



## MANAGEMENT OF ASPHYXIA IN NEONATE AT BIRTH: RETROSPECTIVE DESCRIPTIVE COHORT STUDY

Johanna Hanyanya<sup>1</sup>, Emmanuel Magesa<sup>1</sup>

<sup>1</sup> School of Nursing, Welwitchia University, Windhoek, Namibia

Welwitchia University, Khomas region, Windhoek, Pelican square, Rafrenz.

---

### Article Info

#### \*Corresponding Author:

Emmanuel Magesa

Email: magesa2002@yahoo.com

---

---

### Abstract

Despite guidelines on essential and obstetric emergency care devised by the Ministry of Health and Social Services to address obstetric and neonatal related challenges in Namibia, the report on perinatal and neonatal death review of April 2014 - March 2016, indicated that birth asphyxia is in first position contributing 49.4 % to neonatal deaths. This reflects the severity of asphyxia as a public health concern in Namibia (MoHSS, 2014). The aim of the study was to assess the management of newborn babies with neonatal asphyxia at birth. A retrospective cohort study design in which descriptive data collected was analyzed by using Epi info version 7. The results of the study showed that there was a delay with early recognition and timely decision-making on the safest method of delivery, especially in cases of breech presentations, cephalopelvic disproportion (CPD) and prolonged first stage of labor. Referral of patients from district and regional hospitals to a national referral hospital takes too long. The results of the study further showed that many deliveries were conducted by registered midwives in the absence of a pediatrician or a medical doctor. Improvement of knowledge and skills in maternal and neonatal care is needed by health care providers in order to provide quality antenatal care for pregnant women, conduction of safe deliveries and provision of efficient care for the newborn babies who are at risk of asphyxia. Regulations of the referral system on maternal care should strictly be put in place regarding the hours mothers have to stay

---

---

in labor after complications have been detected to prevent avoidable neonatal deaths especially due to asphyxia.

**Keywords:** Management at birth, asphyxia.

---

## **Introduction:**

Globally, about 7000 children die in the first month of life every day. The death is six times greater in developing countries than in developed countries, and is mainly due to asphyxia (World Health Organization (WHO), 2018). A study conducted by Singh, Brodish & Haney (2014) in Sub-Saharan Africa showed that Africa has the slowest improvements in neonatal mortality rates with a decline of only 19% from 1990 to 2010 in contrast to the 43% decline witnessed in high income countries. Moreover, Africa accounts for 39% of neonatal deaths with the majority of these deaths occurring specifically in sub-Saharan Africa (Singh, et al. 2014). Besides, a study conducted by Maniruzzaman et al (2018), reveals that the highest risk of neonatal death in Africa occurs in Sub-Saharan regions of western, middle and eastern Africa, with an average of 42 and 49 neonatal deaths per 1000 live births compared to America and Caribbean where neonatal death is 15 to 19 per live births (Maniruzzaman, et 2018).

Like other African countries, Namibia is also challenged by high neonatal deaths. The Ministry of Health and Social Services (MoHSS), (2014) indicates that neonatal mortality increased from 27 per 1000 live births in 2006/7 with wide geographic disparities, ranging from 10 neonatal deaths per 1000 live births in the northwestern part of the country to 39 per 1000 live births in the north east. Namibia's child survival strategy of 2014 - 2018 reported that systematic analysis of under-5 mortality for 2008 showed that

neonates had died of birth asphyxia, prematurity, sepsis and pneumonia (MoHSS, 2014). Asphyxia is one of the major causes of early neonatal deaths in Namibia. According to neonatal death review report of April 2014 - March 2016, MoHSS, (2014) reveals that birth asphyxia is in first position in contributing 49.4 % of neonatal deaths. In distant second place is prematurity, contributing 12.7% deaths and in joint 3<sup>rd</sup> place are congenital abnormalities and neonatal sepsis contributing to 10.8% deaths in all regions of Namibia (MoHSS, 2014). According to District Health Information System (DHIS), incidences of neonatal deaths due to asphyxia at Windhoek Central Hospital, maternity units were 16/1000 live births for the year 2012, 42/1000 live births for the year 2013 and 51/1000 live births for the year 2014 (DHIS, 2014). It is evident that birth asphyxia is in first position as it contributes to 49.4 % of neonatal deaths in Namibia according to the perinatal and neonatal death review report of April 2015 - March 2017 (MoHSS, 2018). Despite an increase in asphyxia associated neonatal death at Windhoek Central Hospital, maternity units, little is stipulated in the guidelines of MoHSS on essential obstetric and emergency care regarding the management of neonatal care of a newborn with asphyxia. In fact, little is known if the guidelines on essential obstetric and neonatal emergency care are implemented for the management of newborn babies with asphyxia or not. The aim of this study is to assess how asphyxia in neonatal is managed in Windhoek Central Hospital.

Various studies were conducted regarding the problem of asphyxia in neonatal. In Nigeria, a study conducted by Adebami (2015) substantiates that asphyxia is responsible for long-term neurological disability and impairment. Moreover, Aslam, et al (2014) concluded that without oxygen, the respiratory-, and cardiovascular-, blood-, central nerves- and metabolic system cannot function properly.

Al Yazidi et al. (2015) pointed out that all the asphyxiated newborn babies require assistance to begin breathing at birth. Therefore, the guidelines on essential obstetric and emergency care indicate that at birth, a newborn is assessed for aspiration of amniotic fluid, breathing patterns, skin colour and Apgar score to rule out hypoxia. If any of the aforesaid is absent, or the Apgar score is 4 - 6 out of a total of 10, then immediate resuscitation is commenced with the initiation and maintenance of circulation, airway, breathing (CAB) and the administration of medications to provide substrate and stimulation for the heart in order to support the circulation of oxygen and nutrients to the brain as well as to correct metabolic acidosis (MOHSS, 2016).

Furthermore, evidence from trial studies conducted in sub-Saharan African countries such as South Africa (SA) and Malawi demonstrates that continuous positive airway pressure (CPAP) reduces the need for positive pressure ventilation for babies with respiratory distress (Amin, et al. 2014). The same report also states that 67% of babies on CPAP survived compared to 24% without CPAP but with oxygen only (Rewat, et al. 2016 & Seeni, et al 2018). However, excessive pressure may be detrimental, contributing to hyperinflation and increased pulmonary vascular resistance which can impair venous return, cardiac output and pulmonary blood flow (Wald,

et al. 2015 & Kananura, et al (2017). Therefore, excessive or inappropriate use of oxygen may be harmful; it needs to be avoided by administering the right amount of oxygen according to the prescription or standing order of the unit. A study conducted by Simen-Kapeu, et al (2015) reveals that the amount of oxygen delivered to the baby should depend on the flow rate and the weight of the baby. Thus, if the flow (per min) exceeds the weight (in kg) the concentration will be 100% (Lassi, Salam, Das, & Bhutta,2014; Simen-Kapeu, et al 2015 & Khan, Saeed, Bangash and Klfayat, 2015). Therefore, this study assesses the management of newborn babies with neonatal asphyxia related deaths at Windhoek Central Hospital. Which based on the theoretical framework of a caring process as a framework for providing clinical care to newborn babies, with the following pillars: Assessment, diagnosis, planning, implementation, recording and evaluation.

### **Goal and Objectives:**

The purpose of the study was to assess the management of newborn babies with asphyxia at birth, while an objective was to explore and describe the management of newborn babies with asphyxia at birth.

### **Research design and method:**

#### 1.1 Design

Retrospective descriptive design

#### 3.2 Study Population

A study population includes all the members, or units, of a group that can be clearly defined in terms of their distinguishing criteria, whether they are people, objects or events and about whom the research results can be generalized (Grove, Burns and Gray 2013). A total of 93 cases of neonatal deaths which are related to asphyxia

were identified, but only the records of 90 cases could be retrieved. All these 90 files of patients who died of asphyxia from March 2014 - April 2016 at the maternity unit were included in the study.

### 3.3 Inclusion and exclusion criteria

The study included all the files of newborn babies who were admitted and died within 28 days due to asphyxia.

### 3.4 Sampling and sample size

Non probability sampling was used and 90 patient files were collected

### 3.5 Data collection procedure

The data were obtained by means of the checklist. Information was retrieved from the patients' record files during the period of May - July 2016. The records were used retrospectively and only the information for the years January 2014 - December 2016 was collected. Documentary evidences documented on the management of the newborn with asphyxia were collected in order to identify factors associated with asphyxia related death at maternity units. The implementation of the essential emergency obstetric and essential care guideline by health care providers at the maternity units in care of each case of a newborn with asphyxia related death was assessed. Care that was provided or not provided was verified. The determinant factors for asphyxia associated deaths were therefore identified/determined.

### 3.6 Data analysis

In this study, descriptive data analysis was conducted using Epi Info software version 7. As a descriptive analysis, distributions of variables were displayed using frequencies and percentages to describe the demographic

characteristics of the newborn babies who died due to asphyxia. Frequency distribution and percentages were also produced to describe the management carried out on newborn babies with asphyxia related death. Coefficient correlation by Pearson, was determined in order to find the relationship between asphyxia and other independent variable at birth. Some of the results are displayed in charts, and some were presented by means of graphs.

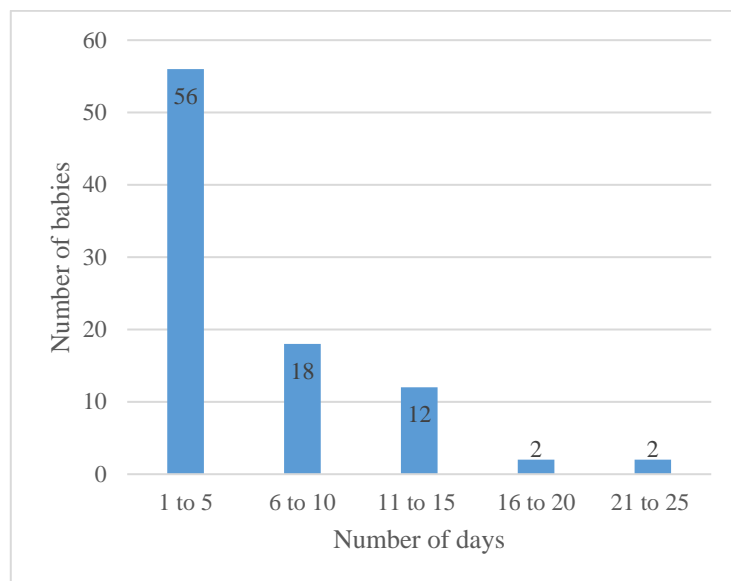
## 4 Ethical considerations

Overall permission to access clients' files to collect information was obtained from the Ministry of Health and Social Services. The findings were reported in general and no individual names from the files were revealed. The study did not incur any risk to human beings because secondary data were collected from the clients' files as the only source of information.

## Results:

### 5.1 Demographic information

#### 5.1.1 Age of babies in days before death.



**Figure 1: Number of days lived by asphyxiated babies before death**

The majority of asphyxia victims died within five days after birth. Out of 90 cases, 56 died within five days, representing 62% of the total sample. Another 20% lived between 6 to 10 days, 13% lived between 11 and 20 days and an equal percentage of 2% each lived between 16 to 20 days and 21 to 25 days respectively. The statistics above show that most newborn babies with asphyxia died within five days from the time of birth. The majority of newborn babies who died because of asphyxia were males, constituting 56% out of the 90 cases of the study population while female babies constituted the remaining 44%.

5.1.2. Maternal demographic (Gestation period in weeks )

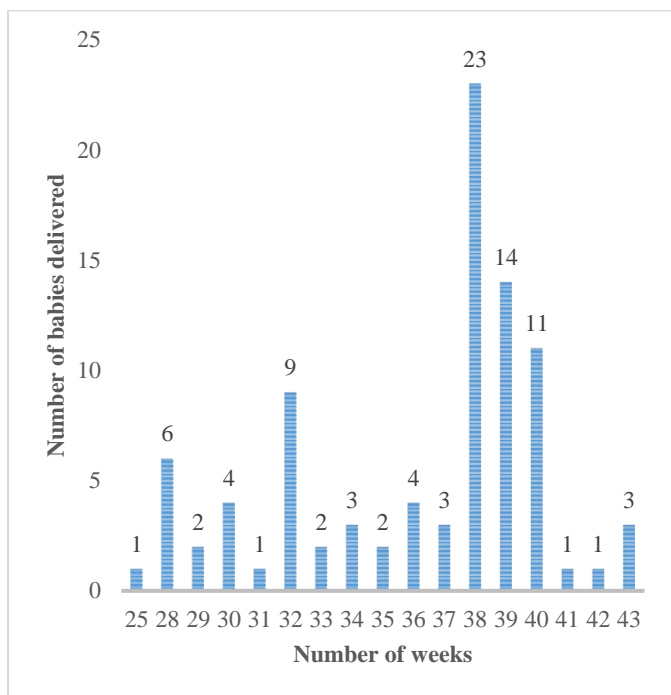


Figure 2: Gestation period

In this study, the mean for gestational period was 36 weeks, with a range of 25-43 weeks. The findings indicate that 26.7% of the babies were born premature.

5.1.3. Mode of delivery

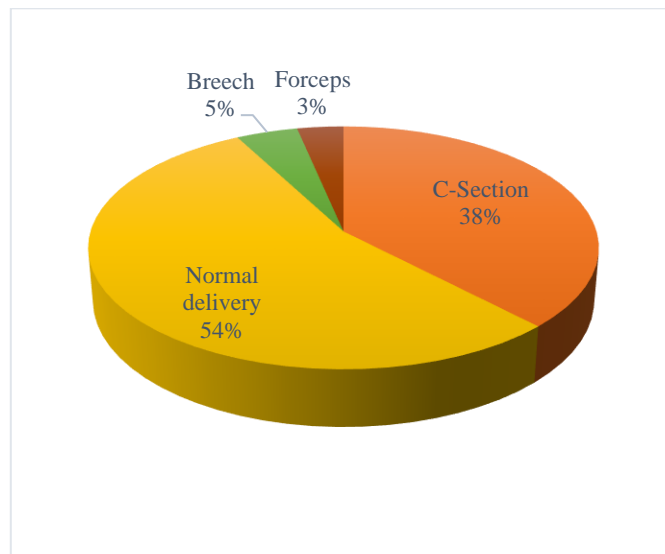


Figure 3: Mode of delivery

The majority (54%) of the cases who died due to asphyxia were delivered normally, 38% were delivered through C-section, 5% through the breech and the remaining 3% were delivered through forceps.

5.2 Apgar score

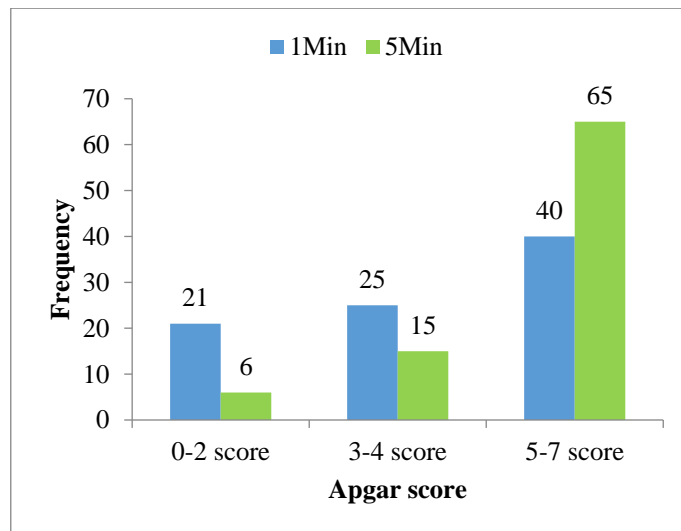


Figure 4: Apgar score

The results show that 21 and 6 newborn babies had an Apgar score of between 0 - 2 for one minute and for 5 minutes respectively, 25 and 15 had an Apgar score of between 3 and 4 for one minute and five minutes respectively while 40

and 65 had an Apgar score of between 5 and 7 respectively. 5.6 Referral status

	Referred from other hospitals	Not referred	Total
Number of cases	62	28	90
Percentage	69%	31%	100%

**Table 1. Referral status**

Out of 90 cases studied, 62 representing 69% of the sample were referral cases, while the remaining 31% were not referral cases.

5.7 Management of babies with asphyxia at birth.

5.7.1 Records of fetal heart conditions

Out of 90 cases, 93% had their fetal heart status examined and recorded while only 7% never had their fetal heart status examined.

5.7.2 Partogram records

Statistics show that 70% of the mothers whose babies succumbed to asphyxia had graphical records about the progress of their active labor observed and recorded while in the ANC unit. A significant number (26%) of the babies sampled were born without the progress of labor being observed and recorded while 4% of the cases sampled were born before arriving at the hospital.

5.7.3 Assessment of whether mothers had prolonged first stage of labor

Out of 90 cases studied, 81% were born after a prolonged first stage of labor. Only 15% of the babies were born without a prolonged first stage of labor.

5.7.4 Assessment of whether mothers had prolonged second stage of labor

Out of a total sample of 90 cases, 42% of the cases who died due to asphyxia were born after a prolonged second stage of labor, 4% were born before arriving at the hospital while the

remaining 54% were born without a prolonged second stage of labor.

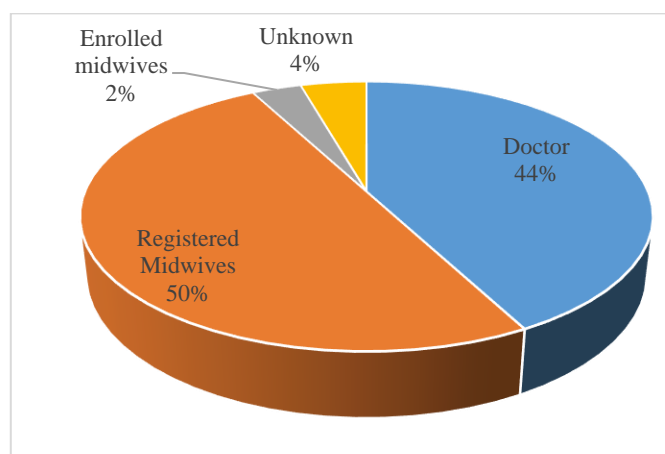
5.7.5 Assessment of whether the status of membranes was indicated

The results show that 64% of the cases studied had the nature of their membranes indicated. Moreover, 29% of the subjects had never studied the nature of their membranes indicated while the records of the remaining 7% were unknown.

5.7.6 Assessment of whether or not the membranes were ruptured

Out of 58 newborn cases, babies whose membranes were indicated, 62% had their membranes ruptured spontaneously while for the remaining 38% the membranes were ruptured artificially.

5.7.7 People who conducted the delivery



**Figure 5: Professionals who conducted delivery**

The results showed that 44% of the deliveries were conducted by doctors, 50% were conducted

by registered midwives, 2% were conducted by enrolled midwives, while the remaining 4% were conducted by unknown people probably traditional birth attendants, as 4% of the cases studied were born before arrival at the study hospital.

5.7.8 Presence of pediatrician or medical doctor at birth

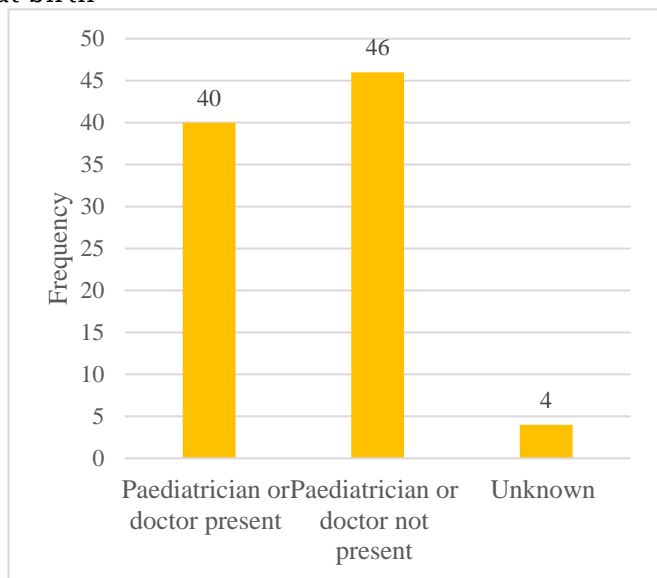


Figure 6: Presence of pediatrician or medical doctor at birth

The results indicate that 44% of the cases were born under the supervision of pediatricians or a medical doctor, 52% were born in the absence of pediatricians or a medical doctor and the remaining 4% were born before arrival at the hospital.

5.7.9 Presence of meconium aspiration at birth

Out of a total of 90 records of cases sampled, 64% had meconium aspiration syndrome (MAS), 29% never had MAS, while it was not easy to establish the status of the remaining 7% of the records of the babies sampled.

5.7.10 Assessment of whether or not any resuscitation was done at birth

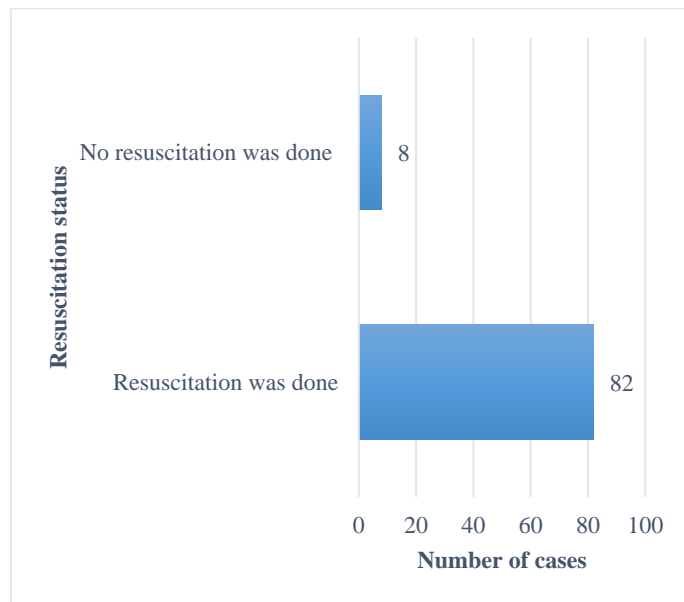


Figure 7: Resuscitation done at birth

Out of 90 babies, 82 cases representing 91% of the total sample were resuscitated. Only 9% of the babies were not resuscitated. It was not clearly known why 9% of the baby were not resuscitated.

5.2.11 Assessment of whether or not mothers had any history of being tired during second stage of labor

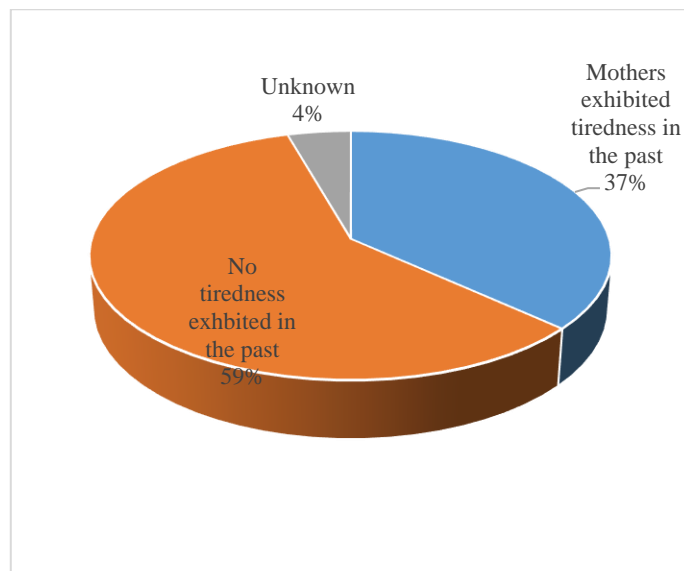


Figure 8: History of the mother being tired during second stage of labor

Out of 90 cases studied, 37% were born by mothers who had experienced tiredness during

the second stage of labor. The majority of the babies, however, were born by mothers who never had any history of tiredness during the second stage of labor, while the status of the mothers of the remaining 4% of the newborn babies was not known.

5.2.12 Existence of fetal distress at birth

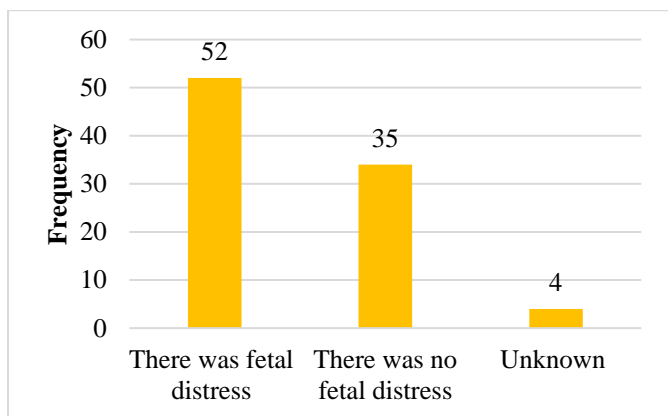


Figure 9: Fetal distress at birth

Out of 90 newborn babies, there was fetal distress in the birth of 57%. There was no fetal distress during the birth of 39% of the babies while the status of the remaining 4% was not known.

5.2.13 Cephalopelvic Disproportion (CPD) at birth

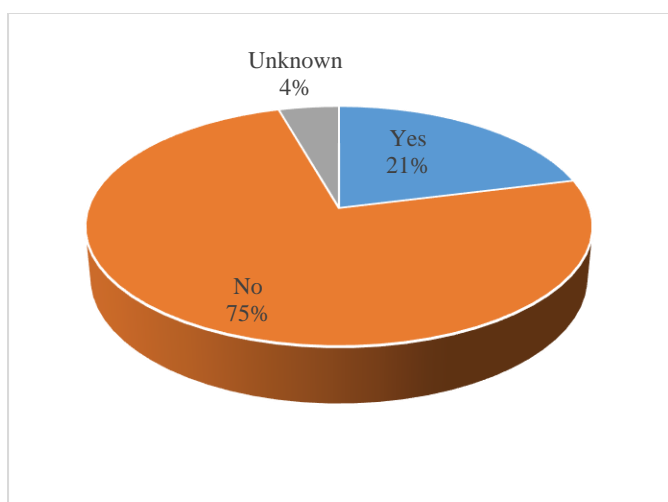


Figure 10: Cephalopelvic disproportion

The results indicated that 21% of the cases were delivered by women whose pelvis were too small

to allow safe delivery of babies, 4% were unknown, and 75% of the babies however were born to mothers with the pelvic of normal measurements.

Out of 90 cases, 78% never had trauma at birth while the remaining 22% had trauma at the time of their birth.

5.2.14. Existence of Ante Partum Hemorrhage (APH): abruptio placentae, placenta previa/accreta)

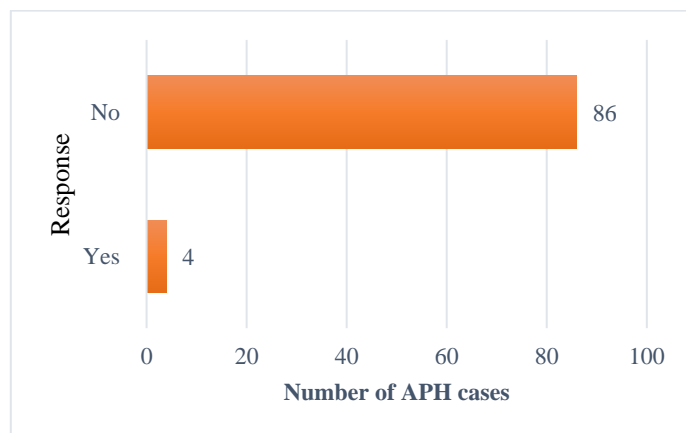


Figure 11: Ante Partum Hemorrhage

Out of 90 cases studied, only 4% were born by women who had ante partum hemorrhage. The remaining 96% were born by women who never had ante partum hemorrhage.

5.2.15. Existence of pregnancy-induced hypertension (PIH) of the mother





**Figure 12: Pregnancy-induced hypertension (PIH)** remaining 87% were born by mothers who were free from PIH.

Out of 90 cases investigated, only 13% were born by mothers who suffered from PIH and the

**Table2. Correlation of asphyxia and medical conditions (independent variables)**

	Variables	Meconium	Fetal heart	Any partogr	Prolonged 2 <sup>nd</sup>	Prolonged 1 <sup>st</sup>	1.5 memeb	Resuscitation	Fetal distres	Poor matern	Head circum
<b>Asphyxia</b>	P value	0.04*	0.132	0.421	0.503	0.167	0.148	0.311	0.06	0.03*	0.013*
*P value is statistically significant at 0.05											

**Discussions:**

**6.1 Assessment**

The discussion under the assessment presents the findings of the demographic information, and the management of the newborn with asphyxia at the labor ward and neonatal unit. The findings on the demographic information with regards to the weight of the babies, gestational period, modes of delivery, Apgar score, head circumference and ANC of the mothers are presented first. The results indicated that 23% of the babies were underweight while 40% were overweight. The weight of babies at birth is associated with asphyxia. Both underweight and overweight increases the chance of newborns to suffer from asphyxia. Kananura, et al (2017). Indicate that premature babies are at risk of asphyxia because of immature pulmonary functioning owing to the deficient lung surfactant. This observation made was consistent with the findings of a later study

conducted by Brenner S, et al (2015) who indicated that both low birth weight and high birth weight over 3.5kgs lead to abnormal fetal heart rate, thick meconium, and premature

delivery, hence, leading to perinatal asphyxia. Meconium is statistically significant associated with asphyxia as indicated in table 2. Subsequently, the findings of this study concluded that a total of 20% of the study cases were underweight and 40% were overweight, the features that put them at risk of asphyxia. The second aspect of the demographic information is the gestational period. Babies born before the end of the 37th gestational week or after 40 weeks are more likely to suffer from asphyxia. Results from the study population of 90 cases, show that 6% of the babies were born post-term and as a result they were at risk for neonatal asphyxia. The mode of delivery also has an influence on the risk for neonatal asphyxia and its results are presented in the next paragraph. The mode of delivery is an important determinant of the well being of newborn babies. A study by Webster, 2015 & Tasew, et 2018, found that the most common substandard care contributing to asphyxia as: neglecting to supervise fetal wellbeing, neglecting signs of fetal asphyxia, incautious use of oxytocin and choosing a non-optimal mode of delivery. The mode of delivery is therefore associated with the outcomes of the Apgar score for the newborn. The results show that 21 and 6

of the study cases had an Apgar score of between 0-2 for one minute and for 5 minutes respectively, 25 and 15 had an Apgar score of between 3 and 4 for one minute and five minutes respectively, while 40 and 65 had an Apgar score of between 5 and 7 respectively. The Apgar score is a useful method used to assess the overall health status of the newborn baby immediately after birth. Therefore, the findings from this study suggested that low Apgar scores in the majority (74.4%) of cases led to asphyxia related neonatal deaths. However, it is inappropriate to use the Apgar score alone to establish the diagnosis of asphyxia (Ergenekon, E. 2016). Other fetal factors such as large head circumference are associated with a difficult delivery and as a result, the newborns may suffer from neonatal asphyxia.

From table 2, the findings indicate that the head circumference is correlate with asphyxia. The bigger the head circumference the higher the chance for the new baby born to die due to asphyxia. Generally, the larger the head circumference of the baby, the more complicated it is in giving birth as the labor period gets prolonged. This finding is supported by Darmstadt and Khattry (2009) which concluded that a large head circumference carried a 1.6 times increased adjusted risk of birth asphyxia.

Substandard ANC for pregnant women creates a risk of asphyxia for the newborn. On the other hand, satisfactory attendance of the ANC by a pregnant woman is associated with a positive outcome of the pregnancy as the potential risks are identified and preventive measures implemented.

The results indicated that the majority of mothers had ANC bookings which showed the history of the development of the unborn baby

during the gestation period. Health care personnel were in a position to predict the complications that may set in at the time of giving birth. Gopal, G. (2014) who state that assessment for antenatal and labor history can help to anticipate the risks for asphyxia. These include the confirmation of gestational age, fetal presentation and position, assessing of the fetal heart, nature of membranes, maternal hypertension and hemorrhage. The results revealed that a majority of the study cases were referral cases and 69% of the cases who were delivered at other health facilities. Only 31% of the cases were delivered at the study context. The study further revealed inefficient referrals of patients from the district and regional hospitals to a national referral hospital and this trend put the fetus at risk of asphyxia. The next sessions present the discussions on the findings about management of newborns with asphyxia. The findings on management of a newborn with asphyxia are presented under recording, nature of membrane, competencies of health professionals who conducted the delivery, cephalopelvic proportion, duration of the 2<sup>nd</sup> stage of labor and incidences of post-partum hemorrhage and pregnancy-induced hypertension as presented in the next sessions.

#### **Records of fetal heart conditions**

The findings indicated that the majority (93%) of the cases had their fetal heart condition assessed and only 7% of the cases were not assessed. This could be attributed to the fact that four mothers gave birth before arriving at the hospital, and therefore, health care personnel had no way of examining the fetal heart condition of the babies. Assessment of the fetal heart status of unborn babies help nurses and doctors to detect any complications that might arise, and to determine

whether the baby is at risk or not. A study done by Gopal, G. (2014) reveal that asphyxia can be prevented through closely monitoring the fetal heart status of unborn babies at the time of birth. To enhance their assertion, Laughon, et al (2014) suggested that midwives should be skillful in interpreting the CTG (Cardiotocography) and to act in a timely and appropriate manner when fetal heart rate patterns indicate a compromised fetus that can lead to asphyxia. However the finding by Pearson coefficient correlation, show that there is no significant relationship between fetal heart and asphyxia.

### **Partogram records**

A significant number (26%) of the babies sampled were born without the progress of labor being observed and recorded while 4% of the cases sampled were born before arriving at the hospital, and thus, it was not possible to observe the progress of labor. For some cases, the mothers underwent an emergency caesarean section due to complications which arose. By observing the progress of labor, health personnel are able to identify abnormalities and invent appropriate interventions. From the above statistics, it can be inferred that, there was some degree of negligence on the side of health personnel by not subjecting the labor process for 26% of the babies who were born in the hospital facility to a partogram.

### **Status of membranes**

The majority of cases studied had the nature of their membranes indicated vis-à-vis whether intact or ruptured before the onset of the second stage of labor. However, 29% of the subjects had never studied the nature of their membranes indicated while the records of the remaining 7%

were unknown. Despite the fact that only 4 children were born before arrival at the hospital, the records of 2 children born in the hospital were not reflected. A study by Lassi, et al (2014) indicate that prolonged rupture of membranes carries a higher risk of birth asphyxia for the newborn. Therefore, failure to assess and indicate the nature of membranes makes the babies susceptible to asphyxia.

Out of the 58 cases whose status of the membranes was indicated, 62% had their membranes ruptured at the 1<sup>st</sup> stage while for the remaining 38% the membranes were ruptured artificially in the 2<sup>nd</sup> stage of labor. This result suggests that, in spite of the care given by health care practitioners, there was a high risk of most babies dying because of early ruptured membranes. This assertion is corroborated by a study conducted by Al Yazidi, et al, (2015), the findings of which indicated that prolonged rupture of membranes carries a higher risk of birth asphyxia for the newborn.

### **Competencies of health professionals who conducted the delivery**

The presence of well-qualified health care practitioners increases the probability of conducting safe deliveries. Most of the deliveries for the study cases were supervised by well-qualified medical practitioners. As indicated by the results of 44% of the deliveries which were conducted by medical doctors, 50% by registered midwives, 2% were conducted by enrolled midwives while the remaining 4% were conducted by unknown people probably the traditional birth attendants. The uncertainty about the status of the remaining 4% arises because they were born before arriving at the hospital. However, 52% of the study cases born in the hospital were delivered in the absence of pediatricians or

medical doctors. Furthermore, the findings showed that resuscitation was done on almost all babies selected for review. Therefore the study concludes that although the medical personnel did what they could medically do, the medical conditions of the affected babies could not be reversed, hence they died.

### **Cephalopelvic Disproportion (CPD) at birth, prolonged 2<sup>nd</sup> stage of labor, and shoulder dystocia and fetal distress**

The results indicate that 21% of the babies were born to women whose pelvis was too small to allow safe delivery of babies, 4% were unknown, and 75% of the babies however were born without interference. Cephalopelvic disproportion causes prolonged labor, fetal distress and a delayed second stage of labor, hence, increasing the risk of babies being born with less oxygen in the brain. These results are consistent with earlier findings by other scholars. For example, a study done by Islam, Ara and Choudhury (2012) reveal that the commonest cause of asphyxia is obstructed labor of which CPD, malposition and malpresentation of shoulder, breech, face and brow are the most common preventable factors of neonatal asphyxia related death in developing countries. Therefore, since the above results are consistent with literature, it suffices to conclude that some newborns succumbed to asphyxia because of CPD which made babies to experience fetal distress and subsequent neonatal asphyxia.

The majority of the babies were born by the mothers who never had any history of tiredness during the second stage of labor. The mothers who were tired prolonged the second stage of labor. As a result, their unborn babies were deprived of adequate oxygenation. There was no shoulder dystocia observed in all the babies born in the hospital facility while shoulder dystocia

status of the remaining 4 children was not known because they were born before arrival to the hospital. Absence of shoulder dystocia meant that the cases under investigation were born with relative ease. It is therefore concluded that in this study, shoulder dystocia was found not to be a factor associated with asphyxia related death.

As a possible result of prolonged labor, the document reviews revealed that there was fetal distress during the delivery of the majority (57 %) of babies under review. There was no fetal distress during the birth of 39% of the babies while the status of the remaining 4% was not known.

### **Existence of Ante Partum Hemorrhage (APH), pregnancy-induced hypertension (PIH) of the mother and cord prolapse at birth**

Birth trauma in newborn babies is caused by injuries resulting from compression and traction during the birth process. The findings indicate that a sizeable number of newborn babies never had trauma at the time of their birth.

Furthermore, there were cases of APH. When there is APH, the mother loses blood, which carries oxygen, hence, depriving newborn babies of oxygen and which results in neonatal asphyxia. The results above are in line with the conclusions arrived at Rawat et al (2016). Which indicated that, there is a risk for impaired gas exchange of the fetus related to decreased blood volume due to the antepartum hemorrhage and this risk the newborn from asphyxia.

Pregnancy-induced hypertension (PIH) increases the risk of asphyxia for the newborn as vasoconstrictions deprive the fetus from oxygen supply. However, most of the babies studied were born to mothers who did not suffer from pregnancy-induced hypertension.

#### 5.4. Recommendations

Based on the study findings, recommendations were made with regard to improvement of knowledge and skills of maternal and neonatal care by the health care providers in order to provide quality ANC to pregnant women, conduction of safe deliveries and provision of efficient care to the newborn babies who are at risk of asphyxia as explained below.

- Regulation of the referral system on maternal care should strictly be put in place regarding the hours mothers have to stay in labor after complications have been detected to prevent avoidable neonatal deaths due to asphyxia.
- All cases of asphyxia especially meconium, baby head circumference and poor maternal health should have a care plan developed as from admission
- All deliveries with cases at risk should be conducted in the presence of a pediatrician for expert resuscitation. Prolonged labor should be managed or resolved efficiently by early recognition and timely decision-making on the safer method of delivery especially with first stage of labor.
- Health care providers should be provided with additional in-service education and training on asphyxia management.
- Ministry of Health and Social Services need to ensure that the national referral hospital has specialists in neonatal care and advanced midwifery.
- The study recommends the use of the checklist from this study by health care providers for the care of newborns with asphyxia for the audit of interventions provided to the newborn with asphyxia.

- The study recommends further research the reason of not resuscitate babies and use of predictive statistics to explore the management of asphyxia.

#### Limitations of the study

Since this study relied only on a desk review, quantitative and descriptive study could not allow exploring a problem or concepts in depth such as from the health care practitioners' perspective as well as from the parents of the deceased babies from asphyxia.

#### Reference:

- [1.] Adebami, O. J. (2015). *Maternal and fetal determinants of mortality in babies with birth asphyxia at Osogbo, Southwestern Nigeria. Global Advanced Research Journal of Medicine and Medical Sciences*, 4(6), 270-276.
- [2.] Al Yazidi, G., Boudes, E., Tan, X., Saint-Martin, C., Shevell, M., & Wintermark, P. (2015). Intraventricular hemorrhage in asphyxiated newborns treated with hypothermia: a look into incidence, timing and risk factors. *BMC pediatrics*, 15, 106. doi:10.1186/s12887-015-0415-7
- [3.] Amin, S. B., Bhutani, V. K., & Watchko, J. F. (2014). Apnea in acute bilirubin encephalopathy. *Seminars in perinatology*, 38(7), 407-411. doi:10.1053/j.semperi.2014.08.003
- [4.] Aslam, H. M., Saleem, S., Afzal, R., Iqbal, U., Saleem, S. M., Shaikh, M. W., & Shahid, N. (2014). "Risk factors of birth asphyxia". *Italian journal of pediatrics*, 40, 94. doi:10.1186/s13052-014-0094-2
- [5.] Brenner S, De Allegri M, Gabrysch S, Chinkhumba J, Sarker M, Muula AS (2015) *The Quality of Clinical Maternal and Neonatal Healthcare - A Strategy for*

- Identifying 'Routine Care Signal Functions'. PLoS ONE 10(4): e0123968. <https://doi.org/10.1371/journal.pone.0123968>
- [6.] Brink, H., Vd Walt, C. & van Rensburg, G. (2013). *Fundamentals of research methodology for health care professionals*. (3rd Edition). Cape Town: Juta.
- [7.] District Health Information Software (DHIS). (2014). 66-14/10. *Health Information System Program (HISP): Ministry of Health and Social Services (MoHSS)*. Namibia.
- [8.] De Vos, A. S., Strydom, H., Fouche, C. B. & Delpont, C. S. L. (2011). *Research at grass root*. (4th Edition). Cape Town: Schaik Publishers.
- [9.] Ergenekon, E. (2016). *Therapeutic hypothermia in neonatal intensive care unit: Challenges and practical points*. *Journal of Clinical Neonatology*, 5(1), 8.
- [10.] Fact Fish Statistics (2014). *Neonatal mortality rate*. Retrieved from <http://www.factfish.com/stastics>.
- [11.] Fox, W. & Bayat, M.S. (2007). *A Guide to managing research*. Cape Town: Juta.
- [12.] Gopal, G. (2014). *Acute Kidney Injury (AKI) in perinatal asphyxia*. *Indian Journal of Pharmaceutical & Biological Research*, 2 (2), 60-65.
- [13.] Grove, S. K., Burns, N. & Gray, R. (2013). *The practice of nursing research: appraisal, synthesis, and generation of evidence*. China: Elsevier.
- [14.] Guest, G. & Namey, E. E. (2015). *Applied thematic analysis: Public health research methods*. Los Angeles: SAGE.
- [15.] Joolay, Y., Horn, A., Raban, S., Harrison, M., Tooke, L. & Rossouw, G. (2015). *Neonatal guidelines and drug doses*. Kadimah. Cape Town.
- [16.] Kananura, R. M., Wamala, R., Ekirapa-Kiracho, E., Tetui, M., Kiwanuka, S. N., Waiswa, P., & Atuhaire, L. K. (2017). A structural equation analysis on the relationship between maternal health services utilization and newborn health outcomes: a cross-sectional study in Eastern Uganda. *BMC pregnancy and childbirth*, 17(1), 98. doi:10.1186/s12884-017-1289-5
- [17.] Khan, U., Saeed, M. H., Bangash, H. & Klfayat, A. (2015). *The morbidity and mortality patterns of preterm infants at a tertiary care hospital in Peshawar: A medical record review*. *Khyber Journal of Medical Sciences*, 8(2), 154
- [18.] Killam, L. (2013). *Research terminology simplified: Paradigms, axiology, ontology, epistemology and methodology*. Canada: Elsevier
- [19.] Lassi, Z. S., Salam, R. A., Das, J. K., & Bhutta, Z. A. (2014). *Essential interventions for maternal, newborn and child health: background and methodology*. *Reproductive health*, 11 Suppl 1(Suppl 1), S1. doi:10.1186/1742-4755-11-S1-S1McElrath, T. F., Allred, E. N., Kuban, K., Hecht, J. L., Onderdonk, A.,
- [20.] Laughon, S. K., Berghella, V., Reddy, U. M., Sandraa, R., Lu, Z. & Hoffman, M. K. (2014). *Neonatal and maternal outcomes with prolonged second stage of labour*. *Obstet Gynecol*, 1 24 (1), 57-67. Doi: 10.1097/AOG.0000000000000278
- [21.] Lawn, J. E., Davidge, R., Paul, V.K., Von Xylanders, S., Johnson, J.G., Costello, A., Kinney, M., V., Sergre, J. & Molyneux, L. (2013). *Boon too soon: Care for the preterm*

- baby. Reproductive Health*, 10(1), S5. Retrieved from <http://www.reproductive-health-journal.com/content/10/51/55>
- [22.] LoBiondo-Wood., G. & Haber, J. (2014). *Nursing research, methods and critical appraisal for evidence based practice*. (8<sup>th</sup>Edition.). St Louis, MI: Mosby Elsevier.
- [23.] Maniruzzaman, M., Suri, H. S., Kumar, N., Abedin, M. M., Rahman, M. J., El-Baz, A., ... Suri, J. S. (2018). Risk factors of neonatal mortality and child mortality in Bangladesh. *Journal of global health*, 8(1), 010417. doi:10.7189/jogh.08.010421
- [24.] Ministry of Health and Social Services. (2015). *Guidelines on obstetric emergency and essential care*. Windhoek: Government of Republic of Namibia.
- [25.] Ministry of Health and Social Services. (2014). *Namibia child survival strategy 2014-18* Windhoek: Government of Republic of Namibia.
- [26.] Ministry of Health and Social Services. (2016). *Patient charter: Your health my concern*. Windhoek: Government of Republic of Namibia.
- [27.] Rawat, M., Chandrasekharan, P. K., Swartz, D. D., Mathew, B., Nair, J., Gugino, S. F., Lakshminrusimha, S. (2016). Neonatal resuscitation adhering to oxygen saturation guidelines in asphyxiated lambs with meconium aspiration. *Pediatric research*, 79(4), 583-588. doi:10.1038/pr.2015.259
- [28.] Reiter, J. & Walsh, R. (2016). *Hypoxic Ischemic Encephalopathy (HIE)*. Retrieved from: [www.abclawcenters.com](http://www.abclawcenters.com)
- [29.] Seeni, I., Ha, S., Nobles, C., Liu, D., Sherman, S., & Mendola, P. (2018). Air pollution exposure during pregnancy: maternal asthma and neonatal respiratory outcomes. *Annals of epidemiology*, 28(9), 612-618.e4. doi:10.1016/j.annepidem.2018.06.003
- [30.] Simen-Kapeu, A., Seale, A. C., Wall, S., Nyange, C., Qazi, S. A., Moxon, S. G., Lawn, J. E. (2015). Treatment of neonatal infections: a multi-country analysis of health system bottlenecks and potential solutions. *BMC pregnancy and childbirth*, 15 Suppl 2(Suppl 2), S6. doi:10.1186/1471-2393-15-S2-S6
- [31.] Singh, K., Brodish, P. & Haney, E. (2014). *Postnatal care by provider type and neonatal death in Sub-Saharan Africa: A multilevel analysis*. Retrieved from: <http://www.biomedcentral.com/1471-2458/14/941>
- [32.] Tasew, H., Zemicheal, M., Teklay, G., Mariye, T., & Ayele, E. (2018). Risk factors of birth asphyxia among newborns in public hospitals of Central Zone, Tigray, Ethiopia 2018. *BMC research notes*, 11(1), 496. doi:10.1186/s13104-018-3611-3
- [33.] World Health Organization (2018). *Newborns: Reducing mortality*. Retrieved from: <http://www.who.int>