956.

Ananth, C.V & Friedman, A.M. 2014. Ischemic placental disease and risks of perinatal morbidity and mortality and neurodevelopmental outcomes. *Seminars in Perinatology*, 38(3): 151-158.

Avenant, T. 2009. Neonatal near miss: a measure of the quality of obstetric care. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 23(3): 369-374.

Babbie, E & Mouton, J. 2011. *The Practice of Social Research*, South African edition. South Africa: Juta.

Blickstein, I. 2013. Single foetal death in twin gestation. *Diagnostico Prenatal,* 41(1): 65-69.

Botma, Y., Greeff, M., Mulaudzi, F.M & Wright, S.C.D. 2010. *Research in Health Sciences,* 1st edition. South Africa: Heinemann.

Boulch, B. 2006. Aid distribution and the MDGs. *World Development*, 34(6), 933-950.

Bricker, L. 2014. Optimal antenatal care for twin and triplet pregnancy: the evidence based. *Best Practice and Research Clinical Obstetrics and Gynaecology*, 28(2): 305-317.

Brink, H., van der Walt C & van Rensburg, G. 2011. *Fundamentals of Research Methodology for Health Professionals*, 2nd edition. Cape Town: Juta.

Burns, N & Grove, S.K. 2011. *The Practice of Nursing Research,* 6th edition. Philadelphia: Saunders.

Cardosi, J. 2009. Intrauterine growth restriction: new standards for assessing adverse outcome. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 23(6): 741-749.

Carolan, M & Frankowska, D. 2011. Advance maternal age and adverse perinatal outcome. *Midwifery,* 27 (6): 793-801.

Chantrapanichkul, P. 2013. Adverse Pregnancy outcomes in cases involving extremely young maternal age. *International Journal of Gynaecology and Obstetrics,* 120(2): 160-164.

Chirayath, H.H. 2006. Diabetes in pregnancy. *Reviews in Gynaecological and perinatal practice*, 6(1-2): 106-114.

Cleary, K.L & Contantine, M .2014. Challenges of studying drugs in pregnancy for off-label indications. Pravastatin for pre-eclampsia prevention*. Seminar in perinatology,* 38(8): 523-527.

Cloke, B & Pasupathy, D. (2013). Understanding perinatal mortality*. Obstetrics, Gynaecology and Reproductive Medicine,* 23 (11), 323-330.

Conde-Agudelo, A., Beliza, J.M & Lammers, C. 2005. Maternal-Perinatal morbidity and mortality associated with adolescent pregnancy in Latin America*. Ame*rican *Journal of Obstetrics and Gynaecology,* 192(2): 342-349.

Cooke, A., Mills, T.A & Lavender, T. 2012. Advance Maternal age: Delayed childbearing is rarely a conscious choice: A qualitative study of women's views and experiences. *International Journal of Nursing Studies*, 49(1): 30-39.

Cyamfi-Bannerman, C. 2011. The Scope of the Problem: The epidemiology of late preterm and early-term birth. *Seminar in Perinatology,* 35 (5): 246-248.

Dadd, J.M & Crowther, C.A. 2008. Evidence-based care of women with a multiple pregnancy. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 19(1): 131-153.

Davidge, R. 2013. Neonatal experience learning site and outreach program in Kwazulu-Natal. *Journal of Neonatal Nursing,* 19 (3): 94-103.

Deadelszen, P., Ansermino, J.M., Dumont, G., Hofmeyr, G.J., Magee, L.A., Mathai, M., Sawchuck, D., Teela, K., Donnay, F & Roberts, J.M. 2012. Improving maternal and perinatal outcomes in the hypertensive disorders of pregnancy. *International Journal of Gynaecology and Obstetrics*, 119 (Supplement 1): S30–S34.

Devjee, J., Moodley J & Singh, M. 2006. Syphilis in Pregnancy- prevalence at different level of health care in Durban. Scientific letter. *South African Medical Journal,* 96(11): 1182-1184.

De Vos, A.S., Strydom, H., Fouche, C.B & Delport, C.S.L. 2011*. Research at Grass Roots for the Social and Human Service Professions*. 4th edition. Cape Town: Van Schaik publishers.

Diehl, W., Diemert, A & Hecher, K. 2014. Twin-twin transfusion syndrome: Treatment and outcome. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 28(2): 227-238.

Du Plessis, J.H & Chauke, H.L. 2008. Management of intra uterine growth restriction: review article. *Obstetrics and Gynaecology Forum,* 18(2): 47-50.

Engle, W.A. 2011. Morbidity and mortality in late preterm and early term new-borns. *Clinics in Perinatology*, 38 (3): 493-516.

Engmann, C., Matendo, R., Kinoshita, R., Ditekemena, J., Moore, J., Goldenberg, R.L., Tshefu, A., Carlo, W.A., McClure, E.M., Bose, C & Wright, L.L. 2009. Stillbirth and early neonatal mortality in rural central Africa. *International Journal of Gynaecology and Obstetrics,* 105(2): 112-117.

Evi, V.G., Antonia, W.D.G., Johan, S.H., Vles, S.D., Boris, W.B., Eveline, S & Pilar, M. 2013. The effect of foetal and perinatal asphyxia on neuronal cytokine level and ceramide metabolism in adulthood. *Journal of Neuroimmunology,* 225 (1-2): 97-101.

Fergus, P.M & Louise, C.K. 2009. Hypertension in pregnancy. *Obstetrics, Gynaecology & Reproductive Medicine,* 19(5): 135-141.

Figueras, F & Cardosi, J. 2011. Intrauterine growth restriction: New concept in antenatal surveillance, diagnosis, and management. *American Journal of Obstetrics and Gynaecology*, 204(4): 288-300.

Firoz, T., Sanghvi, H., Merialdi, M & Deadelszen, P.V. 2011. Pre-eclampsia in low and middle income countries. *Best Practice & Research Clinical Obstetrics and Gynaecology,* 25 (4): 537-548.

Fung, G.P.G., Chan, L.M., Ho, Y.C., To, WK., Chan, H.B & Lao, T.T. 2014. Does gestational diabetes mellitus affect respiratory outcome in late-preterm infants. *Early Human Development*, 90(9): 527-530.

Ganatra, H.A & Zaidi, A.K.M. 2010. Neonatal Infections in the developing world. *Seminars in Perinatology*, 34 (6): 416 – 425.

Goodman, M & Moule, P. 2014. *Nursing research - An Introduction*. 2nd edition. SAGE publications.

Goonewardene, M., Shehata, M & Hamad, A. 2012. Anaemia in pregnancy. *Best Practice & Research Clinical Obstetrics and Gynaecology,* 26(1): 3-24.

Gonzales, G.F., Tapia, V., Gasco, M., Carrillo, C.E & Fort, A.L. 2012. Association of haemoglobin values at booking with adverse maternal outcomes among Peruvian population living at different altitudes*. International Journal of Gynaecology and Obstetrics*, 117(2): 134-139.

Grisaru-Granovsky, S., Reichman, B., Lerner- Geva, L., Boyko V., Hammerman, C., Samueloff, A & Schimmel, M.S. 2012. Mortality and morbidity in preterm small for gestational age infants: A population-based study. *American Journal of Obstetrics and Gynaecology,* 206(2): 150e1-150e7.

Griveli, R., Dodd, J & Robinson, J. 2009. The prevention and treatment of intrauterine growth restriction. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 23(6): 795-807.

Gupta, N., Kiron, U & Bhal, K.2008. Teenage pregnancies: Obstetric characteristics and outcomes*. European Journal of Obstetrics and Gynaecology and Reproductive Biology,* 137(2): 165-171.

Hack, K.E.A., Nikkels, P.G.J., Koopman-Esseboom, C., Derks, J.B., Elias, S.G., van Gemert, M.J.C & Visser, G.H.A. 2008. Placental characteristics of monochorionic diamniotic twin pregnancies in relation to perinatal outcome. *Placenta*, 30(1): 62-65.

Harrison, V. 2008. *The New-born Baby.* 5th edition. South Africa: Juta & Company.

Haug, N.A., Duffy, M & McCaul, M.E. 2014. Substance abuse treatment services for pregnant women: Psychosocial and behavioural approaches. *Obstetrics and Gynaecology Clinics of North America,* 41(2): 267-296.

Hawdon, J.M. 2011. Babies born after diabetes in pregnancy: What are the short and long-term risks and how can we minimise them? *Best Practice and Research Clinical Obstetrics and Gynaecology,* 25(1): 91-104.

Hernandez-Rivas, E., Flores-Le Roux, J.A., Benaiges, D., Sagarra, E., Chillaron, J.J., Paya, A., Pulg-de-Dou, J., Goday, A., Lopez-Vilchez, M.A & Pedro-Botet, J. 2013. Gestational diabetes in a multi-ethnic population of Spain: Clinical characteristics and perinatal outcomes. *Diabetes Research and Clinical Practice*, 100(2): 215-221.

Higgins, R.D., Raju, T., Edwards, A.D., Azzopardi, D.V., Bose, C.L., Clark, R.H., Guillet, R., Gunn, A.J., Hagberg, H., Hirtz, D., Inder, T.E., Jacobs, S.E., Jenkins, D., Juul, S., Laptook, AR., Lucey, J.F., Maze, M., Palmer, C., Pfister, R.H., Robertson, N.J., Rutherford, M & Shankaran, S. 2011. Hypothermia and other treatment options for neonatal encephalopathy: An executive summary of the Eunice Kennedy Shriver NICHD workshop. *The Journal of Paediatrics,* 159(5): 851-858 e1.

Hlimi, T. 2015. Association of anaemia, pre-eclampsia and eclampsia with seasonality: A realist systematic review, *Health Place*, 31(1): 180-192.

Host, D & Garnier, Y. 2008. Preterm birth and inflammation – The role of genetic polymorphisms. *European Journal of Obstetrics and Gynaecology and Reproductive Biology,* 141(1): 3-9.

Hoque, M., Hoque, E & Kader, S.B. 2009. Risk factors for anaemia in pregnancy in rural Kwazulu-Natal South Africa: Implications for health education and health promotion. *South African Family Practice*, 51(1): 68-72.

Hung, T., Hsieh, T., Lo, L., Chiu, T., Hsieh, C & H.SW., J. 2013. Risk factors and perinatal outcomes associated with idiopathic small-for gestational age Taiwanese new-borns. *International Journal of Gynaecology and Obstetrics,* 122(3): 212-215.

Imdad, A & Bhutta, Z. 2013. Nutritional management of the low birth weight/preterm infants in community setting: a perspective from the developing world*. Journal of Paediatrics,* 162(2): s107-s114.

James, S., van Rooyen, D & Strumpher, J. 2010. A model for facilitation of intergenerational reconciliation in teenage pregnancy: A Xhosa perspective. *American Journal of Nursing and Midwifery,* 12(2): 3-13.

Jonge, A., Baron, R., Westerneng, M., Twisk, J & Hutton, E.K. 2013. Severe adverse maternal outcomes among low risk women with planned home versus hospital birth in the Netherlands. *Midwifery,* 29(8): 1011-1018.

Kawaguchi, H., Ishii, K., Yamamoto, R., Hayashi, S & Mitsuda, N. 2013. Perinatal death of triplet pregnancies by chorionicity. *American Journal of Obstetrics and Gynae*cology, 209(1): 36e1 -36e7.

King, J.F & Warren, RA. 2006. Management of suspected acute foetal compromise. *Seminars in Foetal and Neonatal Medicine,* 11 (2): 79-87.

Keskinoglu, P., Bilgic, N., Picakciefe, M., Giray, H., Karakus, N & Gunay, T. 2007. Perinatal outcome and risk factors on Turkish adolescent mothers. *Journal of Paediatrics and Adolescent Gynaecology,* 20(1): 19-24.

Khattab, A.A.A. 2015. Tel index in neonatal respiratory distress and perinatal asphyxia. *The Egyptian Heart Journal,* 67 (3): 243 – 248.

Kudreviciene, A., Bosevicius, A., Lukosewcius, S., Laurynaitiene, J., Marmiene, V., Nedceisliene, I., Buinauskiene, J., Stoniene, D & Tameliene, R. 2014. The value of ultrasonography and Doppler sonography in prognosticating long-term outcomes among full-term new-born with perinatal asphyxia. *Medicina,* 50 (2): 100-110*.*

Laptook, A.R. 2013. Neurologic and metabolic issues in moderately preterm, late preterm and early term infants. *Clinics in Perinatology,* 40(4): 723-738.

Lawn, J.E., Lee, A.C.C., Kinney, M., Sibley, L., Carlo, W.A., Paul, V.K., Pattinson, R & Darmstadt, G.L. 2009. Two million Intrapartum- related Stillbirth and Neonatal deaths: Where, why, and what can be done? *International Journal of Gynaecology and Obstetrics,* 107 (supplemental): S5 – S19.

Lawrence, J.M. 2011. Women with diabetes in pregnancy: different perceptions and expectations. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 25(1): 15-24.

Lee, A.I., & Okam, M.M. 2011. Anaemia in pregnancy*. Haematology/oncology Clinics of North America*, 25(2): 241-259.

Letourneur, A., Freret, T., Roussel, S., Boulouard, M., Divoux, D., Toutain, J., Bernaudin, M., Schumann-Bard, P., Bouet, V & Touzani, O. 2012. Maternal hypertension during pregnancy modifies the response of the immature brain to hypoxia-ischemia: Sequential MRI and behavioural investigations. *Experimental Neurology,* 233(1): 264-272.

Levy, A., Fraser, D., Katz, M., Mazor, M & Sheiner, E. 2005. Maternal anaemia during pregnancy is an independent risk factor for low birth weight and preterm delivery. *European Journal of Obstetrics and Gynaecology,* 122(2): 182-186.

LoBiondo-Wood, G & Haber, J. 2010. *Nursing Research Methods and Critical Appraisals for Evidence-Based Practice.* 7th Edition. St Louis: Mosby Elsevier.

Lopriore, E., Oepkes, D & Walther, F.J. 2011. Neonatal Morbidity in twin-twin transfusion syndrome. *Early Human Development,* 87(9): 595-599.

McCarthy, F.P & Kenny, L.C. 2012. Hypertension in Pregnancy. *Obstetrics, Gynaecology and Reproductive Medicine,* 22 (6): 141-147.

Macdonald, A.P. 2009. Should Preterm labour and Premature Rupture of Membranes be treated with Antibiotics? *Obstetrics and Gynaecology Forum.*19 (2): 43-45.

Marshal, K. 2009. Obstetric management of intrauterine growth restriction. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 26(6): 857-870.

Martinez-Nadal, S., Demestre, X., Raspall, F., Alvarez, J.A., Elizari, C., Vila, C & Sola, P. 2014. Neonatal morbidity in the early-term-new-borns. *Anale de Pediatria* (*English Edition),* 81(1): 39-44.

Marton, T. 2009. Pathological assessment of intrauterine growth restriction. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 23(6): 751-764.

Maryam, A., Kahtani, A.I., Mohammad, A., Mashael, M., Mohamed, A.E., Ashraf, M & Naji, A. 2012. Morbidity and Pregnancy outcomes associated with sickle cell anaemia among Saudi women. *International Journal of Gynaecology and Obstetrics,* 119(3): 224-226.

Matlala & van der Westhuizen. 2012. Factors nursing turnover at four public hospitals within the Limpopo, Sekhukhune district, *Adminisratio (public,* 20(3).

Meur, S & Mann, N.P. 2007. Infant outcome following diabetic pregnancies. *Paediatric and Child Health,* 17(6): 217-222.

Morcel, K., Lavoue, V., Beuchee, A., Le Lannou, D., Pouled, N.P & Plady, R. 2010. Perinatal morbidity and mortality in twin pregnancies with dichorionic placentas following assisted reproductive techniques or ovarian induction alone: a comparative study. *European Journal of Obstetrics and Gynaecology and Reproductive Biology,* 153(2): 138-142.

Mousa, H.A & Laughna, P. 2008. Foetal growth restriction: Investigation and treatment. *Obstetrics, Gynaecology & Reproductive Medicine,* 18(9): 247-252.

Mudaly, 2015. Factors influencing nurse absenteeism in a general hospital in Durban, South Africa. Journal of Nursing Management, 23(5):623-631.

Naljayam, M.V & Karumanchi, S.A. 2013. New developments in pathogenesis of pre-eclampsia. *Advances in Chronic kidney Disease,* 20(3): 265-270.

Neggers, Y.N. 2015. The relationship between preterm birth and underweight in Asian women. *Reproductive Toxicology*. Available online.

Ngidi, D.P. 2007. Students and lectures perceptions of some factors influencing academic success or failure at a historical black university in South Africa. *South African Journal of Higher Education*, 21(4):717-732.

Nyamtema, A.S., Urassa, D.P., Massawe, S., Lindmark, G & Van Roosmalen, J. 2008. Staffing needs for quality perinatal care in Tanzania: Original research article. *African Journal of Reproductive Health*, 12(3): 113-124.

O'Dwyer, V., Burke, G., Unterscheider, J., Daly, S., Geary, M.P., Kennelly, M.M., McAuliffe, F.M., O'Donoghne, K., Hunter, A., Morrison, J.J., Dicker, P., Tully, E.C & Malone, F.D. 2014. Defining the residual risk of adverse perinatal outcome in growth restricted foetuses with normal umbilical artery blood flow. *American Journal of Obstetrics and Gynaecology*, 211 (4): 420.e1 – 420. E5.

Olusanya, B.O. 2010. Intrauterine growth restriction in a low-income country: Risk factors, adverse perinatal outcomes and correlation with current World Health Organization Multicentre Growth Reference. *Early Human Development,* 86(7): 439-444.

Owen, J & Mancuso, M. 2012. Cervical cerclage for the prevention of preterm birth. *Obstetrics and Gynaecology Clinics of North America,* 39(1): 25-33.

Oxford Dictionaries. 2006. *Oxford English Dictionary.* Eleventh edition. New York: Oxford University Press.

Oyelese, Y., Ananth, C.V., Smulian, J.C & Vintzileos, A.M. 2005. Delayed interval delivery in twin pregnancies in the United States: Impact on perinatal morbidity and mortality. *American Journal of Obstetrics and Gynaecology,* 192 (2): 439-444.

Parsons, L.N. 2014. Perinatal complications of maternal diabetes pathobiology of human disease. *A Dynamic Encyclopaedia of Disease Mechanisms,* 211.

Patray, S., Pasrija, S., Trivedi, S.S & Purim, M. 2005. Maternal and perinatal outcome in patients with severe anaemia in pregnancy. *International Journal of Gynaecology and Obstetrics,* 91(2): 164-165.

Payne, B., Magee, L.A & van Dadelszen, P. 2011. Assessment, surveillance and prognosis in the pre-eclampsia. *Best practice and Research clinical Obstetrics and Gynaecology,* 25(4): 449-462.

Pender, N.J., Murdaugh, C.L & Parsons, M.A. 2006. *Health Promotion in Nursing Practice.* 5th edition. Upper Saddle River: Prentice Hall.

Peyter, A.C., Delhaes, F., Baud, D., Vial, Y., Diaceri, G., Menetrey, S., Hohifeld, P & Tolsa, J.F. 2014. Intrauterine growth restriction is associated with structural alterations in human umbilical cord and decreased nitric oxide-induced relaxation of umbilical vein. *Placenta*, 35(11): 891-899.

Plagemann, A. 2011. Maternal diabetes and perinatal programming. *Early Human Development,* 87(11): 743-747.

Qazi, C. 2011. Obstetric and perinatal outcome of multiple pregnancy. *Journal of the College of Physicians and Surgeons Pakistan*, 21(3): 142-145.

Raghuraman, N., March, M.I., Hacker, M.R., Modest, A.M., Wenger, J., Narcisse, R., David J.L., Scott, J & Rana, S. 2014. Adverse maternal and foetal outcomes and deaths related to pre-eclampsia and eclampsia in Haiti. *Pregnancy Hypertension*: *An International Journal of Women's Cardiovascular Health,* 4(4):279-286.

Ramaboea, M.J. 2014. The factors contributing to high neonatal morbidity and mortality in Limpopo Province, University of South Africa, Pretoria, <http://hdl.handle.net/10500/188307.

Ramos, G., Brotschi, B., Latal, B., Bernet, V., Wagner, B & Hagmann, C. 2013. Therapeutic hypothermia in term infants after perinatal encephalopathy: The last 5 years in Switzerland. *Early Human Development,* 89(3): 159-164.

Richens, J., Mayaud, P & Mabey, D.C. 2014. Genital manifestation of tropical diseases. *Manson's Tropical Infectious Disease,* 23rd edition: 292-318.e3.

Risso, F.M., Serpero, L., Zimmermann, L.J.I., Gavilanes, A.W.D., Frulio, R., Michetti, F., Florio, P., Bashir, M., Iskander, I., Mufeed, N., Aboulgar, H & Gazzolo, D. 2012. Perinatal asphyxia: Kidney failure does not affect S100B are concentrations. *Clinica* Chimica *Acta,* 413 (1-2): 150-153

Rizwan, N., Reuf, S & Fathan-Uddin, S. 2013. Maternal and perinatal outcomes among women with eclampsia admitted to a tertiary care hospital in Hyderabad, Pakistan. *International Journal of Gynaecology and Obstetrics*, 123(3): 247-248.

Roescher, A.M., Hitzert, M.M., Timmer, A., Verhagen, E.A., Erwich, J.J.H.M & Bos, A.F. 2011. Placental pathology is associated with illness severity in preterm infants in the first twenty-four hours after birth. *Early Human Development,* 89(4): 315-319.

Romero, J., Muniz, J., Tornatore, T.L., Holubiec, M., Gonzalez, J., Barreto, G.E., Gueiman, L., Lillig, G.H., Blanco, E & Capani, F. 2014. Dual role of astrocytes in perinatal asphyxia injury and neuroprotection*. Neuroscience Letters*, 565(7): 42-46.

Romero, R., Yeo, L., Chaemsaithang, P., Chaiworapongsa, T & Hassan, S.S. 2014. Progesterone to prevent spontaneous preterm birth. *Seminar in Foetal and Neonatal Medicine,* 19(1): 15-26.

Rosser, M.L & Katz, N.J. 2013. Advances in chronic kidney diseases*. Pre-eclampsia: An Obstetrician's Perspective,* 20(3): 287-296.

Salinu, H.M., Duan, J., Nabukera, S.K., Mbau, A.K & Alio, A.P. 2011. Younger Maternal age (at initiation of childbearing) and recurrent perinatal mortality. *European Journal of Obstetrics and Gynaecology and Reproductive Biology,* 154(1): 31-36.

Sankaran, S & Kyle, P.M. 2009. Aetiology and pathogeneses of intrauterine growth restriction. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 23(6): 765-777.

Sawchuck, D.J & Wittmann, B.K. 2014. Pre-eclampsia renamed and reframed: Intra-abdominal hypertension in pregnancy. *Medical Hypotheses*, 83(5): 619-632.

Schneider, Z., Whitehead, D & Elliott, D. 2007. *Nursing and Midwifery Research*: *Methods and Appraisal for Evidence-Based Practice.* 3rd Edition. Elsevier: Australia.

Sellers, P.M. 2012. *Seller' Midwifery.* 2nd Edition. South Africa: Juta and Company Ltd.

Sentilhes, L., Oppenheimer, A., Bouhours, A., Normand, E., Haddad, B., Descamps P., Marpeau, L., Goffinet, F & Kayem, G. 2015. Neonatal outcome of very preterm twins: Policy of planned vaginal or caesarean delivery. *American Journal of Obstetrics and Gynaecology,* 1937(15): 156-158.

Serrano, I.M.G., Plana, A.A., Morales, O.D., Perea, C.H & Bragado, A.H. 2014. Antenatal corticosteroids therapy and late preterm infant morbidity and mortality. *American Journal of Obstetrics and Gynaecology,* 81(6): 374-382.

Shah, A., Fawole, B., M'Imunya, J.M., Amokrane, F., Naflow, I., Wolomby, J.J., Mugerwa, K., Neves, I., Nguti, R., Kublikkas, M & Mathai, M. 2009. Caesarean delivery outcome from the WHO global survey on maternal and perinatal health in Africa. *International Journal of Gynaecology and Obstetrics,* 107(3): 191–197.

Shinwell, E.S. 2005. Neonatal morbidity of very low birth weight infants from multiple pregnancies. *Obstetrics and Gynaecology Clinics of North America*, 32(1): 29-38.

Sibai, B.M. 2006. Pre-eclampsia as a cause of preterm and late preterm (near term) births. *Seminars in Perinatology*, 30(1): 16-19.

Sibeko, S & Moodley, S. 2006. Healthcare attendance patterns by pregnant women in Durban South Africa. *South African Family Practice,* 48 (10): 17,17a-17e.

Singh, R. 2013. Hypertensive disorders in Pregnancy*. Clinical Queries: Nephrology*, 2(2): 47-55.

Soucie, J.E., Yang, Q., Wen, S.V., Kee Fung, K.F & Walker, M. 2006. Neonatal mortality and morbidity rates in term twins with advancing gestational age*. American Journal of Obstetrics and Gynaecology,* 195(1): 172-177.

Staff, A.C., Sibai, B.M & Cunningham, F.C. 2015. Chapter 12- Prevention of pre-eclampsia and eclampsia. *Chesley's Hypertensive disorders in pregnancy* (fourth edition): 253-267.

Steiner, L.A & Gallagher, P.G. 2007. Erythrocytes disorders in the perinatal period. *Seminars in Perinatology,* 31(4): 254-261.

Suparp, T & Ratsiri, T.2011. Obstetric and perinatal outcome of teenage pregnancies in Thailand. *Journal of paediatrics and adolescent gynaecology*, 24(6): 342-346.

Temple, R & Murphy, H. 2010. Type 2 diabetes in pregnancy- An increasing problem. *Best Practice and Research Clinics Endocrinology and Metabolism,* 24(4): 591-603.

Teune, M.J., Van Wassenaer, A.G., Van Buuren, J., Mol, B.W.J & Opmeer, B.C. 2012. Perinatal risk indicators for long-term neurological morbidity among *preterm* neonates. *European Journal of Obstetrics and Gynaecology,* 163(2): 134-141.

Tooher, J., Chiu, C.L., Thornton, C., Lupton, S., O'Loughlin, A., Makris, A., Hennessy, A., Lind, J.M., Korda, A., Ogle, R & Horvath, J. 2012. PPO33. High blood pressure in pregnancy: An indicator of future health outcomes. *Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health,* 2(3): 260.

Tuuli, M.G & Odibo, A.O. 2010. Endocrine regulation of foetal skeletal muscle growth. *Clinics in Laboratory Medicine,* 30 (3): 727-746.

United Nations. 2015. The Millennium Development Goals Report.

Van Baaren, G.J., Peelen, M.J.C.S., Schuit, E., van der Post, J.A.M., Mol, B.W.J., Kok, M & Hajenius, P.J. 2015. Preterm birth in singleton and multiple pregnancies: evaluation of costs and perinatal outcomes. *European Journal of Obstetrics and Gynaecology and Reproductive Biology,* 186(1): 34-41.

Vanderlelie, J & Perkins, A.V.A. 2011. Selenium & Preeclampsia: A global perspective. Pregnancy Hypertension: *An International Journal of Women's Cardiovascular Health*, 1(3): 213-224.

Van Meir, H., Slaghekke, F., Loprore, E & Wijngeerde, N. 2010. Arterio-Arterial anastomoses do not prevent the development of twin anaemia-polycythemia sequence. *Placenta*, 31(2): 163-165.

Velaphi, S & Pattison, R. 2007. Avoidable factors and causes of neonatal deaths from perinatal asphyxia-hypoxia in South Africa: National Perinatal Survey. *Annals of Tropical Paediatrics,* 27(2): 99-106.

Ventura, W., Ventura-Laveriano, J & Nazario-Redondo, C. 2012. Perinatal outcomes associated with subsequent pregnancy among adolescent mothers in Peru. *International Journal of Gynaecology and obstetrics,* 117(1): 56-60.

Vergnes, J.N & Sixou, M. 2007. Preterm low birth weight and maternal periodontas status: a meta-analysis. *American Journal of Obstetrics and Gynaecology,* 196(2): 135.e1-7.

Verklan, M.T & Walden, M. 2010*. Core Curriculum for Neonatal Intensive Care Nursing,* United States of America: Saunders Elsevier.

Verma, S. (2008). Advanced maternal age and obstetric performance*. Apollo Medicine*, 6(3): 258-263.

Villar, J., Carroli, G., Wojdyla, D., Abalos, E., Giordano, D., Ba'ageel, N., Farnot, U., Bergsjo, P., Bakketeig, L., Lumbiganon, P., Campodonico, L., Al-Mazron, Y., Lindheimer, M & Kramer, M. 2006. Pre-eclampsia, gestational hypertension and intrauterine growth restriction. *American Journal of Obstetrics and Gynaecology.* 194(4): 921-931.

Ville, Y & Kareb, A.E.I. 2008. Update on twin-to-twin transfusion syndrome. *Best Practice and Research Clinical Obstetrics and Gynaecology,* 22(1): 63-75.

Voit, K & Carson, D.B. 2014. Post-retirement intentions of nurses and midwives living and working in the Northern Territory. *Original Research*, 14. Online.

Von Beckerath, A., Kollmann, M., Rotky-fast, C., Karpf, E., Lang, U & Klaritsch, P. 2013. Perinatal complications and long-term neurodevelopmental outcome of infants with intrauterine growth restriction. *American Journal of Obstetrics and Gynaecology,* 208(2): 130e1-6.

Warmelink, J.C., Hoijtink, K., Noppers, M., Wiegers, T. A., Paul de Cock, T., Klomp, T & Hutton, E.K. 2015. An explorative study of factors contributing to the satisfaction of primary care midwives. *Midwifery,* 31(4): 482 - 488.

Wax, J.R., Cartin, A & Pinette, M.G. 2010. Biophysical and biochemical screening for the risk of preterm labour. *Clinics in Laboratory Medicine*, 30(3): 693-707.

Whitworth, M & Cockerill, R. 2014. Antenatal management of teenage pregnancy. *Obstetrics*, G*ynaecology and Reproductive Medicine,* 24(1): 23-28*.*

WHO guidelines. 2008. *Neonatal and Perinatal Mortality.* Country, Regional and Global estimates: Geneva: WHO.

WHO guidelines. 2014. Compilation of WHO recommendations on maternal, newborn, child and adolescent health: Geneva: WHO.

Young, D. 2012. Perinatal Mortality and Morbidity. *International Journal of Gynaecology and Obstetrics*119 (3): 52-58.

Zeitlin, J., Ayoubi, M.E.I., Jarreah, P.H., Draper, E.S., Blondel, B., Kunzel, W., Cuttini, M., Kaminski, M., Gortner, L., Van Reempts, P., Kollee, L & Papiernik, E. (2010*).* Impact of fetal growth restriction on mortality and morbidity in a very preterm birth cohort. *The Journal of Paediatrics,* 157(5), 773-739.

Zhang, JJ., Grewal, I., Roosen-Runge, M., Betran Lazga, AP., Souza, J.P., Widmer, M & Merialdi, M. 2012. Severe anaemia, sickle cell disease, and thalassemia as risk factors for preeclampsia in developing countries. Pregnancy Hypertension*: An International Journal of Women's Cardiovascular Health*, 2(3):191-192.

APPENDICES

Appendix I: Ethics Committee Letter

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING:	07/2014
PROJECT NUMBER:	MREC/HS/269/2014: PG
PROJECT:	
Title:	Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa
Researcher:	Ms MG Mathebula
Supervisor:	Ms MK Thopola
Co-supervisor:	Prof ME Lekhuleni
Department:	Nursing & Human Nutrition
School:	Health Sciences
Degree:	Masters of Nursing Science

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 04 September 2014

UNIVERSITY OF LIMPOPO
Medunsa Campus
2014 -09- 04
MEDUNSA RESEARCH ETHICS COMMITTEE
MREC CHAIRPERSON

PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organisation (IORG0004319), as an Institutional Review Board (IRB00005122), and functions under a Federal Wide Assurance (FWA00009419)
Expiry date: 11 October 2016

Note:
i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding solutions for Africa

PROUDLY SOUTH AFRICAN

Appendix II: Permission Request Letter

University of Limpopo
Turfloop Campus
Private Bag x 1106
Sovenga
0727

Limpopo Province
The Department of Health
Private Bag x 9302
Polokwane
0700

RE: REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH STUDY

Dear Sir/Madam

I Mathebula Mpho Gift, student for Masters of Nursing science at University of Limpopo: Turfloop campus, request for a permission to conduct a research study at Mankweng-Polokwane Complex. The title of the study is “Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn district, Limpopo Province, South Africa”. The study will include the registered midwives allocated in labour unit and the neonatal unit.

Hoping my request will be taken into consideration.

Yours faithfully

Mathebula Mpho
Signature…….
Email address:m.morathog@nokiamail.com and cell number: 0837345100

Appendix III: Permission Grating Letter (Department of Health, Limpopo)

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Latif Shamila

Ref:4/2/2

Mathebula MG
University of Limpopo
Turfloop Campus

Greetings,

RE: Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District , Limpopo Province

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
   - Research must be loaded on the NHRD site (http://nhrd.hst.org.za) by the researcher.
   - Further arrangement should be made with the targeted institutions.
   - In the course of your study there should be no action that disrupts the services.
   - After completion of the study, a copy should be submitted to the Department to serve as a resource.
   - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
   - The above approval is valid for a 3 year period.
   - If the proposal has been amended, a new approval should be sought from the Department of Health.

Your cooperation will be highly appreciated.

Head of Department

25/02/2015
Date

18 College Street, Polokwane, 0700, Private Bag x9302, POLOLKWANE, 0700
Tel: (015) 293 6000, Fax: (015) 293 6211/20 Website: http/www.limpopo.gov.za

Appendix IVa: Permission Granting Letter (Mankweng Hospital)

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

MANKWENG HOSPITAL

Ref: S5/3/1/2

Enq: Makola M.M

From: HR Utilization and Capacity Development

Date: 01 June 2015

To: Mathebula M.G
University of Limpopo
Turfloop Campus

PERMISSION TO CONDUCT RESEARCH AT MANKWENG HOSPITAL: MATHEBULA M.G

1. The above matter has reference.
2. This is to confirm that Mathebula M.G has been granted permission to conduct research on " Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province".
3. She will be conducting research as from Thursday, 04 June 2015 to Friday, 31 July 2015 .
4. Attached please find his application letter, Medunsa Research and Ethics Committee Clearance Certificate (University of Limpopo, Medunsa Campus), approval letter from Provincial Office and Research proposal and Questionaire.

Thanking you in advance

Chief Executive Officer

02/06/2015
Date

Department Of Health
Mankweng Hospital
Reciever
2015 -06- 02
Office No. 106
Tel: 015 286 1016
LIMPOPO PROVINCE

Appendix IVb: Permission Granting Letter (Pietersburg Hospital)

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF HEALTH
PIETERSBURG HOSPITAL

ENQ : MOLOKOMME N

REF : 2/8/2/2

TO : Ms. MG MATHEBULA

UNIVERSITY OF LIMPOPO

FROM: T B SEATE

CEO: PIETERSBURG HOSPITAL

DATE : 24 JUNE 2015

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT POLOKWANE TERTIARY HOSPITAL

1. The above matter refers.

2. Your request to conduct research is granted.

3. You will be expected to avail the report about your research to the institution upon completion.

Thank you in advance

T B Seate

24/06/2015

T B SEATE **DATE**

CHIEF EXECUTIVE OFFICER

PIETERSBURG HOSPITAL

Appendix V: Consent Form

UNIVERSITY OF LIMPOPO (Turf loop Campus) ENGLISH CONSENT FORM

Statement concerning participation in a Research Project

Name of Study: **Factors contributing to high perinatal morbidity rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa.**

I have heard the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.

I know that sound recordings scientific publications which will be electronically available throughout the world. I consent to this provided that my name is not revealed. I understand that participation in this Study is completely voluntary and that I may withdraw from it at any time and without supplying reasons.

I know that this Trial / Study / Project have been approved by the Medunsa Research and Ethics Committee (MREC), University of Limpopo (Turfloop Campus) and Limpopo Department of Health. I am fully aware that the results of this study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Study.

....

Name of the volunteer Signature of volunteer

…….. ……

Place Date

…… ……..

Name of the researcher Signature of the researcher

…… ……..

Place Date

Statement by the Researcher

I provided verbal and/or written information regarding this study.

I agree to answer any future questions concerning the study as best as I am able.

Appendix VI: Questionnaire

Factors Contributing to High Perinatal Morbidity Rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa

Section A: Socio-Demographic Data

Please make a cross (x) and fill in the applicable answer

1. My age is between

20- 26 years	1
27-33 years	2
34-40 years	3
41- 47 years	4
48- 54 years	5
55– 61 years	6
62 and above	7

2. Gender

Male	1
Female	2

3. Marital status

Single	1
Married	2
Separated	3
Divorced	4
Widow/Widower	5

4. Residential Area

Informal settlement	1
Rural area	2
Semi-rural area	3
Urban area	4

5. Nursing Qualification

Diploma in Midwifery	1
Diploma in (General nursing, Community, Psychiatry) Midwifery	2
Degree in (General nursing , Community, Psychiatry) Midwifery	3

6. Speciality Qualifications

Advance Midwifery and Neonatal nursing science	1
Diploma in Neonatal Intensive Care Nursing	2
Degree in Neonatal Intensive Care Nursing	3
None	4

7. Work experience in years

Less than 1 year	1
1-5 years	2
6-10 years	3
11-15 years	4
16 -20 years	5
21 -25 years	6
26 and above	7

8. Unit allocated in at present

Antenatal care unit	1
Labour unit	2
Postnatal unit	3
Neonatal unit	4

9. Number of beds in the unit you are in now

8 beds	1
9 to 14	2
15 to 19	3
20 to 24	4
25 and more	5

Section B: Staffing

Please tick applicable answer according to keys below:

0= Never; 1= Hardly Ever; 2 = Sometimes; 3=Often; 4 = Always

		N	H/E	S	O	A
1	Shortage of staff in my unit was a problem in the past 8 months	0	1	2	3	4
2	Absenteeism was high in my unit in the past 8 months	0	1	2	3	4
3	Resignation was high in my unit in the past 8 months	0	1	2	3	4
4	Staff- patient ratio is good	0	1	2	3	4

Section C: Staff Development

Please tick applicable answer:

		YES	NO
1	Are you LINC (Limpopo Initiative for New-born Care) trained?	1	0
2	Have you done essential skills in managing obstetric emergencies (ESMOE)?	1	0
3	Have you done Help Babies Breath (HBB) program?	1	0
4	Do you think there is any pre and post training change?	1	0

Please tick the applicable answer according to keys below:

0= Never; 1= Past year; 2 =Past 2-3 years; 3= Past 4+ years

		N	PY	P2Y	P4Y
5	When were you LINC trained?	0	1	2	3
6	When were you HBB trained?	0	1	2	3
7	When were you ESMOE trained	0	1	2	3

Section D: Workload

Please tick applicable answer according to keys below:

1 = Strongly Agree; 2 = Agree; 3 = Disagree; 4 = strongly disagree

		SA	A	D	SD
1	Working conditions are good in the unit I am working in presently	1	2	3	4
2	Doctors are enough to cover the unit work	1	2	3	4
3	Registered midwives are enough to cover all the work on daily basis	1	2	3	4
4	I am capable of managing the workload in the unit I am working in	1	2	3	4

	Presently				
5	There is shortage of staff in the unit I am working in presently	1	2	3	4
6	It is difficult to cope with the work load in the unit I am allocated in presently	1	2	3	4

Section E: Main Causes for Babies to Become Sick

How prevalent are the following causes for babies to become sick in your institution: Please answer all questions.

0 = Never, 1 = Hardly ever, 2= Sometimes, 3= Often, 4= Always

		N	HE	S	O	A
1	Negligence of nurses	0	1	2	3	4
2	Unskilled nurses	0	1	2	3	4
3	Inexperience of nurses	0	1	2	3	4
4	Overcrowding of patients	0	1	2	3	4
5	Delayed doctors response	0	1	2	3	4
6	Long waiting period for caesarean sections	0	1	2	3	4
7	Long waiting period for babies operations	0	1	2	3	4
8	Poor new staff orientation	0	1	2	3	4
9	Work overload of staff	0	1	2	3	4
10	Shortage of staff	0	1	2	3	4
11	Lack of medication	0	1	2	3	4
12	Lack of equipment and supplies	0	1	2	3	4
13	Congenital anomalies	0	1	2	3	4
14	Perinatal asphyxia	0	1	2	3	4
15	Aspiration, e.g., milk aspiration	0	1	2	3	4
16	Prematurity	0	1	2	3	4
17	Neonatal sepsis	0	1	2	3	4
18	Gastro-intestinal diseases, e.g., Necrotizing enterocolitis	0	1	2	3	4
19	Cardiac diseases of the baby	0	1	2	3	4
20	Metabolic conditions e.g. hypoglycaemia of the baby	0	1	2	3	4
21	Hypothermia of the baby	0	1	2	3	4
22	Labour complications e.g. Shoulder dystocia	0	1	2	3	4

23	Obstetric emergencies	0	1	2	3	4
24	Other-Specify					

SECTION F: EQUIPMENT AND SUPPLIES

Tick the answer on the availability of the following, according to the keys below:

Please answer all questions

0 = Never; 1= Hardly Ever; 2 = Sometimes; 3 =Often; 4 = Always

		N	HE	S	O	A
1	Stethoscopes	0	1	2	3	4
2	Fetoscope	0	1	2	3	4
3	Cardiotocograph machines	0	1	2	3	4
4	Mechanical Ventilators	0	1	2	3	4
5	Nasal Continuous Positive Airway Pressure (NCPAP)	0	1	2	3	4
6	Non stress test machines	0	1	2	3	4
7	Pulse oximeter	0	1	2	3	4
8	Blood gas machine	0	1	2	3	4
9	Ultrasound machine	0	1	2	3	4
10	Infusion pumps machines	0	1	2	3	4
11	Glucose meter	0	1	2	3	4
12	Haemoglobin meter	0	1	2	3	4
13	Vaginal examination packs	0	1	2	3	4
14	Basic packs	0	1	2	3	4
15	Stitch packs	0	1	2	3	4
16	Delivery packs	0	1	2	3	4
17	Cribs	0	1	2	3	4
18	Incubators	0	1	2	3	4
19	Suction apparatus	0	1	2	3	4
20	Phototherapy lamps	0	1	2	3	4
21	Portable oxygen cylinders	0	1	2	3	4

22	Laryngoscope blades	0	1	2	3	4
23	Laryngoscope handles	0	1	2	3	4
24	Batteries	0	1	2	3	4
25	Oxygen cylinders	0	1	2	3	4
26	Neo-puffs	0	1	2	3	4
27	Ambubags	0	1	2	3	4

Section G: Material Resources

Tick the answer on the availability of the following in your unit, according to the keys below:

0 = Never; 1= Hardly Ever; 2 = Sometimes; 3 =Often; 4 = Always

		N	HE	S	O	A
1	Linen	0	1	2	3	4
2	Urine dipsticks	0	1	2	3	4
3	Blood glucose sticks	0	1	2	3	4
4	Blood glucose test machines	0	1	2	3	4
5	Suction catheters	0	1	2	3	4
6	Close suctioning catheters	0	1	2	3	4
`7	Endo tracheal tubes	0	1	2	3	4
8	Cord clamps	0	1	2	3	4
9	Syringes	0	1	2	3	4
10	Ward HB meters	0	1	2	3	4

Section H: Infection Prevention and Control in Your Unit

Tick the answer, according to the keys below: Please answer all questions

0 = Never; 1= Hardly Ever; 2 = Sometimes; 3 =Often; 4 = Always

		N	HE	S	O	A
`1	Antiseptic hand scrub solution available	0	1	2	3	4
2	Hand soaps available	0	1	2	3	4
3	Hand towels available	0	1	2	3	4
4	Alcohol swabs available	0	1	2	3	4
5	Mothers and visitors comply on hand washing	0	1	2	3	4
6	Visitors are limited	0	1	2	3	4
7	Cord care done 3 hourly	0	1	2	3	4
8	Single use materials are used once and discarded	0	1	2	3	4
9	I wash hands after touching 2 to 3 patients	0	1	2	3	4
10	I use antiseptic hand scrub between patients	0	1	2	3	4
11	Dump dusting is done on daily basis in the unit	0	1	2	3	4
12	Bed linen are changed on daily basis	0	1	2	3	4
13	Bed linen are changed only when necessary	0	1	2	3	4
`14	Patients share beds when there are no beds available	0	1	2	3	4
15	Mothers change the hospital attire on daily basis	0	1	2	3	4
16	There is overcrowding in the unit where I am working in now	0	1	2	3	4
17	Incubators and cribs are cleaned thoroughly before and after use	0	1	2	3	4
18	Laryngoscope blades and mygills forceps are autoclaved after use	0	1	2	3	4
19	X-ray plates are cleaned before use	0	1	2	3	4
20	I maintain sterility during invasive procedures e.g. Intubation	0	1	2	3	4
21	Patients with infectious diseases are isolated	0	1	2	3	4
22	Isolation rooms are scrubbed after discharge of patient with infectious diseases	0	1	2	3	4
23	I use alcohol swab to wipe the injection port before administering medication	0	1	2	3	4
24	I wipe multi use vial top with alcohol swab before withdrawing medication	0	1	2	3	4

		N	H/E	S	O	A
25	I change intravenous lines after every 3 days	0	1	2	3	4
26	Nasogastric tubes are changed after every 3 days	0	1	2	3	4
27	Skin bruises or punctures are covered with sterile gauze and secured with strapping.	0	1	2	3	4
28	I wear facial mask when I have upper respiratory infections	0	1	2	3	4
29	I don't go to work when I have upper respiratory infections	0	1	2	3	4
30	Feeding utensils for babies are soaked in a sterilizing solution	0	1	2	3	4
31	I wash my hands after answering my phone, before touching the patient	0	1	2	3	4
32	Transport incubators are cleaned before and after patient transport	0	1	2	3	4
33	Stretchers are cleaned before and after transporting patients	0	1	2	3	4
34	Each and every patient have his/her own pulse oximeter probes	0	1	2	3	4
35	Pulse oximeter probes are cleaned between patients	0	1	2	3	4
36	Each and every patient have his/her own blood pressure cuff	0	1	2	3	4

Appendix VII: Statistician Letter

P.O.Box 2812,

Polokwane, 0700

December 4, 2015.

To whom it may concern,

I herewith confirm that I analysed the quantitative data for the Master of Nursing Science study of

Ms Mathebula, Mpho Gift, titled:

'FACTORS CONTRIBUTING TO HIGH PERINATAL MORBIDITY RATES IN MANKWENG-POLOKWANE COMPLEX OF THE CAPRICORN DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA'

The analysis was done utilising IBM SPSS Statistics Version 23.

Kind regards,

Ms Rita Olwagen

ritaolwagen@gmail.com

BSc Honours (Statistics) and former Research Statistician, University of Limpopo.

Annexure VIII: Editor Letter

MM Mohlake
Reakgona Disability Centre
University of Limpopo
Turfloop Campus
Private Bag x 1106
Sovenga
0727

02 December 2015

To Whom It May Concern

EDITING CONFIRMATION: Ms MG Mathebula's Study

This letter is meant to acknowledge that I, MM Mohlake, as a professional editor, have meticulously edited the Master's degree dissertation of Ms Mathebula Mpho Gift entitled "Factors Contributing to High Perinatal Morbidity Rates in Mankweng-Polokwane Complex of the Capricorn District, Limpopo Province, South Africa".

Thus I confirm that the readability of the work in question is of a high standard.

For any related query/comment please do contact me.

Regards

Mr Mosimaneotsile M. Mohlake
(015) 268 3002 (Office)
072 1944 452 (Mobile)
mosimaneotsile.mohlake@ul.ac.za (Email)