FACTORS CONTRIBUTING TO NEONATAL BIRTH ASPHYXIA IN PUBLIC HEALTH FACILITIES OF MOPANI DISTRICT, LIMPOPO PROVINCE

By

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[redacted]

DISSERTATION

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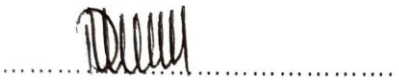
DECLARATION

I, Makhumisane Mphonyane declare that "**FACTORS CONTRIBUTING TO NEONATAL BIRTH ASPHYXIA IN PUBLIC HEALTH FACILITIES OF MOPANI DISTRICT, LIMPOPO PROVINCE"** is my work and that all the sources that I have used or quoted have been indicated and acknowledged through complete references and that this work has not been submitted before for any other degree at any other institution.

MAKHUMISANE MPHONYANE **DATE**



22/02/2024

DEDICATION

I dedicate this dissertation to the following special people: professional midwives, for their endurance and passion for rendering quality nursing care. My parents for always taking care of my kids while I was studying, my husband for the support and understanding when staying up late studying, my twin sister for her encouragement, and my family for motivating me to further my studies.

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ABSTRACT

Introduction and background: Birth asphyxia is a severe medical problem worldwide, especially in developing countries, and the main contributor to neonatal mortality and morbidity. Birth asphyxia is an oxygen deficit at delivery, which can lead to severe hypoxic organ damage (heart, lungs, liver, gut, and kidneys), but brain damage is of most concern and perhaps the least likely to heal quickly or entirely.

Purpose: This research aimed to determine contributory factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.

Research method: The researcher used a quantitative, descriptive, cross-sectional research design. The population of this research study was all professional nurses with midwifery qualifications working in public health facilities of Mopani district, Limpopo Province. Participants (n=139) were sampled using simple random sampling techniques. Self-developed questionnaires were used as an instrument for data collection. The data was analysed using Statistical Package for Social Sciences (SPSS) version 27. Validity and reliability were ensured, and ethical considerations were adhered to in this research study.

Results: The most contributing factor of neonatal birth asphyxia was Prolonged labour n=138(100%) followed by meconium-stained liquor n=114(82.6%) and Delayed emergency caesarean n=108(78.3%).

Conclusion: Prolonged labour/ delayed maternal 2nd stage of labour was identified as one of the leading health-related factors contributing to neonatal birth asphyxia. Meconium-stained liquor was the most contributing factor to neonatal birth asphyxia caused by maternal-related factors. Education and training programmes are recommended for professional midwives which will increase their knowledge and skills on proper management of women in labour including the antenatal period to reduce birth complications that might lead to birth asphyxia.

Keywords: Birth asphyxia, factors, neonatal, preterm, mortality, midwives

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CHAPTER 1

ORIENTATION OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND

Birth asphyxia is a serious medical problem worldwide, especially in developing countries, and is the main contributor to neonatal mortality and morbidity (Fekede & Fufa, 2022). Birth asphyxia is an oxygen deficit at delivery, which can lead to severe hypoxic organ damage (heart, lungs, liver, gut, and kidneys), but brain damage is of most concern and perhaps the least likely to heal quickly or completely. In more pronounced cases, an infant will survive, but with damage to the brain manifested as either mental, such as developmental delay or intellectual disability, or physical, such as spasticity (Tasew, Zemicheal, & Teklay, 2018). The 2020 report of the World Health Organization (WHO) indicated that 4 million neonatal deaths occur annually due to birth asphyxia. The incidence of birth asphyxia in most developed countries accounts for less than 0.1% of newborn deaths. But, in developing countries, it ranged from 4.6/1000 to 7–26/1000 live births (Heliyon, 2021).

Over 130 million infants are born every year globally, about four million neonatal deaths occur each year this is due to serious infections, including tetanus (36%), complications of preterm birth (27%), and birth asphyxia (23%), in developed countries (Masaba & Mmusi-Phetoe, 2020). About 1 million babies died due to birth asphyxia-related complications in the first month of life, and millions have a lifetime of impairment. Birth asphyxia was one of the contributors to early neonatal death, with 34% followed by 25% prematurity, 18% sepsis, and other infectious conditions (Tasew *et al.,* 2018).

The burden of perinatal asphyxia is critical in Sub-Saharan Africa in general and in East and Central Africa in particular (Heliyon, 2021). This problem is high in this region due to poor obstetrics coverage, equity, and quality because of gaps in local health financing models, inaccessible health facilities, socio-cultural norms, low literacy levels, shortages of health workers and supplies, and poor health care spending (Tesew, 2018). Birth asphyxia is a leading cause of infant morbidity and mortality in developing nations, such as Ethiopia.

Though Ethiopia has made considerable achievements in the reduction of the under-five mortality rate, the neonatal mortality burden has not experienced the same reduction, which

may be attributed to birth asphyxia (Woday, 2019). The high rates of perinatal death from intrapartum-related birth asphyxia in South Africa are typical of those in underdeveloped countries, with the most serious deficiencies in rural areas (Masaba, 2020). There were 123,508 births in the hospitals surveyed in South Africa, with 4,142 perinatal deaths among infants > or = 1,000 g, giving a perinatal mortality rate of 33.5/1000 births. Most of these deaths are avoidable, and the reduction of these rates presents an important challenge to providers of perinatal care in this country. Areas worthy of research and action include the provision of mothers' waiting facilities in rural regions, improvements in foetal monitoring, partogram-based labour management, and the establishment of midwifery staffing norms for South African labour units (Serbanescu, Goodwin, Binzen, & Morof, 2019).

Concentration on the remediable priority problems identified (namely labour management, resuscitation of the asphyxiated neonate, and care of the premature neonate) makes the reduction of perinatal mortality in South Africa feasible and inexpensive (Madara, 2019). A neonate diagnosed with birth asphyxia may be breathing weakly or not breathing at all, may have bluish or very pale skin, a low heart rate, poor muscle tone, or be experiencing seizures a few hours after birth (Tasew, 2018). In conclusion, neonatal birth asphyxia was also noted in Limpopo province, including in hospitals. It is against this background that prompted the researcher to conduct the current study to determine the factors contributing to birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo province.

1.2 RESEARCH PROBLEM

Neonatal birth asphyxia happens when a baby's brain and other organs do not get enough oxygen and nutrients before, during, and right after birth (Parratt, 2020). It is considered when the Apgar score is <7 at the 5th minute after birth. This data is collected by trained midwives in the maternity wards and operating theatres, and the information is documented on an Apgar scorecard. Neonatal birth asphyxia is a major contributor to neonatal mortality worldwide, causing all neonatal deaths and the deaths of children less than 5 years of age (Abdo *et al.,* 2019).

In South Africa, 80% of all newborn deaths result from three preventable and treatable conditions, with prematurity being the first, followed by neonatal birth asphyxia and neonatal infections. It was noted that poor-quality care accounts for 61% of neonatal deaths (NDoH, 2022).

This also applies in Limpopo Province, with the main causes of neonatal death being prematurity at 49.2%, followed by intrapartum events leading to birth asphyxia at 28% (NDoH, 2022). The researcher has observed with concern that data from the Mopani District Health Information System (MDHIS) for 2020–2021 shows that the neonatal mortality rate from birth asphyxia accounted for 12.5% from the regional hospital, 5.2% from the district hospitals, and 2% from primary health facilities (MDHIS, 2021). This is still far from the sustainable developmental goals target regarding neonatal and children under 5 morality of 12/1000 livebirth.

Neonatal birth asphyxia can lead to visual impairment, cerebral palsy, seizure disorders, and learning disabilities, with the most common being the leading cause of death if not prevented during the antenatal period, during birth, or properly managed early (Babiker, Abdalla, &., Kabiraj, 2020). As such, the current research study was conducted to determine factors contributing to neonatal birth asphyxia during the antenatal period, labour, and after delivery and to empower professional midwives in the prevention of the condition, thereby reducing neonatal morbidity and mortality rates.

1.3 PURPOSE OF THE STUDY

1.3.1 Aim

This research study aimed to determine contributory factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.

1.3.2 Objectives

The objective of the research proposal was to help the researcher define the contents, plan and execute a research project, and inform potential collaborators and supporters about the topic (Chan & Dai, 2019).

- To assess health system related factors contributing to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.
- To identify maternal related factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo province.

- To determine the association between socio demographic data of professional midwives and factors contributing to neonatal birth asphyxia in public health facilities of Mopani district, Limpopo province.

1.3.3 Hypothesis

A hypothesis is a set of assumptions expressed coherently about the observable phenomenon. The formal statement comprises the researcher's prediction (Brink, 2018).

Therefore, the researcher in this study assumed that prolonged labour was the leading cause of neonatal birth asphyxia.

1.4 OVERVIEW OF THE RESEARCH METHODOLOGY

An overview of the research methodology is presented in this chapter. The full discussion of the methodology is indicated in Chapter 3. A quantitative, non-experimental, descriptive, and cross-sectional research design was used in this research study to determine the factors contributing to neonatal birth asphyxia in public health facilities in Mopani district, Limpopo province. The target population of this study was based on the total population of each clinic and hospital sampled. The population of this research study was 154 professional midwives working in public health facilities in Mopani district, Limpopo Province. The researcher used stratified random sampling to first sample clinics, followed by community health centers and hospitals. Although they possess the same characteristics, their operations differ.

Probability Simple random sampling was used, where participants from each healthcare facility (Table 3.1) were selected randomly from the total population (of each facility) by putting small papers written yes or no in a bowl, and participants were picked and replaced after checking what was written one at a time. This ensured that all participants had an equal chance of participating in the study. The Taro Yamane formula was used to calculate the sample size of n=139 professional midwifes participants from the population (n=154) of each facility. The researcher used self-administered questionnaires, which consisted of closed-ended questions that were simple and short (Appendix C). The researcher worked closely with the statistician, and the data was tabulated using Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) version 27 for cross-tabulations and Pearson's Chi-square test.

This test statistic was used to determine whether the difference between the observed and expected values was statistically significant (Mishra et al., 2019), as discussed in Chapter

3. Ethical considerations were followed, and the researcher obtained ethical clearance from the University of Limpopo Turfloop Research Ethical Committee (TREC) and permission from the Limpopo provincial ethics committee, the chief executive officer of the hospital, the district executive office from Mopani District, and participants (see chapter 3 for more details).

1.5 SIGNIFICANCE OF THE STUDY

The significance of the study is a written statement that explains why your research was needed. It's a justification of the importance of your work and its impact on your research field, its contribution to new knowledge and how others will benefit from it (Andrade, 2019).

This research study could benefit the participants in the Department of Health as the factors contributing to neonatal birth asphyxia will be known, hence increasing their knowledge of managing these factors in their clinical setting and leading to improved skills to prevent birth asphyxia. Educationally, the study will assist in adding to the body of knowledge, as the results and recommendations of the current study could be used in the formulation and design of curriculum, policy development, and updated guidelines that can guide midwives and doctors when they render their care on the prevention and reduction of birth asphyxia. The knowledge of factors associated with birth asphyxia by midwives might reduce the incidence of newborns who suffer from birth asphyxia and, as such, reduce the economic burden the department may face as the number of children admitted to the hospital will be reduced. Midwives could have a limited number of children to care for, and as such, quality neonatal care will be rendered. This study might also benefit the community and society as the number of children with intellectual disabilities will be reduced as the condition deters the functioning of the brain; hence, it will, in turn, increase the economic status of the country at large. This research report will be available in the university library. Students will have access to and apply the information in future research studies about contributing risk factors leading to neonatal birth asphyxia.

1.6 OUTLINE OF THE STUDY

The outline of the study is organised as follows.

Chapter 1 Overview of the study

Introduced the background of the study on the factors contributing to neonatal birth in public health facilities in Mopani districts, Limpopo province. It also provided an overview of the purpose of conducting the study, the objectives, and the problem statement. The methodology and design were discussed, and the structure of the dissertation was outlined.

Chapter 2 Literature review and theoretical framework

Chapter 2 consisted of a literature review and theoretical framework. It also provided Health systems factors leading to neonatal birth asphyxia, maternal factors leading to neonatal birth asphyxia, Prevalence of neonatal birth asphyxia and Conceptual Models for Nursing under the theoretical framework.

Chapter 3 Research Methodology

This chapter describes the research design and methodology of the study in detail. Study settings and participants were sampled using sampling methods. The inclusion and exclusion criteria were outlined clearly. Validity and reliability were stated. The pilot study, data analysis, and data collection were explained in detail. Ethical principles were considered throughout the study, as the identities and names of participants remained anonymous throughout the study.

Chapter 4 Presentation, interpretation and discussion of results

In this chapter, the researcher presents data analysed from the questionnaires using graphs, charts, chi-square tests, and tables. Discussions were done best to interpret each figure, supported by relevant literature.

Chapter 5 Summary, limitations, recommendations and conclusion

Chapter 5 covers the summary, limitations, recommendations, and conclusion of the study about the factors contributing to neonatal birth asphyxia in facilities in Mopani district, Limpopo province.

1.7 SUMMARY

Chapter 1 introduced the background of the study on the factors contributing to neonatal birth in public health facilities in Mopani districts, Limpopo province. It also provided an overview of the purpose of conducting the study, the objectives, and the problem statement. The methodology and design were discussed, and the structure of the dissertation was outlined.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION

A literature review is a methodology for conducting research and offers an overview of different types of reviews, as well as some guidelines for how to both work and evaluate a literature review paper (Snyder, 2019). In this research study, literature was reviewed based on the research objectives, which were to identify health and patient-related factors contributing to neonatal birth asphyxia in public health facilities of Mopani district, Limpopo province. The researcher used search engines such as EBSCOhost, Google Scholar, Pub Med, Science Direct LANCET, and MEDLINE in this review. The keywords used in the search included neonatal birth asphyxia, asphyxia and factors, and prevalence's of birth asphyxia. In this review, the researcher indicated the definition and prevalence of neonatal birth asphyxia. The health system-related factors, as well as the maternal-related factors leading to neonatal birth asphyxia, were described. Lastly, the researcher outlined the Conceptual Models for Nursing, which guided the current study.

2.2 WHAT IS BIRTH ASPHYXIA?

The World Health Organization (WHO) defines birth asphyxia as a failure to trigger and sustain breathing automatically at birth (Berhe *et al.,* 2020). It is a condition that results in hypoxemia (lack of oxygen) and hypercapnia (accumulation of carbon dioxide) when there is a loss of blood-gas exchange (Lius, & Syafaah, 2022). In a low-resource setting, birth asphyxia is usually defined as a failure to initiate or sustain spontaneous breathing at birth. In the resource-replete setting, birth asphyxia is a biochemical definition related to impaired gas exchange due to interruption of placental blood flow (PBF) (Moshiro *et al.,* 2019). Birth asphyxia is defined by the World Health Organization as not initiating and maintaining default breathing at birth (Berhe, Kebedom, Gebregziabher, Assefa, & Berhe, 2020). Birth asphyxia, although the correct definition is imprecise, is an insult to the fetus or newborn due to a failure to breathe or breathing poorly, leading to decreased oxygen perfusion to various organs (Mounika, 2019). Asphyxia is a condition that occurs when there is an impairment of blood-gas exchange, resulting in hypoxemia (lack of oxygen) and hypercapnia (accumulation of carbon dioxide).

The combination of the decrease in oxygen supply (hypoxia) and blood supply (ischemia) results in a cascade of biochemical changes inside the body, whose events lead to neuronal cell death and brain damage (Zhang, Zhang, Zhu, & Wang, 2020). The Apgar score parameter is used to determine the level of birth asphyxia, evaluated in the first and fifth minutes of life, with scores ranging from zero to ten (Pinheiro, 2022). A diagnosis of birth asphyxia can be made when a newborn has an Apgar score of < 7. Apgar score values of four to seven indicate moderate birth asphyxia, whereas severe asphyxia is between zero and three. A newborn was considered to have birth asphyxia when its fifth-minute Apgar score was < 7 (Bayih, Yitbarek, Aynalem, & 2020).

According to the WHO classification of diseases (ICD10), severe birth asphyxia is when the apgar score at 1 minute is 0–3, mild and moderate birth asphyxia is when the apgar score at 1 minute is 4–7 (Razaz, Norman, Alfven, & Cnattingius, 2023). Appearance, Pulse, Grimace Activity, and Respiration (APGAR) score of less than 7 asphyxiated newborn, which shows either not being able to breathe after birth and convulsions or spasms, not being able to suckle normally after birth, or not being able to cry after birth) (Stratton, 2021).

2.3 PREVALENCE OF NEONATAL BIRTH ASPHYXIA

The prevalence of birth asphyxia was found to be 165 (28.3%). Most of the asphyxiated neonates had moderate asphyxia 130 (78.8%), whereas 35 (21.2%) neonates had severe birth asphyxia (Bayih, Yitbarek, Aynalem, Abate, &., Tesfaw, 2020). With respect to birth asphyxia among twin deliveries, the rate of birth asphyxia among the second twins (19.3%) was nearly twice as high as the rate among the first twins (10.2%) (Odongkara, 2023). The proportion of birth asphyxia among neonates delivered at night (60.0%) was higher than that delivered at daytime (17.4%). Moreover, the proportion of birth asphyxia among neonates delivered by the attendance of medical interns alone 37 (28.7%) was higher than that delivered with the help of both midwives and obstetricians 49 (38.9%) (Bayih *et al.,* 2020).

At Chris Hani Barawagnath Hospital in Gauteng, 20% of all neonatal deaths was due to asphyxia (Osman, 2020). A group of 25 term asphyxiated infants admitted to the Johannesburg Hospital Neonatal Unit was studied (Hanyanya, 2018). This study showed a mortality rate of 20%; 16% of children were disabled at the 2-year assessment, and 20% were lost to follow-up (Bell, Hintz, Hansen, &., Bann, 2022). In a follow-up retrospective study of 109 term infants with moderate to severe perinatal asphyxia, their prognosis was

often poor, particularly in patients with seizures, cardiopulmonary signs of asphyxia, and multi-organ dysfunction (Simiyu, Mchaile, Katsongeri, Philemon, & Msuya, 2017).

Moreover 150 neonates, 61.3% survived. The majority who died were out born. The difference was statistically significant ($p < 0.001$). The inborn were about 1.2 times (AOR = 1.22; 95% CI: 1.06–1.78) more likely to survive BA (Uleanya, Aniwada, & Ekwochi, 2019). Among low birth weights (LBWs), 73.9% died, 23.7% of normal weights died, and 14.3% of macrosomia died. The difference was statistically significant ($p < 0.001$). The normal weights were about 2 (AOR = 2.23, 95% CI: 1.76–6.25), and the macrosomia were about 5 times more likely to survive BA than LBWs (Dai, Xu, Ye, & Wang, 2023). Regarding GA, 78.8%, 17.2%, and 18.2% of pre- and post-terms died, respectively. The difference was statistically significant ($p < 0.001$). The term babies were about 11 (AOR = 11.27; 95% CI: 4.02-31-56), and post-term babies were about 9 (AOR = 8.79; 95% CI: 1.43-54.04) times more likely to survive BA than pre-terms9 Supra, Wang'ombe, & 2022). Other significant factors were the degree of asphyxia ($p = 0.003$) and parental education ($p < 0.001$) (Uleanya, Aniwada, & Ekwochi, 2019).

2.4 HEALTH SYSTEMS FACTORS LEADING TO NEONATAL BIRTH ASPHYXIA

Birth asphyxia has a significant association with neonatal morbidity and mortality, as well as neurological complications (Zhang, Li, Zhang, Zhu, & Wang 2020). Delayed emergency caesarean section: if an emergency C-section takes longer than 30 minutes to perform (depending on the circumstances) or if nurses prolong labour for longer than is reasonable, a baby can suffer a brain injury for not getting enough oxygen (Lemma, Misker, Kassa, & Abdulkadir, 2022). There are many critical situations that can occur during labour and delivery that require an emergency C-section. Once recognised, the medical team must take immediate action to deliver the baby via C-section to avoid severe complications that might affect both the mother and the fetus or baby (Mostafayi, & Imani, 2021). The most common complications include fetal distress, placenta abruption, uterine rupture, cord prolapse, and prolonged or arrested labour. All these complications lead to the neonate being deprived of oxygen, resulting in resuscitation or helping the baby to breathe after delivery, causing neonatal birth asphyxia (Wong, Tse, & Lai, 2021).

A study conducted in Khwaja Yunus Ali Hospital (KYAMC), which explored the determinants of birth asphyxia, found there was a significant relationship between birth asphyxia and meconium-stained amniotic fluid, and a case-control study conducted in public hospitals in

central Tigray, Ethiopia, reported that meconium-stained amniotic fluid was an independent risk factor for birth asphyxia (Mulugeta, Sebsibe, Feta, & Sibhat, 2020). Based on this, the presence of an abnormal colour of amniotic fluid indicates the risk of asphyxia and other infections. Subsequently, blood-stained amniotic fluid appears to have a high risk for birth asphyxia in newborns, and babies may require intensive suctioning and resuscitation before they breathe independently (Nicholson, 2022).

Medical conditions in pregnancy, such as hypertension and anaemia, did not emerge as a risk factor for birth asphyxia, but they were found to be more common. Hypertension can cause a decrease in blood flow, resulting in asphyxia, while anaemia causes intrapartum hypoxia, an absence of enough oxygen supply (Parratt, 2020). These conditions are preventable if midwives can detect and are manage them earlier, leading to the prevention of birth asphyxia.

The death of an infant because of perinatal asphyxia is devastating and frequently avoidable. In developed countries with well-functioning health services, these deaths are rare, and ways to prevent them are widely understood and applied (Simiyu *et al.,* 2017). Four categories emerged: (i) understanding of and actions for fetal distress and birth asphyxia, including knowledge, misconceptions, and interventions; (ii) challenges of managing fetal distress and birth asphyxia, such as complexities of the referral system, refusal of referral, lack of equipment, and human resource problems; and finally (iii) health care workers' insights into the prevention of fetal distress and birth asphyxia (Chiwala, 2022).

However, a perinatal audit using the Perinatal Problem Identification Programme (PIPP) has identified perinatal asphyxia as a common and important cause of death in South Africa (Mwamba, Ameyaw, & Singogo, 2022). The fundamental goal of establishing perinatal audits in areas with high perinatal mortality rates is to reduce the number of perinatal deaths through improvements in the quality of care. Currently, there is limited data on perinatal mortality rates, and although the available figures are very high, they are likely to underestimate the problem (Simiyu *et al.,* 2017).

2.5 MATERNAL FACTORS LEADING TO NEONATAL BIRTH ASPHYXIA

Birth asphyxia can be caused by factors related to the antepartum, intrapartum, or postpartum period (Lemma, Misker, Kassa, Abdulkadir ,& Otayto 2022). However, quality of intrapartum care during labour and delivery has been recognized as the single most

important predictor of the overall morbidity and mortality from asphyxia neonatal, parity, multiple births, gestational age < 37 or > 41 weeks, low birth weight, premature rupture of membranes, prolonged labour, and fetal distress have already been identified as being among the risk factors of birth asphyxia (Bayih, Yitbarek, Aynalem, & 2020).

Risk factors for birth asphyxia have been divided into antepartum and intrapartum factors. Contributing factors will be described as follows: Antepartum factors consist of high maternal age, low maternal age, primigravida, grand multipara birth, and eclampsia (Dudhrejia, Karena, & Patel 2020). Intrapartum factors consist of meconium-stained liquor, prolonged labour. There are several risk factors that have been associated with antepartum stillbirth. Maternal age greater than 35 years, parity higher than four, low maternal educational status, lack of antenatal care attendance, chronic or acute maternal medical conditions, pre-eclampsia or placenta abruption during pregnancy, intra-uterine growth restriction, major congenital anomaly of the infant, and poor maternal nutritional status (Radha, Suseela, & Begum, 2020), fetal distress, and premature birth.

2.5.1 Antepartum factors

Attempts to lower the stillbirth rate further may be hampered by an incomplete understanding of the risk factors leading to most antepartum stillbirths (Alyahya, Khader, & Al-Sheyab, 2021). There are several risk factors which have been associated with antepartum stillbirth maternal age greater than 35 years, parity higher than four, low maternal educational status, lack of antenatal care attendance, chronic or acute maternal medical conditions, pre-eclampsia or placenta abruption during pregnancy, intra-uterine growth restriction, major congenital anomaly of the infant, and poor maternal nutritional status (Radha *et al.,* 2020).

Antepartum factors contributing to neonatal birth asphyxia in this research study that the researcher will focus on include the following: High maternal age: mothers aged ≥35 were more or six times more likely to have experienced birth asphyxia than women in the age group between 20 and 34 years old (Abdo, 2019). A study conducted by Pitsawong (2018) indicated that young maternal age (20–25 years) and primigravidity have been two of the main risk factors for developing birth asphyxia (Parvin, BakiBillah, Hasan, & Chowdhury, 2022). Primipara mothers were found to have a four-fold greater risk of birth asphyxia compared to multiparous women because primipara mothers tend to be found in the younger age bracket and are more prone to mal-presentations and prolonged obstructed labour (Mulwa, 2022).

The most common obstetric complication was a failure to progress in labour, which may subsequently result in the delivery of an asphyxiated baby (Sumankuuro & Baatiema, 2022). Thus, it is believed that perinatal asphyxia is expected to be high among primigravida women compared to multipara women (Wosenu, Worku, Teshome, & Gelagay, 2019).

2.5.2 Intrapartum factors

Intrapartum refers to the period during childbirth from the onset of labour through the delivery of the placenta. Intrapartum can refer to both the woman and the fetus (Berhe *et al.,* 2020). Labour is usually considered prolonged when the first and second stages of labour combined are greater than 20 hours for a first pregnancy and greater than 14 hours for women with prior births. Many conditions associated with prolonged and obstructed labour make it more likely that that baby will be exposed to Pitocin, Cytotec, forceps, and/or vacuum extractors (Cheng, & Leung, 2020). All these issues can cause the baby to have neonatal birth asphyxia and brain bleeds, which can cause hypoxic-ischemic encephalopathy (HIE) (Pitsawong *et al.,* 2018).

- *Premature birth*

The risk of developing birth asphyxia was higher in infants weighing 1-2 kg as compared to those weighing 2.5–3.5 kg (Tesew, 2018). Prematurity carried a substantially higher risk of developing birth asphyxia, with a gestational age of 34 to 37 weeks, increasing the risk of asphyxia by a factor of 0.34. Pre-term delivery also emerged as one of the significant risk factors for birth asphyxia (Desalew, Semahgn, & Tesfaye, 2020). It may be because pre-term babies face multiple morbidities, including organ system immaturity, especially lung immaturity, causing respiratory failure (Tesew, 2019).

2.6 EFFECTS OF BIRTH ASPHYXIA ON NEONATES

When a baby is still inside the woman's womb, blood travels from the mother, the uterus, to the placenta and through the umbilical cord to the baby (Heil, & Bordoni 2020). The blood vessels connecting the uterus and placenta, known as uteroplacental circulation, are similar to how the lungs take in and let out gases (Kamau *et al.,* 2022). However, suppose some obstruction, like placenta abruption, prevents adequate blood flow from reaching the infant. In that case, it can affect the amount of oxygen the baby receives and lead to birth asphyxia (Woday, Muluneh, & Denis, 2019).

The specific level of severity of disabilities a child can suffer from birth asphyxia or hypoxic-ischemic encephalopathy (HIE) depends on certain factors, including the length of time they were deprived of oxygen, the baby's condition during the deprivation, and the severity of that deprivation (Rogol, 2020). If a baby is deprived of oxygen for a very short time, it will likely have a milder level of disability than a child who was deprived for a longer time (Everitt, Awseyila, Bhatt, & Johnson 2021).

The following are common long-term effects of birth asphyxia and HIE: Blindness or visual impairment; cerebral palsy, epilepsy, or seizure disorders; learning disabilities that affect speech and thinking, motor and behavioural development issues that affect coordination and walking (Paul, Nahar, Bhagawati, & Kunwar, 2022). Causes of perinatal birth asphyxia may be maternal or fetal. Those who survive asphyxia at birth may have a chance to develop neurological complications, including epilepsy, cerebral palsy, and developmental delay. Risk factors for birth asphyxia have been divided into antepartum, intrapartum, and fetal (Zhang *et al.,* 2020).

Studies conducted in Thailand, Pakistan, and Ethiopia indicated that low birth weight, caesarean section, multiple births, lack of antenatal care, maternal age, gravidity, and mode of delivery, prolonged labour, and fetal distress were significant causes of birth asphyxia (Kaczor, 2022). Hypoxia, hypercarbia, acidosis, hypotension, and ischemia are the short-term effects of birth asphyxia (Pereira, 2022).

2.7 PREVENTION AND MANAGEMENT OF BIRTH ASPHYXIA

Prevention of birth asphyxia with appropriate resuscitation at birth may help reduce morbidity and mortality due to birth asphyxia (Siddiqui, Masood, Butt, & Tariq, 2021) the resuscitations to manage birth asphyxia state that the newborn should be dried and 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 (Kariuki, Sutton, & Leone, 2021) The mother should be informed about the condition of her newborn. The health care workers should ensure that the newborn's airway is free and suction the mouth and nose to remove secretions. The guidelines caution healthcare workers not to suction too deep to avoid further problems (Cook, El-Boghdadly, McGuire. & McNarry, 2020). The newborn shall then be ventilated until the breaths are more than 30 per minute. If this does not happen, ventilation should be continued at 40 per minute. If available, oxygen should be provided. The newborn may be pronounced dead after 20 minutes of resuscitation without

improvement (Mohamed, Abdelhalim, Algantri, Salam, & Taher, 2023). The guidelines discourage chest compressions, citing that they could cause problems if not performed properly. The use of drugs is not considered necessary (Ayebare, Ndeezi, Hjelmstedt, Nankunda, & Tumwine, 2021).

Healthcare workers described the management of fetal distress and birth asphyxia as complex and challenging (Ayebare, Ndeezi, Hjelmstedt, Nankunda & Tumwine, 2021). Thus, guidelines to manage fetal distress and birth asphyxia that are specifically tailored to the different levels of health facilities to ensure high quality of care and reduce the need for referral are called for (Hill, Reed, & Brown, 2021). Innovative ways to operationalise transportation for referral and community dialogues could lead to improved birth experiences and outcomes (Muriuki, Yahner, & Kiragu, 2022). Midwives can prevent this birth asphyxia through early diagnosis of conditions leading to birth asphyxia, early management, and using effective strategies or skills when dealing with asphyxiated neonates. Mothers who give birth to asphyxiated neonates need to be reassured and counselled about the conditions. They should be clarified on what to expect and about the effects of birth asphyxia.

2.8 THEORETICAL FRAMEWORK

A theoretical framework consists of concepts and, with their definitions and references to relevant scholarly literature, existing theories used for a particular study. The theoretical framework should demonstrate an understanding of theories and concepts relevant to the topic of the research paper and the broader areas of knowledge being considered (Osanloo & Grant, 2018).

2.8.1 Conceptual Models for Nursing

A conceptual model shows how various concepts are interrelated and applies theories to predict or evaluate the consequences of alternative actions. In this study, the researcher used Evelyn Adam's models of nursing, developed in 1983, updated in 1987, and again in 1999, as a conceptual framework within the parameters of which to contextualise and determine factors contributing to neonatal birth asphyxia in the selected public health care facilities of Mopani District. Adams's model is concerned with the goals that midwives must have when rendering maternal health care services to pregnant women, their unborn babies, and neonates as beneficiaries of the nursing profession, regardless of their goals, some circumstances within their line of work lead to neonantal birth aspyxia .

The goal of the profession: Adam includes the goal of the profession, as at the end, the member of the profession strives to achieve it (Adams, 1999). In this study, the goal of the profession refers to the maternal health care services provided by midwives to prevent and manage maternal health conditions that might result in neonatal birth asphyxia before, during, intrapartum, and postpartum care. Midwives render maternal health care services to prevent and manage conditions leading to neonatal birth asphyxia in the neonates, who are the beneficiaries.

The beneficiary: As a person or a group of people, the professional directs their activities (Adams, 1999). In this research study, it refers to pregnant women, neonates with birth asphyxia, professional midwives, and the health system, where the midwives strive to prevent and manage conditions resulting in birth asphyxia, as this is their role in the profession.

The role of the profession: As this is the part that the professional plays (Adams, 1999), this research study refers to the fact that professional midwives should be able to identify the problem (the source of the beneficiary's difficulty) during antenatal visits of patients for early diagnoses, preventions, and early intervention to reduce mortality and morbidity from neonatal birth asphyxia.

Source of the beneficiary's difficulty: as the probable origin of the client's difficulty with which the professional is prepared to cope (Adams, 1999). Health related factors such as insufficient equipments, complexities of referral system, delayed interventions by midwives and doctors and maternal related factors such as age at conception, premature labour and number of pregnancies results in a high neonatal birth asphyxia mortality rate. This requires the intervention of professionals to prevent and manage neonatal birth asphyxia.

Intervention of the professional: as the focus or centre of the professional's attention the moment they intervene with a client (Adams, 1999). In this study, intervention by professionals means identification of maternal and health related factors and proper application of nursing skills and care in the management and prevention of neonatal birth asphyxia to reduce the consequences.

Consequences: Adam defines consequences as the results of a professional's effort to attain an ideal or limited goal (Adams, 1999). In this study, consequences refer to the high mortality rate of neonatal birth asphyxia if not properly managed.

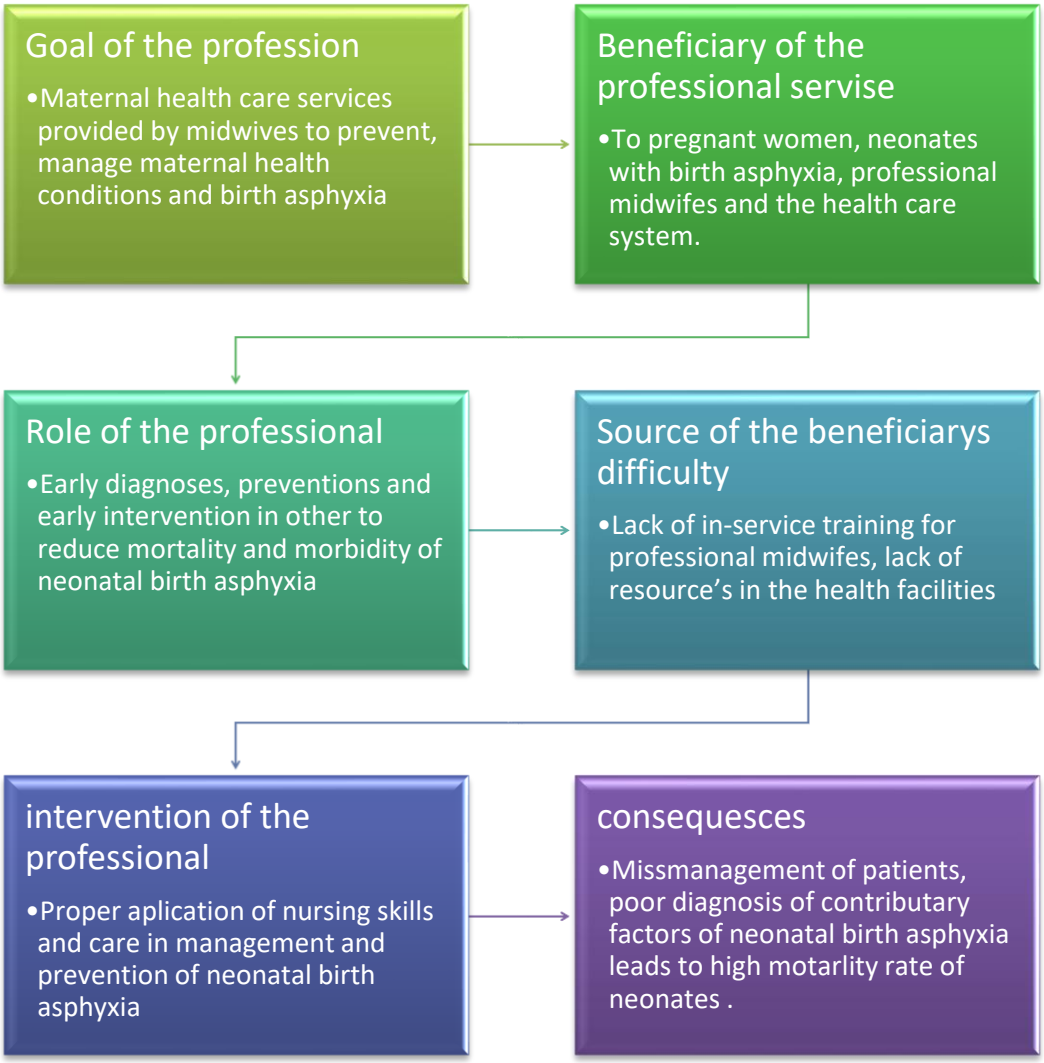

Figure 2.1 Schematic diagram of a conceptual model of nursing (Borges 2018).

2.9 SUMMARY

Chapter 2 consisted of a literature review and a theoretical framework. The definition and prevalence of neonatal birth asphyxia were explained, as were the health system-related factors and maternal-related factors leading to neonatal birth asphyxia. Lastly, the researcher outlined the conceptual nursing models that guided the current study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, the researcher described the literature review as well as the conceptual framework that guided the study. In this chapter, the research design was discussed in terms of the methods, population, sampling, instruments, data collection, and analysis procedures about the present study. The research design was used to determine the aims and objectives of the study.

The objectives of the study were to

- To assess health system related factors contributing to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.
- To identify maternal related factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo province.
- To determine the association between socio demographic data of professional midwives and factors contributing to neonatal birth asphyxia in public health facilities of Mopani district, Limpopo province.

3.2 RESEARCH METHOD

According to Pandey (2018), research methodology refers to methods, techniques and procedures employed in the implementation of the research design or research plan. The method followed in this study includes the population, sampling, data collection and data analysis. Research approaches are plans and procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation (Taglialatela, 2021).

Two types of research approaches are used, namely, qualitative and quantitative. These two approaches are used for different purposes. The main aim of a quantitative research approach is to describe issues and reflect the collected data through frequencies and percentages in tables and figures. The main aim of qualitative research is to explore people's experiences and reflect these through words and concepts (Cypress, 2018).

A quantitative research approach was used in this research study, which aimed to determine factors contributing to neonatal birth asphyxia among professional midwives and reflect the collected data, analysed results through frequencies and percentages in the form of tables and figures. It determines the approach used by the researcher to obtain sources of information such as participants, elements, and units of analysis, to collect and analyse the data, and to interpret the results (Brink, 2018).

3.3 RESEARCH DESIGN

Research designs are types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research design (Creswell, John, & David, 2018). A research design is a blueprint for conducting a quantitative study that maximises control over factors that could interfere with the validity of the findings (Grove, Susan, Jennifer, Gray, & Nancy, 2018). It focuses on the end product and all the steps in the process to achieve the anticipated outcome. It is an overall plan for obtaining answers to the research questions (Joho, 2020).

3.3.1 Non experimental design

Non-experimental desigs allow researcher to collect detailed descriptions of existing phenomena and to utilise the results to justify current conditions and practices or to make further plans to improve the situation (Brink, Woroneicki, & Wendo, 2020). In this study non-experimental designs were used, in the identification of factors contributing to neonatal birth ashyxia birth among professional midwives rendering maternal health care services to pregnant women and mothers. The results might aid in coming up with strategies to reduce neonatal birth asphyxia hence reducing neonatal mortality rate.

3.3.2 Cross-sectional design

Cross-sectional research is defined as a design that analyses, determines, or explains the cause of a relationship established by a descriptive survey (Cypress, 2018). A cross-sectional research design was used, where the researcher collected data through a survey from midwives. The researcher used this design, to determine contributory factors leading to neonatal birth asphyxia among midwives working at Mopani district falilities. The advantage of using this design is that it examines the data collected at one point in time.

3.3.3 Descriptive design

The descriptive design approach is used when little is known about a phenomenon. The design is used to gain more information about the phenomenon under study. No manipulation of variables is involved and dependent and independent variables are not used. In the descriptive design, there is no treatment or intervention, the researcher measures only the variables (Grove, Susan, Jennifer, Gray &., Nancy 2018). A descriptive design was used in this research study, where more information about factors contributing to neonatal birth asphyxia was required in sampled clinics and hospitals of Mopani district by providing a picture of the birth asphyxia conditions as it occurs naturally.

3.4 STUDY SETTING

The research setting refers to the place where the data is collected (Fornaro, Sterin, & Struloeff, 2021). The research setting is the site or location used to conduct a study. Three common settings for conducting nursing studies are natural, partially controlled, and highly controlled (Grove *et al.,* 2018).

The research study was conducted in Mopani district, Limpopo province. Limpopo province consists of five district municipalities. In this study, the researcher focuses on the Mopani district, which consists of six hospitals and 34 clinics. This research study focuses on 4 clinics and 2 hospitals namely: Mapayeni Clinic, Kremetart Clinic, Gate Way Clinic, and Giyani HealthCare Centre, as these are the clinics that transfer patients (pregnant women) to Nkhensani Regional Hospital and Nkhensani Hospital transfers to Lethaba Hospital. The reason the researcher decided to conduct the study in these sampled clinics and hospitals is that these are the facilities that had birth asphyxia cases.

The clinics outlined above render services including chronic patient care, acute patient care, Integrated Management of Mother and Child Illnesses (IMCI), and COVID-19 vaccinations. The hospitals include maternity units, casualties, mental health care units, female and male surgical wards, female and male medical wards, tuberculosis, peads ward, and Nhlamulo. The Nkhensani maternity section estimated admissions per day are 20 to 25, with 16 deliveries consisting of 4 advanced professional nurses per shift.

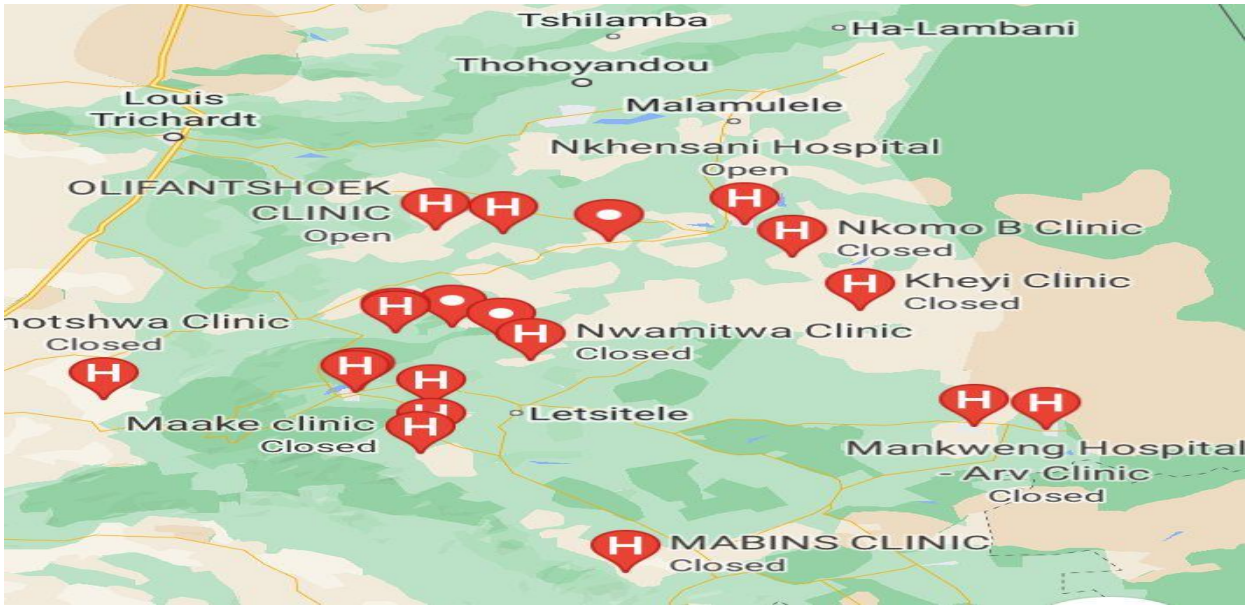

Figure 3.1 Map indicating study site (Limpopo map, 2022)

3.5 POPULATION

A population is the entire group of persons or objects that are of interest to the researcher, or, in other words, that meet the criteria that the researcher is interested in studying (Brink, 2018). The population of a research project is defined as the people who appeal to the interests of the researchers in generalizing the outcomes of the research. Population may also be defined as the total number of units (individuals, organizations, events, objects, or items) from which samples are selected for measurement. The population is all elements (individuals, objects, or substances) that meet certain criteria for inclusion in a study (Grove *et al.,* 2018).

The target population of this study was based on the total population of each clinic and hospital sampled. There were about 154 professional midwives in the sampled health facilities. Lethaba Regional Hospital consists of 60, Nkhensani Regional Hospital 5, Giyani Health Centre 15, Kremetart Clinic 09, Gate Way Clinic 07, and Mapayeni Clinic 08 of professional midwives. (See table 3.1 below.)

Table 3.1: Midwives population size.

Health facilities	Midwives' population
District hospital Lethaba	60
Reginal hospital Nkhensani	55
Giyani Health Centre	15
Kremetart clinic	09
Gate way clinic	07
Mapayeni clinic	08
Total	154

The population of this research study was 154 professional midwives working in public health facilities in Mopani district, Limpopo Province.

3.6 SAMPLING

A sample is a part or fraction of a whole or subject of a larger set selected by the researcher to participate in a research project (Brink, van der Walt, & van Rensburg, 2018). Sampling involves selecting a group of people, events, objects, or other elements with which to conduct a study. A sample is a subset of the population selected for a particular study, and the members of a sample are the subjects or participants (Grove *et al.,* 2018). A sampling method or plan defines the selection process, and the sample defines the selected group of people (or elements) (Mweshi & Sakyi, 2020). In this study, the researcher sampled health care facilities and participants from the total population to form part of the study.

3.6.1 Sampling of health care facilities

There are two basic sampling approaches: probability (random) sampling and non-probability sampling (Brink *et al.,* 2018). Probability-stratified random sampling was used in this research study. In probability stratified random sampling, the population is divided into subgroups or strata according to a variable or variables of importance to the study, so that each element of the population belongs to one and only one stratum (Polit & Beck, 2018).

The researcher used stratified random sampling to first sample clinics, followed by community health centres and hospitals. Although they possess the same characteristics, their operations differ. The researcher sampled the following clinics: Mapayeni, Kremetart, Gate Way, and Giyani Healthcare Centre, followed by Nkhesani District Hospital, and lastly, Letaba Regional Hospital. Pregnant women attended their antenatal and delivery services at the primary health care (PHC) facilities first. PHC facilities transfer patients (pregnant women) to the district hospital if they foresee complications, although during emergencies,

complicated cases are delivered and then transferred to the hospital afterwards. That's why clinics had a lower rate of birth asphyxia than hospitals. The same applies to district hospitals; if they see that they don't have the capacity to manage complications, they further refer patients to the regional hospital equipped to care for more complicated cases. The other reason for sampling was healthcare facilities which had a high rate of birth asphyxia cases as compared to other facilities within the district. As such, as a limitation of this study, other facilities within the district were left out due to a low rate of birth asphyxia and a lack of time and resources, e.g., money.

3.6.2 Sampling of Participants

Probability simple random samples were drawn using the basic probability sampling technique. Participants or elements were drawn in an unexpected way from the sampling frame. Each of the elements in the frame was listed separately and therefore has an equal chance of being included in the sample (Brink *et al.,* 2018). Probability simple random sampling was used in this research study because the sample was much more likely to represent the population and reflect its variable. Simple random sampling was used where midwives from each health care facility (Table 3.1) were selected randomly from the total population (of each facility) by putting small papers written yes or no in a bowl, and participants picked and replaced after checking what was written one at a time. The participants which choose yes were selected to participate in the study. This technique ensured that all participants had an equal chance to participating in the study. This continued until the required number of participants were selected.

3.6.3 Sampling size

In this study, the Taro Yamane formula was used to calculate the sample size drawn from the population of each facility as indicated in Table 1 above, where N was the total number of populations, n was the sample size, and e was the level of error, which is e = 0.05:

$$n = \frac{N}{1 + N(e)^2}$$

Table 2 below indicates the sample size of professional midwives calculated using the Taro Yamane formula per facility. The sampled size of 139 midwives included the errors of those who could withdraw during the study and spoilt questionnaires (incomplete questionnaires).

Table 3.2: Population & Sample of professional midwives.

Health facilities	Midwives' population	Midwives' Sample
Reginal hospital Lethaba	60	52
Districthospital Nkhensani	55	48
Giyani Health Centre	15	14
Kremetart clinic	09	9
Gate way clinic	07	7
Mapayeni clinic	08	8
Total	154	139

3.6 INCLUSION CRITERIA

The inclusion criteria identify the study population in a consistent, reliable, uniform, and objective manner. Inclusion criteria comprise the characteristics or attributes that prospective research participants must have in order to be included in the study. Common inclusion criteria can be demographic, clinical, or geographic in nature (Sileyew, 2019).

All professional midwives working in public health facilities in Mopani district were included in this research study. Professional midwives from the above-selected public health facilities in the Mopani district in Limpopo province were selected because these professional midwives had experience delivering birth-asphyxiated neonates in maternity units.

3.7 EXCLUSION CRITERIA

The exclusion criteria include factors or characteristics that make the recruited population ineligible for the study. Exclusion criteria comprise characteristics that identify potential research participants who should not be included in a study (Hudson, Fielding, & Ramsay, 2019). All professional midwives who possess the characteristics of the study but refuse to participate in the current study and those on leave were excluded. All professional nurses without midwifery working in public health facilities in the Mopani district in Limpopo province, as those professionals had no experience delivering an asphyxiated neonate.

3.8 PILOT STUDY

A pilot study is a small-scale methodological test to ensure that proposed methods and procedures works in the practice before being applied in an extensive, expensive investigation. Pilot studies provide an opportunity to adjust and revise before investing in and incurring the heavy costs associated with a large study (Creswell *et al.,* 2018). A pilot study is often a smaller version of a proposed study, and researchers frequently conduct

these to refine the study sampling process, treatment, or measurement of variables (Grove *et al.,* 2022)

The researcher conducted the pilot study at a facility not selected as part of the research study by distributing self-structured questionnaires to the 10 professional midwives who were selected through simple random sampling in public health facilities in Mopani district in Limpopo province. Participants who were used for the pilot study did not take part in the main study, and their results were not included in the main study. This helped the researcher to pre-test the study, identify and remove questions that were not meeting the research objectives in the research instruments. E.g., Section A: 1. Hospital name; and Section B: 1.Before answering the following questions, which one of the contributing factors leading to neonatal birth asphyxia are you familiar with?

3.9 DATA COLLECTION

The process of data collection is of critical importance to the success of the study. Without high-quality data collection techniques, the accuracy of research conclusions is easily challenged (Mishra, Pandey, Singh, & Gupta, 2019). Data collection is the precise, systematic gathering of information relevant to the research purpose or the specific objectives, questions, or hypotheses of a study (Grove *et al.,* 2022).

3.10.1 Data collection approach

The researcher received Ethical approval from the University of Limpopo to start with data collection process. The researcher followed the approach for data collection by contacting the Chief Executive Officer (CEO) office at the Department of Health, Mopani District, to request consent to conduct this study at the selected primary health care facility in Limpopo Province. The researcher submitted the permission letter and ethical clearance certificate to the CEO's office of Nkhensani and Letaba Hospitals for consent, and approval was granted to conduct research studies at the hospitals. The researcher contacted the operational managers of all six selected facilities to arrange for data collection.

3.10.2 Development and testing of the data collection instrument

The researcher used self-administered questionnaires. The designed questionnaire was developed with the help of the statistician and given to the supervisor and midwifery experts in quantitative research for validation (Appendix C). A pilot study was also conducted in order to test the questionnaire.

3.10.3 Characteristics of the data collection instrument

The questionnaires consisted of closed-ended questions that were simple and short. Based on the literature collected in chapter 2, the researcher managed to developed a questionnaire, which was divided into three sections (Appendix C). Section A was demographic information of participants; Section B was health-related factors contributing to neonatal birth; and Section C was maternal-related factors contributing to neonatal birth asphyxia in public health facilities in Mopani district, Limpopo province. The questionnaire consisted of questions in the form of a checklist, where participants had to tick inside the box with an X. The answers were designed as yes, no, strongly agree, agree, neutral, disagree, and strongly disagree. English was used in the developed questionnaire, and the researcher did not translate the questions as the participants were able to read and write in English. The questionnaire was taken to the midwifery aspets, supervisor and statiscian for validation and reliability.

3.10.4 Data collection process

The researcher visited the sampled facilities in Mopani District, Limpopo Province, one at a time and requested permission for data collection from the Operational Managers (OPM) first before entering the wards. The researcher visited all sampled participants in their workplace on the agreed-upon date for data collection. The purpose of the study was explained again, as this was done during recruitment. Participants were issued concent form for them to sign before answering the questionnaire. After issuing of the questionnaires, the participants answered the questions by ticking their correct answer with yes or no, true or false, agree or disagree in the questionnaire. The completion of a questionnaire took 30 minutes of participants' time. In cases where the participant does not understand a question, the researcher assists in clarifying the question. Participants who are not comfortable with the researcher being around while answering the question were provided privacy by being in the other room to ensure quality data collection. Due to COVID-19, participants were wearing their masks, and while issuing questionnaires, the researcher ensured that participants sanitized their hands. Data was collected from February 2023 to March 2023 at 4 sampled clinics and Nkensani hospital. Letaba Hospital data was collected on 2nd and 3rd june 2023. The answered questionnaires collected from paricipants was stored in a loocked carboard. The researcher tranfered the data inside the computer using excel

spreadsheet. The computer used had password. Data was collected for a period of four weeks in all the sampled facilities.

3.11 DATA ANALYSIS

Data analysis aims to organise, reduce, and give meaning to the collected data (Brink *et al.,* 2018). Descriptive statistics were used to describe and summarise the data and thus tell what the data set looked like (Mishra *et al.,* 2019). A descriptive approach was used, as it employs measures such as frequency distributions and measures of central tendency. Descriptive statistics were further used to describe and summarise the data collected in this study. The researcher worked closely with the statistician, and the data was tabulated using Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) version 27 for cross-tabulations and Pearson's Chi-square test. The Chi-square statistical test compared the observed values to the expected values. This test statistic was used to determine whether the difference between the observed and expected values was statistically significant (Mishra *et al.,* 2019). Data was further presented graphically in the form of frequencies, percentages, tables, charts, and figures to be meaningful (Chapter 4). The data was stored on USB and computers, which are password-protected.

3.12 VALIDITY & RELIABILITY OF THE STUDY

Validity and reliability of the study was discussed under the following headings.

3.12.1 Validity

Validity is the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform. Validity is about what an instrument measures and how well it does so (Ahmed & Ishtiaq, 2021). The validity of a measurement instrument is essential in research to ensure the evidence provided in a study is as close as possible to the real world and provides helpful evidence for practice (Connelly, 2022). The validity of an instrument is a determination of the extent to which the instrument actually reflects the construct being examined.

Construct validity:

Construct validity is defined as what the instrument is really measuring. It is the adherence of an assessment to the existing knowledge and theory of the concept that is being

measured. (Ahmed & Ishtiaq, 2021). The construct was ensured as the self-administered questionnaire covered all the objectives of the study to assess the existing knowledge.

Face validity:

Face validity addresses whether the instrument measures the target construct or content and not some other construct. Face validity may determine if participants will complete the study because it appears to address an issue relevant to them (Connelly, 2022). The questionnaire consisted of questions that covered the objectives of the study and was further validated by the statistician, supervisor, and midwifery experts for face validity.

Content validity:

Content validity assesses how the instrument represents all the variable components to be measured. Face validity is based on an intuitive judgment made by participants in the field (Brink *et al.,* 2018). The researcher ensured face and content validity by assessing that all features needed to meet the objectives were included. Thus, concepts should be clearly defined and logically discussed to prevent confusing and vague statements at the beginning of the questionnaire. Content validity was done by using literature during the development of the research instrument, and face validity was done by asking experts in maternal health care services to check if the instrument addressed what it must address.

3.12.2 Reliability

Reliability concerns the truthfulness in the data obtained and the degree to which any measuring tool controls random error (Ahmed & Ishtiaq, 2021). Reliability can be thought of as consistency (Spence, Fontem &, Feltman, 2023).

Internal consistency reliability:

It is the consistency of the measurement itself, meaning that it measures if you get similar results from different parts of a test that is designed to measure the same thing (Ahmed & Ishtiaq, 2021). The reliability of this study was determined by using the Taro Yamane formula, where the (e) number of errors was 0.05. SPSS version 27 for cross-tabulations and Pearson's Chi-square test with the help of the statistician The researcher ensured reliability by being consistent across studies and documenting data accurately and comprehensively.

3.13 BIAS

Bias is an influence that produces an error or distortion, which can affect the quality of evidence in both quantitative and qualitative studies (Brink et al., 2018). Selection bias was avoided by ensuring that the participants sampled were all working in the maternity area. The researcher ensured bias by encouraging participants to present themselves in the best possible way (openness). Bias was avoided by not communicating the researcher's experiences or expectations with participants. The researcher prevented bias by giving professional midwives enough and equal time to answer the questionnaire. Where bias was unavoidable, the researcher ensured that she did not assist in answering questionnaires provided to participants. The researcher ensured that the questions asked in the questionnaire were relevant to the study and did not intimidate one's feelings.

3.14 ETHICAL CONSIDERATION

Ethics in research refers to a set of moral principles that are used to guide the planning, implementation, evaluation, and reporting of any research project. It provides principles, rules, and guidelines to the researcher regarding behavioural expectations and the expected conduct towards participants in the study, co-researchers, research assistants, fieldworkers, the institution, and sponsors (Brink & Woronieck, 2020).

3.14.1 Ethical clearance

Ethical clearance was obtained from the University of Limpopo Turfloop Research Ethical Committee (TREC) TREC/584/22: PG.

3.14.2 Informed consent

Informed consent means that the participants understand the aims, objectives, data collection methods, duration, and participation needed from them (Brink et al., 2018). Informed consent is the process of telling potential research participants about the key elements of a research study and what their participation will entail. The informed consent process is one of the central components of the ethical conduct of research with human subjects. The consent process typically includes providing a written consent document containing the required information (i.e., elements of informed consent) and the presentation of that information to prospective participants. (Bhardwaj, 2019).

The researcher obtained consent from participants before collecting data so that, as an individual, they could choose whether they wished to participate in this research study or

not after ensuring that participants understood the research study and taking steps to ensure that they had a complete understanding of the procedures to be used, the risks involved, the rewards, and the trauma that was placed on them.

Participants were provided with a form to complete before engaging in this research project to ensure that consent was obtained. The researcher informed participants on the freedom of termination in the research project by informing them that they can choose to go out during the project at any time during the project, even in the middle of answering questionnaires. No penalties or harm may be done to them at any stage of the contact, including after signing the consent form.

3.14.3 Permission

All research participants must give their permission to be part of a study, and they must be given pertinent information to make an “informed” consent to participate. This means you have provided your research participants with everything they need to know about the study to make an “informed” decision about participating in your research (Yusof, Teo, & Ng, 2022). The researcher asked for permission from the provincial department of health. The Chief Executive Officer of public health facilities in Mopani district also obtained permission from the operational managers of the selected hospitals and clinics, as well as from participants (professional midwives). Copies of the questionnaires were provided to the participants to complete. In cases where the participants were not willing to participate, the researcher did not hand out the questionnaire.

3.14.4 Confidentiality

Confidentiality means that the information obtained through the research is not made available to other people (Brink *et al.,* 2018). The researcher ensured confidentiality by ensuring that participants' information was not shared with other people outside the research project. The data collected was stored on a computer, where no one was able to access it.

3.14.5 Anonymity

Anonymity means that the state of the research participant is unknown (Evans, Currin, Garons, & Stokes, 2022). The researcher ensured anonymity by not using participants' names on the questionnaire but numbers and avoiding defining the participants' condition

or state, including abnormalities and attire, in correlation to the information obtained during the answering of questionnaires.

3.14.6 Privacy

This is the freedom of the participant to determine the time, circumstances, and extent to which private information will be shared (Brink *et al.,* 2018). The research ensured privacy by ensuring that participants were in a close setting (room) when answering questionnaires provided to them for this research project. The room was free from people going in and out, noise, and disturbance where participants provided answers without the possibility of later being used to embarrass them. Any belongings, such as participant files, were not used without their consent, including the use of videos and tape recordings without their being informed and agreeing to it.

3.14.7 Justice

People should be treated fairly and should receive what they are due or owed. There must also be fair distribution in their selection and participation (Burns & Grove, 2018). The researcher ensured an ethical obligation to distribute the benefits and burdens of the research project fairly. The researcher ensured that the means used to select research participants were equitable and fair (see section 3.6.2).

3.14.8 Beneficence

Beneficence is concerned with preventing harm and discomfort and promoting good. Discomfort and harm can be physical, psychological, social, or economic in nature. However, participants should not be put at a disadvantage or exposed to situations for which they have not been prepared (Creswell *et al.,* 2018). The researcher ensured that the questionnaires did not consist of questions that jeopardized their dignity. The researcher ensured that all participants that were traumatized by answering the research questionnaire received counselling; this was done by meeting with the participant one-on-one in a close room and counselling them. Furthermore, a psychologist was notified of the data collection so that she or he would be ready to receive participants who were experiencing distress.

3.14.9 Autonomy

The term autonomy means that a person can make his or her own decisions about what to do and what to agree to (Susser, Roessler, & Nissenbaum, 2019). The researcher ensured

that participants could make their decisions freely about what to do without fear of being penalised. The researcher respected that participants individually should make their own informed decisions about whether to participate in a research study or not.

3.14.10 Avoidance of harm

Harm means an injury to the rights, safety, or welfare of a research participant that may include physical, psychological, social, financial, or economic factors. It is the responsibility of the researcher to avoid, prevent, or minimize harm to others (Chan, Dai, Wang, & Lacka 2019). The researcher ensured the avoidance of harm to professional midwives by protecting their privacy and identity; counselling was provided by the researcher to those who needed it after answering the questionnaire; and the services of the psychologists were sought although no participant was referred to the service. COVID-19 procedures, e.g., wearing a face mask, sanitizing hands, and social distancing, were practiced avoiding transmission of the virus.

3.15 SUMMARY

This chapter describes the research design and methodology of the study in detail. Study settings and participants were sampled using sampling methods. The inclusion and exclusion criteria were outlined clearly. Validity and reliability were stated. The pilot study, data analysis, and data collection were explained in detail. Ethical principles were considered throughout the study, as the identities and names of participants remained anonymous throughout the study. The analysis and presentation of the data are presented in Chapter 4.

CHAPTER 4

PRESENTATION, INTERPRETATION AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

Data analysis aims to organize, reduce, and give meaning to the collected data (Brink *et al.,* 2018). Descriptive statistics were used to describe and summarize the data and thus tell what the data set looked like (Mishra *et al.,* 2019). A descriptive approach was used, as it employs measures such as frequency distributions and measures of central tendency. Descriptive statistics were further used to describe and summarize the data collected in this study. This chapter deals with the analysis, presentation, and description of the data collected, as described in Chapter 3 of this dissertation. The data was further supported by the literature and the theoretical framework that guided the study.

4.2 DATA MANAGEMENT AND ANALYSIS

The data collection, handling, and management plan addresses three major areas of concern: data input, storage, retrieval, and preparation; analysis techniques and tools; and analysis mechanics (Yang, Sun, Ying, & Muthu, 2022).

After obtaining an ethical clearance certificate from the University of Limpopo, the researcher applied for permission to conduct the research and was granted permission to collect data from the Limpopo Department of Health at the selected sampled health facilities in Mopani District, Limpopo Province. Data was collected for 2 months using self-administered questionnaires; the questionnaires were issued to each participant for response. A total of 138 questionnaires were distributed to participants, and all were completed and brought back to the researcher. The completed questionnaire was stored in a locked cupboard for audit purposes, and the researcher also created a folder on the computer with a password to store the captured information.

The researcher worked closely with the statistician, and the data was tabulated using Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) version 27 for cross-tabulations and Pearson’s Chi-square test. The analysed data was submitted to the supervisors.

4.3 RESEARCH RESULTS

4.3.1 SECTION A: Demographic data

This section included the number of participants, age, relationship status, qualification status, years of experience, additional duties in the work field, being currently enrolled in other studies, having an idea about contributing factors leading to neonatal birth asphyxia, and having never heard about contributing factors leading to neonatal birth asphyxia and would like to be briefed about it.

Table 4.1: Demographic data of respondents

Items		Frequency	Percent	Valid Percent	Cumulative Percent
Age	23-35	38	27.5	27.5	27.5
	35 and above	100	72.5	72.5	100.0
	Total	138	100.0	100.0	
Relationship status	Single	62	44.9	44.9	44.9
	Married	64	46.4	46.4	91.3
	Widow	8	5.8	5.8	97.1
	Divorced	4	2.9	2.9	100.0
	Total	138	100.0	100.0	
Qualification	Diploma in Midwifery	96	69.6	69.6	69.6
	Degree plus Midwifery	42	30.4	30.4	100.0
	Total	138	100.0	100.0	
Years of experience	1 to 5 years	27	19.6	19.6	19.6
	5 to 15 years	51	37	37	37.00
	15 to 30 years	42	30.4	30.4	30.4
	30 and above	18	13.0	13.0	100.0
	Total	138	100.0	100.0	
Additional duties	None	54	39.1	39.1	39.1
	Matron	5	3.6	3.6	42.8
	Sister In-Charge	79	57.2	57.2	100.0
	Total	138	100.0	100.0	
Enrolled for other studies	Yes	20	14.5	14.5	14.5
	No	118	85.5	85.5	100.0
	Total	138	100.0	100.0	
Ideas about contributing factors leading to neonatal birth asphyxia	Yes	128	92.8	92.8	92.8
	No	10	7.2	7.2	100.0
	Total	138	100.0	100.0	

Nursed patients with factors contributing to neonatal birth asphyxia	Yes	26	18.8	18.8	18.8
	No	112	81.2	81.2	100.0
	Total	138	100.0	100.0	

The results in Table 4.1 indicate the age of professional midwives who participated in the current study. The majority of respondents were 35 years of age and older n = 100 (72.5%), followed by those who were between 23 and 35 years of age n = 38 (27.5%). Professional midwifery relationship status was different; most of them were married n = 64 (46.4%), followed by those who were single n = 62 (44.9%), widows n = 8 (5.8%), and divorced n = 4 (2.9%). Most respondents had a diploma in midwifery n = 96 (69.6%), others had a degree inclusive of midwifery n = 42 (30.4%), and none had a masters or doctoral degree in nursing. The years of experience of respondents in the current qualification were 1–5 years n = 27 (19.6%), 5–15 years n = 51 (37%), 15–30 years n = 42 (30.4%), and 30 years and older n = 18 (13%).

Respondents who, while at work, had additional duties, such as having a sister in charge, were n = 79 (57.2%), followed by Matron with n = 5 (3.6%), and n = 54 (39.1%), who did not have any additional duties. Respondents who were currently enrolled in other studies were n = 20 (14.5%), and those who were not studying were n = 118 (85.5%). The majority of respondents had an idea about contributing factors leading to neonatal birth asphyxia; n = 128 (92.8%) and n = 10 (7.2%) had no idea about contributing factors leading to neonatal birth asphyxia. Professional midwives who have ever nursed patients with factors contributing to neonatal birth asphyxia If No would like to be briefed about it were n = 26 (18.8%) of respondents, and those who liked not to be briefed were n = 112 (81.2%).

The findings of this study revealed that the majority of respondents were 35 years of age and older with a diploma in midwifery as a qualification and more than 5 years of experience in the midwifery fraternity. Years of service in maternal health care services and experience are associated with the level of knowledge, skills, and expertise the respondents have acquired throughout the years they have been in the service. As such, various studies confirmed the findings of the current study, which revealed that nurses 40 years of age and older with a qualification in midwifery (degree or diploma) and more years of service were associated with an increased likelihood of performing neonatal skills and managing neonatal conditions correctly compared to nurses between 20 and 29 years old (OR = 9.50; CI: 3.63–

24.88) (Joho, Kibusi, & Mwampagatwa, 2020; Sintayehu, Desalew, Geda, & Shiferaw, 2020).

The possible implication of these findings is that the younger the age of professional midwives, the less experience they have in managing neonatal birth asphyxia. Lack of qualifications and educational studies might result in poor management of maternal complications. Lack of experience in a work field about neonatal birth asphyxia cases might lead to a lack of insight and knowledge, resulting in poor management and intervention of birth asphyxia cases. Relating the conceptual model of nursing that was used in the current study to these results, midwives have a role to play in acquiring knowledge and skills that must be applied when identifying neonates with signs of birth asphyxia so that they can prevent and manage neonates who are affected.

4.3.2 SECTION B: HEALTH SYSTEM RELATED FACTORS

Table 4.2 below presented the health system related factors contributing to neonatal birth asphyxia.

Table 4.2 Health system related factors

Questions		Frequency	Percent	Valid Percent	Cumulative Percent
B1 Delayed emergency caesarean section contributes to neonatal birth asphyxia	Agree	137	99.3	99.3	99.3
	Disagree	1	0.7	0.7	100.0
	Total	138	100.0	100.0	
B2 Early diagnosis of complications	Agree	131	94.9	94.9	94.9
	Neutral	5	3.6	3.6	98.6
	Disagree	2	1.5	1.5	100.0
	Total	138	100.0	100.0	
B3 Prolonged labour /delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia	Agree	138	100.0	100.0	100.0
B4 Poor diagnosis, management and skills of a health care workers lead to prolonged labour resulting in neonatal birth asphyxia	Agree	125	90.6	90.6	90.6
	Neutral	10	7.2	7.2	97.8
	Disagree	3	2.2	2.2	100.0
	Total	138	100.0	100.0	

B1. Delayed emergency caesarean section

Respondents were asked if delayed emergency caesarean sections contributed to neonatal birth asphyxia. Most of the respondents, n = 137 (99.3%), agreed with the statement, with

only 1 (0.7%) disagreeing with it. Almost all the respondents agreed (n = 137, or 99.3%) on the delay in early diagnosis of a complicated maternal case in need of a caesarean section, which resulted in the fetus being deprived of oxygen supply, which contributed to neonatal birth asphyxia.

In support of the findings of the current study, Lemma, Misker, Kassa, and Abdulkadir (2022) indicated that a delayed emergency caesarean section, if an emergency C-section takes longer than 30 minutes to perform (depending on the circumstances) or if nurses prolong a labour for longer than is reasonable, can cause a baby to suffer a brain injury from not getting enough oxygen. A similar study conducted by Wayessa, Belachew, and Joseph (2018) indicated that infants born through caesarean section were 2.3 times more likely to develop birth asphyxia (AOR: 2.3, 95%CI: 1.0, 5.1) than infants delivered through spontaneous vaginal delivery.

The possible implications are that any delay in the diagnosis of an emergency caesarean section by health care professionals, including midwives and doctors in an institution, might lead to neonatal birth asphyxia, as resuscitation will be highly recommended for the neonate to breathe properly. The role of the professional in the conceptual model of nursing by Adams (1999) is that early diagnosis and intervention of emergency caesarean sections will reduce mortality and morbidity rates caused by neonatal birth asphyxia.

B2. Early diagnosis of complications

As indicated in Table 4.2, the majority of respondents agreed (n = 131, or 94.9%), with n = 5 (3.6%) neutral and n = 2 (1.4%) disagreeing with a question about early diagnosis of complications, e.g., fetal distress that leads to caesarean section, which prevents complications such as neonatal birth asphyxia. The majority of respondents agreed that if complications such as foetal distress, meconium-stained liquor, and poor labour progress are detected early during labour, neonatal birth asphyxia can be avoided.

As such, a study conducted by Woday, Muluneh, and Denis (2019) among mothers who were admitted to a postnatal unit discovered that the odds or chanses of birth asphyxia were threefold higher among those who experienced complicated labour than those who gave birth without any complications [AOR = 3.45; 95% CI 1.58–7.49]. The prevalence of birth asphyxia was 32.9% in the first minute and 12.5% in the fifth minute (Woday *et al.,* 2019). Similarly, other authors explained that birth asphyxia was significantly associated with medical complications (AOR: 3.92, 95%CI: 1.62, 9.46), obstetric complications (AOR: 3.76,

95%CI: 1.71, 8.26), prolonged second stage of labour (> 3 h; AOR: 3.72, 95%CI: 1.46, 12.18), low birth weight (AOR: 4.21, 95%CI: 1.5, 12.2), meconium-stained amniotic fluid (AOR: 8.29, 95%CI: 3.6, 18.9), tight nuchal cord (AOR: 7.4, 95%CI: 1.6, 34.1), not attending antenatal care (AOR: 6.4, 95%CI: 2, 20.2), incomplete antenatal care visit (AOR: 4.6, 95%CI: 2.0, 10.5), non-cephalic presentation (AOR: 6.98, 95%CI: 2.66, 18.28), and caesarean section delivery (AOR: 2.3, 95%CI: 1.0, 5.1) (Wayessa, Belachew, & Joseph 2018)

The possible implications of the findings are that pregnant women, if they do not attend antenatal visits early or as soon as they find out of the pregnancy, professional midwives will be unable to diagnose and prevent conditions such as hypertension or anaemia during pregnancy that are leading to neonatal birth asphyxia. According to the theoretical concept of nursing by Adams (1999), the goal of the profession is to prevent and manage maternal health conditions in order to prevent complications for the beneficiaries of maternal health care services, which are the mothers and their newborn babies.

B3. Prolonged labour/ delayed maternal 2nd stage

All respondents agreed (n = 138,100%) on the statement that prolonged labour or delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia. Delay in the second stage of labour contributes to neonatal birth asphyxia, as the baby will have to endure the contractions for a long period of time, and during delivery, the baby will be tired and unable to respond while being stimulated. This can occur in the case of a big baby or a big abdomen of 39 or 40 centimetres. Midwives have a duty to ensure early diagnoses of prolonged labour, initiate appropriate interventions, and prevent prolonged labour.

In support of the current, a study conducted by Wayessa, Belachew, and Joseph (2018) indicated that prolonged second stage labour for more than 3 hours was 3.72 times more likely to cause birth asphyxia. A similar study conducted reported that birth asphyxia was 4.2 times more likely to occur in women who experienced prolonged labour than in those who did not (Ahmed, Mosa, Sultan, & Helill, 2021). Many conditions associated with prolonged and obstructed labour make it more likely that that baby will be exposed to Pitocin, Cytotec, forceps, and/or vacuum extractors. All these issues can cause the baby to have neonatal birth asphyxia and brain bleeds, which can cause hypoxic ischemic encephalopathy (HIE) (Pitsawong *et al.,* 2018).

The possible implication of these findings is that prolonged labour, if not early diagnosed by professional midwives, can lead to more complications, such as the baby's failure to breathe early after delivery and intensive resuscitation. All this will lead to a low Apgar score, resulting in neonatal birth asphyxia. As such, midwives' role is to properly diagnose prolonged labour early in order to prevent neonatal birth asphyxia.

B4. Poor diagnosis, management and skills of a health care workers

The majority of respondents agreed (n = 125, or 90.6%), were neutral (10, or 7.2%), and a few (n = 3) disagreed (n = 2.2%) that poor diagnosis, management, and skills of health care workers lead to prolonged labour, resulting in neonatal birth asphyxia. Most professional midwives are aware that proper management and proper use of guidelines in neonatal resuscitation for newborns with birth asphyxia will improve neonatal outcomes.

As such, a study conducted by Weldearegay, Abrha, Hilawe, and Gebrekidan (2020) indicated that resuscitated newborns delivered within 12 hours and with less duration of labour were 1.76 times more likely to survive than those delivered within 12 hours. This might be because of the prolonged duration of labour, which predisposes neonates to brain damage leading to cerebral palsy. This will result in prolonged oxygen deprivation to the fetus or newborn, and the longer the baby is deprived of oxygen, the more severe the damage, and the neonate might die. Another study conducted by Popescu, Panaitescu, Pavel, Zagrean, and Peltecu (2020) recommended the need for repeated training to ensure that midwives can identify and diagnose prolonged labour and be able to resuscitate a newborn in distress. As such, dolls can be used in practice sessions aimed at improving skills. The appropriate equipment for resuscitating asphyxiated babies comprises sterilised disposable mucus suction traps, which can be used to clear the airways of obstructing secretions (Popescu, Panaitescu, Pavel, Zagrean, & Peltecu, 2020).

Poor diagnosis and a lack of management skills by midwives can lead to more complications in a neonate with birth asphyxia, leading to a high mortality rate for neonates, as indicated in the conceptual model of nursing (Adams, 1999).

4.3.3 PREVENTABLE MATERNAL CONDITIONS

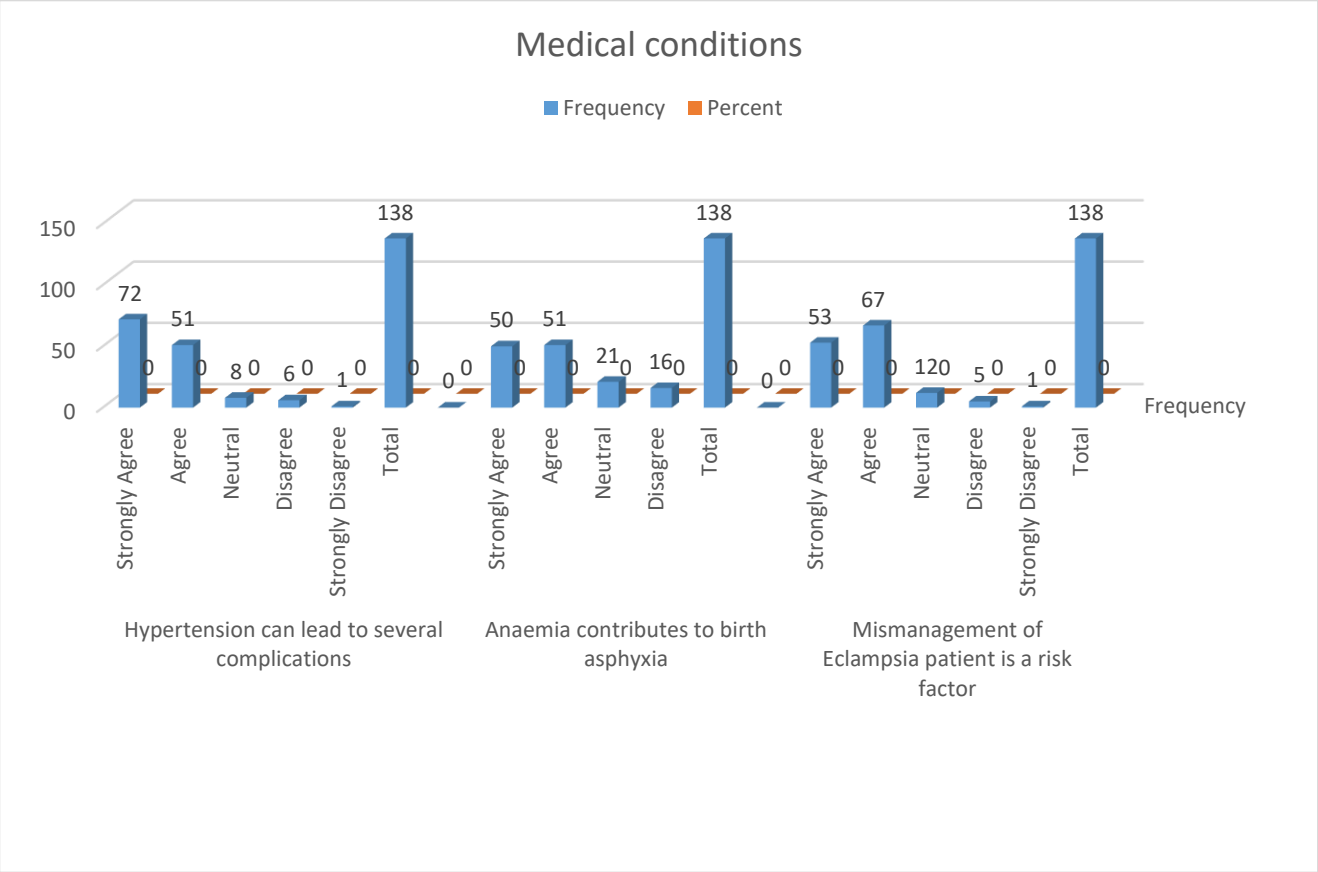

Figure 4.1 Medical conditions

From figure 4.1 above, the question asked on preventable maternal conditions, hypertension, if not early diagnosed during pregnancy, can lead to several complications as it decreases blood flow to the fetus. The majority of respondents strongly agree (n = 72, 52.2%), agree (n = 51, 37%), neutral (n = 8.8%), disagree (n = 6.3%), and strongly disagree (n = 0.7%) with that question. Most professional midwives strongly agree (n = 72, 52.2%) that patients with hypertension in pregnancy should attend their antenatal care visits at hospital institutions early, as this will prevent more complications such as fresh birth, pre-eclampsia, and eclampsia, which are contributing factors to neonatal birth asphyxia. As such, Ahmed *et al.,* (2021) recommended that pregnant women should be educated about the importance of early attendance at antenatal visits so that hypertensive disorders in pregnancy can be prevented and diagnosed early, as this can benefit both the baby and the mother.

In the same study, authors indicated that the probability of developing birth asphyxia among women who had chronic hypertension was 2.5 times higher than that among those who did

not (OR = 2.52; 95% CI: 1.69, 3.752) (Ahmed, Mosa, Sultan, & Helill, 2021). Another study similar to this one indicates that this condition, if early diagnosed during antenatal visits, can be managed to prevent birth asphyxia. Hypertension can cause a decrease in blood flow, resulting in asphyxia (Pitsawong, 2018).

The implication of this findings is that hypertension in pregnancy is a silent killer, if not well managed or not early diagnosed could results into losing both the mother and baby. As indicated in the conceptual frame work by Adam (1999) the professional midwives uses guidelines and protocol when managing women as beneficiaries of maternal health care services during pregnancy, labour to prevent and manage hypertension, pre-eclampsia and eclampsia.

In Figure 4.1 above, the researcher asked if anaemia contributes to birth asphyxia as it leads to an absence of enough oxygen supply during pregnancy. The majority of respondents agreed (n = 51, 37%), followed by strongly agreeing (n = 50, 36.2%), neutral (n = 21, 15.2%), and disagreeing (n = 16, 11.6%) on the question. Professional midwives agree (n = 51, or 37%) and strongly agree (n = 50, or 36.2%). This condition during pregnancy affects the fetus as there is not enough and adequate food and oxygen supply, leading to poor organ development, including the lungs.

In support of the results of the current study, maternal anaemia was found to be a significant risk factor for neonatal birth asphyxia (OR: 5.1; 95% CI: 2.6, 9.9). (Techane, Alemu, Wubneh, & Belay, 2022). Neonates delivered from mothers who had anemia during pregnancy were three times more likely to be asphyxiated as compared to neonates from mothers who were non-anaemic during pregnancy (adjusted OR = 2.992, 95% CI: 1.073–8.35) (Alemu, Melaku, Abera, & Damte, 2019). Anaemia causes intrapartum hypoxia, an absence of enough oxygen supply, leading to birth asphyxia (Pitsawong, 2018).

The possible implications of these findings are that anaemia during pregnancy leads to the fetus not getting adequate oxygen and food supply, as we all know that the blood passes food through the umbilical cord to feed the fetus. This leads to low blood supply and low oxygen supply, and the fetus will not develop properly in the mother's womb as the lungs will not mature during delivery. In the conceptual model of nursing, Adams (1999) describes the role of the profession as early diagnosis, intervention by a professional midwife, and health education for pregnant women about early booking that will prevent neonatal birth asphyxia.

In figure 4.1 above, the question is whether mismanagement of eclampsia in a pregnant woman a risk factor for neonatal birth asphyxia is. The majority of respondents indicated that they agreed with the mentioned statement (n = 67, or 48.6%), followed by strongly agreeing (n = 53, or 38.4%), neutral agreeing (n = 12, or 8.7%), and a few who disagreed (n = 3.6%) and strongly disagreeing (n = 0.7%). It was evident from the findings of the study that eclampsia results from uncontrolled high blood pressure, if not early managed or diagnosed during antenatal visits, which is a risk factor for neonatal asphyxia.

In support of the findings of the current study, Giordano, Parpinelli, Cecatti, and Haddad (2023) discovered in their study that the proportions of stillbirths, low birthweight, low Apgar score at birth, and neonatal complications were more frequent among the group of babies born from pre-eclamptic and eclamptic mothers. Similarly, in a recent study conducted on mothers who delivered and experienced hypertensive disorders during pregnancy, the authors indicated that pre-eclampsia is one of the most severe complications of pregnancy and a leading cause of maternal and perinatal morbidity and mortality (Von Dadelszen, Syngelaki, Akolekar, & Magee, 2023).

Mismanagement of eclampsia: pregnant women will experience seizures or convulsions that prevent blood flow to the brain and the baby. This condition can cause maternal and fetal mortality. According to the conceptual framework, Adams (1999) indicated intervention of the professional as one of the concepts related to midwives for them to acquire the skills in management of pre-eclampsia and eclampsia during pregnancy in order to prevent neonatal birth asphyxia.

4.3.4 HEALTH SYSTEM RELATED FACTORS CONTRIBUTING TO NEONATAL BIRTH ASPHYXIA

Table 4.3 Health system factors

Questions		Frequency	Percent	Valid Percent	Cumulative Percent
B5 Does lack of equipment contributes to birth asphyxia	Agree	105	76.1	76.1	76.1
	Disagree	33	23.9	24.1	100.0
	Total	138	100.0	100.0	
B6. Complexities of the referral system	Agree	119	86.2	86.2	86.2

	Disagree	19	13.8	13.8	100.0
	Total	138	100.0	100.0	
B7. Does lack of knowledge, misconceptions, and poor interventions in managing birth asphyxia contributes to neonatal birth asphyxia.	Agree	126	91.3	91.3	91.3
	Disagree	12	8.7	8.7	100.0
	Total	138	100.0	100.0	

B5. Does lack of equipment contributes to birth asphyxia

Table 4.3 denotes that the majority of respondents, n = 105 (76.1%), agreed that a lack of equipment contributes to neonatal birth asphyxia, whereas n = 33 (23.9%) disagreed with the statement. Lack of proper equipment and resources in the management of birth asphyxia leads to an increase in neonatal mortality rates. Neonates delivered with birth asphyxia require proper suctioning and resuscitation using the required equipment.

In support of the findings of the current study, a study conducted in Brazil indicated that, although 98% of pregnant women do deliver their babies in hospitals, a large number of these facilities are not well equipped to deal with pregnancy-related complications. The shortage of intensive care units (ICUs) to which such women can be transferred is still a worrying reality in several settings. In addition, the proportion of facilities with adequately trained staff to deal with complications is not known at all (Giordano, Parpinelli, Cecatti, & Haddad, 2023). Another study indicates that areas worthy of research and action include the provision of mothers' waiting facilities in rural regions, improvements in fetal monitoring, partogram-based labour management, and the establishment of midwifery staffing norms for South African labour units (Serbanescu, Goodwin, Binzen, & Morof, 2019).

The possible implications are that a lack of equipment in most public health facilities contributes to neonatal birth asphyxia. Due to financial constraints, government facilities are not well structured to provide proper, adequate equipment for the management of neonatal birth asphyxia. Equipment such as sanctioning machines, baby warmers, and oxygen machines is not well serviced and is not functional. All these factors lead to neonatal birth asphyxia. Lack of equipment in the neonatal unit and even the delivery room might lead to poor intervention and mismanagement of neonatal birth asphyxia, resulting in high maternal and neonatal mortality. According to Adams (1999).

B6. Complexities of the referral system

The complexities of the referral system, e.g., refusal of referral, act as a challenge in managing neonatal birth asphyxia. According to the results of the study in the above table 4.3, the majority of respondents (n = 119, or 86.2%) agreed with the statement, with only a few respondents (n = 19, or 13.8%) disagreeing with it. Any delay in referral of pregnant women might be due to the patient not wanting to deliver or being transferred to a tertiary institution and the delay in the arrival of Emergency Medical Services (EMS) to the facility. This will result in the patient not getting proper interventions in time and also more complications, leading to factors contributing to neonatal birth asphyxia.

As such, a study conducted by Kironji, Hodkinson, De Ramirez, Anest, and Wallis (2018) indicated that health system factors are related to the accessibility of health facilities and the inability of health providers to manage patient conditions or to refer patients appropriately. Cost and access to transport are important barriers in many low-resource areas in developing countries. Several studies showed that the unavailability of the ambulance or inadequate transport are barriers related to transportation (Alaofe, Lott, Kimaru, & Okusanva, 2020). Patients or their families have to make their way to the referral facilities, such as using public transportation, which will be of high cost in some areas, and this also makes it difficult to ensure appropriate care during travel. Moreover, the unavailability of the ambulance made patients have to wait a long time to arrange transport. This barrier can occur due to a lack of coordination of transport between facilities to facilitate referral. However, even when ambulances are available, there can be other problems, such as poor management and maintenance of the ambulance, a lack or unavailability of drivers, poorly equipped ambulances, a lack of quality ambulance personnel to provide appropriate treatment to patients during travel, and a late ambulance arrival, which can result in patients dying on the way to the referral facility (Harahap, Handayani, & Hidayanto, 2023). As a result, a study conducted by Muriuki, Yahner, and Kiragu (2022) reported that innovative ways to operationalise transportation for referral and community dialogues could lead to improved birth experiences and outcomes.

Possible implications of these findings are that any delay in ambulance service or delay in referral of a pregnant woman can result in complications such as neonatal birth asphyxia, as some maternal conditions need to be attended to as soon as possible by doctors in higher institutions. According to Adam’s (1999) conceptual model of the nursing goal of the profession, the availability of ambulances and early response to an emergency call, either

from a pregnant woman at home or professional midwives in clinics, can reduce complications and promote quick intervention for the conditions at hand. This will also reduce neonatal birth asphyxia.

B7. Does lack of knowledge, misconceptions, and poor interventions

A question on lack of knowledge, misconceptions, and poor interventions in managing birth asphyxia contributes to neonatal birth asphyxia. The majority of respondents agreed (n = 126; 91.3%) with the question, with a few (n = 12; 8.7%) who disagreed with the statement. Lack of in-service training and poor maternal programs in all facilities, which contribute more to neonatal mortality, result in a lack of knowledge in the management of birth-asphyxiated babies by professional midwives.

In support of the current findings, a study conducted by Joho, Kibusi, and Mwampagatwa (2020) reported that the majority of the participants (59.9%) in their study did not have adequate knowledge of managing babies who needed resuscitation, i.e., Helping Babies Breathe (HBB). Among the assessed nurses, only 29.7% performed Helping Babies Breathe skills correctly, while 70.3% had inadequate skills in HBB (Joho, Kibusi, & Mwampagatwa, 2020). This problem is high in this region due to poor obstetrics coverage, equity, and quality because of gaps in local health financing models, inaccessible health facilities, socio-cultural norms, low literacy levels, shortages of health workers and supplies, and poor health care spending (Tesew, 2018).

The possible implications of these findings are the lack of knowledge of professional midwives concerning birth asphyxia, misconceptions in such a way that old professional midwives focus more on their experiences about birth asphyxia than utilising new guidelines, and poor intervention due to a lack of information and skills. All this will result in mismanagement of complications in pregnancy, resulting in neonatal birth asphyxia. Consequences of lack of knowledge, as indicated in the conceptual model of nursing by Adams (1999), indicate that mismanagement of patients and poor diagnosis of contributing factors of neonatal birth asphyxia led to high mortality rates in neonatal birth asphyxia.

4.3.5 SECTION C: MATERNAL RELATED FACTORS

Antepartum factors

Table 4.4 Maternal related (Antepartum factors)

Questions		Frequency	Percent	Valid Percent	Cumulative Percent
C1. Women who conceive at the age of 35 and above are at risk of neonatal birth asphyxia	Agree	83	60.1	60.1	60.1
	Disagree	55	39.9	39.9	100.0
	Total	138	100.0	100.0	
C2. Young maternal age leads to neonatal birth asphyxia	Agree	80	58.0	58.0	58.0
	Disagree	58	42.0	42.0	100.0
	Total	138	100.0	100.0	
C3. Primigravida contributes to neonatal birth asphyxia than grand multipara	Agree	73	52.9	52.9	52.9
	Disagree	65	47.1	47.1	100.0
	Total	138	100.0	100.0	
C4. Grand multipara contributes to neonatal birth asphyxia than primigravida	Disagree	46	33.3	33.3	33.3
	Agree	92	66.7	66.7	100.0
	Total	138	99.3	100.0	

C1. Women who conceive at the age of 35 and above

In response to a question about whether women over the age of 35 are at risk of neonatal birth asphyxia, the majority of respondents n=83(60.1%) agreed with the statement, while n=55(39.9%) disagreed. High maternal age, also known as advanced maternal age, leads to more complications during pregnancy, such as increased blood pressure, placenta abruption, eclampsia, and neonatal asphyxia. As such, mothers are to be given advice on the use of contraceptives and taught about the dangers of conceiving above the age of 35.

A similar study indicates that mothers aged ≥35 were more or six times more likely to have experienced birth asphyxia than women in the age group between 20 and 34 years old (Abdo, 2019). Contrary to the findings of the current study, another study was conducted on mothers who gave birth to neonates with asphyxia. The authors identified that mothers at the age of 20–25 were at a higher risk of developing birth asphyxia as compared to younger or elder mothers (<20 or >25) (OR 0.30, CI 95% 0.07–1.21).

The risk is increased significantly with a decline in the booking status of the mother (OR 0.20, CI 95% 0.11-0.37, p = <0.01) (Aslam, Saleem, Afzal, & Iqbal, 2014). In this study, the findings indicate that high maternal age ≥35 years (83%) are at risk of neonatal birth asphyxia, as supported by a study conducted by Abdo (2019).

The possible implication of the current findings of mothers who conceive at the age of 35 years places mothers at high risk as they are prone to complications during their pregnancy, such as hypertension and diabetes, leading to neonatal birth asphyxia. According to the Adams conceptual model of nursing (1999), the beneficiaries of the professional services are all women entering the health care facility, who must be given health education about maternal health services and the disadvantages of conceiving at an age above 35 years, as this has more complications and might lead to neonatal birth asphyxia.

C2. Young maternal age (12-19 years)

From the question, which was asked if young maternal age leads to neonatal birth asphyxia, the majority of respondents agreed (n = 80, or 58%), although n = 58, or 42%, disagreed. Teenage pregnancy is a serious problem as mothers are not well developed physically to accommodate the fetus during delivery as the passage is small for the baby to pass through. Similarly to the results of the current study, a study conducted by Pitsawong (2018) indicated that young maternal age (20–25 years) and primigravidity have been two of the main risk factors for developing birth asphyxia. Include at least two sources.

The possible implications are that teenage pregnancy has been a challenge in rural and undeveloped countries, as most young stars get pregnant in order to take care of their siblings with the use of social grants. Peer pressure is a challenge in influencing teenage pregnancy. Due to a lack of money, knowledge, and motivational resources, teenage pregnancy will remain high. Being pregnant at a very young age results in many complications during pregnancy, and you also have a high chance of delivering a preterm baby, which will lead to factors contributing to neonatal birth asphyxia. As indicated by Adams (1999), the beneficiaries of maternal health care services are young mothers. As indicated by the findings of the current study, midwives must conduct campaigns and out-reach programs to strengthen family planning methods in order to reduce and prevent teenage pregnancy.

C3. Primigravida contributes to neonatal birth asphyxia than grand multipara

Majority of respondents n=73(52.9%) agreed with the question on primigravida contributes to neonatal birth asphyxia than grand multipara, whereas n=65(47.1%) disagreed. Neonates born by prim gravida mothers are at risk of birth asphyxia than grand multipara due to poor progress during labour or delay in second stage of labour.

According to the results of the current study, a study conducted by Mulwa (2022) indicated that primipara mothers were found to have a four-fold greater risk of birth asphyxia compared to multiparous women because primipara mothers tend to be found in the younger age bracket and are more prone to malformations and prolonged obstructed labour. A similar study conducted by Ahmed *et al.* (2021) indicated that primiparas were 2.84 times more likely to develop birth asphyxia than multiparas. Another supporting study by Aslam et al. (2018) reported that infants of primiparous women carried a higher risk for birth asphyxia as compared to grand multipara.

Primgravida is more likely to occur at a young maternal age; as such, pregnancy is associated with high risks, for example, cephalopelvic disproportion (CPD), where the passenger will be bigger than the corridor or passage. This condition leads to a high chance of a caesarean section, which increases the risk of neonatal birth asphyxia. The goal of the profession, as indicated in Adams' (1999) conceptual framework, relates to maternal healthcare services provided by midwives to prevent and manage maternal health conditions associated with neonatal birth asphyxia.

C4. Grand multipara contributes to neonatal birth asphyxia than primigravida

As indicated in Table 4.2, a total of 92 (66.7%) respondents agreed that grand multipara contributes more to neonatal birth asphyxia than primigravida, with 45 (33.3%) disagreeing with the statement. The number of respondents who agreed with the statement showed that they are aware that pregnant women with a parity of more than 5 are at risk of anaemia in pregnancy, hypertension, and macrosomia, as all these factors lead to neonatal birth asphyxia.

The possible implications are that in grand multiparas women, the uterus is now soft and fragile as it has carried many pregnancies. Women tend to have more complications after delivery, for example, postpartum haemorrhage, anaemia, and mal-presentation, including birth asphyxia. Beneficiaries of the professional service, which is maternal health care

services, are grand-multipara women, where midwives are to manage them appropriately to identify any condition that might predispose the new-born to birth asphyxia and be treated.

Intrapartum factors

Table 4.5 Maternal related (Intrapartum factors)

Questions		Frequency	Percent	Valid Percent	Cumulative Percent
C5. Premature birth contributes to neonatal birth asphyxia as the lungs and other organs are not well developed	Agree	97	70.3	70.3	70.3
	Neutral	25	18.1	18.1	88.4
	Disagree	16	11.6	11.6	100.0
	Total	138	100.0	100.0	
C6. Neonates delivered with meconium-stained liquor are at risk	Agree	133	96.4	96.4	96.4
	Neutral	3	2.2	2.2	98.6
	Disagree	2	1,4	1.4	100
	Total	138	100.0	100.0	

C5. Premature birth contributes to neonatal birth asphyxia

In table 4.5, the researcher asked a question about whether premature birth contributes to neonatal birth asphyxia as the lungs and other organs are not well developed. From this question, respondents agreed (n = 97, 70.3%), were neutral(25, 18.1%), disagreed (16, 11.6%), and From these results, it was evident that the majority of respondents know that premature birth, i.e., babies delivered with a birth weight of less than 2.5 kg, are at risk of neonatal birth asphyxia due to organs not well developing or maturing while in the mother's womb. Such babies, after delivery, take longer to breathe and need resuscitation as their lungs are not well developed. The premature newborn baby is given steroids (dexamethasone) to boost the lungs of the infants to maturity.

The findings of the current study are in line with the study by Aslam *et al.,* (2018), where the authors indicated that prematurity carries a substantially higher risk of developing birth asphyxia with a gestational age of 34 to 37 weeks, increasing the risk of asphyxia by a factor of 0.34 (CI 95% 0.19–0.58). A similar study conducted by Tesew (2018) reported that the risk for developing birth asphyxia was higher in infants of weight 1–2 kg as compared to infants with weights of 2.5–3.5 kg. The birth weight of the newborns also had a significant

positive association with birth asphyxia. Low birth weight was 4.2 times more likely to cause birth asphyxia (AOR: 4.214, 95%CI: 1.458, 12.178) than normal birth weight when compared to non-asphyxiated infants by adjusting other variables (Wayessa, Belachew, & Joseph, 2018).

The possible implication the current study findings (premature birth) predisposes newborn babies to birth asphyxia as the organ of the newborn are not well developed including the immature lungs. As such there is a need for midwives to diagnose premature labour and give steroids as indicated in the maternity care guideline. If protocols and guidelines are not well followed this could result in neonatal birth asphyxia. The role of profession as stated in the conceptual framework of Adams (1999) indicates that early diagnosis of a preterm labour, preventions and early intervention will reduce the high rate of neonatal mortality rate and neonatal birth asphyxia.

C6. Neonates delivered with meconium-stained liquor are at risk

From the question where the researcher asked if neonates delivered with meconium-stained liquor are at greater risk of neonatal birth asphyxia than those delivered with clear liquor, most responded with an agreed-upon n = 133 (96.4%) with the question, whereas few were neutral (3.2%), disagree (2.4%). During labour, some of the fetus passes meconium while in the uterus before being delivered, and then the liquor (amniotic fluid) will be stained with meconium. During delivery, the baby inhales those fluids, blocking the airway for the baby to properly breathe. Well-trained midwives should resuscitate the newborn to clear the airway; if not, this might result in neonatal birth asphyxia. As such, a study conducted by Woday *et al.,* (2019) recommended proper training of professional midwives about neonatal resuscitation.

A similar study indicates that concerning the colour of the amniotic fluid, mothers with meconium-stained and bloody amniotic fluid were 8.29 times more prone to having children with birth asphyxia (AOR: 8.292, 95% CI: 3.633, 18.928) than those with clear amniotic fluid (Wayessa, Belachew & Joseph, 2018; Ahmed, Mosa, Sultan & Helill, 2021). A case-control study conducted in public hospitals in central Tigray, Ethiopia, reported that meconium-stained amniotic fluid was an independent risk factor for birth asphyxia (Sultan *et al.,* 2021). Contrary to the findings of the current study, a study conducted by Woday, Muluneh, and Denis (2019) reported that mothers with blood-stained amniotic fluid at birth were five times more likely to have a baby who experienced birth asphyxia compared to mothers who had

clear amniotic fluid at birth [AOR = 5.02; 95% CI 1.69–14.87]. Nicholson (2022) concurred by indicating that the abnormal colour of amniotic fluid indicates the risk of asphyxia and other infections. Subsequently, blood-stained amniotic fluid appears to have a high risk for birth asphyxia in newborns, and babies may require intensive suctioning and resuscitation before they breathe independently (Nicholson, 2022).

The implication of these findings is that meconium-stained liquor, if not early diagnosed, can result in a severe birth asphyxiated neonate, which, as a result, can also lead to many complications for the neonate, including death. Intervention of the midwives as health care professionals according to the concept of nursing indicates that proper management and skills of professional midwives in diagnosing and managing meconium-stained liquor can prevent neonatal birth asphyxia (Adams, 1999).

4.3.6 SECTION D: Association between socio demographic data and factors contributing to neonatal birth asphyxia.

Table 4.6 Association between age and factors contributing to neonatal birth asphyxia

Factors	**Pearson Chi-Square**		**Factors**	**Pearson Chi-Square**	
1.Delayed emergency caesarean section contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	3.205 0.361 3	10.Lack of knowledge, misconceptions and poor interventions in managing birth asphyxia contributes	Value: Significance (2-sided) Df	2.354 0.502 3
2. Early diagnosis of complications	Value: Significance (2-sided) Df	10.442 0.316 9	11. Women who conceive at the age of 35 and above are at risk of neonatal birth asphyxia	Value: Significance (2-sided) Df	1.209 0.751 3
3. Neonates delivered with meconium-stained liquor are at risk	Value: Significance (2-sided) df	14.167 0.290 12	12. Low maternal age leads to neonatal birth asphyxia	Value: Significance (2-sided) Df	5.383 0.345 3
4. Meconium-stained liquor contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	12.582 0.400 12	13. Primigravida contributes to neonatal birth asphyxia than grand multipara	Value: Significance (2-sided) Df	3.121 0.373 3
5. Hypertension can lead to several complications	Value: Significance (2-sided) Df	8.105 0.777 12	14. Grand multipara contributes to neonatal birth asphyxia than primigravida	Value: Significance (2-sided) Df	0.679 0.878 3
6. Anaemia contributes to birth asphyxia	Value: Significance (2-sided) Df	3.411 0.946 9	15. Premature birth contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	12.014 0.445 12
7. Miss management of Eclampsia patient is a risk factor	Value: Significance (2-sided) Df	12.769 0.386 12	16. Prolonged labour delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	Constant

8. Does lack of equipment contributes to birth asphyxia	Value: Significance (2-sided) Df	1.675 0.607 3	17. Poor diagnosis management and skills of a health care workers lead to prolonged labour.	Value: Significance (2-sided) Df	4.601 0.868 9
9. Complexities of the referral system	Value: Significance (2-sided) Df	0.665 0.881 3			

Based on the results indicated in table 4.6 above, there was no significant association between age and contributing factors such as delayed caesarean section evident by Pearson Chi-square (AOR = 3,205, p = 0,361); early diagnosis of complications (AOR = 10.442, p = 0.361); neonates delivered with meconium-stained liquor are at risk (AOR = 14.167, p = 0.290); meconium-stained liquor contributes to neonatal birth asphyxia (AOR = 12.582, p = 0.400); hypertension can lead to several complications (AOR = 8.105, p = 0.777); anemia contributes to birth asphyxia (AOR = 3.411, p = 0.946); Miss management of Eclampsia patients is a risk factor (AOR=12.769,p=0.386); lack of equipment contributes to birth asphyxia (AOR=1.675,p=0.607); complexity of the referral system (AOR=0,665,p=0.881); lack of knowledge, misconception, and poor interventions (AOR=2.354,p=0.502); age 35 and above (AOR=1.209,p=0.751); low maternal age (AOR=5.383,p=0.345); primigravida (AOR=3.121,p=0.373); grand multipara (AOR=0.679,p=0.878); premature (AOR=12.014,p=0.445); prolonged labour, delayed maternal 2nd stage of labour (p=constant); poor diagnosis, management, and skills of health care workers (AOR=4.601,p=0.868).

The findings of another study conducted by Joho, Kibusi, and Mwampagatwa (2020) are contrary to those of researchers; current findings show that there is significance in the age category; 35% of providers between the ages of 20 and 39 demonstrated adequate skills, and 50.7% of nurses above 40 performed neonatal breathing skills correctly (P = 0.01; x2 = 27.61) (Joho, Kibusi, and Mwampagatwa, 2020). In another supporting study concerning age groups, it was observed that those respondents who were aged 20–34 (adjusted odds ratio (AOR) = O.082, p = 0.008) and 35–49 (AOR = 0.087, p = 0.010) were significantly less likely to have adequate skills as compared to respondents aged 50 and above (Mbinda & Moshi, 2022).

Based on the results evident from this study, the possible implication is that age does not have a significant impact on factors contributing to neonatal birth asphyxia. As a result, professional midwives are able to properly diagnose and manage cases based on their

knowledge of the factors leading to neonatal birth asphyxia. The Conceptual Model of Nursing The role of the professional is to gain enough knowledge about neonatal birth asphyxia to improve diagnoses, preventions, and early interventions for neonatal birth asphyxia.

Table 4.7 Association between Qualifications and factors contributing to neonatal birth asphyxia

Factors	**Pearson Chi-Square**		**Factors**	**Pearson Chi-Square**	
1.Delayed emergency caesarean section contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	0.441 0.507 1	10. Does lack of knowledge, misconceptions and poor interventions in managing birth asphyxia contributes	Value: Significance (2-sided) Df	2.376 0.123 1
2. Early diagnosis of complications	Value: Significance (2-sided) Df	7.046 0.070 3	11. Women who conceive at the age of 35 and above are at risk of neonatal birth asphyxia	Value: Significance (2-sided) Df	1.518 0.218 1
3. Neonates delivered with meconium-stained liquor are at risk	Value: Significance (2-sided) df	4.440 0.350 4	12. Low maternal age leads to neonatal birth asphyxia	Value: Significance (2-sided) Df	1.574 0.210 1
4. Meconium-stained liquor contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	2.280 0.684 4	13. Primigravida contributes to neonatal birth asphyxia than grand multipara	Value: Significance (2-sided) Df	0.675 0.411 1
5. Hypertension can lead to several complications	Value: Significance (2-sided) Df	2.759 0.599 4	14. Grand multipara contributes to neonatal birth asphyxia than primigravida	Value: Significance (2-sided) Df	0.340 0.560 1
6. Anaemia contributes to birth asphyxia	Value: Significance (2-sided) Df	3.775 0.287 3	15. Premature birth contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	4.389 0.356 4
7. Miss management of Eclampsia patient is a risk factor	Value: Significance (2-sided) Df	5.509 0.239 4	16. Prolonged labour delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	Constan t
8. Does lack of equipment contributes to birth asphyxia	Value: Significance (2-sided) Df	1.824 0.177 3	17. Poor diagnosis management and skills of a health care workers lead to prolonged labour.	Value: Significance (2-sided) Df	2.627 0.453 3
9. Complexities of the referral system	Value: Significance (2-sided) Df	0.177 0.674 1			

Therefore, based on the results indicated in table 4.7 above, there was no significant association between qualifications and contributing factors such as delayed caesarean section evident by Pearson Chi-square (AOR=0.441,p=0.507); early diagnosis of complications (AOR=7.046,p=0.070); neonates delivered with meconium-stained liquor are at risk (AOR=4.440,p=0.350); meconium-stained liquor contributes to neonatal birth

asphyxia (AOR=2.280,p=0.684); hypertension can lead to several complications (AOR=2.759,p=0.599); anemia contributes to birth asphyxia (AOR=3.775,p=0.287); Miss management of Eclampsia patients is a risk factor (AOR=5.509,p=0.239); lack of equipment contributes to birth asphyxia (AOR=1.834,p=0.177); complexity of the referral system (AOR=0,177,p=0.674); lack of knowledge, misconception, and poor interventions (AOR=2.376,p=0.123); age 35 and above (AOR=1.518,p=0.218); low maternal age (AOR=1.574,p=0.210); primigravida (AOR=0.675,p=0.411); grand multipara (AOR=0.340,p=0.560); premature (AOR=4.389,p=0.356); prolonged labour, delayed maternal 2nd stage of labour p=constant; poor diagnosis, management, and skills of health care workers (AOR=2.627,p=0.453).

A similar study indicates that the score of neonatal nurses' knowledge was 11.42 ± 1.82 before the intervention and increased to 14.62 ± 1.92 after the intervention. However, paired t-test did not show a significant difference between the scores of knowledge of neonatal nurses before and after the intervention ($P < 0.01$) (Kabusi, Golfiroozi, Rajabloo, Yahyanezhad, & Hojjati, 2023). On the contrary a study conducted by (Joho *et al*., 2020) indicates the significance with the duration of professional training appeared to impact skill performance as 53.8% of participants with more than 3 years of nursing education were able to perform skills correctly, while only 19.2% with less than 3 years of education performed skills correctly ($P = 0.01$; $x2 = 20.92$).

Another supporting study finding reported that among the total (246) participants, 89 (36.2%) and 66 (26.8%) had adequate knowledge and appropriate skills of neonatal resuscitation care, respectively. Having a BSc in Nursing (AOR = 8.83, 95%CI = 2.00-38.96) and the presence of guidelines (AOR = 3.52, 95%CI = 1.59 -7.80) were significantly associated with knowledge of neonatal resuscitation, adequate knowledge (AOR = 2.80, 95%CI = 1.15-6.84) were factors significantly associated with essential neonatal resuscitation skills (Kamau, Koech, Hecht, McHenry &, Songok, 2022). Another study indicated that being a midwife, Bachelor Sciences degree or above educational status, ever performing neonatal resuscitation, and good knowledge were associated with skill retention. Providers should be encouraged to upgrade their educational level to build their skill retention and expose themselves to neonatal resuscitation (Chikuse, Chirwa, Maluwa, & Odland, 2012).

The possible implication based on the findings is that the qualifications of professional midwives do not have a significant impact on factors contributing to neonatal birth asphyxia.

Hence, this implies that professional midwives will be able to properly manage birth asphyxia cases regardless of their qualifications or educational level of study. According to the conceptual model of nursing, the role of the professional is to gain enough knowledge about neonatal birth asphyxia to improve diagnoses, prevention, and early intervention of neonatal birth asphyxia, which reduces neonatal mortality. Sources of the beneficiary's difficulties include a lack of education and in-service training, which can contribute to a lack of information and knowledge, which may lead to poor management and diagnoses of neonatal birth asphyxia.

Table 4.8 Association between experience and factors contributing to neonatal birth asphyxia

Factors	**Pearson Chi-Square**		**Factors**	**Pearson Chi-Square**	
1.Delayed emergency caesarean section contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	2.082 0.556 3	10. Does lack of knowledge, misconceptions and poor interventions in managing birth asphyxia contributes	Value: Significance (2-sided) Df	1.826 0.609 3
2. Early diagnosis of complications	Value: Significance (2-sided) Df	12.711 0.176 9	11. Women who conceive at the age of 35 and above are at risk of neonatal birth asphyxia	Value: Significance (2-sided) Df	4.080 0.253 3
3. Neonates delivered with meconium-stained liquor are at risk	Value: Significance (2-sided) df	7.472 0.825 12	12. Low maternal age leads to neonatal birth asphyxia	Value: Significance (2-sided) Df	3.493 0.322 3
4. Meconium-stained liquor contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	13.088 0.363 12	13. Primigravida contributes to neonatal birth asphyxia than grand multipara	Value: Significance (2-sided) Df	8.323 0.040 3
5. Hypertension can lead to several complications	Value: Significance (2-sided) Df	11.183 0.513 12	14. Grand multipara contributes to neonatal birth asphyxia than primigravida	Value: Significance (2-sided) Df	1.961 0.580 3
6. Anaemia contributes to birth asphyxia	Value: Significance (2-sided) Df	14.078 0.120 9	15. Premature birth contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	15.257 0.228 12
7. Mismanagement of Eclampsia patient is a risk factor	Value: Significance (2-sided) Df	14.000 0.301 12	16. Prolonged labor delayed maternal 2nd stage of labor contributes to neonatal birth asphyxia	Value: Significance (2-sided) Df	Constant
8. Does lack of equipment contributes to birth asphyxia	Value: Significance (2-sided) Df	5.524 0.137 3	17. Poor diagnosis management and skills of a health care workers lead to prolonged labor.	Value: Significance (2-sided) Df	7.734 0.561 9
9. Complexities of the referral system	Value: Significance (2-sided) Df	0.482 0.923 3			

Based on the study results indicated in Table 4.8 above, the experience of participants has a more significant association with Primigravida contributing to neonatal birth asphyxia than the grand multipara factor that contributes to neonatal birth asphyxia, as evident by the p=0.040<0.005 level of significance. There was no significance association between experience and contributing factors of neonatal birth asphyxia such as Delayed caesarean section evident by Pearson Chi-square where (AOR=2.082,p=0.556); Early diagnosis of complications (AOR=12.711,p=0.176); Neonates delivered with meconium-stained liquor are at risk (AOR=7.472,p=0.825); Meconium-stained liquor contributes to neonatal birth asphyxia (AOR=13.088,p=0.363); Hypertension can lead to several complications (AOR=11.183,p=0.513); Anaemia contributes to birth asphyxia (AOR=14.078,p=0.120); Miss management of Eclampsia patient is a risk factor (AOR=14.000,p=0.301); Does lack of equipment contributes to birth asphyxia (AOR=5.524,p=0.137); Complexities of the referral system (AOR=0,482,p=0.923); Lack of knowledge, misconception, poor interventions (AOR=1.826,p=0.609); Age 35 and above (AOR=4.080,p=0.253); Low maternal age (AOR=3.493,p=0.322); Grand multipara (AOR=1.961,p=0.580); Premature (AOR=15.257,p=0.228); Prolonged labour, delayed maternal 2nd stage of labour (p = constant), poor diagnosis, management, and skills of health care workers (AOR = 7.734, p = 0.561)

The findings of the study are similar to those of another study, which shows that there are no significant associations between the pass rate of the written examination and years of experience, role, or prior in-service training. All of the hospitals had the basic equipment required for neonatal resuscitation (Kamau *et al.,* 2022). Another similar study indicates that among nurses with at least 5 years of work experience, 53.2% performed skills correctly. In comparison, only 10.5% of nurses with less than 5 years of work experience performed skills correctly with a significant difference (P = 0.001; x2 = 37.21) (Joho *et al.,* 2020). For working experience, it was observed that those respondents who worked 4–6 (AOR = 2.905, p = 0.003) and 10 > years and above (AOR = 12.825, p < 0.001) were significantly more likely to have adequate skills as compared to respondents who worked <4 years (Mbinda & Moshi, 2022). Longer work experience (more than 5 years) was associated with an increased likelihood of adequate neonatal resuscitation skills knowledge compared to nurses with less than 5 years of work experience in maternity units.

The findings of another study indicate that the midwives had knowledge of birth asphyxia in general. However, there were gaps in their ability to identify warning signs of birth asphyxia through partograph use (Chikuse, Chirwa, Maluwa, & Odland, 2018).

The possible implication based on the results of this study is that the experience of professional midwives has a greater significance in primigravida contributing to neonatal birth asphyxia than the grand multipara factor. As a result, the higher the experience, the better the intervention in the management of neonatal birth asphyxia cases, resulting in a low neonatal mortality rate. However, experience shows no significance for other factors contributing to neonatal birth asphyxia. The conceptual model of nursing intervention by Adams (1999) indicates that the proper application of knowledge and nursing skills by professional midwives through experience and education leads to the prevention of neonatal birth asphyxia.

4.4 SUMMARY OF THE CHAPTER

In this chapter, the researcher presented the data analysed from the questionnaires using graphs, charts, chi-square tests, and tables and interpreted the findings. The discussion was supported by relevant literature and further integrated with the theory. Chapter 5 presented the summary, conclusions, limitations, and recommendations of the study.

CHAPTER 5

SUMMARY, LIMITATIONS, RECOMMENDATIONS, CONCLUSION

5.1 INTRODUCTION

In the previous chapter, the researcher presented the results of the study, interpreted them, discussed them, and supported them with literature and the conceptual framework. This chapter presents a summary of research findings related to factors contributing to neonatal birth asphyxia as well as the limitations experienced by the researcher during the process of conducting this study. Conclusions were drawn regarding the significance of the study as well as recommendations related to the findings of the current study to various stakeholders and for further research.

5.2 AIM OF THE STUDY

The aim of this research study was to determine contributory factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.

5.3 RESEARCH DESIGN AND METHOD

The quantitative research approach was used in this research study to determine factors contributing to neonatal birth asphyxia in public health facilities in Mopani district, Limpopo province. Non-experimental designs were used, and the researcher collected data from a defined population of professional midwives. A descriptive type was used in this research study, where more information is required in particular field clinics and hospitals through the provision of a picture of the phenomenon as it occurs naturally. A cross-sectional research design was used, where the researcher collected data through a survey of professional midwives (n = 138). The researcher used self-administered questionnaires, which consisted of closed-ended questions that were simple and short. The designed questionnaire was developed with the help of the statistician and given to the supervisor and midwifery experts in quantitative research for validation (Appendix C). Analysis and interpretation of the data were presented in frequency tables and graphs.

5.4 SUMMARY OF THE STUDY FINDINGS BASED ON THE RESEARCH OBJECTIVES AND HYPOTHESIS

The objectives of the study were to

- To assess health related factors contributing to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo Province.
- To identify maternal related factors leading to neonatal birth asphyxia among professional midwives working in public health facilities of Mopani district, Limpopo province.
- To determine the association between socio demographic data of professional midwives and factors contributing to neonatal birth asphyxia in public health facilities of Mopani district, Limpopo province.

The hypothesis of the study was

- Prolonged labor was the leading cause of neonatal birth asphyxia.

5.4.1 Health related factors

Based on the findings of this research study, the following were identified: prolonged labour or delayed maternal 2nd stage of labour contributed to neonatal birth asphyxia, followed by delayed emergency caesarean, lack of knowledge, misconceptions, and poor interventions in the management of neonatal birth asphyxia. Any delay in the referral of a pregnant woman results in the patient not getting proper interventions in time and more complications, leading to factors contributing to neonatal birth asphyxia. Lack of proper equipment and resources in the management of birth asphyxia leads to neonatal mortality.

5.4.2 Maternal related factors

The majority of professional midwives responded that the leading contributing factors to neonatal birth asphyxia were meconium-stained liquor, followed by grand multipara, which contributes more to neonatal birth asphyxia than primigravida. High maternal age, also known as advanced maternal age, leads to more complications during pregnancy. Poor diagnosis, management, and skills of health care workers lead to prolonged labour, resulting in neonatal birth asphyxia. Neonates delivered with a low birth weight of less than 2.5 kg are at risk of neonatal birth asphyxia.

5.4.3 Associations between demographic data and factors contributing to neonatal birth asphyxia

Thus, based on the findings evident from this study, there are no significant associations between age and factors contributing to neonatal birth asphyxia. There are no significant associations between qualifications and factors contributing to neonatal birth asphyxia. Significance was identified between the experience of professional midwives and primigravida contributing to birth asphyxia compared to the grand multipara factor. It was identified that there was no significant association between experience and other factors.

5.4.4 Summary related to hypothesis of the study

The hypothesis of the study was that prolonged labour was the leading cause of neonatal birth asphyxia. Based on the findings from the current study, it was confirmed that prolonged labour or delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia, followed by delayed emergency caesarean under health-related factors. Maternal-related factors are evident in meconium-stained liquor.

5.5 CONCLUSION

Prolonged 2nd stage of labour followed by delayed emergency caesarean are the most contributing factors under health-related factors. The majority of professional midwives responded that meconium-stained liquor, followed by Grand multipara, contributes more to neonatal birth asphyxia than primigravida under maternal-related factors. There is no significant association between age, qualifications, and experience and factors contributing to neonatal birth asphyxia. However, there is a more significant association between experience and primigravida contributing to neonatal birth asphyxia than with grand multipara.

5.6 RECOMMENDATIONS

Based on the findings of this research study, the following recommendations were made, which may be implemented to reduce contributing factors leading to neonatal birth asphyxia:

5.6.1 Recommendation for nursing education

- Improving the clinical skills of all professional midwives working in maternity and neonatal units for them to identify risk factors early and initiate early management, for example on the resuscitation of newborn babies.

5.6.2 Recommendations for clinical practice for midwives

- Implementation of national maternal and neonatal guidelines as this will improve the knowledge and management skills of clinicians to neonatal birth asphyxia.
- Proper utilisation of reproductive maternal care intervention programs This will help in the early identification and prevention of risk factors contributing to neonatal birth asphyxia during antenatal visits and delivery.
- Initiate and revitalise programmes available on maternal and neonatal services. This will help in knowing proper procedures for diagnosis and management of neonatal birth asphyxia.
- Early diagnosis and proper use of maternity supplements during pregnancy will result in the prevention of neonatal birth asphyxia.
- Proper management and utilisation of updated guidelines about the management of eclampsia decrease neonatal birth asphyxia.

5.6.3 Recommendations for the management and administration

- Quality improvement programmes on maternal and neonatal care services as this will improve health service provision by professional midwives.
- Simple and accessible protocols on maternal and neonatal resuscitation allow professional midwives to quickly assess the management of birth asphyxia.
- Frequent review of maternity guidelines and protocols for neonatal birth asphyxia.
- Benchmarking in other counties on what approaches are used to reduce neonatal birth asphyxia so that such approaches may be adopted to improve neonatal birth asphyxia in South African hospitals.
- Adequate supply and provision of resuscitation equipment’s to healthcare facilities to improve the management of asphyxiated babies and the outcomes.
- More EMS transport should be distributed to stations to avoid shortages of EMS at certain facilities, and health education to patients about the importance of referrals is recommended to improve complications.

5.6.4 Recommendations for the community which also involves midwives

- Health education to the community on the importance of early antenatal booking, antenatal visits, and contributing factors of neonatal birth asphyxia.

- Awareness campaigns are to be conducted among the community members about the risk of being pregnant at early and advance age as it predisposes neonates to birth asphyxia.
- Health educational programs should be entesified and conducted at high schools to educate teenages and adolescence about the importance of family planning and prevention of teenage pregnancy inorder to reduce the risk of neonatal asphyxia.

5.6.5 Recommendations for further research

- Develop simple and easy neonatal resuscitation procedures and protocols; this will improve early intervention for neonates delivered with birth asphyxia.
- Research should be done on the impact of these effects on babies diagnosed with neonatal birth asphyxia.
- Develop improved diagnostic tools during antenatal visits for birth asphyxia to identify women who are at high risk of neonatal birth asphyxia.

5.7 LIMITATIONS OF THE STUDY

The study was conducted in six selected health facilities in Mopani District, Limpopo Province. Data collection was time-consuming, and the researcher had to travel to all facilities using their own transportation, which consumed more money as the researcher had to wait for payday (salary) to collect data. However, despite these limitations, the researcher managed to go to all the facilities to collect data. Some participants had no interest in answering the questionnaires as they were busy doing their daily routine in the wards. The researcher managed to convince them by providing sweets at the end of the questionnaire.

5.8 CONCLUDING REMARKS

This study aims to assess health and identify maternal-related factors contributing to neonatal birth asphyxia in public health facilities in Mopani district, Limpopo Province. The findings of this study show that health-related factors evident in prolonged labour or delayed maternal 2nd stage of labour are the leading contributing factors to neonatal birth asphyxia. Maternal-related factors evident in meconium-stained liquor are the most contributing factors to neonatal birth asphyxia. Factors contributing to neonatal birth asphyxia are still a big challenge worldwide. Proper intervention in all counties will reduce neonatal mortality rates. The government, together with management and health providers, works together to

strategize and improve maternal and neonatal care services. This study might reduce the rate of neonatal birth asphyxia.

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APPENDIX A: LETTER TO REQUEST FOR PERMISSION

Provincial Department of Health

Private Bag X9302

Polokwane

0700

Dear Sir/Madam

Ref: permission letter to conduct research study at public health facilities at Mopani district in Limpopo province.

I Makhumisane Mphonyane, student No: 202238539 doing Musters in Nursing at University of Limpopo request for permission to conduct my research study in factors contributing to neonatal birth asphyxia in public health facilities of Mopani district in Limpopo province

Your positive respond will be highly appreciated. For more information don't hesitate to contact the researcher on 0710414938. Email: mrmakhumisane@gmail.com

THANK YOU

Kind regards

Ms Makhumisane M

Signature _____ Date _____

APPENDIX B: APPROVAL LETTERS

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **29 November 2022**

PROJECT NUMBER: **TREC/584/2022: PG**

PROJECT:

Title:	**Factors contributing to neonatal birth asphyxia in public health facilities of Mopani District, Limpopo Province.**
Researcher:	**M Makhumisane**
Supervisor:	Prof TI Ramavhoya
Co-Supervisor/s:	Dr TE Mutshatshi
School:	Health Care Sciences
Degree:	Master of Nursing

PROF D MAPOSA
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**

ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.**

iii) **PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
HEALTH

Ref : LP_2022-12-010
Enquires : Ms PF Mahlokwane
Tel : 015-293 6028
Email : Phoebe.Mahlokwane@dhsd.limpopo.gov.za

Mphonyane Makhumisane

PERMISSION TO CONDUCT RESEARCH IN DEPARTMENTAL FACILITIES

Your Study Topic as indicated below;

Factors contributing to neonatal birth asphyxia in public health facilities of Mopani district, Limpopo province

1. Permission to conduct research study as per your research proposal is hereby Granted.
2. Kindly note the following:
   a. Present this letter of permission to the Office District Executive Manager a week before the study is conducted.
   b. This permission is **ONLY** for **Giyani CHC; KREMETART CLINIC; LETABA HOSPITAL; MAPAYENI CLINIC; NKHENSANI HOSPITAL**
   c. In the course of your study, there should be no action that disrupts the routine services, or incur any cost on the Department.
   d. After completion of study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
   e. The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
   f. **The approval is only valid for a 1-year period.**
   g. If the proposal has been amended, a new approval should be sought from the Department of Health
   h. Kindly note that, the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated

26/01/2023

Head of Department **Date**

pp

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

mmmmmmmmm

DEPARTMENT OF
HEALTH

Ref: S5/4/2
Enq :Mr Malatji E.M
Tel : 015 303 8509
Email : Eleck.malatji@dhsd.limpopo.gov.za

To: Chief Executive Officer (Mrs Ragolane VJ)
From : Deputy Director: Corporate Services (Mr Nkolele TT)

Attention: MAKHUMISANE M

RE: APPLICATION FOR AN APPROVAL TO CONDUCT RESEARCH ON FACTORS CONTRIBUTING TO NEONATAL BIRTH ASPHYXIA IN PUBLIC HEALTH FACILITIES OF MOPANI DISTRIC, LIMPOPO PROVINCE.

1. The above Matter refers.
2. Kindly be informed that the Chief Executive Officer has approved your application to conduct research. The approval is with effect from the 2nd and 3rd of June 2023.

Time: 07h30 to 16h30
Lunch : 1hour

3. Hopefully you will find the above to be in good order.
4. **N.B. Please note that you will not get remunerations/Compensations during your research.**

CHIEF EXECUTIVE OFFICER
MS RAGOLAE VJ

02/06/23
Date

Private Bag X 1430 LEBOWAKGOMO 0870
Cnr Tarentaal and Lydenburg Road, Tel: (015) 303 8200 Fax no: 015 303 8421

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LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH
MOPANI DISTRICT

Ref No. S4/2/2
Enquiries: S Chuma
Tel Direct: 015 811 6633
Email: Shadrack.Chuma@dhsd.limpopo.gov.za

To: **Ms. Mphonyane Makhumisane**
P.O Box 1569
Giyani
0826

Dear Makhumisane M

SUBJECT: REQUEST TO CONDUCT RESEARCH IN THE DEPARTMENTAL HEALTH FACILITIES OF MOPANI DISTRICT: YOURSELF

1. Your letter dated the 30 February 2023 has reference.
2. This serves to inform you that permission is granted to your request to conduct research in Mopani District of Limpopo Department of Health.
3. Your research is on "**Factors contributing to neonatal birth asphyxia in public health facilities of Mopani District, Limpopo Province**".
4. Note that this approval is for the period one year.
5. You will be required to furnish the Chief Executive Officer/Head of Institution or manager of the following facilities with this letter for the purposes of access and assistance: **Giyani CHC, Krematart Clinic, Letaba Hospital, Mapayeni Clinic, and Nkhensani Hospital.**
6. You are further expected to abide by all prescripts governing public service during the course of your research.
7. Thanking you.

.....
pp DIRECTOR: CORPORATE SERVICES

2023/01/30
DATE

14 Aug 2023, 11 10

APPENDIX C: CONSENT FORM

Statement concerning participation in a Research Project:

Title of Project: Factors contributing to neonatal birth asphyxia in public health facilities of Mopani district in Limpopo province.

I have read the information and heard the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue.

The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way. I am aware that the results of this project may be used in scientific publications which will be electronically available throughout the world.

I consent to this provided that my number does not reveal my identity. I understand that participation in this Study / Project is completely voluntary and that I may withdraw from it at any time and without supplying reasons. This will have no influence on my workplace.

I know that this Study / Project has been approved by the Turfloop Research Ethics Committee (TREC). I am fully aware that the results of this Study / Project will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed. I hereby give consent to participate in this Study / Project

Name of participant Signature of Participant

_____ _____

Statement by the Researcher:

I confirm that I have provided every information concerning this research and I agree to answer any information and clarity required by the participant. I will adhere to the approved protocol.

Researcher Signature of Researcher

_____ _____

Witness Signature of Witness

_____ _____

APPENDIX D: QUESTIONNAIRES

The information collected is intended for the study on factors contributing to neonatal birth asphyxia in public health facilities of Mopani district in Limpopo province your answer will be helpful in identifying factors leading to neonatal birth asphyxia and effects of neonatal birth asphyxia.

SECTION A

1. Participants NO: ☐

Mark with an X in the box provided bellow

2. Age: ☐

3. Relationship status:

Single	Married	Widow	Divorced

4. Qualification:

Diploma in midwifery	Degree inclusive of midwifery	Or PhD in nursing

5. Years of experience

☐

6. Additional duties in the work field

Matron	
Sister in charge	
Other specify	

7. Currently enrolled for other studies

Yes		No	

8. I have an idea about contributing factors leading to neonatal birth asphyxia:

Yes		No	

9. Have you ever nursed patients with factors contributing to neonatal birth asphyxia eg. Meconium stained liquor etc.

Yes		No	

If No would you like to be briefed about this:

Yes		No	

SECTION B

HEALTH SYSTEM RELATED FACTORS

1. **Delayed emergency caesarean section**

1.1 Delayed emergency caesarean section contributes to neonatal birth asphyxia?

YES		NO	

1.2 Early diagnosis of complications E.g foetal distress that leads to caesarean section prevents complications such as neonatal birth asphyxia.

A. Strongly agree	B. Agree	C. Nuetral	D. Disagree	E. Strongly disagree

2. Meconium-stained liquor

2.1 Neonates delivered with meconium-stained liquor are at risk of neonatal birth asphyxia than those delivered with clear liquor?

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E. Strongly disagree

2.2 Meconium-stained liquor contributes to neonatal birth asphyxia?

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E.Strongly disagree

3. Medical conditions

3.1 Hypertension if not early diagnosed during pregnancy can lead to several complications as it decreases blood flow to the foetus?

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E.Strongly disagree

3.2 Anaemia contributes to birth asphyxia as it leads to absence of enough oxygen supply during pregnancy?

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E.Strongly disagree

3.3 Miss management of Eclampsia patient is a risk factor for neonatal birth asphyxia.

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E.Strongly disagree

4. Health system

4.1 Does lack of equipment contributes to birth asphyxia?

YES		NO	

4.2 Complexities of the referral system E.g refusal of referral, acts as a challenge in managing neonatal birth asphyxia?

YES		NO	

4.3 Does lack of knowledge, misconceptions and poor interventions in managing birth asphyxia contributes to neonatal birth asphyxia?

YES		NO	

SECTION C: MATERNAL RELATED FACTORS

1. Antepartum factors

1.1 High maternal age (35 and above)

1.1.1 Women who conceive at the age of 35 and above are at risk of neonatal birth asphyxia?

YES		NO	

1.2 Low maternal age

1.2.1 Low maternal age leads to neonatal birth asphyxia?

YES		NO	

1.3 Primigravida and Grandmultipara

1.3.1 Primigravida contributes to neonatal birth asphyxia than grandmultipara?

YES		NO	

1.3.2 Grandmultipara contributes to neonatal birth asphyxia than primigravida?

YES		NO	

2. Intrapartum factors

2.1 Pre mature birth

2.1.1 Premature birth contributes to neonatal birth asphyxia as the lungs and other organs are not well developed?

A. Strongly agree	B. Agree	C. Neutral	D. Disagree	E.Strongly disagree

2.2 Prolonged labour

2.2.1 Prolonged labour/ delayed maternal 2nd stage of labour contributes to neonatal birth asphyxia?

YES		NO	

2.2.2 Poor diagnosis, management and skill of health care workers lead to prolonged labour resulting in neonatal birth asphyxia?

A. Strongly agree	B. Agree	C. Nuetral	D. Disagree	E. Strongly disagree

THANK YOU SO MUCH FOR YOUR PARTICIPATION ENJOY YOUR DAY

APPENDIX E: EDITORS LETTER

Editing Certification 2 December 2023

TO WHOM IT MAY CONCERN

This editing certificate verifies that this Research was professionally edited for Mphonyane Makhumisane

Thus, it is meant to acknowledge that I, Mrs K.L Malatji, a professional Editor under a registered company, RightMove Multimedia, have meticulously edited the manuscript from the University of Limpopo. Title: "FACTORS CONTRIBUTING TO NEONATAL BIRTH ASPHYXIA IN PUBLIC HEALTH FACILITIES OF MOPANI DISTRICT, LIMPOPO PROVINCE."

Mrs K. L Malatji