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KNOWLEDGE AND PERCEPTIONS OF POTENTIAL FACTORS CONTRIBUTING TO BIRTH ASPHYXIA IN A SELECTED MOTHER AND CHILD HOSPITAL IN GAUTENG PROVINCE

By

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DECLARATION

I, Nompumelelo Precious Mthembu declare that the study “Knowledge and Perceptions of potential factors Contributing to Birth Asphyxia in a Selected Mother and Child Hospital in Gauteng Province” is my work, that all sources that I have used or quoted have been indicated and acknowledged using complete references and that this work has not been submitted for any other degree at any other institution.

Nompumelelo Precious Mthembu:

Date Signed  : 25 May 2023

DEDICATION

This thesis is dedicated to all pregnant women, babies born with birth asphyxia, midwives and advanced midwives who render quality nursing care to these babies and pregnant women. Dedication also goes to my mom who supported me throughout the study. My aunt Lindiwe Khumalo always gave me the motivation to push when things we not going well, My daughter Okuhle who allowed me time to study without interference, My cousin Thembelihle Mthembu who kept on motivating me.

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ABSTRACT

Background

Birth asphyxia is a major contributor to neonatal mortality worldwide resulting in neonatal mortality and morbidity. Birth asphyxia is the fifth largest cause of death in children under the age of 5 years. According to WHO of the 130 million babies born every year, about 4 million die in the first 4 weeks of life.

Aim of the study

To determine midwives' knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province.

Research methods

A quantitative, cross-sectional descriptive survey design was used. The population included 72 midwives and advanced midwives working in the maternity and neonatal departments in a selected hospital in Gauteng province. Probability sampling was used to select the total population in this study. A self-administered questionnaire was used for data collection and the Statistical Package for Social Sciences version 24 to analyse data. The results were presented in the form of tables with frequencies and percentages and the use of bar and pie charts. Validity and reliability were ensured during the process of data collection and through the pilot study, to ensure that the results are accurate as possible.

Results

The results indicated that there is still so much training and awareness that need to be done on factors contributing to birth asphyxia, as it seems like most midwives do not have much knowledge of factors contributing to birth asphyxia. The results indicated positive results that midwives know the management of pregnant women during antenatal care, labour, and the postnatal period.

Recommendations

Based on the findings of the study, the researcher recommends further research on the same topic or theme as the study was done only on one hospital that falls under the City of Johannesburg instead of the whole six hospitals and two community healthcare centres found in the City of Johannesburg. Other research on the management and attitude of nurses towards birth asphyxia should be pursued.

Keywords

Birth asphyxia, factors, midwives, advance midwives, neonates.

LIST OF ABBREVIATIONS

BA	Birth Asphyxia
HIE	Hypoxic- Ischaemic Encephalopathy
MgSO4	Magnesium Sulphate
NDoH	National Department of Health
SANC	South African Nursing Council
WHO	World Health Organization
UK	United Kingdom

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.1. INTRODUCTION AND BACKGROUND OF THE STUDY

Worldwide, newborn mortality and morbidity are largely caused by birth asphyxia. The fifth most common cause of mortality in children under the age of five is asphyxia at birth. WHO(2020) estimates that out of the 130 million babies born each year, approximately 4 million die during their first four weeks. According to the World Health Organization (WHO) (2012:6), birth asphyxia is defined as inadequate oxygen perfusion to vital organs which is generally caused by a failure to initiate and sustain breathing at birth. The number of babies with birth asphyxia remains unacceptably high in a selected mother-child hospital in Gauteng province on the hospital records. Birth asphyxia can result in serious systemic and neurologic complications resulting from decreased blood flow or oxygen to the fetus. This may occur during antepartum as well as intrapartum periods Bayih, Yitbarek, Aynalem, Abate, Tesfaw, Ayalew, Belay, Hailemmeskel and Alemu, 2020:2).

Pregnancy is the term used to describe the intra-uterine period of foetal development and usually lasts 40 weeks (Women's Health, 2010:5). The midwives need to provide total quality care to the woman during pregnancy, intrapartum and post-natal care as it is associated with the prevention of birth asphyxia. Women who attend antenatal care well or adhere to the schedule tend to have low risk of asphyxiated neonates. According to the maternity guidelines, a woman should have at least eight antenatal care visits (NDoH, 2015:38). During the antenatal care visits, blood tests and physical examinations are done, and history is taken to assess the past, and present obstetrics, medical and surgical problems to detect risk factors for the patient and her baby. Regardless of the above services provided, some complications may occur during pregnancy such as anaemia in pregnancy, antepartum haemorrhage, pregnancy-induced hypertension, gestational diabetes, and pre-eclampsia (Sellers, 2012:295).

According to Aslam, Saleem, Afzal, Iqbal, Saleem, Shaikh and Shahid (2014), birth asphyxia is defined as inadequate oxygen perfusion to vital organs, generally caused by failure to initiate and sustain breathing at birth. Other authors defined birth asphyxia as a failure to trigger and sustain breathing automatically at birth (Berhe, Kededom, Gebregziabher, Assefa, Berhe, Mohammednur, Wellay, Berihu, Welearegay, Mitiku & Teka, 2020:13). Birth asphyxia can result in intense systemic and neurologic consequences due to decreased blood flow or oxygen to the fetus. Continuous asphyxia will also lead to multiple organ dysfunction (Gabkika, Adrienne & Yannick, 2018:151). According to Abdol, Halil, Kebede, Anshebo and Gejo (2019), the presence of the following conditions, severe hypotension or

hypertension, oligohydramnios, antepartum haemorrhage, and maternal fever during pregnancy might contribute to birth asphyxia.

In a study conducted in Southern Ethiopia, Alemu, Maleku, Abera and Damte (2019:70) found that birth asphyxia is associated with maternal anaemia, pregnancy-induced hypertension, antepartum haemorrhage and less than three antenatal care visits. Maternal anaemia may result in a low oxygen supply to the fetus due to low haemoglobin concentration or a reduced number of red blood cells. Pregnancy-induced hypertension can affect placental development, resulting in limited blood supply to the foetus, causing pre-term delivery or placenta abruption, contributing to birth asphyxia (Alemu et al, 2019:70).

According to Amadi, Oluchina, Makworo and Mbithi (2019:65), the causes of birth asphyxia include birth trauma, congenital sepsis, intrauterine pneumonia, severe meconium aspiration, cord compression, cardiac abnormalities, obstructed airway and transplacental anaesthetic. Cord compression reduces blood flow from the placenta to the baby, decreasing oxygen supply to the vital organs and to failure to sustain breathing at birth which results in birth asphyxia. An obstructed airway can happen due to the cord being tight around the foetus's neck which also reduces the oxygen supply to the vital organs.

According to Abdo et al, (2019:2) birth asphyxia is the leading cause of brain damage and in severe cases, cause potentially fatal conditions such as hypoxic-ischemic encephalopathy, brain injuries, autism, attention deficit hyperactivity disorder, seizures, and cerebral palsy. Perinatal asphyxia survivors often face lifelong health problems such as disabilities, including intellectual disabilities, developmental delay, and behavioural problems (Abdo et al, 2019:2). As such, this study was conducted to determine factors contributing to birth asphyxia among fetuses and neonates. There are old studies done in South Africa between 1997 to 2014. Hence, this study will be conducted to determine knowledge and perceptions of potential factors contributing to birth asphyxia amongst fetuses and neonates in a selected mother and child hospital in Gauteng province for a researcher to update the South African study on midwives' knowledge and perceptions of potential factors contributing to birth asphyxia, Word Health Organization covers worldwide studies including UK studies. In this study, the researcher determined midwives' knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

In the preliminary literature, it was revealed that neonatal and intrapartum-related factors like serve maternal hypertension, advanced maternal age, maternal anaemia, prolonged rupture of membranes and prolonged labour were found to be significant factors contributing to birth asphyxia amongst fetus

and neonates (Abdol et al, 2019:2). The study further indicated that factors associated birth asphyxia were anaemia in pregnancy, chronic hypertension, meconium-stained amniotic fluids, and low birth weight newborns (Wayessa, Belachew & Joseph 2018:1292; Alemu et al, 2019:70). Other factors identified that might lead to asphyxia are prolonged rupture of membranes with the increased risk of cord prolapse that will impair blood supply to the foetus and resulting in foetal heart rate abnormalities. The presence of meconium-stained liquor during labour is an indication of foetal distress that can result in birth asphyxia (Alemu et al, 2019:72). Prematurity, the risk for preterm labour is associated with maternal and fetal factors such as uterine fibroids, multiple births and malpresentation (Aslam, Saleem, Azal, Iqbal, Saleem, Shaikh & Shahid, 2014:2).

1.2. PROBLEM STATEMENT

Compared to developed countries, birth asphyxia is the main cause of newborn illness and mortality in underdeveloped nations (Alemu et al, 2019:69). Birth asphyxia is also a leading cause of brain damage among children under the ages of 5 years (Gabkika et al, 2018:151). Birth asphyxia is associated with a prolonged rupture of membranes and prolonged labour. Additionally, birth asphyxia can be caused by premature birth, cord prolapse, placental abruption, placental previa, pre-eclampsia and uterine rupture (Asfere & Yesuf, 2018:208). Some of the factors such as maternal anaemia and pregnancy-induced hypertension may lead to birth asphyxia can be prevented or treated by midwives and doctors if diagnosed early (Alemu et al, 2019:70)

However, the researcher observed the hospital statistics from the Quality Assurance office between 2018 and 2019. Around 350 cases of birth asphyxia out of 1 800 births occurred in the selected mother and child hospital in Gauteng province. This has resulted in 61 known deaths as a result of birth asphyxia. Some of the noted mortality cases happened within five days of the infants' lives, while they were still hospitalised there were +/- 50 deaths. A number of these cases were discussed during the hospitals' monthly maternity and neonates' departmental meetings. Thus, they were associated with unbooked pregnant women, extremely low birth weight infants, breech presentation, medical and obstetric complications, therefore +/-2500 of foetuses and neonates were diagnosed with birth asphyxia yearly. According to the WHO (2014:13) birth asphyxia is a major contributor to neonatal mortality worldwide causing 23% of all neonatal deaths, with the majority, 98% of birth asphyxia-related deaths occurring during the first week of life. About 80% of birth asphyxia survivors live with chronic neuro-development morbidity including cerebral palsy, mental retardation and learning disabilities (Abdo et al, 2019:2). According to the study done in Mozambique by Chikuse, Chirwa, Maluwa, Malata and Odland (2012:354) overall findings indicated that midwives ability to identify warning signs of birth asphyxia was substandard in most of the parameters measured as per partograph review. The fetal heart rate for

example was not monitored according to the guidelines. Instead of checking the fetal heart half hourly, it was monitored every 2 hours or was not monitored at all as also reported from Mozambique in which the fetal heart was not monitored on half of the partographs despite having the risk factor of asphyxia. Color of liquor which is supposed to be monitored together with fetal heart to assess the fetal condition was also not done according to the guidelines. The results show that the biggest problem among the participants in this study was to monitor women for asphyxia risk factors using the partographs (Chikuse, Chirwa, Maluwa, Malata and Odland, 2012:354).

The researcher decided to conduct this study as it was observed that the statistics and the number of cases of birth asphyxia are still high. This is associated with the concern of disability and lifelong burden for parents with babies born with birth asphyxia. The researcher decided to conduct this study to identify midwives' knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

1.3. SPECIFIC RESEARCH HYPOTHESIS, AIM OF THE STUDY AND OBJECTIVES

1.3.1. Aim of the study

To determine the knowledge and perceptions and management thereof potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

1.3.2. Objectives

- To identify the midwives' knowledge of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.
- To assess the knowledge and perceptions of midwives in the management of pregnant women during antenatal care and labour (intrapartum) care to reduce birth asphyxia.

1.4. DEFINITION OF CONCEPTS

Midwife: South African Nursing Act (Act 33 of 2005, Chapter 2;30(2)) defines a midwife as a person who is qualified and competent to independently practice midwifery in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice. In this study, a midwife will be a professional person that provides care to pregnant women in the antenatal, intrapartum, and postnatal periods. The midwife should also observe for potential factors contributing to birth asphyxia.

Advanced midwife: South African Nursing Act (Act 33 of 2005, Chapter 2;30(2)) defines an advanced midwife as a registered professional nurse and midwife who has advanced expertise in Midwifery, holds an additional qualification in Midwifery and is registered as such with the South African Nursing Council. In this study, an advanced midwife will be a professional person that provides care to pregnant women in the antenatal, intrapartum, and postnatal periods.

Factors: An agent or element that contributes to the production of a result (Merriam-Webster.com.2020). In this study, the factors related to perinatal asphyxia include complications of pregnancy, prolonged labour, fetal heart rate abnormalities, breech presentation and knowledge of birth asphyxia.

Birth asphyxia: According to Gabkika et al, (2018:151), birth asphyxia occurs when a baby experiences a lack of oxygen to the brain before or during birth. Birth asphyxia results from circulatory, respiratory, and biochemical factors. Circulatory patterns that accompany asphyxia indicate an inability to make the transition to extrauterine circulation and a return to a fetal circulatory pattern, with the majority of the blood by passing the lungs. Failure of lung expansion and establishment of respiration rapidly produces serious biochemical changes including hypoxia, metabolic acidosis, and hypercapnia. In this study, perinatal asphyxia is regarded as the result of poor oxygen supply to the baby that can happen during pregnancy, in labour (intrapartum) which can be due to pregnancy complications.

Neonates: An infant from birth till they reach the age of four weeks (Sellers, 2013:759). In this study, neonates are infants that are less than four weeks old and cared for by midwives.

1.5. SIGNIFICANCE OF THE STUDY

Nursing practice: This study exposes focus areas on nursing and midwifery practice to prevent birth asphyxia. The study will enlighten nurse managers about necessary in-service training regarding the prevention of perinatal asphyxia. The study will provide midwives with information on the potential factors which lead to birth asphyxia and how they can prevent it where possible. The study will also dispel myths or any misinformation amongst midwives about the potential factors contributing to birth asphyxia.

Nursing education: The findings of the study will improve nursing education with available researched articles to pave ways for new treatment protocols which will improve patient outcomes, research discover new knowledge and innovation related to nursing care to build a scientific basis for nursing practice that is generalisable.

Executive management of the hospital: The results of the study might improve the health care service delivery in the hospital and midwives might be informed about the factors contributing to birth asphyxia. The findings of the study will assist in improving hospital practices by involving the patients and their families in planning the care for patients during antenatal care visits. The findings of this study might lead to a reduction in the number of babies or neonates born with birth asphyxia as the causes will be known to midwives and patients and preventative measures will be implemented at an earlier stage, resulting in the improvement of maternal health care services.

1.6. PARADIGM AND ASSUMPTIONS

A paradigm is described by (Pilot & Beck, 2017:9) as a researcher's philosophical worldview. The paradigms are structured by theories, assumptions, beliefs, concepts, and principles that give a researcher a guide and influence in conducting a research study. This study was from a positivistic paradigm as a quantitative descriptive cross-sectional design was used to identify knowledge and perceptions of factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

1.6.1. Positivist paradigm

The positivist paradigm refers to researcher's attempts to explain the phenomena they study in the most economical way (Kivuja & Kuyini, 2017:30). Quantitative approach gathers information focusing on describing phenomena across a larger number of participants.

Epistemology is used to describe how we come to know something, and how we know the truth of reality (Kivuja & Kuyini, 2017:26). The researcher used questionnaires to identify potential factors contributing to perinatal asphyxia. The questionnaires were pre-tested for reliability before the study was done. The gathering of information when using the positivist paradigm requires a large number of participants. The researcher used all midwives and advanced midwives working at the selected mother and child hospital to fulfil the positivist paradigm as it requires the large number of participants.

Ontology is a branch of philosophy concerned with the assumptions we make to believe that something makes sense or is real (Kivuja & Kuyini, 2017:26). In this study there was an objective environment referred to the practical skills the midwives need to master. The ontological assumption of the study was that birth asphyxia assumed to be related to decreased oxygen supply to the fetus during intrapartum and related to majority of neonatal deaths annually (Woday, Muluneh and Denis, 2019:2). Pre-testing of the questionnaire was done before starting with the study.

1.6.2. Methodological assumptions

Brink et al (2018:19) describe methodological assumptions as how the researcher should obtain the knowledge. A quantitative descriptive cross-sectional design was used in this study to identify potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

1.7. RESEARCH DESIGN

This study used a quantitative research design. It used a non-experimental, descriptive cross-sectional survey design to determine knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng from midwives and advanced midwives working in the maternity and neonatal department. The study was conducted in a selected mother and child hospital in Gauteng province. The study was conducted in the hospital where all the participants answered the questionnaire. All participants signed the informed consent form to take part in the study before the questionnaire was answered.

1.7.1. Population and sampling

Population refers to the entire group of persons or objects that is of interest to the researcher and which meet the criteria they are interested in studying (Pilot & Beck, 2017:131). The population in this study were all midwives and advanced midwives working in the maternity and neonatal department in a selected mother and child hospital in Gauteng province. A sample was drawn from this population. Sampling refers to the process of selecting the sample population from a population to obtain information regarding a phenomenon in a way that represents the study population (Brink et al, 2018:115). In this study, a sample included midwives and advanced midwives working in a maternity and neonatal department in the selected mother and child hospital in Gauteng province. Total population sampling was used as it implies that all elements in the population have an equal chance of being included in the sample (Brink et al, 2018:119). Because the midwives and advanced midwives were 72 in number, all were included in the study and a total population sampling was used in the study to select all advanced midwives and midwives working in maternity and neonatal departments.

1.7.2. Research instrument

The researcher developed a questionnaire with the help of the statistician looking at the literature and the additional literature related to the topic according to the methodology that was presented in the proposal (Annexure D & Annexure E statistician letter). The format of the questionnaire includes Section A: Demographic characteristics of the respondents; Section B: General information (training, awareness, guidelines accessibility, counselling, and complications assessment); Section C: Identifying factors contributing to birth asphyxia; Section D: Assessing the level of knowledge of birth asphyxia; Section E: Assessing the understanding in the management of pregnant women during antenatal care, labour (intrapartum) and post-natal period. The questionnaires were self-administered and consisted of only closed-ended questions as it was a cross-sectional study. The participants filled in the answers just by indicating with a cross.

1.7.3. Ethical Considerations and Informed consent

Ethical considerations mean that the researcher will conduct research with competence, acknowledge other authors and acknowledge fairly those who contributed assistance and guidance, and communicate results accurately (Fleming & Zegwaard, 2018:210). Permission was obtained from the University of Pretoria Ethics Committee with Ref no 15/2021 and Gauteng Department of Health Research Committee Ref no GP 202104 034. Witwatersrand University Health Research Ethics Committee Ref No: M220878. The principles of respect for a person, the principle of beneficence, the principle of non-maleficence, the principle of justice and the principle of confidentiality and privacy were considered as well as the issue of vulnerable subjects. Subjects were provided with a full description of the purpose of the project and its general value.

1.8. ORGANISATION OF CHAPTERS

The chapters of the dissertation are organised as follows:

Chapter one:

Overview of the Study

Chapter 1 is an overview of the study, including the following: introduction and background of the study, problem statement, research hypothesis, aim of the study, objectives of the study, definition of concepts, and significance of the study.

Chapter Two:

A Literature review

Chapter 2 is a literature review of the study which includes the definition of birth asphyxia, factors contributing to birth asphyxia and management of birth asphyxia.

Chapter Three:

Research Design and Methods

Chapter 3 presents the research strategies and approach, study setting, population, sampling, pilot study, data collection, data analysis, validity and reliability, ethical considerations, informed consent, privacy, confidentiality, and anonymity.

Chapter Four:

Results, Data Analysis, Interpretation and Discussion

Chapter 4 focuses on data analysed using SPSS software, tables, bar graphs, and pie charts were used during the analysis. Interpretations were made concerning the data analysed.

Chapter Five:

Conclusion, Recommendations and Limitations of the Study

Chapter 5 provides the conclusion of the study with the research findings. Recommendations are made in the context of the objectives of the study. Limitations of the study are also indicated in this chapter.

1.9. SUMMARY

This chapter highlighted the orientation and overview of the study on knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province. An outline of the problem statement, research design, significance of the study, dissemination of results and organisation of chapters was provided. The next Chapter (Chapter Two) will outline the literature review.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Chapter 1 highlighted the orientation and overview of the study in knowledge and perceptions of factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province. An outline of the problem statement, research design, the significance of the study, dissemination of results and organisation of chapters was provided. Chapter 2 focuses on the literature review of the study.

2.2 LITERATURE REVIEW

A literature review refers to a critical summary of existing knowledge on a topic, often prepared to contextualise the research problem (Pilot & Beck, 2017:733). According to Ridley (2008:2), the literature review is part of the thesis where there is extensive reference related to the research and theory in the researcher's field. It is where connections are made between the source texts that the researcher draws on and where the researchers position themselves. The literature review also refers to the process involved in creating the review that appears in the researcher's dissertation or thesis. Initially, the researcher's literature review helps the researcher to formulate their research questions at the same time the researcher begins to identify the relevant theories and related research studies to their own and the methodology that the researcher might adopt for their research. Later the literature assists the researcher in the analysis and interpretation of their data (Ridley, 2008:2-3). A literature review can be defined as the selection of available documents (both published and unpublished) on the topic. Which contains information, ideas, data, and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic. The review includes the effective evaluation of these documents concerning the research being proposed (Ridley, 2008:3).

2.2.1 Search method

In this study, the literature used by the researcher included both primary and secondary sources. The researcher used literature to gain an understanding of the existing research and debates relevant to a particular topic or area of study and to present that knowledge in the form of a written report (Western Sydney University Library, 2017). According to Ridley (2008:30-310), there are multiple forms of literature review. The literature helped the researcher to get ideas about the focal point of their research

and the wider context in which it will sit. Literature helped the researcher in identifying their approach to the research and the methodology the researcher wishes to adopt. More specifically the literature helped the researcher to identify the type of data the researcher might collect and use, the type of data collection, the sample size and how the researcher might analyse this data. Literature helped the researcher in extending the researcher's understanding of the key concepts, theories, and methodologies in the field. Another important reason for a rigorous literature review is to find out what others have done in the area to avoid duplicating previous work. This enables the researcher to ensure the originality of the researcher's work, an essential prerequisite for master's research. Moreover, through exploring previous research in the field the researcher can identify areas where research has not been undertaken, how the work of others could be extended, how questions which previous research has left unanswered can be addressed and how to avoid repeating mistakes that others have made. In other words, the researcher can identify gaps that their research can fill. A further purpose of your literature review is to identify key people, organisations and texts which are relevant to your research (Ridley 2008:30-310). In the context of this study, the literature review included the definitions of birth asphyxia, factors that contribute to birth asphyxia, management of birth asphyxia, long-term effects of birth asphyxia and studies conducted regarding birth asphyxia.

2.2. Scope of the literature review

The scope of the literature review covered the relevant literature that determined knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province.

2.3. Birth Asphyxia

2.3.1. What is Birth Asphyxia?

According to Gabkika, et al (2018,151), birth asphyxia occurs when a baby experiences a lack of oxygen to the brain before or during birth. Birth asphyxia can result in hypoxemia and hypercapnia. According to Ayebare et al. (2021:1), authors define birth asphyxia as a failure of the newborn to initiate and sustain breathing at birth or an Apgar score of less than 7 at 1 minute, birth asphyxia occurs due to interruption of placental blood flow leading to foetal hypoxia and acidosis. Amadi, et al. (2019:65), concurred by indicating that birth asphyxia is when newborns are deprived of oxygen for a long period enough to cause physical harm, especially to the brain. Birth asphyxia is a common and serious neonatal problem globally and significantly contributes to both neonatal morbidity and mortality given that it is a major cause of death and acquired brain damage in newborns.

However, World Health Organization (WHO) (2012:6) defines birth asphyxia as the failure to sustain or in extreme circumstances to initiate breathing at birth. Birth asphyxia may occur in the antepartum and intrapartum and fetal period. Birth asphyxia is a major contributor to neonatal mortality worldwide resulting in neonatal mortality and morbidity. Birth asphyxia is the fifth largest cause of death in children under the age of 5 years. According to the WHO of the 130 million babies born every year, about 4 million die in the first 4 weeks of life during the neonatal period, in low-income countries with 23% of all neonatal deaths that occur due to birth asphyxia (Yadav & Damke, 2017:518). It was discovered that the cascade of biochemical changes can lead to neuronal cell death and resulting brain damage (Gabkika, et al 2018:151). Hence this study was conducted to determine the factors contributing to birth asphyxia to come up with recommendations that will reduce neonatal morbidity and mortality rate.

2.3.2. Factors contributing to birth asphyxia

Factors: defined as an agent or element that contributes to the production of a result (*Merriam-Webster.com.2020*). Birth asphyxia can be caused by factors related to the antepartum, intrapartum, or postpartum period. The factors will be divided into maternal factors and healthcare system factors.

2.3.2.1 Maternal factors

Maternal factors consist of three parts antepartum, intrapartum, and fetal risk factors (Abdo et al. 2019:2).

Antepartum risk factors

- Severe maternal hypotension or hypertensive diseases during pregnancy: increase the risk of impairment in uteroplacental blood flow resulting in fetal hypoxia and fetal heart rate abnormalities
- Antepartum haemorrhage: placental abruption due to increased stretching of the uterus results in antepartum haemorrhage Less than four antenatal care visits: lack of attendance in antenatal care where the woman is at high risk of undiagnosed multiple pregnancies also contributed to birth asphyxia
- Oligohydramnios: increase the risk of cord compression, fetal growth restriction and underdeveloped lungs, which increases the risks of birth asphyxia
- Maternal fever: increases the risk of neurodevelopmental disorders, which increases the risk of birth asphyxia

- Maternal anaemia: may cause the baby to not grow to a healthy weight (low birth weight) which increases the risk of birth asphyxia
- Young maternal age: primigravida deliveries who are at risk of cephalopelvic disproportion resulting in prolonged labour
- Advanced maternal age: increases the risk of having co-morbidities which might to birth asphyxia (Abdo et al. 2019:2).

Intrapartum risk factors

- Malpresentation: increases the risk of the baby's head getting stuck on the perineum, especially in case of a breech presentation which decreases the oxygen supply to the baby which increases the risks of birth asphyxia
- Prolonged second stage of labour: result in fetal distress and decreased blood supply to the fetus which increases the risk of birth asphyxia
- Oxytocin use for augmentation of labour: which might cause uterine hyperstimulation resulting in diminishing of uteroplacental blood flow resulting in fetal hypoxia
- Meconium stained fluid: during labour is an indication of foetal distress that might results in birth asphyxia (Abdo et al. 2019:2).

2.3.2.2 Fetal risk factors

- Low birth weight: the lungs are not mature with a lack of surfactant which increases the risks of fetal distress which can lead to birth asphyxia.
- High birth weight (macrosomia): increases the risk of shoulder dystocia, which will decrease the oxygen supply to the baby and increases the risk of birth asphyxia.
- Multiple gestations: increases the chances of preterm labour, which increases the risks of birth asphyxia
- Tight nuchal nord: decreased blood supply to the fetus which increases the risk of birth asphyxia
- Preterm delivery: increases the risk of low birth weight which might have underdeveloped lungs, which increases the risks of the infant having birth asphyxia
- Pre-rupture of membranes: with the increased risk of cord prolapse that will impair blood supply to the foetus and result in fetal heart rate abnormalities
- Fetal distress and resuscitation: poor resuscitation may lead to poor oxygen supply to the brain cells which increases the risks of birth asphyxia (Abdo et al. 2019:2).

Healthcare system factors

The literature indicated that the health system also contributes to birth asphyxia by

- Short acute malnutrition among pregnant women, can lead to low birth weight and developmental delays, which increases the risks of birth asphyxia.
- Shortage of skilled health care providers during delivery in government hospitals especially skilled midwives, which can increase the risk of birth asphyxia in case of a complicated delivery.
- Poor access to healthcare services, which leads to a lack of antenatal visits which can lead to pregnancy complications not being treated and increases the risks of birth asphyxia. Some facilities do not have resources and equipment, some facilities use Pinard fetal stethoscopes to monitor the fetal heart rate throughout labour as they do not have cardiotocography machines. This increases the risk of undiagnosed fetal distress during labour, which leads to increased risks of birth asphyxia (Woday et al. 2019:4-9), (Igboanugo et al. 2019:1051).

In the preliminary literature, it was revealed that neonatal and intrapartum-related factors like serve maternal hypertension, advanced maternal age, maternal anaemia, prolonged rupture of membranes and prolonged labour were found to be significant factors contributing to birth asphyxia amongst fetuses and neonates (Abdol et al, 2019:2). According to Mershram and Bokade (2019:30), the factors that contribute to birth asphyxia can be associated with primigravida deliveries who are at risk of cephalopelvic disproportion resulting in prolonged labour.

Advanced maternal age and lack of attendance in antenatal care where the woman is at high risk of undiagnosed multiple pregnancies also contributed to birth asphyxia (Alemu et al, 2019:70). Sometimes midwives facilitate the progress of labour through induction by using oxytocin, which might cause uterine hyperstimulation resulting in diminishing of uteroplacental blood flow resulting in fetal hypoxia (Gabkika et al., 2018:152). Other factors identified that might lead to asphyxia are prolonged rupture of membranes with the increased risk of cord prolapse that will impair blood supply to the foetus and result in fetal heart rate abnormalities. The presence of meconium stained liquor during labour is an indication of foetal distress that might results in birth asphyxia (Alemu et al, 2019:72). Prematurity, the risk for preterm labour is associated with maternal and fetal factors such as uterine fibroids, multiple births and malpresentations (Aslam, Saleem, Azal, Iqbal, Saleem, Shaikh & Shahid, 2014:2). These factors

increase the risk of placental abruption due to increased stretching of the uterus results in antepartum haemorrhage and increased risk of prematurity (Alemu et al, 2019:70). Hypertensive disorders in pregnancy such as pre-eclampsia/ eclampsia increase the risk of impairment in utero-placental blood flow resulting in fetal hypoxia and fetal heart rate abnormalities (Mershram & Bokade 2018:26). It is therefore important for midwives to observe the woman's blood pressure with every ante-natal care visit to identify hypertensive disorders early as they are preventable and treatable and can lead to the prevention of birth asphyxia in infants (NDoH, 2015:86).

Strategies to prevent birth asphyxia

Moreover, to prevent conditions that might predispose birth asphyxia, pregnant women should be advised to start antenatal care as soon as they find out that they are pregnant. During antenatal visits, women should be educated on a healthy diet and the importance of exercising during pregnancy because women who are obese are at risk of developing complications (Davidson, London & Ladewig, 2012:395). Routine blood investigations on pregnant women should be taken more frequently in women who are at risk to deliver a baby who is asphyxiated at birth to prevent its occurrence (Davidson et al, 2012:425).

According to guidelines for maternal care in South Africa (2016:22-23) during the antenatal care visits pregnant women that are at high risk are done routine ultrasound examinations (which include fetal medicine scans and Doppler ultrasounds) to detect fetal anatomy for abnormalities, to examine the uterus and other pelvic anatomy, to determine the number of fetus and placental structure, to examine blood flow patterns and to monitor fetal growth, the amount of amniotic fluid and to determine the position of the fetus. Routine blood investigation includes heamoglobin, Rhesus blood group, rubella immunity, hepatitis B, Syphilis, HIV, hepatitis C, blood glucose screening and full blood count. A haemoglobin test is done on physical status and anaemia. A rhesus blood group test is done to determine whether the patient is Rhesus positive or negative, and whether the patient has Rhesus antibodies. Rubella immunity test is done to detect protection against the rubella virus. A hepatitis B test is done to prevent passing the virus on to the newborn baby during delivery if the mother has hepatitis B. Syphilis test is done because during pregnancy it is associated with stillbirths, neonatal deaths, bone deformities, blindness to the baby and neurological impairment. HIV test is done to prevent HIV from passing through the placenta to infect the fetus. A hepatitis C test is done as the baby can contract hepatitis C in-utero, during labour and during the postpartum period through contact with blood. A blood glucose screening test is done to check for gestational diabetes. A Full blood count test determines the count of red blood cells, white blood cells, plate cell haemoglobin and haematocrit (Guidelines for maternal care in South Africa, 2016:22-23). During labour, midwives should be more observant and monitor contractions and

fetal heart rate continuous using a cardiotocography, especially for those women who are at risk (Davidson et al, 2012:942). For early detection of abnormal changes in labour, four hourly monitoring of a woman in latent phase of labour and two hourly monitoring in active phase of labour as per maternal guidelines must be done. Early detection of abnormalities in labour will help midwives in decision-making on when to intervene when the problem arises during labour (Davidson, London & Ladewig, 2012:564). A study conducted in one of the referral hospitals in Southern Ethiopia, in 2017 indicated that in 262 postnatal mothers with live infants, 32.8% of the infants had birth asphyxia (Alemu et al, 2019:72). The studies conducted further indicated that factors associated birth asphyxia were anaemia in pregnancy, chronic hypertension, meconium-stained amniotic fluids and low birth weight newborns (Wayessa, Belachew & Joseph 2018:1292; Alemu et al, 2019:70).

Signs and symptoms to indicate birth asphyxia

According to Woday, Muluneh and Denis (2019:12) the following signs and symptoms indicate the birth asphyxia:

- Apgar score of < 7
- Cyanosed (a bluish or purplish discolouration of the skin)
- Low heart rate.
- Not breathing or very weak breathing
- Poor muscle tone
- Grunting
- Lethargic
- Low blood pressure
- Abnormal blood clotting (Woday et al. 2019:2).

2.3.3. Healthcare workers' views and management of birth asphyxia

According to Ayebare et al. (2021:4 -5), healthcare workers diagnosed birth asphyxia as low Apgars of less than 7 or when the infant is born and does not cry. Health care workers mentioned signs and symptoms such as chest in-drawing, nasal flaring, grunting, gasping, blue skin discolouration and a lack of cord pulsation as the indicators of birth asphyxia. Healthcare workers mentioned stimulants for the newborn, suctioning and positive pressure ventilation using the Ambu bag as an aspect of resuscitation.

2.3.3.1 Midwives' view on what can be done to prevent birth asphyxia

Most importantly, to prevent conditions that might predispose birth asphyxia, pregnant women should be advised to start antenatal care as soon as they find out that they are pregnant. During antenatal

visits, women should be educated on a healthy diet and the importance of exercising during pregnancy because women who are obese are at risk of developing complications (Davidson, London & Ladewig, 2012:395). To prevent birth asphyxia healthcare workers must ensure that the mothers understand the signs of labour and when to seek health care was also mentioned to be important. Furthermore, the study health care workers said that it is the key to screen women from early in pregnancy to identify and manage risk factors of birth asphyxia such as pre-eclampsia and anaemia. Preventive measures suggested during labour included proper hydration of mothers encouraging them to drink fluids, proper monitoring of labour, proper pelvic assessment and acting in case of any abnormalities was another way to prevent asphyxia (Ayebare et al 2021:7).

2.3.4. Management of birth asphyxia

Immediate management of an asphyxiated newborn

During resuscitation asphyxiated neonate may require bag and mask ventilation and the baby might require intubation with or without medication .

Mild asphyxia

According to Standard treatment protocol for management of common newborn conditions in small hospitals a baby that requires a bag and mask ventilation for less than 60 seconds and does not require intubation or medications at birth. Assess the baby 5 minutes after birth for sensorium and tone and look for abnormal movements. Shift to the mother's side to initiate breastfeeding if not able to breastfeed start alternative methods of feeding.

Moderate to severe asphyxia

A baby requiring bag and mask ventilation for 60 seconds or more, needed for intubation and medication at birth. Check vitals temperature, heart rate, capillary refill time, colour, oxygen saturation, respiratory rate, lower chest retractions and abnormal movements.

- Maintain normal temperature– if hypothermia follows standard treatment protocol. Avoid hyperthermia (temperature > 37.5C)
- Maintain oxygenation and ventilation- secure airway, start oxygen by nasal cannula or hood if SP02 is < 90% (target SP02 90- 95%)
- Maintain normal perfusion- administer normal saline bolus if capillary refill time is prolonged, transfuse if there is evidence of blood loss and if in shock follow standard treatment protocol.

- Maintain normal blood glucose- start iv 10% Dextrose for the next 12 hours, and check blood glucose every 12 hours in the first 48-72 hours of life. Maintain blood glucose between 60-120mg/dL, if hypoglycaemic follow standard treatment protocol.
- Watch for seizures- administer phenobarbitone if the baby has seizures (follow standard treatment protocol for seizures)
- Assess if the infant has encephalopathy 8 hours until 72 hours based on consciousness, tone, seizures and sucking reflexes or respiration (WHO guidelines, 2015).

2.3.5 Resuscitation and stabilisation in the delivery room

According to (Araez et al,2018:215-216) in Spain all neonatal units in tertiary care hospitals have specific protocols for resuscitation and stabilisation in the delivery room of newborns, that exhibit signs of birth asphyxia in adherence with current recommendations. These hospitals have staff specifically trained in neonatal resuscitation and avoid the administration of calcium and sodium bicarbonate. They also report turning off the radiant heat of the incubator once the newborn has stabilised after resuscitation. While current guideline calls for preventing hyperthermia and initiating therapeutic hypothermia in newborns with moderate to severe HIE, they do not specify the measures that should be initiated during resuscitation. After the initial stabilisation monitoring of various physiological parameters, including heart rate, blood pressure, respiratory function and body temperature is standard practice in the management of birth-asphyxiated infants (Araez et al,2018:215-216). South African midwives follow the newborn resuscitation algorithm by the Resuscitation Council of South Africa when resuscitating in the delivery room or nursery. See the algorithm below.

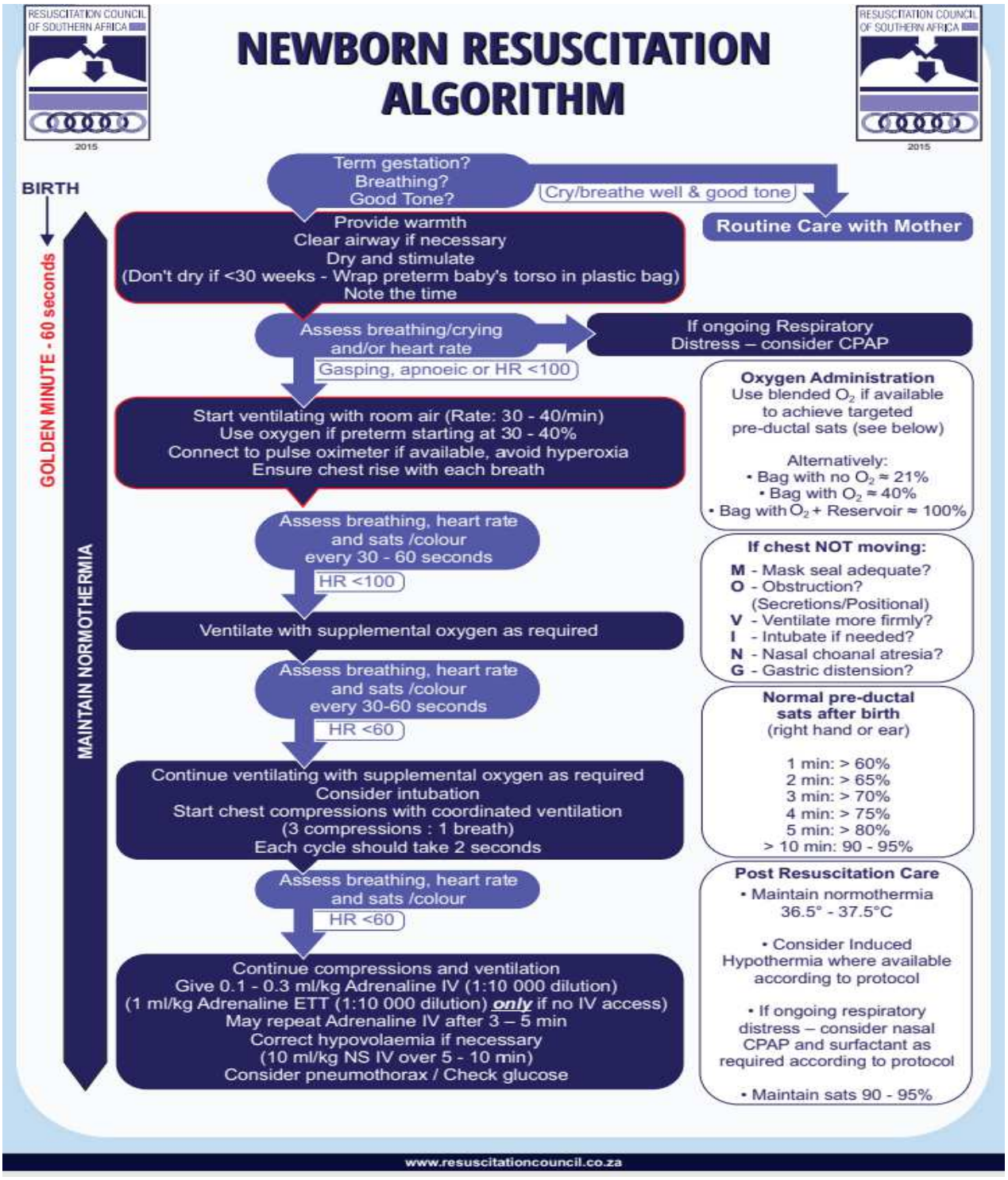

Figure 2.3. (Newborn resuscitation algorithm):

2.3.5.1 Control of body temperature

A key aspect in the care of newborns with perinatal asphyxia is the control of body temperature from minutes after birth until the decision is made whether to use therapeutic hypothermia or not. For each 1-degree Celsus increase in body temperature, there is an up to 4-fold increase in the odds ratio for death or moderate to severe neurologic impairment. Consistency with this knowledge 98% of hospitals reported transferring the newborn to the neonatal unit with the heat of the transport incubation off and monitoring the rectal temperature in the first hours of life to avoid excessive cooling and more importantly hyperthermia. In addition, most hospitals reported that they maintained a body temperature of below 36C (Araez et al, 2018:216-217). In South Africa, midwives and advanced midwives working in a neonatal department in a selected mother and child hospital starts body cooling using a body cooling machine immediately when it is prescribed.

2.3.5.2 Control of comorbid factors

Birth asphyxia is an important cause of hypoglycaemia due to the anaerobic metabolism of glucose. Furthermore, the concomitant presence of hypoxaemia and ischaemia may increase the vulnerability of the neonatal brain to hypoglycaemia. A blood glucose level of less than 40-46.8mg/ dL in the early hours of life increases the risk of developing moderate to severe HIE and of subsequent death or neurologic impairment. All hospitals reported measuring blood glucose levels at least once and initiated fluid therapy on admission. It is important to assess for the presence of acidosis or hyperlactatemia which could be signs of poor intestinal perfusion (Araez et al,2018:217).

2.3.5.3 Supportive care therapy

According to Golubnitschaja et al (2011:205) in clinical settings after the resuscitation of an infant with birth asphyxia, the emphasis is on supportive therapy. Several interventions have been proposed to attenuate secondary neuronal injuries elicited by asphyxia, including hypothermia. Hypothermia has been pointed out to be an effective intervention against the secondary neuronal injury, elicited by birth asphyxia. applied immediately after birth asphyxia hypothermia generally lowers metabolic rates and diminishes the glutamate levels in the brain. Nicotinic acid and nicotinamide have been proposed to protect against oxidative stress, ischaemic injury, and inflammation by replacing the depletion of the nicotinamide adenine dinucleotide (NADH/NAD) pair produced by polymerase- 1(PARP-1), which is over-activated under severely hypoxic conditions. Therapeutic application of nicotinamide has been reported to prevent several of the changes induced by perinatal asphyxia on monoamines even if the treatment is delayed for 24hrs suggesting a clinically relevant therapeutic window. Therefore, this approach is currently considered as the therapeutic strategy against the long-term deleterious

consequences of birth asphyxia as well as for several pathophysiologic conditions such as myocardial reperfusion injury, stroke, neurotrauma, arthritis, multiple sclerosis, and severe complications secondary to diabetes mellitus. The application of low concentrations of nitric oxide (NO)- inhibitors is beneficial against extensive ischaemic lesions in the brain. Pre and post-hypoxic treatment with N-methyl-D-aspartate (NMDA)- receptor antagonists appear to reduce cerebral tissue injury. Calcium channel blockers have also been demonstrated to have beneficial effects by reducing post-asphyxia lesions in the brain. Pre-treatment with barbiturates may improve survival and reduce the severity of brain injury. It reduces cerebral metabolism and decreases oxygen consumption by lowering the oxygen consumption it prevents free-radical destruction of the cell membranes. The barbiturate pre-treatment reduces the intra and extra-cellular accumulation of water and in this way prevents convulsions (Golubnitschaja et al 2011:205) .

Emotional, psychological, and developmental support are essential components of the care of small and sick newborns. Newborns were formerly considered to be unaware of their environment and unable to participate in meaningful interaction. This belief has been disproved. Emotional, psychosocial, and developmental support provides an environment for the survival and thriving of the newborn (World Health Organization, 2020:108).

Nurturing care comprises the conditions necessary for babies' and children's health, nutrition, security and safety and responsive caregiving and opportunities for early learning. Nurturing care starts before birth, and keeps the newborn safe, healthy, and well-nourished. Ensures that their needs are met and they can interact with their caregivers and others. Small and sick newborns are a vulnerable group who benefits more from nurturing care and are at risk of developmental difficulties without it. Caregivers need guidance in their interactions with their small or sick newborns because the behaviour and response of these babies are often less predictable than those of others (World Health Organization, 2020:108).

Developmental support care introduced in the 1980s, consists of a broad category of interventions designed to minimise the stress of the neonatal intensive care environment. Various strategies have been used to modify the environment to decrease stress on the newborn, including controlling external stimuli (vestibular, auditory, visual, tactile), clustering nursery care activities, minimal handling, intentional positioning (nesting, prone position, swaddling) and protective sleep. Programs such as Newborn Individualised Developmental Care and Assessment Program Combine these strategies according to need. (World Health Organization, 2020:108).

Nurses in neonatal intensive care units in high-income countries generally practice minimal handling and grouping of interventions, when possible, as tolerated by the infant. Care should maximise contact

with parents especially mothers, to encourage bonding and support lactation and breastfeeding. It should also include the correct positioning of the newborn to protect the skin, safeguard sleep and minimise stress and pain (World Health Organization, 2020:108).

If the above-mentioned management of birth asphyxia failed or if it was not done correctly it can lead to long-term complications of birth asphyxia.

2.3.6. Long-term complications of birth asphyxia

Severe degrees of asphyxia can cause severe multi-organ damage resulting in brain damage, lung dysfunction, cardiomyopathy, renal failure, hepatic failure, and necrotising enterocolitis. From these damages, brain damage is of greatest concern because the survivors are likely to have lifetime complications like permanent seizure disorder, intellectual incompetence, and motor deficits. This has raised the demand for costly technological care of asphyxiated newborns though little can be done for severely asphyxiated neonates in the health care system (Bayih et al. 2020:2). In the first days of life, birth asphyxia may lead to generalised organ damage such as acute kidney injury while long term complications may include infant neurological disorders or cognitive impairment (Ayebare et al. 2021:2). According to Abdo et al. (2019:2) birth asphyxia is a leading cause of brain damage, if severe it can injure brain cells and cause potentially fatal conditions including hypoxic-ischemic encephalopathy (see management of HIE below the long-term complications), brain injuries, autism, attention deficit hyperactivity disorder, seizures, cerebral palsy. Survivors often face lifelong health problems such as disabilities, developmental delay, palsy, intellectual disabilities, and behavioural problems, furthermore, birth asphyxia places financial and emotional burdens on the families and communities involved. According to Golubnitschaja et al (2011:200), the latter is the most frequent cause of perinatal and neonatal death as well as of severe injury of the central nervous system and damage to other organs resulting in, nephropathy and cardiomyopathy as the most usual long-term outcome.

The long-term effects of mild asphyxia are completely underestimated, due to less dramatic short-term outcomes compared to severe asphyxia. Although mild insults do not cause perinatal death, the most frequent long-term outcome include functional psychotic syndromes, attention deficit disorder, hyperactivity, epilepsies, schizophrenia, diabetes mellitus, cancer, and hypoxic-ischaemic encephalopathy. Identification of newborns with hypoxic ischaemic encephalopathy abnormality in electrocortical activity detected by an Electroencephalogram (EEG) has been used to determine the

indication of therapeutic hypothermia in newborns with perinatal asphyxia and more commonly to monitor brain function during the acute phase of encephalopathy and defect silent seizures (Araez et al, 2018:219).

2.4. Impact of the long-term complications of birth asphyxia on family, child, and health care system

2.4.1 Impact on the Family

The long-term complications of birth asphyxia can have a negative impact on the family on financial and time costs. It can be physically and emotionally demanding. The parents may have increased stress levels, which take a toll on their mental and physical health. It can be difficult for families to find appropriate and affordable childcare, which can affect decisions about work, and education. On the positive side, it can increase the family members' awareness of their inner strength, enhance family cohesion and encourage connections to community groups or religious institutions (Reichman, et al. 2008:679).

2.4.2 Impact on the Child

The long-term complications of birth asphyxia can leave the child suffering from anxiety or depression, the child can have attachment difficulties. It can be difficult for a child to learn, understand or do things compared to other children of the same age (Reichman, et al. 2008:679).

2.4.3 Impact on the Healthcare System

The child may need frequent medical testing, hospital stays, equipment, therapy, and medication, which can also hurt the health system as the child might be having serious special needs (Reichman, et al. 2008:679). Based on the literature review in this chapter, it is clear that birth asphyxia is a major contributor to neonatal mortality worldwide resulting in neonatal mortality and morbidity. Midwives and advanced midwives must know the factors contributing to birth asphyxia, the long-term effects of birth asphyxia and the management of birth asphyxia to reduce the cases of birth asphyxia and reduce the mortality rate related to birth asphyxia (Bayih et al, 2020:2) .

2.5. Summary

In this chapter, the researcher presented literature on birth asphyxia. The following was discussed linked to birth asphyxia, factors contributing to birth asphyxia, signs and symptoms of birth asphyxia, management of birth asphyxia, support care therapy, the long-term complications of birth asphyxia and

its impact on the child, family, and healthcare system. Then Chapter 3 presents the research methodology used to assess potential factors contributing to birth asphyxia.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1. Introduction

Chapter 2 focused on the literature review. This chapter presented the methodology used in this study. The choice of method to conduct the study was deductive. According to Leedy et al (2019), deductive reasoning moves from the general to the specific or from a general premise to a particular situation or conclusion. Quantitative research, therefore, forms the basis of the research design and methods, population and sampling, pilot study, data collection methods, data analysis, validity and reliability, ethical consideration, privacy, confidentiality, and anonymity as adopted and explained in this chapter.

3.2. Research Methodology

Brink et al (2018:19) describe the methodology as how the researcher should obtain the knowledge. In this study, the word methodology refers to how research was done, and the logical sequence applied. The focus of this study was to determine the knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province, therefore the research approach was quantitative.

3.3. Research Design

Research design is defined as a plan that shows how the study is going to look, a plan according to which data will be assembled. Its purpose is to provide a scheme for achieving the objectives of the study by providing the research questions, hypothesis, and study objectives (Brink, 2007:92). The design for this study was quantitative descriptive and cross-sectional in nature. The design assisted the researcher to reach the objectives of the study which were to identify and assess the knowledge and perceptions of potential factors contributing to birth asphyxia from midwives working in the selected mother and child hospital in Gauteng province.

3.4. Quantitative Research

3.4.1. Features of Quantitative Research

Burns and Grove (2021:30- 35) differentiate between quantitative and qualitative research approaches and note that qualitative is best defined as a formal, objective, systematic study process implemented to obtain numerical data to answer a research question. This research approach is used to describe life experiences, cultures, and social process from the perspectives of the persons involved in their natural settings whereas the quantitative approach is used to describe variables, examine relationships among

variables and determine cause-and-effect interactions between variables. Quantitative and qualitative research complement each other because they generate different kinds of knowledge that are useful in nursing practice. The problem to be studied and the purpose to be achieved determine the type of research to be conducted and the researcher's knowledge of both types of research promotes accurate selection of the methodology for the problem identified. Quantitative and qualitative research methodologies have some similarities because both require research expertise, follow steps of the research process, involve rigour in implementation and result in the generation of scientific knowledge for nursing practice (Burn & Grove, 2021:31).

Assumptions of Quantitative Research

Assumptions are believes that are accepted as true, without proof. In a statistical testing a belief related to a data set that in untrue, may invalidate the test's results for that particular set (Burn and Grove, 2021:804). The selected approach made a foundation of the study, the study was guided positivist paradigm. The positivist paradigm refers to researcher's attempts to explain the phenomena they study in the most economical way (Kivuja & Kuyini, 2017:30).

- A quantitative research paradigm is founded on, amongst others, the following assumptions:
- Assumptions are statements that are taken for granted or considered true, even though they have not been scientifically tested.
- Assumptions are often embedded in thinking and behaviour, uncovering them requires introspection.
- Sources of assumptions includes universally accepted truths, e.g. divorce has some relationship to childhood happiness.
- Assumptions are embedded in the philosophical base of the framework, study design and interpretation of findings.
- Theories and instruments are developed on the basis of assumptions that the researcher may or may not recognise.
- Assumptions influence the development and implementation of the research process.
- Assumptions influence the logic of the study, so their recognition leads to more rigorous development (Burn & Grove, 2005:40).

3.4.3. Motivation for Using a Quantitative design in this Study

The quantitative research approach and its assumptions are compatible with the research hypothesis, research question and research objectives of the study. Assessing the knowledge and perception of potential factors contributing to birth asphyxia allows for further research to be carried out. Furthermore,

it aids in identifying the gaps midwives had in their knowledge of factors contributing to birth asphyxia. A quantitative approach was considered suitable for this study as it afforded the collection and analysis of data using preconceived ideas of what should be collected and there were previous studies to provide the base for this study. Quantitative research is a means of testing objective theories by examining the relationship among variables. These variables can be measured typically on instruments so that numbered data can be analysed using statistical procedures (Khaldi, 2017:19).

3.4.4. Methods of Quantitative Research

Quantitative research involves research question and the objectives of the study. This study involved a literature review from the beginning of the study. Immediately after the researcher identified the problem, the literature review started. The literature review helped in the formulation of the problem, refining the research question, contextualising the study, and guiding the conceptualisation of relevant objectives. It also guided the research on which method or research design to follow in this study, the quantitative approach was used (Burns and Grove, 2021:152).

The data collection tool used in this study was the questionnaire. Closed-ended questions were formulated. The probability sampling method was used and a total population sampling was deemed suitable for this study. The quality of data was assessed by validity and reliability measures, but unlike the qualitative research approach, trustworthiness was not considered. Analysis of data was performed using the Statistical Package for Social Sciences (SPSS).

3.4.5. Quantitative Research Approaches Used in Published Studies on Birth Asphyxia

Several studies were conducted using quantitative approaches in several countries. An example of such a study is the one carried out in a referral hospital in Southern Ethiopia in 2017 indicated that in 262 postnatal mothers with live infants, 32.8% of the infants had birth asphyxia (Alemu, 2019: 72). The study further indicated that factors associated with birth asphyxia were anaemia in pregnancy, chronic hypertension, meconium-stained amniotic fluids, and low birth weight newborns (Wayessa, Balechew & Joseph, 2019: 70). To prevent birth asphyxia health care workers emphasised that mothers should be taught to come early in labour, ensure that the mother understands the signs of labour and when to seek for health care was also mentioned to be important. Further, the study health care workers said that it is key to screen women from early in pregnancy to identify and manage the risk factors of birth asphyxia such as pre-eclampsia and anaemia in pregnancy.

3.4.6. Advantages and Disadvantages of Quantitative Research

The quantitative research approach allowed the researcher to collect sufficient information in a short period. The research used structured procedures and formal instruments to collect data that were easy to analyse statically rather than analysing narrative data which will take more time (Brink, 2007:154). However, the disadvantage is that the researcher can be subjective when analysing data and can be biased when reporting data. Data can be used to explore a new area of the study and can provide rich descriptions which are of value for mothers, midwives, and subsequent researchers (Brink, 2007:154) .

3.5. Research Methods

A quantitative research design is defined as a blueprint, pattern or recipe for the study and determines the methods used by the researcher to obtain subjects, collect data, analyse the data, and interpret the results (Brink et al, 2018:92). A quantitative research design was suitable for this study because the researcher used a non-experimental design where the survey study was conducted by collecting data from a defined population. This allows the researcher to make detailed descriptions of existing phenomena with the intent of utilising the result to justify current conditions and practices or to make further plans to improve the situation. The investigator conducted the study on advanced midwives and midwives to determine the knowledge and perceptions regarding the potential factors contributing to birth asphyxia without giving them pre-test data was collected (Brink, 2007:106).

3.5.1 Cross-sectional research design

Cross-sectional research is defined as a non-current in nature and is done at a specific point in time. All the information on a specific topic is collected at the same time from the same participants (Brink et al, 2018:85). Exploratory research describes an information- seeking problem context that is open-ended, persistent and multifaceted and information- seeking processes that are opportunistic, iterative and multitactical (White and Roth, 2009:2). This method was seen to be appropriate as the study investigated the knowledge and perceptions of advanced midwives and midwives regarding the perceived potential factors contributing to birth asphyxia.

3.6. Study Setting

The study was conducted at one of the mother and child hospitals located in the West Rand of Johannesburg Gauteng. It is a suburb located in Region B of the City of Johannesburg. Eighty to ninety percent of patients in this hospital are illiterate as most of the patients are foreigners. Rahima Moosa Mother and Child Hospital accommodate patients from Diepsloot, Cosmo City, Roodepoort, Randburg, Mayfair, Crosby, Auckland Park, Newlands, and Westbury. Most patients in this hospital came in as

unbooked, and never attended antenatal care visits, as most of their patients are foreigners without documents. Some of their patients cross the border just for delivery.

3.7. Population and Sampling

A population refers to the entire group of persons or objects that is of interest to the researcher and which meet the criteria they are interested in studying (Pilot & Beck, 2017:131). In this study, the population comprised advanced midwives and midwives working in a maternity and neonatal department. A sample subset of the population is selected for a study (Burn & Grove, 2021:823). The probability sampling method was used and a total population sampling was deemed suitable for this study. Total population sampling was used as it implies that all elements in the population have an equal chance of being included in the sample (Brink et al, 2018:119). Thus, because the number of midwives and advanced midwives is 72 in number, all midwives and advanced midwives were included in the study and a total population sampling was used in the study to select all advanced midwives and midwives working in maternity and neonatal departments.

3.7.1. Inclusion and exclusion criteria

The following inclusion and exclusion criteria were followed:

Inclusion criteria was

- They can either be male or female midwives who gave consent to voluntary participation in the study.
- They should be working in the maternity or neonatal department in a selected mother and child hospital in Gauteng province.
- They should be registered with the South African Nursing Council as a midwife or as an advanced midwife.
- Respondents should be communicating in English, as it is the official language used in the hospital.
- Respondents should have 2 years of experience in midwifery and neonatal care.

Exclusion criteria was

- All midwives and advance midwives who refused to participate in the study, those who were not working in the maternity or the neonatal department in a selected mother and child hospital in Gauteng province or do not have the required two years of experience.

3.8. The Pilot study

A pilot study is defined as a small-scale study conducted before the main study with a limited number of participations. It aims to investigate the feasibility of the proposed study and to detect possible flaws in the methodology (Brink et al, 2018:161). A pilot study was conducted on 9 advanced midwives and midwives working in the postnatal wards. The participants of the pilot study were not included in the main study. The sample of the pilot study indicated to the researcher whether the population selected was suitable for the study. The variability of the study was determined through the pilot study (Brink, 2007:54). The pilot study was conducted on participants with the same characteristics. Questionnaires were formulated for participants to determine if the design was suitable or not. The cost and length of the main investigation were estimated during a pilot study. The pilot study was done in the hospital arrangements were made with the unit managers of the postnatal wards to avoid interrupting the ongoing routine.

- ✓ The completion of questionnaire took 30-35 minutes less than the estimated time, the midwives were not familiar with the term ‘perinatal asphyxia’, so the term was changed to ‘birth asphyxia’ respectively. All midwives read the instructions correctly as all questionnaires were completed. Only 4 midwives out of 9 knew the management of birth asphyxia.

3.9. Preparation for Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate outcomes (Kabir, 2016:201). Gaining entry to the study involved obtaining approval from the University of Pretoria, the University of Witwatersrand, and the Gauteng Department of Health.

3.10. Data Collection Methods

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate outcomes (Kabir, 2016:201). Data collection often employs measuring instruments to gather research data from the target population. Self-administered questionnaires were used for data collection. This method was chosen because it was a quick way of obtaining data from a large group of people (Brink et al, 2018:139).

3.10.1 Recruitment of Participants

After the researcher received the approval letters from the hospital nursing deputy director and the hospital chief executive officer. The researcher approached the unit managers of the maternity and

neonatal departments and informed them about the study. Thus, they were asked for their assistance with the off duties of the midwives. The researcher introduced herself to the participants, informed them about the study and asked for their permission to participate in the study.

3.10.2 Questionnaire design

The researcher designed the questionnaire with the help of the statistician, the literature review was used to develop questionnaires. Structured and closed-ended questions were formulated. Questionnaires were formulated in English because the participants were midwives who understand English. The questionnaire had several sections. The first section of the questionnaire covered demographic information followed by general information related to participants' work. The subsequent sections covered objective number one (1) of the study which was to identify the potential factors contributing to birth asphyxia. This was followed by a section which addressed objective number two (2) which assessed the knowledge and perceptions of midwives in the management of pregnant women during antenatal care and labour (intrapartum) care (Annexure B).

3.10.3 Distribution of questionnaire

The researcher distributed the questionnaires to the participants during their working hours. The researcher gave specific instructions to clear up possible uncertainties. The participants were given twelve hours to complete the questionnaires and put them inside the boxes that were left in their departments to ensure anonymity after which they were collected. The researcher collected data from all participants. Completion of the questionnaire took 30 to 45 minutes. Therefore, because the total population was used, the researcher spent 5 weeks collecting data.

3.11. Data Analysis

Data analysis is defined as several techniques that are used to display data and they are also aimed at answering the research question (Brink et al, 2018:165). Data were analysed using the Statistical Package for Social Sciences (SPSS) and were presented graphically (Brink, 2007:171). Inferential statistics and a descriptive approach were used in the presentation of the results. Inferential statistics designed to allow inference from a sample statistic to a population parameter (Burns and Grove, 2021:813). A descriptive approach employs measures such as frequency distributions and measures of central tendency (Burns and Grove, 2021:809). Descriptive statistics were used to describe and summarise data collected in this study (Burns and Grove, 2021:809). The researcher worked closely with the statistician to analyse the data collected. Inferential statistics (Chi-square test) were used in

determining the association between demographical information to knowledge and understanding factors contributing to birth asphyxia. A p-value of a=0,05 was used to test the level of significance in this entire analysis (Chapter 4).

3.12. RIGOR

The quality of data was assessed by validity and reliability measures, but unlike the qualitative research approach, trustworthiness was not considered.

3.12.1 Validity and Reliability

Validity refers to the extent to which an instrument reflects or can measure the construct being examined. Validity is an ideal state to be pursued, but not to be attained, as the roots of the word imply, validity includes truth, strength, and value (Burn & Grove, 2021:463- 464). Validity has to do with whether a measuring device covers the full range of meanings or forms that would be included in the variable being measured. Thus, to ensure the validity of the measuring instruments, face validity which means that the instrument appears to measure what it is supposed to measure, was applied. During the pilot study the validity of the instrument was checked by administrating the same questions to advance midwives and midwives working in a postnatal ward who were not included in the main study (Brink, 2007:99). The completion of questionnaire took 30-35 minutes less than the estimated time, the midwives were not familiar with the term ‘perinatal asphyxia’, so the term was changed to ‘birth asphyxia’ respectively. All midwives read the instructions correctly as all questionnaires were completed. Only 4 midwives out of 9 knew the management of birth asphyxia.

Content validity is defined as an assessment of how well an instrument represents all components of the variable to be measured and always precedes data collection (Brink et al, 2018:152). In this study, content validity and information obtained in the literature review were used to develop questionnaires, it was also used during the collection and analysing of data.

Reliability refers to homogeneity, internal consistency addresses the extent to which all items on an instrument measure the same variable (Brink et al, 2018:156). Equivalence reliability involves examining the consistency of scores between two forms of the same measure or instrument or two observers measuring the same event (Burn & Grove, 2021:460). A pilot study was done to ensure that the

questionnaire is reliable. In this study, reliability was checked when the pilot study was conducted. During the pilot study the validity of the instrument was checked by administrating the same questions to advance midwives and midwives working in a postnatal ward who were not included in the main study.

3.13. Ethical Considerations

The permission to conduct the study was obtained from the University of Pretoria Health Sciences Research Ethics Committee, the University of Witwatersrand Health Research Ethics Committee, and the Gauteng Department of Health. The principles of respect for the person, the principle of beneficence and justice were considered, as well as the issue of vulnerable subjects.

3.13.1. Principles of Respect for Person

3.13.1.1. The Right of Self-Determination

According to Burns and Grove (2021:195), the right to self-determination is based on the ethical principle of respect for persons. Respect for people means that humans are capable of making their decisions. Thus, because of this right, humans should be treated as autonomous agents who have the freedom to conduct their lives as they choose without external controls. The risk of coercion was dealt with by indicating the nature and purpose of the study.

3.13.1.2. The Right to Self-Disclosure

The right to self-disclosure implies that participants have the adequacy of information given by the researcher (Sim and Waterfield, 2019:3004). Participants were fully briefed about the nature of the study before data collection.

3.13.1.3. Informed Consent

Informed consent prospective subject's agreement to participate voluntarily in a study, which is reached after the subject assimilates essential information about the study. While collecting a study, you should treat the participants fairly and respect that agreement. If the data collection requires appointments with the participants, be on time for each appointment and terminate the data collection process at the agreed-upon time (Burn & Grove, 2021:208). In this study, advanced midwives and midwives were made to understand that the research will help improve health practices. They will know all the factors that contribute to birth asphyxia. About 30 to 45 minutes were required for them to fill in questionnaires. Also, the informed consent form was designed so that they had to sign it to show that they have entered

into an agreement with the researcher of their free will and that they were free to withdraw from the study at any time (Brink, 2007:35).

3.13.2. Principle of Beneficence

3.13.2.1. The Right to Protection from Discomfort and Harm

The right to protection from discomfort and harm, one should do well, not harm. Therefore, the researcher should protect participants from discomfort and harm while ensuring they receive the greatest possible balance of benefits in comparison with harm (Burn & Grove, 2021:208). The researcher was aware that although physical harm was unlikely to occur from the study like this. The researcher nevertheless tried to be sensitive and responsive to any psychological discomfort and was prepared to provide clarification where necessary.

3.13.2.2. Benefit-risk Ratio

According to Burn & Grove (2021:210), the benefit-risk ratio is the term given to a comparison of the benefits, or risks of a study and is determined based on the maximised benefits and the minimised risks. In this study, participants were informed of the expected benefits and risks. Likely, the benefits were direct or immediate to the participants in this study. The short-term benefits were for the researcher that is to enable the researcher to complete her course of study and allow her to identify the knowledge gaps advanced midwives and midwives about factors contributing to birth asphyxia. Hence, reduce the mortality rate in children under five years of age. A possible risk identified was the loss of time.

3.13.3. Vulnerable Subjects

The term “vulnerable subjects” can be used to refer to people who are unable to give consent (Burn & Grove, 2002:197). Subjects of this type such pregnant women, human foetuses, neonates, children, persons with mental incompetence and prisoners (Burn & Grove, 2021:196). In this study, advanced midwives and midwives aged 25 to 60 were included as they could give consent themselves.

3.13.4. Principle of Justice

This principle includes the subjects’ right to fair selection and treatment and the right to privacy.

3.13.4.1. Right to Fair Selection

The selection of the population and the specific participants of the study should be fair so that the risks and benefits of the study are distributed appropriately. Subjects should be selected for reasons directly related to the problem being studied. Too often participants are selected because the researcher has easy access to them (Burn & Grove, 2021:207). In this study, participants were selected because they possessed the characteristics required by the study objectives. Subjects were selected fairly as they were neither related to the researcher nor the researcher's friends.

3.13.4.2. Right to Fair Treatment

According to Burn & Grove (2021:207), this principle holds that each person should be treated fairly and should receive what he or she is owed. In research, the selection of participants and their assignment to experimental or control group should be made impartially. In addition, their treatment during the course of the study should be fair. In this study, subjects were respected and treated fairly. The researcher indicated that the completion of the questionnaire will take 30 to 45 minutes, the researcher did not exceed this agreed time.

3.13.4.3. Right to Privacy

Privacy is an individual's right to determine the time, extent, and general circumstances under which personal information is shared with or withheld from others. This information consists of one's attitudes, beliefs, behaviour, opinions, and records (Burn & Grove, 2021:203). Individuals who agreed to participate in research have the right to expect that the information collected from or about them remained private and this occurred through either anonymity or confidentiality procedures.

3.13.4.4. Confidentiality and Anonymity

Confidentiality is the researcher's management of private information shared by a participant that should not be shared with others without the authorisation of the participant. When the information is shared in confidence, the researcher should maintain confidentiality (Burn & Grove, 2021:205). Anonymity means that even the researcher cannot link a participant's identity to that participant's responses. In most studies, researchers desire to know the identity of their participants and promise that their identity will be kept confidential (Burn & Grove, 2021:205). In this study, a code was assigned to every participant so that they remained anonymous. Participants did not write their names on the questionnaires and also did not include anything that one can trace to them.

3.13.5. Protection from Harm

The research was planned and undertaken in such a manner as to avoid as far as possible any emotional, physical, social, or economic harm to the subject. The participants were treated fairly and

with respect. The researcher related well to participants, the researcher used questionnaire for data collection, questionnaire did not offend participants. The researcher was transparent when designing the questionnaire (Burn & Grove, 2021:209- 210).

3.14. Summary

The chapter dealt with the research methods that had been followed in this study, addressing the population, sampling procedure and the data collection instrument. Thus, to enhance the validity and reliability of the result, data collection measures were adhered to, and ethical considerations observed. The next chapter will present the data analysis, interpretations, and discussions.

CHAPTER 4

RESULTS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presented the results, its interpretation and discussions of the data collected using questionnaires. Discussions were further supported by the literature. The study aimed at determining the knowledge and perceptions of midwives regarding the potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

Objectives

- To identify midwives' knowledge of the potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province.
- To assess the knowledge and perceptions of midwives regarding the management of pregnant women during antenatal care and labour (intrapartum) care to reduce birth asphyxia.

4.2. Data management and analysis

Data was collected between October 2022 and December 2022 using self-designed questionnaires. The researcher developed questionnaires based on the literature review with an assistance of a statistician to identify the knowledge and perceptions of midwives regarding the potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province. In this study, data analysis was based on 72 questionnaires, all questionnaires distributed were completed. The statistician assisted the researcher with the data analysis using SPSS version 26. Data analysis includes descriptive statistics, the results presented in the form of tables with frequencies and percentages, use of bar charts and pie charts.

4.2.1. Descriptive statistics

According to Burns and Grove (2021:809), descriptive statistics are summary statistics that describe a sample's average and uniformity. Descriptive statistics (mean, median, standard deviation, minimum and maximum) in summarising the results of the study relating to identifying the potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province. This also assesses the knowledge and perceptions of midwives in the management of pregnant women during antenatal care, labour (intrapartum) and post-natal period. This was confirmed by a one-way analysis of variance in evaluating if there is a significant difference between participants that agreed and participants that disagreed with the statements.

4.2.2. Inferential statistics

According to Burns & Grove (2021:813), inferential statistics are statistics designed to allow inference from a sample statistic to a population parameter, commonly used to test hypotheses of similarities and differences in subsets of the sample under study. Inferential statistics (Chi-square test) in determining the association between demographical information to knowledge, understanding and factors contributing to birth asphyxia. A p-value of α=0,05 was used to test the level of significance in this entire analysis. The hypothesis was addressed by conducting a correlation analysis between factors contributing to birth asphyxia and the understanding management of pregnant women during antenatal care, labour and postnatal.

4.3. Demographical information of the participants

4.3.1 Age group

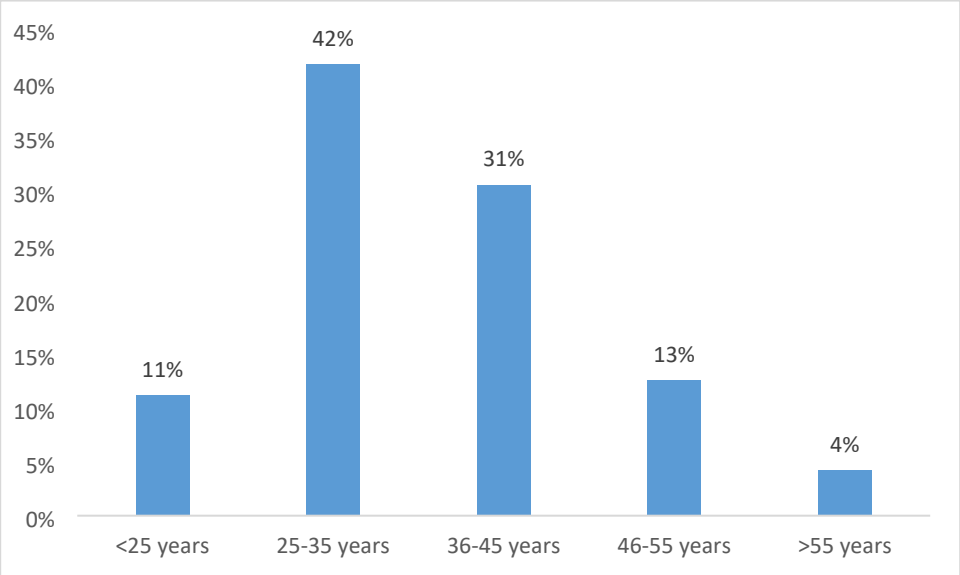

Figure 4. 1: Age group distribution of participants

Table 4.1 and Figure 4.1 depicts that most of the participants were between 25-35 years of age (42%) followed by those between 36-45 years of age (31%). This indicates that the midwifery profession in the study setting is currently dominated by the millennial generation which is between the age of 25-35 years. The average age group of the participants is 36 years with a minimum of 23 years and a maximum of 63 years.

Fewer participants were above the age of 46 (15%) while only 8;11% represented participants younger than 25 years.

Table 4. 1: Age statistics

	Age
N	72
Mean	36,1667
Median	35
Std. Deviation	10,2105
Minimum	23
Maximum	63

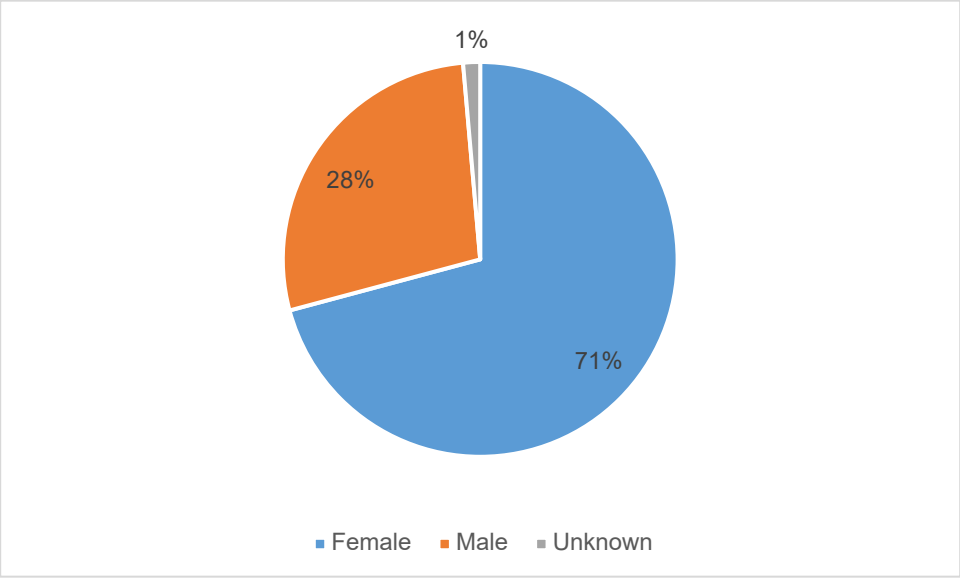

Figure 4. 2: Gender of participants

The majority of participants were female (71%), as compared to the 28% who are males known as accoucheurs (figure 4.2). The South African Nursing Council provisional distribution of nursing manpower versus the population of South Africa (stat. 1/2022) indicates that the midwifery profession is often female-dominated, this is evident in this study.

4.3.2. Educational level

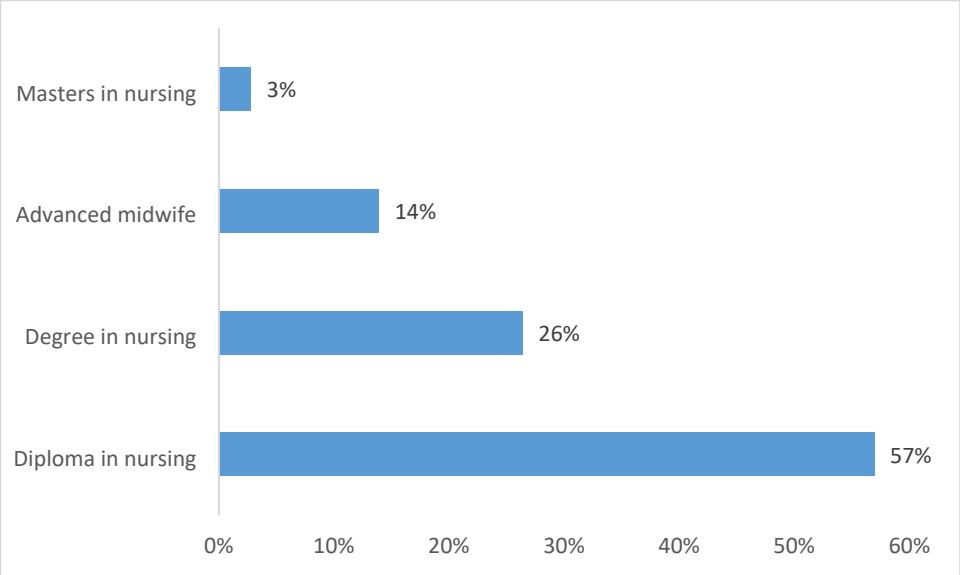

Figure 4. 3: Educational level

As indicated in Figure 4.3, the majority of participants held a diploma in nursing (41;57%) followed by 26% with a degree in nursing and 14% with an advanced midwife. Fewer participants have a master's degree in nursing (2;3%). This implies that only a few specialised in midwifery which might have a detrimental effect on the management of pregnant women which might result in birth asphyxia.

4.3.3. Experience

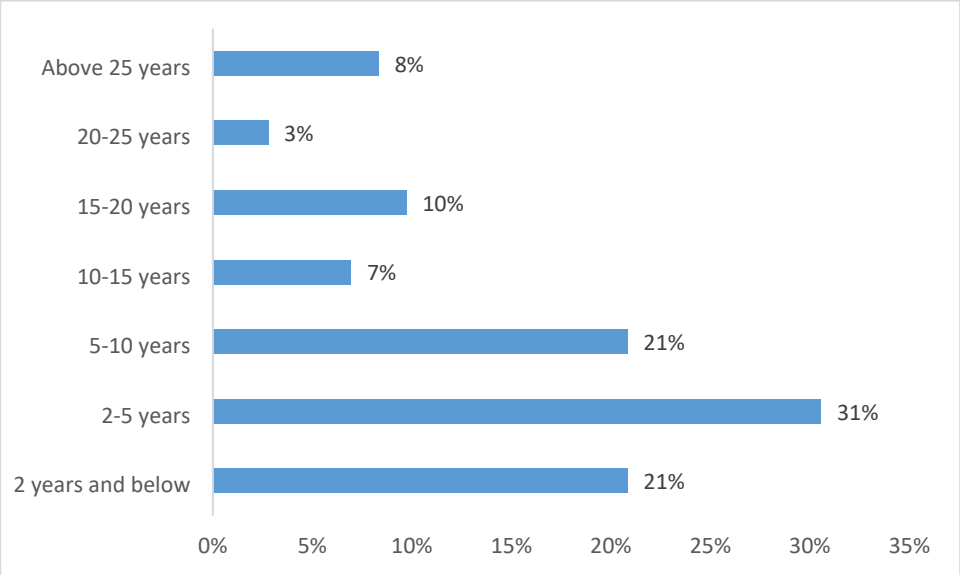

Figure 4. 4: Experience level of participants

In Figure 4.4, most of the participants in this study had between 2-5 years of experience (31%) followed by participants with 5 to 10 years' experience (21%) similar to participants below two years of experience. Participants with between 10 to 20 years of experience were 17% while above 20 years' of experience were represented by 11% of participants. the level of experience is associated with competency as most skills in nursing are repetitive as such, midwives with more years of experience are experts when it comes to the management of pregnant women which includes their labour and post-partum management.

4.4. Reliability

Cronbach alpha was applied to test the reliability of the study. There is 92% internal consistency in statements representing potential factors contributing to birth asphyxia; 89% in statements representing the level of knowledge of birth asphyxia; 93% in statements representing understanding of the management of pregnant women. These results are presented in Table 4.2 below.

Table 4. 2: Reliability

FACTORS CONTRIBUTING TO BIRTH ASPHYXIA	Cronbach's Alpha if Item Deleted	Knowledge of birth Asphyxia	Cronbach's Alpha if Item Deleted	Understanding	Cronbach's Alpha if Item Deleted
Prolonged labour	92%	Low apgars score is the first sign of birth asphyxia	89%	Infant cooling is one of the management of birth asphyxia	93%
Decreased blood supply to the fetus	92%	Birth asphyxia is one of the leading cause of deaths world wide	88%	Birth asphyxiated infant may need to be ventilated as management of birth asphyxia	93%
Unbooked pregnant women	91%	High birth weight babies>4000g are at risk of birth asphyxia	89%	Continuous monitoring of labour may prevent birth asphyxia	93%
Maternal Anaemia	91%	Primipara mothers have four times greater risk of birth asphyxia compared to multiparous women	89%	Infants born with birth asphyxia may need neonatal follow up dates after discharge	92%
Advance maternal age	92%	Majority of cases of perinatal asphyxia occur intrapartum or during labor	87%	Tetanus toxoid vaccination can be used as a prevention	93%
Lack of key skills in assisting women in labour	92%	Mothers with premature rupture of membranes have greater risk of birth asphyxia	88%	Iron folate supplements	93%
Poor use of guidelines	91%	Birth asphyxia can be caused by maternal factors	87%	Detection and management of pre-eclampsia	93%
Lack of training	91%	Birth asphyxia can be caused by uterine factors	87%	Screening and treatment of infectious diseases	93%
Lack of proper awareness given to pregnant mothers	91%	Birth asphyxia can be caused by intrapartum infections	88%	General maternal educational level	93%
Understaffing	91%	Birth asphyxia can be caused by cord factors	87%	Community based intervention should be used to manage quality care for all pregnant mothers	92%
Lack of resources	91%			Health facility based intervention should be used to manage quality care for all pregnant mothers	93%
Lack of support structure for pregnant women	91%			Promotion of health programs and intervention should be regularly conducted for awareness to all pregnant mothers.	92%
Increased patient load	92%			Level of knowledge of midwives can hamper the promotion of health programs	92%
Delayed decision-making	91%			Guidelines/protocols are readily accessible for all midwives to use to provide relevant care to pregnant mothers.	93%
Negative attitude by staff	91%				
Poor communication	91%				
Poor managerial support	91%				
Poor maternal nutrition	91%				
Cronbach's alpha	**92%**		**89%**		**93%**

4.5. General information (training, awareness, guidelines accessibility, counselling, and complications assessment)

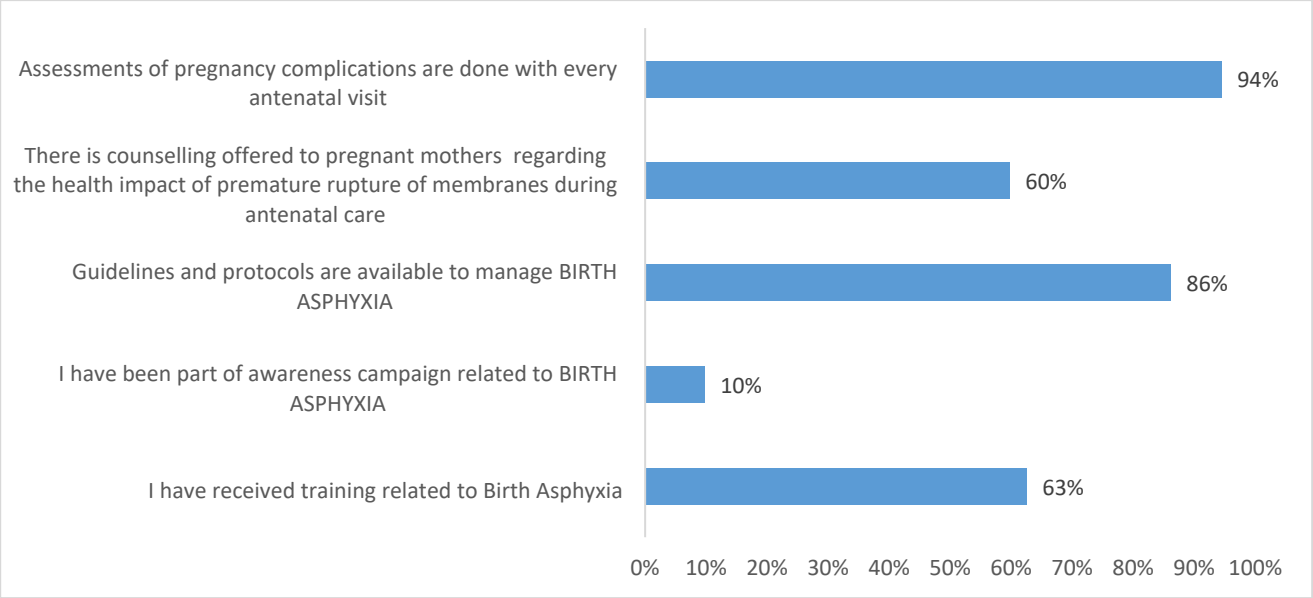

Figure 4. 5: Training, awareness, guidelines accessibility, counselling, and complications assessment

Figure 4.5 presents participants' level of training, awareness, guidelines accessibility, counselling, and complications assessment. The majority of participants have received training related to birth asphyxia (63%); have available guidelines and protocols to manage Birth Asphyxia (86%); have skills to counsel pregnant mothers regarding the health impact of premature rupture of membranes during antenatal care (60%); do assessments of pregnancy complications with every antenatal visit (94%). However, the majority of participants were not part of an awareness campaign related to Birth Asphyxia (90%) compared to 10% that was part of the awareness campaign. The results indicated that assessments of complications are done to pregnant women with every antenatal care visit they have, and the guidelines and protocols are in place to utilise during the management of birth asphyxia although more awareness campaigns and more training about birth asphyxia and its management is still to be done.

In South Africa, protocols and guidelines relating to the management of birth asphyxia are available and training and updates are offered though not to all the midwives (Ramavhoya, Maputle, Lebese & Netshikweta 2021:26). In a study conducted by Ayebare, Ndeezi, Hjelmstedt, Nankunda, Tumwine, Hanson and Jonas (2021:3) in Uganda, Clinical Guidelines on resuscitation to manage the birth

asphyxia stated that the newborn should be dried up and be stimulated. In case there is no response, the cord is clamped and cut to enable the healthcare workers to transfer the newborn to a safe place for resuscitation. The mother should be informed about the condition of her newborn. The health care workers should ensure that the airway of the newborn is free and perform suction of the mouth and nose to remove secretions. The newborn shall then be ventilated until the breaths are more than 30 per minute. If this does not happen, ventilations should be continued at a rate of 40 per minute. If available oxygen should be provided. The guidelines discourage chest compressions citing that they could cause problems if not performed properly. Based on the results of the current, the training provided for midwives and accoucheurs might improve the quality of health care rendered to pregnant women and their unborn babies. Awareness about the condition and its management might improve the outcomes of birth asphyxia.

4.6. POTENTIAL FACTORS CONTRIBUTING TO BIRTH ASPHYXIA

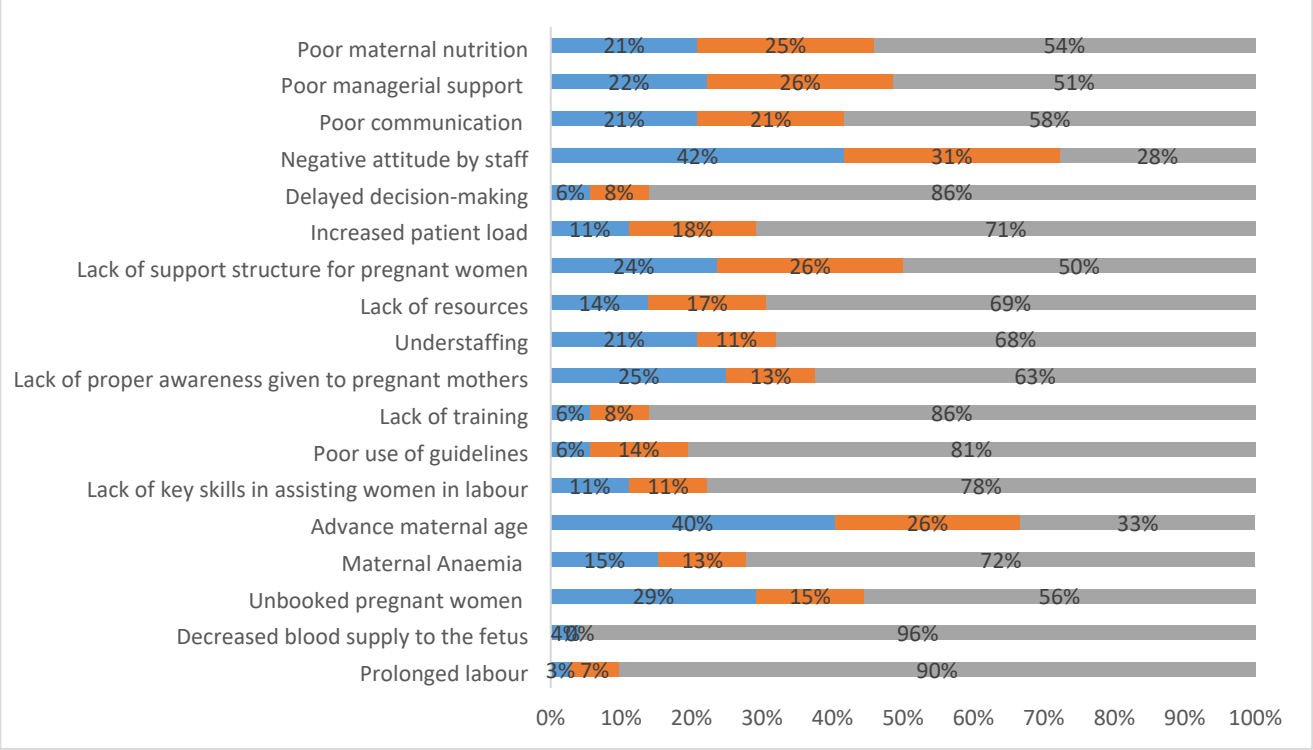

Figure 4. 6: Potential factors contributing to birth asphyxia.

Figure 4.6 presents potential factors contributing to birth asphyxia. The majority of participants (>50%) agreed that what is contributing to birth asphyxia is prolonged labour (58%); decreased blood supply to the fetus (96%); unbooked pregnant women (56%); and maternal anaemia (72%); a lack of key skills

in assisting women in labour (78%); poor use of guidelines (81%); the lack of training (86%); lack of proper awareness given to pregnant mothers (63%); understaffing (68%); lack of resources(69%); lack of support structure for pregnant women (50%); increased patient load (71%); delayed decision-making (86%); poor communication (58%); poor managerial support (51%); poor maternal nutrition (54%) as indicated in Figure 4.6 above. However -less than half of the participants (40%) disagreed that advanced maternal age and Negative attitude by staff (42%) contribute to birth asphyxia.

These results are confirmed by the one-way analysis of variance in Figure 4.6 that there is a significant difference between participants that agreed that prolonged labour; decreased blood supply to the fetus; unbooked pregnant women; maternal anaemia; lack of key skills in assisting women in labour; poor use of guidelines; lack of training; lack of proper awareness given to pregnant mothers; understaffing; lack of resources; lack of support structure for pregnant women; increased patient load; delayed decision-making; poor communication; poor managerial support; and poor maternal nutrition are the contributing factors to birth asphyxia. However less than half of the participants (40%) disagreed that Advance maternal age and Negative attitude by staff (42%) contributes to birth Asphyxia The average percentage of participants that agreed is 66% compared to 17% that disagreed. This shows that there is strong evidence to conclude that the majority of participants agreed that prolonged labour; decreased blood supply to the fetus; unbooked pregnant women; maternal anaemia; lack of key skills in assisting women in labour; poor use of guidelines; lack of training; lack of proper awareness given to pregnant mothers; understaffing; lack of resources; lack of support structure for pregnant women; increased patient load; delayed decision-making; poor communication; contributes to birth asphyxia since the p-value was significantly less than 0,05.Contrary to the results of this study, Kune, Oljira, Wakgari, Zerihun & Aboma (2021:2) stated that prenatal obstetric complications parity, multiple pregnancies, gestational age, birth weight, premature rupture of membranes, prolonged labour and fetal distress were previously identified as the determinants of birth asphyxia. Various international studies found that multiple risk factors: socio-demographic (mother's age, residence, mother's marital status, educational status, occupation), antepartum (ANC follow-up, parity, history of prior neonatal death, pre-eclampsia), intrapartum (prolonged labour, status of amniotic fluid, cephalopelvic disproportion, nature of amniotic fluid), neonatal (preterm babies, birth weight, gestational age) are associated with neonatal asphyxia (Tasew, Zemicheal, Teklay, Mariye, and Ayele, 2018:5; Admasu, Melese, Amare, Zewude, Denku & Dejenie 2022:2). Based on nursing practice more informative educational training on birth asphyxia still need to be done, especially, of factors contributing to birth asphyxia to improve care rendered and for better outcomes for infants born with birth asphyxia, which will also help when managing the pregnant women during antenatal, labour, and postnatal care.

Table 4.3: One-way ANOVA

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Disagree	19	3,371914	0,177469	0,012829		
Agree	19	12,56404	0,661265	0,033525		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2,223559	1	2,223559	95,93808	<0,0001	4,113165
Within Groups	0,834373	36	0,023177			
Total	3,057932	37				

4.7. Level of knowledge of Birth Asphyxia

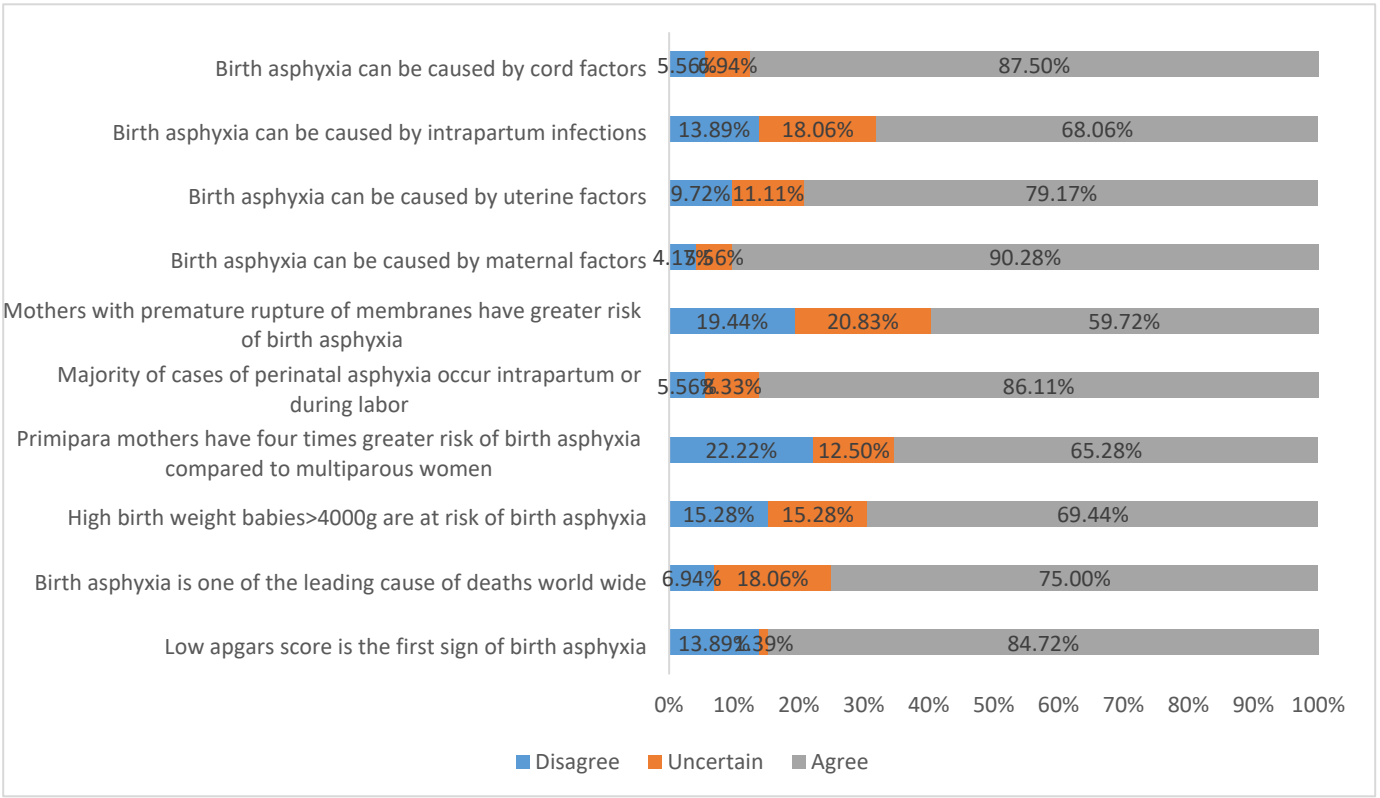

Figure 4. 7: Level of knowledge of birth Asphyxia

Figure 4.7 presents results relating to the level of knowledge of birth Asphyxia. Results show that the majority of participants (>50%) agreed that a low Apgar score is the first sign of birth asphyxia; Birth asphyxia is one of the leading causes of death worldwide as indicated by (75 %), with (69,44%) of participants indicating that high birth weight babies>4000g are at risk of birth asphyxia, More than half

of the participants (65,28%) indicated that primipara mothers have four times greater risk of birth asphyxia compared to multiparous women. The majority of cases of perinatal asphyxia occur intrapartum or during labour as indicated by (86,11%). From the results of the study, it was evident that the majority of participants (59,72%) were of the notion that mothers with premature rupture of membranes have a greater risk of birth asphyxia as compared to (19,44%) who disagreed; Birth asphyxia can be caused by maternal factors as agreed by (90,28%) with (79,17%) indicating the cause as uterine factors, (68,06%) as intrapartum infections and lastly (87,50%) as cord factors. Results further confirm that the majority of the participant on average (76%) agreed compared with 11% that disagreed with the statement relating to knowledge of participants regarding birth asphyxia. Thus, there is strong evidence indicated in Table 4.3 that the majority of participants agreed since the p-value is significantly less than the 0,05 level of significance. The knowledge of the factors contributing to birth asphyxia as demonstrated by participants might be attributed to knowledge gained through education and training.

These results were supported by Amadi, Oluchina, Makworo & Mbithi (2019:65), where the factors contributed to birth asphyxia were attributed to birth trauma, congenital sepsis, intrauterine pneumonia, severe meconium aspiration, cord compression, cardiac abnormalities, obstructed airway, and transplacental anaesthetic. Furthermore, a study conducted in Southern Ethiopia among midwives on their knowledge regarding causes of birth asphyxia found that birth asphyxia was associated with maternal anaemia, pregnancy-induced hypertension, antepartum haemorrhage, and women who attended less than three antenatal care visits Alemu, Melaku, Abere & Damte (2019:70). On the contrary, Krishnan et al (2021:2), stated that proximal health determinants like socio-economic deprivation, maternal illiteracy and unemployment, maternal co-morbidities including hypertension and poor nutrition, and distal health determinations such as socio-cultural factors, child marriages, high home delivery rates, health system factors and failure are all associated with increased incidence of birth asphyxia. In another study conducted by Woday et al (2019:2), related to midwives' knowledge of contributing factors to birth asphyxia, the researchers identified that antepartum risk factors such as maternal age, maternal education, pre-eclampsia and primi gravida were among the causes mentioned to the in condition. From the same study, intrapartum risk factors such as breech presentation, mode of delivery and maternal fever and fetal risk factors (i.e. pre-term babies, fetal distress, and baby weight) were also mentioned as contributory to birth asphyxia (Woday, Muluneh & Denis 2019:3). The level of knowledge on the factors contributing to birth asphyxia as indicated by midwives will assist in the prevention of its occurrence hence the morbidity and mortality rate associated with it will be reduced.

Table 4. 4: One-way analysis of variance _Knowledge

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Disagree	10	1,166667	0,116667	0,003909		
Agree	10	7,652778	0,765278	0,011208		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2,103482	1	2,103482	278,2931	<0,0001	4,413873
Within Groups	0,136053	18	0,007559			
Total	2,239535	19				

4.8. Understanding the management of pregnant women during antenatal care, labour, and post-natal period

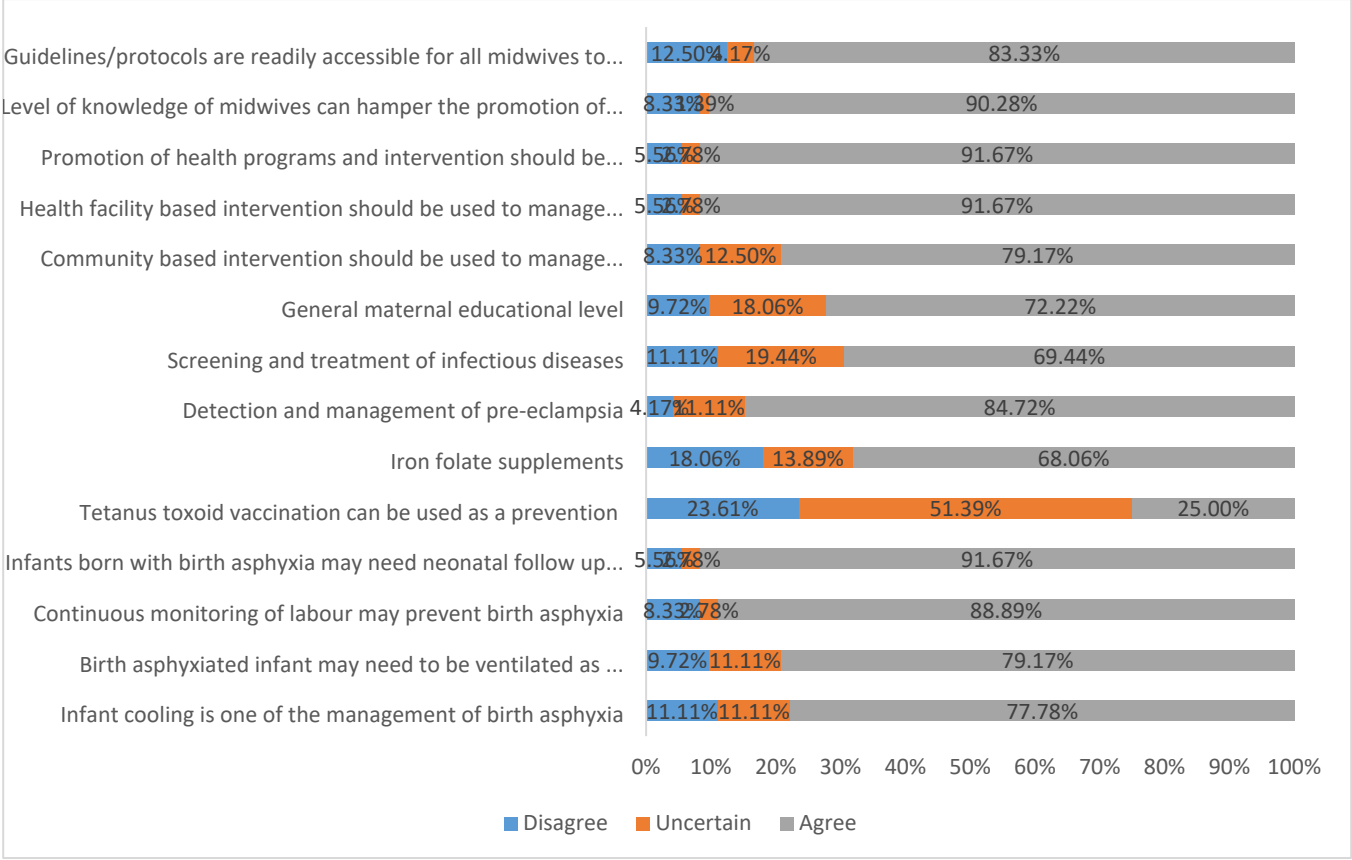

Figure 4. 8: Understanding management of pregnant women during antenatal care, labour, and post-natal period

Figure 4.8 presents participants responses regarding understanding the management of pregnant women during antenatal care, labour, and post-natal period through the use of guidelines and other health interventions. However, the majority of participants (91,67%) indicated that the promotion of health programs and interventions should be regularly conducted for awareness among pregnant

mothers. As part of management, detection and management of preeclampsia was indicated by (84,72%) of participants. More than half of the participants (68,06%) indicated that all pregnant women must take iron folate supplements during pregnancy and continuous monitoring of labour may prevent birth asphyxia as indicated by (88,89%). As such, guidelines/ protocols are readily accessible for all midwives to provide care to pregnant women and their neonates as indicated by (83,33%). The majority of participants (>50) agreed that birth asphyxiated infants may be ventilated as part of management, it was evident that the majority of participants (77,78%) were of the notion that infant cooling is one of the managements of birth asphyxia as compared to (11,11%) who disagreed. Lastly, infants born with birth asphyxia may need neonatal follow-up dates after discharge as agreed by (91,67%). However, the majority of participants were unsure about whether Tetanus toxoid vaccination can be used as a prevention with only 25% of participants agreeing that Tetanus toxoid vaccination can be used as a prevention. Results in Figure 4.8. shows that there is a significant difference between the 78% majority of participants that agreed on average compared to 10% that disagreed with a p-value of less than 0,0001. This implies that management of pregnant women during antenatal care, labour and post-natal period as demonstrated by the participants might be attributed to knowledge gained through education.

The results indicated positive results that midwives know the management of pregnant women during antenatal care, labour, and post-natal period. Similar to the results of this study, Ayebare et al (2021:7) conducted a study on healthcare workers and discovered that screening women early and identifying and managing risk factors for birth asphyxia such as pre-eclampsia, malaria and anaemia was the key to preventing birth asphyxia. In the same study, healthcare workers strongly emphasised that adolescent pregnancies should be avoided since birth asphyxia was more common among young mothers. In support of the results of the current study, Davidson and his associates indicated that preventive measures suggested during labour which included proper hydration of mothers by encouraging them to drink tea and other fluids had a positive effect on the outcome of labour. As such, proper labour monitoring, pelvic assessment and acting in case of any abnormality was another way to prevent asphyxia. During labour, midwives should be more observant and monitor contractions and fetal heart rate continuously using a cardiotocography, especially for those women who are at risk (Davidson, London & Ladewig, 2012:942). For early detection of abnormal changes in labour, four hourly monitoring of a woman in latent phase of labour and two hourly monitoring in the active phase of labour as per maternal guidelines must be done.

Early detection of abnormalities in labour will help midwives in decision-making on when to intervene when the problem arises during labour (Davidson, London & Ladewig, 2012:564). Iron supplements

were mentioned in this study as another way to prevent anemia as it reduces the risk of preterm deliveries. These results were supported by Gebremichael (2019:1057-1058) who indicated that early antenatal iron-folate supplementation reduces iron deficiency anaemia, preterm birth, early neonatal death, and low birth weight among pregnant women which are associated with birth asphyxia. As such, The World Health Organization (2018) has recommended a 6-month regimen of a daily supplement containing 60mg of elemental iron along with 400 mcg of folic acid for all pregnant women. In areas with a higher prevalence of anaemia, it is recommended that supplementation continues for three months postpartum. The researcher in the current study did not focus on antenatal and intrapartum care only, but also on the post-natal period as birth asphyxia infants need to be followed up. According to Robertson and Perlman (2006:279), the timing and type of individual childhood follow-up post asphyxia HIE are based on the detectability of impairments as follows: severe motor or sensory loss (first year), low developmental quotient (second year), fine and gross motor dysfunction (two to four years), abnormalities in cognitive function (four to seven years) and learning disabilities (seven to nine years). Understanding the management of pregnant women during antenatal care, labour and post-natal period might assist in better management of birth asphyxia, reduction of birth asphyxia cases and improve care rendered.

Table 4. 1: One-way analysis of variance

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Disagree	14	1,416667	0,10119	0,002773		
Agree	14	10,93056	0,780754	0,030157		
ANOVA						
Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3,232646	1	3,232646	196,3348	<0,0001	4,225201
Within Groups	0,428089	26	0,016465			
Total	3,660735	27				

4.9. Association between demography, Training, awareness, guidelines accessibility, counselling and complications assessment with factors, knowledge, and understanding

4.9.1 Association between demography and factors, knowledge and understanding

Table 4. 6 Association between Age group and factor: Unbooked pregnant women

Variable name	Age group	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Unbooked pregnant women	<25	1	1	0	5	1	8	44.183a	28	0,02665
		20%	6%	0%	25%	5%	11%			
	26-30	0	1	0	1	1	3			
		0%	6%	0%	5%	5%	4%			
	31-35	0	3	7	9	2	21			
		0%	19%	70%	45%	10%	30%			
	36-40	0	4	2	1	1	8			
		0%	25%	20%	5%	5%	11%			
	41-45	1	3	1	3	5	13			
		20%	19%	10%	15%	25%	18%			
	46-50	2	3	0	0	4	9			
		40%	19%	0%	0%	20%	13%			
	51-55	1	0	0	0	2	3			
		20%	0%	0%	0%	10%	4%			
	>55	0	1	0	1	4	6			
		0%	6%	0%	5%	20%	8%			
	Total	5	16	10	20	20	71			
		100%	100%	100%	100%	100%	100%			

Results of Table 4.6 denotes that the age of group participants falling under 31- 35 has a significant association with the knowledge of potential factors contributing to birth asphyxia. The contributing factor with a significant association is unbooked pregnant women. The level of association is evident due to p-value =0,026 less than 0,05 level of significance. Thus, the majority of participants that agreed that unbooked pregnant women contributed to perinatal birth asphyxia were between the age group 31-35 years (55%). This implies that most midwives between the age of 31- 35 knew that some women presented themselves when in labour and did not attend antenatal visits hence it harmed their newborn babies as some suffered from birth asphyxia. In a qualitative study conducted by Jinga, Mongwenyana, Moolla, Malete & Onoya (2019:4) on reasons for late presentation for antenatal care among healthcare providers, the results indicated that when they interview women, most women were reluctant to disclose a pregnancy before 4 months gestation and start to ANC due to cultural beliefs about the vulnerability of the pregnancy in the early stage and the need to safeguard the pregnancy by keeping it as a secret from friends and family. Attendance of ANC service will require disclosure of the pregnancy and ANC is therefore postponed until disclosure is inevitable as a result predisposing the unborn baby to asphyxia neonatorum (Jinga et al 2019:5).

In some cases, this avoidance of pregnancy disclosure is due to the fear of stigma when the women are unmarried/ underage, older or the pregnancy is unplanned, especially sooner after a previous one (Jinga

et al 2019:5). Similarly, Abduljalil, Nadham, AlSada, Qureshi & Dayoub (2020:47) conducted a study on the effect of booking status on the mode of delivery and postnatal maternal outcome and discovered that unbooked mothers had a statistically significant incidence of pre-eclampsia which predisposes the unborn babies to birth asphyxia and they were 13 times more likely to die in the hospital. Another study found that unbooked mothers were likely to deliver by spontaneous vaginal delivery and were twice as likely to have infant asphyxia with an Apgar score of<7. According to Ago & Ekanem (2022:9) who conducted a study on the obstetric outcome of booked and unbooked deliveries at the University of Calabar teaching hospital, Nigeria, the researchers discovered that most of the unbooked patients presented with pregnancy and labour complications such as eclampsia, prolonged obstructed labour, and uterine rupture, which were the reason for the adverse neonatal outcome (asphyxia neonatorum). The knowledge of midwives about booked pregnant women as a factor in birth asphyxia will assist in educating women so that they attend the antenatal clinic as soon as they find out that they were pregnant. Conditions which predispose their newborn to birth asphyxia will be identified earlier and proper care being offered hence prevention of neonatal morbidity and mortality rate.

Table 4. 7: Association between Age group and factor: Lack of key skills in assisting women in labour

Variable name	Age group	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Lack of key skills in assisting women in labour	<25 years	0	0	2	5	1	8	43.104a	28	0,034009
		0%	0%	40%	19%	3%	12%			
	26-30 years	0	3	1	7	11	22			
		0%	60%	20%	27%	37%	32%			
	31-35 years	0	0	0	6	2	8			
		0%	0%	0%	23%	7%	12%			
	36-40 Years	2	0	0	3	7	12			
		67%	0%	0%	12%	23%	17%			
	41-45 years	1	0	1	4	2	8			
		33%	0%	20%	15%	7%	12%			
	46-50 years	0	0	0	0	3	3			
		0%	0%	0%	0%	10%	4%			
	51-55 years	0	2	1	1	1	5			
		0%	40%	20%	4%	3%	7%			
	>55 years	0	0	0	0	3	3			
		0%	0%	0%	0%	10%	4%			
	Total	3	5	5	26	30	69			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.7 show that the age group of the participants has a significant association with the lack of key skills in assisting women in labour, a factor that contributes to birth Asphyxia. The level of association is evident due to p-value =0,03 less than 0,05 level of significance. Thus, the majority of participants that agreed were between the age group 26-30 years (64%). This might mean that a lack of key skills in assisting women in labour might have a detrimental effect on the outcome of maternal health care delivery as some midwives especially those who lack experience might fail to recognise any deviation from normal when managing pregnant women during antenatal, labour and even postnatal period.

A study conducted by Magqadiyane (2020:194) on the experiences of midwives who were caring for pregnant mothers in the maternity unit revealed that women were attended by midwives who lacked experience as there was a high rate of resignations which included skilled professionals with advanced training. Due to the shortage, many specialised skills were not performed predisposing pregnant women, fetuses, and newborns to complications such as birth asphyxia. Similarly, Kumakech et al (2020:2) conducted a study and discovered that the high number of births not attended by skilled birth attendants was partly attributable to the inadequate numbers of nurse-midwives with advanced education in

midwifery and maternal neonatal health to address obstetrical and perinatal emergencies such as respiratory distress syndrome and birth asphyxia.

Table 4.8: Association between age group and Poor managerial support factor

Variable name	Age group	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Poor managerial support	<25 years	0	0	5	2	1	8	43.284a	28	0,032667
		0%	0%	29%	9%	7%	11%			
	26-30 years	0	4	5	9	4	22			
		0%	33%	29%	39%	29%	31%			
	31-35 years	0	3	2	1	1	7			
		0%	25%	12%	4%	7%	10%			
	36-40 Years	1	1	2	7	2	13			
		25%	8%	12%	30%	14%	19%			
	41-45 years	3	2	2	0	2	9			
		75%	17%	12%	0%	14%	13%			
	46-50 years	0	0	0	1	2	3			
		0%	0%	0%	4%	14%	4%			
	51-55 years	0	2	1	2	0	5			
		0%	17%	6%	9%	0%	7%			
	>55 years	0	0	0	1	2	3			
		0%	0%	0%	4%	14%	4%			
	Total	4	12	17	23	14	70			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.8 show that the age group of the participants has a significant association with Poor managerial support factor that contributes to birth Asphyxia. The level of association is evident due to p-value =0,032 less than 0,05 level of significance. Thus, the majority of participants that agreed were between the age group 26-30 years (68%). This implies that due to poor managerial support, there might be poor care rendered to pregnant women which leads to poor neonatal outcomes which can be due to lack of resources, understaffing and more.

These results were supported by Ayebare et al (2021:6) who conducted a study on healthcare workers' experiences of managing foetal distress and birth asphyxia and discovered that limited resources made it difficult to offer appropriate care for foetal distress and birth asphyxia, resuscitation equipment was available but not always in proper condition for immediate use. Healthcare workers pointed out situations when all equipment was unsterile yet there was a newborn with birth asphyxia who needed to be

resuscitated. Healthcare workers talked about staff shortages and absence from duty as a barrier to appropriate care. Sometimes they had to call upon other non-competent staff members to assist during neonatal resuscitation (Ayebare et a l 2021:6; Kumakech et al 2020:5).

4.9.2 Gender

Table 4. 9: Gender by factors contributing and understanding

Variable name	Gender	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Unbooked pregnant women	Female	5	7	7	14	17	50	11.068a	4	0,025812
		100%	44%	70%	70%	89%	71%			
	Male	0	9	3	6	2	20			
		0%	56%	30%	30%	11%	29%			
	Total	5	16	10	20	19	70			
		100%	100%	100%	100%	100%	100%			
Poor use of guidelines	Female	2	0	4	22	21	49	11.851a	4	0,018494
		100%	0%	57%	65%	91%	72%			
	Male	0	2	3	12	2	19			
		0%	100%	43%	35%	9%	28%			
	Total	2	2	7	34	23	68			
		100%	100%	100%	100%	100%	100%			
Understaffing	Female	6	7	3	17	16	49	9.730a	4	0,045222
		100%	78%	50%	57%	89%	71%			
	Male	0	2	3	13	2	20			
		0%	22%	50%	43%	11%	29%			
	Total	6	9	6	30	18	69			
		100%	100%	100%	100%	100%	100%			
Poor managerial support	Female	4	9	8	15	13	49			
		100%	75%	47%	65%	100%	71%			
	Male	0	3	9	8	0	20			
		0%	25%	53%	35%	0%	29%			
	Total	4	12	17	23	13	69			
		100%	100%	100%	100%	100%	100%			
Health facility-based intervention should be used to manage quality care for all pregnant mothers.	Female	2	0	2	16	31	51	10.979a	4	0,026798
		67%	0%	100%	55%	86%	72%			
	Male	1	1	0	13	5	20			
		33%	100%	0%	45%	14%	28%			
	Total	3	1	2	29	36	71			
		100%	100%	100%	100%	100%	100%			

Results of Table 4.9 shows that there is a significant association between gender and the following contributing factors: Unbooked pregnant women managed by (89 %) of females as compared to (11%) managed by males; Poor use of guidelines, Understaffing and Poor managerial support was indicated by the majority of females (100%) as compared to (0%) of males. Similarly, there is a significant association between being part of the gender and understanding of participants relating to which health facility-based intervention should be used to manage quality care for all pregnant mothers (p-value

<0,05). The majority of participants that agreed with the statements were female. This implies that females are the most gender that is exposed to maternity departments compared to males, whereas males are not usually allocated to the maternity departments by the hospital management.

The results of the current study were in line with a study conducted by Sibiya, Madlala and Ngxongo (2019:2267) stated that the nursing managers in the Free State province place accoucheurs on a rotational basis in the units such as casualty, intensive care, and general units except in the maternal health care units.

Table 4.10: Education level by knowledge statements

	Educational level	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Health facility based intervention should be used to manage quality care for all pregnant mothers	Diploma in nursing	2	1	1	5	29	38	26.389a	12	0,009451
		50%	25%	25%	38%	67%	56%			
	Degree in nursing	1	3	1	6	8	19			
		25%	75%	25%	46%	19%	28%			
	Advanced midwife	1	0	1	2	6	10			
		25%	0%	25%	15%	14%	15%			
	Masters in nursing	0	0	1	0	0	1			
		0%	0%	25%	0%	0%	1%			
	Total	4	4	4	13	43	68			
		100%	100%	100%	100%	100%	100%			
Infants born with birth asphyxia may need neonatal follow-up dates after discharge	Diploma in nursing	2	1	1	8	29	41	26.613a	12	0,00878
		67%	100%	50%	40%	63%	57%			
	Degree in nursing	0	0	0	10	9	19			
		0%	0%	0%	50%	20%	26%			
	Advanced midwife	1	0	0	2	7	10			
		33%	0%	0%	10%	15%	14%			
	Masters in nursing	0	0	1	0	1	2			
		0%	0%	50%	0%	2%	3%			
	Total	3	1	2	20	46	72			
		100%	100%	100%	100%	100%	100%			
Iron folate supplements	Diploma in nursing	2	3	7	15	14	41	26.018a	12	0,010672
		50%	33%	70%	50%	74%	57%			
	Degree in nursing	0	4	2	9	4	19			
		0%	44%	20%	30%	21%	26%			

	Advanced midwife	2	0	1	6	1	10			
		50%	0%	10%	20%	5%	14%			
	Masters in nursing	0	2	0	0	0	2			
		0%	22%	0%	0%	0%	3%			
	Total	4	9	10	30	19	72			
		100%	100%	100%	100%	100%	100%			
General maternal educational level	Diploma in nursing	0	2	11	14	14	41	40.849a	12	5,19E-05
		0%	40%	85%	47%	64%	57%			
	Degree in nursing	1	1	2	12	3	19			
		50%	20%	15%	40%	14%	26%			
	Advanced midwife	1	0	0	4	5	10			
		50%	0%	0%	13%	23%	14%			
	Masters in nursing	0	2	0	0	0	2			
		0%	40%	0%	0%	0%	3%			
	Total	2	5	13	30	22	72			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.10 shows that there is a significant association between education level and the following knowledge statements: Health facility-based intervention should be used to manage quality care for all pregnant mothers; Infants born with birth asphyxia may need neonatal follow-up dates after discharge; Iron folate supplements; and General maternal educational level (p-value <0,05). The majority of participants that agreed with the above-mentioned statements have a diploma in nursing. This might mean that more participants have a diploma in nursing compared to the participants who have a degree in nursing and have a speciality in nursing hence their knowledge in the management of neonatal complications such as birth asphyxia might vary.

According to Kumakech, Anathan, Udho, Auma, Atuhaire, Nsubuga and Ahaisibwe (2020:2), the majority of midwives in Uganda were having certificates and diplomas and were trained to manage normal pregnancy, labour, postpartum and newborn care but not the complications of pregnancy, labour, and newborn care. Therefore, there was a problem of lack of midwives with specialised knowledge and skills such as advanced midwifery and neonatal care to manage complications of pregnancy, labour, and newborn care across the healthcare spectrum.

4.9.3 Experience

Table 4. 11: Experience by Lack of support structure for pregnant women factor

Variable name	Experience	Strongly disagreed	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Lack of support structure for pregnant women	2 years and below	0	5	2	5	3	15	44.774a	24	0,006194
		0%	36%	11%	20%	27%	21%			
	2-5 years	1	3	10	6	2	22			
		33%	21%	56%	24%	18%	31%			
	5-10 years	0	3	4	6	2	15			
		0%	21%	22%	24%	18%	21%			
	10-15 years	2	0	2	1	0	5			
		67%	0%	11%	4%	0%	7%			
	15-20 years	0	1	0	5	1	7			
		0%	7%	0%	20%	9%	10%			
	20-25 years	0	0	0	0	2	2			
		0%	0%	0%	0%	18%	3%			
	Above 25 years	0	2	0	2	1	5			
		0%	14%	0%	8%	9%	7%			
	Total	3	14	18	25	11	71			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.11 show that there is a significant association between experience and Lack of support structure for pregnant women factor (p-value =0,0061<0,05). The majority of participants that agreed with the statements had 2 to 5 years of experience. This implies that experience had an impact on their exposure to the support structure for pregnant women, as during the COVID-19 pandemic no visitors and doulas were allowed in the hospital.

On the contrary, a study conducted by Ayebare et al.(2021:8) among healthcare workers reported that companions, typically the mother-in-law, although was allowed in the labour room, shouted, and slapped the pregnant mother to ensure that she pushes the baby while not yet due which had a detrimental effect on the fetus.

Table 4. 12: Experience by poor communication factor

Variable name	Experience	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Poor communication	2 years and below	0	2	4	6	3	15	37.078a	24	0,042987
		0%	17%	31%	21%	21%	21%			
	2-5 years	1	6	3	7	4	21			
		33%	50%	23%	25%	29%	30%			
	5-10 years	0	1	3	7	4	15			
		0%	8%	23%	25%	29%	21%			
	10-15 years	1	0	0	4	0	5			
		33%	0%	0%	14%	0%	7%			
	15-20 years	0	1	0	4	2	7			
		0%	8%	0%	14%	14%	10%			
	20-25 years	1	0	0	0	1	2			
		33%	0%	0%	0%	7%	3%			
	Above 25 years	0	2	3	0	0	5			
		0%	17%	23%	0%	0%	7%			
	Total	3	12	13	28	14	70			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.12 shows that there is a significant association between experience and poor communication factor (p-value =0,04 <0,05). The majority of participants that agreed with the statements had between 2 to 5 years of experience. This meant that their level of experience had a negative effect on the care rendered as communication between the pregnant woman and the health care provider was a barrier to good perinatal outcomes.

This was supported by Saeed et al (2022:2) who indicated that communication is an important determinant of preventable adverse maternal and neonatal health outcomes, yet poor communication remains widespread in perinatal care. This caused the World Health Organization (2016) to develop a framework to improve the quality of perinatal health care, which includes eight domains of quality maternity care, including effective communication. Good communication between the pregnant woman and the midwife will facilitate good understanding and cooperation between the two hence good maternal outcome.

4.10. Association between training by factors, knowledge and understanding

Table 4. 13: Training by knowledge

	Training	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Birth asphyxia can be caused by intrapartum infections	Yes	3	6	7	12	16	44	12.014a	4	0,017249
		75%	100%	58%	41%	80%	62%			
	No	1	0	5	17	4	27			
		25%	0%	42%	59%	20%	38%			
	Total	4	6	12	29	20	71			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.13 shows that there is a significant association between the level of training received and the knowledge of participants who agreed that Birth asphyxia can be caused by intrapartum infections (p-value =0,017<0,05. The majority of participants that agreed with the statement did receive training. As such, their level of training and knowledge might result in the prevention and proper management of newborn who might experience birth asphyxia.

Similarly, Centinkaya, Turkoglu, Dogan & Kara, (2022:287) supported these results by indicating that the fact that nurses and midwives working in delivery rooms and neonatal intensive care units (NICU) pass through the neonatal resuscitation program and gain knowledge and experience in the field will be effective in reducing neonatal death.

Table 4. 14: Awareness and factors, knowledge and understanding

Variable name	Awareness	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	Df	p-value
Understaffing	Yes	3	0	1	1	2	7	13.181a	4	0,010425
		50%	0%	17%	3%	11%	10%			
	No	3	9	5	28	17	62			
		50%	100%	83%	97%	89%	90%			
	Total	6	9	6	29	19	69			
		100%	100%	100%	100%	100%	100%			
Low apgars score is the first sign of birth asphyxia	Yes	1	3	1	2	7	14	16.833a	3	0,000765
		25%	60%	8%	4%	10%	107%			
	No	3	2	11	47	63	126			
		75%	40%	92%	96%	90%	393%			
	Total	4	5	12	49	70	140			

		100%	100%	100%	100%	100%	500%			
Primipara mothers have four times greater risk of birth asphyxia compared to multiparous women	Yes	0	5	0	1	1	7			
		0%	50%	0%	4%	6%	10%	21.392a	4	0,000265
	No	6	5	9	27	17	64			
		100%	50%	100%	96%	94%	90%			
	Total	6	10	9	28	18	71			
		100%	100%	100%	100%	100%	100%			
Majority of cases of perinatal asphyxia occur intrapartum or during labor	Yes	1	0	2	3	1	7	11.058a	4	0,025918
		33%	0%	50%	11%	3%	10%			
	No	2	1	2	24	34	63			
		67%	100%	50%	89%	97%	90%			
	Total	3	1	4	27	35	70			
		100%	100%	100%	100%	100%	100%			
Birth asphyxia can be caused by uterine factors	Yes	1	2	0	4	0	7	16.718a	4	0,002192
		25%	67%	0%	15%	0%	10%			
	No	3	1	8	23	29	64			
		75%	33%	100%	85%	100%	90%			
	Total	4	3	8	27	29	71			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.14 show that there is a significant association between being part of the awareness and knowledge of participants relating to the following contributing factors: low Apgars score as the first sign of birth asphyxia; Primipara mothers have four times greater risk of birth asphyxia compared to multiparous women; Majority of cases of perinatal asphyxia occur intrapartum or during labour; Birth asphyxia can be caused by uterine factors as well as intrapartum infections (p-value <0,05. The majority of participants that agreed with the statements were not part of the awareness. This implies that whether a participant was exposed to awareness or not, their level of knowledge in terms of contributory factors to birth asphyxia was similar. The awareness might lead to improving the quality of care rendered and better neonatal outcomes.

Similar to the findings of the current study, Admasu et al (2022:2) conducted a study on maternal healthcare workers and found that they were aware of multiple risk factors for birth asphyxia: socio-demographic (mother's age, residence, mother's marital status, educational status, occupation), antepartum (ANC follow up, parity, history of prior neonatal death, pre-eclampsia), intrapartum

(prolonged labour, status of amniotic fluid, cephalopelvic disproportion, nature of amniotic fluid), neonatal (preterm babies, birth weight, gestational age) were associated with neonatal asphyxia.

Another study which supports the findings of this study was conducted by Woday et al (2019:2) where various contributing factors of birth asphyxia such as antepartum risk factors(i.e. maternal age, maternal education, pre-eclampsia and primi gravida), intrapartum risk factors (i.e. breech presentation, mode of delivery and maternal fever) and fetal risk factors (i.e. pre-term babies, fetal distress, and baby weight) were indicated by midwives. Therefore, as an implication to the nursing practice, the midwives' awareness of the intrapartum factors contributing to birth asphyxia might lead in identification and prevention of the factors associated with birth asphyxia hence reducing perinatal morbidity and mortality rate.

Table 4. 15: Guidelines and protocols availability and factors contributing to birth asphyxia

	Availability of guidelines and protocols	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	df	p-value
Lack of key skills in assisting women in labour	Yes	3	2	5	24	27	61	15.371a	4	0,003991
		100%	40%	100%	96%	90%	90%			
	No	0	3	0	1	3	7			
		0%	60%	0%	4%	10%	10%			
	Total	3	5	5	25	30	68			
		100%	100%	100%	100%	100%	100%			

The results in Table 4.15 show that there is a significant association between Guidelines and protocol availability and Lack of key skills in assisting women in labour factor (p-value =0,0039<0,05. The majority of participants that agreed with the statement indicated that guidelines and protocols were available as such, it will assist them in the management of pregnant women during ANC, labour, and post-natal care although the results indicated a lack of skills on their side.

As such, guidelines for maternal care in South Africa guide the midwives on the management of pregnant women during antenatal care, intrapartum, and post-natal care, it also guides with the management of maternal and delivery complications. The study conducted by Ayebare et al (2021:2-3), indicated that there are no specified guidelines on the management of foetal distress however during labour, healthcare workers should monitor labour using the partograph and consider a foetal heart rate of fewer than 120 beats per minutes and higher than 160 beats per minutes as foetal distress. When the woman is undergoing induction of labour and gets hypertonic contractions or foetal distress, the

Uganda Clinical Guidelines require the healthcare workers to stop the oxytocin infusion, give Salbutamol 5mg in 500ml of Normal Saline at a rate of 10 drops per minute and/ or perform an emergency caesarean section.

Table 4. 16: Assessment by factors contributing, knowledge and understand

	Assessment	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Pearson Chi-Square	df	p-value
Advance maternal age	Yes	11	17	19	12	9	68	11.043a	4	0,026087
		100%	100%	100%	100%	82%	97%			
	No	0	0	0	0	2	2			
		0%	0%	0%	0%	18%	3%			
	Total	11	17	19	12	11	70			
		100%	100%	100%	100%	100%	100%			
Lack of key skills in assisting women in labour	Yes	3	4	5	26	28	66	12.588a	4	0,013475
		100%	80%	100%	100%	100%	99%			
	No	0	1	0	0	0	1			
		0%	20%	0%	0%	0%	1%			
	Total	3	5	5	26	28	67			
		100%	100%	100%	100%	100%	100%			
Birth asphyxia can be caused by uterine factors	Yes	4	2	8	27	27	68	11.238a	4	0,024018
		100%	67%	100%	100%	96%	97%			
	No	0	1	0	0	1	2			
		0%	33%	0%	0%	4%	3%			
	Total	4	3	8	27	28	70			
		100%	100%	100%	100%	100%	100%			

Results in Table 4.16 shows that assessments of pregnancy complications done with every antenatal visit is significantly associated with factors contributing to birth asphyxia: Advanced maternal age; Lack of key skills in assisting women in labour; Birth asphyxia can be caused by uterine factors (p-value <0,05) and that majority of participants that agreed with the statements said that assessments of pregnancy complications were done with every antenatal visit. Assessments of complications might improve maternal and neonatal health care hence reduction of birth asphyxia and other neonatal conditions. These results were supported by Sellers (2012:295) who indicated that during the antenatal care visits, blood tests and physical examinations are done, and history is taken to assess past and present obstetrics as well as the medical and surgical problems to detect risk factors for the patient and

her baby. Regardless of the above services are provided, there are complications that may occur during pregnancy such as anemia in pregnancy, antepartum haemorrhage, pregnancy-induced hypertension, gestational diabetes, and pre-eclampsia.

4.11. Correlation analysis between causes and management

This section provides correlation analysis to address the study hypothesis. The potential factors contributing to birth asphyxia were correlated to understanding the management of pregnant women during antenatal care, labour, and post-natal period.

4.11.1 Infant cooling is one of the management of birth asphyxia

Results show that there is a strong correlation with a p-value of less than 0,05 between Infant cooling as one of the management of birth asphyxia and cause such as decreased blood supply to the fetus, unbooked pregnant women, maternal anaemia, and others indicated in Table 4. 2 on potential factors contributing to birth asphyxia and 4.17 below.

Infant cooling might prevent the worsening of brain tissue damage and reduces the risk of seizures in an infant with Hypoxic- ischaemic encephalopathy (HIE), therapeutic hypothermia should be initiated within the first 6 hours after birth (Bruckner et al 2021:494). Both active and passive cooling is feasible and safe to achieve a target body temperature of 33-34 degree Celsius in asphyxiated tern born infants. Asphyxiated new-born infants have impaired thermoregulation due to reduced oxygen consumption, energy production, a high surface area, a wet and a thin skin and they lose temperature at a higher rate than non-asphyxiated infants as such, infant cooling strategy assist in the prevention of asphyxia. Infants with potentially higher degree of brain injury cool faster, as their natural protective mechanisms are inhibited. Therefore, initiating cooling sooner might prevent worsening of brain tissue injury, as such, passive cooling should be started after the initial stabilization or during neonatal transport.

Table 4. 17: Infant cooling is one of the managements of birth asphyxia

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.161	0.207	63
Decreased blood supply to the fetus	0.592**	<,001	68
Unbooked pregnant women	0.503**	<,001	67
Maternal Anaemia	0.476**	<,001	66

Advance maternal age	0.293*	0.015	68
Lack of key skills in assisting women in labour	0.455**	<,001	65
Poor use of guidelines	0.487**	<,001	65
Lack of training	0.594**	<,001	67
Lack of proper awareness given to pregnant mothers	0.352**	0.003	67
Understaffing	0.311*	0.011	66
Lack of resources	0.398**	0.001	65
Lack of support structure for pregnant women	0.280*	0.022	67
Increased patient load	0.484**	<,001	63
Delayed decision-making	0.645**	<,001	67
Negative attitude by staff	0.360**	0.003	66
Poor communication	0.470**	<,001	66
Poor managerial support	0.453**	<,001	66
Poor maternal nutrition	0.343**	0.004	67

4.11.2. Birth asphyxiated infant may need to be ventilated as management of birth asphyxia.

Results in Table 4.18 shows a significant correlation with a p-value of less than 0,05 level of significant between Birth asphyxiated infant may need to be ventilated as management of birth asphyxia with the following causes for example, prolonged labour, decreased blood supply, unbooked pregnancy, advance maternal age and others as indicated in table 4.18 and table 4. 3 on factors contributing to birth asphyxia. Ventilation as one of the managements of birth asphyxia might results in improved oxygen perfusion to the various organs including the brain.

These results were supported by a study conducted by Bruckner et al (2021:490) where neonatal resuscitation guidelines were recommended using an appropriate face mask connected to a manual ventilation device in order to correct hypoxia caused by asphyxia neonatorum. However, mask ventilation with a T-piece resuscitator might result in a fewer intubations in the delivery rooms resulting in a higher rate of survival in new-borns affected by asphyxia.

Table 4. 18: Birth asphyxiated infant may need to be ventilated as management of birth asphyxia

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.313*	0.011	66
Decreased blood supply to the fetus	0.513**	<,001	71

Unbooked pregnant women	0.322**	0.006	70
Maternal Anaemia	0.409**	<,001	69
Advance maternal age	0.271*	0.022	71
Lack of key skills in assisting women in labour	0.333**	0.005	68
Poor use of guidelines	0.451**	<,001	68
Lack of training	0.426**	<,001	70
Lack of proper awareness given to pregnant mothers	0.348**	0.003	70
Understaffing	0.308**	0.010	69
Lack of resources	0.483**	<,001	68
Lack of support structure for pregnant women	0.374**	0.001	70
Increased patient load	0.453**	<,001	66
Delayed decision-making	0.447**	<,001	70
Negative attitude by staff	0.348**	0.003	69
Poor communication	0.397**	<,001	69
Poor managerial support	0.507**	<,001	69
Poor maternal nutrition	0.420**	<,001	70

4.11.3. Continuous monitoring of labour may prevent birth asphyxia

Moreover, the results show a significant correlation with a p-value of less than 0,05 level of significance between continuous monitoring of labour may prevent birth asphyxia with the following causes of birth asphyxia as indicated in table 4.19 as prolonged labour, the decreased blood supply to the fetus, unbooked pregnant women, maternal anaemia, advance maternal age.

Continuous monitoring as one of the managements of birth asphyxia might result in early detection of complications during intrapartum (Davidson, London & Ladewig, 2012: 942). For early detection of abnormal changes in labour, four hourly monitoring of a woman in latent phase of labour and two hourly monitoring in active phase of labour as per maternal guidelines must be done. Early detection of abnormalities in labour will help midwives in decision-making on when to intervene when the problem arises during labour (Davidson, London & Ladewig, 2012: 564). According to Singh, Kumar, Agarwal, Tyagi & Bisht (2022:7398), foetal monitoring during the intrapartum period is of paramount importance. Antepartum and intrapartum fetal surveillance is the best way to reduce perinatal morbidity and mortality.

Table 4.19: Continuous monitoring of labour may prevent birth asphyxia

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.250*	0.041	67
Decreased blood supply to the fetus	0.608**	<,001	72
Unbooked pregnant women	0.272*	0.022	71
Maternal Anaemia	0.436**	<,001	70
Advance maternal age	0.253*	0.032	72

Lack of key skills in assisting women in labour	0.452**	<,001	69
Poor use of guidelines	0.524**	<,001	69
Lack of training	0.529**	<,001	71
Lack of proper awareness given to pregnant mothers	0.242*	0.042	71
Understaffing	0.295*	0.013	70
Lack of resources	0.444**	<,001	69
Lack of support structure for pregnant women	0.459**	<,001	71
Increased patient load	0.519**	<,001	67
Delayed decision-making	0.599**	<,001	71
Negative attitude by staff	0.238*	0.048	70
Poor communication	0.405**	<,001	70
Poor managerial support	0.463**	<,001	70
Poor maternal nutrition	0.321**	0.006	71

4.11.4. Infants born with birth asphyxia may need neonatal follow up dates after discharge

Most importantly, the results in Table 4.20 shows a significant correlation with a p-value of less than 0,05 level of significant between Infants born with birth asphyxia may need neonatal follow up dates after discharge with the following causes of birth asphyxia: prolonged labour, decreased blood supply to the fetus, unbooked pregnant women, maternal anaemia.

As such, in their study, Robertson & Perlman (2006:279) indicated that the timing and type of individual childhood follow-up post asphyxial HIE are based on the detectability of impairments as follows: severe motor or sensory loss (first year), low developmental quotient (second year), fine and gross motor dysfunction(two to four years), abnormalities in cognitive function (four to seven years) and learning disabilities (seven to nine years). Hence, follow up might assists in the dictation of abnormalities associated with birth asphyxia leading to proper management of such complications.

Table 4. 20: Infants born with birth asphyxia may need neonatal follow up dates after discharge

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.281*	0.021	67
Decreased blood supply to the fetus	0.713**	<,001	72
Unbooked pregnant women	0.466**	<,001	71

Maternal Anaemia	0.483**	<,001	70
Advance maternal age	0.292*	0.013	72
Lack of key skills in assisting women in labour	0.469**	<,001	69
Poor use of guidelines	0.538**	<,001	69
Lack of training	0.653**	<,001	71
Lack of proper awareness given to pregnant mothers	0.441**	<,001	71
Understaffing	0.382**	0.001	70
Lack of resources	0.482**	<,001	69
Lack of support structure for pregnant women	0.243*	0.041	71
Increased patient load	0.511**	<,001	67
Delayed decision-making	0.664**	<,001	71
Negative attitude by staff	0.252*	0.035	70
Poor communication	0.460**	<,001	70
Poor managerial support	0.420**	<,001	70
Poor maternal nutrition	0.312**	0.008	71

4.11.5. Tetanus toxoid vaccination can be used as a prevention of maternal and neonatal tetanus

Therefore, results in Table 4.21 shows a significant correlation with a p-value of less than 0,05 level of significant between Tetanus toxoid vaccination can be used as a prevention maternal and neonatal tetanus with the following causes of birth Asphyxia as indicated in table 4.21, maternal anaemia, poor maternal nutrition, delay decision making.

As such, Giles, Mantel, Munoz, Moran, Roos, Yusuf, Diaz, Ahun, Lochlainn, Wootton, Pathirana, Rendell, Tuncalp, Perut, Hombach, Merten & Lambach (2020:5269) indicated that maternal immunisation has emerged as a strategy to reduce the morbidity and mortality of pregnant women and their young infants during the first weeks of the infant's life as this can be transported via the placenta and breast milk. Maternal immunisation strategies in line with the Sustainable Development Goal launched in 2015, target 3.2 aimed at ending preventable deaths of new-borns and children under five years of age by 2030 and to reduce neonatal mortality to a maximum of 12 per 1000 live births. The most common preventable deaths include preterm birth complications, birth asphyxia, acute respiratory infections, and diarrhoea (Giles, Mantel, Munoz, Moran, Roos, Yusuf, Diaz, Ahun, Lochlainn, Wootton, Pathirana, Rendell, Tuncalp, Perut, Hombach, Merten & Lambach 2020:5269). Key components of this initiative include routine immunisation of pregnant women and women of reproductive age with tetanus toxoid containing vaccine, hygienic delivery and cord care practices and strengthening neonatal tetanus surveillance.

Table 4. 21: Tetanus toxoid vaccination can be used as a prevention

Factors	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.027	0.830	65
Decreased blood supply to the fetus	0.235	0.050	70
Unbooked pregnant women	0.230	0.057	69
Maternal Anaemia	0.315**	0.009	68
Advance maternal age	-0.012	0.918	70
Lack of key skills in assisting women in labour	0.121	0.328	67
Poor use of guidelines	0.146	0.240	67
Lack of training	0.076	0.535	69
Lack of proper awareness given to pregnant mothers	0.162	0.185	69
Understaffing	0.004	0.977	68
Lack of resources	0.237	0.054	67
Lack of support structure for pregnant women	0.339**	0.004	69
Increased patient load	0.046	0.716	65
Delayed decision-making	0.289*	0.016	69
Negative attitude by staff	0.114	0.355	68
Poor communication	0.145	0.239	68
Poor managerial support	0.192	0.117	68
Poor maternal nutrition	0.326**	0.006	69

4.11.6. Iron folate supplements

Results in Table 4.22 shows a significant correlation with a p-value of less than 0,05 level of significance between Iron folate supplements with the following causes of birth Asphyxia as maternal anaemia, and poor maternal nutrition.

According to Gebremichael (2019:1057-1058), early antenatal iron-folate supplementation reduces iron deficiency anaemia, preterm birth, early neonatal death, and low birth weight among pregnant women. As such, the maternity care guidelines of South Africa indicated that all women with Hb ≥ 10g/dL to be given ferrous sulphate 200 mg oral daily and folic acid 5 mg oral daily for the duration of the pregnancy and during the post-partum period (NDoH, 2016: 96). Furthermore, the World Health Organization has recommended that in areas with a higher prevalence of anaemia, it is recommended that supplementation continues for three months postpartum, this will reduce the risk of anaemia in women and promote good health with future pregnancies hence reducing the rate of birth asphyxia.

Table 4. 22: Iron folate supplements

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.230	0.061	67

Decreased blood supply to the fetus	0.459**	<,001	72
Unbooked pregnant women	0.526**	<,001	71
Maternal Anaemia	0.591**	<,001	70
Advance maternal age	0.347**	0.003	72
Lack of key skills in assisting women in labour	0.382**	0.001	69
Poor use of guidelines	0.477**	<,001	69
Lack of training	0.414**	<,001	71
Lack of proper awareness given to pregnant mothers	0.296*	0.012	71
Understaffing	0.368**	0.002	70
Lack of resources	0.486**	<,001	69
Lack of support structure for pregnant women	0.342**	0.004	71
Increased patient load	0.406**	<,001	67
Delayed decision-making	0.587**	<,001	71
Negative attitude by staff	0.389**	<,001	70
Poor communication	0.442**	<,001	70
Poor managerial support	0.427**	<,001	70
Poor maternal nutrition	0.578**	<,001	71

4.11.7. Detection and management of pre-eclampsia

The results in Table 4.23 show a significant correlation with a p-value of less than 0,05 level of significance between the detection and management of pre-eclampsia with the following causes of birth Asphyxia: advanced maternal age, unbooked pregnant women, decreased blood supply to the fetus.

Pre-eclampsia is a condition in which the blood pressure is increased with or without proteinuria and may occur with or without the complications of other organs. As such, good perinatal outcomes were reported in centres equipped to manage high-risk pregnancies and premature neonates. The provision of Magnesium sulphate (MgSO4) 40% as a brain protector and corticosteroids to infant lung maturation can reduce complications of asphyxia , hence, improved perinatal outcomes (Aziz & Mose, 2016: 6).

Table 4. 23: Detection and management of pre-eclampsia

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.384**	0.001	67
Decreased blood supply to the fetus	0.629**	<,001	72
Unbooked pregnant women	0.394**	<,001	71
Maternal Anaemia	0.578**	<,001	70
Advance maternal age	0.302**	0.010	72

Lack of key skills in assisting women in labour	0.478**	<,001	69
Poor use of guidelines	0.567**	<,001	69
Lack of training	0.503**	<,001	71
Lack of proper awareness given to pregnant mothers	0.319**	0.007	71
Understaffing	0.270*	0.024	70
Lack of resources	0.451**	<,001	69
Lack of support structure for pregnant women	0.239*	0.045	71
Increased patient load	0.371**	0.002	67
Delayed decision-making	0.626**	<,001	71
Negative attitude by staff	0.245*	0.041	70
Poor communication	0.432**	<,001	70
Poor managerial support	0.368**	0.002	70
Poor maternal nutrition	0.445**	<,001	71

4.11.8. Screening and treatment of infectious diseases

Furthermore, the results in Table. 4.24 shows a significant correlation with a p-value of less than 0,05 level of significant between screening and treatment of infectious diseases with the following causes of birth Asphyxia: Decreased blood supply to the fetus, maternal anaemia, prolonged labour.

Screening and treatment of infectious diseases done by midwives at each antenatal visits will reduce the rate birth asphyxia because conditions such as syphilis, rubella, herpes can be detected and a pregnant woman might receive treatment early. According to Giles, Mantel, Munoz, Moran, Roos, Yusuf, Diaz, Ahun, Lochlainn, Wootton, Pathirana, Rendell, Tuncalp, Perut, Hombach, Merten & Lambach (2020:5269) vaccination against infectious diseases such as rubella provided by the Expanded Programme on Immunisation has played a key role in improving child health.

Table 4. 24: Screening and treatment of infectious diseases

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.458**	<,001	66
Decreased blood supply to the fetus	0.517**	<,001	71
Unbooked pregnant women	0.562**	<,001	70
Maternal Anaemia	0.709**	<,001	69

Advance maternal age	0.318**	0.007	71
Lack of key skills in assisting women in labour	0.498**	<,001	68
Poor use of guidelines	0.647**	<,001	68
Lack of training	0.490**	<,001	70
Lack of proper awareness given to pregnant mothers	0.356**	0.003	70
Understaffing	0.275*	0.022	69
Lack of resources	0.444**	<,001	68
Lack of support structure for pregnant women	0.397**	<,001	70
Increased patient load	0.303*	0.013	66
Delayed decision-making	0.534**	<,001	70
Negative attitude by staff	0.345**	0.004	69
Poor communication	0.337**	0.005	69
Poor managerial support	0.463**	<,001	69
Poor maternal nutrition	0.510**	<,001	70

4.11.9. General maternal educational level

At this point, results show a significant correlation with a p-value of less than 0,05 level of significance between general maternal educational level with the following causes of birth Asphyxia as indicated in table 4.25 prolonged labour, unbooked pregnant women, and maternal anaemia. As such, midwives play an important role as they are educators of the community including women of childbearing age. Women are taught to book earlier as soon as they discovered that they are pregnant so that identification of conditions such as anaemia be done early.

Women are taught how to prevent anaemia through a diet that they might adhere to before and during pregnancy and the importance of attending antenatal classes. According to Fatriana, Indarty, Mallongi, Mappajanci, Seweng, Hidayanty, Nur & Syam (2021:133) the risk factors that cause neonatal asphyxia and their prevention are taught to the mother such as consumption of nutritious food to avoid the risk of low birth weight, which increases the risk of neonatal asphyxia. Besides maintaining of physical fitness with exercise during pregnancy to prevent the risk of prolonged labour which increases the risk of neonatal asphyxia is taught.

Table 4. 25: General maternal educational level

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.158	0.203	67
Decreased blood supply to the fetus	0.362**	0.002	72
Unbooked pregnant women	0.466**	<,001	71

Maternal Anaemia	0.370**	0.002	70
Advance maternal age	0.324**	0.005	72
Lack of key skills in assisting women in labour	0.272*	0.024	69
Poor use of guidelines	0.361**	0.002	69
Lack of training	0.457**	<,001	71
Lack of proper awareness given to pregnant mothers	0.439**	<,001	71
Understaffing	0.258*	0.031	70
Lack of resources	0.423**	<,001	69
Lack of support structure for pregnant women	0.404**	<,001	71
Increased patient load	0.421**	<,001	67
Delayed decision-making	0.411**	<,001	71
Negative attitude by staff	0.292*	0.014	70
Poor communication	0.262*	0.029	70
Poor managerial support	0.354**	0.003	70
Poor maternal nutrition	0.370**	0.002	71

4.11.10. Community based intervention should be used to manage quality care for all pregnant mothers

Results shows a significant correlation with a p-value of less than 0,05 level of significance between Community based intervention should be used to manage quality care for all pregnant mothers with the following causes of birth asphyxia as indicated in table 4.26, prolonged labour, advance maternal age, maternal anaemia, poor maternal nutrition.

Recently, the department of health has revisited and revitalised the birth initiative strategy of community support through birth companionship. This can be done by any member of the pregnant women family or relative who must accompany the women to the health care facility during pregnancy, when the women are in labour and to be involved during the postpartum period. Community based intervention will assist in the reduction of birth asphyxia. On the contrary, a study conducted by Ayebare et al (2021:8-9) among health workers reported differently, instead of birth companions to support the women, family members such as mother in-law were shouting or slapping the women while in labour as such, women were pushing before time in order to precipitate delivery hence their thought was in preventing prolonged labour. This form of abuse and disrespectful care leads to poor birth outcomes and impacts the mother's psychological well-being. It also means that decision making ability of the women in labour in this community is limited. There is a need to interact with relatives and communities of women in labour and facilitate positive companionship and during labour to improve birth outcomes.

Table 4. 26: Community based intervention should be used to manage quality care for all pregnant mothers

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.252*	0.039	67
Decreased blood supply to the fetus	0.540**	<,001	72
Unbooked pregnant women	0.557**	<,001	71
Maternal Anaemia	0.442**	<,001	70
Advance maternal age	0.308**	0.008	72
Lack of key skills in assisting women in labour	0.375**	0.002	69
Poor use of guidelines	0.508**	<,001	69
Lack of training	0.571**	<,001	71
Lack of proper awareness given to pregnant mothers	0.459**	<,001	71
Understaffing	0.425**	<,001	70
Lack of resources	0.587**	<,001	69
Lack of support structure for pregnant women	0.376**	0.001	71
Increased patient load	0.519**	<,001	67
Delayed decision-making	0.608**	<,001	71
Negative attitude by staff	0.342**	0.004	70
Poor communication	0.417**	<,001	70
Poor managerial support	0.438**	<,001	70
Poor maternal nutrition	0.400**	<,001	71

4.11.11. Health facility-based intervention should be used to manage quality care for all pregnant mothers

In the intervention for all pregnant mothers, the results shows a significant correlation with a p-value of less than 0,05 level of significance in Health facility-based intervention should be used to manage quality care for all pregnant mothers with the following causes of birth asphyxia as indicated in table 4.27; lack of key skills in assisting women in labour, lack of support structure for pregnant women, delay decision making.

According to Ayebare et al (2021:5) health care workers find themselves in a difficult situation with inadequate resources and internal pressure that affect their ability to offer good quality care. The lack of resources included, in lower-level facilities had challenges such as lack of oxygen and lack of special care units for sick newborns that affect the management of birth asphyxia. Healthcare workers talked about staff shortage and absence from duty as a barrier to appropriate care. One of the major challenges to managing both foetal distress and birth asphyxia was the referral system associated with ambulance services. Health care workers called upon the sub-county ambulance based at the Health centre IV to be available to transfer women (Ayebare et al 2021:7) However, one ambulance was not enough to serve all the health centres in the catchment area. In addition, lack of fuel, ambulance breakdown and lack of drivers were commonly reported which led to referral of women and newborns using motorcycles. In other facilities midwives waited for private or public transport vehicles on the roadside to take the referred mothers to the next level of care and paid for transportation of the women. All this factors might

have a detrimental effect in the management of the pregnant women with for example fetal distress hence predisposing the fetus or newborn to birth asphyxia.

Table 4. 27: Health facility based intervention should be used to manage quality care for all pregnant mothers

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.480**	<,001	67
Decreased blood supply to the fetus	0.730**	<,001	72
Unbooked pregnant women	0.436**	<,001	71
Maternal Anaemia	0.552**	<,001	70
Advance maternal age	0.380**	<,001	72
Lack of key skills in assisting women in labour	0.572**	<,001	69
Poor use of guidelines	0.747**	<,001	69
Lack of training	0.747**	<,001	71
Lack of proper awareness given to pregnant mothers	0.435**	<,001	71
Understaffing	0.499**	<,001	70
Lack of resources	0.634**	<,001	69
Lack of support structure for pregnant women	0.405**	<,001	71
Increased patient load	0.606**	<,001	67
Delayed decision-making	0.697**	<,001	71
Negative attitude by staff	0.412**	<,001	70
Poor communication	0.485**	<,001	70
Poor managerial support	0.586**	<,001	70
Poor maternal nutrition	0.454**	<,001	71

4.11.12. Promotion of health programs and intervention should be regularly conducted for awareness to all pregnant mothers.

Results shows a significant correlation with a p-value of less than 0,05 level of significance between Promotion of health programs and intervention should be regularly conducted for awareness to all pregnant mothers with the following causes of birth Asphyxia as indicated in table 4.28; prolonged labour, decreased blood supply to the fetus, advance maternal age. Health promotion programs are aimed at preventing the occurrence of diseases and complication as such if the community is made aware of the complications which goes along with advanced maternal age, such pregnancies will be avoided.

A woman who falls pregnant while in their advance maternal age >35 years is prone to a lot of complications and conditions such as hypertensive disorders in pregnancy which is caused by abnormal implantation of the placenta. This in turn will cause decreased blood supply to the fetus resulting in

asphyxia as pregnancy progresses. Herval, Oliveira, Gomes & Vargas (2019:5) indicated that educational activities that start during the antenatal period and continue postpartum appeared to be more effective than methods with focused on education during pregnancy only. The review highlighted that educational activities which continued after birth were associated with better outcomes in terms of breastfeeding continuation at 6 months, appropriate health behaviour, improved knowledge of health care.

Table 4. 28: Promotion of health programs and intervention should be regularly conducted for awareness to all pregnant mothers.

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.298*	0.014	67
Decreased blood supply to the fetus	0.688**	<,001	72
Unbooked pregnant women	0.515**	<,001	71
Maternal Anaemia	0.511**	<,001	70
Advance maternal age	0.319**	0.006	72
Lack of key skills in assisting women in labour	0.443**	<,001	69
Poor use of guidelines	0.528**	<,001	69
Lack of training	0.524**	<,001	71
Lack of proper awareness given to pregnant mothers	0.381**	0.001	71
Understaffing	0.412**	<,001	70
Lack of resources	0.545**	<,001	69
Lack of support structure for pregnant women	0.372**	0.001	71
Increased patient load	0.439**	<,001	67
Delayed decision-making	0.618**	<,001	71
Negative attitude by staff	0.331**	0.005	70
Poor communication	0.465**	<,001	70
Poor managerial support	0.396**	<,001	70
Poor maternal nutrition	0.514**	<,001	71

4.11.13. Level of knowledge of midwives can hamper the promotion of health programs

Most importantly, in Table 4.29 the results show a significant correlation with a p-value of less than 0,05 level of significance between “level of knowledge of midwives can hamper the promotion of health programs with the following causes of birth Asphyxia” and “unbooked pregnant women, maternal anaemia, lack of key skills in assisting women in labour”. Contrary to this results, Zondag, Haken, Offerhaus, Maas & Nieuwenhuijze (2022:7) indicated that the knowledge and skills of a reflective practitioner seem to lead to more personalised care compared to standardised use of interventions as defined in protocols. This personalised care helps in the pursuit for appropriate use of childbirth interventions and may reduce medicalisation in childbirth.

Table 4. 29: Level of knowledge of midwives can hamper the promotion of health programs

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.543**	<,001	66
Decreased blood supply to the fetus	0.734**	<,001	71
Unbooked pregnant women	0.392**	<,001	70
Maternal Anaemia	0.534**	<,001	69
Advance maternal age	0.435**	<,001	71
Lack of key skills in assisting women in labour	0.497**	<,001	68
Poor use of guidelines	0.656**	<,001	68
Lack of training	0.562**	<,001	70
Lack of proper awareness given to pregnant mothers	0.401**	<,001	70
Understaffing	0.353**	0.003	69
Lack of resources	0.500**	<,001	68
Lack of support structure for pregnant women	0.466**	<,001	70
Increased patient load	0.420**	<,001	66
Delayed decision-making	0.627**	<,001	70
Negative attitude by staff	0.328**	0.006	69
Poor communication	0.384**	0.001	69
Poor managerial support	0.483**	<,001	69
Poor maternal nutrition	0.355**	0.003	70

4.11.14. Guidelines/protocols are readily accessible for all midwives to use to provide relevant care to pregnant mothers.

Nevertheless, results in Table 4.30 show a significant correlation with a p-value of less than 0,05 level of significance in Guidelines/ protocols are readily accessible for all midwives to use to provide relevant care to pregnant mothers with the following causes of birth asphyxia: poor managerial support, delayed decision making, lack of resources.

Regardless of the availability of protocols and guidelines, a study conducted by Mashamba & Ramavhoya (2021:7) indicated that, lack of resources and poor managerial support had a negative impact on the management of obstetric conditions such as eclampsia which predisposes the fetus and infant to birth asphyxia. As such, provision of equipment's, materials and having enough skilled staff might assist in the reduction of birth asphyxia as proper care required by pregnant women during pregnancy, labour will be provided.

Table 4.30: Guidelines/protocols are readily accessible for all midwives to use to provide relevant care to pregnant mothers.

	Pearson Correlation	Sig. (2-tailed)	N
Prolonged labour	0.425**	<,001	67
Decreased blood supply to the fetus	0.573**	<,001	72
Unbooked pregnant women	0.229	0.055	71
Maternal Anaemia	0.374**	0.001	70
Advance maternal age	0.271*	0.021	72
Lack of key skills in assisting women in labour	0.460**	<,001	69
Poor use of guidelines	0.501**	<,001	69
Lack of training	0.468**	<,001	71
Lack of proper awareness given to pregnant mothers	0.192	0.109	71
Understaffing	0.034	0.779	70
Lack of resources	0.324**	0.007	69
Lack of support structure for pregnant women	0.376**	0.001	71
Increased patient load	0.182	0.140	67
Delayed decision-making	0.581**	<,001	71
Negative attitude by staff	0.202	0.093	70
Poor communication	0.313**	0.008	70
Poor managerial support	0.248*	0.038	70
Poor maternal nutrition	0.414**	<,001	71

Thus, the correlation analysis shows that the causes contributing to birth asphyxia is significantly associated to understanding the management of pregnant women during antenatal care labour and the post-natal period.

4.12. Summary

This chapter presented data analysed from the questionnaires using descriptive and inferential statistics. Data was presented using tables, chi-square test results and bar charts. Interpretations and discussions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province was done supported by relevant literature. Chapter 5 provided the conclusions, recommendations, and limitations of the study.

CHAPTER 5

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

5.1. Introduction

This chapter presents the conclusion, recommendations and limitations of the study based on the research findings regarding midwives' knowledge and perceptions and management thereof potential factors contributing to birth asphyxia amongst foetus and neonates in a selected mother and child hospital in Gauteng Province.

5.2. Purpose of the study

The purpose of the study was to determine the midwives' knowledge of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province.

5.3. Conclusions in Relation to the Research Objectives

The study answered the following question: "What are the perceived potential factors contributing to birth asphyxia."

By answering this question, the study achieved the following objectives:

- To identify the midwives' knowledge of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng province.

It was evident from the current study that the following midwives' knowledge regarding factors contribute to birth asphyxia; prolonged labour; decreased blood supply to the fetus; unbooked pregnant women; maternal anaemia; lack of key skills in assisting women in labour; poor use of guidelines; lack of training; lack of proper awareness given to pregnant mothers; understaffing; lack of resources; lack of support structure for pregnant women; increased patient load; delayed decision-making; poor communication ; poor managerial support ; poor maternal nutrition. All these factors contribute to birth asphyxia since the p value was significantly less than 0,05.

- To assess the knowledge and perceptions of midwives in the management of pregnant women during antenatal care and labour (intrapartum) care to reduce birth asphyxia.

The correlation analysis shows that the causes contributing to birth asphyxia is significantly associated to midwives understanding the management of pregnant women during antenatal care, labour, and

postnatal period. There was an indication that assessments of complications were done with pregnant women with every antenatal care visit. This implies that management of pregnant women during antenatal care, labour and post-natal period might be attributed to knowledge gained through education. However, the age of group participants falling under 31-35 has a significant association with lower knowledge of potential factors contributing to birth asphyxia and lack of key skills in assisting women in labour, a factor that contributes to birth asphyxia. The results indicated positive results that the majority of midwives knows the management of a pregnant women during antenatal care, labour, and post-natal period although few did not. The majority of participants were of the notion that mothers with premature rupture of membranes have greater risk of birth asphyxia. A majority indicated that health promotion programmes to be conducted regularly for pregnant women to make them aware of factors contributing to birth asphyxia. Infant cooling and ventilation were indicated as an important factor which can be used in the prevention and management of birth asphyxia.

5.4 Gaps Identified in knowledge of midwives regarding management of the pregnant women during antenatal care and intrapartum care.

Some of the midwives are not certain about the factors contributing to birth asphyxia. Most midwives still lack knowledge on management of birth asphyxia. Most midwives disagreed with the fact that unbooked pregnant women are at the higher risk of birth asphyxia and most disagreed that premature rupture of membranes increases the risks of birth asphyxia, which increases the risk of cord prolapse. The results showed researcher that there is a lack of in-service training was the main cause of the lack of knowledge, midwives and advance midwives are outdated when it comes to new evidenced based practices.

5.5. Conclusions Related to the Assumptions of the Study

The assumption of this study is that birth asphyxia was caused by complications of pregnancy. In this study, the researcher discovered that not only complications of pregnancy were associated with birth asphyxia, other causes from the mother also results in birth asphyxia for example, mothers who did not attend antenatal care, advanced maternal age; the diet that women consumed which lacked iron predisposes their fetus and newborn to birth asphyxia. A lack of support structures for pregnant women was among the noted factors. The following factors were discovered from the health system, some midwives lacked knowledge regarding management of pregnant women during antenatal, intrapartum, and postnatal care. The lack of knowledge regarding the factors contributing birth asphyxia may be the cause in the increase cases of birth asphyxia. Poor usage of the maternity care guidelines when managing pregnant women during pregnancy and when in labour. Poor communication and negative

attitudes of staff was among the factors. Poor support from the managers in relation to provision of resources such as equipment, enough human resources and effective guidelines were attributed to the causes of birth asphyxia.

5.6. Limitations of the Study

The study only included midwives and advanced midwives working in maternity, neonatal wards, postnatal wards, and antenatal clinic. Those who were working in other wards outside maternity were excluded. Only one hospital in the City of Johannesburg was studies out of 6 hospitals and 2 community health care centres. Therefore, the study could not be generalised to all other hospitals within the City of Johannesburg or the greater Gauteng Province.

5.7. Recommendations Arising from the Study in Relation to the Objectives

Based on the findings of the study, the following recommendations were made;

- Recommendations for the chief executive officer and maternity unit manager;
  - ✓ Expose all midwives and advanced midwives to in-service training on birth asphyxia.
  - ✓ Midwives must be sent to attend more refresher courses about the prevention, causes and management of birth asphyxia,
  - ✓ More presentations should be done based on the recent information about potential factors contributing to birth asphyxia.
  - ✓ Although guidelines and protocols about birth asphyxia are available, they must be made available to all midwives and advanced midwives in every maternity and neonatal ward.
  - ✓ Frequent departmental or formal training about the guidelines and protocols must be done in each department.
  - ✓ More accoucheurs must be placed in the maternity and neonatal departments.
  - ✓ Training must be done on management of an infant with birth asphyxia especially cooling and ventilation of an infant. This will improve the health care provided to the infants and pregnant women.
  - ✓ Investigate cases of birth asphyxia and formulate guidelines and training to prevent the causes.
  - ✓ More support from the managers in relation to provision of resources such as equipment, enough human resources and effective guidelines were attributed to the causes of birth asphyxia.

- Midwives must do the following to prevent birth asphyxia;
  - ✓ Awareness campaigns and health promotions on birth asphyxia must be done frequently this must make the community to be aware of the conditions.
  - ✓ Teach the community about birth companionship which is meant to support pregnant women through their journey until post-natal period.
  - ✓ Educate women to consume food with iron and to attend ante-natal cate earlier.
  - ✓ To implement guidelines and protocols when rendering maternal health care services
  - ✓ To avail themselves when there is a call for training on birth asphyxia
  - ✓ Journal clubs to encourage evidence based practice

5.8. Recommendations for Future Research

Based on the findings of the study, the researcher recommends further research on the same topic or theme as the study was done only on one hospital that falls under City of Johannesburg instead of the whole six hospitals and two community healthcare centres found in the City of Johannesburg. Poor support from the managers in relation to provision of resources such as equipment, enough human resources and effective guidelines were attributed to the causes of birth asphyxia. The research study on management and attitude of nurses towards birth asphyxia should be pursued.

5.9. Summary

The study showed that not all midwives and advanced midwives are knowledgeable about the factors contributing to birth asphyxia and it's management. Midwives and advance midwives in the study sample were uncertain about most factors contributing to birth asphyxia. Midwives that have been in practice for longer are outdated on new evidenced based practices and research are not done in the hospitals. The midwives and advanced midwives must be given opportunities to attend courses and training about birth asphyxia to improve the health care system and to improve care rendered.

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ANNEXURE A INFORMED CONSENT

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

School of Health Care Sciences

Department of Nursing Sciences

INFORMATION LEAFLET AND INFORMED CONSENT TO BE COMPLETED AND SIGNED BY MIDWIVES AND ADVANCE MIDWIVES WHO VOLUNTARY PARTICIPATE IN COMPLETING A QUESTIONNAIRE ON KNOWLEDGE AND PERCEPTIONS OF FACTORS CONTRIBUTING TO BIRTH ASPHYXIA IN A SELECTED MOTHER AND CHILD HOSPITAL IN GAUTENG PROVINCE

STUDY TITLE:

Knowledge and Perceptions of Factors Contributing to Birth Asphyxia in a Selected Mother and Child Hospital in Gauteng Province.

Principal Investigator: Nompumelelo Precious Mthembu

Supervisor: Prof T.I Ramavhoya and Dr M Musie

Institution: Rahima Moosa Mother and Child Hospital

Daytime telephone number: 0838617627

DATE AND TIME OF INFORMED CONSENT DISCUSSION:

			:	
Dd	**Month**	**Year**	**Time**	

Dear Prospective Research Participant

Dear Mr / Ms / Mrs

1) INTRODUCTION

You are invited to volunteer for a research study. I am doing this research for master's degree purposes at the University of Pretoria. The information in this document is provided to help you to decide if you would like to participate. Before you agree to take part in this study, you should fully understand what is involved. If you have any questions, which are not fully explained in this document, do not hesitate to ask the researcher. You should not agree to take part unless you are completely happy with the kind of questions that will be asked.

2) THE NATURE AND PURPOSE OF THIS STUDY

The aim of this study is to identify the factors contributing to birth asphyxia in a selected mother and child hospital. By doing so I wish to learn more about the factors that contributes to birth asphyxia. You will be given questionnaires that you will have to answer in your own time and where you will be comfortable to answer.

3) EXPLANATION OF PROCEDURES AND WHAT WILL BE EXPEXTED FROM PARTICIPANTS

I would like you to complete a questionnaire. It will take approximately +/-30 minutes. I will collect the questionnaire from you before you leave the ward/ study site. I will be available to help you with the questionnaire. The researcher will keep the completed questionnaires in a safe place for five years to make sure that only people working on the study will have access to it. Please do not write your name on the questionnaire. This will ensure that your answers are kept confidential (so nobody will know what you have answered).

The questionnaire consists of **five sections*:***

Section A: Demographic data that relate to Socio-demographic information, which involves answering some questions about your age, marital status, where you live.

Section B: General information (training, awareness, guidelines accessibility, counseling, and complications assessment).

Section C: Identifying factors contributing to birth asphyxia.

Section D: Assessing the level of knowledge of birth asphyxia.

Section E: Assessing understanding in the management of pregnant women during antenatal care, labour (intrapartum) and post-natal period.

4) RISK AND DISCOMFORT INVOLVED

There is no foreseeable physical discomfort or risk involved. If there are questions that are too sensitive for you to answer, you do not need to answer them.

5) POSSIBLE BENEFITS OF THIS STUDY

The results of the study might improve the health care service delivery in the hospital and midwives might be informed about the factors contributing to birth asphyxia. The findings of the study will assist in improving the hospital practices by involving the patients and their families in planning the care for patients during antenatal care visits. The community will be informed to encourage pregnant women to attend antenatal care early as the patients and their families will be involved in planning care for patients.

6) ETHICS APPROVAL

This Protocol will be submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, Medical Campus, Tswelopele Building, Level 4-59, Telephone numbers 012 356 3084 / 012 356 3085 and written approval will be granted by that committee. The study has been structured in accordance with the Declaration of Helsinki (last update: October 2013), which deals with the recommendations guiding doctors in biomedical research involving humans. A copy of the Declaration may be obtained from the investigator should you wish to review it.

7) INFORMATION

If you have any questions concerning this study, you may contact:

Nompumelelo Mthembu 0838617627, Prof T. I Ramavhoya 012 356 3162 & Dr M Musie

8) CONFIDENTIALITY

All records from this study will be regarded as confidential. All results will be published or presented in such a way that it is not possible to identify the participants.

9) COMPENSATION

You will not be paid to take part in the study. There are no costs involved for you to be part of the study.

10) CONSENT TO PARTICIPATE IN THIS STUDY

I confirm that the person requesting my consent to take part in this study has told me about the nature and process, any risks or discomforts, and the benefits of the study. I have also received, read, and understood the above written information about the study. I have had adequate time to ask questions and I have no objections to participate in this study. I am aware that the information obtained in the study, including personal details, will be anonymously processed, and presented in the reporting of results. I understand that I will not be penalised in any way should I wish to discontinue with the study and my withdrawal will not affect my employment or student status. I am participating willingly.

I have received a signed copy of this informed consent agreement.

_____	_____
Participant's name (Please print)	Date
_____	_____
Participant's signature	Date
_____	_____
Researcher's name (Please print)	Date
_____	_____
Researcher's signature	Date

ANNEXURE B THE QUESTIONNAIRE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

School of Health Care Sciences

Department of Nursing Sciences

INSTRUCTIONS

- **Please complete the questionnaire by making the appropriate box with an (x).**
- **Where indicated provide a brief description.**
- **Please do not write your name anywhere on the questionnaire.**
- **Please respond to All questions.**
- **Please remember that there are no right or wrong answer as it is your personal experience or opinion that is important for this study.**

SECTION A: DEMOGRAPHIC DATA

1. Age: ☐

2. Gender:

1.Female	☐	2.Male	☐

3. Citizenship:

1.South African	☐	2.Other, specify	☐

4. Educational Level:

1) Diploma in Nursing	
2) Degree in Nursing	
3) Advanced midwife	
4) Masters in Nursing	
5) PhD	

5. Years of experience:

1) 2 years and below	
2) 2- 5years	
3) 5 -10 years	
4) 10-15 years	
5) 15-20 years	
6) 20 -25 years	
7) Above 25 years	

SECTION B: **General information (training, awareness, guidelines accessibility, counselling, and complications assessment)**

No.	**Variable**	**Yes (1)**	**No (2)**
1	I have received training related to Birth Asphyxia		
2	I have been part of awareness campaign related to BIRTH ASPHYXIA		

3	Guidelines and protocols are available to manage BIRTH ASPHYXIA		
4	There is counselling offered to pregnant mothers regarding the health impact of premature rupture of membranes during antenatal care		
5	Assessments of pregnancy complications are done with every antenatal visit		

SECTION C: IDENTIFYING FACTORS CONTRIBUTING TO BIRTH ASPHYXIA

Please select the appropriate option (make only one choice). In this table strongly disagree is represented by 1; disagree -2; uncertain -3; agree -4 and strongly agree – 5.

	QUESTIONS	Strongly disagree (1)	Disagree (2)	Uncertain (3)	Agree (4)	Strongly Agree (5)
1	Prolonged labour					
2	Decreased blood supply to the fetus					
3	Unbooked pregnant women					
4	Maternal Anemia					
5	Advance maternal age					
6	Lack of key skills in assisting women in labour					
7	Limited use of guidelines					
8	Lack of training					
9	Lack of proper awareness given to pregnant mothers					

10	Understaffing					
11	Lack of resources					
12	Lack of support structure for pregnant women					
13	Increased patient load					
14	Delayed decision-making					
15	Negative attitude by staff					
16	Limited communication					
17	Inadequate managerial support					
18	Limited maternal nutrition					

SECTION D: Assessing the level of knowledge of birth Asphyxia

Please select the appropriate option (make only one choice). In this table strongly disagree is represented by 1; disagree -2; uncertain -3; agree -4 and strongly agree – 5.

	QUESTIONS	Strongly disagree (1)	Disagree (2)	Uncertain (3)	Agree (4)	Strongly Agree (5)
1	Low apgar score is the first sign of birth asphyxia					
2	Birth asphyxia is one of the leading cause of deaths world wide					
3	High birth weight babies>4000g are at risk of birth asphyxia					
4	Primipara mothers have four times greater risk of birth asphyxia compared to multiparous women					

5	Majority of cases of perinatal asphyxia occur intrapartum or during labor					
6	Mothers with premature rupture of membranes have greater risk of birth asphyxia					
7	Birth asphyxia can be caused by maternal factors					
8	Birth asphyxia can be caused by uterine factors					
9	Birth asphyxia can be caused by intrapartum infections					
10	Birth asphyxia can be caused by cord factors					

SECTION E: Assessing understanding in the management of pregnant women during antenatal care and labour (intrapartum) care.

	QUESTIONS	Strongly disagree (1)	Disagree (2)	Uncertain (3)	Agree (4)	Strongly Agree (5)
1	Infant cooling is one of the managements of birth asphyxia					
2	Birth asphyxiated infant may need to be ventilated as management of birth asphyxia					
3	Continuous monitoring of labour may prevent birth asphyxia					
4	Infants born with birth asphyxia may need neonatal follow up dates after discharge					
5	Tetanus toxoid vaccination is one of the most important of antenatal care that can help prevent birth Asphyxia					

6	Iron folate supplements is one of the most important of antenatal care that can help prevent birth Asphyxia					
7	Detection and management of pre-eclampsia is one of the most important of antenatal care that can help prevent birth Asphyxia					
8	Screening and treatment of infectious diseases is one of the most important of antenatal care that can help prevent birth Asphyxia					
9	General maternal educational level is associated with management and prevention of Birth Asphyxia					
10	Community based intervention should be used to manage quality care for all pregnant mothers					
11	Health facility based intervention should be used to manage quality care for all pregnant mothers					
12	Promotion of health programs and intervention should be regularly conducted for awareness to all pregnant mothers.					
13	Level of knowledge of midwives can hamper the promotion of health programs					
14	Guidelines/protocols are readily accessible for all midwives to use to provide relevant care to pregnant mothers.					

- The questionnaires were done following the objectives.

…Thank you, this is the end of the questionnaire…

ANNUXURE C LETTER OF PERMISSION

Rahima Moosa Mother and Child Hospital

Enquiries: Mrs. Lesley A Rose
Directorate: Health Nursing
Tel: 011 470 9033
Email: Lesley.Rose@gauteng.gov.za Ref:

22 July 2022

Protocol Title: Knowledge and perceptions of factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province

Ethics Reference Number: 15/2021

Name of the Reseacher:

Miss N P Mthembu

Nursing Department

Rahima Moosa Mother and Child Hospital

Department where Research will be conducted:

Maternity and Neonatal Departments

Re: Permission to conduct study

Dear Miss N P Mthembu

Permission is granted for you to conduct the research as indicated in the title above.

The terms under which this permission is granted is contained in the Researcher Declaration form that you have signed. Failure to comply with these conditions will result in the withdrawal of such permission.

It is crucial for you to inform the Research Coordinator, Karen Marshall of the actual start and end dates of your study. This could be done by e-mail.

Should the study commence more than 12 months after receipt of this approval letter you will have to go through the process of applying again.

You are strongly advised to keep a signed copy of the declaration form so as to ensure that the terms of this agreement are complied with at all times.

Yours sincerely,

Mrs. Lesley Rose

Date: 22/07/2022
RN, ADM, BA (CUR)UNISA
Deputy Manager r, Nursing
Rahima Moosa Mother and Child Hospital

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Rahima Moosa Mother and Child Hospital
Enquiries: Adjunct Professor Ashraf Coovadia
Tel: 011 470 9284/9100
Email: Karen.Marshal@wits.ac.za

24 August 2022

TITLE OF RESEARCH PROJECT:
"KNOWLEDGE AND PERCEPTIONS OF FACTORS CONTRIBUTING TO BIRTH ASPHYXIA IN A SELECTED MOTHER AND CHILD HOSPITAL IN GAUTENG PROVINCE"

NAME OF SUPERVISOR:
Prof Irene Ramavhoya

NAME OF RESEARCHER:
Ms. Nompumelelo Precious Mthembu
Department of Nursing Science
School of Healthcare Sciences
Faculty of Health Sciences
University of Pretoria

NHRD REF NO: GP 202104 034

Dear Ms., Mthembu,

Permission is granted for you to conduct the research as indicated in the title above.

The terms under which this permission is granted is contained in the Researcher Declaration form that you have signed. Failure to comply with these conditions will result in the withdrawal of such permission.

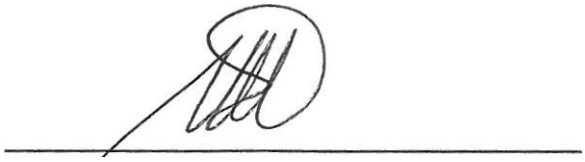
It is crucial for you to inform the Research Coordinator, Karen Marshall of the actual start and end dates of your study. This could be done by e-mail.

Should the study commence more than 12 months after receipt of this approval letter you will have to go through the process of applying again.

24/8/2022

You are strongly advised to keep a signed copy of the declaration form to ensure that the terms of this agreement are always complied with.

Yours sincerely,



DR NP MKABAYI
Chief Executive Officer
Rahima Moosa Mother and Child Hospital

Date:

ANNEXURE D: ETHICS PERMISSION LETTER FROM UNIVERSITY OF PRETORIA

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

Institution: The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- FWA 00002567, Approved dd 18 March 2022 and Expires 18 March 2027.
- IORG #: IORG0001762 OMB No. 0990-0278 Approved for use through August 31, 2023.

Faculty of Health Sciences **Research Ethics Committee**

18 May 2023

Approval Certificate
Amendment

Dear Miss NP Mthembu,

Ethics Reference No.: 15/2021 – Line 2
Title: "Knowledge and Perceptions of Potential Factors Contributing to Birth Asphyxia in a Selected Mother and Child Hospital in Gauteng Province"

The **Amendment** as supported by documents received between 2023-04-19 and 2023-05-17 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on 2023-05-17 as resolved by its quorate meeting.

Please note the following about your ethics approval:

- Please remember to use your protocol number (15/2021) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

On behalf of the FHS REC, Dr R Sommers
MBChB, MMed (Int), MPharmMed, PhD
Deputy Chairperson *of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria*

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health).

Research Ethics Committee
Room 4-60, Level 4, Tswelopele Building
University of Pretoria, Private Bag x323
Gezina 0031, South Africa
Tel +27 (0)12 356 3084
Email: deepeka.behari@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tsa Maphelo

ANNEXURE D: ETHICS LETTER FROM WITS

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Innovation)

TO: Ms N Mthembu
Department of Nursing
University of Pretoria

E-mail: mpumzam1406@gmail.com

CC: Supervisor: Ms M Musie
<Maurine.Musie@up.ac.za>
and <HREC-Medical Research Office@wits.ac.za>

FROM: Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2022/09/06

REF: R14/49

PROTOCOL NO: **M220878** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

PROJECT TITLE: *Knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms N Mthembu

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M220878

NAME: (Principal Investigator)	Ms N Mthembu
DEPARTMENT:	Department of Nursing University of Pretoria
PROJECT TITLE:	*Knowledge and perceptions of potential factors contributing to birth asphyxia in a selected mother and child hospital in Gauteng Province*
DATE CONSIDERED:	Ad hoc
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Ms M Musie
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2022/09/06

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in August and therefore reports and re-certification will be due in the month of August each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator _____ Date _____

ANNEXURE E: BIOSTATICIAN LETTER OF SUPPORT

LR Research & Data Analysis Consulting (Pty) Ltd

28 September 2020

To whom it may concern

SUBJECT: LETTER OF CLEARANCE FROM THE STATISTICIAN ON SERVICES RENDERED BY LR RESEARCH & DATA ANALYSIS CONSULTING (PTY) LTD

1. This letter confirms that the student, Nompumelelo Precious Mthembu, studying at the University of Pretoria, discussed the Project titled "FACTORS CONTRIBUTING TO BIRTH ASPHYXIA IN A SELECTED MOTHER AND CHILD HOSPITAL IN GAUTENG PROVINCE" with me.

2. I hereby confirm that I am aware of the project and undertake to assist with the Statistical analysis of the data generated from the project and the project will be treated with the confidentiality level required.

3. The analytical tool that will be used will be SPSS Software and Microsoft Excel to achieve the objective(s) of the study

Livhuani Nedzingahe
Managing director & Statistician
Lr Research & Data Analysis Consulting

Signature:  Date: 28/09/2020

Lr Research & Data Analysis Consulting (PTY) Ltd| Cell: +27 76 304 6953| 2016/172929 /07
lrresearchconsulting@gmail.com|

ANNEXURE F: LETTER FROM EDITOR

University of Pretoria
Hatfield
O122

420 Unit C Mankweng 0727
081 5666 755
rightmovemultimedia@gmail.com
karabokonyani@gmail.com

12 May 2023

TO WHOM IT MAY CONCERN

This editing certificate verifies that this dissertation was professionally edited for Nompumelelo Precious Mthembu (12043852).

Thus, it is meant to acknowledge that I, Mrs K.L Malatji and Dr E.J Malatji professional Editors under a registered company RightMove Multimedia, have meticulously edited the proposal from the University of Limpopo. Title: “KNOWLEDGE AND PERCEPTIONS OF POTENTIAL FACTORS CONTRIBUTING TO BIRTH ASPHYXIA IN A SELECTED MOTHER AND CHILD HOSPITAL IN GAUTENG PROVINCE".

Sincerely,

Mrs K. L Malatji