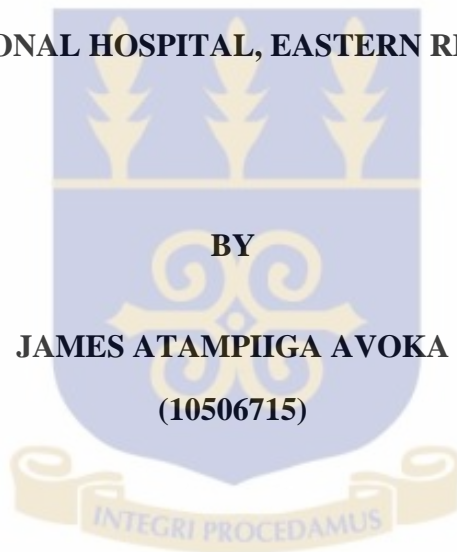


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**

**HEALTH FACILITY-BASED FACTORS AND MATERNAL CHARACTERISTICS
THAT INFLUENCE VERY EARLY NEONATAL MORTALITY IN KOFORIDUA
REGIONAL HOSPITAL, EASTERN REGION**



**BY
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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF
MASTER OF PUBLIC HEALTH (MPH) DEGREE**

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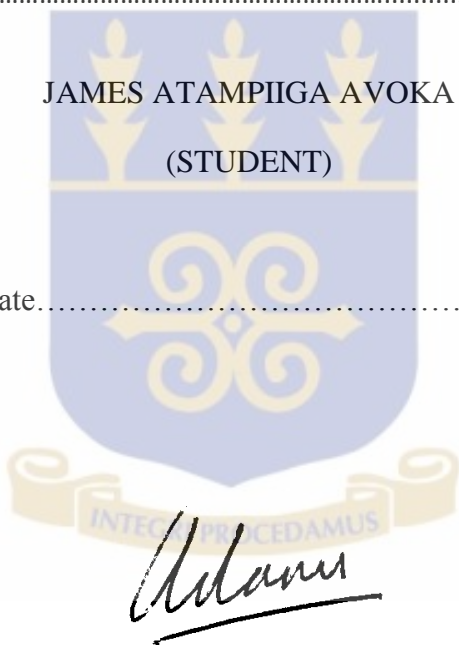
DECLARATION

I, **James Atampiiga Avoka** hereby declare that this work is the result of my own original research and that this dissertation, either in whole or in part has not been presented here or elsewhere before. Also, works of others, which served as references, have been dully acknowledged.

.....

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Date.....

DEDICATION

I, James Atampiiga Avoka hereby dedicate this dissertation to my dear Wife, Mrs. Esther B. Avoka and my son Melvin Awintiti Avoka for the love and care they have shown me through the difficult times .May the almighty God guide, protect, and bless them abundantly.



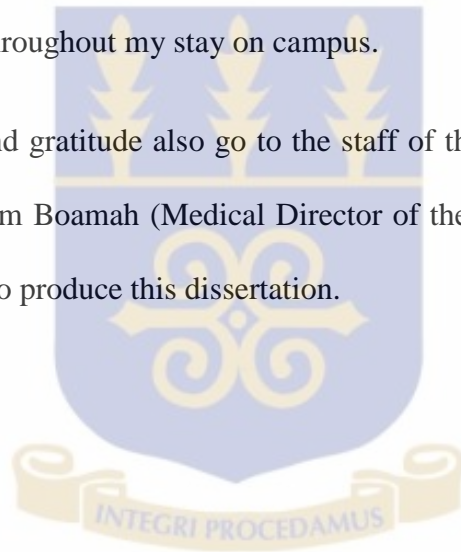
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I am most grateful to the almighty God for his guidance, protection and love bestowed upon me throughout the whole course of study.

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ABSTRACT

Background: Very early neonatal mortality (deaths within 24 hours after birth) is a major contributor to death among children under 5 years old in low and middle income countries. This particular study was conducted to determine the health facility-based factors and maternal characteristics that influence very early neonatal mortality rate (VENMR), the level of knowledge of nurses, midwives, and doctors on neonatal care and resuscitation, the practices of nurses, midwives, and doctors that may contribute to very early neonatal deaths, the gaps in equipment and logistics that may contribute to very early neonatal mortality, and to identify the maternal characteristics that influence very early neonatal mortality in Koforidua Regional Hospital.

Methods: In all 811 delivery records were reviewed at Koforidua Regional Hospital for a period of 2years, January 2013 to December, 2014 using data extraction sheets. The maternal characteristics and causes of death were extracted from the delivery register, and admission and discharge (A &D) books. Semi-structured questionnaires were also administered to 4 doctors, 13 midwives, and 7 nurses who work in the labour ward and NICU.

Results: The VENMR was 9 per 1000 live births. Midwives had the highest average knowledge on newborn care and resuscitation (70.8%) but the difference was not significant, infection prevention protocols and good practices were said to be done from the responses. There was 12.5% gap in access to Infant face Masks sizes (0, 1,2). Doctors had the highest number of logistics and equipment available to them. Multiparity reduced the odds of very early neonatal death by 30%.Number of previous child deaths was 34.75 times the odds of dying within the first 24 hours after birth than those without previous child deaths. Mothers

with a previous neonatal death had about 8 times the odds of having a very early neonatal death as compared to those without history of neonatal death.

Conclusion: VENMR at Koforidua regional hospital is low as compared to the National figure of Ghana but high in comparison with other studies. There is low knowledge on neonatal care and resuscitation among the different cadre of staff in the NICU and labour ward. Maternal characteristics have a significant contribution to very early neonatal outcome.

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LIST OF ABBREVIATIONS

A&D	Admission and Discharge
AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
C.I	Confidence Interval
CHCs	Comprehensive Health Centres
CHPS	Community-based Health Planning and Services
FMV	Face Mask Ventilation
GDHS	Ghana Demographic and Health Survey
GHS	Ghana Health Service
HIE	Hypoxic-Ischaemic Encephalopathy
HIV	Human Immunodeficiency Virus
LBW	Low Birth Weight
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
NDSS	Navrongo Demographic Surveillance System
NFHS	National Family Health Survey
NICU	Neonatal Intensive Care Unit
NTC	Nurses Training College
O&G	Obstetrics and Gynecology
OPD	Outpatient Department
OR	Odds Ratio
PPV	Positive Pressure Ventilation
TB	Tuberculosis
TBA	Traditional Birth Attendance

UK	United Kingdom
UNFPA	United Nations Population Fund
USA	United States of America
VENMR	Very Early Neonatal Mortality Rate
WHO	World Health Organisation

DEFINITION OF TERMS

Neonate: The first four weeks of a newborns life.

Early Neonatal mortality: The death of a child within the first 0-7 days after birth.

Very early neonatal mortality: Neonatal death occurring within the first 24 hours after birth.

CHAPTER 1

INTRODUCTION

1.1 Background

Very early neonatal death is any form of newborn mortality that occurs within the first 24 hours after delivery (WHO et al., 2010). One of the main causes is birth asphyxia which may be due to mismanagement of obstetric complications coupled with lack of neonatal resuscitation skills.

Globally, almost 44% of child mortality occurs during the neonatal period (Fernandes et al., 2014). Neonatal mortality, of which very early neonatal deaths are included, has always been an issue of great concern to the world; it is one of the indicators used to measure the standard of living of a country.

In Africa, almost 40% of the 10 million mortalities that occur every year in children under 5 are at the neonatal age. This is double the number of HIV/AIDS infections in a year (Adetola et al., 2011). However, HIV/AIDS gets a lot more international attention and support than the main factors directly affecting very early neonatal outcome. Almost 99% of all neonatal mortality also occurs in third world countries. Out of this, more than half of the deaths occur in Africa and South East Asia (Adetola et al., 2011). Reports from Ghana Health Service 2014 performance review clearly indicated that the National intra-partum and very early neonatal mortality rate was 16% per 1,000 deliveries (GHS., 2014).

Very early neonatal risk factors such as meconium stained, hypothermia and a host of others increase the risk of death in very early neonates. Other factors may be inadequate knowledge

and skills on neonatal resuscitation, poor prenatal care, child spacing and poverty. Several studies conducted also identified a number of factors that influence neonatal mortality; these include maternal ill health, marital status, parity, malaria, HIV infection, pre-eclampsia/eclampsia, pregnancy related diabetes, and even maternal death (Mosha, 2010).

Minimizing very early neonatal deaths does not depend on only adequate knowledge of pregnancy, delivery, and very early neonatal care but on effective implementation of the knowledge, good attitudes and practices (Kassar et al., 2013). Current performance reviews of evidence indicate that many newborn deaths, more especially very early newborn deaths, can easily be prevented by the use of proven interventions such as effective neonatal resuscitation and clean care practice (Neupane et al., 2014). During a neonatal mortality audit at Maceio', in the state of Alagoas, in Northeastern Brazil, for instance, it was proved that more than 75% of the neonatal deaths including very early neonatal mortalities were preventable through adequate care at pregnancy and delivery. Further studies therefore need to be conducted to ascertain other factors that may influence very early neonatal deaths the world over and to seek out the most pragmatic means by which to minimize them.

1.2 Problem Statement

Deaths occurring on the first day of delivery now called day 0 in survey and vital registration and in clinical practice are mostly significant to review because they describe the kind of interventions to earmark at delivery (Oza et al., 2014).

Delivery day and the first few days after are critical periods for very early neonatal survival. Research conducted in 186 countries shows that 50% of newborn mortality occurs within 24-48 hours after delivery. The report further indicate that 2.8 million (44%) of 6.3 million deaths under five years occurred among very early neonates. Three-quarters of this took place in the first week of life. Current estimates indicate that out of 2.7 million newborn mortalities globally, about 36.3% of the mortalities took place on day 1(very early neonates) and 73.2% in the first 1 week (Oza et al., 2014).

A study conducted by Adetola et al. (2011) in Ibadan, Nigeria indicates that 82% of early newborn mortalities took place in the first one week after birth and out of that, 56% of the very early newborn deaths occurred within the first 24 hours of life (Adetola et al.,2011).

On a worldwide scale, almost 3 million neonates die yearly before they reach one month (Mason et al., 2014). In rural Nepal, research shows that out of 14,323 infants, 409 died in the first one week of life. Death in the first 7 days of life was 28.6 per 1000 live births (Katz et al., 2003). The odds of death in the first one hour after delivery (very early neonatal deaths) in the USA, is 0.91 per 1000 live births and the next 23 hours is 1.58 per 1000 live births (Oza et al., 2014).

The situation is more prevalent in sub-Saharan Africa because of poverty, inequity, and inadequate access to health care. The burden of neonatal mortality and very early neonatal mortality continues to rise accounting for up to 41% of mortalities before age 5 (Neupane, 2014).

Sub-Saharan Africa recorded the highest odds of very early neonatal mortality on day 0 which is 11.2 per 1,000 live births. Southern Asia topped with the number of mortalities on the first 24 hours (n=392,300) (Oza et al., 2013).

Asphyxia related issues account for about 1 million newborn mortalities every year in the world. Hence, equipping midwives and doctors with neonatal resuscitative skills to appropriately manage cases will be a major achievement. Forty six thousand infants die every year in Cambodia due to neonatal asphyxia related complications (Cadungog-Uy, 2006). Therefore, proper resuscitation, and clean birth practices at delivery will prevent a greater percentage of deaths. Emphasis should therefore be placed on clinical guidelines in basic neonatal resuscitation, and clean birth care especially in resource-limited settings (Mason et al., 2014).

The 2008 Ghana Demographic and Health Survey (GDHS) report indicates that Ghana lists neonatal death as a critical public health issue. Welaga et al. reported that majority of these deaths occur in the first seven days of the child's life (Welaga et al., 2013). Moyer et al's. (2012) report revealed that Ghana's neonatal mortality rate was 43 per 1,000 live births.

On regional basis in Ghana, the intra-partum and very early neonatal mortality rate is 33% per 1,000 deliveries in the Upper West region, 22% per 1,000 deliveries in the Northern region, and 15% per 1,000 deliveries in the Eastern region of which Koforidua is the capital (GHS.,2014 performance review report).

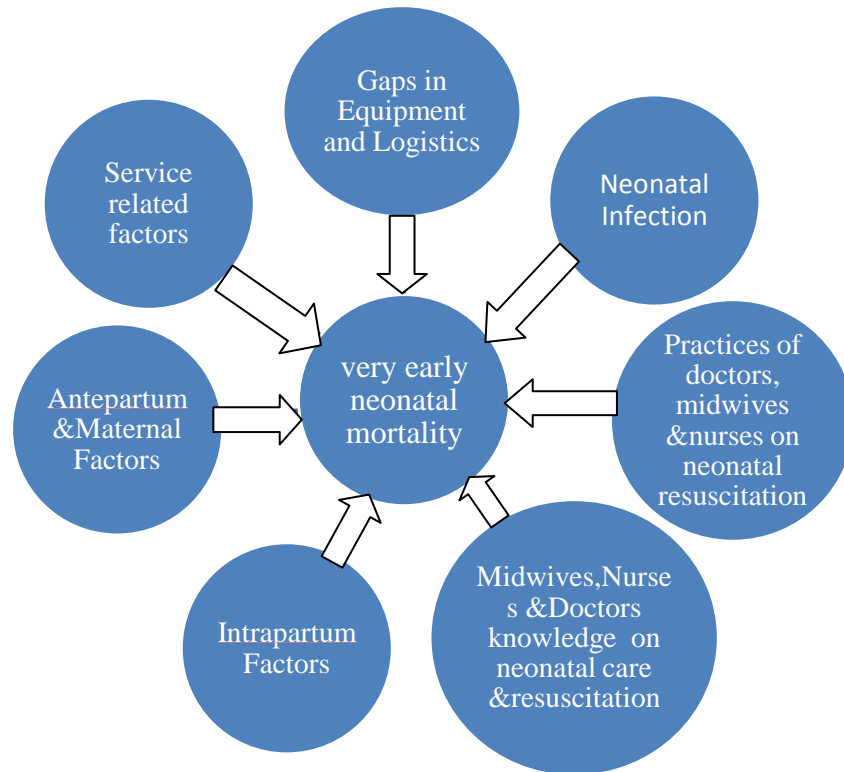
It was imperative, therefore, to investigate the factors that influence these deaths and find a lasting solution to the persistent problem especially in Africa (Kazaura et al., 2006). Against this backdrop, this research was being conducted to investigate the health facility-based factors and maternal characteristics that influence very early neonatal deaths in Koforidua Regional Hospital as an attempt at solving problems related to these deaths.

1.3 Conceptual Framework

According to World Health Organization (WHO) reports, the main causes of neonatal death of which very early neonatal mortality is included are: congenital anomalies (6.8%), neonatal tetanus (3.4%), diarrheal diseases (2.6%), other non-infectious perinatal causes (5.7%), birth asphyxia and birth trauma (23%), prematurity and low birth weight (31%), and neonatal infections (26%) (WHO, 2008).The statistics above show that birth asphyxia and birth trauma, prematurity and low birth weight , and neonatal infections are the leading reported causes of very early neonatal deaths.

The research therefore centred more on factors that are likely to be under the control of health facility staff and management and maternal Characteristics influencing these deaths.

Figure 1.0 Conceptual Framework on Health Facility-based Factors and Maternal Characteristics that Influence very early neonatal mortality in Koforidua Regional Hospital.



The availability of equipment can be the turning point in reducing the spate of neonatal mortality in the hospitals or health facilities. Therefore, there is the need for all facilities that conduct deliveries to have in their custody all the vital equipment and logistics to enable them perform effectively. Equipment like Resuscitation Bag and Mask, Stethoscopes, Infant Warmers, Infant Incubators and a lot more should all be made available for use to enable babies breathe.

Adequate knowledge and practice in neonatal care is the mainstay in making neonates live. The capacity of staffs who conduct deliveries must be properly built to safely manage

neonates and save lives. When this is done, they will be able to determine when and how to resuscitate and appropriate newborn care strategies used in saving the lives of the neonates.

Besides, service related factors such as the deployment of midwives and doctors to critical areas should be done with circumspection otherwise it can hinder effective health care delivery. This is because there is likely to be shortage of staff in some areas thereby putting a lot of stress on the few professionals and this could lead to work stress and fatigue.

Neonatal infection can contribute to an increase in very early newborn deaths. The standard protocols used in infection prevention should be strictly observed to reduce neonatal infections.

The practices of doctors, midwives and nurses who care for very early newborns should be held high with the best of professionalism. Anything devoid of good ethical standards and professionalism coupled with dedication to the service of humanity may spell doom for human life and existence. That is why these practices should be assessed and streamlined to conform to standards.

Inadequate knowledge in neonatal care and resuscitation can lead to increase in very early newborn deaths. Therefore, there is the need to assess the knowledge of these cadres of staff in order to plan for refresher training to update their knowledge in newborn care and resuscitation.

The care given to women and their newborn babies is very critical to the survival of both mother and the very early neonate. Anything short of quality of care can lead to post partum hemorrhage for the mother or neonatal asphyxia. Hence the need for intra partum factors to be examined.

Additionally, prenatal care of the pregnant woman is equally as important as the intra partum care. All these must be critically assessed and conducted properly to avoid needless very early neonatal deaths.

1.4 Justification

The MDG 4 may never be achieved if conscious efforts at preventing very early neonatal deaths are not made. The most disturbing aspect of the problem is that most of these deaths can easily be prevented through appropriate and effective skilled delivery (Adetola, Tongo, Orimadegun, & Osinusi, 2011).

According to Ghana Demographic and Health Survey (GDHS) report of 2008, the national neonatal mortality rate is 30 per 1000 live births (GDHS, 2008). The Multiple Indicator Cluster Survey (MICS) 2011 also reveals a neonatal mortality rate of 32 deaths per 1,000 live births (MICS, 2011). However, annual report from the Koforidua Regional Hospital indicates an increasing rate of 26, 28 and 35 per 1,000 live births for 2012, 2013 and 2014 respectively. This trend is increasing and thus merits an in-depth inquiry into the present circumstances.

The question comes up as to whether the reported causes of early neonatal mortalities which includes deaths within the first 24 hours (very early neonatal deaths) apply to the Koforidua Regional Hospital.

This research was therefore important because it sought to unearth the actual factors that contribute to very early neonatal deaths so that appropriate actions can be taken by management of the facility to curb the menace (Musooko et al., 2014).

1.5 Objectives

1.5.1 General Objective was

- ❖ To determine health facility-based factors and maternal characteristics that influence very early neonatal mortality (24 hours of birth) in Koforidua Regional Hospital.

1.5.2 Specific Objectives were:

- ❖ To determine the level of knowledge of nurses, midwives, and doctors on neonatal care and resuscitation.
- ❖ To find out the practices of nurses, midwives, and doctors that may contribute to very early neonatal deaths.
- ❖ To identify the gaps in equipment and logistics that may contribute to very early neonatal mortality.
- ❖ To identify maternal characteristics that influence very early neonatal mortality at Koforidua Regional Hospital.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

It is approximated that 1 million neonates die as a result of infections in the developing world (Ganatra et al., 2010). In confirming the challenges associated with neonatal care, reliable data from Community-based Health Planning and Services (CHPS) zones, hospitals, and clinics on the real factors that influence very early neonatal deaths are lacking. Practical oriented, well trained, and disciplined staffs that are skilled in very early neonatal care are needed in order to salvage the situation of very early neonatal mortality.

2.2 Level of Knowledge of Midwives and Doctors on Very Early Neonatal Care

Birth asphyxia has been identified as an important cause of very early neonatal mortality in the world. A study conducted in Afghanistan by Kim et al, (2013) revealed that about 3 to 6% of neonates will need basic resuscitation with stimulation at delivery and assistance with Positive Pressure Ventilation (PPV) to enable them breathe. This particular practice can reduce birth asphyxia by 30%. Therefore, all doctors and midwives trained to handle normal pregnancies and deliveries should be able to detect and deal with complications in women and neonates and to make appropriate referrals when necessary. They should have the ability to conduct basic neonatal resuscitation irrespective of the place of delivery (Kim et al., 2013).

Research conducted in four countries (Cameroon, Ethiopia, Kenya, and Nepal) revealed that missing equipment and insufficient provider knowledge and skills in resuscitation were impediments to the performance of positive pressure ventilation (Kim et al., 2013). Lack of knowledge and skills in essential newborn care also contribute to very early neonatal deaths.

Following the Afghan study, over 80% of midwives and doctors had been trained on neonatal resuscitation. There were no significant differences on knowledge and skills between midwives and doctors in conducting neonatal resuscitation. Midwives had 66% and doctors 71% on knowledge and 71% and 66% respectively for midwives and doctors on skilled delivery. Generally 75% of doctors and 83% of midwives were very confident in performing Positive Pressure Ventilation (Kim et al., 2013). Table 1.0 below explicitly shows the results of Kim et al.'s (2013) study based on health facility deliveries and the very early neonatal mortality rates per 1,000 live births.

Table 1.0 Very early neonatal mortality rates in health facilities in Afghanistan

Health Facility	No of Institutional deliveries	No of neonatal deaths in 24 hours after birth	Very early newborn mortality rate per 1,000 live births
CFCs	2,770	8	2.9
District Hospitals	36,068	47	1.3
Provincial Hospitals	59,942	759	12.7
Regional Hospitals	35,158	187	5.3
Specialized Hospitals	58,689	421	7.2
Total	192,627	1,422	7.4

Source: Kim et al., 2013

Despite all the skills and knowledge midwives and doctors in Afghanistan had on neonatal care, they still recorded 7.4 very early neonatal deaths per 1,000 live births. What then is the problem?

2.3 Knowledge Attitudes and Practices of Midwives and Doctors on Early Neonatal Care

Recent data from Navrongo Demographic Surveillance System (NDSS) show that infections account for not less than 20% of early neonatal deaths in Kassena Nankana District of the Upper East Region of Ghana. In the same District, infection accounts for 23% of early neonatal deaths from 1995 to 2002. The report indicates that 35% of deliveries were conducted by midwives or physicians, 27% by untrained assistants, and 22% by TBAs (Moyer et al., 2012). Meanwhile, there is an increasing use of facility-based delivery according to the research. A physician indicated that some of the health workers (midwives) are judgmental in delivering care (Moyer et al., 2012). There is the urgent need for health staff who conduct deliveries to observe infection prevention practices in order to avoid neonatal infections leading to very early neonatal deaths.

According to Moyer et al. (2012) the pillars of clean deliveries are: clean hands/Gloves, clean surface for delivery, clean cord tying, cutting, dressing, and bathing. The results in the research conducted show that all the health care providers (especially midwives and doctors) who participated in the study hardly ever mentioned hand washing and glove use as part of infection prevention measure (Moyer et al., 2012).

Following the increasing number of hospital deliveries, some health facilities are unable to contain the numbers, thus conducting some of the deliveries on the floor. This increases the risk of neonatal infection.

2.4 Maternity-Based Labour and Delivery Services

According to a report by Doctors of the World/USA, (2002) training sessions were instituted to improve infrastructure and physician skill level. This will help reduce harmful practices and bring about evidence-based medicine. Providing important life-saving logistics and

equipment to all delivery sites will lead to a great success. It is therefore imperative to provide training to midwives on basic obstetric and newborn care (Cadungog-Uy, 2006).

2.5 Hypothermia

A research conducted by Fernanda et al, (2014) in nine (9) University Neonatal Intensive Care Units (NICUs) in Brazil revealed that preterm neonates are susceptible to hypothermia immediately after delivery. It further indicates that 47% of 5277 very low birth weight neonates had $<36^{\circ}$ C body temperature and were admitted to the NICU. It showed a 28% increase in death rate per 1° C decline in body temperature. Neonates with both modest and severe hypothermia were at high risk of death before been admitted, treated and discharged from the hospital in California (Fernanda et al., 2014). This implies that keeping all the babies warm at all times especially immediately after delivery are critical for newborn survival and development.

2.6 Neonatal Resuscitation and Intrapartum-related newborn deaths

According to research conducted by Wall et al, (2009) in South Africa, the findings show that annually approximately 10 million neonates need support to start breathing. About 5 to 10% of all neonates require some level of resuscitation such as the A, B, and C (Airways, Breathing and Circulation) of resuscitation. Any delay in administering Positive Pressure Ventilation (PPV) will increase the newborn's risk of complex ventilation procedures which can easily lead to death (Wall et al., 2009).

In a study conducted by Langli et al, (2011) rudimentary resuscitation procedures such as stimulation and suctioning using Face Mask Ventilation (FMV) are vital for neonatal survival. Evidence from the study conducted shows that hospital-based simple newborn resuscitation

might reduce 30% of intrapartum-based newborn mortalities. Just a few neonates may require complex resuscitation such as endotracheal intubation and drugs such as epinephrine. Such babies may not stay alive unless they receive ventilation (Langli, Mduma, Svensen, & Perlman, 2012).

The results of the research revealed that out of 5845 newborns that were delivered; 5689 of them were alive. Among these, 84% started normal breathing; 93% of them began breathing in about 30 seconds after resuscitation and 99% in less than or equal to 60 seconds. The fundamental resuscitation (stimulation, suctioning, and FMV) was conducted in 920 infants out of 5689 (16.0%) and 49.9% initiated FMV. The results showed that 96.0% of the neonates were able to breathe normally, 1.0% died, and 0.3% admitted to the NICU for further care. The possibility of death increases by 16% for every 30 seconds delay in commencing FMV. Therefore, the bulk of unconscious neonates were in primary apnea and responded to stimulation, suctioning or FMV. Babies who needed FMV were most at risk of death when resuscitation was delayed (Langli et al., 2012).

2.7 Night Deliveries

A study by Heller et al., (2000) in Germany confirmed a lot of very early neonatal deaths in low risk neonates delivered at night. This is attributed to the tiredness experienced by doctors and midwives during the night. They repose a lot of confidence in the less experienced staff to deliver, hence contributing to very early neonatal deaths (Heller et al., 2000).

2.8 Medical Errors

According to Kanter et al., (2004) the national rate of reported cases of medical errors in Low birth newborns is 1.2 per 100 discharges. A Cochran-Armitage test was conducted and it

indicated a significant linear increase in medical errors based on the birth weights of neonates (Kanter et al., 2004). Examples of these errors are administering an inappropriate medication, leaving surgical implements inside the mother's womb, and unable to act appropriately to avoid very early neonatal deaths.

2.9 Essential Newborn Care

Essential newborn care (ENC) is an all-inclusive approach intended to advance the health of newborns by intervening before pregnancy, during pregnancy, and immediately after birth, and during the post partum stage.

Maternal and Infant Health Project report by Doctors of the World/USA in 2002 show that care of the neonate is an essential component of neonatal survival. Monitoring the fetal heart tones will enable pediatricians or doctors assess heart rate patterns linked with other delivery complications. There is the need to introduce procedures like Oxygenation, and amnioinfusion in delivery. The monitoring should be done in the first and second stages of labour (Cadungog-Uy, 2006).

2.10 Preventable Newborn Deaths

The need for greater efforts in child survival, health, and development has increased. The focus is now on a healthy start. More than 15 000 babies die every day—ten every minute. Preterm delivery, intrapartum complications including birth asphyxia, and infections are the leading causes of neonatal deaths. Proper care delivered during the above stages of birth has the greatest chance of 41% of deaths averted and appropriate care of small and ill neonates has 30% of the deaths prevented. The ability to improve quality of care for every newborn child in the health facilities could decrease deaths by 2 million each year. An appropriate

strategy to cater for the poor at home could prevent deaths by almost one quarter through community-based intervention (Lawn et al., 2014).

The ability to promote institutional deliveries is a key focus in minimizing newborn deaths (Lim et al., 2010). The National Family Health Survey (NFHS) report, India in 2007 showed that the provision of financial packages for institutional deliveries to pregnant women and to the CHC (Community Health Committees) as pertains in Ghana who serves as a link between the community and the health system will go a long way to improve institutional deliveries (NFHS,2007).

Neonatal death is seen as a result of multi-dimensional factors. These include socio-economic, demographic, environmental and biological factors (Vandresse, 2008).All these play a vital role at one point or the other in influencing very early neonatal mortality.

Reports have it that about 10,000 neonates die every day at the neonatal stage. Owing to the consequences of this especially in developing countries, 189 United Nations member countries came to a consensus to help reduce under five deaths by two-third by 1990 to 2015.This was labeled as MDG 4 (Kayode et al.,2012).

The MDG 4 deadline is almost at hand. Therefore, efforts are being made worldwide to achieve the targets by 2015 (Moseson et al., 2014). Neonatal near-miss cases are those of neonates manifesting serious fatal complications but later survive the neonatal stage. These cases can be identified earlier than usual by clinical signs such as inability to suckle well, Low birth weight, lethargy, inability to breathe properly, hypothermia and a host of them (Musooko et al.,2014).

Additionally, a greater number of third trimester (2.6million) still births are recorded worldwide yearly with 45% occurring during childbirth (Mason et al., 2014).

2.11 Death of Newborn Babies

Majority of newborn mortalities (99%) occur in low and middle income nations. Almost five percent of these deaths occur at home. Very early neonatal mortality has seen the least improvement. Newborn or neonatal period is only 28 days after birth but a greater percentage (38%) of deaths occur within that period. Hence mean daily death rate at the neonatal stage is almost 30 times higher than other stages. Death rate is very high during the first day of life forming about 25-45% of the newborn deaths. Worldwide, three-quarters of the newborn deaths occur within the first 0-7days (Lawn et al., 2005).

2.12 Neonatal Sepsis

Newborn Sepsis is defined as bacteremia associated with hemodynamic compromise and general signs of infection. It can be grouped into early onset sepsis that is from 0 to 7 days of life and its related infections from the mother's birth or from 8 to 28 days of the neonate's life. Here, infections come from home or hospital environment. On the contrary, the classifications are not always true for third world countries. In these places, poor hygienic delivery practices and quality of neonatal care expose them to environmental pathogens during and after delivery (Ganatra & Zaidi, 2010).

2.13 Nosocomial Infections

Majority of health care centers in low and middle income countries are sources of newborn infections for facility-based deliveries. Most delivery rooms are not adequately resourced; hence they lack salient sanitary materials to keep the places tidy. Most facilities do not have adequate running water for cleaning and disinfection. Some staffs are not adequately trained in infection control strategies. A number of health care facilities do not have a septic technique for invasive procedures. Their inability to properly sterilize multiple use equipment and overcrowding of wards predispose many hospitals in the developing world to infection (Ganatra et al.,2010).

2.14 Management Related Issues

Assisting in organizing the maternity wing for effective health care delivery is paramount. Management has a huge task in implementing delivery protocols and establishing high-risk pregnancy triage, and procedures for referrals to the next level. Working to establish the use of partograph to monitor progress of labour is another critical issue for management to implement. Deployment of midwives according to service needs is also important in order to avert stress and inappropriate practices that can lead to early neonatal deaths. These are all contained in the Maternal and Infant Health Project report by Doctors of the World/USA in 2002.

2.15 Equipment and Logistics Supply

It is important to have all the neonatal care equipment to minimize neonatal deaths. United Nations Commission on Life-saving Commodities for women and children has bag and mask as part of their life- saving commodities. The inability of some hospitals and health facilities to procure these equipment poses a great risk to newborn care and survival (Kim et al., 2013).

2.16 Training on Neonatal Care

Draycott et al. (2005) indicated that the health sector in the UK targeted a 25% cut in the number of careless damage in newborn care by 2005. This was as a result of many recommendations made to improve the skills of personnel through effective training. The report further stated that current logical review of global training publications in obstetrics shows that little training has been conducted. The import of the research was to find out whether training can improve neonatal outcome through reduction in number of newborns with 5minute Apgar score of 6 or less. The results from the study indicated that emergency obstetric training significantly reduced low 5 minute Apgar scores and hypoxic–ischaemic encephalopathy (HIE) (Draycott et al., 2005).

In another study conducted by Carlo et al. (2010) revealed that out of 3.7 million newborn mortalities, 75% of them took place in the first 0 to 7 days of life. As a result, efforts should be put in place to reduce early neonatal deaths in order to achieve the MDG 4 target by 2015. Therefore, introducing interventions such as early newborn resuscitation training, could be useful in dropping the rates of mortality due to these causes. This brought about the Essential Newborn Care course by WHO which sets to build the competence of countries to teach skilled birth personnel in evidence-based protocols in neonatal care (Carlo et al., 2010).

This protocol guides health care providers in the care and treatment of newborn care within the first seven days of life. The training has decreased asphyxia-related mortality rates in some medical centers in India. The outcome of the study indicated that 7 day newborn death rate declined from 11.5% mortalities per 1000 live births to 6.8 mortalities per 1000 live births owing to the Essential Newborn Care training (Carlo et al., 2010).

2.17 Newborn care in Low Resource Areas

In a study conducted in 4 low income countries by Goldenberg et al., (2013), they thought that moving deliveries from home or substandard level clinics to hospitals will improve outcomes. However, current research in India proved otherwise most especially where quality of care was compromised. Owing to this, WHO, United Nations Population Fund (UNFPA), and other Non-governmental organizations sought an assessment of quality of care at the hospital. Further to this, the study revealed that neonatal mortality in low resourced areas including very early neonatal deaths is also linked to the quality of services rendered at the health facility (Goldenberg et al., 2013).

2.18 Maternal Characteristics that Influence Very Early Neonatal Mortality

A case control study conducted by Kassir et al.,(2013) in Maceio, Northeastern Brazil revealed that mothers with previous child deaths, and inadequate prenatal care were both associated with neonatal deaths. Unearthing the associated risks factors from mother to the very early neonate is crucial and requires an improvement of care offered to pregnant women and the very early newborns. This will help reduce very early neonatal deaths. The ability to identify these risk factors and provide the needed attention and care during the delivery stage and the maternal and reproductive history properly taken will be of immense intervention to curb the menace. The study established that 41% of the deaths occurred within the first 24 hours all linked to inability to provide adequate care at pregnancy, delivery and previous birth history (Kassar et al., 2013).

2.19 Improving Care and Outcome for Low-Birth-Weight Babies

Reports from the World Health Organization indicate that about 20 million low birth weight (LBW) babies are born annually and this usually happens in poor, low and middle income countries. This contributes significantly to the number of very early neonatal deaths occurring worldwide of which Ghana is no exception (WHO, 2003).

Kangaroo mother care is the type of care given to very low birth weight or preterm babies by wrapping them firmly to the mother skin-to-skin in order to keep the babies warm and prevent heat loss. Health facility staff could help in this regard by coaching mothers how to practice kangaroo mother care to avert preventable very early new born deaths (WHO, 2003).

2.20 Use of Partograph

The worldwide view of the importance of partograph use to pictorially monitor the progress of labour and foetal condition in order to appropriately identify and diagnose labour complications necessitated its use globally. This will enable skilled birth attendants to intervene in case of prolonged labour to avoid very early neonatal deaths and maternal distress. The use of partograph involves adequate number of skilled birth attendants who are dedicated and willing to use it to improve very early neonatal and maternal outcome (Ogwang et al., 2009).

CHAPTER 3

METHODOLOGY

3.1 Type of Study

A cross-sectional study involving record reviews and interviewing of staff in 2 departments of labour and pediatrics (NICU) in Koforidua regional hospital was conducted. It employed the use of quantitative methods of data collection.

Records of data on very early neonatal deaths and maternal characteristics were collected from the hospital records. Semi-structured questionnaire were also administered to doctors, nurses and midwives.

3.2 Study Period

The study was a two year period, from January, 2013 to December, 2014

3.3 The Study Area

The study was conducted at the Koforidua Regional Hospital. It is one of ten Regional Hospitals in Ghana and has a staff strength of 813 comprising 62 Doctors, 261 Nurses (64 Midwives), 248 support staff, and 242 non-mechanized staff.

It has a main OPD for adults and a children`s OPD for children below 12years of age. The various wards and departments are: Pharmacy, Administration, Laboratory, male and female surgical wards, theatre, children`s ward, labour ward and lying-in wards and Neonatal Intensive Care Unit (NICU). An average of 456 mothers is admitted to the labour ward for skilled delivery monthly and 90 neonates are admitted to the NICU per month for special care.

3.4 Outcome Variable

Very early neonatal deaths

3.5 Independent Variables

- Age
- Sex
- Marital status
- Occupation
- Religion
- Educational level
- Midwives and Doctors knowledge on essential newborn care and resuscitation
- Midwives and Doctors practices that contribute to very early neonatal deaths
- Lack of adequate training on neonatal care and resuscitation
- Equipment and logistics supply
- Antepartum factors
- Intrapartum factors

3.6 The Study Population

The study population included 13 midwives, 7 nurses, and 4 doctors who work in the NICU and Labour Ward and agreed to participate in the study.

3.7 Sample size

The sample size for those interviewed was all the skilled birth attendants (doctors, nurses and midwives) working in the labour ward and NICU. The questionnaires were both self-

administered and interviewer-administered. In all 13 midwives in the labour ward, 4 medical doctors (2 in the labour ward and 2 in the NICU), and 7 nurses from the NICU were interviewed totaling 24 respondents.

3.8 Data Collection Techniques/Tools

- Questionnaires were administered to determine level of knowledge, availability of equipment, clean birth practice, and trainings conducted in newborn care and resuscitation.
- Reviewed records of deliveries conducted and causes of deaths.

3.8.1 Section A

This took into account the practices of midwives, nurses, and doctors in relation to newborn care such as: the conduct of neonatal resuscitation, the processes involved in cleaning the baby after delivery, the surface of delivery, the cord tying, cutting where the baby can bleed to death if not done properly, and dressing process, support for early initiation of breast feeding, and modes of keeping babies warm.

3.8.2 Section B

This aspect measured the level of knowledge of doctors, nurses, and midwives in very early newborn care. A semi-structured questionnaire was therefore administered to participants and the scores graded. The questionnaire contained the basic concepts in very early newborn care and positive pressure ventilation processes and how to manage each of them.

3.8.3 Section C

Section C sought to find out the gaps in essential logistics and equipment for newborn care and resuscitation that might have contributed to very early neonatal deaths at the hospital.

3.9 Records Review

All records of deliveries conducted in the hospital from January 2013 to December, 2014 were reviewed using data extraction sheets. The principal investigator coordinated the records review. Facility stakeholders were contacted and records checked appropriately. The principal investigator, assisted by facility managers, selected a record screener (Health Information Officer) and the researcher acted as a medical reviewer. These two ideally were external to the hospital and had a good understanding of how the facility is organised and were able to ensure confidentiality. The data were then collected in a specially designed data extraction sheet for analyses.

3.10 Research Assistants

Research assistants were trained for one day by the principal investigator. The training lasted 2 hours and provided detailed instructions and opportunity for practice sessions. The outcomes of the pre-test questionnaire were discussed and corrections made. A total of five research assistants administered the questionnaire, and reviewed the records. The data collectors were made up of one Nutritionist, one Health Information Officer, while the other three were national service persons at the hospital. All the interviewers spoke both English and Twi.

3.11 Data Collection Review

All data collectors converged at a point at the end of the day to review and discuss the data collected. These were done routinely till the end of the study. The process was coordinated by the principal investigator.

3.12 Quality Control

The data were crosschecked and double entered to ensure accuracy. The data collection review was one way of helping to address the issue of data quality.

3.13 Data Collection and Processing

The investigator assessed nurses, doctors, and midwives working in the labour ward and NICU using both self-administered and interviewer administered questionnaires on their knowledge of neonatal care and resuscitation. Logistics and equipment for delivery of newborn care and resuscitation were also assessed.

Data from delivery records were collected on maternal characteristics and very early neonates delivered at the hospital and detained at the NICU. Data extraction sheet was developed and used to collect the data from the records by trained research assistants. The maternal and neonatal characteristics were grouped into A and B. Group (A) for all those who survived within the first 24 hours and group (B) for those who died within the same period. The neonatal and maternal characteristics that were examined were: birth weight, gestational age, Apgar score at 1 and 5 minutes, and on the mothers side: maternal age, antenatal status, job status and parity. The gestational age in completed weeks were found by obstetric approximation. It is always based on the last menstrual period and ultrasound scans.

The very early neonatal mortality rate was calculated using the WHO formula:

Very early neonatal mortality rate= $\frac{\text{Total number of very early neonatal deaths}}{\text{Total live births}} \times 1,000$

3.14 Data Analyses

The data processing, management and analyses were conducted using Epidata and STATA SE 13. The data were entered into Epidata version 3.1 and exported to STATA for the analyses. Measures of association were made using chi-square test for the categorical variables. Statistical significance levels were shown for comparisons between groups A (survived) and B (died). Bivariate associations between Apgar scores and survival or death, birth weight, antenatal status of mothers, gestational age of baby, number of previous neonatal death, number of previous child death, marital status, and parity were determined. Odds ratios were computed to determine the strength of association between the risks of death and survival. Nurses, doctors, and midwives level of knowledge on neonatal resuscitation, cleanliness, equipment availability, training in neonatal resuscitation, and certain practices that may contribute to very early neonatal deaths were also examined using frequencies and descriptives. Logistic regression was also used to investigate the overall effect of the independent variables on the outcome. This helped to unveil the true effects of each independent variable.

The results were presented in the form of tables, frequencies, and odds ratios with 95% C.I.

3.15 Ethical considerations

Ethical clearance was obtained from the Ethical Review Board of the Ghana Health Service, Research and Development Division, Accra, through the School of Public Health, University of Ghana. Approval was also obtained from the regional hospital Koforidua, before the study commenced.

3.16 Voluntary consent

Respondents were told that participation in the study was voluntary. Details of the study including the purpose and study procedure were explained to respondents and they were free to ask questions for clarification.

3.17 Data storage and usage

The data collected for the study were recorded onto a compact disk and stored in locked cabinets of the principal investigator.

3.18 Risks and benefits

The study did not pose any risk to respondents.

3.19 Measures to reduce risks during the study

Possible risks associated with responding to questions in this study were explained to respondents before they consented.

3.20 Description of possible benefits

Respondents did not derive any benefits from this study apart from using the results of the findings to improve upon the good work they are doing.

3.21 Compensation

Respondents were not given any form of compensation, be it monetary or non-monetary.

3.22 Conflict of interest

The researcher declares that there was none.

3.23 Proposal and Funding Information

This research was solely funded by ALL SAINTS EDUCATIONAL TRUST based in London UK. For details on ethical issues please see appendix I.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents the analysis and interpretation of results obtained from the study. The chapter is further organized into two sections excluding the introductory section. Section 4.2 deals with the data from review of records while section 4.3, deals with the primary data with a response rate of 79.4 % to measure the knowledge of doctors, midwives, and nurses on neonatal care. The response rate means the opinions expressed in the sample are the same as those to whom surveys were sent but no responses were received. The practices of Doctors, Midwives, and Nurses that may contribute to very early neonatal mortality were also examined. Additionally, the gaps in equipment and logistics that may contribute to very early neonatal deaths were assessed. Again, maternal characteristics that influence very early neonatal deaths were looked at. The analysis was carried out using Stata SE 13 statistical software and Microsoft Excel for the table work.

4.2 Review of Records

This section is concerned with the analysis of data retrieved from the delivery records from Koforidua Regional Hospital. In all 811 records were reviewed. The very early neonatal mortality rate was found to be 9 per 1000 live births.

4.2.1 Records Review Process

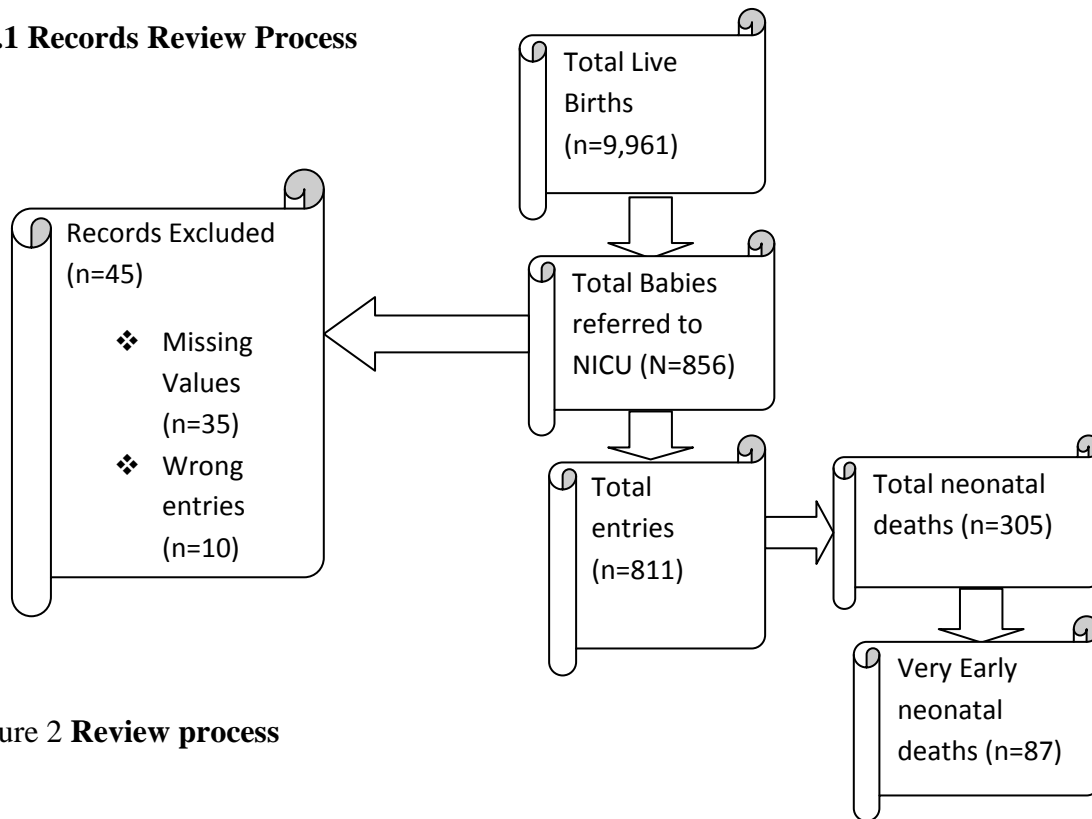


Figure 2 Review process

$$\begin{aligned} \text{Very early neonatal mortality rate} &= \frac{\text{Total number of very early neonatal deaths}}{\text{Total live births}} \times 1,000 \\ &= \frac{87}{9,961} \times 1,000 = 8.73 = 9 \text{ per } 1000 \text{ live births} \end{aligned}$$

The results of this study shows that out of the total (n=9,961) live births for the period of January 2013 to December, 2014, over eight hundred (n=856) of them were referred to the NICU for special care. Out of this number, three hundred and five (n=305) of the neonates died. Among these deaths, eighty seven (n=87) died within the first 24 hours (very early neonatal deaths). Missing values and wrong entries were all excluded in the data entry and analysis totaling (n=45).

4.2.2 Maternal Characteristics

The results from maternal characteristics show that majority of women who went through delivery fell between the ages of 18 to 35 years making up 77.4% of pregnant women. The teenagers formed 10% of the deliveries and those above 35 years formed 12.6%. Majority of the women had Secondary/Technical/College certificates making up 38.6% of the records reviewed. 92.6% of the women who delivered at the Hospital were Christians and employment rate was 72.7%. A little over twenty (20.3%) percent of the women have ever had their children dying at infancy. Table 1.0 below gives a detail account of the results.

Table 2.0 Maternal Characteristics of post partum women from records review

Maternal Age	Frequency	Percent
Below 18	81	10.0%
18-35	628	77.4%
Above 35	102	12.6%
Education Level		
No Formal	227	28.0%
Primary	245	30.2%
Secondary/Technical/College	313	38.6%
University	26	3.2%
Religion		
Christian	751	92.6%
Muslim	57	7.0%
Traditional	3	0.4%
Job Status		
Employed	590	72.7%
Unemployed	221	27.3%
Number of Previous Child Deaths		
None	646	79.7%
One or more	165	20.3%
Marital Status		
Married	570	70.3%
Not Married	241	29.7%

4.2.3 Obstetric Factors

In terms of obstetric factors, 90.7% of the women who came to deliver were ANC attendants, 5.4% non-attendants, and 3.8% not regular attendants. Women with normal gestational age were 64.9% and the abnormal 35.1%.

Table 3.0 Obstetric Factors

Antenatal Status	Frequency	Percentage
Attendant	735	90.7%
Non-attendant	44	5.4%
Not regular attendant	31	3.8%
Gestational Age		
Normal (37-42Wks)	526	64.9%
Abnormal (<37Wks,>42Wks)	285	35.1%

Table 4.0 Neonatal Characteristics and Risk Factors that Influence Very Early Neonatal Mortality

Mortality Status	Frequency	Percentage (%)
Survived	702	89.0
Died	87	11.0
Gender		
Male	457	56.4
Female	354	43.6
Birth weight Category		
Normal (≥ 2.5 Kg)	401	49.4
Low (< 2.5 Kg)	410	50.6
Apgar score 1minute		
Normal (7-10)	88	10.9
Low (< 7)	723	89.1
Apgar score 5minutes		
Normal (7-10)	214	26.4
Low (< 7)	597	73.6
Cause of referral to NICU		
Pre-term	251	30.9
Neonatal Jaundice	18	2.2
Respiratory Distress Syndrome	12	1.5
Neonatal Asphyxia	164	20.2
Low Apgar score	197	24.3
Neonatal Sepsis	14	1.7
Macrosomia	36	4.4
LBW	16	2.0
Meconium stained	19	2.3
*Other	84	10.4
Causes of death		
Pre-term	39	44.8
Respiratory Distress Syndrome	5	5.7
Neonatal Asphyxia	32	36.8
Neonatal Sepsis	2	2.3

¹*Other=offensive liquor, hydrocephalous, seizures, hypoglycaemia, bilateral foot inversion, poor suckling, cleft palate, sepsis, and small for gestational age.

In auditing the mortality status of newborn babies that were referred to the NICU, out of the total number of 811 records reviewed, 89% of the very early neonates survived and 11% died

within the first 24 hours after delivery. Twenty two (22) of the deaths occurred after the first 24 hours and they are not part of the very early neonatal deaths. Male children formed the majority of the deaths with 56.4% and 43.6% females. Neonates with low birth weights (LBW) made up 50.6% and the normal birth weight was 49.4% slightly lower than the LBW babies. The Apgar score at 1 minute clearly indicates from the results that the low Apgar score babies formed 89.1% and the normal Apgar scores was 10.9%. Again, Apgar scores at 5 minutes also reveal that the low scores formed 73.6% and the normal formed 26.4%.

4.2.4 Major Causes of Referral to NICU

A series of diseases and conditions accounted for why newborns were referred to the NICU for further management. These are: Pre-term 30.9% which forms the highest cause of referral to the NICU. The second cause is low Apgar score of 24.3%, followed by neonatal Asphyxia with 20.2%.

4.2.5 Causes of Death

The major causes of very early neonatal mortality at the Koforidua Regional Hospital are: Pre-term 44.8%, followed by neonatal Asphyxia 36.8% .Other minor causes are respiratory distress syndrome 5.7%, and neonatal sepsis 2.3%.

4.2.6 Bivariate analysis showing maternal characteristics of mothers who lost their babies within the first 24 hours after birth compared with those who survived

Table 5.0 a. Maternal characteristics associated with very early neonatal death.

Characteristics	Mortality Status.				Chi-square	p-value
	Survived		Died			
Maternal Age	Freq	Percent	Freq	Percent		
Below 18	77	11.0%	2	2.3%	6.886	0.032
18-35	538	76.6%	71	81.6%		
Above 35	87	12.4%	14	16.1%		
Parity						
Primipara	438	62.4%	39	44.8%	9.990	0.002
Multipara	264	37.6%	48	55.2%		
Job Status						
Employed	510	72.6%	64	73.6%	0.033	0.857
Unemployed	192	27.4%	23	26.4%		
Education Level.						
No Formal	199	28.3%	22	25.3%	3.194	0.363
Primary	205	29.2%	32	36.8%		
Secondary/Technical	273	38.9%	32	36.8%		
University	25	3.6%	1	1.1%		
Marital Status						
Married	493	70.2%	61	70.1%	0.001	0.983
Not Married	209	29.8%	26	29.9%		
Number of Previous Child Deaths						
None	635	90.5%	9	10.3%	331.180	0.000
One or more	67	9.5%	78	89.7%		

4.2.6.1 Bivariate analysis showing maternal and neonatal characteristics of mothers who lost their babies as compared to those who survived within 24 hours after birth. Table 6.0 b. Maternal and neonatal characteristics associated with very early neonatal mortality

	Mortality Status				Chi-square	P-value
	Survived		Died			
Antenatal Status	Freq.	%	Freq.	%		
Non-attendant	35	5.0%	8	9.2%	2.652	0.266
Attendant	640	91.3%	76	87.4%		
Not Regular						
Attendant	26	3.7%	3	3.4%		
Gestational Age						
Normal	470	67.0%	46	52.9%	6.780	0.009
Preterm	232	33.0%	41	47.1%		
Previous Neonatal Death						
No	660	94.2%	77	88.5%	4.075	0.044
Yes	41	5.8%	10	11.5%		
Birth weight						
Normal (≤ 2.5 kg)	366	52.1%	32	36.8%	7.031	0.007
Low (> 2.5 kg)	336	47.9%	55	63.2%		
Apgar Score 1 minute						
Normal (< 6)	85	12.1%	2	2.3%	7.592	0.006
Low (≥ 6)	617	87.9%	85	97.7%		
Apgar score 5 mins						
Normal (< 6)	204	29.1%	7	8.0%	17.448	0.000
Low (≥ 6)	498	70.9%	80	92.0%		

To investigate the individual relationships of the risk factors between those who died and those who survived within the first 24 hours, percentages and chi-square tests were performed. The results are found in Table 4.0. In this table; the figures are representing characteristics of mothers whose babies died within the first 24 hours of delivery. There are

still twenty two other babies who died after the first 24 hours and hence are not included in the table above.

For maternal characteristics, the age of the mother showed a significant association with very early neonatal mortality as those below 18 years were associated with fewer deaths than those above 18 years (p-value :0.032). Parity was also a significant maternal factor associated with very early neonatal mortality (p-value: 0.002) which shows that Primiparas are more likely to be referred to the NICU and associated with very early neonatal mortality than the multiparas. Previous child death was also significantly related to very early neonatal mortality (P-value<0.001). Other maternal factors like education level, marital status and job status were not significantly related to very early neonatal mortality.

In the case of obstetric factors, gestational age and previous neonatal death were significantly related to very early neonatal mortality. Antenatal clinic attendance status however was not significantly associated with very early neonatal death, though; majority of the very early neonatal deaths came from those who were regular antenatal attendants (87.4%).

4.2.6.2 Birth Weight

Out of 52.1% (n=366) normal weight babies that were alive at delivery, 36.8% of thirty two (n=32) died. With respect to the low birth weight (LBW) babies, 63.2% of fifty five (n=55) neonates died and 47.9% of three hundred and thirty six (n=336) survived at delivery. These culminated in a P-value=0.007 indicating a significant association between birth weight and very early neonatal death.

4.2.6.3 Apgar score

An Apgar score is a short form of interpreting the clinical status of newborn infants and how they respond to resuscitation. The Apgar score is made up of 5 elements which comprise: heart rate, respiratory effort, muscle tone, reflex irritability, and color of which each is assigned a score of 0, 1, and 2. These scores are assigned at 1 minute and 5 minutes after delivery. Table 5.0b gives detail representation of the results.

At 1 minute, among those with normal apgar scores, a total of eighty five (n=85) neonates were alive forming 12.1% and 2 died forming 2.3% (p-value=0.006) whereas those with the low apgar score, six hundred and seventeen (n=617) of them survived (87.9%) and a total of 85 neonates died forming (97.7%) with (p-value=0.006). Therefore, Apgar score at 1 minute was significantly associated with very early neonatal mortality.

At 5 minutes, among those with normal apgar scores, a total of (n=204) neonates were alive forming 29.1% and 7 died forming 8% (p-value<0.001) whereas those with the low apgar score, four hundred and ninety eight (n=498) of them survived (70.9%) and a total of 80 neonates died forming (92%) with (p-value<0.001). Therefore, Apgar score at 5 minutes was significantly associated with very early neonatal mortality.

4.2.7 Logistic Regression showing significant risk factors that influence very early neonatal mortality

Table 7.0 Assessment of Associations with very early neonatal mortality

Factors	Coefficient	Odds Ratio	Chi-square	P-value
Maternal Age	-0.009	0.99	0.007	0.769
Parity	-0.358	0.69	29.71	0.02
Number of child deaths	3.548	34.75	13492.56	<0.001
Educational Level	0.216	1.07	1.54	0.301
Antenatal Status	-0.423	0.66	6.04	0.117
Gestational Age	-0.151	0.86	0.027	0.685
Previous neonatal death	2.07	7.93	163.46	<0.001
Marital Status	0.37	1.45	1.12	0.304
Job Status	-0.162	0.85	0.05	0.631
Birth Weight	0.728	2.07	14.41	0.041
Apgar 1min Status	0.532	1.69	20.8	0.033
Apgar 5min Status	1.898	6.67	100.17	0.002
Constant	-4.065	0.02	108.6	<0.001

Since there may be some interrelationships among the explanatory factors, a multiple logistic regression was used to analyze the effects of the risk factors that influence very early neonatal mortality, making manifest the interrelationship among the independent variables.

Significant risk factors associated with very early neonatal mortality were identified using the multiple logistic regression analysis.

4.2.7.1 Maternal and Neonatal Characteristics that Influence Very Early Neonatal death

Multiparity reduced the odds of very early neonatal death by 30% (OR 0.69, 95% CI 0.52-0.94).

Also in line with the maternal factors, number of previous child deaths was 34.75 times the odds of dying within the first 24 hours after birth than those without previous child deaths (OR 34.75, 95% CI 18.22-66.24). Mothers of lower educational status had a 7% increase in the odds of experiencing very early neonatal mortality (OR 1.07, 95% CI 0.88-1.64) compared to those with higher education (more than basic) but education was not a significant maternal factor (P-value=0.301). Marital status and Job status were not significantly associated with very early neonatal deaths.

Previous neonatal death was the only significant obstetric factor in this case. Those with a previous neonatal death had about 8 times the odds of having a very early neonatal death (OR 7.93, 95% CI 2.83-22.19) as compared to those without history of neonatal death. Gestational Age and Antenatal clinic attendance status were not significant factors in this case.

On neonatal factors, birth weight, Apgar score at 1 minute and Apgar score at five minutes were all investigated. The very early neonates with low birth weights were 107% times the odds of dying within the first 24 hours (OR 2.07, 95% CI 1.21-4.34) as compared to the

normal weight babies. Neonates with low 1 minute Apgar score were 69% times the odds of experiencing very early neonatal death (OR 1.69,95%CI 0.65-3.56) and 5 minutes Apgar score about 7 times the odds of experiencing very early neonatal death (OR 6.67, 95%CI 3.78-10.43) as compared to those with normal scores.

4.3 Essential Newborn Care Practices by Doctors, Midwives, and Nurses

In this section, the study looks at the knowledge of Doctors, Midwives, and Nurses on neonatal resuscitation. Clean birth practices, infection control measures, and the necessary logistics and equipment available for effective health care delivery were also examined. Whether these cadres of staff had the opportunity of going for in-service/refresher training on neonatal resuscitation or not was also assessed and analyzed.

Table 8.0 Demographic Characteristics of Doctors, Midwives, and Nurses

Gender	Frequency	Percentage (%)
Male	4	16.7
Female	20	83.3
Age Category		
20-35	17	70.8
35 and above	7	29.2
Cadre of Staff		
Doctors	4	16.7
Midwives	13	54.2
Nurses	7	29.2

The results of the demographic characteristics of the different cadres of staff indicate that 83.3% of females and 16.7% of males work in the NICU and labour ward. Out of this, 70.8% fall within the ages of 20 and 35 and 29.2% above 35 years of age. Midwives formed majority of the respondents with 54.2% followed by 29.2% of Nurses and 16.7% of Doctors.

4.3.1 Practices of Doctors, Midwives, and Nurses that Influence Very Early Neonatal outcome
Table 9.0 Practices of the different Cadre of Staff

Practices	Response	Doctor	Midwife	Nurse	Total	%
		Frequency	Frequency	Frequency		
Ensure that place of delivery is clean	Always	4	12	7	23	95.8
	Sometimes	0	1	0	1	4.2
	Never	0	0	0	0	0.0
Clean the perineum with safe water	Always	4	12	7	23	95.8
	Sometimes	0	1	0	1	4.2
	Never	0	0	0	0	0.0
Clean hands using soap and safe water	Always	4	12	7	24	100
	Sometimes	0	0	0	0	0.0
	Never	0	0	0	0	0.0
Cover Incision with sterile pad till after resuscitation	Always	2	9	5	16	66.7
	Sometimes	2	4	1	7	29.2
	Never	0	0	1	1	4.2
Use scissors to cut the cord	Always	4	12	7	24	100
	Sometimes	0	0	0	0	0.0
	Never	0	0	0	0	0.0
Encourage women in second stage to bear down when fetal head is visible	Always	3	8	3	15	62.5
	Sometimes	1	4	3	8	33.3
	Never	0	0	1	1	4.2
Avoid manually stretching the perineum	Always	3	11	5	20	83.3
	Sometimes	1	1	1	3	12.5
	Never	0	0	1	1	4.2
Allow delivery of head slowly preferably between contractions	Always	4	12	7	23	95.8
	Sometimes	0	0	1	1	4.2
	Never	0	0	0	0	0.0
Allow shoulders to rotate spontaneously once head is delivered	Always	3	11	7	22	91.7
	Sometimes	0	1	0	1	4.2
	Never	1	0	0	1	4.2

In assessing the practices of doctors, midwives, and nurses that influence very early neonatal care in the NICU and labour ward, respondents indicated that 95.8% of them always ensure that the place of delivery is clean and the perineum cleaned with safe water. 100% of respondents always clean their hands with soap and safe water and 66.7% always cover incisions with sterile pad till after resuscitation.

In cutting the cord, 100% of respondents use scissors to cut and 62.5% of them always encourage the pregnant women in second stage of labour to bear down when the fetal head is visible. Also, 83.3% of respondents always avoid manually stretching the perineum, 95.8% allow delivery of the head slowly preferably between contractions, and 91.7% always allow the shoulders to rotate spontaneously once the head is delivered.

4.4 Availability of Equipment and Logistics

Table 10.0 Access to Equipment and Logistics

Logistics	Response	Doctor	Midwife	Nurse	Total	%
		Frequency	Frequency	Frequency		
Infant Ambu Bag	No	0	0	0	0	0.0
	Yes	4	13	7	24	100
Infant face masks (Sizes 0,1,2)	No	0	1	2	3	12.5
	Yes	4	12	5	21	87.5
Towels or cloth for newborn	No	0	2	1	3	12.5
	Yes	4	11	6	21	87.5
Newborn resuscitation Table	No	1	0	0	1	4.2
	Yes	3	13	7	23	95.8
Syringes (1ml,2ml,5ml,10ml)	No	0	1	0	1	4.2
	Yes	4	12	7	23	95.8
Suction Apparatus	No	0	0	0	0	0
	Yes	4	13	7	24	100
Stethoscope for use with Newborns	No	0	2	0	2	8.3
	Yes	4	11	7	22	91.7
Source of warmth	No	0	0	0	0	0
	Yes	4	13	7	24	100
Delivery Set	No	0	2	0	2	8.3
	Yes	4	11	7	22	91.7
Laryngoscope	No	1	10	5	16	66.7
	Yes	3	3	2	8	33.3
Ever received any neonatal resuscitation training	No	1	5	4	10	41.7
	Yes	3	8	3	14	58.3

A check list was used to assess the equipment availability level in the labour ward and NICU. It was confirmed that the hospital has all the equipment listed in the questionnaire with the exception of Towels or cloth for newborns. Meanwhile, the feedback from respondents in both the NICU and labour ward indicated certain gaps in access to these equipment.

In determining the availability of the equipment and logistics for effective health care delivery at the NICU and labour ward, 100% of the respondents had access to an Infant Ambu bag, and 87.5% had access to an Infant face Masks sizes (0,1,2) and Towels or cloth for newborn respectively.

Additionally, respondents had 95.8% access to Newborn resuscitation table and syringes (1ml,2ml, 5ml,10ml) respectively. All respondents had access to Suction Apparatus (100%), 91.7% had Stethoscopes for use and 100% had access to Radiant Warmer. Delivery Sets were available to 91.7% of respondents and 33.3% had access to Laryngoscopes. However, 58.3% of the respondents had In-service/refresher training on neonatal resuscitation.

4.5 Comparison of percentage clean birth practice, knowledge on neonatal resuscitation, and equipment and logistics available to the different cadre of staff

Table 11.0 Comparison of clean birth practice, knowledge on neonatal resuscitation, and logistics and equipment available to the different Cadre of Staff

Clean birth practices & Infection control measures	Number	%	P-value
Doctors	4	90	0.4
Midwives	13	95	
Nurses	7	90	
Knowledge on neonatal resuscitation & Newborn care			
Doctors	4	65.3	0.432
Midwives	13	70.8	
Nurses	7	69.8	
Availability of equipment and Logistics			
Doctors	4	83	0.438
Midwives	13	75	
Nurses	7	75	

With clean birth practice and infection control measures, midwives adhere to it the most (95%) while nurses and doctors adhered the least (90%) but the differences were not significant (p-value = 0.400).

Again, midwives showed the highest level of knowledge on resuscitation with an average percentage score of 70.8%. Nurses had the second highest score of 69.8% whilst doctors scored an average of 65.3%. The differences however, were not significant. (p = 0.432).

Also doctors showed the highest number of logistics and equipment available to them with a percentage score of 83% while nurses and Midwives showed the least with 75% each but the differences were not statistically significant (P-value=0.438).

CHAPTER 5

DISCUSSION

5.1 Very Early Neonatal Mortality

The health facility-based study in Koforidua regional hospital revealed that out of the total number delivered, over nine thousand (n=9,656) of them were alive (97%). This agrees with Langli et al.'s (2012) study that shows that out of 5845 newborns that were delivered; 5689 of them were alive (97%). This generally implies that deliveries conducted by skilled attendants gives very high positive outcomes (live births).

The very early neonatal mortality rate was therefore found to be 9 per 1000 live births as against the National and Eastern Regional figures of 16% per 1000 live births and 15% per 1000 live births respectively (GHS Annual Report, 2014). This implies that the hospital is doing better to improve very early neonatal survival. The results of the study also agrees with the findings of Kim et al.'s (2013) research which indicates a very early neonatal mortality rate of 7.4 per 1000 live births in the Afghanistan study which is a little lower than the Koforidua Regional Hospital finding of 9 per 1000 live births. The very early neonatal death rate is rather high if compared with the USA which is 0.91 and 1.58 per 1000 live births (Oza et al., 2014).

5.2 Maternal and Neonatal Characteristics that Influence Very Early Neonatal Mortality

A bivariate relationship between the risk factors and very early neonatal mortality showed that those below 18 years were associated with fewer deaths than those above 18 years (P-

value=0.032). Multiparity reduced the odds of very early neonatal death by 30% as compared to the primiparas. However, employment status, educational level, antenatal status, and marital status were all not associated with very early neonatal mortality. These results go to support Mosha's (2010) findings by revealing that parity is associated with very early neonatal mortality. Marital status was however, not associated with very early neonatal death.

Moreover, number of previous child deaths was associated with very early neonatal mortality (P-value<0.001). Gestational age, and mothers who have had previous neonatal deaths were significantly associated with very early neonatal deaths. The health facility-based and maternal characteristics study supports the findings of Kassir et al.'s (2013) study by establishing that number of previous child and neonatal deaths were associated with very early neonatal mortality.

The results also indicate significant risk factors associated with very early neonatal mortality. These were identified as: number of child deaths (P-value<0.001), previous neonatal deaths (P-value<0.001), Apgar score at 1 minute (p-value=0.033), Apgar score at 5 minutes (P-value=0.002), and birth weight (P-value=0.041).

5.3 Level of knowledge of Nurses, Doctors, and Midwives on very early Neonatal Care

In this study, one of the aims was to determine the level of knowledge of the above cadre of staff on neonatal care and resuscitation. The study results showed that majority of the respondents were aged 20-35 years old. Midwives had the highest average knowledge on newborn care and resuscitation making up 70.8%. Nurses came second in terms of the level of knowledge on newborn care and resuscitation with a percentage score of 69.8% whilst doctors scored the least with 65.3%.

According to Kim et al., (2013), midwives had 66% knowledge on neonatal resuscitation and doctors had 71% which rather varies slightly from this study which shows that midwives had 70.8% of knowledge on neonatal resuscitation as against 65.3% of doctors. This goes to confirm that midwives are specially trained purposely to conduct normal deliveries and therefore need to have adequate knowledge and skills in neonatal resuscitation.

5.4 Practices of doctors, midwives, and nurses that might contribute to very early neonatal deaths

In this research, a simple descriptive statistical analysis revealed that 95.8% of the different cadres of staff under study always ensure that the place of delivery is clean and the perineum washed with safe water to avoid infection which accounted for no less than 20%, and 23% of neonatal deaths in Kassena Nankana District of the Upper East Region of Ghana (Moyer et al.,2012).

Additionally, the study also revealed that 100% of respondents always clean their hands with soap and safe water.100% of the respondents use clean scissors to cut the cord, and 58.3% always encourage the pregnant women to bear down when the fetal head is visible. This agrees with Moyer et al.'s (2012) study which spells out the pillars of clean delivery as: clean hands/Gloves, clean surface for delivery, clean cord tying, cutting, dressing and bathing. This probably accounted for why neonatal sepsis contributed only 2.3% of the causes of very early neonatal deaths and 1.7% of the cause of referral to the NICU at the hospital. All these were geared towards ensuring a safe delivery without foetal distress which could lead to very early neonatal deaths.

5.5 Gaps in Equipment and Logistics that might contribute to very early Neonatal Mortality

This objective in the research intends to assess the equipment and logistics availability for effective newborn care and survival and the gaps therein which need to be addressed. The results of the study revealed that 70.8% of the respondents had access to Mucus Extractors, 100% had access to an Infant Ambu bag, and 87.5% had access to Infant face Masks sizes (0,1,2) and Towels or cloth for newborn care. This means there is a 29.2% gap in access to Mucus Extractors, 12.5% gap in access to Infant face Masks sizes (0,1,2) and Towels for newborn care.

Also, the respective respondents showed 95.8% access to newborn resuscitation Table and syringes (1ml,2ml,5ml and 10mls) living a gap of 4.2%. However, all respondents had access to Suction apparatus (100%), 91.7% had stethoscopes for use and another 100% access to Radiant warmer. Delivery sets were available to 91.7% of the respondents with a gap of 8.3% and 33.3% had access to Laryngoscopes with a gap of 66.7%. This goes to buttress the United Nations Commission on Life saving Commodities for women and children` appeal to have bag and mask and all essential equipment for health care and neonatal survival.

The results of the Afghan study by Kim et al. (2013) showed that over 90% of health facilities had access to logistics and equipment for newborn care and survival. This study agrees with the finding by revealing a 100% availability and access to some logistics and equipment .A few gaps were however found in the area of logistics and equipment. This means the department does not lag behind completely in terms of equipment and logistics supply.

5.6 Training on Neonatal Care and Resuscitation

The outcome of the study showed that 58.3% of respondents have been trained in neonatal resuscitation. The study conducted by Draycott et al. (2005) showed that the UK targeted a 25% reduction in the number of avoidable damage in newborn care due to staff inability to acquire new skills and refresh their knowledge on newborn care and resuscitation through training. The results of this study showed that little refresher/In-service training on neonatal resuscitation has been done. The import of Draycott et al.'s research was to establish whether training could improve neonatal outcome through reduction in newborns with 5 minute Apgar score of 6 or less.

According to Carlo et al., (2010), essential newborn care training has reduced newborn death rate from 11.5% mortalities per 1000 live births to 6.8 mortalities per 1000 live births. Hence the need for doctors, midwives, and nurses to receive further training in neonatal resuscitation in order to minimize very early neonatal deaths in Koforidua Regional Hospital.

The reports by Doctors of the World/USA, (2002) indicated that training sessions were instituted to improve infrastructure and physician skill level. This is to help reduce harmful practices in very early neonatal care and bring about evidence-based medicine. It is therefore imperative to conduct further training for midwives, doctors, and nurses on basic neonatal resuscitation.

This study therefore, reveals a short fall of 21.7% on the training status of doctors, midwives, and Nurses on neonatal resuscitation comparing it to the Afghan study conducted by Kim et al., (2013) which revealed that over 80% of midwives and doctors have been trained on neonatal resuscitation whereas this study in Koforidua regional Hospital shows that 58.3% of doctors, midwives, and nurses have had the training. This gap might have accounted for the

36.8% asphyxia related very early neonatal mortalities at the hospital as a result of their inability to resuscitate these babies properly.

5.7 Neonatal Resuscitation and Intrapartum-related newborn deaths

Wall et al., (2009) in South Africa intimated in his research that about 5 to 10% of all neonates require some level of basic neonatal resuscitation in order to breath. He noted that a delay in administering resuscitation will increase the newborns risk of death.

Langli et al., (2011) also reported in his research that hospital-based simple neonatal resuscitation might help reduce 30% of intrapartum-related newborn deaths. This is because only a few neonates may require complex neonatal resuscitation procedures such as endotracheal intubation and the use of medications. The research results further stated that even community health nurses can conduct neonatal resuscitation with 20% reduction in intrapartum-based newborn mortalities (Langli, Mduma, Svensen, & Perlman, 2012).

In their study, fundamental resuscitation (stimulation, suctioning, and FMV) was conducted in 920 infants out of 5689 (16.0%) and 49.9% initiated Face Mask Ventilation (FMV). The results showed that 96.0% of the neonates were able to breathe normally, 1.0% died, and 0.3% admitted to the NICU for further care (Langli et al., 2012). The health facility-based study however, could not find records or evidence of neonatal resuscitation conducted at the facility. Meanwhile 8.6% of the babies were admitted to the NICU for special care which is far more than Langli`s finding.

5.8 Causes of very early Neonatal Deaths

According to Lawn et al., (2014) preterm delivery, intrapartum complications including birth asphyxia and infections are the leading causes of neonatal deaths. His research showed that preterm birth accounted for 28% of the deaths, and Asphyxia related cases was pegged at 23%. The results of this current study in Koforidua had the figures a little higher than the findings of Lawn and his colleagues. Preterm delivery and birth Asphyxia contributed 44.8% and 36.8% respectively of the cause of very early neonatal deaths in Koforidua Regional Hospital. The findings of Esrdal et al., (2012) also presents 30% cause of deaths by preterm birth, and 25% by birth asphyxia. The neonatal Asphyxia in the health facility-based study accounted for 20.2% of the cause of referral to the NICU and that translated into the 36.8% of the very early neonatal deaths that occurred. The differences could be due to the coverage of the study areas because this is a facility-based study as against country wide studies by Lawn and Esrdal.

5.9 Research Limitations

The research finding could not establish a link between the lack of training and very early neonatal deaths. Besides, the study again could not establish any connection between lack of equipment and very early neonatal deaths in the hospital.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In conclusion, births within the first 24 hours are a critical stage to earmark for interventions and therefore need to be critically monitored and supervised to curtail further mortalities.

Based on the study findings, these conclusions were drawn:

- ❖ Generally midwives had the highest average knowledge on very early newborn care and resuscitation as compared to doctors and nurses.
- ❖ Very early neonatal mortality is high at Koforidua Regional hospital despite the fact that the staff report following recommendations in delivery and care of newborns.
- ❖ There were minimal gaps in equipment and logistics that could have contributed to very early neonatal mortality.
- ❖ The women who gave birth more than once (Multiparas) were less likely to have their very early neonates dying within 24 hours after birth as compared to the primiparas (first time deliveries).
- ❖ Employment status, educational level, antenatal status, and marital status were all not risk factors for very early neonatal mortality in this study.
- ❖ Mothers who have ever had any of their children dying at infancy were more likely to experience very early neonatal mortality as compared to women who have never recorded any.

6.2 Recommendations

- ❖ The hospital management should ensure that good practices of doctors, midwives, and nurses towards women in labour are nurtured and sustained for the betterment of the society, the hospital and the country as a whole.
- ❖ Management of the hospital should make the necessary equipment and logistics available and accessible to all the different cadres of staff working in the NICU and labour ward to save lives.
- ❖ Adequate monitoring should be given to the primiparas by the labour ward and NICU departments of the hospital to avert preventable deaths.

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APPENDICES**Appendix I. Consent Form****Project Title**

Health facility-based Factors that influence very early neonatal mortality in Koforidua Regional hospital, Eastern Region. School of Public Health, University of Ghana, Legon.

Background

Dear Participant,

I invite you to take part in this study. My name is James Atampiiga Avoka. I am a student of the School of Public Health, University of Ghana. I am conducting a study on the topic: "Health facility-based factors that influence very early neonatal mortality in Koforidua Regional hospital, Eastern Region". The objective of this study is to determine the factors that influence very early neonatal mortality (first 24 hours after birth) in Koforidua Regional Hospital.

Consent

I, declare that the purpose, procedures as well as risks and benefits of the study have been thoroughly explained to me and I have understood.

I hereby agree to take part in this study

Signature of participant

Date..... / /

Interviewer's Statement

I, the undersigned, have explained this consent form to the subject in simple language that she/he understands, clarified the purpose of the study, procedures to be followed as well as the risks and benefits involved. The subject has freely agreed to participate in the study.

Signature of interviewer

James Atampiiga Avoka (0204953105)

Date / /

Address

In case of any concern you can contact the ethics administrator Ms Hannah Frimpong. Contact Number: 0243235225/0507041223

Ethical Clearance

Ethical clearance was sought from the ethical review committee of Ghana health service research division, Accra.

Privacy and Confidentiality

Privacy and confidentiality of information gathered will be ensured. No names will be mentioned and the data will be used for only academic purposes.

Voluntary Participation

Your participation in the study is voluntary and you may refuse to answer any question or choose to stop participating at any time. Your decision not to volunteer will not influence the nature of the ongoing relationship you may have with the investigator or the School of Public Health, either now or in the future.

Withdrawal

You may stop participating in the research at any time, for any reason, if you so desire. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researcher. Should you decide to withdraw from the study; all data generated as a consequence of your participation will be destroyed.

Potential Risk/Benefits

The information you provide will help me understand the state of very early neonatal care in the health facility. The information, I believe, would benefit you in the long run, as it would arouse the interest of policy makers to pay more attention to neonatal care in the health facilities. Your participation in this study does not involve any risk or cost. Be assured that the information you will provide shall be treated with utmost privacy and secrecy.

Informed Consent Process

This study was intended to investigate health providers (doctors, nurses, and midwives) knowledge, clean delivery, training status, and practices on neonatal care. It was also to assess equipment and logistics supply for newborn care in order to identify the factors that contribute to very early neonatal deaths in the hospital for informed decision making. In doing this, records of deliveries conducted in the facility were reviewed. This was purely an academic exercise, which formed part of my work for the award of a Masters Degree in Public Health.

Data Storage and Ownership

The data were stored in the Principal Investigator`s custody under lock and key. Nobody else had access to these data.

Declaration of Conflict of Interest

There was none declared.

Compensation

The participation in this study will not lead to any harmful effects. Therefore, there was no compensation for anyone who wanted to participate or withdraw from the study.

Description of Subjects Involved in the Study

The study population included midwives, nurses, and doctors who work in the Neonatal Intensive Care Unit (NICU) and Labour Ward.

Proposal and Funding Information

This research was solely funded by All Saints Educational Trust, London UK.

Appendix II. Questionnaires

Dear Participant,

I invite you to take part in this study. My name is **James Atampiiga Avoka**. I am a student of the School of Public Health, University of Ghana. I am conducting a study on the topic: “Health facility-based factors that influence very early neonatal mortality in koforidua regional hospital, eastern region”. The objective of this study is to determine the factors that influence very early neonatal mortality (first 24 hours after birth) in Koforidua Regional Hospital.

Section A. Socio- demographic characteristics

Age/Date of birth of Participant.....Sex.....

Doctor/ Midwife/Nurse.....Marital Status.....

Religion.....Educational level.....

Ethnicity..... Date...../...../2015

Clean delivery practice and sterilization

1. Do you normally ensure that place of delivery is clean?

Always	Sometimes	Never

2. Do you always clean the perineum with sterile water?

Always	Sometimes	Never

3. Clean hands using soap and safe water and dry them thoroughly

Always	Sometimes	Never

4. For those who have had episiotomy, once the baby is born, cover incision with sterile pad, until baby is resuscitated

Always	Sometimes	Never

5. Using sterile scissors to cut the cord

Always	Sometimes	Never

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6. Encourage women in second stage to bear down as she desires when fetal head is visible

Always	Sometimes	Never

7. Avoid manually stretching the perineum

Always	Sometimes	Never

8. Allow delivery of the head slowly, preferably between contractions

Always	Sometimes	Never

9. Once the head is delivered, allow the shoulders to rotate spontaneously

Always	Sometimes	Never

Section B. (i). Knowledge on Newborn care and Resuscitation. Select the most appropriate answer

1. Have you ever heard about very early neonatal mortality? Yes No
2. What is very early neonatal mortality?
 - a. Death of a neonate from 0-27 days of life
 - b. Death of a neonate from 0-7 days
 - c. Death of a neonate within the first 24 hours after delivery
 - d. Death of a neonate from 0-28 days of life
3. What causes very early neonatal mortality?
 - a. Infection prevention, diarrhoea and cold
 - b. Asphyxia, AIDS and TB
 - c. Infection, Asphyxia and food
 - d. Asphyxia, infection, and preterm birth

4. What is neonatal resuscitation?
 - a. Series of actions to assist babies breathe
 - b. Normal delivery and vacuum extraction
 - c. Resuscitation of an individual
 - d. Bringing a baby back to life after birth
5. What risk factors are associated with the need for neonatal resuscitation?
 - a. Post-term gestation, multiple gestation and alcohol
 - b. Chronic hypertension, previous fetal or neonatal death, and diminished fetal activity
 - c. Bleeding in second or third trimester, maternal infection, and food intake
 - d. Multiple gestation and bad luck
6. What intrapartum risk factors are associated with the need for neonatal resuscitation?
 - a. Meconium aspiration, fetal bradycardia, and cancer
 - b. Preterm labor, use of general anesthesia, and prolonged labour
 - c. Vacuum assisted delivery, emergency cesarean section and TB
7. The first step in thermal protection for the newborn includes
 - a. Drying the baby thoroughly immediately after birth
 - b. Drying the baby thoroughly after the cord has been cut
 - c. Covering the baby with a clean, dry cloth immediately after birth
 - d. Covering the baby with a clean, dry cloth after the cord has been cut
8. Immediate care for a newborn include
 - a. Skin-to-skin contact followed by placing the baby in a warming incubator
 - b. Drying the baby, removing the wet cloths, and covering the baby with a clean dry cloth.
 - c. Stimulating the baby by slapping the soles of the baby`s feet.
 - d. Deep suctioning of the airways to remove mucus.
9. Which of the following can contribute to hypothermia in newborns?
 - a. The baby is not dried thoroughly immediately after delivery
 - b. The baby is bathed immediately after delivery
 - c. The baby is dried and placed in skin-to-skin contact with the mother

d. A and B

10. To maintain the newborn's axillary temperature between 36.5° and 37.5 c it is important to

- a. Place the baby in an incubator
- b. Bathe the baby in warm water immediately after birth
- c. Rub the baby vigorously with a blanket
- d. Cover the baby's head, place the baby in skin-to-skin contact on the mother's chest, and cover with a blanket.

11. Before performing an exam on a baby who is 2 hours old and who has not been bathed, the skilled provider should

- a. Wash hands with soap and dry with a clean towel, then put on exam gloves
- b. Wash hands with soap and dry with a clean towel
- c. Bathe the baby with soap and water
- d. Put on sterile gloves

12. Care of the umbilical cord should include

- a. Cleansing with alcohol
- b. Covering with a sterile compress
- c. Cleansing with cooled, boiled water and leaving uncovered
- d. Applying antibiotic cream

13. The best way to determine if a newborn needs resuscitation is to

- a. Wait until 1 minute after birth and assign the Apgar score
- b. Listen to the baby's heart rate
- c. Observe respirations immediately and begin resuscitation if they are less than 30/minute
- d. Perform resuscitation only if central cyanosis is present

14. Breastfeeding should begin

- a. After the baby's first bath
- b. When the baby starts to cry
- c. within the first hour following birth
- d. When the mother's milk comes in

15. When counseling the mother about breast feeding, the skilled provider should tell her to
- Avoid giving colostrum to the newborn
 - Establish a schedule for breast feeding so the baby gets plenty of sleep
 - Give the baby water after each feed
 - Breast feed on demand for as long as the baby wants to feed
16. When counseling the mother about her newborn, the skilled provider should
- Help the mother formulate a complication readings plan for her baby
 - Make sure the mother understands danger signs for her baby and where to go if they arise
 - Tell the mother to bring her baby for a newborn care visit on the sixth day after birth
 - All of the above
17. Newborn resuscitation procedures
- Always require the use of oxygen
 - Should be started after assigning the Apgar score
 - Can usually be carried out without oxygen
 - Should only be carried out by a pediatrician
18. When performing newborn resuscitation with an Ambu bag and Mask, it is important to verify that
- The newborn's head is in neutral position
 - The seal between the newborn's mouth, nose, and Ambu bag is adequate
 - The baby is not covered
 - Cardiac massage is being performed
19. When performing newborn resuscitation with an Ambu bag and mask, ventilate at the rate of
- 20-30 breaths per minute if there is no chest in-drawing
 - 40breaths per minute for all babies
 - 60 breaths per minute if the baby is gasping
 - None of the above

Section C. (i). Availability of Equipment and logistics, Tick Appropriately

1. Mucus extractor	Yes	No
2. Infant Ambu bag	Yes	No
3. Infant face Masks (Sizes 0,1,2)	Yes	No
4. Towels or cloth for newborn	Yes	No
5. Newborn resuscitation table	Yes	No
6. Syringes (1 ml, 2ml, 5ml, 10ml)	Yes	No
7. Suction apparatus	Yes	No
8. Stethoscope for use with newborns	Yes	No
9. Source of warmth	Yes	No
10. Delivery set	Yes	No
11. Laryngoscope	Yes	No

Section C. (ii).Trainings

12. Have you ever received any training in newborn resuscitation? Yes No
13. If yes, since when? (Give date)
14. What type of training did you receive in newborn resuscitation? Pre-service In-service

Check List to Determine Availability of Equipment and Logistics

1. Mucus extractor	Yes	No
2. Infant Ambu bag	Yes	No
3. Infant face Masks (Sizes 0,1,2)	Yes	No
4. Towels or cloth for newborn	Yes	No
5. Newborn resuscitation table	Yes	No
6. Syringes (1 ml, 2ml, 5ml, 10ml)	Yes	No
7. Suction apparatus	Yes	No
8. Stethoscope for use with newborns	Yes	No
9. Source of warmth	Yes	No
10. Delivery set	Yes	No
11. Laryngoscope	Yes	No

Data extraction sheet. Month.....Year.....Code (0.....) Client ID:.....

Name of Data

Screeners.....Date.....Signature.....

Maternal Age ()	No. of births (Parity)	Died	Survived
	oooooooooooooooooooo ()	oooooooooooooooooooo ()	oooooooooooooooooooo ()
Marital status (Tick)	Single	Married	Divorced
Level of education (Circle)	<input type="checkbox"/> No formal education <input type="checkbox"/> Primary	<input type="checkbox"/> Secondary <input type="checkbox"/> University	<input type="checkbox"/> Technical/College <input type="checkbox"/> postgraduate
Occupation			
Religion (Tick)	Christian	Muslim	Traditional
Obstetric factors Associated with very early neonatal deaths.			
Antenatal status of mother (Tick)	Attendant (Including 32-36Wks)	Not regular Attendant (Not seen at 32-36 Wks)	Not an Attendant
Gestational age at booking	2 nd Trimester (Specify)	3 rd trimester (Specify)	
Previous neonatal deaths	Yes (How many?)	No	
Neonatal Characteristics			
Sex of baby	Male	Female	
	Died	Survived	
Gestational age	Preterm (<37 wk)	Term (37-42 wks)	Post term (>42 wks)
Birth weight (kg)			
Resuscitation done	Yes	No	Don't know
Apgar score 1 minute			
Apgar score 5 minutes			
Attributable cause(s) of death within the first 24 hours or days			
Causes of death			
Causes of referral to NICU			

In case of reply the number and the date of this letter should be quoted.



REGIONAL HOSPITAL
P. O. BOX 201
KOFORIDUA

9TH FEBRUARY, 2015

TEL. # 03420-23011 FAX # 0342025294
Email: reghspkof@yahoo.com.

My Ref. No RHK/
Your Ref. No.

HEAD OF DEPARTMENT
DEPT. OF POPULATION
FAMILY & REPRODUCTIVE HEALTH
UNIVERSITY OF GHANA

APPROVAL LETTER
MR. JAMES ATAMPIIIGA AVOKA

Approval has been given to you to conduct research in our institution that would lead you to acquire your certificate from the school of Public Health.

We wish you a sound study and stay.
Thank you.

A handwritten signature in blue ink is written over a blue official stamp. The stamp contains the text: 'CLINICAL DIRECTOR', 'REGIONAL HOSPITAL', 'P. O. BOX 201', and 'KOFORIDUA'.

.....
DR. CARDINAL NEWTON
CLINICAL DIRECTOR
For: MEDICAL DIRECTOR