

**FACTORS CONTRIBUTING TO THE INCREASED PERINATAL MORTALITY RATE
IN LIMPOPO PROVINCE**

by

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DECLARATION

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I declare that the dissertation **Factors contributing to the increased perinatal mortality rate in Limpopo province** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.



SIGNATURE

20 OCTOBER 2018

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FACTORS CONTRIBUTING TO THE INCREASED PERINATAL MORTALITY RATE IN LIMPOPO PROVINCE

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ABSTRACT

The purpose of the study was to determine the causes, of the increased perinatal mortality, identify and describe other factors contributing to the increased perinatal mortality rate in a rural healthcare facility situated in Sekhukhune district in Limpopo province, and to formulate the recommendations that will reduce the perinatal mortality rate based on the results. A quantitative, descriptive, cross-sectional and retrospective design was conducted. The study population was one hundred and sixty two (162) records of babies who died in the perinatal facility from the 1st January 2015 to the 31st December 2015 with a gestational age of about 28 weeks or more. No sampling was done, but a census was used. The sample comprised of one hundred and sixty two (162) of all the records related to perinatal mortality. Data were collected from patients' records by using a checklist. Analysis of the data was performed by the IBM Statistical Package for Social Sciences (SPSS) version 14 computer software. Frequency tables and pie graphs were used to present the data.

The results indicated that 75.3% (n=122) of the records were associated with health personnel as a factor contributing to perinatal mortality. Furthermore, preterm cases accounted for 45.1% (n=73) and prematurity accounted for 37.0% (n=60) of the cases of perinatal mortality. Therefore, preterm births and prematurity are risk factors that should be managed immediately after birth, and all babies should be managed prior to being transferred to the other healthcare institutions.

The recommendations are that the education of patients about early antenatal visit, signs of labour and danger signs during pregnancy and training of healthcare workers on record-keeping have to be done on a continuous basis. Managers should conduct quality improvement programmes, benchmarking and implement maternal and neonatal guidelines in the clinical area throughout pregnancy.

KEY CONCEPTS

Antenatal, Health care, Labour, Perinatal mortality, Prematurity, Still birth.

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DEDICATION

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TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	v
DEDICATION	vi
LIST OF FIGURES	xiv
LIST OF TABLES.....	xv
LIST OF ANNEXURES	xvi
LIST OF ACRONYMS AND ABBREVIATIONS.....	xvii
CHAPTER 1.....	1
ORIENTATION TO THE STUDY.....	1
1.1 INTRODUCTION	1
1.2 BACKGROUND OF THE STUDY	2
1.3 STATEMENT OF THE RESEARCH PROBLEM.....	3
1.4 RESEARCH PURPOSE	4
1.4.1 Research objectives.....	4
1.4.2 Research questions	4
1.4.3 Significance of the study.....	4
1.5 DEFINITIONS OF KEY CONCEPTS	5
1.6 RESEARCH SETTING	6
1.7 RESEARCH DESIGN AND METHODS.....	6
1.7.1 RESEARCH DESIGN	6
1.7.1.1 Quantitative approach	7
1.7.1.2 Non-experimental approach	7
1.7.1.3 Descriptive approach.....	7
1.7.1.4 Cross-sectional approach.....	7
1.7.1.5 Retrospective document analysis.....	8
1.7.2 RESEARCH METHOD	8
1.7.2.1 Population.....	8
1.7.2.2 Sampling technique and sample	8
1.7.2.2.1 Sampling technique.....	8
1.7.2.2.2 Sample.....	9

1.7.2.3	Inclusion and exclusion criteria	9
1.7.2.4	Development and pre-testing of an instrument	9
1.7.2.5	Data collection	11
1.7.2.6	Data management and analysis	12
1.8	VALIDITY AND RELIABILITY	12
1.8.1	VALIDITY	12
1.8.2	RELIABILITY	12
1.9	ETHICAL CONSIDERATIONS	13
1.9.1	Researcher specific ethical considerations	13
1.9.2	Records specific ethical considerations	13
1.9.2.1	Informed consent	13
1.9.2.2	Confidentiality and anonymity	14
1.9.2.3	Beneficence	14
1.9.2.4	Justice	14
1.9.2.5	Privacy	15
1.10	SCOPE AND LIMITATIONS OF THE STUDY	15
1.11	STRUCTURE OF THE DISSERTATION	16
1.12	CONCLUSION	16
CHAPTER 2	17
LITERATURE REVIEW	17
2.1	INTRODUCTION	17
2.2	THEORETICAL BACKGROUND OF PERINATAL MORTALITY RATES	17
2.3	PERSPECTIVES ON PERINATAL MORTALITY RATE	18
2.3.1	SOUTH AFRICA	18
2.3.1.1	Registered perinatal mortalities in South Africa	19
2.3.1.1.1	Age differentials in perinatal mortalities	20
2.3.1.1.2	Age differential in early perinatal mortalities	21
2.3.1.1.3	Distribution of mortalities by month and year of mortalities	22
2.3.1.1.4	Differentials in perinatal mortalities by province	23
2.3.2	AFRICA	24
2.3.3	INTERNATIONAL	25
2.4	CURRENT FACTORS CONTRIBUTING TO PERINATAL MORTALITY	25
2.4.1	Perinatal factors	26

2.5	CURRENT INTERVENTIONS TO IMPROVE PERINATAL MORTALITY	27
2.5.1	Interventions to improve perinatal mortality	27
2.5.1.1	Interventions during the antenatal period to reduce perinatal mortality ..	27
2.5.1.2	Intervention during labour and birth in the prevention of intra-partum-related perinatal mortalities.	28
2.5.1.3	Interventions to reduce premature-related mortalities.....	28
2.6	CURRENT RECOMMENDATIONS TO IMPROVE PERINATAL HEALTH CARE SERVICES IN SOUTH AFRICA	29
2.6.1	Current recommendations to improve perinatal health care services (Saugstad 2011:256).	29
2.7	CONCLUSION	30
CHAPTER 3.....		31
RESEARCH DESIGN AND METHODS.....		31
3.1	INTRODUCTION	31
3.2	RESEARCH DESIGN	31
3.2.1	Quantitative approach.....	31
3.2.2	Non- experimental approach	32
3.2.3	Descriptive approach	32
3.2.4	Cross-sectional design.....	33
3.2.5	Retrospective document analysis	33
3.3	RESEARCH METHOD	34
3.3.1	Research setting	34
3.3.2	Population	34
3.3.3	Sampling technique and sample size	35
3.3.3.1	Sampling technique	35
3.3.3.2	Sample size	35
3.3.4	Inclusion and exclusion criteria	35
3.3.5	Development and pre-testing of an instrument.....	36
3.3.5.1	Pre-testing of an instrument	37
3.4	DATA COLLECTION	38
3.5	DATA MANAGEMENT AND ANALYSIS.....	39
3.6	VALIDITY AND RELIABILITY.....	40
3.6.1	Validity.....	40
3.6.1.1	External validity.....	40

3.6.1.2	Internal validity.....	40
3.6.1.3	Content validity.....	41
3.6.1.4	Face validity.....	41
3.6.2	RELIABILITY.....	41
3.7	ETHICAL CONSIDERATIONS.....	42
3.7.1	Researcher- specific ethical considerations.....	42
3.7.2	Records- specific ethical considerations.....	42
3.7.2.1	Informed consent.....	42
3.7.2.2	Confidentiality and anonymity.....	43
3.7.2.3	Beneficence.....	43
3.7.2.4	Justice.....	43
3.7.2.5	Privacy.....	44
3.8	CONCLUSION.....	44
CHAPTER 4.....	45	
DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF RESULTS	45	
4.1	INTRODUCTION.....	45
4.2	DATA MANAGEMENT AND ANALYSIS.....	45
4.3	RESEARCH RESULTS.....	46
4.3.1	SECTION A.....	47
4.3.1.1	Outcome of the baby’s delivery.....	47
4.3.1.2	Baby’s birth weight.....	48
4.3.1.3	Baby’s Apgar score in the 1st and 5th minute.....	49
4.3.2	SECTION B.....	50
4.3.2.1	Age on admission.....	50
4.3.2.2	Reasons for admission.....	51
4.3.2.3	Problems on admission.....	52
4.3.2.4	Appropriate management taken by health care workers.....	53
4.3.2.5	Further assessments conducted by health workers.....	54
4.3.2.6	Maternal risk factors.....	55
4.3.2.7	Perinatal risks.....	56
4.3.2.8	Perinatal risk factors.....	57
4.3.2.9	Estimated gestational age.....	58
4.3.3	SECTION C.....	58

4.3.3.1	Classification of neonates according to weight for gestational age	59
4.3.3.2	The plan of care available	60
4.3.3.3	Resuscitation done	61
4.3.3.4	Gestational age in weeks	62
4.3.3.5	Days after giving birth.....	63
4.3.3.6	Intervention taken by health care workers	64
4.3.3.7	Referral to the neuro-surgeon	64
4.3.3.8	Recommendations done by patient safety incident (psi) committee.....	65
4.3.3.9	Delay in seeking help by patient or family	66
4.3.3.10	Declined treatment by the family or patient.....	67
4.3.3.11	Other factors contributing to increasing perinatal mortality by patient or family	68
4.3.3.11.1	Logistics: delay of emergency medical service (ems).....	69
4.3.3.11.2	Logistics: accessibility or availability of transport	70
4.3.3.11.3	Logistics: Other factors contributing to increasing perinatal mortality (n=162).....	71
4.3.3.11.4	Facilities: Lack of services after hours.....	72
4.3.3.11.5	Facilities: Lack of equipment	73
4.3.3.11.6	Facilities: Other factors contributing to increasing perinatal mortality	73
4.3.3.11.7	Health personnel problems: Poor labour monitoring	74
4.3.3.11.8	Health personnel problems: Lack of education about transport.....	75
4.3.3.11.9	Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality	76
4.3.3.11.10	Health personnel problems: Other factors contributing to increasing perinatal mortality	77
4.3.3.11.11	Health or, and illness of the neonate: Prematurity.....	79
4.3.3.11.12	Health or /and illness of the neonate: Pneumonia.....	79
4.3.3.11.13	Health or /and illness of the neonate: Birth asphyxia	80
4.3.3.11.14	Health or/and illness of the neonate: Other factors contributing to increasing perinatal mortality.....	81
4.4	IDENTIFIED CAUSES AND OTHER FACTORS RELATED TO PERINATAL MORTALITY BASED ON THE RESULTS OF THE STUDY	81
4.5	NUMBER OF DAYS IN NEONATAL UNIT ON DISCHARGE OR DEATH.....	83
4.6	CONCLUSION.....	83

CHAPTER 5.....	84
DISCUSSION, CONCLUSION AND RECOMMENDATIONS	84
5.1 INTRODUCTION	84
5.2 SUMMARY OF THE RESEARCH RESULTS	84
5.2.1 Outcome of the baby’s delivery	84
5.2.2 Baby’s birth weight.....	85
5.2.3 Baby’s Apgar score in the first and fifth minute	85
5.2.4 Age on admission	86
5.2.5 Reasons for admission	86
5.2.6 Problems on admission.....	87
5.2.7 Appropriate management taken	87
5.2.8 Further assessment conducted	88
5.2.9 Maternal risk factors.....	88
5.2.10 Perinatal risks	89
5.2.11 Perinatal risk factors	89
5.2.12 Estimated gestational age	89
5.2.13 Classification of neonate according to weight for gestational age	90
5.2.14 Plan of care available.....	91
5.2.15 Resuscitation done	91
5.2.16 Gestational age in weeks.....	91
5.2.17 Days after giving birth	92
5.2.18 Interventions taken by health care workers	92
5.2.19 Other referral to neuro-surgeon	93
5.2.20 Recommendations done by patient safety incidents committee	93
5.2.21 Factors identified from the patient’s family or patient: Delay in seeking help	94
5.2.22 Declined treatment by the family or patient	94
5.2.23 Other factors contributing to increasing perinatal mortality according to patient or family	95
5.2.24 Logistics: Delay of emergency medical service.....	96
5.2.25 Logistics: Accessibility or availability of transport.....	96
5.2.26 Logistics: Other factors that contribute to increased perinatal mortality.....	96
5.2.27 Facilities: Lack of services after hours.....	97
5.2.28 Facilities: Lack of equipment	97

5.2.29	Facilities: Other factors contributing to increased mortality rate.....	97
5.2.30	Health personnel problems: Poor labour monitoring	97
5.2.31	Health personnel problems: Lack of education about transport.....	97
5.2.32	Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality	98
5.2.33	Health personnel problems: Other factors contributing to increased perinatal mortality rate	98
5.2.34	Health or, and illness of the neonate: Prematurity	99
5.2.35	Health or, and illness of the neonate: Pneumonia.....	99
5.2.36	Health or, and illness of the neonate: Birth asphyxia.	100
5.2.37	Health or, and illness of the neonate: Other factors contributing to increased perinatal mortality	100
5.3	RECOMMENDATIONS	100
5.3.1	Education	100
5.3.2	Clinical practice	101
5.3.3	Management	101
5.3.4	Future research.....	101
5.4	LIMITATIONS OF THE STUDY	102
5.5	CONCLUDING REMARKS.....	102
	LIST OF SOURCES	103
	ANNEXURES	113

LIST OF FIGURES

Figure 4.1: Baby's birth weight (N=162)	48
Figure 4.2: Reason for admission (N=162)	51
Figure 4.3: Appropriate management taken (N=162).....	53
Figure 4.4: Maternal risk factors (N=162).....	55
Figure 4.5: Perinatal risks factors (N=162).....	57
Figure 4.6: Classification of neonate according to weight for gestational age (N=162)	57
Figure 4.7: Resuscitation done (N=162).....	61
Figure 4.8: Days after giving birth (N=162)	63
Figure 4.9: Referral to neuro-surgeon (N=162).....	64
Figure 4.10: Delay in seeking help by patient or family (N=162).....	66
Figure 4.11: Other factors contributing to increasing perinatal mortality according to patient or family (N=162).....	68
Figure 4.12: Logistics: Accessibility or availability of transport (N=162)	70
Figure 4.13: Facilities: Lack of services after hours (N=162).....	72
Figure 4.14: Facilities: Other factors Contributing to increasing perinatal mortality according to facilities (N=162).....	73
Figure 4.15: Health personnel problems (lack of education about transport) (N=162) .	75
Figure 4.16: Health personnel problems: Other factors Contributing to increasing perinatal mortality (N=162).....	77
Figure 4.17: Health and/or illness of the neonate pneumonia (N=162)	79
Figure 4.18: Health and/or illness of the neonate: other factors contributed to increased perinatal mortality (N=162).....	81

LIST OF TABLES

Table 1.1:	Structure of the dissertation	16
Table 2.1:	Distribution of perinatal mortality by age and year of mortality, 2011-2013	20
Table 2.2:	Distribution of early perinatal mortalities	21
Table 2.3:	Distribution of mortalities by month and year for 2011-2013	22
Table 2.4:	Number and percentage of early perinatal mortality by province and year of mortality for 2011-2013	23
Table 4.1:	Outcome of the baby's delivery (N=162).....	47
Table 4.2:	Baby's Apgar score in the 1 st and 5 th minute (N=162)	49
Table 4.3:	Age on admission (N=162).....	50
Table 4.4:	Problems on admission (N=162).....	52
Table 4.5:	Further assessment conducted by health care workers (N=162)	54
Table 4.6:	Perinatal risks (N=162).....	56
Table 4.7:	Estimated gestational age (N=162).....	58
Table 4.8:	The plan of care available (N=162).....	60
Table 4.9:	Gestational age in weeks (N=162).....	62
Table 4.10:	Intervention taken by health care workers (N=162)	64
Table 4.11:	Recommendations by PSI Committee (N=162).....	65
Table 4.12:	Recommendations by PSI Committee (N=162).....	67
Table 4.13:	Logistics: Delay of emergency medical services (N=162)	69
Table 4.14:	Logistics: Other factors contributing to increasing perinatal mortality.....	69
Table 4.15:	Facilities: Lack of equipment (N=162).....	71
Table 4.16:	Health personnel problems: Poor labour monitoring (N=162).	73

Table 4.17: Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality (N=162).....	74
Table 4.18: Health and, or illness of the neonate: Prematurity (N=162).....	76
Table 4.19: Health and/or illness of the neonate: Birth asphyxia (N=162).....	76

LIST OF ANNEXURES

ANNEXURE 1: Ethical Clearance from Health Studies Higher Degrees Committee, UNISA.	113
ANNEXURE 2: Letter seeking permission from the Department of Health: Limpopo Province (HOD).....	114
ANNEXURE 3: Approval letter from Limpopo province department of health Research Ethics Committee (HOD).	115
ANNEXURE 4: Letter seeking permission from the Department of Health, Sekhukhune District where the health care facility is located (DEM).	116
ANNEXURE 5: Approval Letter from the Department of Health, Sekhukhune District where the health care facility is located (DEM).	117
ANNEXURE 6: Letter seeking permission from the Department of Health, the management of the health care facility (CEO).	118
ANNEXURE 7: Approval letter from the Department of Health, the management of the health care facility (CEO).....	119
ANNEXURE 8: Letter seeking permission from the Department of Health, the neonatal unit manager of the health care facility (Unit manager).....	120
ANNEXURE 9: Approval letter from the Department of Health, the neonatal unit manager of the health care facility (Unit manager).	121
ANNEXURE 10: Checklist for data collection	122
ANNEXURE 11: Statistician Report.....	132
ANNEXURE 12: Language editor's Report	133

LIST OF ACRONYMS AND ABBREVIATIONS

ACCESS	Accountability Connection Capacity Essential steps for sick babies
AIDS	Acquired immunodeficiency syndrome
ANC	Antenatal Care
APH	Ante partum Haemorrhage
BANC	Basic Antenatal Care
CEO	Chief Executive Officer
CHW	Community Health Worker
CPD	Cephalo Pelvic Disproportion
C/S	Caesarean Section
DEM	District Executive Manager
DHP	District Health Plan
EMS	Emergency Medical Services
HB	Haemoglobin
HIV	Human immunodeficiency virus
HOD	Head of Department
MDG	Millennium Development Goal
MMR	Maternal Mortality Rate
MSL	Meconium Stained Liquor
NCU	Neonatal care unit
NDOH	National Department of Health
PIH	Pregnancy Induced Hypertension

PMTCT	Prevention of Mother to child Transmission
PROM	Premature Rupture of Membranes
PSI	Patient Safety Incident
RDS	Respiratory Distress syndrome
SDG	Sustainable Development Goal
SFH	Symphysis fundal Height
SOP	Standard Operating Procedures
SIDS	Sudden Infant Death Syndrome
SPSS	Statistical Package for the Social Science
UN	United Nations
WHO	World Health Organization

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

National Department of Health (2014b:21) has identified a need to publish statistics reports on perinatal mortalities. This information is based on administrative records captured on death notification forms collected from the South African civil registration system maintained by the Department of Home Affairs. The report discussed the causes of mortalities of which 22.6 % were related to maternal factors and to complications during the antenatal period, labour and delivery. Maternal complications account for 13.6 % of perinatal mortalities.

The report concludes the findings by highlighting the increase in stillbirths from 63 % to 66% between 2011 and 2013. It further recommends that the number of perinatal mortalities can be reduced by effective and efficient care during pregnancy (National Department 2014b:26). Furthermore, the increase in perinatal mortality rates has affected the clinics and community health centres that refer high risk patients to the hospitals. These institutions should be empowered to prevent pregnancy problems and to prevent delays in accessing health care services when problems occur (National Department of Health 2014b:22).

The focus on perinatal mortality is an important developmental measure which was identified by the eighth (8th) Millennium Development Goals (MDGs) and seventeen (17) sustainable development goals (SDGs). Goal number 4 of the 8th millennium development goals (MDGs) states that reducing child mortality remains an important measure to improve child health. Although it was hoped that there would be progress in reducing mortality rates in children maternal mortality rates (MMR's) have not decreased irrespective of the 8th millennium development goals numbers 4 and 5 which state that the target for the year 2015 is that the perinatal mortality ratio must be reduced by three-quarters (Knight, Self & Kennedy 2013:1, Department of Health 2013a:24).

Paradoxically, it has not been due to a lack of effective, evidence-based interventions that this problem persists. The sustainable development goal, number three was considered after the failures of the 8th millennium development goals in 2015. It focuses on healthy life styles and promotes well-being for all. Specific goals are addressed based on the 17 sustainable development goals in line with the topic of this study. The relevant goal developed by the United Nations (2015:12) strives to achieve the reduction of the global mortality of new-borns and children under five years of age, aiming to reduce perinatal mortality to at least as low as 12 per 1,000 live births and under five mortality to at least as low as 25 per 1,000 live births by the year 2030 in all countries.

The challenges of an increased perinatal mortality rate were identified by the researcher. Based on the identified problem and on the abovementioned discussion, the researcher was prompted to conduct a study to determine the causes of an increased perinatal mortality rate and to identify the factors contributing to its increase in a specific rural health care facility in the Limpopo province.

1.2 BACKGROUND OF THE STUDY

The Minister of Health is committed to striving for a long and healthy life for all South Africans where the national service delivery agreement reflects the commitment of the health care sectors to the reduction of perinatal mortality. The strategies to reduce perinatal mortality were proposed. These include among others an intention to increase the availability of contraception to mothers (National Department of Health 2012:13).

Despite this investment in public health there is a high and increasing level of perinatal mortality in South Africa. Poor transport facilities, lack of proper health care facilities and lack of appropriately trained staff has contributed to increased perinatal mortality rates. These factors are responsible for an inability to follow standard procedures, such as failure to classify pregnancies as low or high risk cases and failure to use Partogram during labour. These are reported to be some of the deficiencies in procedures which perpetuate and contribute to the perinatal mortality rate. Poor initial assessments and diagnoses were also reported to be some of the factors that hinder progress in reducing perinatal mortality in South Africa (National Department of Health 2014b:27).

There are several contributory factors related to the increased perinatal mortality rate which include late booking of antenatal care (Department of Health 2013b: 2). According to South Africa's 'Saving babies' report, non-attendance and late attendance of antenatal care are among the avoidable causes of perinatal mortality. HIV/AIDS is also a leading cause of perinatal and maternal mortality (Solarin & Black 2013:359).

During the antenatal care bookings midwives play a vital role in promoting early bookings and adherence to antenatal care supervision. There is a tendency among the pregnant women who attend the specific health care facility under study in Limpopo province of starting antenatal care late while others do not attend at all. This study attempted to determine the causes of the increased perinatal mortality rate and identified other factors that contribute to an increased perinatal mortality rate at this specific health care facility.

1.3 STATEMENT OF THE RESEARCH PROBLEM

The Child Health Programme is one of the priority programmes in the Limpopo province. However, the province was challenged by an increased number of perinatal mortalities. The following factors were amongst the identified problems, namely, a shortage of health professionals and under-resourced emergency medical services (National Department 2014b:12). The continuing high perinatal mortality rate in low resource countries, including South Africa, led the researcher to identify other factors and to determine the causes of perinatal mortality.

The researched district has 33 per 1000 perinatal mortality cases which is still below the international commitment of 20 cases per 1000 (Department of Health 2015a:79; Mothiba, Maputle & Tladi 2013:145). The researcher has been exposed to working in that Sekhukhune district and has observed and realised that this district in Limpopo province in which this study was conducted is faced with high numbers of perinatal mortality cases. In 2012, the province of Limpopo experienced an average of 39 perinatal mortality rates per 1000 and 239 per 100 000 from January to June 2010 (Mothiba, Maputle & Tladi 2013:145).

1.4 RESEARCH PURPOSE

The purpose of this study was to determine the causes of the increased perinatal mortality rate and to identify and describe other factors that contribute to its increase in a rural health care facility in Limpopo province. Furthermore, the recommendations that were formulated will be communicated to the Department of Health, Limpopo province in order to assist in the reduction of the perinatal mortality rate in the province.

1.4.1 Research objectives

The research objectives were the following:

- To determine the causes of the increase in the perinatal mortality rate.
- To identify and describe other factors that contribute to an increase in the perinatal mortality rate in a specific rural health care facility.
- To formulate and present the recommendations to the Limpopo provincial government based on the results in order to assist in the reduction of the perinatal mortality rate in Limpopo province.

1.4.2 Research questions

The research questions were the following:

- What are the causes of the increased perinatal mortality rates in a specific rural health care facility?
- What are the factors that contribute to an increased perinatal mortality rate?
- What recommendations should be made to reduce the perinatal mortality rate?

1.4.3 Significance of the study

The study will provide health care workers with informative knowledge, awareness and a clear understanding of the factors that contribute to an increase in the perinatal mortality rate and its effects.

Furthermore, the results of the study will assist the researcher to formulate and present recommendations to the Limpopo provincial government based on the results in order to assist in the reduction of the perinatal mortality rate in the province of Limpopo.

1.5 DEFINITIONS OF KEY CONCEPTS

1.5.1 **Conceptual definitions** present the abstract or theoretical meaning of the concepts studied (Polit & Beck 2012:52). The following terms were defined conceptually.

1.5.1.1 **Cause:** Cause refers to a relationship between variables with the presence or absence of one variable determining the value of the other (Polit & Beck 2012:721).

1.5.1.2 **Factor:** Factor refers to a circumstance, fact, or influence that contributes to an event, such as the death of a baby or a mother (*Oxford English dictionary* 2010:24).

1.5.1.3 **Maternal mortality:** Maternal mortality refers to the death of a woman while pregnant or within 42 .days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to, or aggravated by pregnancy or its management, but not from accidental or incidental causes (World Health Organization 2014:14).

1.5.1.4 **Perinatal mortality:** Perinatal mortality refers a total number of stillbirths and early neonatal deaths per 1000 live births (Fraser & Cooper 2012:479).

1.5.1.5 **Record:** Record refers to the data source that the researcher can use to access the information (Polit & Beck 2012:190).

1.5.1.6 **Records section:** Records section refers to a distinct part of an area where the records are filed and arranged according to a filing system (*Oxford new advanced dictionary* 2015:1229).

1.5.1.7 **Stillbirth:** Stillbirth refers to the death of a foetus after a pregnancy lasting for six calendar months (Fraser & Cooper 2012:479).

- 1.5.2 **Operational definitions:** Operational definitions refer to the definition of concept or variable in terms of procedures by which it is to be measured (Polit & Beck 2012:736)
- 1.5.2.1 **Cause:** Cause refers to an element that causes the death of the baby or the mother.
- 1.5.2.2 **Factor:** Factor refers to elements contributing to the death of the mother coming to deliver irrespective of the gestational age from any cause related to pregnancy and the number of stillbirths and neonatal death.
- 1.5.2.3 **Maternal mortality:** Maternal mortality refers to death of a woman while coming to deliver irrespective of the gestational age from any cause related to pregnancy.
- 1.5.2.4 **Perinatal mortality:** Perinatal mortality refers to the number of still babies died (either still or macerated and neonatal death from birth 28 weeks of gestational till delivery at term or post-term (after 41 weeks).
- 1.5.2.5 **Records:** Records refer to the documents or piece of evidence constituting the past information, like maternity case record that contains the information of mother who attended antenatal care and delivery till death.
- 1.5.2.6 **Records section:** Records section refers to separated site where the records are filed according to hospital guideline or standard operating procedure (SOP).
- 1.5.2.7 **Stillbirth:** Stillbirth refers to the death of an infant that has died in the womb after having survived through at least the first 28 weeks of pregnancy.

1.6 RESEARCH SETTING

The research setting refers to the specific place or places where the data are collected (Brink, Van der Walt & Van Rensburg 2012:59). The research setting in this study was a specific rural health care facility in the province of Limpopo.

1.7 RESEARCH DESIGN AND METHODS

1.7.1 RESEARCH DESIGN

Research design refers to the overall plan for obtaining answers to the research questions (Polit & Beck 2012:58). A quantitative, non-experimental, descriptive, cross-sectional and retrospective document analysis was used in the form of a checklist. This research design was utilised to achieve the objectives of this study.

1.7.1.1 Quantitative approach

The quantitative approach uses a structured procedure and developed instrument to gather data. Empirical reasoning is the process of developing specific observations from the general principles (Brink, Van der Walt & Van Rensburg 2012:6). Deduction was part of this study since the researcher examined particulars in respect of perinatal mortality queries and relevant answers in order to draw generalisations about the phenomenon under study.

1.7.1.2 Non-experimental approach

The non-experimental approach was used in discussing the occurrence of the events under study. This entailed measuring designated variable variables at a specific time without manipulating the variables. This approach is also applicable in cases in which other variables that could be technically manipulated are considered to be ethically non-manipulative (Polit & Beck 2012:223). In this study, the researcher determined the causes of increases in perinatal mortality and identified and described other factors that could contribute to its increase in a rural health care facility in Limpopo province.

1.7.1.3 Descriptive approach

The descriptive approach is utilised when little is known about the concept. This approach is utilised to increase more information about concept under study. No manipulation of variables which involve dependent and independent concepts take place during this approach (Botma, Greef, Mulaudzi & Wright 2010:110). With this approach, all records in the neonatal unit related to perinatal mortality were used in order to identify and describe other factors that led to an increase in the perinatal mortality rate.

1.7.1.4 Cross-sectional approach

The cross-sectional approach is approved when records of data are collected at one area in time and one group is observed in their various stages of development, trends and patterns. The intention of this approach is to describe the changes in the phenomenon across different stages (Polit & Beck 2012:184).

In this study, the researcher collected data at one point in time and determined the causes and identified the contributory factors which lead to an increased perinatal mortality rates.

1.7.1.5 Retrospective document analysis

Retrospective document analysis includes those studies in which data in respect of an outcome occurring in the present is collected and is linked retrospectively to determinants that occurred in the past. A situation existing in the present is linked to an event that occurred in the past (Brink, Van der Walt & Van Rensburg 2012:102). The identified data contained in the records in this specific rural health care facility in Limpopo province were used. All records used covered the period of 12 months from the 1st January to the 31st December 2015. A checklist was used to extract data from all the records related to perinatal mortality.

1.7.2 RESEARCH METHOD

A research method is the technique used to structure a study and to gather and analyse relevant information (Polit & Beck 2012:741). A quantitative research method was used in the current study to collect data in the form of a checklist.

1.7.2.1 Population

Population refers to all individuals or objects with common and defining characteristics (Polit & Beck 2012:13). The population comprised one hundred and sixty two (162) records of babies who died in the perinatal unit from the 1st January 2015 to the 31st December 2015.

1.7.2.2 Sampling technique and sample

1.7.2.2.1 Sampling technique

A sampling technique is a process of selecting a group of people, events or elements that are representative of the population being studied (Grove, Gray & Burns 2015:37). There was no sampling technique used, a census because the sample size was manageable.

All records related to perinatal mortalities were used for data collection and analysis for this study.

1.7.2.2.2 *Sample*

A sample refers to a subset of population comprising those selected to participate in a study (Polit & Beck 2012:275). In this study one hundred and sixty two records identified from the records sections. All these records were reported as perinatal mortalities happened from the 1st January 2015 to the 31st December 2015.

1.7.2.3 **Inclusion and exclusion criteria**

Inclusion criteria refer to those characteristics that the subject or an element must possess to be the part of the target population (Grove, Gray & Burns 2015:250). An inclusion criterion of this study was all the records related to the perinatal mortality rate in the record section of the health care facility from the 1st January 2015 to the 31st December 2015 with the exclusion of the records used during pre-testing.

1.7.2.4 **Development and pre-testing of an instrument**

Pre-testing of an instrument refers to the data prior to the experimental intervention, sometimes called the baseline data (Polit & Beck 2012:738). A data instrument was developed and based on the related literatures which were relevant to the purpose of this study. Furthermore, information was reviewed to ensure that the relevant items were included in this instrument. A checklist was developed as an instrument to collect data for this study. World Health Organization guidelines on neonatal care in South Africa were also used in assistance to compile this checklist (Department of Health 2013b:44, WHO 2010:7).

Experts on neonatal care were consulted for the evaluation of the checklist instrument's internal and content validity. These experts were paediatricians, experienced nurses, a statistician and the researcher's supervisor. The instrument developed for data collection from the perinatal records had three sections (refer to Annexure 10).

The questions in section A include items on the outcomes of the delivery, gender of the infant, birth weight and Apgar score in the first and fifth minute after baby's birth. The questions in Section B include the following: age on admission, reason for admission, problems during admission, appropriate immediate management, and any further assessment was done to identify perinatal risks, maternal risk factors, perinatal risk, perinatal risk factors and estimated gestational age.

Section C consists of a classification of the neonate according to the weight for gestational age, plan of care resuscitation done, and gestational (weeks) at delivery, days since delivery, interventions, death avoidable according to the Patient Safety Incident (PSI) committee and contributory factors according to an assessment done (refer to Annexure10). Elaboration on the development of checklist is addressed in the discussion of research design and methods in chapter 3.

The checklist was pre-tested at the same health care facility in Limpopo province. Pre-testing of the checklist for the preparation of data collection was done from the 3rd September 2017 to the 7th September 2017.

One of the reasons for this pre-test was to test whether the content of the checklist was relevant and sufficient. Furthermore, the pre-test was done to check the reliability and validity of the checklist. Five (5) records from the perinatal unit at the health facility were used to pre-test the checklist. The researcher approached the perinatal unit operational manager. The operational manager supplied the researcher with the statistics records of the number of cases of perinatal mortality from the 1st January 2015 to the 31st December 2015. This was found in the admission register provided which was also used to write the numbers of perinatal mortality cases at the health care facility. The register indicated the hospital numbers of the deceased babies. Afterwards, the researcher went to the record section where all the records relating to perinatal mortalities were kept. These records were requested from the clerk of the record section.

The clerk of the record section extracted five (5) records according to the hospital numbers provided from the perinatal unit. The records used for pre-testing were not used during the main study in order to avoid the duplication of the results. The results were analysed and used to correct the checklists before data were collected for the main study.

The final corrected checklist was submitted to the supervisor and statistician for final approval.

1.7.2.5 Data collection

Data collection is the process of selecting study subjects and gathering information from them. The real procedure in data collection is detailed to its study and depends on chosen research design and measuring methods utilised (Polit & Beck 2012:59). Data was collected after approval and the permission to conduct the study was granted by the relevant authorities. Since it was impossible to trace the deceased, the letter of permission from the office of the CEO of the hospital to conduct the study was used as consent to conduct the study (refer to Annexure 7).

Data was collected from the record section of the specific health care facility. The records that were targeted to be used to collect information were kept under the supervision of a record clerk to ensure that no records were taken out of the facility. The researcher extracted one hundred and sixty two (162) records with the assistance of the record clerk in the record section where records were kept safe. All these records of babies who died in the perinatal unit from the 1st January 2015 to the 31st December 2015 were identified, registered and given to the researcher. The pre-tested checklist was used for data collection (refer to Annexure 10).

Data was collected from the 16th October 2017 to the 27th October 2017. Data collection was done during the day from 08:00 to 16:00 on a daily basis from Monday to Friday for about two weeks. Privacy, confidentiality and anonymity were maintained by allocating the numbers to the respondents' records and by de-identifying them. The names of health care professionals were not used on the data collected. After the data had been collected, the records extracted were returned to the clerk using the compiled list as evidence that they were returned after data collection. The checklists were kept under lock and key for safety in a locker which was purchased by the researcher and was put in the facility manager's office. The keys of the locker were accessed by the researcher only. The collected data was captured in the computer by the researcher. The researcher printed the hard copies of the collected data and put them safe where they could only be accessed by the researcher.

1.7.2.6 Data management and analysis

Data management is a systematic organisation and synthesis of research data and, in quantitative studies, the testing of hypotheses using those data (Polit & Beck 2012:725). Descriptive statistics were used to provide answers to the research questions. This approach allowed the researcher to organise the data in a way that gave meaning and facilitated insight and to examine the phenomenon from a variety of angles. A professional statistician assisted in analysing and summarising the data (refer to Annexure 11) by using STATA Statistical Package for the Social Science (SPSS) version 14. Frequency distribution tables, figures and graphs were used to present and describe the results of the study (LoBiondo-Wood & Haber 2010:310).

1.8 VALIDITY AND RELIABILITY

1.8.1 VALIDITY

Validity is defined as the degree to which the instrument measures what it is supposed to measure (Grove, Gray & Burns 2015: 514). External, internal, content and face validity were addressed. These types of validity will be discussed in the chapter on research design and methodology.

1.8.2 RELIABILITY

Reliability refers to the degree of consistency or dependability with which an instrument measures an attribute (Brink, Van der Walt 2012 & Van Rensburg: 126; Wood & Ross-Kerr 2011:184).

Reliability in this study was assessed by pre-testing the instrument. The checklist was pre-tested at the same health care facility in Limpopo but the records used for pre-testing were not used during the main study. Five records (5) from the neonatal unit of this health facility were used before collecting the data of the main study to ensure that it was consistent and dependable.

1.9 ETHICAL CONSIDERATIONS

1.9.1 Researcher specific ethical considerations

Ethics refers to a system of moral values that is concerned with the degree to which research procedures adhere to the professional, legal and social obligations of the study participants (Polit & Beck 2012:727). Approval to conduct the study was granted by the Research and Ethics Committee at the University of South Africa, Department of Health Studies (refer to Annexure 1). Furthermore, the letters seeking permission to conduct the study were written and letters of permission were granted to conduct the study.

Letters seeking consent to conduct the study were written and submitted to the Department of Health, Limpopo, the Research Ethics Committee in the Limpopo Department of Health (refer to Annexure 2), Sekhukhune District Health (refer to Annexure 4), the management of the hospital (refer to Annexure 6) and the neonatal unit manager (refer to Annexure 8).

Permission letters to conduct the study were granted by the Limpopo Department of Health Research and Ethics Committee, Head of Department (HOD) (refer to Annexure 3), Sekhukhune District Health District Executive Manager (DEM) (refer to Annexure 5) the management of the hospital, the Chief Executive Officer (CEO) (refer to Annexure 7) and the unit manager of the perinatal unit (refer to Annexure 9).

1.9.2 Records specific ethical considerations

1.9.2.1 Informed consent

Informed consent means that the participants have adequate information about the research, comprehend the information and have the ability to consent to, or decline participation voluntarily (Polit & Beck 2012:177). In this study, since it was impossible to trace the deceased, the hospital's ethical committee gave permission and approval to conduct the study and this was used as consent to conduct the study (refer to Annexure 7).

1.9.2.2 Confidentiality and anonymity

Confidentiality is a pledge that any information which participants have provided will not be publicly reported in a manner that identifies the participants and will not be accessible to others (Polit & Beck 2012:163). The researcher used these records in data collection but the names of health care professionals were not used in the analysis of the data. Confidentiality was maintained by keeping records anonymous by ensuring that the patient's identity could not be linked to the individual's response. This was achieved by removing all the identifiers from the data and removing the link between any identifiable data so that the link could not be established between the data and identified perinatal records. The researcher used the checklist to collect the information and kept the checklists under lock and key in a locker after collecting the information from the records section.

1.9.2.3 Beneficence

Beneficence encompasses three principles, one ought to prevent evil, one ought to remove evil and one ought to do, or promote good. There should be no one, including the experts who could be placed at a compromised, or exposed to a situation for which they were not equipped to handle. (Brink, Van der Walt & Van Rensburg 2012:25). Retrospective document analysis was applied where people were not directly observed but the data were collected from the records of the babies. Thus, no harm was done to the respondents.

1.9.2.4 Justice

The principle of justice refers to participants having the right to fair selection and treatment and this is also the unifying principle in health and nursing. It includes principles of fairness and the right to privacy (Brink, Van der Walt & Van Rensburg 2012:36 &37).

After the information pertaining to the deceased was collected, the researcher allocated a specific number for identification. The information was kept anonymous and no links were made to the deceased or care providers. No record was taken out of the record section.

1.9.2.5 Privacy

The principle of privacy refers to the ethical consideration of the researcher towards the individual to determine the interval, range and overall condition under which data will be shared with, or in remission from others (Botma, Greef, Mulaudzi & Wright 2010:113). In this study privacy was maintained by ensuring that the data collection was done by the researcher, numbers allocated to the records were known only by the researcher. The allocated to the records were de-identified that no records can be associated with the death of the baby.

1.10 SCOPE AND LIMITATIONS OF THE STUDY

The limitation of this study was that the results cannot be generalised to other district hospitals. The other limitation was that the records were incomplete.

1.11 STRUCTURE OF THE DISSERTATION

The research was structured in five chapters as follows:

Table 1.1: Structure of the dissertation

Chapters	Chapter name	Description of the chapters
1	Introduction	The orientation to the study comprised the introduction, background to the research problem, the research statement, the aim of the study, its objectives and a definition of key terms.
2	Literature Review	Literature related to the study was reviewed.
3	Research design and methods	The chapter on research design and methodology, focused on research methodology, design, population, sampling, data collection methods, data analysis protocol, reliability and validity of the research design and the data collection instrument. Ethical considerations were detailed.
4	Data analysis, presentation and interpretation.	The results of the study were analysed, presented and interpreted according to the set objectives.
5	Discussion, conclusion and recommendations	This chapter summarised the discussion of the results, and presented the conclusions and recommendations of the researcher in relation to the problem statement and objectives of the study.

1.12 CONCLUSION

This chapter discussed the introduction to, and background of the study. The objectives and the purpose of the study were discussed. Key terms were defined operationally and conceptually. Research design methodology and ethical considerations were discussed. The next chapter will be literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter outlines the literature reviewed in regard to the factors contributing to the perinatal mortality rate in Limpopo. A literature review involves a search for information on the current topic and a systemic organisation of the information. It indicates what is currently known and lacking (Brink, Van der Walt & Van Rensburg 2012:71). The literature review was conducted to generate a picture of what was known and not known about the problem of perinatal mortality (Burns & Grove 2011:37).

The following items were discussed:

- Theoretical background in regard to perinatal mortality rates;
- Perspective of perinatal mortality rate in South Africa, Africa and countries abroad;
- Possible contributory factors to the current perinatal mortality rate;
- Current interventions to decrease the perinatal mortality rate; and
- Current recommendations to improve perinatal health care services in South Africa.

2.2 THEORETICAL BACKGROUND OF PERINATAL MORTALITY RATES

As the 8th millennium development goals expired in 2015, a new set of goals, the sustainable development goals (SDGs), are being discussed and are expected to shape the development agenda in the post-2015 era. The draft SDG framework includes 17 goals and 169 targets which were developed by the United Nation's Open Working Group on Sustainable Development Goals. Goal 3 is a broad health goal which is to ensure healthy lives and promote well-being for all at all ages". It includes two targets that influence maternal mortality and reproductive health (Department of Health 2015c:21).

Sustainable development goal no 3.7 is aimed at ensuring universal access to sexual and reproductive health-care services, including family planning, information and education and the integration of reproductive health into national strategies and programmes by the year 2030 (UN 2015:1).

Perinatal mortalities are an indicator of the quality of pre-natal, obstetric and neonatal care. They provide the information needed to improve care for pregnant women, newborn babies and new mothers (Onwudiegwu & Awowole 2012:6). Specifically, recent evidence indicates that globally, deaths during the perinatal phase are responsible for almost 40% of all infant deaths (Ezechi & David 2012:4). According to the World Health Organization's (2012:357) survey on global health, there were over 6.3 million perinatal mortality globally of which 2.64 million were stillbirths and 3.0 million were cases of early neonatal mortality respectively.

2.3 PERSPECTIVES ON PERINATAL MORTALITY RATE

2.3.1 SOUTH AFRICA

The perinatal problem identification programme has been used as a facility-based audit system for monitoring the quality of care and perinatal mortality. Data are collected from different institutions where deliveries take place. According to the findings of the collected data, the perinatal mortality rates in Limpopo province have not changed over the last 10 years. Most stillbirths and perinatal deaths occur in the specific rural health care facility which forms part of this study. The overall perinatal mortality for all infants with birth weight of less than 500 grams was twelve per 1000 live births and nine per 1000 live births for those weighing more than 1000 grams. The perinatal mortality was high in women younger than 18 years of age, that is, 65 per 1000 births, followed by women over the age of 34 years of age, that is, 50 per 1000 births (Department of Health 2014:81).

The following obstetric causes were found to be associated with perinatal mortalities. About 22% were unexplained uterine deaths, 12% spontaneous pre-term labour, 16% intra-partum hypoxia and trauma, 15% maternal infections, and 11% were ante-partum haemorrhage. The district and provincial hospitals reporting on these mortalities indicated that less than a quarter 20% of the mortalities was absolutely avoidable (Rhoda, Greenfield, Muller, Prinsloo, Kauchali & Kerber 2014:162).

Limpopo province is one of the poorest and fourth largest provinces in South Africa with an estimated population of 5.5 million people. The birth-rate is at 21% of the total population and the perinatal mortality rate is at 41% (Department of Health 2015a:81). Thus, the researcher was prompted to identify the factors and make recommendations that could reduce this perinatal mortality.

The perinatal mortality rates are a combination of the number of fetuses that are born dead (stillbirths) and the number of those babies who die in the first week after birth (Oti & Odimegwu 2011:1). In South Africa, the Birth and Death Registration Act (Act No 51 of 1992:) states that a stillborn infant refers to a child who has had at least 26 weeks of intra-uterine existence but shows no sign of life after a complete birth. Furthermore, in terms of the regulation on the registration of births and mortalities, the mortality occurs due to natural causes, informants (Midwife, advanced midwife or doctor) shall give, within 72 hours, notice of the mortality'. If there is any doubt as to whether the mortality was due to natural causes, such mortality must be reported to a police officer (National Department 2014b:21).

2.3.1.1 Registered perinatal mortalities in South Africa

This section indicates recent trends in perinatal mortality for the distribution of mortalities which occurred from 2011 to 2013. It is presented by age in days and hours, month of occurrence, population group and province where mortality occurred.

2.3.1.1.1 *Age differentials in perinatal mortalities*

Table 2.1: Distribution of perinatal mortality by age and year of mortality, 2011-2013.

Age in days	Year of mortality					
	Number			Percentage		
	2011	2012	2013	2011	2012	2013
0	17 572	183 84	17 401	78.8	79.4	78.7
1	1 591	1 529	1514	7.2	6.6	6.8
2	1 102	1 133	1 063	4.9	4.9	4.8
3	669	651	672	3.0	2.8	3.1
4	429	491	490	1.9	2.1	2.2
5	354	372	384	1.6	1.6	1.7
6	311	309	333	1.4	1.3	1.5
7	262	298	259	1.2	1.3	1.2
Total	22 290	23 167	22 116	100	100	100

Source: (Department of Health 2015d: 10).

The distribution of early perinatal mortality is shown in table 2.1. The reduction in number of deaths was seen from day 0 to day 7. The highest number at day 0 (17572) and the lowest at day 7 (262).

2.3.1.1.2 *Age differential in early perinatal mortalities*

The distribution of early perinatal mortalities is shown in table 2.2 for 2011-2013

Table 2.2. Distribution of early perinatal mortalities

Age in hours	Year of mortality					
	Number			Percentage		
	2011	2012	2013	2011	2012	2013
Under 1 hour	1 783	1 139	196	22.1	13.4	2.6
1-23 hours	1 577	2 589	2 601	19.5	30.4	34.6
24-167 hours	4 718	4 783	4 715	58.4	56.2	62.8
Total	8 078	8 504	7 512	100	100	100

Source: (Department of Health 2015d: 15).

Each of three years in the distribution of early perinatal mortality is shown in table 2.2. More than 50% of the early perinatal mortalities occurred between 24 hours to 167 hours after birth. This is followed by babies who were aged between one and twenty-three hours. The least number of early perinatal mortalities occurred in babies aged less than one hour.

2.3.1.1.3 *Distribution of mortalities by month and year of mortalities*

Table 2.3: Distribution of mortalities by month and year for 2011-2013.

Month of death	Year of mortality					
	Number			Percentage		
	2011	2012	2013	2011	2012	2013
January	1 884	2 044	1 992	8.5	8.8	9.0
February	1 704	2 026	1 813	7.6	8.7	8.2
March	2 000	2 076	1 986	9.0	9.0	9.0
April	1 844	1 903	1 877	8.5	8.2	8.5
May	2 019	2 065	1 875	9.1	8.9	8.5
June	1 859	1 855	1 814	8.3	8.0	8.2
July	1 826	1 934	1 800	8.2	8.3	8.1
August	1 772	1 939	1 826	7.9	8.4	8.3
September	1 772	1 779	1 696	7.7	7.7	7.7
October	1 808	1 828	1 847	8.1	7.9	8.4
November	1 874	1 804	1 798	8.4	7.8	8.1
December	1 938	1 914	1 779	8.7	8.3	8.0
Total	22 290	23 167	22 116	100	100	100

Source: (Department of Health 2015d: 11).

Table 2.3 shows that there is no noticeable pattern in the distribution of mortalities by month of death for all three years, except for March and September when the proportions remained constant in the three years despite changes in absolute numbers.

Mortalities were more or less fairly distributed over 12 months of the year, that is, between 7% and 9% each month. However, the month of March had on average the highest proportion, that is, 9% of perinatal mortalities and September had on average the lowest proportion of perinatal mortalities, that is, 7% over the three year period.

2.3.1.1.4 Differentials in perinatal mortalities by province

Table 2.4 indicates the number and percentage of early perinatal mortality by province and year of mortality for 2011-2013.

Province of death	Year of mortality					
	Number			Percentage		
	2011	2012	2013	2011	2012	2013
Western Cape	2 161	2 267	2 186	9.7	9.8	9.9
Eastern Cape	1 196	1 240	1 185	5.4	5.4	5.4
Northern Cape	622	689	680	2.8	3.0	3.1
Free State	2 128	1 883	1 719	9.5	8.1	7.8
KwaZulu-Natal	5 231	5 377	5 377	23.5	23.2	24.3
North West	1 862	2 038	1 952	8.4	8.8	8.8
Gauteng	5 233	5 581	5 181	23.5	24.1	23.4
Mpumalanga	1 629	1 794	1 544	7.3	7.7	7.0
Limpopo	1 841	2 091	2 116	8.3	9.0	9.6
Unspecified	384	204	176	1.6	0.9	0.7
Total	22 287	23 164	22 116	100	100	100

Source: (Department of Health 2015d: 13).

It is important to note that the percentage distribution of mortality by province of death occurrence shown in table 2.4 is largely similar to the distribution of the South African population by province. The distribution of perinatal mortalities by province shows wide disparities. Kwa-Zulu Natal and Gauteng had the highest proportion of perinatal mortalities, but these proportions may be related to high population numbers.

2.3.2 AFRICA

A study by Mmbaga, Lie, Kibiki Olomi, Kvale and Datveit (2011:2) was conducted in Tanzania on the factors that contribute to the transference of babies to neonatal care units. The purpose of the study was to estimate the influence of pregnancy-related maternal medical conditions on the health of unborn babies during the antenatal and intra-partum periods in order to reduce mortality by focusing on morbidity. However, it is also of importance to consider factors associated with perinatal morbidity which lead to perinatal mortality. In the aforementioned study, perinatal morbidity led to the transfer of babies to neonatal care units (NCU). This could serve as an indicator of morbidity which could be used for designing and implementing interventions aimed at improving health and increasing perinatal survival. The results indicated the strong associations between neonatal transfer and perinatal risk factors to mortality. Generally, transfer is more likely in the case of babies who show signs of poor health status, or in the case of a complicated pregnancy (Mmbaga, Lie, Kibiki, Olomi, Kvale & Datveit 2011: 2).

A study by Rajab and Ghareba (2013:195) was conducted on the perinatal mortality rate in a special care unit at the Gharian Teaching Hospital in Libya. The aim of the study was to identify the main causes of perinatal syndrome and prematurity. The mortality was found to be 71% for premature new-borns. The consequence of a lack of care during delivery was also identified as a contributory factor. The problems affecting the babies were found to be preventable, such as birth asphyxia. This study revealed that there was poor training on resuscitation skills and the majority of the babies who died were ventilated.

In a study done in Cameroon by Nkwabong, Fomulu, Hamida, Onama, Tjek, Kouam and Ngassa (2011:2) NB, early perinatal mortalities were significant in older women primi gravidas due to low Apgar scores. The poor Apgar scores were related to poor dilation of the cervix despite good uterine contractions and to rigid perineum.

2.3.3 INTERNATIONAL

In a study conducted by Moura, Maesta, Rugolo, Angluski, Caldeira, Peracoli and Ruge (2014:4) in Brazil on the factors leading to perinatal mortality at two different levels of care, it was found that perinatal mortality occurred during the early perinatal period. Prematurity was found to be associated with higher mortality.

A study was conducted in Bangladesh by Khatun, Rasheed, Moran, Alam, Shomik, Sultana, Choudhury, Iqbal and Bhuiya (2012:3) in the Dhaka slums on the causes of maternal and perinatal mortalities and its consequences for quality health care service delivery. The study found birth asphyxia to be the main contributory factor related to the mortalities, lack of resuscitation after birth and lack of referrals to hospital post-delivery as the contributory factors to perinatal mortalities. Most of these perinatal mortalities occurred within seven days after birth.

In a study conducted in Rajshahi Medical College hospital to evaluate the existing set-up of perinatal mortality in the perinatal unit, prematurity was the common cause of admissions (Bari, Ullah & Khatun 2008:35). The majority of these pre-term babies were severely depressed at birth with low Apgar scores at one minute. The commonest cause of perinatal mortality was birth asphyxia. The study found that the mortality rate was inversely associated with birth weight during the early natal period.

2.4 CURRENT FACTORS CONTRIBUTING TO PERINATAL MORTALITY

There are general factors contributing to increased perinatal mortality. These current factors played a role before this current study was conducted. This study focused specifically on determining the causes and identifying and describing other factors that contributed to an increase in the perinatal mortality rates in a specific rural health care facility.

Its purpose was to present recommendations based on the results in order to reduce perinatal mortality in a specific rural health care facility in Limpopo province in general and specifically in the Sekhukhune district where the problem was identified.

2.4.1 Perinatal factors

Infection rate in the perinatal period contributes to neonatal mortality. The infections may be from maternal vaginosis or untreated acquired sexual transmitted infection from a colonised birth canal. A study was conducted in Malawi on the effect of prophylactic antibiotics on women with premature rupture of the membrane. It is not clear whether the antibiotics had any effect in preventing the infants from being infected (Saugstad 2011:253). The study conducted in India on Bacteriological profile of neonatal septicaemia and antibiotic susceptibility pattern of the isolates found that neonatal sepsis was noted as one of the factors leading to perinatal mortality in infants born prematurely (Eichenwald 2013:1088).

The following diseases, namely, pneumonia, diarrhoea and malaria accounted for 43% of all deaths in children under the age of five years worldwide in 2008. Pneumonia and diarrhoea together account for one-third of all under-five deaths. According to this report, most of these lives could have been saved through low-cost prevention and treatment measures, including antibiotics for acute respiratory infections, oral rehydration for diarrhoea, immunisation and the use of insecticide-treated mosquito nets and appropriate drugs for malaria. There is a need to refocus attention on pneumonia and diarrhoea as they are two of the three main killers of children (WHO 2010:3).

Baby asphyxia is found amongst the top five causes of under-five mortality in Africa. This birth asphyxia is a preventable condition if a woman is managed properly during second and third stage of labour (Velaphi & Rhoda 2012:66). In a study conducted in China on the effect of the second stage of labour on maternal and neonatal outcomes, it was found that a prolonged second stage of labour can decrease the Apgar score at one minute and can increase the incidence of asphyxia at birth (Li, Zhang, Ling & Jin 2011:410).

2.5 CURRENT INTERVENTIONS TO IMPROVE PERINATAL MORTALITY

Various interventions were implemented before the current study was conducted. Despite the interventions the problem of the perinatal mortality rate still persists as previously discussed in the section on the South African perspective. Therefore, the researcher intends to make recommendations that would contribute to reducing perinatal mortality in a specific rural health care facility situated in Limpopo province.

2.5.1 Interventions to improve perinatal mortality

2.5.1.1 Interventions during the antenatal period to reduce perinatal mortality

Maternal health plays a major role during pregnancy and has an effect on the health of the baby. According to the guidelines for maternity care (Department of Health 2015b:34), the woman needs to start attending the antenatal care clinic at the time that she misses her first menstrual period (Beauclair, Petro & Meyer 2014:2).

The following actions must be done during the first antenatal care visits: physical examination, history taking related to the present and current pregnancy, social, medical, obstetrical history and family history are recorded. Full examination of the pregnant woman is performed and her weight, height, heart and respiratory rate are monitored, including pulse and blood pressure. In addition, the pregnancy is measured by calculating the gestational period by dates and by abdominal palpations and by measuring Symphysis-fundal height (SFH). The Mid-upper arm circumference is measured to determine the nutritional status of the pregnant woman (Department of Health 2015b:34).

The pregnant woman will be screened for anaemia by checking her haemoglobin level. Iron and folic acid are given to the pregnant mother as prophylaxis. This supplementation with iron improves the new-born's birth weight in those women who start pregnancy with an iron deficiency, and makes no significant difference to those women who are not deficient (Aranda, Ribot, Garcia, Viteri & Arijia 2011:791).

Tetanus toxoid was endorsed by World Health Organization (WHO) in 2014 on principles and considerations for adding a vaccine to a national immunization programme during antenatal care to prevent neonatal tetanus that can be fatal to the babies (WHO 2014:19).

A survey was conducted in India on the incidence of neonatal tetanus in pregnant women who were immunised against tetanus. The results indicated a reduction in the perinatal mortality rate to above 80% in the total deliveries (Khan, Zahidie & Rabbani 2013:4).

2.5.1.2 Intervention during labour and birth in the prevention of intra-partum-related perinatal mortalities.

The interventions to reduce perinatal mortality in South Africa included improvements in basic obstetric care (Velaphi & Rhoda.2012:70). These include:

- Providing elementary and inclusive emergency obstetric care.
- Identifying and categorising high risk clients at antenatal health care facilities.
- Administer the antibiotics during pre-term labour, oxytocic and steroids during pre-term labour, and continuous monitoring of women in labour;
- Referral of pregnant women not meeting basic antenatal care specifically mothers with medical conditions, such as pregnancy-induced hypertension (PIH) to the relevant health care facilities for further assessment and management.
- Immediate care of the baby after delivery and on-going perinatal health care.

2.5.1.3 Interventions to reduce premature-related mortalities

Universally, studies were completed and prematurity was identified as a challenge and contributes to 40% to 80% of perinatal mortality cases. The study conducted in Malawi indicated that the mothers who experience pre-term labour and premature rupture of membranes reacts positively to an administration of antibiotics. This administration of antibiotics demonstrated protective effect to reduce the infection that may lead to perinatal mortality. Mothers are also advised to stop smoking during pregnancy to reduce the incidence of intra-uterine growth restriction (Saugstad 2011:255).

2.6 CURRENT RECOMMENDATIONS TO IMPROVE PERINATAL HEALTH CARE SERVICES IN SOUTH AFRICA

Maternal health plays a major role during pregnancy and has an effect on the health outcomes of the baby. According to the *Guidelines for maternity care* (Department of Health 2015b:34), the woman needs to start attending the antenatal care clinic at the time she misses her first menstrual period. This will help in early screening and identifying the risk factors (Beauclair, Petro & Meyer 2014:2).

In spite of the existing recommendations which are generally intended to improve perinatal and maternal health services, there are no improvements in South Africa in general and in Limpopo province in particular where the present study was conducted. This situation has prompted the researcher to determine the causes and identify and described other factors that have contributed to the increased perinatal mortality rates in order to present recommendations to the Limpopo Department of Health for implementation.

2.6.1 Current recommendations to improve perinatal health care services (Saugstad 2011:256).

- Record audits and keeping are suggested to recommend the measures to reduce perinatal mortality rate.
- Develop universal standard system at various level of health care in provision of quality perinatal services.
- Communicate, locally, regional and internationally to exchange good ideas on universal perinatal health care.
- Guiding scientific studies continuously on perinatal health care is to be emphasized
- Provide affordable and quality health care services and access to pre-natal and post-natal services
- Clinics, community health centres and hospitals deliveries should be encouraged hence pregnant women are managed by qualified and experienced midwives.

- Invest in provision of equipment (incubators and monitors) and staff in maternity and neonatal units as required.
- Draw evidence based treatment and health care facilities protocols, procedures and guidelines.
- Free essential drugs (tracer drug list) should be provided.

2.7 CONCLUSION

The literature review was outlined, and the theoretical background on the maternal and perinatal mortality rates were discussed. Perspectives on maternal and perinatal mortality rates in South Africa, Africa and countries worldwide were discussed. Perinatal mortality rates were discussed. Current factors contributing to perinatal mortality rates were discussed. Current interventions to improve perinatal and maternal mortality rates were outlined. The following chapter deals with the research design and methodology.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

The previous chapter addressed the literature review. In this chapter, the research design and methodology are discussed based on the purpose and objectives of the study. Furthermore, the following aspects were discussed: the population, sampling, development and pre-testing of an instrument, data collection and analysis, validity, reliability and ethical considerations.

3.2 RESEARCH DESIGN

Research design refers to the overall plan for obtaining answers to the research questions (Polit & Beck 2012: 58). Research design involves a set of decisions regarding the topic to be investigated in respect of a certain population using particular research methods, and for a particular purpose. It focuses on the end- product and all the steps in the process that can achieve the outcome anticipated (De Vos, Strydom, Fouché, & Delport 2011:156). A quantitative, non-experimental, descriptive, cross-sectional and retrospective research design was used to achieve the objectives of this study. The retrospective document analysis used was in the form of a checklist.

3.2.1 Quantitative approach

The quantitative approach requires that the concepts relevant to the study should be given operational meaning so that the concepts can be measured. A checklist was used to collect data and a programme for data analysis was chosen. Furthermore, quantitative approach uses a structured procedure and a formal instrument to collect data. A quantitative approach also refers to official, unbiased methodical procedures where statistical information is utilised to achieve evidence about the world (Burns & Grove 2011:17).

Cognitive thinking was integrated when the researcher describes the facts of perinatal mortality queries and answers to draw general views about the phenomenon under investigation. The results in this study are presented in numerical and statistical form.

The researcher used a checklist to collect data which was predetermined and planned in advance and, therefore, it could not be changed once the data was collected and the objectivity of the data collection process was maintained.

3.2.2 Non- experimental approach

The non-experimental design is used in describing the phenomenon under study. Selected variables were measured at a specific time and there was no manipulation of variables. Generally, the non- experimental approach is also applicable where another variable could be technically manipulated and was ethically non-manipulative (Polit & Beck 2012:223).

In this study, the researcher determined the causes of an increase in perinatal mortality and, furthermore, identified and described other factors that contributed to its increase in a specific rural health care facility.

3.2.3 Descriptive approach

A descriptive design approach is used when little is known about the phenomenon. This approach is used to gain more information about the phenomenon under study. Variables cannot be manipulated but observed as they occur (Botma, Greef, Mulaudzi & Wright 2010:110).

Burns and Grove (2011:24) state that through descriptive studies researchers describe what exists, determine the frequency with which something occurs, discover new meanings and categorise information. The purpose of descriptive design is to identify the current practice, justify existing practices and determine what these practices done in a similar situation.

In this study, the researcher chose a descriptive approach in order to identify and describe other factors that contribute to an increase in the perinatal mortality rate and to determine the causes of an increased perinatal mortality rate in a specific rural facility.

3.2.4 Cross-sectional design

In a cross-sectional approach, data collection is taking place at one place in time and one cluster is observed in their different levels of progress, trends and patterns. The purpose of this approach is to explain the alterations in the phenomenon across all levels (Polit & Beck 2012:184). The advantage of this design is that it is very economical but inferring changes overtime with this design may be problematic (Polit & Beck 2012:186).

In this study, the researcher collected data at one location where the perinatal records were extracted in order to identify and describe other factors that contributed to an increase in the perinatal mortality rate and to determine the causes of an increased perinatal mortality rate in a specific rural health care facility.

3.2.5 Retrospective document analysis

Retrospective document analysis includes studies in which data is collected about an outcome occurring in the present and it is linked retrospectively to determinants that occurred in the past. A phenomenon existing in the present is linked to concepts that have occurred in the past (Brink, Van der Walt & Van Rensburg 2012:102).

According to Polit and Beck (2012:157), the de-identified data refers to the information that is eliminated from health records. De-identified data contained in the records in this specific rural health care facility in Limpopo province were used. All records were used to cover the period of 12 months from the 1st January to the 31st December 2015. A checklist was used to extract data from all the records related to the perinatal mortality rate. In this case, the researcher studied events that had occurred that had an effect on the perinatal mortality rate. These events cannot be manipulated or controlled to affect the phenomenon under study.

3.3 RESEARCH METHOD

Research method is the technique used to structure a study and to gather and analyse relevant information (Polit & Beck 2012:741). A quantitative research method was used to collect data in the form of a checklist.

3.3.1 Research setting

The research setting refers to the specific place or places where the data are collected (Brink, Van der Walt & Van Rensburg 2012:59). The research setting was a specific rural health care facility in Limpopo province.

3.3.2 Population

Population refers to all individuals or objects with common and defining characteristics (Polit & Beck 2012: 13). The population is further deliberated as the total collection of the incidences of interest to an investigator; these are the multitudes of individuals. However, the population in this current study was restricted to the records of the in the health care facility located in Limpopo province

The population can be targeted or accessible. The target population refers to the group about which information is gathered and a conclusion drawn (Polit & Beck 2012:274). The target population is clearly defined irrespective of person, time and place. This contains the eligibility criteria of the study population which has common characteristics of interest to a researcher (Joubert & Ehrlich 2010:94).

An accessible population is found within the target population from which the researcher gains access to information. It is regarded as the population available for a particular study and it is a sub-set of the target population that meets the target group criteria. A researcher usually draws samples from the accessible population (Polit & Beck 2012:719).

The population in this study consisted of all the records of 162 babies who died in the perinatal unit from 1 January 2015 to 31 December 2015.

3.3.3 Sampling technique and sample size

3.3.3.1 Sampling technique

Sampling involves a process of selecting a group of people, events or elements that are representative of the population being studied (Grove, Gray & Burns 2015:37). In the current study, no specific sampling method was used but all the records were used because the number of infants in the sampling frame was manageable, thus a census was used. The facility reported one hundred and sixty two (162) incidents of perinatal mortalities in the district (Department of Health 2015a:82). These one hundred and sixty (162) records were used to collect data related to perinatal mortality from the 1st January 2015 to the 31st December 2015 and to analyse it.

3.3.3.2 Sample size

Sample size refers to the number of subjects, events, types of behaviour, or situation examined in a study (Grove, Gray & Burns 2015:266). In this study, the sample size was one hundred and sixty two (162) cases reported by the health care facility in 2015. The admission register in the perinatal unit was utilised to determine the sample. All records which met the inclusion criteria of perinatal mortality reported from the 1st January 2015 to the 31st December 2015 were used as sample size. The records were retrieved from the record section as it appeared in the perinatal mortality register.

3.3.4 Inclusion and exclusion criteria

An inclusion criterion refers to those characteristics that the subject or an element must possess to form part of the target population (Grove, Gray & Burns 2015:250).

Inclusion criteria describe the essential characteristics that the participants should have in order to be eligible to participate (Polit & Beck 2012:274). All the records of babies and mothers who died in the perinatal unit during the relevant period mentioned above were identified with the exclusion of the records of the babies used during pre-testing of the study.

3.3.5 Development and pre-testing of an instrument

The term 'instrument' refers to a formal written document used to collect and record information, such as a questionnaire or checklist (Polit & Beck 2012:191). The checklist was the instrument which was used for data collection (refer to Annexure 10). It was developed on the basis of a literature search about relevant topics. Thus, the literature was also reviewed to ensure that the relevant items were included in this instrument.

The WHO guidelines on neonatal health care and the maternity guidelines in South Africa were consulted (WHO 2010:7; Department of Health 2015b:44). Experts on neonatal care, including paediatricians, experienced nurses, a statistician and the researcher's supervisor, were involved on the structuring and the content of an instrument. Thus, internal and content validity were evaluated. The checklist as an instrument for collecting information on the perinatal mortality rate was pre-tested (refer to Annexure 10).

The objective of the perinatal care checklist was to determine the causes of the increase in the perinatal mortality rate and to identify and describe other factors that contributed to its increase and to formulate recommendations for the Limpopo Department of Health based on the results in order to assist in the reduction of the perinatal rate in the Limpopo province.

The perinatal checklist consists of three sections (refer to Annexure 10). The questions in section A include the outcomes of the delivery which indicates that the baby was either a stillbirth, or a neonatal death. Further items requiring clarification related to stillbirth, its birth weight (four digits) and the Apgar score in the first and fifth minute by indication of a numerator and a denominator.

Section B includes the following multiple-choice questions, namely, age on admission, reason for admission, problem during admission, appropriate immediate management, further assessment was done to identify perinatal risks, maternal risk factors, perinatal risk, perinatal risk factors and estimated gestational age.

The last section C consists of different multiple-choice questions which include, classification of the neonate according to the weight for gestational age, plan of care resuscitation done, and gestational (weeks) at delivery, days since delivery, interventions, death avoidable according to the Patient Safety Incident (PSI) committee and contributory factors according to the assessment done (refer to Annexure 10).

3.3.5.1 Pre-testing of an instrument

Pre-test refers to the collection of data prior to the experimental intervention which is sometimes called, baseline data (Polit & Beck 2012:738). The checklist was pre-tested. Pre-testing of the checklist for the preparation of data collection was done from the 3rd September 2017 to 7th September 2017. The purpose of this pre-testing was to determine the quality, validity, relevancy and the appropriateness of the checklist (LoBiondo-Wood & Haber 2010:280).

The developed checklist was pre-tested on five (5) perinatal records which were not included in the main study. The pre-test was conducted at the same health care facility in the Limpopo province in which the main data was collected. The researcher requested the statistics from 1st January 2015 to 31st December 2015 in respect of perinatal mortality from the perinatal unit operational manager. These statistical records were found in the admission book which indicated the name, age and hospital number of the deceased.

The operational manager of the perinatal unit gave the researcher the admission book to choose the hospital numbers. The purpose of choosing the hospital numbers was to retrieve the perinatal records as it was the only way of retrieving them from the record section filing system of the hospital. The researcher went to the record section to retrieve the records by using the hospital numbers supplied from the perinatal unit admission book which was found at the perinatal unit. In order to retrieve the records, the hospital numbers were given to the record section clerk by the researcher.

The clerk retrieved five (5) requested records and gave them to the researcher. The researcher completed the information in the checklist (refer to Annexure 10). Every record had its own checklist for collecting data and the checklists were kept under lock and key for safety in a locker which was purchased by the researcher.

It was put in the facility manager's office after data had been collected from the record section. The keys of the locker were accessed by the researcher only.

3.4 DATA COLLECTION

Data collection is the process of selecting the study subjects and gathering information from the subjects. The actual steps followed in collecting data is specific to each study and depends on the selected research design and measuring methods utilised (Polit & Beck 2012:59).

The letters seeking permission to conduct the study were written and submitted to the following authorities:

Research Ethics in Limpopo, Department of Health (refer to Annexure 2), Sekhukhune District Health where the facility is located (refer to Annexure 4), the management of the hospital (refer to Annexure 6) the perinatal unit manager (refer to Annexure 8).

Data was collected after approval was provided and the permission to conduct the study was granted by the Department of Health Studies Research and Ethics Committee at the University of South Africa (refer to Annexure 1), Limpopo Department of Health Research and Ethics Committee (Head of Department) (refer to Annexure 3), Sekhukhune District Health (District Executive manager) (refer to Annexure 5), the management of the hospital (Chief Executive Officer) (refer to Annexure 7) and the unit manager of the perinatal unit (refer to Annexure 9).

Since it was impossible to trace the deceased, letters of approval of the hospital from the office of the CEO was used as the permission to conduct the study (refer to Annexure 7). The researcher requested the statistics on perinatal mortality rate from the operational manager of neonatal mortality rate. These statistical records were found in admission book which indicated the name, gender and hospital of the deceased baby.

Data was collected from the record section of that specific health care facility. The records which were used to collect information in the record section were under the supervision of a record clerk who ensured that no records were taken out of the facility.

One hundred and sixty two (162) records were extracted by the researcher with the assistance of the record clerk in the record section where records are kept safe.

All the records of babies who died in the perinatal unit from 1st January 2015 to 31st December 2015 were identified. One hundred and sixty two (162) identified records matched the number of the extracted records. The researcher collected data by using the developed pre-tested checklists (refer to Annexure 10). Each record had its own checklist for the collection of the data. The data was collected from 16 October 2017 to 27 October 2017. Data collection was done during the day from 08:00 to 16:00 on a daily basis from Monday to Friday for about two weeks.

Privacy, confidentiality and anonymity were maintained by allocating the numbers to the babies' records and by de-identifying the records. The names of the health care professionals involved in each case were withheld from the data collected. No names of health care workers were required by the checklist. The results were not associated with the health care provider providing the health care service. The checklists were kept safe in the facility manager's office for safety and data analysis purposes. The keys of the locker were accessed by the researcher only.

3.5 DATA MANAGEMENT AND ANALYSIS

Data management and analysis involves the systematic organisation and synthesis of research data and, in quantitative studies, the testing of hypotheses using those data (Polit & Beck 2012:725). Descriptive statistics were used to provide answers to research questions. This approach allowed the researcher to organise the data in ways that gave meaning and facilitated insight and examined the phenomenon from a variety of angles. A professional statistician assisted in analysing and summarising the data (refer to Annexure 11) by using STATA version (SPSS) version 14. Frequency distribution figures, tables and graphs were utilised to describe and present the results of the study (LoBiondo-Wood & Haber 2010:310).

3.6 VALIDITY AND RELIABILITY

3.6.1 Validity

Validity is defined as the degree to which the instrument measures what it is supposed to measure (Grove, Gray & Burns 2015: 514; Polit & Beck 2012:336).

The validity of an instrument is a determination of the extent to which the instrument actually reflects the constructs being examined (Polit & Beck 2012:336) In this study, experts on neonatal care, including paediatricians, experienced nurses, a statistician and the researcher's supervisor, were consulted on the structure and the content of the checklist to enhance its validity. The same checklist was being pre-tested in the same rural health care facility where the study was conducted to determine the extent to which it measured what it was intended to measure.

3.6.1.1 External validity

External validity refers to the degree to which the results can be generalised to settings or samples other than the one studied (Polit & Beck 2012:727). The external validity of the study was achieved by selecting all the records of the deceased for investigation. In addition, there was no sampling error as all of the records were used. The results cannot be generalised to other facilities since only one facility in the province was used.

3.6.1.2 Internal validity

Internal validity refers to the validity of inferences given that an empirical relationship exists and it is an independent variable rather than something else that caused the outcome (LoBiondo-Wood & Haber 2010:156).

In this study the World Health Organization (2014) guidelines on neonatal care in South Africa were used to compile on an instrument. Experts on perinatal health care were involved on the structure and the content of the checklist. The following experts were involved in the compilation of the checklist: obstetricians, paediatricians, experienced nurses, statisticians and the researcher's supervisor.

3.6.1.3 Content validity

Content validity is an assessment of how well the instrument represents all the components of the variables to be measured (Brink, Van der Walt & Van Rensburg 2012:166).

The checklist was validated by consulting the study supervisor, specialists and experts in the field, namely, paediatricians, experienced, practicing neonatal nurses and the neonatal unit supervisor before it was used for data collection. A professional statistician was used to check for content validity which would help to analyse and summarise data (refer to Annexure 11). The literature was reviewed to ensure that the significant items were included in the instrument. Corrections were made to the checklist after it was pre-tested and experts had indicated their inputs.

3.6.1.4 Face validity

Face validity refers to whether the instrument looks like it is measuring the target construct, although face validity is not considered as strong evidence of validity (Polit & Beck 2012: 336). Face validity was ensured in the study where experts, specialists and staff with research experience in the neonatal unit were given the checklist to assess whether it measured what it was supposed to measure and to give their views on it.

3 6.2 RELIABILITY

Reliability refers to the degree of consistency or dependability with which an instrument measures an attribute (Brink, Van der Walt 2012 & Van Rensburg: 126; Wood & Ross-Kerr 2011:184). Reliability in this study was assessed by pre-testing the checklist used in the study. It was pre-tested at the same health care facility in Limpopo province. The records used for pre-testing were not used during the main study. Five records from the perinatal unit of this health care facility were pre-tested before the data was collected for the main study to ensure that it was consistent and dependable.

3.7 ETHICAL CONSIDERATIONS

3.7.1 Researcher- specific ethical considerations

Ethics is defined as system of moral values that is concerned with the degree to which research procedures adhere to the professional, legal and social obligations of the study participants (Polit & Beck 2012:727).

The researcher adhered to specific ethical considerations which involved the following:

Approval to conduct research was given by the Research and Ethics Committee at the University of South Africa (UNISA) Department of Health Studies (refer to Annexure 1). Letters seeking consent to conduct the study at the Limpopo province Department of Health were addressed to the Research Ethics Committee, Limpopo Department of Health (refer to Annexure 2), Sekhukhune District where the facility is located (refer to Annexure 4), the management of the hospital (refer to Annexure 6), and the unit manager of the Perinatal Unit (refer to Annexure 8). Permission was granted by the Limpopo Department of Health, Research and Ethics Committee, Head of Department (HOD) (refer to Annexure 3), the district health District Executive Manager (DEM) (refer to Annexure 5), the management of the hospital, the Chief Executive Officer (CEO) (refer to Annexure 7), and the unit manager of the Perinatal Unit (refer to Annexure 9) of the hospital under study.

3.7.2 Records- specific ethical considerations

3.7.2.1 Informed consent

Informed consent means that the participants have adequate information about the research, comprehend the information and have the ability to consent to, or decline their participation voluntarily (Polit & Beck 2012:177).

In this study, since it is impossible to trace the deceased, de-identified records were used and secondary data was collected. Therefore, the permission of the hospital's ethical committee and their approval to conduct the study was used as consent to conduct the study.

3.7.2.2 Confidentiality and anonymity

Confidentiality is a pledge that any information that respondents provide will not be publicly reported in a manner that identifies them and will not be accessible to others (Polit & Beck 2012: 163). These records were kept safe in the operational manager's office. The keys of the locker were accessed by the researcher alone. The records used were de-identified so that no information collected could be associated with the respondents and the names of professional health care workers were not used when the data was analysed.

3.7.2.3 Beneficence

Beneficence encompasses three principles, namely, one ought to prevent evil, one ought to remove evil and one ought to do or promote good. No-one, including the experts should be put at a disadvantage or exposed to a situation for which they were not prepared (Brink, Van der Walt & Van Rensburg 2012:25). The method used was retrospective document analysis. Thus, people did not participate in the study but instead data was gleaned from records. Therefore, respondents were not exposed to harm.

3.7.2.4 Justice

The principle of justice means that participants have the right to fair selection and treatment and this is the unifying principle in health and nursing. It includes the principles of fairness and the right to privacy (Brink, Van der Walt & Van Rensburg 2012:36).

Only information on perinatal mortality was collected and it was kept securely in a place known only to the researcher. After the information on the deceased was collected, the researcher allocated a specific number for identification. The information was kept anonymous and no links were made to the deceased or care providers. No records were taken out of the record section.

3.7.2.5 Privacy

It is the right of an individual to determine the time, extent and general circumstances under which information will be shared with, or withheld from others (Bothma, Greeff, Mulaudzi & Wright 2010: 113). Therefore, privacy was maintained by allocating specific numbers to the perinatal records and by de-identifying them.

3.8 CONCLUSION

Chapter 3 discussed the detailed research design and the methods of the study. Ethical considerations were addressed. The data collection checklist was validated and reliability was addressed. Chapter 4 will discuss data analysis and presentation of the results.

CHAPTER 4

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF RESULTS

4.1 INTRODUCTION

Chapter 3 describes and discusses the research design and method in detail. This chapter discusses the analysis and management of the data. It was conducted by means of a statistical package called SPSS version 14 with the assistance of a statistician (refer to Annexure11). The results were analysed to ensure that the data collected were presented clearly in the form of tables, percentages and graphs. Afterwards the presented data were interpreted.

The main aim of the data analysis and management was to address the three research objectives, which were to:

- determine the causes of the increased perinatal mortality rate;
- identify and describe other factors that contribute to an increase in the perinatal mortality rate in a specific rural health care facility; and
- Formulate and present recommendations to the authorities in the Department of Health, Limpopo province based on the results in order to assist in the reduction of the perinatal mortality rate in Limpopo province.

4.2 DATA MANAGEMENT AND ANALYSIS

Data analysis is the systemic organisation and synthesis of the research results (Polit & Beck 2012:725). Data were managed and analysed quantitatively and descriptively. The data was collected from the health care facility records by completing the checklist (refer to Annexure 10). The very same data was analysed. Descriptive statistics described and summarised data collected by converting and condensing it into organised and visual representations.

This approach allowed the researcher to organise the data in the way that gave meaning, facilitated insight and to examine the phenomenon from a variety of angles. The presentation of descriptive statistics and information were grouped according to the variables appearing on the checklist and were described in words. In addition, it was managed descriptively by presenting and interpreting the research results in the form of tables, graphs and figures. A professional statistician (refer to Annexure 11) assisted with analysing and summarising the data using the STATA Statistical Package for the Social Sciences (SPSS) version 14. Information was grouped according to the variables on the checklist and described in words. The analysis was done according to the following sections of the data collection checklist (refer to Annexure 10).

Section A

Section A addressed the outcomes of the delivery which indicated whether the baby was a stillbirth or a neonatal death. An Apgar score in the 1st and 5th minute was indicated by a numerator and denominator.

Section B

Section B addressed age on admission, reasons for admission, problems during admission, appropriate immediate management of problems, further assessment done to identify perinatal risks, maternal risk factors, perinatal risk factors and an estimated gestational age.

Section C

Section C addressed the classification of the neonate according to its weight for gestational age, plan of care, resuscitation done, gestational (weeks) at delivery, days since delivery, interventions, death avoidable according to the Patient Safety Incident committee (PSI) and the contributory factors according to the assessment done.

4.3 RESEARCH RESULTS

The research results presents the results obtained from data collected during the study. The results section provides information about statistical tests which were used to test hypotheses and evaluate the believability of the results (Polit & Beck 2012:64). In this study the discussion to follow presents and interprets the results.

4.3.1 SECTION A

4.3.1.1 Outcome of the baby's delivery

Table 4.1 Outcome of the baby's delivery (N=162)

The outcomes of delivery	Frequency (n)	Percentage (%)
Stillbirth	100	61.7
Neonatal death	60	37.0
Missing record	2	1.2
Total	162	100.00

The results of the study as indicated in table 4.1 shows that the majority of the babies were stillborn 61.7% (n=100), 37.0% (n=60) were neonatal deaths and 1.2% (n=2) were reported as missing records and there was no information about the death of the baby. More than 50 % (n=100) of the babies died in the first week of their lives with the highest perinatal mortality in the first day of life. These babies were born with no signs of life, and 37% (n=60) were born with signs of life but died at a later stage. This study's results concur with the study conducted on the risk factors for perinatal death at two various levels of care. In that study, 46.9% (n=130) of the perinatal mortality cases occurred in the first seven days with the highest risk of mortality on the day one of life (Moura, Maesta, Rugolo, Angulski, Caddeira, Peracoli & Rudge2014:3).

4.3.1.2 Baby's birth weight

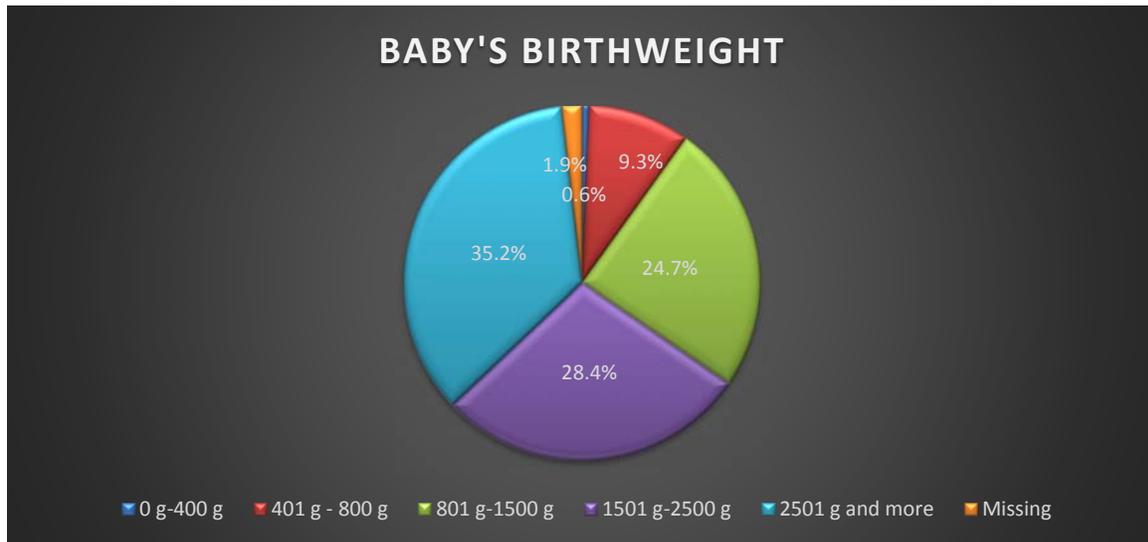


Figure 4.1 Baby's birth weight (N=162)

The results in figure 4.1 indicate the weight of the babies who died. The majority 35.2% (n=57) of the babies who died weighed 2501 grams and more, followed by 28.4% (n=46) of the babies weighing between 1501 and 2500 grams, 24.7% (n=40) weighing between 801g and 1500 grams, 9.3% (n=15) weighing between 401g and 800g and, lastly, only 0.6% (n=1) who died with a weight of less than 400 grams. In 1.9% (n=3) the weights of the babies were not recorded, and therefore, the researcher reported them as missing information. These results suggest that the bigger the weight of the baby, the bigger the chances of perinatal mortality. The results of this study differ from the results of a study conducted in Northern Tanzania on the transfer of new-borns to a neonatal care unit. In that study low birth weight was reported to contribute to 40% to 80% of neonatal morbidity and mortality (Mmbaga, Lie, Kibiki, Olomi, Kvale & Daltveit 2011:13).

4.3.1.3 Baby's Apgar score in the 1st and 5th minute

An Apgar score is the score given to new-borns soon after birth, this test checks baby's heart rate, muscle tone, reflexes, skin colour and breathing rate and effort.

Table 4.2: Baby's Apgar score in the 1st and 5th minute (N=162)

Apgar Score	Frequency (n)	Percent (%)
0/10 and 0/10	94	58.0%
1/10 and 1/10	1	0.6%
2/10 and 2/10	3	1.9%
3/10 and 3/10	1	0.6%
3/10 and 5/10	2	1.2%
5/10 and 6/10	2	1.2%
6/10 and 7/10	5	3.1%
6/10 and 8/10	3	1.9%
7/10 and 7/10	3	1.9%
7/10 and 8/10	1	0.6%
7/10 and 9/10	2	1.2%
8/10 and 8/10	2	1.2%
8/10 and 9/10	5	3.1%
9/10 and 9/10	17	10.5%
Delivered at home with no Apgar recorded	7	4.3%
Missing	14	8.6%
Total	162	100.00%

The results in table 4.2 indicate the Apgar score of the babies in the 1st minute and 5th minute after delivery. The highest Apgar score with no change in both the first and fifth minute was 58.0% (n=94) at 0/10 to 0/10; followed by 10.5% (n =17) at 9/10 in the first and fifth minute; 3.1% (n=5) 6/10 to 7/10; 3.1% (n =5) 8/10 to 9/10; 3.1% (n=5) 7/10 to 7/10; 1.9% (n=3) 2/10 to 2/10; 1.9% (n=3) 6/10 to 8/10; 1.2% (n=2) 7/10 to 9/10; and 1.2% (n=2) 8/10 to 8/10. The following accounted for 0.6% on the Apgar score classifications, 1/10 to 1/10 0.6% (n=1); 3/10 to 3/10; 0.62% (n=1) and 7/10 to 8/10 0.62% (n=1).

There were cases which appeared in the register, where there was no classification of an Apgar score for the deceased babies 8.6% (n=14). These cases were reported as missing results. The classifications of the Apgar score for the babies who were delivered at home with no Apgar score recorded were 4.3% (n=7). The results of this study show that the lower the Apgar score at the first and the fifth minutes at birth, the lower the chances of survival for the baby. These results concur with a study conducted in China involving an epidemiology survey on hospitalised babies which revealed that a low Apgar score at the first minute can increase the occurrence of perinatal mortality from birth asphyxia at delivery (Li, Zhang, Ling & Jin 2011:410).

4.3.2 SECTION B

4.3.2.1 Age on admission

Table 4.3: Age on admission (N=162)

Age category	Frequency (n)	Percent (%)
0-6 hours	118	72.8%
6-24 hours	22	13.6%
1-7 days	17	10.5%
More than 7 days	4	2.5%
Missing	1	0.6%
Total	162	100%

Table 4.3 shows results indicating the age on admission of the babies in the study population. Of the 162 babies 72.8% (n=118) were in the 0 to 6 hour age group, followed by 13.6% (n=22) babies in the 6 to 24 hours age group, 10.5% (n=17) babies were in the one day to seven days age group and four babies were older than seven days 2.5% (n=4). Only one record 0.6% (n=1) was reported as missing as a classification of the case did not appear in the records. Most 86.4% (n=140) of the babies were admitted within the first 24 hours. The first 24 hours of life of an infant are the most crucial hours because when a baby is admitted it needs the full attention of the health care providers. The researcher assumes that the health care facility has no resources and equipment to ensure that babies are attended to as soon as possible to reduce the perinatal mortality rate.

The majority of the babies 96.9% (n=157) remained in the health care facility for less than seven days before they died. The results of this study correspond to findings of a study conducted by Bucens, Reid, Barreto, Dwivedi and Counahan (2013:452) in the Dili, East Timor hospital. The study investigated three years of neonatal morbidity and mortality at a national hospital where nearly half 45.9% of the babies were admitted within the first 24 hours of life.

4.3.2.2 Reasons for admission

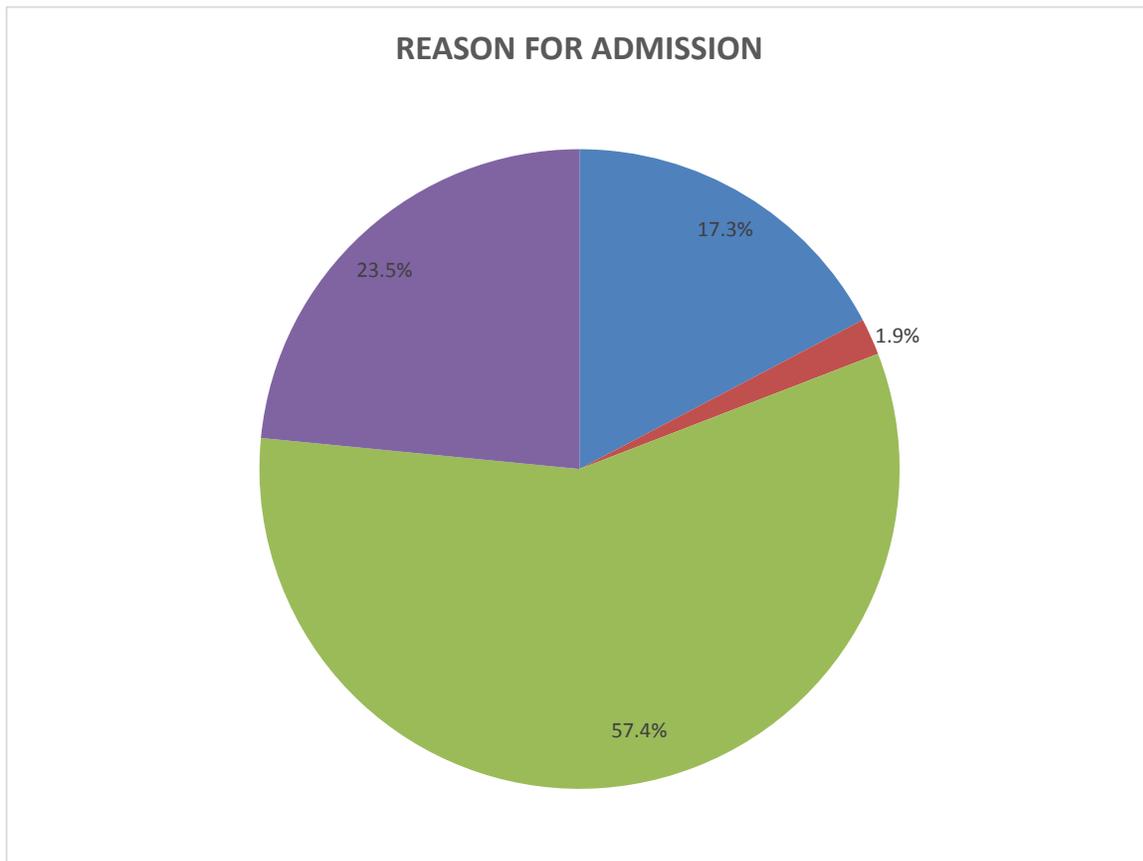


Figure 4.2: Reasons for admission (N=162)

According to figure 4.2, prematurity was the reason for admission in 17.3% (n=28) of the cases of babies who died compared to only 1.9% (n=3) of the babies who had neonatal infections. In more than half 57.4% (n=93) of the cases the reasons for admission were not recorded. There is no indication as to why the reasons for admission were not recorded in these cases. Reasons for admission other than those provided in the checklist comprised nearly one-quarter 23.5% (n=38) of the cases.

Attention should also be paid to other factors, such as intra-uterine foetal death, intra-uterine growth retardation, premature rupture of the membrane, retardation and Cephalo Pelvic Disproportion (CPD) but these factors were not included in the checklist.

The results of this study differ from the findings of the aforementioned study conducted by Bucens, et al (2013:452) in Dili Indonesia, East Timor hospital to investigate three years of neonatal morbidity and mortality at a national hospital. Most of the deliveries took place at home where the babies were not admitted to the health establishment after delivery and the most common reasons for admission were sepsis 38% and respiratory disease 22%, respectively. Overall mortality was 11%, mainly attributed to prematurity 28%, infection 26% and asphyxia 24%.

4.3.2.3 Problems on admission

Table 4.4: Problems on admission (N=162)

Problems on admission		
Response	Frequency (n)	Percent (%)
Sign of respiratory distress	44	27.2
Signs of shock and bleeding	6	3.7
Hypoglycaemia	6	3.7
Convulsions	1	0.6
Signs of infection	5	3.1
Failure to suck	2	1.2
Not recorded	79	48.8
Others	19	11.7
Total	162	100

Table 4.4 shows data on the medical condition of infants on admission. The recorded problems on admission were associated with signs of respiratory distress 27.2% (n=44), signs of shock and bleeding 3.7% (n=6), hypoglycaemia 3.7% (n=6), convulsions 0.6% (n=1), signs of infection 3.1% (n=5), and babies failing to suck 1.2% (n=2). Other 11.7% (n=19) data relate to cases without classification.

These 19 other factors indicated in the checklist were reflected in the records as they contributed to the problems experienced by the infants on admission. These problems are diminished foetal heart and movement; intra-uterine growth retardation; cord prolapse; and Cephalo pelvic disproportion. However, nearly half 48.8% (n=79) of the problems experienced by infants on admission were not recorded.

Most of the 78 babies whose problems were recorded were admitted to the Neonatal Unit with respiratory distress 27.2% (n=44). This study concurs with the study conducted in northern Tanzania by Mmbaga, Lie, Olomi, Mahande, Olola and Daltveit (2011:8) that indicate that during the transfer of new-borns to a neonatal care unit the majority of babies were admitted to the neonatal unit with respiratory distress and low Apgar scores were premature. Furthermore, the study which was conducted in Indonesia on neonatal morbidity and mortality in the neonate hospital in Dili, East Timor over three years also found that the common problems on admission of these babies were infection followed by respiratory disease, asphyxia and prematurity (Bucens et al 2013:454).

4.3.2.4 Appropriate management taken by health care workers

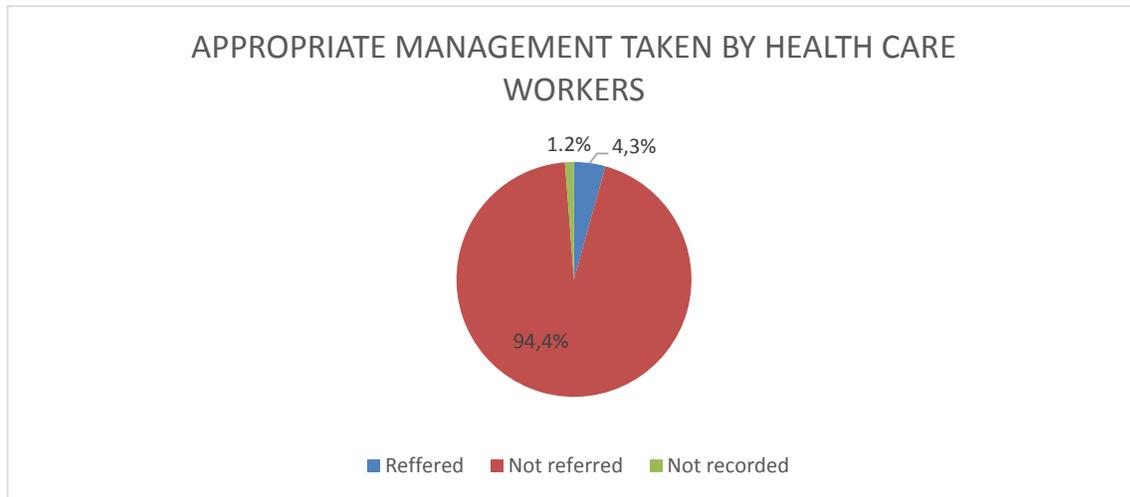


Figure 4.3: Appropriate management taken by health care workers (N=162)

The results in figure 4.3 show whether babies were referred, or not referred, out of the health care facility. The data shows that the majority 94.4% (n=153) of these babies were not referred to receive appropriate management action.

Only 4.3% (n=7) of these babies were referred and in 1.2% (n=2) of the cases there was no record of whether they were referred or not referred. Only a minority of the babies were referred. Babies referred to the next level of care were assessed, managed and stabilised as reflected in the records before they were referred back to the health establishment. These babies died in the health facility after they were referred back. The results of this study differ from the results of the study conducted in Kwa-Zulu Natal by Nsibande, Doherty, Ijumba, Tomlinson, Jackson, Sanders and Lawn (2013:2) on the assessment of the intake of neonatal and young infant referrals by community health workers at public health facilities in an urban informal settlement. The aforementioned study indicated that the time taken to complete referrals was immediate (less than one hour) for one-quarter 24% of the mothers, but referrals that were delayed up to 12 hours 12% and beyond 12 hours 63% were reported. The median number of days taken from receiving the referral from the community health workers to attend a clinic was one day. Out of 79 women who delayed seeking care by more than one hour, 78 gave reasons for the delay. The most common reasons for the delay which was reported by the mothers were that they realised the seriousness of the illness of the baby and the importance of reporting but they found the clinic closed. This led to inappropriate management of these babies.

4.3.2.5 Further assessments conducted by health workers

The purpose of further assessment and management is important to identify or predict whether the babies are most likely to experience adverse health events.

Table 4.5 shows whether any further assessment and management to identify perinatal risks by health care workers were conducted.

Table 4.5: Further assessment conducted by health care workers (N=162)

Any further assessment conducted to identify perinatal risks		
Response	Frequency (n)	Percent (%)
Yes	160	98.8
No	2	1.2
Total	162	100.00

Table 4.5 indicates that 98.8% (n=160) of these babies were assessed and only 1.2% (n=2) were not assessed. The majority of the babies were assessed to identify the perinatal risk factors. After the assessment was done to predict the perinatal risks, perinatal mortality was confirmed. Only 1.2% (n=2) did not have any further assessment conducted to identify the perinatal risk factors that would assist in predicting perinatal mortality.

4.3.2.6 Maternal risk factors

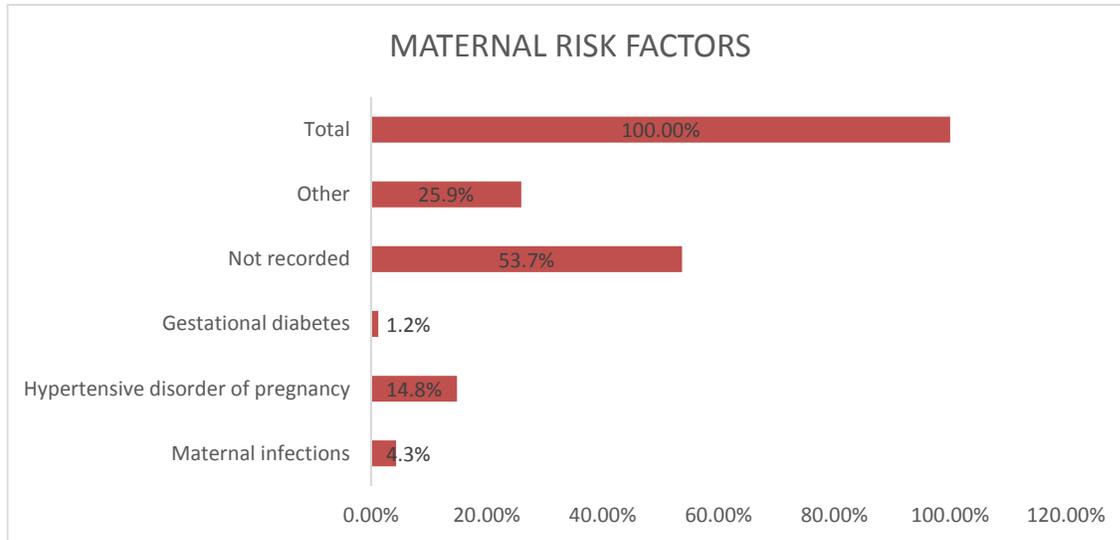


Figure 4.4: Maternal risk factors (N=162)

The graph in figure 4.4 shows the results in respect of the maternal risk factors which influenced the health of the infants in this study. About 4.3% (n=7) of the infants were exposed to maternal infections, 14.8% (n=24) of infants were at risk of maternal hypertensive disorders, and 1.2% (n=2) were exposed to gestational diabetes. More than half 53.7% (n=87) of the records did not reflect maternal risk factors and 25.9% (n=42) identified other factors related to maternal risk factors.

Health care providers should identify and complete information about maternal risk factors for all mothers during antenatal care and labour to reduce complications that can lead to perinatal mortality. The incomplete information in this respect is regarded as one of the limitations of the study.

Several other factors in the checklist 25.9% (n=42) were identified and reflected in the records as other factors contributing towards perinatal mortality.

These factors were anaemia, premature rupture of membranes (PROM), Primi gravida, Rhesus negative, advanced maternal age, problems associated with previous pregnancies and antepartum haemorrhage (APH).

Maternal chronic hypertension and diabetes are significantly associated with negative birth outcomes. It is evident that new-born babies are more likely to suffer perinatal mortality if the mother also shows evidence of infection. The results of the current study concur with the results of the study conducted by Ezechi and David (2012:7) in Nigeria about the patterns of morbidity and mortality in the new-born special care unit. The study indicated signal of the universal perinatal mortality rate that some maternal conditions expose the babies to perinatal mortality. The following conditions such as hypertension, diabetes mellitus and infectious diseases (HIV/AIDS and malaria) predispose the babies to increase mortality.

4.3.2.7 Perinatal risks

Table 4.6: Perinatal risks (N=162)

Any perinatal risks		
Response	Frequency (n)	Percent (%)
Yes	154	95.1
No	1	0.6
Not recorded	7	4.3
Total	162	100

Table 4.6 shows that in 95.1% (n=154) of the cases perinatal risks were identified and classified, whereas only 0.6% (n=1) was not identified and classified and 4.3% (n=7) were not recorded or classified as perinatal risks. Most of the perinatal risks were identified although there were no follow-up questions from the checklist to identify the type of risk. The outcomes of this study concur with the findings of the study conducted in the Nigeria Delta region, regarding patterns of morbidity and mortality in the new-born special care unit in a tertiary institution where the total number of babies admitted with different conditions amounted to 35.1% that were diagnosed with neonatal sepsis, 16.4% were premature and 24.1% suffered from birth asphyxia. The study further indicated that perinatal risks were identified and specified (Ugwu 2012:136).

4.3.2.8 Perinatal risk factors

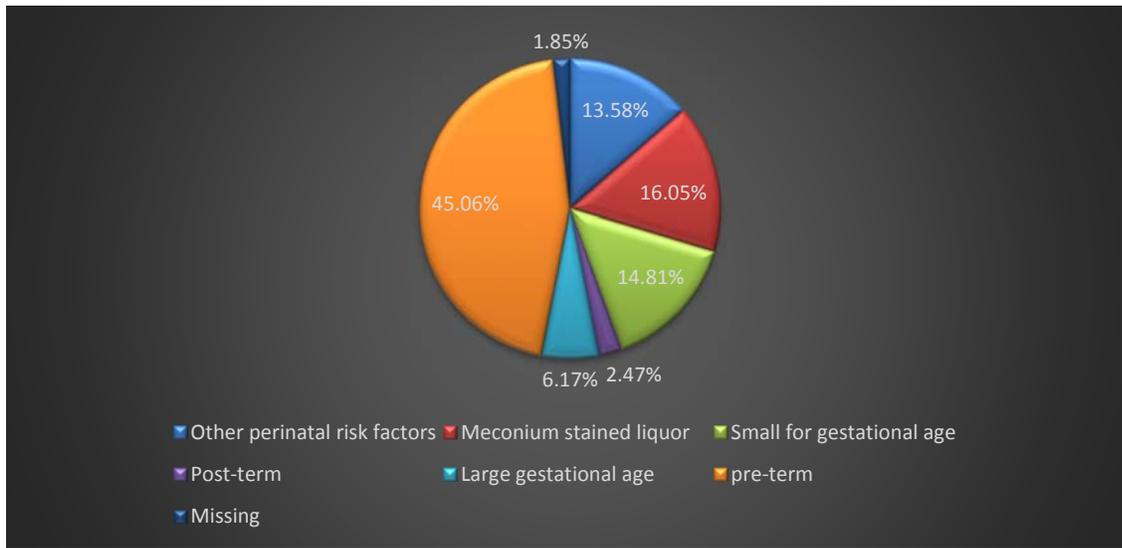


Figure 4.5: Perinatal risks factors (N=162)

The results in figure 4.5 show that pre-term infants accounted for 45.1% (n=73) of the total number of babies admitted in the perinatal unit. Meconium-stained liquid excreted by the mother was observed in 16.1% (n=26) of the cases, 14.8% (n=24) of the babies were small for their gestational age, 6.2% (n=10) were large for their gestational age, and 2.5% (n=4) were post-term. Other perinatal risk factors accounted for 13.6% (n=22) of the cases and 1.9% (n=3) were recorded as missing. Pre-term babies were the highest in number compared to any other risk factors since pre-term babies are predisposed to perinatal mortality. The other perinatal risk factors that needed attention was meconium-stained liquid and there was a slight difference between the number of infants whose mothers excreted meconium-stained liquid and the number who were small for their gestational age. The difference of 1.3% was observed, and this indicates that babies that are born small for gestational age require attention for their survival.

The results of this study differ from the results of the study conducted in northern Tanzania by Mmbaga, et al (2011:7) where most of the babies were admitted to the Neonatal Unit. The results obtained in respect of the perinatal risk factors showed that pre-eclampsia 32%, premature rupture of membranes 55% and Caesarean birth 24% accounted for the transfer of the babies to the neonatal unit.

4.3.2.9 Estimated gestational age

Table 4.7: Estimated gestational age (N=162)

Estimated gestational age		
Response	Frequency (n)	Percent (%)
Pre-term	68	42.0
Term	74	45.7
Post-term	12	7.4
Not recorded	8	4.9
Total	162	100

The results on the estimated gestational age of the infants indicated that 42.0% (n=68) were pre-term babies, 45.7% (n=74) full-term babies, 7.4% (n=12) were post-term and 4.9% (n=8) were not recorded. The information not recorded indicates that no classification was made according to an estimated gestational age. The majority of the babies who died were at term, followed by pre-term babies and post-term babies. A term birth is defined as the delivery of the baby occurring from the 37th week of pregnancy (Forrester 2014:1).

The reduction in the perinatal mortality rate can be observed in babies born at term. There should be an evaluation of the health care providers in respect of the utilisation of maternity resources, including maternity guidelines, maternity case records, Partogram and human resources. Pre-term has been commonly related to perinatal mortality in an estimated gestational age. The results of the current study concur with the results of the study conducted in Tanzania by Mmbaga, et al (2011:7) which indicated that pre-term deliveries accounted for 28% of the neonatal mortalities of babies transferred to the neonatal care unit in Tanzania.

4.3.3 SECTION C

Section C consists of different multiple-choice questions which classify neonates according to the weight for gestational age, plan of care resuscitation done, and gestational (weeks) or at delivery, days since delivery, interventions, death avoidable according to the Patient Safety Incident committee (PSI) and the contributory factors according to the assessment done.

4.3.3.1 Classification of neonates according to weight for gestational age

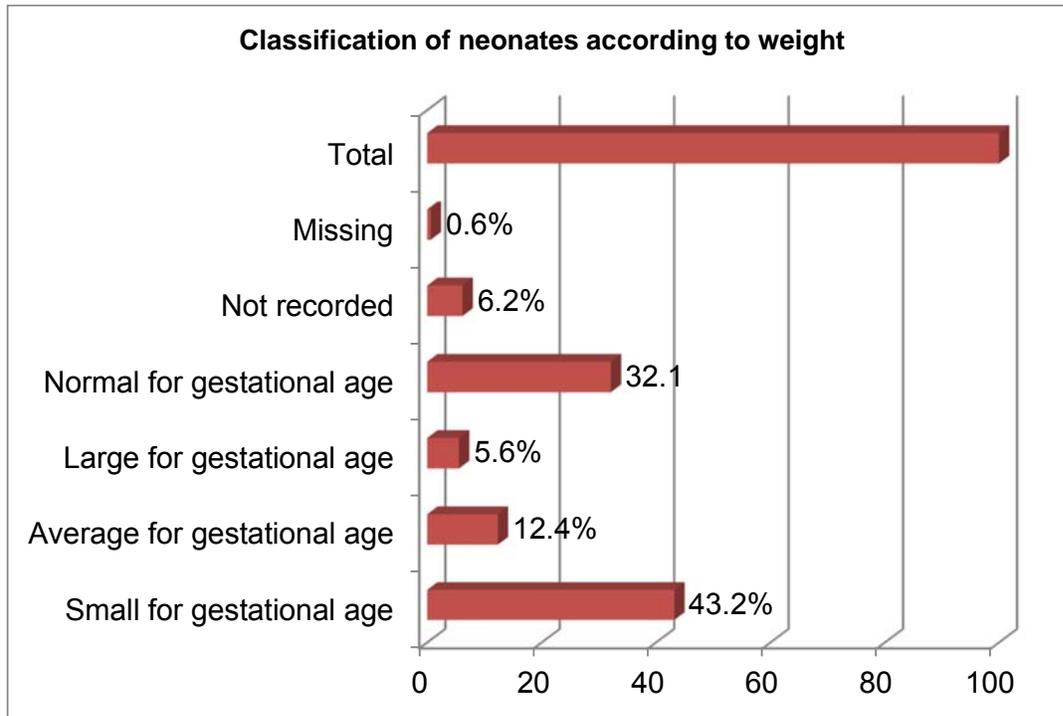


Figure 4.6 Classification of neonates according to weight for gestational age (N=162)

Figure 4.6 shows that 43.2% (n=70) babies were small for their gestational age, 12.4% (n=20) babies were born at an average weight for their gestational age and 5.6% (n=9) babies were large for their gestational age, and 32.1% (n=52) babies were normal for their gestational age. Of these perinatal mortalities, at least 6.2% (n=10) were not recorded for classification and the researcher reported 1% of them as missing.

There is a relationship between small neonatal for their gestational age and the classification of neonates according to weight for gestational age. These results show that the smaller the gestational age of the baby, the lower the chance of survival.

The results of this study differ from the results of the study conducted in Tanzania by Mmbaga, et al (2011:7) on the transfer of new-borns to a neonatal care unit which showed that high morbidity and mortality rates were observed amongst babies with a birth weight above 4000 grams.

4.3.3.2 The plan of care available

Table 4.8: The plan of care available (N=162)

The plan of care available		
Response	Frequency (n)	Percent (%)
Yes	161	99.4%
No	1	0.6%
Total	162	100

Table 4.8 shows that in 99.4% (n=161) of the babies' records included a plan of care which is made available based on records of antenatal care visits and admission to the health care facility until the baby is classified as a stillbirth or a neonatal death. Only 0.6% (n=1) baby had not been provided with a plan of care for continuous reassessment and change by the hospital personnel caring for the baby. Most of the records had a plan of care available written in the hospital records during baby or mother's admission, besides the plan of care written either by the doctor or a nurse, the outcome of these babies was mortality. The study conducted in rural Tanzania on the impact of a plan of care delivery on perinatal mortality concurs with the results of the current study. The results revealed that the odds that mothers who delivered outside a health facility would experience neonatal deaths would be as 1:63 times. Furthermore, the plan of care is always available for new babies at the place of delivery and the execution of the delivery of care was a challenge (Ajaari, Masanja, Weiner, Abokyi & Owusu-Agyeic 2012:52).

4.3.3.3 Resuscitation done

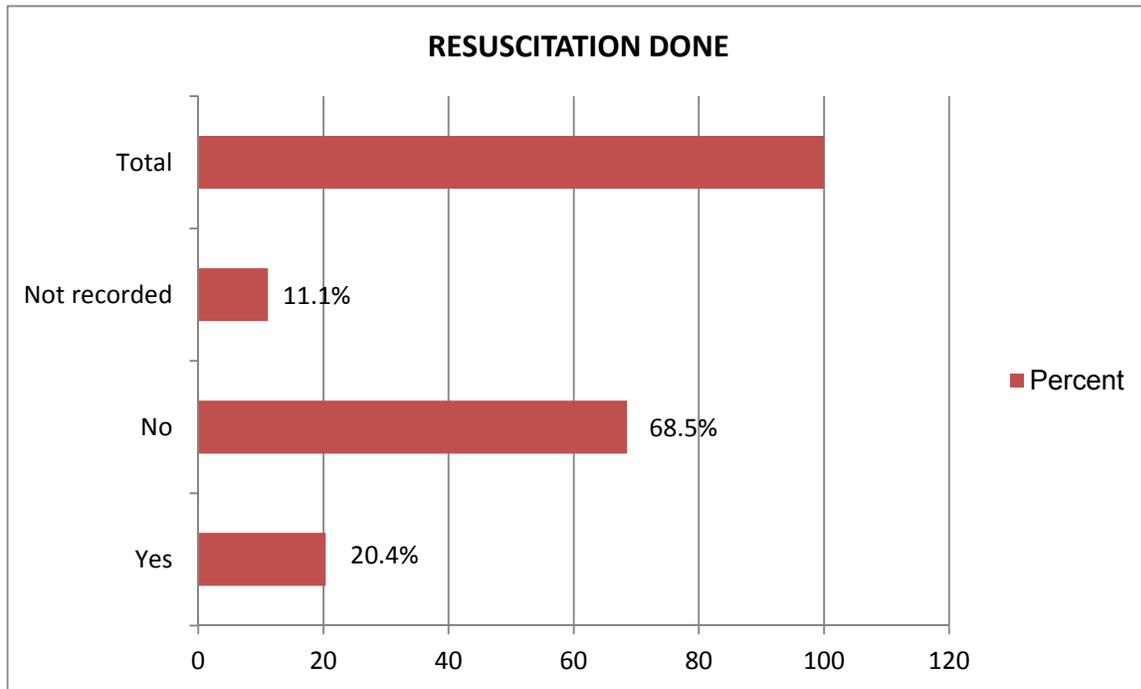


Figure 4.7: Resuscitation done (N=162)

Figure 4.7 shows that over two-thirds 68.5% (n=111) of the babies were not resuscitated including those who required resuscitation, and 20.4% (n=33) of the babies were resuscitated. In 11.1% (n=18) of the cases there was no record of whether resuscitation was done or not done. According to the records more than half 50% of the babies were not resuscitated and no valid reason was given as to why resuscitation was not done on these babies. More than 15% of the records did not indicate whether resuscitation was done or not done.

These results differ from the outcomes of the study conducted by Velaphi and Rhoda (2012:70) which revealed that the majority of babies with respiratory distress syndrome are likely to develop hypoxia and will, therefore, need supplemental oxygen through resuscitation. According to Velaphi and Rhoda (2012:69), neonatal stimulation at birth by wiping the baby and keeping him warm reduces intra-partum related neonatal deaths by one-third.

The study conducted on care during labour and birth for the prevention of intra-partum - related neonatal deaths indicated that provision of resuscitation equipment and the

training of health care providers reduces neonatal mortalities and intra-partum mortality cases as the majority of babies only need immediate assessment at birth and simple new-born care (Lee, Cousens, Darmstadt, Blencowe, Pattison, Moran, Hofmeyr, Haws, Bhutta & Lawn 2011: 23).

4.3.3.4 Gestational age in weeks

Table 4.9: Gestational age in weeks (N=162)

Gestational (weeks) or during delivery		
Response	Frequency (n).	Percent (%)
28 to 32 Weeks	47	29.0%
33 to 36 Weeks	32	19.8%
37 to 40 Weeks	38	23.5%
41 or more Weeks	15	9.3%
Not known	30	18.5%
Total	162	100.00%

Table 4.9 indicates the weeks of pregnancy when perinatal mortality occurs. Over one-quarter 29.0% (n=47), of the perinatal mortality cases occurred from 28 to 32 weeks followed by deaths at 37 to 40 weeks 23.5% (n=38), and 33 to 36 weeks 19.8% (n=32). About 18.5% (n=30) cases were not known. The aforementioned cases were not considered by the researcher because the case records were not complete. Only 9.3% (n=15) mortality cases occurred at 41 or more weeks. The 47 babies who died at the gestational age of 28 to 32 weeks reflect the proportion of pre-term to perinatal mortality rates directly. More than 20% of the babies died at term and these are the babies who should have survived because they were delivered at the correct time. More effort should be channelled in ensuring that the babies delivered at term survive.

This current study results differ from the findings of the study conducted in Brazil on the risk factors for perinatal mortality in two different levels of care (Moura, Maesta, Rugolo, Angulski, Caddeira, Peracoli & Rudge 2014:3).

Firstly, the results revealed that the majority 46.9% (n=130) of the perinatal mortalities occurred in the first week with the highest risk of mortality on the first day of life.

Furthermore, the results indicate that in the participating tertiary hospital, the chances of death dropped considerably from 27 weeks of gestation onwards. This indicates a one-week reduction in the foetal limit of viability as compared to local data from the past decade.

The findings of the study conducted by Paull and Robson (2013:58) concur with the findings of this study. The results show that diminished foetal movements are associated with a poor perinatal outcome as the majority of mothers who had a still-birth described reduced foetal movements prior to the diagnosis of still-birth.

4.3.3.5 Days after giving birth

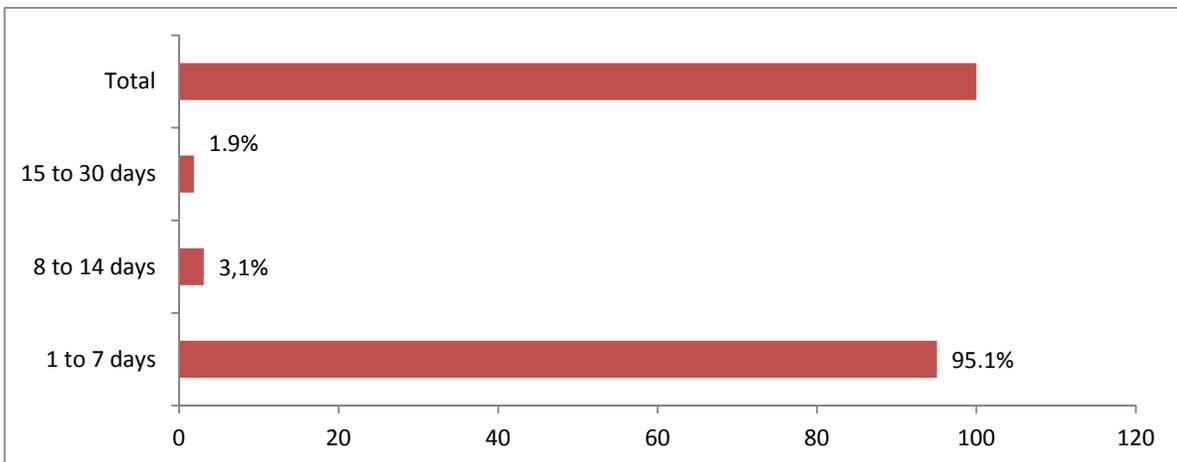


Figure 4.8: Days after giving birth (N=162)

Figure 4.8 indicates that the majority of the babies 95.1% (n=154) stayed in the unit for a period of one to seven days. Only 3.1% (n=5) babies stayed between eight and 14 days and three 1.9% (n=3) of the babies stayed more than 14 days but less than 30 days. Most of these babies stayed within the seven days after their delivery before their deaths. The results of the current study concur with the findings of the study conducted in Dhaka on the causes of neonatal mortalities. It was found that three quarter of the neonatal mortalities happened with seven days after deliveries (Khatun, Rasheed, Moran, Alam, Shomik, Sultana, Choudhury, Iqbal & Bhuiya 2012:4).

The findings of the study conducted in the National Hospital in Dili; East Timor also concur with the results of the current study by showing that the majority of perinatal mortality cases occur in less than seven days of their stay in the neonatal unit (Bucens, et al 2013:453). The same study came to the same conclusion that most perinatal mortality cases occur during the first seven days of the babies' lives.

4.3.3.6 Intervention taken by health care workers

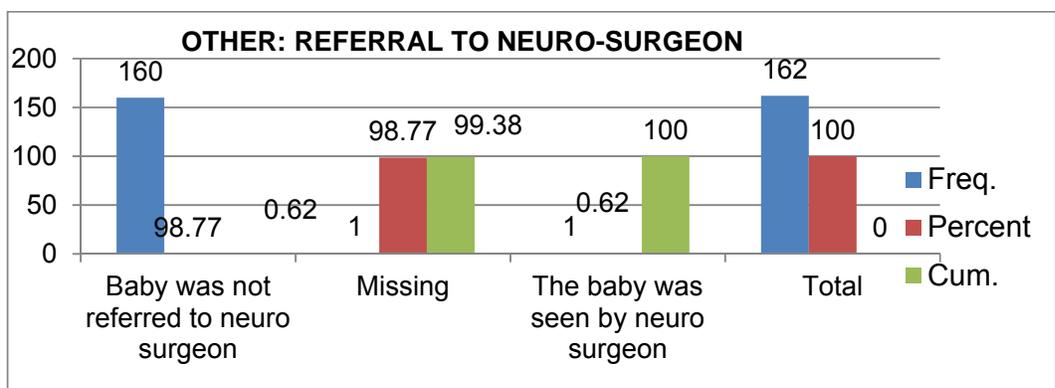
Table 4.10: Intervention taken by health care workers (N=162)

Interventions were taken		
Response	Frequency (n)	Percent (%)
Non-medication treatment	158	97.6%
Medication drug pharmacological administration	2	1.2%
Other	2	1.2%
Total	162	100

The results shown in table 4.10 reveal that non-medication treatment was administered to most 97.6% (n=158) of the babies. Only 1.2% (n=2) of the babies were nursed with medication or pharmacological drugs and a further two case records 1.2 % (n=2) showed that there was no other intervention. In most of the cases non- medication treatment was implemented. This means that the health workers treated these babies in their care without medication. Prevention of Mother to Child Transmission (PMTCT) guidelines indicate that the antiretroviral prophylaxis should be administered to all babies born to HIV positive mothers soon after birth (Department of Health 2010:20).

4.3.3.7 Referral to the neuro-surgeon

infant was referred to the neuro-surgeon. One case record 0.6 % (n=1) had insufficient information to link it to the referral of the baby to a neuro-surgeon. It was evident as indicated in the records that the facility was able to manage the babies before they were referred to a neuro-surgeon as indicated in the records.



. Figure 4.9: Other referral to the neuro-surgeon (N=162).

4.3.3.8 Recommendations done by patient safety incident (psi) committee

Table 4.11: Recommendations by PSI Committee (N=162)

Recommendations by PSI committee		
Response	Frequency (n)	Percent (%)
No recommendations	162	100.00
Total	162	100.00

Out of 162 records, none had a recommendation from the PSI committee because the records indicated that the facility does not have such a committee. A PSI committee deals with the areas contributing to perinatal mortality and gives recommendations to curb the mortalities. The implementation of PSI recommendations and specific interventions could have a major impact on reducing the perinatal mortality rate if implemented effectively countrywide (Department of Health 2011:98).

It is expected that hospitals should establish a patient safety incident committee which should meet once per month according to the National Department of Health guidelines to discuss the patient safety incidents.

4.3.3.9 Delay in seeking help by patient or family

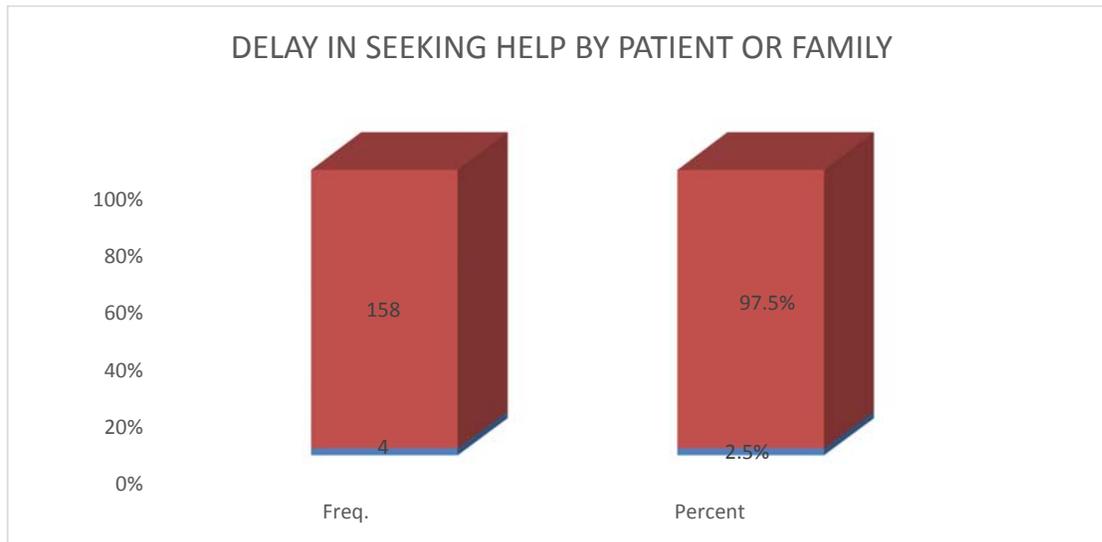


Figure 4.10: Delay in seeking help by the patient or family (N=162)

Figure 4.10 indicates that in four 2.5 % (n=4) cases the mother or family of the infant delayed in going to the health care facility to seek help whereas in most 97.5% (n=158) cases the mother or family member came to seek health care services for the baby on time. However, irrespective of the help sought by the mother or family, the outcome was perinatal mortality. There is an inverse proportion between the delay in seeking help by the patient or family members and the outcomes of the perinatal mortality. Although the majority of the records indicated that the patient or family came to seek help, the same babies died in the same health care facility.

The results of this study is in contrast to the findings of the study conducted in Nigeria by Guerrier, Oluyide, Keramarou and Grais (2013:498) on the high maternal and neonatal mortality rates in northern Nigeria. It was an eight- month observational study which found that the neonatal mortality rate is related to prematurity and infection (sepsis). The study concluded that the majority of babies died because of poor attitudes towards seeking health care. The study further indicated that many women and neonates died in rural Africa without presenting themselves to modern health care services.

4.3.3.10 Declined treatment by the family or patient

Table 4.12: Declined treatment by family or patient (N=162)

Declined treatment by family or patient		
Response	Frequency (n)	Percent (%)
Yes	1	0.6%
No	160	98.8%
Missing	1	0.6%
Total	162	100.00%

Table 4.12 shows that in most 98.8% (n=160) cases hospital treatment at the entrance of the health care facility was accepted. In only one case 0.6% (n=1) the health care facility treatment was refused and only one 0.6% (n=1) case was recorded as missing. These results indicate that the mothers agreed that their babies should be treated by the health care facility.

The results of a study conducted in Boston about the management of pregnant patients who refused medically-indicated Caesarean section delivery concurred with the results of this study (Deshpande & Oxford 2012:144). It concluded that there was a fine balance between the ethical principles that are to be applied in a patient care when pregnant mothers are involved. In order to address the dilemma that may arise between mother and foetus, one must understand the historic and social context of a pregnant woman's refusal of a medically-indicated caesarean delivery. Obstetricians and advanced midwives should be empathetic to encourage a pregnant woman to accept a caesarean birth if the risk of morbidity or mortality to the foetus is high.

4.3.3.11 Other factors contributing to increasing perinatal mortality by patient or family

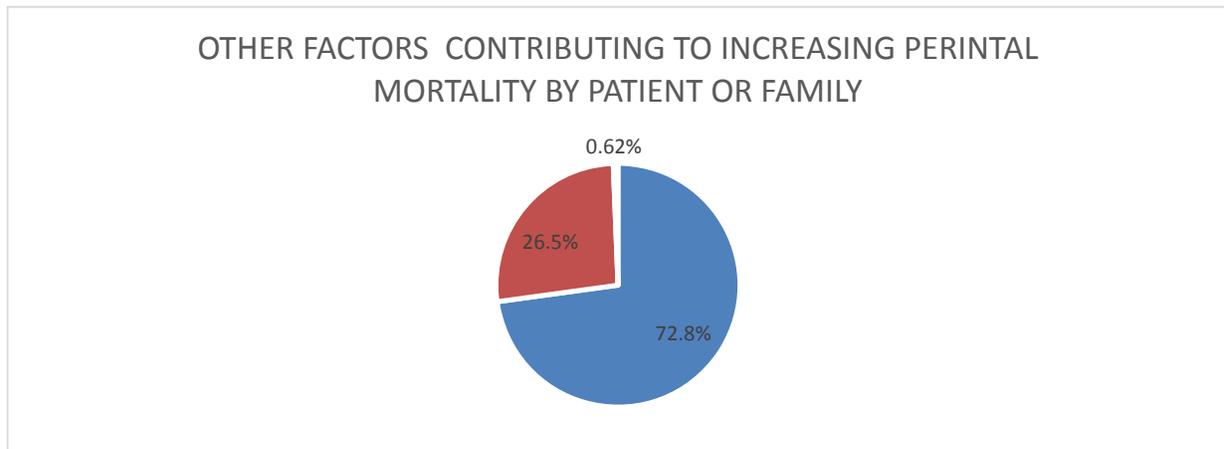


Figure 4.11: Other factors contributing to increased perinatal mortality by patient or family (N=162)

Figure 4.11 shows that in 72.8% (n=118) of the cases other factors contributed to the mortality of the babies. In 26.5% (n=43) of the cases no association of the mortality with any other factor was indicated and only one record 0.6% (n=1) was reported as missing.

These following maternal factors were previous miscarriage, Rhesus negative, advanced age, multi parity; low haemoglobin, and previous Caesarean section predisposed the baby to mortality. Maternal care from the day of conception until the day of delivery is of great importance. These factors should be treated according to severity. Therefore, if the mother needs to be referred to the next level of care immediately then referral should be arranged at once. Based on these results, the researcher assumes that antenatal care history record-taking is not comprehensive in the health care facility and referral institution that was part of the current study. Maternal risk factors should be identified and if the mother is not classified under basic antenatal care she should be referred to the next level of care according to maternity guidelines.

Pre-term birth remains a global perinatal health problem and occurs in both developed and developing countries. Worldwide, pre-term births account for 9.6% births and approximately 85% of these births were concentrated in Africa.

The causal factors of pre-term births are maternal medical conditions during pregnancy, multiple births, greater use of assisted reproduction techniques and Caesarean births in developed countries (Beck, Woljdyla, Say, Betran, Meraldi, Rquejo, Rubens, Menon & Van Look 2010:32).

According to Andargie, Berhane, Worku and Kebede (2013:168), in the developing countries there are a number of risk factors associated with pre-term births, such as poor socio-economic status, very young maternal age, poor diet, cigarette smoking and infections. A birth interval of less than two years was also associated with increased perinatal mortality. Chronic conditions, such as maternal hypertension and diabetes mellitus increase the risk of still-births. Obstetric complications, such as multiple pregnancy and prolonged labour increase the perinatal mortality risk if the woman is not managed properly.

4.3.3.11.1 *Logistics: delay of emergency medical service (ems)*

Table 4.13: Logistics: Delay of emergency medical services (N=162)

Logistic Delay of EMS		
Response	Frequency (n)	Percent (%)
Yes	1	0.6%
No	160	98.8%
Not sure	1	0.6%
Total	162	100.00%

The results in table 4.13 indicate that in 98.8% (n=160) of the cases there was no delay of emergency medical services, 0.6% (n=1) indicated that they were not sure whether there was a delay by the emergency services (EMS) and only one 0.6% (n=1) record indicated a delay by EMS. Generally, according to these results, EMS does not delay the patient during referral. The results of the study differ from the results of a study conducted in Gambia regarding the barriers to emergency obstetric care services in perinatal deaths in rural Gambia which show that long distances to the hospital and lack of appropriate means of transportation (EMS included) are major problems affecting the timely evacuation of women with obstetric complications (Jammeh, Sundby & Vangen 2011:4).

4.3.3.11.2 Logistics: accessibility or availability of transport

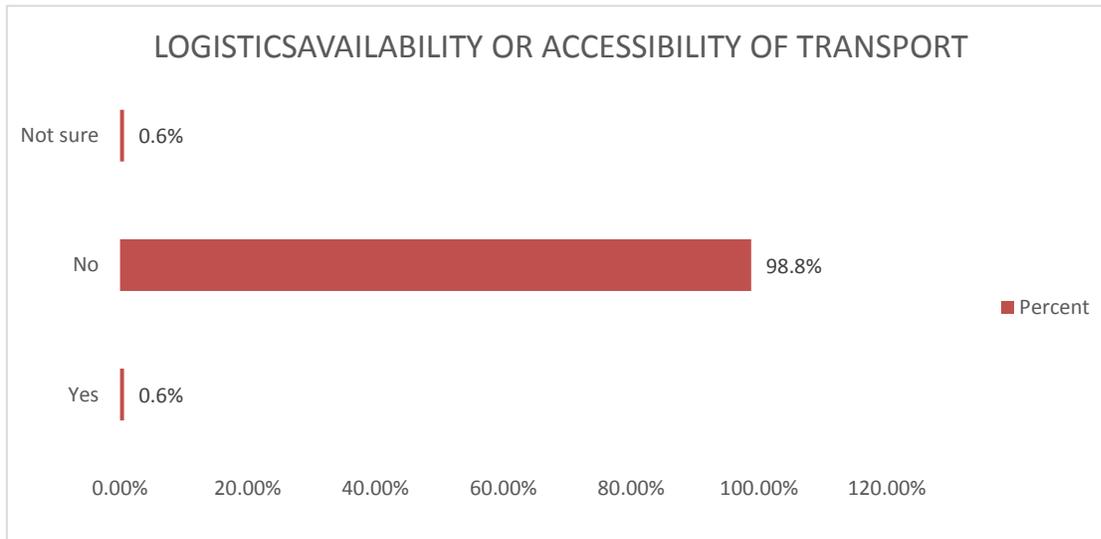


Figure 4.12: Logistics: Accessibility or availability of transport (N=162)

The results in figure 4.12 show that most 98.8%, (n=160) of the mothers did not experience a lack of transport but used either private or emergency medical services. In only one 0.6% (n=1) case there was uncertainty about the accessibility or availability of transport and in one other 0.6%, (n=1) a problem in regard to the availability or accessibility of transport was recorded. From the facility records it would appear that in the health education offered to patients they are encouraged to arrange their own private transport. Private transportation of patients to the health care facility reduces the turn-around time for emergency services. Reduced turn-around time of emergency services to a health facility should decrease perinatal mortality. In this regard, the results of this study differ from the results of the study conducted in Gambia by Jammeh, Sundby and Vangen (2011: 4) on the role of emergency obstetric care services in perinatal deaths in rural Gambia. The results show that long distances to the hospital and a lack of appropriate means of transportation were found to be major problems affecting the timely evacuation of women with obstetric complications.

4.3.3.11.3 *Logistics: Other factors contributing to increasing perinatal mortality*
(n=162)

Table 4.14: Logistics: Other factors contributing to increasing perinatal mortality

Logistics: Other factors contributing to increasing perinatal mortality		
Response	Frequency (n).	Percent (%)
Yes	4	2.5%
No	156	96.3%
Not sure	1	0.6%
Missing	1	0.6%
Total	162	100%

The results in table 4.14 indicate that only four 2.5% (n=4) records show that logistical factors besides transport problems contributed to the mortalities of the babies. Thus, most 96.3 % (n=156) of the records indicated that no other logistical factors contribute to increased perinatal mortality. One 0.6% (n=1) of the records indicated uncertainty about logistical problems that could have contributed to perinatal mortality. Only one 0.6% (n=1) record was reported as missing in this regard. Logistics cannot be regarded as a factor contributing to perinatal mortality.

These results differ from the results of a study conducted by Andargie, Berhane, Worku and Kebede (2013:168) about the predictors of perinatal mortality in rural populations of Northwest Ethiopia. The study indicates that at least 75% of the perinatal deaths that occur in developing countries are caused by problems that also kill women.

4.3.3.11.4 Facilities: Lack of services after hours

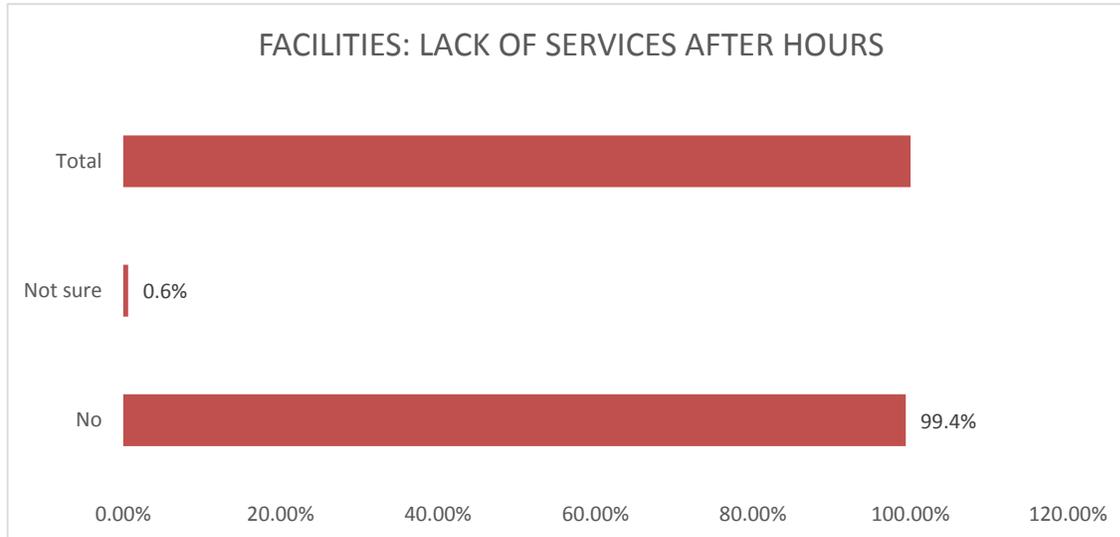


Figure 4.13: Facilities: Lack of services after hours (N=162)

Figure 4.13 indicates that 99.4% (n=161) of the patients received 24-hour services from the facilities of referral (clinics and community health centres) and the referring facility and in only one 0.6% (n=1) of the cases the patient did not know whether services are rendered after hours. All but one of the patients had knowledge that the facility renders a 24-hour service. This implies that the patients can seek the health care services, including maternal and perinatal care at any time of the day. The records further indicated that the referring facility was also rendering 24-hour services and, therefore, nearly all received it.

The results of this study differ from the results of the study conducted in Nigeria by Adeboye, Ojuawo, Ernest, Fadeyi and Salisu (2010:250) on the mortality patterns within twenty-four hours of emergency paediatric admission in a resource-poor national health facility. In the aforementioned study, the majority of the babies died because the mothers reported late at the hospital for medical care. Furthermore, the results indicated that facilities of referral do not render 24-hour services except in the case of the hospitals in Nigeria.

4.3.3.11.5 *Facilities: Lack of equipment*

Table 4.15: Facilities: Lack of equipment (N=162)

Facilities: Lack of equipment		
Response	Frequency (n)	Percent (%)
No	161	99.4%
Yes	1	0.6%
Total	162	100.00%

The results in table 4.15 show that 99.4% (n=161) of the facilities have equipment and consumables, including intravenous infusion lines and medication. In only one 0.6% (n=1) case the record indicated that the facility experienced a lack of equipment. Lack of equipment does not appear to be a problem. The 'Saving mothers' report (Department of Health 2013b:27) indicates that lack of equipment does not contribute to perinatal mortality.

4.3.3.11.6 *Facilities: Other factors contributing to increasing perinatal mortality*

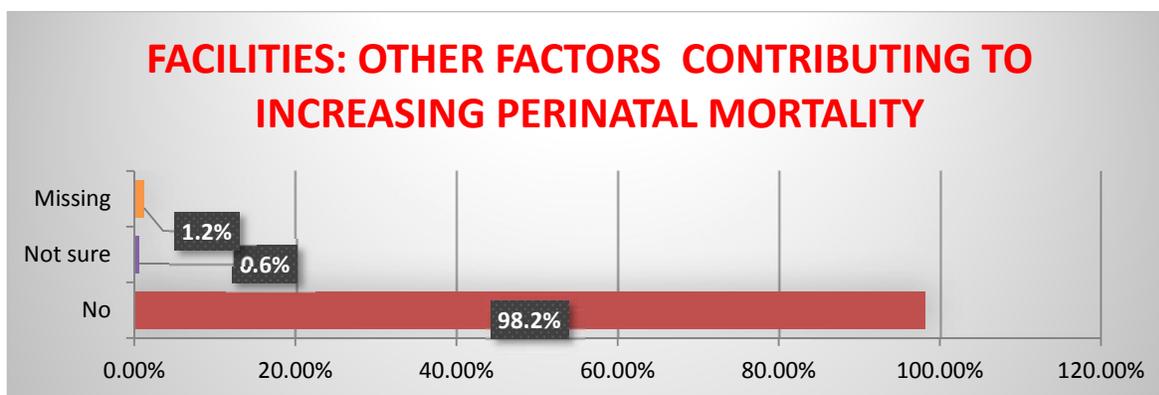


Figure 4.14: Facilities: Other factors contributing to increased perinatal mortality (N=162)

In figure 4.14 the results indicate that most 98.2% (n=159) of the records show that other factors related to the facilities were not contributing to increased perinatal mortality. Only one 0.6% (n=1) record indicated uncertainty about whether other factors related to facilities contributed to perinatal mortality, and two 1.2% (n=2) records did not have this information.

4.3.3.11.7 Health personnel problems: Poor labour monitoring

Table 4.16: Health personnel problems: Poor labour monitoring (N=162).

Health personnel problems: Poor labour monitoring		
Response	Frequency (n)	Percent (%)
Yes	46	28.4%
No	115	71.0%
Missing	1	0.6%
Total	162	100.0%

Table 4.16 shows that a total of 28.4% (n=46) records identified poor labour monitoring by health personnel as a contributory factor. Seventy-one percent 71.0% (n=115) indicated that labour monitoring by health personnel was not poor, while only one 0.6% (n=1) record had missing information about poor labour monitoring as a contributory factor. The following contributory factors were identified from the records: a Partogram was neither plotted nor fully completed even when the patient had been in labour for more than a day, no monitoring of contractions during labour took place, and it could not be determined whether the mother was able to reach an alert or an action line.

There was consistent poor labour monitoring recorded in more than one-quarter of the results revealing the challenge posed by health personnel problems in this regard. According to the records the challenge of health personnel problems in respect of poor labour monitoring is not a shortage of health personnel but the poor implementation of maternity guidelines according to which women in the latent phase of labour (1cm-3cm) should be attended to every four hours, and in the active phase of labour they should be (4cm-10cm) attended to every two hours. However, this guideline was not adhered to. There is a relationship between poor monitoring of labour and the negative outcome of the delivery or the fourth stage of labour. Poor labour monitoring by the health care personnel increases the chances of perinatal mortality.

This study concurs with the 'Saving mothers' report (Department of Health 2013b:24) which indicates that delays in seeking medical attention during labour account for 10% of the total perinatal mortality rate.

4.3.3.11.8 Health personnel problems: Lack of education about transport

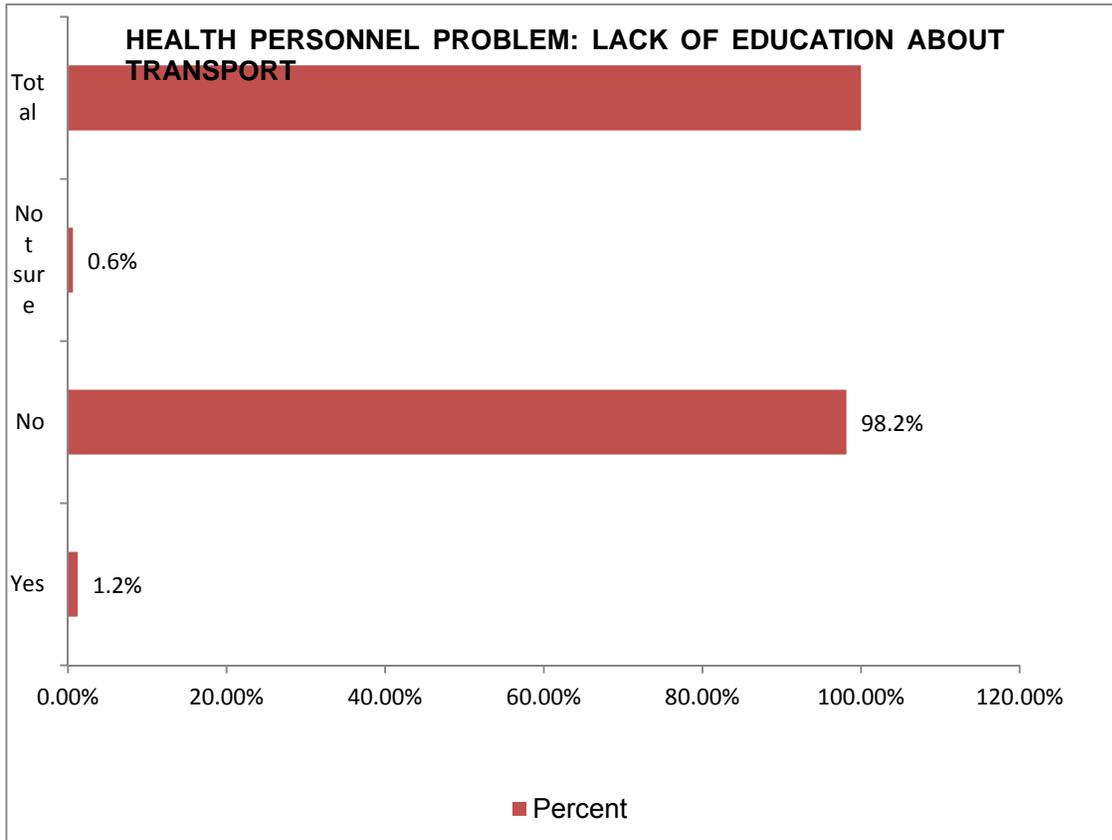


Figure 4.15: Health personnel problems: Lack of education about transport (N=162)

The results of the study shown in figure 4.15 indicate that 98.2% (n=159) of the mothers were educated about the transport arrangements, 1.2% (n=2) indicated that they were not educated about the transport arrangements and 0.6 (n=1) were not sure whether transport was a contributory factor in increased perinatal mortality. From the records it appears that the majority of the mothers were advised about the importance of the transport available. The hospital records (the maternity case records) include a section that asks if health education about transport was given and more than 98% of these mothers indicated that they were informed about transport. Furthermore, the records indicated that the mothers arranged their own transport to hospital.

Thus, the results indicated that there are no problems in respect of the education provided to mothers about transport. The results of this study differ from the results of the study done in Gambia by Jammeh, Sundby and Vangen (2011: 4), already mentioned above, the results of which show that long distances to the hospital and lack of appropriate means of transportation were found to be major problems affecting the timely evacuation of women with obstetric complications. The study further indicated that transport education is not an integral part of their antenatal care.

4.3.3.11.9 *Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality*

Table 4.17: Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality (N=162)

Health personnel problems: Delays in appropriate action to reduce perinatal mortality		
Response	Frequency (n)	Percent (%)
Yes	25	15.4%
No	136	84.0%
Missing	1	0.6%
Total	162	100.00%

Table 4.17 indicates that in 84.0% (n=136) of the cases no delays by health personnel were experienced in taking appropriate action to reduce perinatal mortality. A delay in taking appropriate action by the health personnel was indicated in 15.4% (n=25) of the records. The records indicated that the delay was caused by the following contributory factors: doctors were called at night but arrived the following day, and there was a lack of appropriate action, especially in respect of the Partogram (Action line). In only one 0.6% (n=1) of the records, information about a delay in taking appropriate action was missing.

In approximately 5% of the perinatal mortality cases reported in the ‘Saving babies’ report, (Department of Health 2013b: 24) there was a direct human resources delay in taking appropriate action. This percentage is probably higher as other avoidable factors, missed opportunities and sub-standard care that also include the human resource factor, such as delays in referring patients. Furthermore, the assessments of the 25 mortalities were performed at the site where the mortality occurred. Thus, the reporting of this factor is mostly likely to be under-estimated.

4.3.3.11 10 *Health personnel problems: Other factors contributing to increasing perinatal mortality*

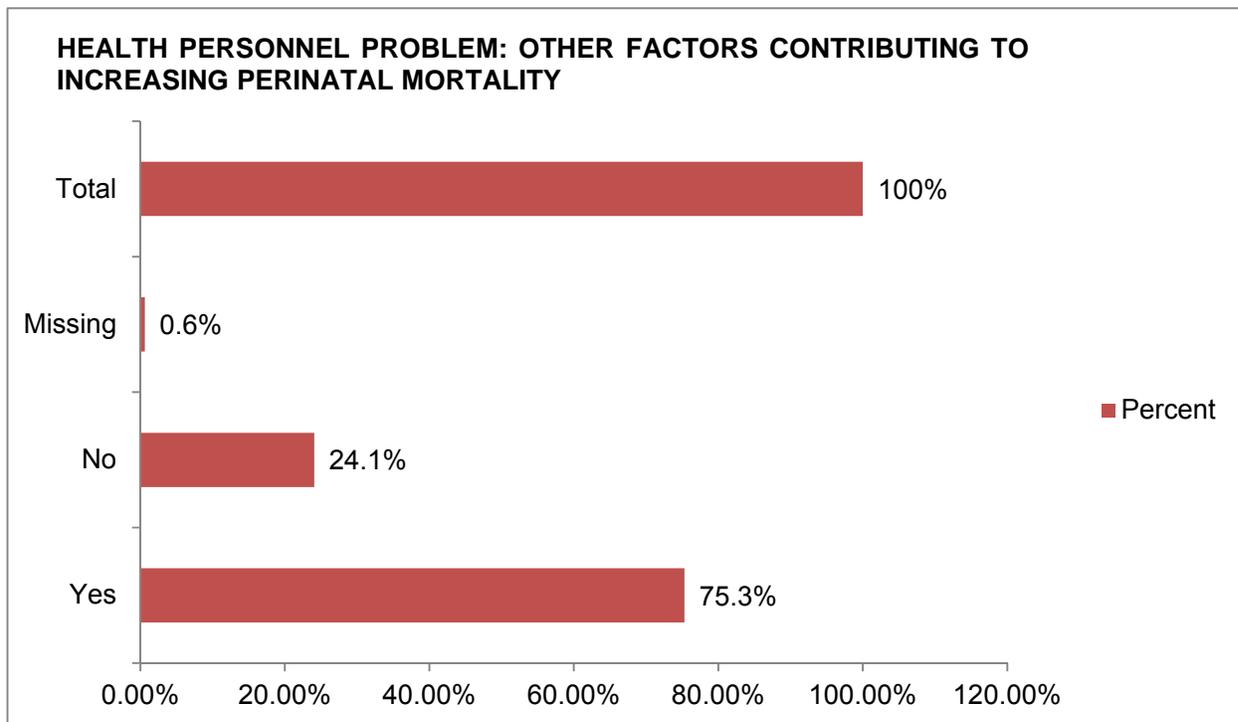


Figure 4.16: Health personnel problems: Other factors contributing to increasing perinatal mortality (N=162)

Figure 4.16 shows that the majority 75.3% n=122) of the records indicated other factors related to health personnel problems as contributing to perinatal mortality. Only 24.1% (n=39) indicated no other factors related to health personnel problems contributed to increased perinatal mortality and only one (0.6%) record had missing information in this regard.

The records indicated that health personnel identified the following factors that contribute to increased perinatal mortality: poor completion of maternity case records by midwives, poor utilisation of Partogram equipment during labour, incomplete recording, and poor monitoring of gestational age during antenatal care, protocols not followed especially for eclamptic mothers, failure of physicians on call to arrive on time and failure by clinics to refer the mothers on time to antenatal care (ANC) at hospital. The basic antenatal care guide indicates that antenatal care should be at a hospital but clinics continue not to refer the patient.

Recommendations to be made should include knowledgeable, dedicated and skilled health care providers to reduce the perinatal mortality rate in the health care facility. In-service training, health education and symposia about perinatal care should be planned and implemented. Consequences management should be implemented by managers of the health care facility in cases in which protocols and procedures were violated and negligence is evident. Consequences management can be influenced by monthly patient safety meetings.

The majority of the records reflected that health care personnel contributed to the mortalities that occurred between the 1st January 2015 and the 31st December 2015. The records indicate unprofessional behaviour among doctors who do not respond to calls and discrepancies in the training given to doctors and nurses also featured as a contributory factor in perinatal mortality. This study concurs with the 'saving babies' report (Department of Health 2013b: 25) which indicated that the following factors contribute to perinatal mortality: personnel not sufficiently trained to manage patients personnel too junior or inexperienced to manage patients, insufficient doctors and nurses available, delay in doctors responding to calls, doctors lack of response to calls, delays in calling for expert advice, delays in referring patients and delays in administering anaesthetics.

4.3.3.11.11 *Health or, and illness of the neonate: Prematurity*

Table 4.18: Health and, or illness of the neonate: Prematurity (N=162)

Health and/or illness of the neonate: Prematurity		
Response	Frequency (n)	Percent (%)
Yes	60	37.04%
No	102	62.96%
Total	162	100.00%

In table 4.18, the results reveal that prematurity as a risk factor accounted for over one-third 37.0% (n=60) of the total babies admitted to the neonatal unit, and 63.0% (n=102) of the records did not contain any sign of prematurity throughout the admission of the mother or the baby. Thus, prematurity remains one of the contributory factors in the perinatal mortality rate.

A study on 92 patterns of morbidity and mortality in a new-born special care unit revealed that 452 babies were admitted with different conditions. The conditions were as follows, neonatal sepsis was 35.1% (n=228) of the cases, prematurity was 16.4% (n=108) and birth asphyxia was 24.1% (n=116) of the cases (Ugwu 2012:136). The study identified prematurity as another contributory factor in perinatal mortality. Hence, it concurs with the current study. In the East Timor neonate hospital the common reason for admission was infection 38% (n=868) followed by respiratory disease 22%; n=499), asphyxia 12% (n=282) and prematurity 11% (n=242) (Bucens et al 2013:453).

4.3.3.11.12 *Health or /and illness of the neonate: Pneumonia*

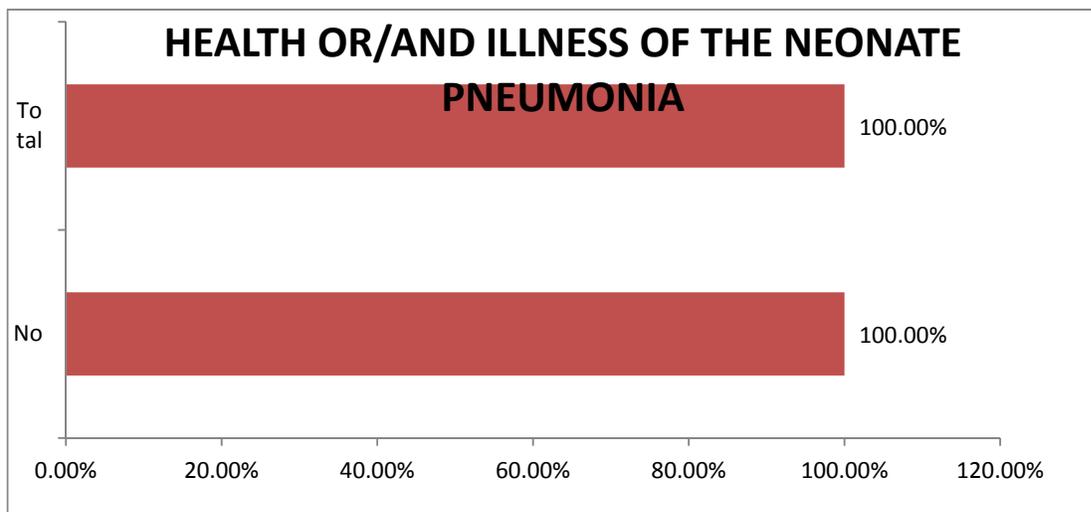


Figure 4.17: Health and/or illness of the neonate: Pneumonia (N=162)

The results in figure 4.17 indicate that none of the 162 infants in the current study experienced any pneumonic attack. The results indicate that no babies experienced pneumonia as an illness during their stay in the health care facility. Pneumonia did not contribute to perinatal mortality in this study. The study conducted in London on the effects of 100% case management on perinatal mortality due to sepsis and pneumonia indicates that oral or injectable antibiotics alone are highly effective in reducing deaths from neonatal sepsis or pneumonia (Zaid, Ganatra, Syed, Cousens, Lee, Black, Bhutta & Lawn 2011:2). The results of the current study differ from the aforementioned study as no indication of pneumonia or pneumonic attack was recorded.

4.3.3.11.13 Health or /and illness of the neonate: Birth asphyxia

Table 4.19: Health and/or illness of the neonate: Birth asphyxia (N=162)

Health or/and illness of the neonate :Birth asphyxia		
Response	Frequency (n)	Percent (%)
No	161	99.4%
Missing	1	0.6%
Total	162	100.00%

According to table 4.19, birth asphyxia is not a factor contributing to perinatal mortality. Birth asphyxia was not indicated as a contributory factor in all but one of the records 99.4% (n=161) and in only one 0.6% (n=1) of the cases information about birth asphyxia was missing. Generally, birth asphyxia was not experienced by the babies during their stay at the health facility. The results of this study differ from the results of the study conducted by Bucens, et al (2013:454) in East Timor on neonatal morbidity and mortality at the neonate national hospital in Dili. It revealed that the common reason for admission was infection 38% followed by respiratory, disease 22%, asphyxia 12% and prematurity 11%). The study on patterns of morbidity and mortality in the new-born special care unit showed different results to the current study as, of the total of babies admitted with different conditions, neonatal sepsis was 35.1%, prematurity was 16.1% and birth asphyxia was 24.1% (Ugwu 2012:136).

4.3.3.11.14 *Health or/and illness of the neonate: Other factors contributing to increasing perinatal mortality*

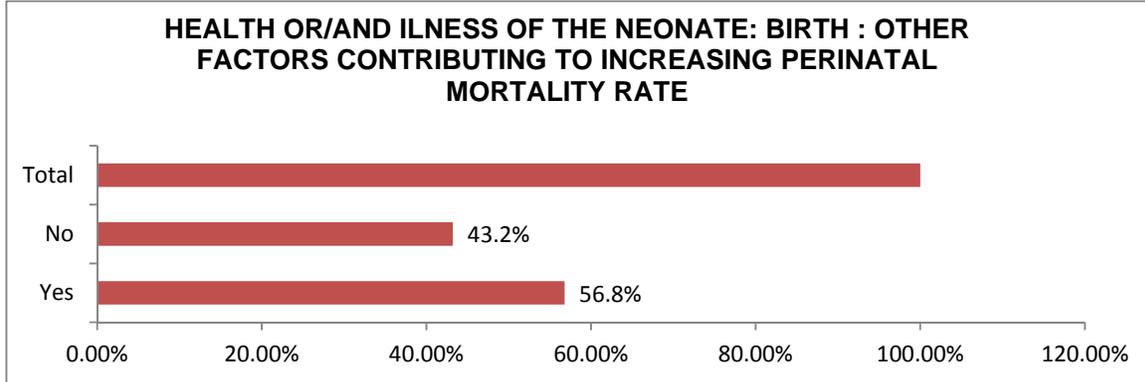


Figure 4.18: Health or/and illness of the neonate: other factors contributing to increasing perinatal mortality (N=162)

Figure 4.18 indicated several other factors under health and/or illness of the neonate contributing to perinatal mortality. These other factors make up more than half 56.8% (n=92) of the total. These factors are as shown in the records related to the state of health and illness of the neonate and contribute to perinatal mortality and include congenital anomalies, pyrexia (elevated temperature), intra-uterine growth retardation, intra-uterine foetal death, baby cord prolapse, maternal infections. Furthermore, 43.2% (n=70) of the records indicated no other factors contributed to perinatal mortality.

The leading causes of infant death include: congenital abnormalities, pre-term or low birth weight, sudden infant death syndrome, Problems related to complications of pregnancy and respiratory distress syndrome (RDS), immaturity- related (born too soon), perinatal hypoxia and infection (both foetal and neonatal) (Department of Health 2013b: 24).

4.4 IDENTIFIED CAUSES AND OTHER FACTORS RELATED TO PERINATAL MORTALITY BASED ON THE RESULTS OF THE STUDY

The results of the study indicate that 75.3% (n=122) of the cases were associated with other factors related to problems in respect of health personnel as a factor contributing to perinatal mortality (refer to figure 4.16) The factors include poor completion of maternity records, poor utilisation of a Partogram, incomplete recording and poor monitoring of gestational age during antenatal care, protocols not followed especially for mothers with eclampsia, failure of physicians on call to arrive on time.

The basic antenatal care (BANC) protocol indicates that mothers who do not meet its criterion of being classified under basic antenatal care from maternity case records should be referred to hospital but some records indicated that clinics continued with BANC even if the criterion was not met. In the majority of the cases there were delays by the health care personnel in taking appropriate action which accounted for 15.4% (n=25) of the cases (refer to table 4.17).

Furthermore, 72.8% (n=118) of the other factors related to patient or family contributed to the mortalities of babies. Factors, such as previous miscarriage, rhesus negative, advanced age, multi parity, low HB, and previous Caesarean section predisposed the baby to mortality (refer to figure 4.11).

A total of 57.8% (n=92) records indicated that other factors related to the illness of the neonate contributed to perinatal mortality. These factors include congenital anomalies, pyrexia (elevated temperature), intra-uterine growth retardation, intra-uterine foetal death, and baby cord prolapse (refer to figure 4.18).

Pre-term birth encompassed 45.1% (n=73) of the deaths and prematurity accounted for 37.0% (n=60) of the deaths (refer to figure 4.5 and table 4.18 respectively). The results of the study differ from the report on perinatal death in South Africa which found that respiratory and cardiovascular disorders specific to the perinatal period was the leading cause of death in all age groups for each of the three years (National Department 2014b:21). For each of the three years, the ten leading causes of death differed greatly in ranking and also in proportions by age.

The results of this study provide an overview of health personnel problems as the leading contributory factor to perinatal mortality. This was followed by other factors related to patient or family that contributed to the mortalities of babies. Other factors related to the illness and state of health of the infant contributed significantly to perinatal mortality and factors, such as congenital anomalies, pyrexia (elevated temperature), intra-uterine growth retardation, intra-uterine foetal death, and baby cord prolapse should be considered during neonatal care. Pre-term birth and prematurity are risk factors that should be managed immediately after birth, and all babies should be managed prior to being transferred to another health care institution.

4.5 NUMBER OF DAYS IN NEONATAL UNIT ON DISCHARGE OR DEATH

About 95.1% (n=154) (refer to figure 4.8) of the babies remained in the unit for less than seven days, with 3.1% (n=5) staying between 8 days and 14 days and 5.5 (n=9%) of the babies remained for less than 30 days. Three 1.9% (n=3) babies remained 15 and 30 days and no babies stayed for more than 30 days in the unit (refer to figure 4.5). A study conducted on the causes of neonatal and maternal deaths indicated that most of neonatal deaths occurred during the first seven (0-7) days (Khatun, Rasheed, Moran, Alam, Shomik, Sultana, Choudhury, Iqbal & Bhuiya 2012:4). According to Bucens et al (2013:454), the majority of babies stayed for less than 7 days in the neonatal unit.

Effective care of babies in the first week of care can reduce perinatal mortality. The package of essential care includes antenatal care for the mother, obstetric care and birth attendant's ability to resuscitate new-borns at birth. Most of the infections related to mortality could be avoided by identifying perinatal risk factors.

4 6 CONCLUSION

In this chapter, the analysed data is presented in graphs and tables. The results were described and discussed and references to other studies were also made in relation to the results of this study. Chapter 5 discusses the summary and recommendations of the study.

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter discussed the results of the study. The data was analysed, presented and interpreted. This chapter summarises and discusses the results and presents the conclusions and recommendations of the researcher in regard to the problem statement and objectives of the study. The study's objectives were to determine the causes of the increased perinatal mortality rate, to identify and describe other factors that contributed to an increase in the perinatal mortality rate in a specific rural health care facility, and to formulate and present the recommendations to the Limpopo Department of Health based on the results in order to assist in the reduction of perinatal mortality in Limpopo province. A summary and interpretation of the research results focused on the outcomes of reducing the perinatal mortality rate in Limpopo province.

5.2 SUMMARY OF THE RESEARCH RESULTS

5.2.1 Outcome of the baby's delivery

The results of the study as indicated in table 4.1 show that the nearly two thirds 61.7% (n=100) of the infants were still-born, 37.0% (n=60) were neonatal deaths and in two (1.2%) of the cases the records had no information about the death of the baby. More than half (n=100) of the babies died in the first week of their lives with the highest perinatal mortality rate on the first day of life. The results of a study conducted by Bayou and Berhan (2012:154) in Ethiopia on perinatal mortality and associated factors concurs with these results as it found that still-births accounted for 87% of perinatal mortalities.

5.2.2 Baby's birth weight

The results in table 4.2 indicate the weights of the babies who died. More than one-third 35.2% (n=57) of the babies weighed between 2501 grams and higher, followed by babies who weighed between 1501 and 2500 grams 28.4% (n=46), 24.7% (n=40) of the babies weighed 801 to 1500 grams, 9.3% (n=15) weighed 401 to 800g and lastly only one baby 0.6% (n=1) died with a weight of less than 400 grams.

Three records 1.9% did not record the weight of the babies, and therefore, the researcher reported them as missing information. This result seems to suggest the probability that the higher the weight of the baby in this study, the bigger the chances of perinatal mortality. High admissions were also observed amongst babies with birth weights of over 2500 grams. This result is not consistent with the report about perinatal deaths in South Africa (National Department 2014b:1). That study found that statistics about the distribution of still-born babies by birth weight is essential, as low birth weight is associated with the mortality of many new-borns, developmental problems and health risks.

5.2.3 Baby's Apgar score in the first and fifth minute

The scores of over half 58.0% (n=94) of the babies were at 0/10 to 0/10, followed by 10.5% (n=17) at 9/10 in the first and fifth minutes, 3.1% (n=5); 6/10 to 7/10; 3.1% (n=5) 8/10 to 9/10; 3.1% (n=5) 7/10 to 7/10; 1.9% (n=3) 2/10 to 2/10; 1.9% (n=3) 6/10 to 8/10; 1.2% (n=2) 7/10 to 9/10; and 1.2% (n=2) 8/10 to 8/10. The following accounted for 0.6% on Apgar score classifications: 1/10 to 1/10; 0.6% (n=1); 3/10 to 3/10 0.62% (n=1) and 7/10 to 8/10 0.62%. (n=1). There were cases which appeared in the register, where there was no classification of Apgar scores of the deceased babies 8.6% (n=14). These cases were reported as missing results. The following scores 4.3% (n=7) of the babies were delivered at home without classifications of Apgar scores.

The lower the Apgar score at the first and fifth minutes after birth, the lower the chances of survival. More than fifty percent (58%; n=94) of these perinatal mortality cases occurred with scores of 0/10 and 0/10 in the first and fifth minutes of the baby's death. All of these records were found to be still-births.

The study conducted in China by Li, Zhang, Ling and Jin (2011: 409) on the effect of a prolonged second stage of labour on maternal and neonatal outcomes found that the Apgar score used to estimate the survival of the infants was antiquated and its predictive value has been considerably weakened by the introduction of prompt and effective neonatal care.

5.2.4 Age on admission

The results in table 4.3 indicated the age on admission of the babies. The highest number for age on admission was at 0 to 6 hours 72.8% (n=118), followed by 6 to 24 hours 13.6% (n=22), one day to seven days 10.5% (n=17) and more than seven days 2.5% (n=4). Only 0.6% (n=1) was reported as missing as there was no classification in the records. The majority 86.4% (n=140) of the babies were admitted within 24 hours. The first 24 hours of life of the babies are the most crucial hours when the admission of the baby needs the full attention of health care providers. These babies should be assessed from head to toe, a proper diagnosis should be made, a plan of action should be executed, implementations of treatment should be carried out, and an evaluation should be done according to treatment. The study conducted by Ali, Ahmed and Lohana (2013:428) in Pakistan on disease patterns and outcomes of neonatal admissions at a secondary care hospital which indicated that 51% of the babies were admitted within 24 hours concurs with the results of this study where the majority were admitted within 24 hours.

5.2.5 Reasons for admission

Prematurity as indicated in figure 4.2 accounted for 17.3% (n=28) of the cases as the reason for the admission of the babies who died compared to only three (1.9%) who died of neonatal infection. In over half 57.4% (n=93) of the cases the reason for admission was not recorded. There were some other reasons 23.5% (n=38) that were recorded besides those provided in the checklist. The results of the study conducted by Ali, Ahmed and Lohana (2013:428) in Pakistan on disease pattern and outcome of neonatal admissions at a secondary care hospital indicate that the main reasons for admissions were prematurity 27.9% and infection 20.3% respectively.

5.2.6 Problems on admission

Over one-quarter 27.2% (n=44) of the problems on admission shown in table 4.4 were associated with the signs of respiratory distress, Signs of shock and bleeding, hypoglycaemia, convulsions, signs of infection, and babies who failed to suck comprised only 11.7% (n=20) of the cases. As nearly half 48.8% (n=79) of the problems on admission were not recorded these cases could have an impact on the results.

The majority of problems on admission were related to signs of respiratory distress as it accounted for more than one-quarter of the results. Attention should be directed to the highest number of cases not classified according to problems on admission. Collection of information during admission of the baby or the mother should be prioritised, record auditing should be done in the health care facility to identify the challenges of data collection and recording.

Problems associated with respiratory distress should also be addressed as they are regarded as the second highest contributory factor in perinatal mortality. Resuscitation should be prioritised for the baby experiencing respiratory distress. The study coincides with the study conducted by Narayan (2012:80) in Sri Lanka on patterns of admission and outcomes in an intensive care unit at high altitude where the results revealed that the following problems are related to admissions, neonatal jaundice 54%, prematurity 27%, respiratory distress 11%, meconium aspiration 9% and hypoglycaemia 5%.

5.2.7 Appropriate management taken

The results in figure 4.3 show that the majority 94.4% (n=153) of the babies were not referred out of the health care facility, only 4.3% (n=7) were referred to the next level of care but managed within the health care establishment.

The study conducted in an Ethiopian referral hospital identified the challenges related to the management of babies during admission and acted decisively on them and that yielded the positive outcome of reducing the perinatal mortality rate. The challenges identified were that of all the 55 cases admitted the temperatures of 75% (n=43) of the cases were recorded before the babies were referred to other institutions.

It was found that 67% (n=29) of the cases were unidentified hypothermic. Holistically, all the vital signs of the babies should be taken before referral and the abnormalities stabilised before referral (Fulton 2013:1).

5.2.8 Further assessment conducted

Babies were assessed to identify the perinatal risk factors. The results indicated in table 4.5 show that nearly all 98.8% (n=160) of the babies were assessed and only two 1.2% (n=2) records did not indicate whether they were assessed. If assessment was done, action should be taken if the outcomes which predicted perinatal risk factors could predispose the babies to perinatal mortality. The results of the study conducted in Kenya by Aluvaala, Nyamai, Were, Wasunna, Kosgei, Karumbi, Gathara and English (2015: 45) regarding the assessment of neonatal care in clinical training facilities match the results of this study as it revealed that in 95% of these facilities the required neonatal forms used to assess babies during admission were available

5.2.9 Maternal risk factors

The results in figure 4.4 reflect the maternal risk factors as follows, 4.3% (n=7) was maternal infections, 14.8% (n=24) was the maternal hypertensive disorders, 1.2% (n=2) was due to gestational diabetes, 53.7% (n=87) records did not reflect maternal risk factors and 25.9% (n=42) identified other factors related to maternal risk factors.

The health care providers should identify and complete information about maternal risk factors to all mothers during antenatal care and labour to reduce complications that could lead to perinatal mortality. The results of the study conducted by Owais, Syed, Farugue, Das, Ahmed, Rahman and Stein (2013:3) on the maternal and antenatal risk factors for stillbirth and perinatal mortality in rural Bangladesh differs with the results of this study. In that study hypertension (6%), and antepartum haemorrhage, were significant risk factors related to perinatal mortality

5.2.10 Perinatal risks

It is shown in table 4.6 that in 95.1% (n=154) of the cases, perinatal risks were identified although there were no follow-up questions to identify the type of risk. The results of the study conducted in Brazil identified risks associated with perinatal mortality.

The following risks were identified as intra-uterine infection, premature rupture of ovular membranes and twin pregnancy (Moura, Maesta, Rugolo, Angulski, Peracoli & Rudge 2014:1).

5.2.11 Perinatal risk factors

The results in figure 4.5 show that pre-term accounted for 45.1% (n=73) of the total babies admitted in the perinatal unit. The second highest indicated that the cause was meconium-stained liquid 16.1% (n=26), 14.8% (n=24) were small for gestational age, 6.2% (n=10) were large for gestational age, 2.5% (n=4) were post-term, and other perinatal risk factors accounted for 13.6% (n=22).

Pre-term babies were the highest in number compared to any other risk factors; pre-term births predispose babies to perinatal mortality. The other factor that needed attention was meconium-stained liquid.

The results of a study conducted in Kenya by Yego, D'Este, Byles, Nyongesac and Williams (2014:5) regarding a case-control study of risk factors for foetal and early neonatal deaths in a tertiary hospital differ from the results of this study as it identified the following factors related to perinatal mortality: respiratory distress (33%), neonatal complications (16%) and congenital malformation (11%).

5.2.12 Estimated gestational age

The results listed in table 4.7 show that the estimated gestational age is as follows: 42.0% (n=68) were pre-term babies, 45.7% (n=74) were term babies, 7.4% (n=12) were post-term and 4.9% (n=8) were not recorded. The information not recorded shows that no classification was made according to an estimated gestational age.

The majority of the babies who died were at term followed by pre-term babies and post-term babies. Pre-term is a direct cause of mortality but also aggravates the other risk factors where the percentage of small infants for their gestational age may increase.

The study conducted by Marchant, Willey, Katz, Clarke, Kariuki, Kuile, Lusingu, Ndyomugenyi, Schmiegelow, Watson-Jones and Schellenberg (2012:9) in East African countries (Kenya, Uganda and Tanzania) on the neonatal risk associated with pre-term births reported similar results concluding that 52% of these perinatal mortality cases were born as pre-term babies, and 12.9% of the baby's outcomes occurred at term.

5.2.13 Classification of neonate according to weight for gestational age

The records in figure 4.6 show that 43.2% (n=70) of the babies were small for gestational age, 12.4% (n=20) of the babies were born at an average weight for their gestational age and 5.6% (n=9) of the babies were large for their gestational age. Babies who were normal for their gestational age contributed to 32.1% (n=52) of perinatal mortalities. At least 6.2% (n=10) and only 0.6% (n=1) case was not recorded for classification and the researcher reported it as missing. There is a relationship between small for gestational age and the classification of neonates according to weight for gestational age. This relationship reflected in these results was that the smaller the gestational age of the baby, the lower the chance of survival. The results of the study by Mohangoo, Blondel, Gissler, Velebil, Macfarlane and Zeitlin (2013:3) conducted in London on international comparisons of foetal and perinatal mortality rates in high-income countries concur with this study. It found that the foetal mortality rates based on gestational age were significantly higher than those based on birth weight. Another study by Pilliod, Cheng, Jonathan, Smowenden, Amy, Doss, Aaron and Causey (2012:2) conducted in the United States of America on the risk of intra-uterine foetal death in the small for gestational age group agreed with the results of this study by showing that the risk of intra-uterine foetal death is greater for infants who are small for gestational age.

5.2.14 Plan of care available

The results in table 4.8 indicate that most 99.4% (n=161) of the babies were allocated a plan of care record from antenatal care visits and admission in the health care facility until the baby was classified as a still-birth or neonatal death. The plan of care was written on admission, apart from the plan of care written either by the doctor or a nurse. However, the outcome of these babies' stay in the facility was mortality.

The plan of care needs to address the basic care of the mother and the baby from the day of conception until the 30 days after the delivery to reduce this perinatal mortality rate. Only one (0.6%) (n=1) record had no plan of care for continuous re-assessment and change by the hospital caring for the patient. The study conducted by Dizikes (2014:1) in Thailand about how improved hospital access lowered the infant death rate among the poor within a year has led to a 13% drop in infant mortality in about a year.

5.2.15 Resuscitation done

Two-thirds 68.5% (n=111) of the babies as shown in figure 4.7 were not resuscitated, even those who required resuscitation, and according to the records, no valid reason was given as to why resuscitation was not done on these babies. The results of the study by Lloyd (2013:519) about perinatal mortality in South Africa and how it can be decreased, indicates that the cost-effective intervention, such as resuscitation of the new-born baby, can dramatically reduce the number of deaths due to asphyxia by 30.8%.

5.2.16 Gestational age in weeks

Table 4.9 indicated that more than half 29.0% (n=47) of the babies died at 28 to 32 weeks of gestational age. The results in respect of the pre-term and perinatal mortality rates were in direct proportion to each other. More than 20% of the babies died at term and these are the babies that should have survived because they were delivered at the correct time. More effort should be channelled in ensuring that the babies delivered at term survive.

These results agree with the results of the study conducted by Martinez, Aguilar, Lucena, Vinuesa and Extremera (2013:46) in Spain on perinatal mortality in new-born infants with a birth weight of less than 1000 grams in hospital in San Cecilio, Granada which revealed the following distribution of mortality over the perinatal period in new born infants: 39% of the infants were born at less than 24 weeks, 25% from 24 to 26 weeks, 22% between 27 and 28 weeks, 7% from 29 to 30 weeks and 4% from 31 to 32 weeks and 1% at more than 32 weeks. The patterns of these results indicate that more babies were lost during the early weeks of gestational age as shown in the results of this study.

5.2.17 Days after giving birth

The results in figure 4.8 indicate that the majority 95.1% (n=154) of the babies stayed in the unit for a period ranging between one to seven days, 3.1% (n=5) of the babies stayed between eight and 14 days and only three (1.9%) of the babies stayed more than 14 days, but less than 30 days. The results of the study coincide with the report in National Department (2015a:1) about South Africa's dying babies that indicated that more than 50% of the early neonatal deaths occur between 24 hours (1day) and 167 hours (7days) after birth and 65% of these mortalities take place in a hospital.

5.2.18 Interventions taken by health care workers

The results in table 4.10 reveal that in 97.5% (n=158) of the cases non-medication treatment was implemented, these babies were treated without medication while in the care of the facility. The researcher assumes that interventions were not documented and recommends that at all the times when the babies are seen or that interventions are done these actions must be written down. Only two 1.2% (n=2) of the babies were nursed with medication or pharmacological drugs and 1.2 % (n=2) of the records showed that there was no other intervention.

The study conducted by Moura, Costa, Rodrigues, Almeida, Maia and Guimaraes (2011:1570) in Portugal regarding the end of life in the neonatal intensive care unit differs from the findings of this study because 95.7% of the infants received pharmacological drug and invasive ventilator support, 75% received antibiotics, and 58.1% received Inotropic.

5.2.19 Other referral to neuro-surgeon

According to figure 4.9, the following results were revealed in respect of the referral of babies to a neuro-surgeon. Most 98.8% (n=160) of these babies were not referred to the neuro-surgeon with only one (0.6%) being referred to the neuro-surgeon. The facility was able to manage the babies before it was necessary to refer them to a neuro- surgeon as indicated in the records.

The study conducted in 23 countries on child neurology in Africa indicated that only five countries (South Africa, Senegal, Nigeria, Egypt and Cameroon) had paediatric neurology groups. The study further indicates that although there was a clear referral system in South Africa, babies were not referred on time as the level of training related to neurological problems of the babies is inadequate (Wilmshurst, Badoe, Wammanda, Mallewa, Kakooza-Mwesige, Venter & Newton 2011:1555). Therefore, a need for training and referral guidelines to aid primary health cases is recommended in these incidences.

5.2.20 Recommendations done by patient safety incidents committee

Following the results in table 4.11, no recommendations were done by the Patient Safety Incident committee as to whether the mortalities were avoidable or not avoidable because the facility does not have a PSI committee. The report of the committee on morbidity and mortality in children under five years of age recommends that the committees in the facilities which treat children under five years must be held responsible by the institution and the factors contributing to these incidents must be discussed.

The report further proposes that the committee should discuss the (ACCESS) issues, namely; the accountability of managers of institutions to reduce perinatal mortality; the connection with other institutions if referral is required; the capacity of the health care workers to deal with the morbidity of babies; the essential steps to deal with the sick babies; standard operating procedures and guidelines on the implementation used in maternity cases; and support of the staff and managers experiencing patient safety incidents (Department of Health 2014:85).

5.2.21 Factors identified from the patient's family or patient: Delay in seeking help

The outcome from the results in figure 4.10 indicate that in 2.5 % (n=4) of the cases the patient's family delayed in going to the health care facility to seek help but in the remaining cases 97.5% (n=158) the family sought help in time. However, irrespective of the help needed by the mother or family, the outcome was perinatal mortality. Although the majority of the records indicated that the patient or family came to seek help, the same babies died in the same health care facility.

The results of the study conducted by Pacagnella, Cecatti, Parpinelli, Sousa, Haddad, Costa, Sousa and Pattison (2014:947) in Brazil about delays in receiving obstetric care and poor maternal outcomes reveal different results to this study's findings. More than half (53.8%) of the neonatal deaths were related to different kinds of delays, such as the user-related factors which include kinds of behaviour, and knowledge of, and attitudes toward the use of the health system. The accessibility of facilities, transportation, distribution of services, medical supplies, equipment and general costs also play a vital role in reducing perinatal mortality.

5.2.22 Declined treatment by the family or patient

The results consolidated from table 4.12 show that 98.8% (n=160) of the patients or families accepted hospital treatment at the entrance of the health care facility, only one 0.6% refused health care facility treatment and another one (0.6%) was recorded as missing. These results indicate that mothers agreed to their babies being treated by the health care facility.

The results of the study conducted in Boston by Deshpande & Oxford (2012:144) on the management of pregnant patients who refuse medically indicated caesarean section delivery concurred with this study. It concludes that there is a fine balance between the ethical principles that are to be applied in patient care when pregnant mothers are involved. In order to address the dilemma that may arise between mother and foetus, one must understand the historic and social context of a pregnant woman's refusal of a medically indicated caesarean delivery.

Obstetricians and advanced midwives should work with empathy to encourage a pregnant woman to accept a caesarean birth if the risk of morbidity or mortality to the foetus is high.

5.2.23 Other factors contributing to increasing perinatal mortality according to patient or family

The results in figure 4.11 show that in nearly three quarter 72.8% (n=118) of the cases other factors contributed to the increased perinatal mortality of the babies according to the patient or family. More than one-quarter 26.5% (n=43) indicated no association of the mortality with any other factor. Only one record was reported as missing. The other factors, namely, previous miscarriage, Rhesus negative, advanced age, multi parity; low haemoglobin, and previous Caesarean section predisposed the baby to mortality. Maternal care from the day of conception until the day of delivery should be of great importance.

These factors should be treated according to their severity. If the mother needs to be referred to the next level of care immediately then referral should be arranged. Based on these results, it would appear that the antenatal care history-taking is not comprehensive in the health care facility and referral institutions. Maternal risk factors should be identified and if the mother is not classified under basic antenatal care she should be referred to the next level of care according to maternity guidelines.

According to Andargie, Berhane, Worku and Kebede (2013:168), in the developing countries there are a number of risk factors associated with pre-term births, such as poor socio-economic status, very young maternal age, poor diet, cigarette-smoking and infections. Birth intervals of less than two years was also associated with increased perinatal mortality. Chronic conditions like maternal hypertension and diabetes mellitus increase the risk of stillbirths. Obstetric complications, such as multiple pregnancy and prolonged labour increase the perinatal mortality if the woman has not been managed properly. The results of the aforementioned study show that the data on other contributory factors related to the patient or family are similar to the results of current study. Both studies indicate that there are other factors contributing to the increase in the perinatal mortality rate.

5.2.24 Logistics: Delay of emergency medical service

The results in table 4.13 show that in most 98.8% (n=160) of the cases there were no delays by the emergency medical services (EMS). Generally, according to these results the emergency services do not delay the patient during referral.

The results of the study conducted by Indongo (2014:470) in Namibia about risk factors and causes of neonatal deaths coincide with this study's results in that only 0.5% of the mothers of the babies who died experienced a delay due to transport or financial barriers

5.2.25 Logistics: Accessibility or availability of transport

The results in figure 4.12 show that 98.8% (n=160) of the mothers did not experience a shortage of transport and that it was either private or emergency medical services. Private transportation of patients to the facility reduces the turnaround time for the EMS. In reducing the turnaround time to the health facility the EMS could decrease perinatal mortality.

The study conducted in Brazil by Pacagnella, Cecatti, Parpinelli, Sousa, Haddad, Sousa and Pattison (2014:947) on delays in receiving obstetric care and poor maternal outcomes revealed different results to this study. More than half (53.8%) of the neonatal deaths were related to classifications of different delays, such as user-related factors which include behaviour, knowledge and attitudes about the use of the health system. The accessibility, transportation, distribution of services, medical supplies, equipment and general costs were also identified as factors.

5.2.26 Logistics: Other factors that contribute to increased perinatal mortality

Logistical contributory factors cannot be regarded as contributing to perinatal mortality because it only contributed to 2.5% (n=4) of the total of mortality cases.

5.2.27 Facilities: Lack of services after hours

The outcomes of the results in figure 4.13 reveal that most 99.4% (n=161) of the patients received 24- hour services from the facility of referral (clinics and community health centres) and the referring facility. The records further indicated that the referring facility was also rendering 24-hour services. The report of the National perinatal morbidity and mortality committee (NapeMMCo) concurs with this study by indicating that the 22 community centres that were being studied were providing 24-hour services (Department of Health 2013b:12).

5.2.28 Facilities: Lack of equipment

The results in table 4.15 show that most 99.4% (n=161) of the facilities have equipment and consumables, including intravenous infusion lines and medication. Only one (0.6%) indicated that they have experienced a lack of equipment. The 'Saving mothers' report indicates that a lack of equipment does not contribute to perinatal mortality (Department of Health 2013b:27).

5.2.29 Facilities: Other factors contributing to increased mortality rate

In figure 4.14, the results indicate that in 98.2% (n=159) of the cases other factors related to facilities did not contribute to increased perinatal mortality. No other factors contributed to perinatal mortality in the facilities.

5.2.30 Health personnel problems: Poor labour monitoring

The results in table 4.16 show a total of 28.4% (n=46) agreed that the health personnel problems at the facility are related to poor labour monitoring as the contributory factor. However, 71.0% (n=115) indicated that poor labour monitoring by health personnel was not a problem. This study concurs with the 'Saving mothers' report which indicates that delays in seeking medical attention during labour account for 10% of the total perinatal mortality rate (Department of Health 2013b:24).

5.2.31 Health personnel problems: Lack of education about transport

The results of the study in figure 4.15 shows that in 98.2% (n=159) of the cases health personnel were educated about the transport arrangements, two (1.2%) records indicated that they were not educated about the transport arrangements and in one (0.6%) case health personnel were not sure whether the transport was a contributing factor to increased perinatal mortality. From the records it appears that the majority of the mothers were educated about the importance of the transport.

The results of the study conducted by Indongo (2014:470) in Namibia about risk factors and causes of neonatal deaths coincide with this study's results in that only 0.5% of the mothers of the babies who died experienced a delay due to transport or financial barriers.

5.2.32 Health personnel problems: Delays in taking appropriate action to reduce perinatal mortality

Table 4.17 indicates that in 84.0% (n=136) of the cases no delay in taking appropriate action to reduce perinatal mortality by health personnel was experienced. The results of the study conducted in India by Upadhyay, Rai and Krishnan (2013:101) on the three delays model to understand the social factors responsible for neonatal deaths in rural Haryana agree with the current study in determining that out of 50 new-born deaths 44% (n=22) was as a result of the care worker delaying in deciding to seek care. This includes transport problems and delays in referring the babies to the next level of care as the health care worker had the perception that the babies would never get any help.

5.2.33 Health personnel problems: Other factors contributing to increased perinatal mortality rate

Figure 4.16 shows that in 75.3% (n=122) of the cases other factors related to health personnel problems contribute to perinatal mortality. Only 24.1% (n=39) of the records indicated that there are no other factors related to health personnel problems that contribute to increased perinatal mortality.

The 'Saving babies' report, 2010-2011 (Department of Health 2013b: 16) supports the results of this study by identifying worker-related problems in 44% of the cases in which babies died. The following five factors were identified: foetal distress was monitored but not detected, foetal distress was not monitored, no intervention was taken in a prolonged second stage of labour, delays in referring the patient and delays in calling in expert assistance.

5.2.34 Health or, and illness of the neonate: Prematurity

The results in table 4.18 reveal that prematurity is a risk factor which accounts for 37.0% (n=60) of the total of babies admitted in the neonatal unit, 63.0% (n=102) of the records did not note any sign of prematurity throughout the admission of the mother or the baby. Prematurity remains one of the contributory factors in the perinatal mortality rate.

The results of the study conducted by Iyoke, Lawani, Ezugu, Ilechukwu, Nkwo, Mba and Asinobi (2014: 884) regarding the prevalence and perinatal mortality associated with pre-term birth in a tertiary medical centre in the South East of Nigeria concurs with this study's findings by suggesting that overall spontaneous pre-term births occurred in approximately 41% of the total births.

5.2.35 Health or, and illness of the neonate: Pneumonia

The results in figure 4.17 indicate that not one 100% (n=162) of the babies experienced a pneumonic attack. The results indicate that none of the babies experienced pneumonia as an illness during their stay in the facility. Pneumonia did not contribute to the perinatal mortality rate in this study.

The study results reported by Ntuli, Malangu and Alberts (2013:96) and Ntuli and Malangu (2012:142) on the causes of deaths in children under five at a tertiary hospital in Limpopo differ from the results of this study in concluding that 31.8% of the cases were caused by pneumonia and regarded it as the prevalent cause of the mortality rate.

5.2.36 Health or, and illness of the neonate: Birth asphyxia.

The results in table 4.19 show that birth asphyxia is not a contributory factor of perinatal mortality. Almost none 99.4% (n=161) of the records indicated birth asphyxia as a contributory factor. The results of the study conducted by Ersdal, Mduma, Svensen and Perlman (2012:1228) in a Tanzanian rural hospital on birth asphyxia as a major cause of perinatal mortality differs from this study as the results indicate that 61% of the infants died due birth asphyxia.

5.2.37 Health or, and illness of the neonate: Other factors contributing to increased perinatal mortality

The results in figure 4.18 indicate that in more than half 56.8%; (n=92) of the records, other factors related to the state of health or illness of the neonate contribute to perinatal mortality. These factors include congenital anomalies, pyrexia (elevated temperature), intra-uterine growth retardation (IUGR), intra-uterine foetal death (IUFD), baby cord prolapse, and maternal infections. Furthermore, 43.2% (n=70) of the records indicate that no other factors contribute to perinatal mortality. The results of the study conducted by Bayou and Berhan (2012:154) in Ethiopia regarding perinatal mortality and associated risk factors is in agreement with the results of this study by indicating that malpresentation also contributes to perinatal mortality.

5.3 RECOMMENDATIONS

5.3.1 Education

In view of the abovementioned findings, the following recommendations are put forward to bring about a decrease in the mortality rates among perinatal infants:

Educate health care providers on:

- Strengthening scientific services of all health care workers in maternity and neonatal units on an uninterrupted basis;
- In-service midwives and accouchers working maternity units and neonatal units on resuscitation of the new-born.

- Teaching and training health care providers on the importance of record-keeping.

Educate patients

- about late booking or inadequate antenatal care;
- to avoid delays in seeking help during labour and
- to recognise danger signs in pregnancy and symptoms of labour.

5.3.2 Clinical practice

- Emphasise the importance of records audit develop quality improvement plans.
- Implement national, provincial, district and health care facility policies, protocols and procedures to reduce perinatal mortality.
- Strengthen health services packages available on neonatal and maternal health care services.

5.3.3 Management

- Establish point of reference (benchmarking) from other countries on good methods to reduce perinatal morbidity and mortality rates.
- Reviewing of maternity procedures and strategies endlessly on quality perinatal and maternal health care.
- Implement quality improvement plan on perinatal and maternal health care services.

5.3.4 Future research

- Determine the barriers that hinder health care workers in record keeping during maternal and perinatal health care services
- Evaluate the knowledge and attitudes of health care workers on maternal and neonatal care.
- Assess the application of maternal and neonatal health care services by the public.

- Assess the readiness accessibility and availability of human and material resources in maternal and neonatal health care services.
- Evaluate the National Health Insurance (NHI) impact on mother and child health services.

5.4 LIMITATIONS OF THE STUDY

The study was conducted in one regional facility and the results of the study cannot be generalised to the whole of the Limpopo province. Some records contained loose sheets of paper and, therefore, information could have been lost. Data collection was time-consuming as the researcher had to peruse each file to get information. The challenge of this process of sampling and data collection was that information in some of the records in the record section was missing.

5.5 CONCLUDING REMARKS

High perinatal mortality rates are still a major problem in other countries worldwide, including Sub-Saharan regions of Africa. These high rates contribute to the burden of disease in all countries. Maternal health and perinatal care play an important role in reducing perinatal mortality. The challenge is for the health care providers to plan on how to foster community participation and involvement to reach the stakeholders so that perinatal care and mortality can be reduced.

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ANNEXURES

Annexure 1: Ethical Clearance from Health Studies Degree Committee (UNISA)



**RESEARCH ETHICS COMMITTEE: DEPARTMENT OF HEALTH STUDIES
REC-012714-039 (NHRC)**

1 February 2017

Dear Mr PC Maesela

Decision: Ethics Approval

MSHDC/580/2017

Mr PC Maesela

Student: 4443-912-1

Supervisor: Dr KA Maboe

Qualification: D Litt et Phil

Joint Supervisor: -

Name: Mr PC Maesela

Proposal: Factors contributing to increased perinatal and maternal mortality rate in Limpopo Province.

Qualification: MPCHS94

Thank you for the application for research ethics approval from the Research Ethics Committee: Department of Health Studies, for the above mentioned research. Final approval is granted for the duration of the research period as indicated in your application.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the Research Ethics Committee: Department of Health Studies on 1 February 2017.

The proposed research may now commence with the proviso that:

- 1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*
- 2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Research Ethics Review Committee, Department of Health Studies. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*



University of South Africa
Pretoria Street, Muckleneuk Ridge, City of Tlokweng
PO Box 292 UNISA 0003 South Africa
Telephone: +27 2 429 3111 Fax: +27 2 429 4130
www.unisa.ac.za

Annexure 2: Letter seeking permission to conduct the study at Sekhukhune district health care facility: Limpopo province

P.O BOX 1115

APEL

0739

14/09/2016

Limpopo Province (HOD)

The Department of Health

POLOKWANE

0700

SIR/MADAM

REQUEST TO CONDUCT STUDY

I am Maesela Phogole Crawford a research student pursuing Master of Public Health at the University of South Africa (UNISA) and currently employed by Department of Health at Tshwane District office as Quality assurance coordinator. My student number is 44439121.

I hereby request to conduct a study in Limpopo Province specifically in Sekhukhune District. The title of my study is **FACTORS CONTRIBUTING TO INCREASED PERINATAL RATE IN LIMPOPO PROVINCE** and the purpose is to identify and describe the factors that increase perinatal mortality rate in Limpopo Province, Sekhukhune District Health services. Based on the results the recommendations to reduce the mortalities will be based on personal/family/patient contribution, logistics, facilities or/and health personnel problems

Annexure 3: Approval letter from the Department of Health, Limpopo Province (HOD)



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Latif Shami'a (015 293 6650)

Ref:4/2/2

Maesela PC
UNISA

Greetings,

RE: Factors Contributing To Increased Perinatal And Maternal Mortality Rate In Limpopo Province

The above matter refers.

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

Your cooperation will be highly appreciated.


Head of Department

10/04/2017
Date

Annexure 4: Letter seeking permission to conduct the study at Sekhukhune district health care facility: Sekhukhune district office

P.O BOX 1115

APEL

0739

16/11/2016

District executive Manager

The Department of Health

Chuenespoort

0745

SIR/MADAM

REQUEST TO CONDUCT STUDY

I am Maesela Phogole Crawford a research student pursuing Master of Public Health at the University of South Africa (UNISA). My student number is 44439121.

I hereby request to conduct a study in Limpopo Province specifically in Sekhukhune District. The title of my study is **FACTORS CONTRIBUTING TO INCREASED PERINATAL AND MATERNAL MORTALITY RATE IN LIMPOPO PROVINCE** and the purpose is to identify and describe the factors that increase Perinatal and Maternal Mortality rate in Limpopo Province, Sekhukhune District Health services. Based on the results the recommendations to reduce the mortalities will be based on personal/family/patient contribution, logistics, facilities or/and health personnel problems.

Kindly refer to an Ethical Clearance certificate from UNISA as attached.

Annexure 5: Approval letter from the Department of Health, Sekhukhune District (DEM)



**DEPARTMENT OF HEALTH
SEKHUKHUNE DISTRICT**

REF : 4/2/2
ENQ : Mashiane P.N
Tel : 015 633 2352
Date : 03 May 2017

TO : CHIEF EXECUTIVE OFFICERS
Philadelphia, Mecklenburg and Dfokong Hospitals
: SUB-DISTRICT MANAGER FOR: Fetakgomo, Makhuduthamaga, Ephraim Mogale

From : HUMAN RESOURCE UTILIZATION AND CAPACITY DEVELOPMENT

SUBJECT: APPROVAL FOR PERMISSION TO CONDUCT RESEARCH IN RESPECT OF MR MAESELA PC

1. The above matter serves as reference.
2. The Head of Department has granted approval to conduct research in your institutions in respect of Maesela PC, the student at the University Of South Africa (UNISA) who has registered Masters Degree in Public Health. The title of his research is factors contributing to increased perinatal and maternal mortality rate within the province.
3. Take note that the approval is valid for Three (03) years.
4. The student will present himself, scope and schedule of his work in your institution during the assumption of research conduct and during the course of his study, he shall not take any action that will disrupt the services in the institution facility.
5. Hope the matter is found to be understandable.


District Executive Manager
Mrs. Maepa M.L.

04/05/2017
Date

Private Bag X04
Chuenespoort 0745. Tel: 015 633 2300. Fax 015 633 7927. Website: <http://www.limpopo.gov.za>
The heartland of southern Africa – development is about people

Annexure 6: Letter seeking permission to conduct the study at Sekhukhune district health care facility (CEO).

P.O BOX 1115

APEL

0739

16/11/2016

CHIEF EXECUTIVE OFFICER

The Department of Health

JANE FURSE

SIR/MADAM

REQUEST TO CONDUCT STUDY

I am Maesela Phogole Crawford a research student pursuing Master of Public Health at the University of South Africa (UNISA). My student number is 44439121.

I hereby request to conduct a study in Limpopo Province specifically in Sekhukhune District. The title of my study is **FACTORS CONTRIBUTING TO INCREASED PERINATAL AND MATERNAL MORTALITY RATE IN LIMPOPO PROVINCE** and the purpose is to identify and describe the factors that increase Perinatal and Maternal Mortality rate in Limpopo Province, Sekhukhune District Health services. Based on the results the recommendations to reduce the mortalities will be based on personal/family/patient contribution, logistics, facilities or/and health personnel problems.

Kindly refer to an Ethical Clearance certificate from UNISA as attached.

Annexure 7: Approval Letter from the Department of Health, the management of the health care facility (CEO).



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

**DEPARTMENT OF HEALTH
JANE FURSE MEMORIAL HOSPITAL**

ENQ: Dr. Marishane S.T.M
TEL: 013 265 9407
FAX: 013 265 9647

Jane Furse Hospital
Private Bag X 429
JANE FURSE
1085

09 May 2017

TO: WHOM IT MAY CONCERN.

FROM: CHIEF EXECUTIVE OFFICER JANE FURSE HOSPITAL (SEKHUKHUNE).

SUBJECT: PERMISSION TO CONDUCT RESEARCH BY MR. MAESELA P.C.

1. The above matter serves as reference.
2. Mr. Maesela P.C, Master student of Public Health at the University of South Africa (UNISA). He has obtained an approval to conduct a research on factors contributing to increased Perinatal and Maternal Mortality rate with the province.
3. Take note that the approval is valid for three years.
4. The scope will be limited to Maternity and Paediatric wards in Jane Furse Hospital. These activities shall not disrupt the services in the facility.
5. Hope for high cooperation.


D. MUMBANE
CEO (CHIEF EXECUTIVE OFFICER)

09/05/2017
DATE

Annexure 8: Letter seeking permission to conduct the study at Sekhukhune district health care facility: Limpopo province

P.O BOX 1115

APEL

0739

14/09/2016

Neonatal unit operational Manager

The Department of Health

POLOKWANE

0700

SIR/MADAM

REQUEST TO CONDUCT STUDY

I am Maesela Phogole Crawford a research student pursuing Master of Public Health at the University of South Africa (UNISA) and currently employed by Department of Health at Tshwane District office as Quality assurance coordinator. My student number is 44439121.

I hereby request to conduct a study in Limpopo Province specifically in Sekhukhune District. The title of my study is **FACTORS CONTRIBUTING TO INCREASED PERINATAL RATE IN LIMPOPO PROVINCE** and the purpose is to identify and describe the factors that increase perinatal mortality rate in Limpopo Province, Sekhukhune District Health services. Based on the results the recommendations to reduce the mortalities will be based on personal/family/patient contribution, logistics, facilities or/and health personnel problems

Annexure 9: Approval letter from Department of Health, neonatal unit of the health care facility: (Unit manager).



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

**DEPARTMENT OF HEALTH
JANE FURSE MEMORIAL HOSPITAL**

ENQ: Dr. Marishane S.T.M
TEL: 013 265 9407
FAX: 013 265 9647

Jane Furse Hospital
Private Bag X 429
JANE FURSE
1085

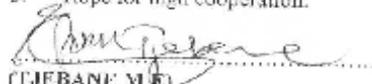
16 May 2017

TO: WHOM IT MAY CONCERN.

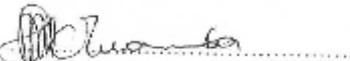
FROM: MATERNITY ASSISTANT DIRECTOR JANE FURSE HOSPITAL.

SUBJECT: PERMISSION TO CONDUCT RESEARCH BY MR. MAESELA P.C.

1. The above matter serves as reference.
2. Mr. Maesels P.C, Master student of Public Health at the University of South Africa (UNISA). He has obtained an approval to conduct a research on factors contributing to increased Perinatal and Maternal Mortality rate with the province.
3. Take note that the approval is valid for three years.
4. The scope will be limited to Maternity ward in Jane Furse Hospital. These activities shall not disrupt the services in the facility.
5. Hope for high cooperation.


(M. M. M. M. M.)
ASSISTANT DIRECTOR MATERNITY

16.05.2017
DATE


DR. MUAMBA N.C
ACTING (CEO)

16/05/2017
DATE

Annexure 10

Checklist

PLEASE NOTE THE MEANING OF THE FOLLOWING CODES:

66- UNKNOWN

77 - SELECTED MORE THAN ONE ANSWER
88 - NOT AVAILABLE
99 - MISSING DATA/ INFORMATION

SECTION A

1.1 What was the Outcomes of delivery?

(1) Stillbirth	(2) Neonatal death	(3) 77	(4) 88	(5) 99
----------------	--------------------	--------	--------	--------

1.2 What was the baby's Birth weight (in grams)?

--	--	--	--

1.3 Apgar score in 1st minute and 5 minutes

--	--

SECTION B

2.1 What was the Age on admission?

Age	Answer
(1) Less than 6 hours	
(2) 6-12 hours	
(3) 1 day to seven days	
(4) More than seven days	
(77)	

(88)	
(99)	

2.2 What was the Reason for admission?

Reason for admission	Answer
(1) birth asphyxia	
(2) Prematurity	
(3) Neonatal infections	
(4) Other : Specify	
(77)	
(88)	
(99)	

2.3 What were the problems during the admission process?

Problems on admission	Answer
(1) Signs of respiratory distress, Tachypnea, recession, grunting, cyanosis or nasal flaring	
(2) Sign of shock: bleeding, pallor	
(3) hypoglycaemia	
(4) Convulsions	
(5) sign of infection, jaundice, hypothermia, vomiting and distended abdomen	
(6) Other: Specify	
(77)	
(88)	
(99)	

2.4 Appropriate immediate management of problems

Appropriate immediate Management	Answer
(1) Referred	
(2) Not referred	
(3) Not recorded	
(4) if not done : state the reason	
(77)	
(88)	
(99)	

2.5 Was there any further assessment conducted to identify perinatal risks?

Assessment done	Answer
(1) Yes	
(2) No	
(3) Not recorded	
(77)	
(88)	
(99)	

2.6 Maternal risk factors

Maternal risk factors	Answer
(1) Maternal infections	
(2) Hypertensive disorder	
(3) Gestational diabetes	
(4) Assisted delivery	
(5) other: specify	
(77)	
(88)	
(99)	

2.7 Were there any perinatal risks?

2.7.1 If yes, please specify

Perinatal risks	Answer
(1) yes	
(2) No	
(3) Not recorded	
(77)	
(88)	
(99)	

2.8 Please indicate the perinatal risk factors involved

2.8.1 If yes, please specify

Perinatal risk factors	Answer
(1) Meconium stained liquor	
(2) Small for gestational age	
(3) Pre-term	
(4) Large for gestational age	
(5) Post-term	
(6) Other: Specify	
(77)	
(88)	
(99)	

2.9 What was the estimated gestational age?

Gestational age	Answer
(1) Pre-term	
(2) Term	
(3) Post-term	
(4) Term	
(77)	
(88)	
(99)	

SECTION C

3.1 Classification of neonate according to weight for gestational age

Classification	Answer
(1) Small for gestational age	
(2) Average for gestational age	
(3) Large for gestational age	
(4) Normal for gestational age	
(77)	
(88)	
(99)	

3.2 Was the Plan of care available?

Plan of care available	Answer
(1) Yes	
(2) No	
(3) Not recorded	
(77)	
(88)	
(99)	

3.3 Was the process Resuscitation conducted?

Resuscitation done	Answer
(1) Yes	
(2) No	
(3) Not done	
(4) Not recorded	
(77)	
(88)	
(99)	

3.4.1 If No, please state the reason

3.5 Gestational (weeks) or during delivery

Gestational week at delivery	Answer
(1) 28-32 weeks	
(2) 33-36 weeks	
(3) 37-40 weeks	
(4) 41 week and more	
(66) unknown	
(77)	
(88)	
(99)	

3.6 How many days after giving birth? (Days since delivery.)

Days since delivery	Answer
(1) One day to Seven days	
(2) Eight to fourteen days	
(3) fifteen to thirty days	
(4) Thirty one to forty two days	
(66) unknown	
(77)	
(88)	
(99)	

3.7 Which interventions were taken? (Tick in appropriate box)

Interventions	Answer
(1) Non medications (Non pharmacological intervention).	
(2) Medication or Pharmacological intervention.	
(3) Surgical intervention. E.g Caesarean section	
(4) Blood transfusion	
(5) Other	
(77)	
(88)	
(99)	

3.7.1 If other, specify

3.8 Was the death of the baby avoidable according to patient safety incident committee recommendation?

Recommendations by PSI committee	Answer
(1) Yes	
(2) No	
(3) No recommendations	
(77)	
(88)	
(99)	

3.9 Health care system	Yes	No	Not sure	77	88	99
3.9.1 Family or patient: Delay in a seeking help]						
3.9.2 Family or patient: Declined treatment by the mother]						
3.9.3 Family or patient: Other contributory factors increasing perinatal mortality]						
3.9.3.1 If other, specify						

<p>3.9.4 Logistic Availability/ accessibility of transport</p> <p>3.9.5 Logistic Delay of Emergency medical services (EMS)</p> <p>Logistic: Other contributory factors increasing perinatal mortality</p> <p>3.9.5.1 If other, specify</p>					
<p>3.9.6 Facilities: Lack of service after hours</p> <p>3.9.7 Facilities: Lack of equipment</p> <p>3.9.8 Facilities: Other contributory factors increasing perinatal mortality</p> <p>3.9.8.1 If other, specify</p>					
<p>3.9.9 Health personnel problems: Poor labour monitoring by staff.</p> <p>3.9.10 Health personnel problems: Lack of education about transport]</p> <p>3.9.11 Health personnel problems: Delays in appropriate action</p> <p>3.9.12 Health personnel problems: Other contributory factors increasing perinatal mortality</p> <p>3.9.12.1 If other, specify</p>					

<p>3.9.13 Health or/and illness of the neonate: Prematurity</p>						
<p>3.9.14 Health or/and illness of the neonate: Pneumonia</p>						
<p>3.9.15 Health or/and illness of the neonate: Birth asphyxia.</p>						
<p>3.9.16 Health or/and illness of the neonate: Other contributory factors increasing perinatal mortality.</p>						
<p>3.9.16.1 If other, specify</p>						

Annexure 11: Statistician report

Annexure 11

Data analysis is the systemic organisation and synthesis of the research data (Polit & Beck 2012:725). Data was managed and analysed quantitatively and descriptively. Information obtained during data collection which appeared on the checklist was analysed. Descriptive statistics described and summarised data collected by converting and condensing it into organised and visual representations.

This approach allowed the researcher to organise the data in the way that gave meaning, facilitated insight and examined the phenomenon from a variety of angles. The presentation of descriptive statistics and information were grouped according to variables on the tool and were described into words. It was further managed descriptively whereby the research results were presented and interpreted in the form of tables and figures.

A professional statistician assisted to analyse and summarise data using STATA Statistical Package for the Social Science (SPSS) version 14. Information was grouped according to the variables on the tool and described in words. The analysis was done according to the following sections of the data collection checklist.

Name: Londiwe

Surname: Msano

Date: 27 November 2017

Contact detail: 012 451 9046

Signature: 

Annexure 12: Language Editor's report

PROFESSOR KA MABOE
DEPARTMENT: HEALTH STUDIES,
UNIVERSITY OF SOUTH AFRICA

19 August 2018

**Re: EDITING OF DISSERTATION BY PHOGOLE CRAWFORD MAESELA
(STUDENT NUMBER: 44439121)**

Dear Prof Maboe

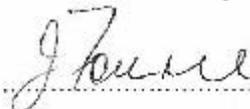
This is to confirm that I edited and proofread the dissertation entitled:

***Factors contributing to the increased perinatal mortality rate in Limpopo
Province***

by the abovementioned student of your department. It was submitted in accordance with the requirements for the degree Masters in Public Health.

Yours faithfully

Dr JA Fourie
Member of the Professional Editors' Guild
0825121841
jackie.j.fourie@gmail.com



Annexure 13: Technical Editor's Letter



To Whom It May Concern

Re: Technical Editing

This letter serves to inform you that the Master thesis for Mr Phogole Crawford Maesela, title: **FACTORS CONTRIBUTING TO THE INCREASED PERINATAL MORTALITY RATE IN LIMPOPO PROVINCE**, was technically edited and formatted.

Regard

Rinnie Matlou



To Whom It May Concern

Re: Technical Editing

This letter serves to inform you that the Master thesis for Mr Phogole Crawford Maesela, title: **FACTORS CONTRIBUTING TO THE INCREASED PERINATAL MORTALITY RATE IN LIMPOPO PROVINCE**, was technically edited and formatted.

Regard

Rinnie Matlou

A handwritten signature in black ink, appearing to read "Rinnie Matlou".



To Whom It May Concern

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Regard

Rinnie Matlou

A small, handwritten signature in black ink, appearing to read "Rinnie Matlou".