FACTORS INFLUENCING LENGTH OF HOSPITAL STAY OF NEONATES ADMITTED TO THE NEWBORN UNIT AT KENYATTA NATIONAL HOSPITAL

BY

BRIGID CHERUIYOT

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DECLARATION

I, Brigid Cheruiyot, declare that this dissertation is my own original work and has not been presented for a degree award at any other University or institution of higher learning.

Signed ……Date……

CERTIFICATE OF APPROVAL

This dissertation has been submitted with our approval as university supervisors:

Dr Margaret Chege

Lecturer University of Nairobi

School of Nursing Sciences

Signed……..Date……

Mrs. Kivuti Bitok

Lecturer University of Nairobi

School of Nursing Sciences

Signed……..Date……

DEDICATION

This work is dedicated to my husband Louis, and children, Ivan, Kimberly and Maryann, for their love, prayers and encouragement throughout this study

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TABLE OF CONTENTS

DECLARATION ..... **ii**
CERTIFICATE OF APPROVAL ..... **iii**
DEDICATION ..... **iv**
ACKNOWLEDGEMENT ..... **v**
TABLE OF CONTENTS ..... **vi**
LIST OF TABLES ..... **viii**
LIST OF FIGURES ..... **ix**
LIST OF ABBREVIATION AND ACRONYMS ..... **x**
OPERATIONAL DEFINITIONS ..... **xi**
ABSTRACT ..... **xii**
CHAPTER 1: INTRODUCTION **1**
1.1 Background Information 1
1.2 Problem Statement 2
1.3 Purpose of the study 3
1.4 Justification 3
1.5 Research Questions 4
1.6 Study Objectives 4
1.6.1 Broad Objective 4
1.6.2 Specific Objectives 4
1.7 Study Variables 5
1.7.1 Dependent variable 5
1.7.2 Independent variables 5
1.8 Expected Benefits of the Study 5
1.9 Theoretical Framework 5
1.9.1 Definition of Key Variables 8
CHAPTER 2: LITERATURE REVIEW **9**
2.1 Introduction 9
2.2 Causes of neonatal admissions that influence Length of Hospital stay 11
2.3 Demographic factors influencing length of neonatal hospital stay 15

2.4 Socio-economic factors influencing length of neonatal hospital stay 17
CHAPTER 3: METHODOLOGY 20
3.1 Introduction 20
3.2 Study Design 20
3.3 Study Area 20
3.4 Study Population 21
3.4.1 Inclusion Criteria 21
3.4.2 Exclusion Criteria 21
3.5 Sample Size Determination 22
3.6 Sampling Method 23
3.7 Sampling Interval 23
3.8 Data collection procedures 23
3.9 Pre-testing and Piloting 24
3.10 Data management and analysis plan 25
3.11 Study limitations 26
3.12 Ethical Considerations 26
3.13 Ensuring Study Reliability and Validity 27
CHAPTER FOUR: RESULTS 28
CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION 40
5.1 DISCUSSION 40
5.2 CONCLUSION 46
5.3 RECOMMENDATIONS 46
APPENDIX 1(b): CONSENT EXPLANATION AND CONSENT FORM FOR THE CARETAKERS OF NEONATES 54
APPENDIX 2: QUESTIONNAIRE 55
APPENDIX 3: CONSENT EXPLANATION AND CONSENT FORM FOR HEALTH CARE WORKERS 59
APPENDIX 4: KEY INFORMANT'S INTERVIEW GUIDE 60
APPENDIX 5: LETTER OF APPROVAL 61

LIST OF TABLES

Table 1: Demographic characteristics of the mothers..... 28

Table 2: Neonates demographic characteristics..... 30

Table 3: Demographic factors influencing length of stay..... 31

Table 4: Causes of neonatal admission..... 33

Table 5: Association of neonatal characteristics by length of stay..... 35

Table 6: Association of maternal characteristics and Length of neonatal hospital stay..... 36

Table 7: Socio-economic factors influencing neonates 'length of hospital stay..... 37

Table 8: Socio-economic factors versus length hospital stay..... 38

LIST OF FIGURES

Figure 1 : Conceptual Framework 6

Figure 2: Operational Framework..... 7

LIST OF ABBREVIATION AND ACRONYMS

Bsc.N	Bachelor of Science in Nursing
KMTC	Kenya Medical Training Centre
KNH	Kenyatta National Hospital
NBU	New Born Unit
NICU	Neonatal intensive care unit
SCBU	Special care baby unit
SPSS	Statistical Package for Social Sciences
UON	University Of Nairobi
LOS	Length of stay
SGA	Small gestational age
LGA	Large gestational age
WHO	World health organization
MDG	Millennium development goal

OPERATIONAL DEFINITIONS

Neonate: A newborn infant, especially one less than four weeks old (0-28days).

Special care baby unit (SCBU): SCBU is a specialized unit to care for babies from birth who require intensive care. Many of these babies will be mechanically ventilated or need intensive nursing in an incubator.

Neonatal intensive care unit (NICU) KNH: The NICU at KNH is a level II nursery and can receive all critical cases including premature babies of gestational age of 23 weeks.

Length of stay: Length of stay (**LOS**) is the interval between admission of the neonate to the Unit and discharge.

Short stay: length of stay of up to one Week

Long stay: Length of stay exceeding 7 days

Caretaker: A mother or guardian who is directly involved with care of neonate admitted at the new born unit and constitute the study population

Turnover: The mean number of patients "passing through" each cot during a period. Indicates the use made of available cots.

Supplementary Feeding: Feeding of the neonate by cup/Nasal gastric tube

ABSTRACT

Background: Length of neonatal hospital stay arises from the retention of the neonate within a health care institution in order to resolve any clinical problems before discharge. Prolonged stay of the neonate within the hospital further exposes it to infection and increased cost of health care among other factors hence the increasing pressure to decrease neonatal hospital length of stay. Kenyatta Hospital like most of other healthcare systems is struggling to contain rising costs and allocate scarce resources due to the increased demand by the rising number of neonatal conditions. Hence the purpose of this study was to determine the factors influencing length of hospital stay among neonates admitted to newborn unit at Kenyatta national hospital.

Methods: A cross-sectional study design was used to collect both quantitative and qualitative data from a total of 122 mothers of hospitalized neonates. Key informant interviews with nurses were used to collect qualitative data on the institutional factors that influenced hospital length of stay among the neonate. Quantitative data collected was coded and analysis done using Statistical Package for Social Sciences (SPSS) version 20.0.

Results: Majority of the neonates admitted were born to mothers aged between 26 to 35 years 75(61.5%) who were married 92(75.4%) with para 2 or above 56 **(**65.6%). Many of the hospitalized neonates were aged between 15 to 21 days old 66(54.1) with a small majority aged below 7 days 5(4.1%).

Demographic factors that significantly influenced the neonate length of hospital stay included mothers education level (χ^2=0.134, p=0.001). Neonatal sepsis and jaundice were the leading causes of admission among the neonates 50(40.2%) and 49 (40.1%) respectively.

Among the factors that significantly influenced length of hospitalization included gestational age of less than 37 weeks (OR 2.578, p=0.003), birth weight below 1500gms
(OR 1.111, p<0.002), parity and marital status OR 4.1, p<=0.003 and OR 4.7, p=0.001 respectively.

Conclusion: Gestational age of less than 37 weeks and low birth weight are among the factors that influenced longer hospital stay among the neonates. Hence the study recommends early identification of risk factors for neonates' problems and further capacity building in the lower level hospitals in terms of infrastructure and personnel training.

Identified risk factors and subsequent neonatal problems can then be managed early at all levels and strategies must also be put in place to reverse the worrying trend of inadequate staffing.

CHAPTER 1: INTRODUCTION

1.1 Background Information

Newborn babies are admitted to special care baby unit care unit for various reasons such as Prematurity, fetal distress, respiratory distress syndrome and any other maternal condition or disease that resulted in the newborn being unable to cope without intensive support. The cause of admission into the unit coupled with other factors jointly influences the length of hospital stay which varies from one neonate to another.

Globally, Studies done have shown that Long stays in the newborn units are associated with high costs and economic burdens on the family, society and health care systems .In the United States of America for instance, it is estimated that about 34% of the neonates admitted into newborn intensive with low birth weight related to prematurity stay in the hospital until they attain weight equal to their expected weight at term, this has been found to be one of the major causes of prolonged hospital stay among neonates in the main hospital in the USA (Brewchet,2011)

Some research studies indicate that a high proportion of the costs of managing neonatal conditions are attributed to exacerbations. This varies from 40% to 57% of the total direct costs and can be as high as 63% in severely affected patients. Inpatient admission is a major cost driver in neonatal intensive care accounting for about 54% of the direct cost associated with its management in the UK. The cost of hospitalization is also significantly influenced by the length of hospital stay. (Söderström, Benzein, & Saveman, 2003)

In Africa, poor socio-economic status of the parents has been the main contributing factor to the long stay of patients in hospitals irrespective of age, gender, diagnosis and management given in the hospital (Shin, 2004)

A study by Heerman et al revealed that parents of infants admitted to the NICU are believed to experience high levels of distress; such experiences of distress are also thought to be related to financial inability to meet costs of the admission which is often over a long period of time (Heerman, Wilson, & Wilhelm, 2005).

Though many studies have been done on improving admission outcomes for neonatal conditions and improving efficiency, few tended to focus on reducing duration of in-patient care, none has really focused on the factors influencing neonates' length of stay at the new born unit.

1.2 Problem Statement

There has been public outcry over shortage of space and incubators to accommodate the ever increasing number of neonates requiring critical care in the newborn unit at KNH. This shortage has been attributed to prolonged duration of stay of those admitted to the unit, among other factors. Prolonged stay in such units exposes the neonate to risks which may contribute to morbidity and mortality rate (Lawn et al 2005). It further states that the neonates' precarious nature puts them at an increased magnitude of risk associated with physiological characteristics amongst other factors (Lawn 2005). This calls for strategies to reduce length of hospital stay so as to admit more needy cases and promote the image of the hospital through quality service to the newborns**.**

1.3 Purpose of the study

The purpose of the study was to explore and describe the factors that influence the length of hospital stay among neonates admitted to the newborn unit. Understanding of these influences could help optimize care for neonates and help health workers and hospital management to develop interventions that may reduce neonatal length of hospital stay.

1.4 Justification

Prolonged neonatal stay presents a major threat among the neonates since it increases mortality and morbidity, in as much as efforts are made to promote maternal bonding at this stage, it may not really be very practical if the neonate is admitted at the NICU unnecessarily for too long. The neonates' parents also become apprehensive and the cost of care is higher.

According to a UNDP report of 2005, Kenya, like the rest of Africa is struggling to achieve MDG4, and financing remains its biggest challenge. The health and well-being of the neonate is dependent on our Countries' efforts on provision of health care therefore KNH being a referral facility, admits many newborn babies who require specialized care. It is therefore, very important that specialized units such as Newborn Unit have high turnover of neonates.

The findings from this study may help identify gaps so as to put in place strategies to reduce length of hospital stay, admit more needy cases.

1.5 Research Questions

1. What are the reasons of neonatal admissions to the new born unit that influence length of hospital stay?

2. Do Socio -demographic factors influence length of hospital stay?

3. What are the institutional factors that influence length of hospital stay?

1.6 Study Objectives

1.6.1 Broad Objective

To determine the factors influencing length of hospital stay among neonates admitted to newborn unit at Kenyatta national hospital

1.6.2 Specific Objectives

1. To determine causes of Neonatal admission to the unit that influence length of hospital
2. To determine Socio-economic factors that influence length of hospital stay
3. To determine Institutional factors that influence length of hospital stay

1.7 Study Variables

1.7.1 Dependent variable

Length of neonatal hospital stay

1.7.2 Independent variables

1. Reasons of admission into newborn unit like prematurity, hypothermia, neonatal health status
2. Socio-economic and demographics factors
3. Institutional factors: such as health care provider qualifications, admission and discharge policy, team work (major round), frequent patient reviews

1.8 Expected Benefits of the Study

The findings from this study will help in understanding the factors that influence neonatal length of hospital stay therefore enabling the health workers and hospital management to develop interventions that will reduce length of hospital stay in order to optimize care for neonates and admit more needy cases.

1.9 Theoretical Framework

The study is based on E.Schorr model (2012) .The model identifies four categories of determinants:-

1) Patient characteristics: medical history, healthcare knowledge, family support, religion, age/sex/gender/race, residence.

2) Clinical caregiver characteristics: culture, specialty, training, team, quality of care and physician choice of prescribed medications;

3) Characteristics of the social or family environment: school, peers,, economics and community

4) Characteristics or properties of the healthcare system: admitting service (surgical vs. medical), structure of services, types of services and available technology.

Recent studies suggests that LOS is complex in nature, and cannot be determined by a single factor(E.schorr ,2001)This model has been adopted in this study in order to guide on the factors that influence neonatal Length of stay .

Figure 1 : CONCEPTUAL FRAMEWORK

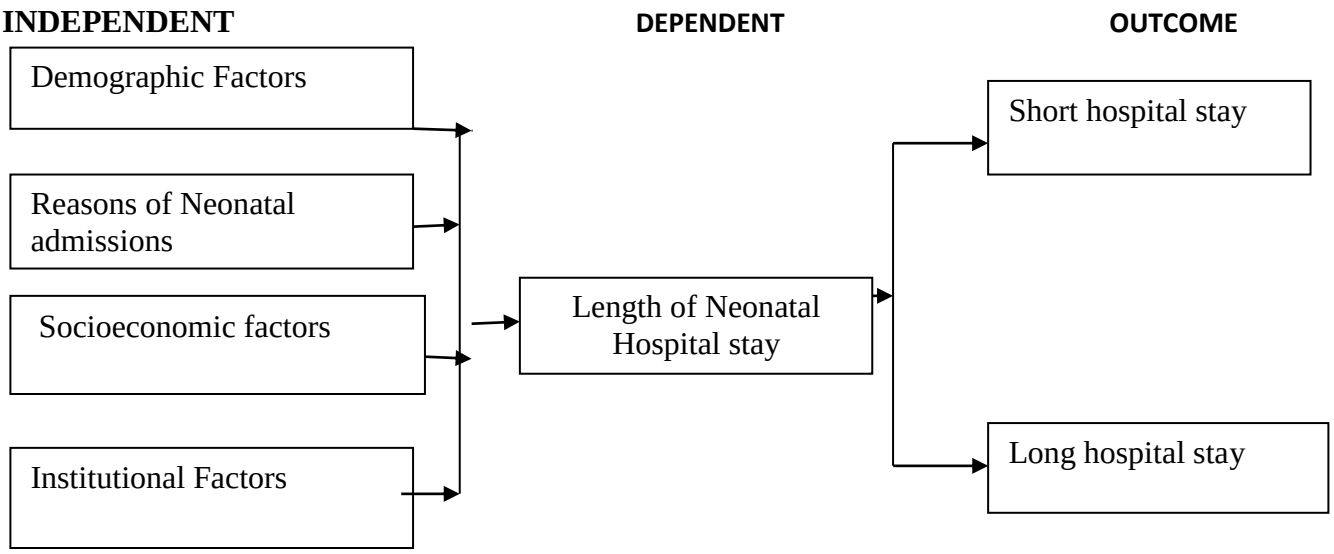
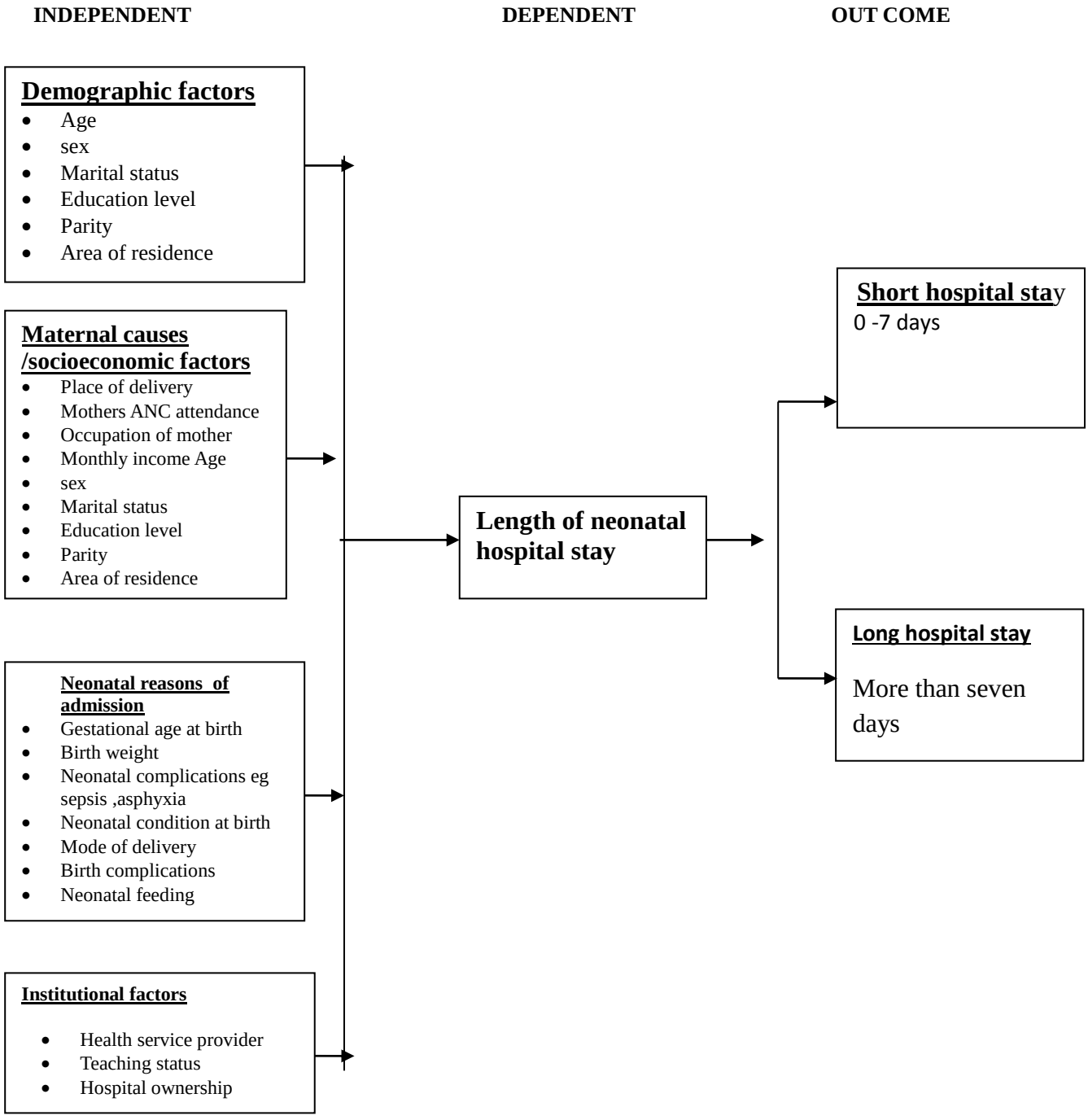


Figure 2: Operational Framework



1.9.1 Definition of Key Variables

Causes of neonatal admissions: These are clinical or physiological causes that leads to neonatal admission for instance gestational age, birth weight mode of delivery, neonates' health status.

Socio -demographic factors: Socio-demographic factors refer to a set of variables such as a maternal age, or socioeconomic status, level of education, antenatal clinic attendance.

M**aternal causes of neonatal admissions:** Specific diseases/conditions that causes significant neonatal health problems like premature rapture of membranes, preeclampsia, medical conditions like HIV/AIDS, diabetes**.**

Institutional factors: Characteristics or properties of the healthcare system: Health care provider qualification, teamwork, frequency of major ward rounds and patient reviews. An independent variable in the study

Length of stay (**LOS)**: is the interval between admission of the neonate to the Unit and discharge. This is a dependent variable

Short hospital stay: Length of Hospital Stay of seven days or less, this is the outcome variable of the study

Long hospital stay: length of Hospital Stay lasting for more than seven days, it's an outcome variable

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this study, the term "short length of stay" describes hospital discharge occurring before or on the seventh day following admission, and is reported as the length of neonatal hospital stay in days. "Long stay describes neonates discharge occurring after Seven days" .A study by Spencer et al, 2004 has shown that discharge timing that is considered "early" has been redefined as the prevailing length of stay and has progressively decreased. In the United States, for example, the standard length of stay was 8 to 14 days in the 1950s but declined to less than 2 days in the mid-1990s (Spencer et al, 2004) .However in the developing countries like Kenya, the standard length of stay is up to one week.

Currently, early discharge is defined as discharge prior to 48 hours after birth in the United States. Development of early discharge programs paralleled the decline in maternal and neonatal length of hospital stay. They were initiated to promote and support maternal-infant well-being and family adaptation by providing medical, psychosocial, and economic advantages for low-risk families. Prenatal preparation and postpartum follow-up in the form of one or more home visits or telephone contacts during the first week post-discharge were common program elements (Pokala and Sahasivam, 2007).

According to Rawlings,1996 , length of stay in the neonatal intensive care unit (NICU) for premature infants is influenced by a number of factors but is most strongly affected by gestational age (GA) and weight at birth(Rawlings,1996) ,little is known about the other possible factors influencing neonatal length of stay

Length of stay can be conceptualized as the outcome of a process that involves the patient and provider, and is influenced by payor type. For example, providers may have retained newborns in hospital to resolve clinical problems before discharge. In contrast, multiparious, bottle-feeding mothers with healthy newborns may be discharged early, reflecting beliefs that the mothers could be safely discharged home and that they do not have physiological or learning needs requiring postpartum hospitalization (Brown, Small and Faber, 2002). Studies have demonstrated that a significant number of such illnesses are avoidable through improved quality of antenatal, intrapartum and postpartum care. (Haaq et.al 2011)

A survey done to compare discharge timing in a homogeneous population of healthy premature infants cared for in different Massachusetts NICUs showed that the majority of neonatologists required observation for 5 to 7 days between the last documented apneic spell and discharge to home, but responses varied from 1 to 10 days.(Darnall et al 1997)

It further states that Infants delivered at the earliest gestational age have the longest hospital stays, in part because of the higher incidence of medical complications in extremely low birth weight infants. However, in contrast to adult and other pediatric patients, premature infants are unique in their need to attain not only medical stability but also physiologic maturity,

Most healthcare systems are struggling to contain rising costs and allocate scarce resources sensibly. Length of hospital stay is an important component of the overall cost of hospital areas of patient care (Liberero et al, 2004).

Irshad et al (2002) observed that the impact of reductions in postpartum length of stay have been widely reported, but factors influencing length of hospital stay after vaginal birth have received

less attention. They further stated that early obstetrical discharge has been offered to new mothers in the United States since the 1940s.

The American Academy of Pediatrics and American College of Obstetricians and Gynecologists have recommended criteria for determining readiness for early discharge that include physiological, social support, and patient education parameters (Hawn et al, 2000).

2.2 Causes of neonatal admissions that influence Length of Hospital stay

A study by Lee et al showed that Prematurity, whether examined by gestational age or birth weight, is associated with significant neonatal hospital costs, all of which decrease exponentially with advancing gestational age (Lee et al, 2012). These preterm infants require a prolonged stay in the neonatal intensive care units to enable the lungs to mature so that they can survive independent of the intensive care.

Preterm births have continued to increase despite years of research into its epidemiology, causes and management of preterm labor. Regardless of the cause, the burden of prematurity is enormous for the infant, family, health care system and the society. Depending upon degree of prematurity and development of various morbidities, these premature neonates require prolonged hospital stay which is a great health problem (Jehan, 2009)

Similarly, KhanQuan and Bugar (2006) found out that clinical readiness for discharge, measured by neonatal clinical problems, influenced length of stay. A longer length of stay was more likely for newborns with clinical problems, most commonly through a full second postpartum day. In fact, only 1 newborn had a clinical problem after 12 hours of life among 367 in their earliest

length-of-stay group, suggesting that this was a reason for delaying discharge within the study population of essentially normal low-risk mothers and infants.

Wright et al 91997) added that perceived readiness for discharge to clinical discharge criteria, such as absence of clinical problems, would provide a more comprehensive assessment of readiness for discharge after birth. They suggested that incorporating assessment of readiness into discharge planning can be accomplished as simply as asking the mother if she feels ready for discharge. A more detailed assessment, using a tool such as the Readiness for Discharge after Birth Scale, can provide information on which to base the decision about discharge timing and individualized interventions to facilitate the transition to home they added.

Studies have demonstrated that antenatal care has increased in all regions with global average for at least 1 visit at 78%. In sub-Saharan Africa, 71% of women have at least 1 visit, although fewer have 4 or more visits (44%) according to (UNICEF, 2010). However, in many countries the 6-week postnatal visit is usually the mother and baby's first interaction with the formal health system after birth (Martine's et.al, 2010)

Neonatal Risk Factors for Perinatal Problems

A neonates' high risk status can be anticipated from maternal antenatal and intrapartal history or from certain neonatal conditions present at birth. (Kenner, 1993) Antenatal risk factors that have been shown to correlate with an increased incidence of neonatal sepsis include prolonged rupture of membranes and chorioamnionitis, maternal colonization with group B streptococcus,(Baker,1997) prematurity, birth asphyxia, male gender, and maternal urinary tract infection

Birth asphyxia

Birth asphyxia is defined as a severe disturbance of oxygen supply to the fetus which

develops during the first or second stage of labour (Schneider, 2001) over all it is estimated that it affects 2.9 to 9 neonates per 1000 births and causes 1 million deaths annually on a global basis with an equal number of infants left with serious neurological sequelae (Jamal,2002)

Hypothermia

The World Health Organization (WHO) has included thermal care (including the prevention of neonatal hypothermia) as a component of essential care in newborn among a package of basic interventions recommended universally for all babies in under-resourced settings in low and middle income countries, Kenya included.

Findings from a study done in South Nepal showed that hypothermia at birth is one of the most important risk factors for morbidity and mortality in newborn infants of all birth weights and gestational ages (Mullany et al, 2001). Prevention and management of hypothermia is one of the key interventions for reducing neonatal mortality and morbidity, such interventions can help reduce neonatal mortality or morbidity by 18%–42% (UNICEF 2007).

Hypoglycemia

Neonatal hypoglycemia is a major metabolic severe problem that is common among high may result in morbidity and severe handicap among survivors. According to McGowan (1999) Hypoglycemia, can occur in infants who are small-or large-for-gestational-age, or premature, and in those who have low glycogen stores, hyperinsulinemia, stress, or mothers with gestational diabetes.

Maternal causes influencing Length of neonatal admissions

A study done in India to assess the length of postnatal hospital stay of healthy newborns and determine the factors facilitating their early discharge (≤ 48 hr) in a tertiary care hospital found that Most of the children in the set-up were being discharged within 48 hrs. Early discharge is governed primarily by maternal indications. A follow-up visit after 72 hr is important to assess the need of re-hospitalization in healthy newborns discharged within 48 hrs of birth(Gupta et al ,2006)

Vertical transmission of HIV can occur in uteri during labor or after delivery. It is estimated that in 65 percent of HIV-infected infants, transmission occurred during labor (WHO,2000)Studies have shown that Antenatal Antiretroviral drugs can substantially and dramatically reduce the risk of Mother to child transmission from already infected women through reduction of viral load (Nduati *et al.*, 2000).

A study done to quantify risk factors for and the prevalence of early onset group B streptococcal sepsis in neonates in a geographically defined population showed that Group B streptococcal disease is the leading cause of early onset neonatal sepsis in developed countries

(Baker etal2001), it further gave the findings that the rupture of the membranes before the onset of labor is an important risk factor and might identify potential cases at an earlier stage.

Current prophylactic guidelines might prevent or ameliorate three quarters of all cases of infection at the cost of giving antibiotics to 16% of all women in labor (Baker et al 2001)

Women colonized with GBS during pregnancy at increased risk of premature delivery and Perinatal transmission of the organism. Pregnancy-associated GBS disease is most often manifest during labor or within the first few days of an infant's life and this it can affect the neonates' health (CDC, 1995)

Uncontrolled maternal diabetes has an effect on fetal growth, and preparation for extra uterine life. Kalhan et al (2002),states that a small subgroup of fetuses, usually carried by mothers with advanced diabetic vascular disease, are at risk birth weight less than the fifth percentile for gestational age

2.3 Demographic factors influencing length of neonatal hospital stay

Demographic characteristics and readiness for discharge (clinical and perceived) have been associated with length of postpartum hospital stay. Length of stay is an outcome of a complex interface between patient, provider, and payor influences on discharge timing that requires additional study. Including perceived readiness for discharge in clinical discharge criteria will add an important dimension to assessment of readiness for discharge after birth (Baker, Einstadter and Husak, 2004)

A Kenyan study done to compare the morbidity and outcome of low birth weight babies of adolescent (age < 20 years) and older mothers found out that the Low birth weight babies of the adolescent mothers were more likely to have increased morbidity and adverse outcome compared to similar babies of older mothers (Wassuna, 2002)

Liberero et al (2004) found out that males were more likely to be discharged earlier than females though the proportional hazard assumption did not hold. The same study also found out that admissions from more deprived areas were more likely to stay longer in hospital possibly due to them having more severe underlying health conditions.

An Australian study by Mcleese et al (1994) that compared new mothers with a hospital stay of less than 48 hours with women hospitalized for 5 days or more, it was established that early-discharge mothers were more likely to be multiparious, low income, and without private health insurance. Although the impact of payor pressures on length of postpartum hospital stay receives extensive coverage in the media and the outcomes of early obstetrical discharge were widely reported, other factors that might also influence length of hospital stay have received less attention such as less than high school education, age greater than 35 years, inadequate prenatal care, breastfeeding, and care provided by a midwife (McAleese and Odling-Smee, 1994).

Further research is needed to evaluate whether demographic factors associated with short length of stay persist when women and their caregivers are the decision-makers about timing of discharge without the pressures associated with reimbursement incentives for early discharge, as was intended with implementation of the legislation guaranteeing a 48-hour postpartum hospital stay (Liberero et al, 2004). A study by Rahim et al 2007, showed the predominance of males for both admissions and deaths raising the issues of biological vulnerability of male neonates.

Other studies have also shown that baby girls have a lower mortality rate than baby boys. In societies where care is equal for boys and girls, the ratio of neonatal mortality for boys to girls is usually at least 1.2 or higher. Analysis of DHS data for African countries does not show a loss of this in-built survival advantage for girl babies, although DHS may not be sensitive enough to detect this difference.

2.4 Socio-economic factors influencing length of neonatal hospital stay

A trend of decreasing length of postpartum hospital stay has been observed globally. In the United States, in response to pressures fueled by anecdotal data, public opinion, and political rhetoric, legislation was enacted that mandated insurance coverage for a minimum postpartum hospital stay of 48 hours for mothers and babies after vaginal birth. However, the legislation left the ultimate decision on timing of discharge with the new mother and her caregiver (Cohen, Bilimoria and Ko, 2009).

The length of hospital stay associated with hospital deliveries has been steadily decreasing since Nineteen Seventy. With indemnity coverage there are few incentives for physicians to limit lengths-of-stay, whereas managed care plans have a clear incentive to reduce their enrollees' health care expenditures while maintaining quality. Although one would expect that managed care enrollees would have shorter lengths-of-stay after delivery than indemnity enrollees have, the few studies that have examined this issue yield inconsistent results (Ohwaki, Yano and Nagashima, 2008).

Length of hospital stay may provide an illuminating example of the emerging understanding of the sociopolitical and economic systems that shape health behaviors and access to health resources. Even though newborns with clinical problems tend to stay longer, women and babies

with socio-demographic characteristics that suggest potential vulnerability are more likely to go home early (Hawn et al, 2000)

Consistent with the findings of other studies, a study by Baker, Einstadter and Husak (2004) showed that mothers who were discharged early were more likely to be multiparous, less educated, low socioeconomic status, and without privately funded health insurance.

2.5 Institutional factors that influence length of neonatal hospital stay

A study by Higgins et al(2003) demonstrated that the presence of a full-time physician who does daily rounds also has been associated with a reduced likelihood of prolonged length of stay and reduced complications . Most explanations of this phenomenon cite consistency of care and increased experience in dealing with both clinical issues and issues of patients' families as the main reasons for shortened stays (Dimmick et al 2001)

Hospital discharge practices after normal vaginal delivery are influenced by both type of plan and geographic region. Newborn and maternal readmissions do not appear to be associated with type of plan or length-of-stay. The majority of newborn and maternal readmissions occurred three days after discharge (Cohen, Bilimoria and Ko, 2009).

Huang et al. (2002) modeled the impact of teaching status and hospital ownership on length of stay and hospital charges. They did not find statistically significant differences between public and private hospitals. Moreover, while the differences between teaching hospitals and non-teaching hospitals' were statistically significant, they were too small to be meaningful. Notably, they found that public and teaching hospitals admitted more minority and Medicaid patients than other hospitals.

Some research has shown that having multiple caregivers, insufficient staffing, and a high NICU census and resulting busy staff can influence LOS and outcomes. Variations in NICU practice also extend stays. For example, evidence suggests that when there are multiple caregivers (residents, attending fellows, and so on) care is less continuous on weekends compared to NICUs with fewer personnel providing direct care. Variation in NICU practice from other sources may also extend the hospital stay(Gupta et al, 2006)

CHAPTER 3: METHODOLOGY

3.1 Introduction

This section gives details of procedures, methods and materials that were used in conducting the study. It describes the study design, study area, study population, target population, sample size, sampling technique, data collection and data analysis. The ethical issues put into consideration are also highlighted.

3.2 Study Design

This was a cross-sectional study that utilized both quantitative and qualitative methods.

I t was carried out to determine factors influencing length of hospital stay among neonates admitted to newborn unit at Kenyatta National Hospital.

3.3 Study Area

KNH is a national referral teaching and research hospital located in Nairobi Kenya. It has a 1800 bed capacity and has been in existence since 1901. It receives patients from other hospitals within and outside Kenya for specialized health care. It has specialized units including Critical Care Unit, Renal Unit, Burns Unit, Newborn Unit among others

The Newborn Unit is on the first floor of the hospital's tower block and it receives babies from the hospital's labor ward and theatres as well as from outside the hospital as referrals from

private and provincial hospitals. It is subdivided into three sections namely:-NBN, SCBU, and NICU

The NBN is designed to care for all well newborns; SCBU is a specialized unit to care for babies from birth who require intensive care while the NICU receives all critical cases including premature babies of gestational age of 23 week.

3.4 Study Population

Neonates admitted into the Newborn unit during the period of study formed the study population. Study participation was voluntary. The NBU, Kenyatta National Hospital admitted an average of One hundred and Seventy Five neonates per month (New Born Unit Inpatient Statistics, KNH 2012)

3.4.1 Inclusion Criteria

Study subjects met the following criteria:-

- They were neonates
- The neonates were admitted in newborn unit at Kenyatta National Hospital
- The neonates 'mothers had consented to participate in the study

3.4.2 Exclusion Criteria

Potential subjects with any of the following characteristics were excluded from the study

a) Neonates admitted at NBU, Kenyatta but whose mothers declined to consent.

b) Abandoned Neonate

3.5 Sample Size Determination

Sample size was estimated using the formula as recommended by fisher's *et al.*, (1991)

$n = z^2 pq / d^2$

Where

n = Desired sample size (when population is greater than 10,000)

z = Standard Normal Deviation which is equal to 1.96 corresponding to 95% confidence interval

p = Prevalence of the issue under study, 50%

q = 1-p

d = confidence limit of the prevalence (p) at 95% confidence interval 1-0.95 = 0.05

Degree of accuracy desired for the study is hence set at 0.05.

Substituting the figures above in the formula.

Thus $n = \frac{1.96^2 \times 0.5 \times 0.5}{(0.05)^2}$

$n = 384$

Since the target population was less than 10,000 the sample size was adjusted using the formula.

$nf = n/1+ (n/N)$

where nf – Desired sample size (when the population is less than 10,000).

n – sample size (when population more than 10,000) calculated 384.

N – Number of monthly estimated Neonates admitted at the KNH new born Unit at any given time

Thus $nf = n/1 + (n/N)$

$= \frac{384}{1 + (384/17}$. Thus approximate minimum sample size was 122 respondents

3.6 Sampling Method

Probability sampling method was used to obtain a sample of 122 respondents. This targeted neonates admitted in the unit during the time of data collection. The study group was assigned a number systematically following their inpatient numbers, and a table of random numbers drawn Selection of numbers was done at any random point from the column or row till the required sample size was obtained.

Respondents for Key informant study Sample were selected using purposive sampling. In this case, 5 Neonatal Specialist Nurses or Unit team leaders from the various sub-Units only were considered.

3.7 Sampling Interval

The sampling interval was determined by dividing the target population by the sample size that is 179/122 = 1.46 and is rounded off to 1 as the sampling interval .The researcher therefore selected all the Neonates who met the criteria.

3.8 Data collection procedures

All eligible respondents were given the consent form in either English or Swahili language according to ones preference and given adequate time to go through it. The researcher availed himself to answer any questions or give clarifications regarding the consent and the research where necessary.

Data was collected using semi-structured questionnaires administered to the neonates' caretakers (Appendix2) and a key informant guide for the Nursing staff(Appendix3).The Neonates' medical records was also used to extract some data. All these the instrument items sought to capture information related to the neonates' length of hospital stay. The researcher used random sampling to identify respondents. Explanation of the purpose of the study and request for participation was done.

A questionnaire was then given to each respondent for filling .They had an option of choosing between English and Kiswahili consent form. Those who could not read and write were assisted by the researcher. Each questionnaire was then evaluated for completeness.

A key informant guide was used to collect data relating to the study from (5) health care workers in the New born Unit based on their expertise. The Neonates' files were also reviewed to assess information related to the study.

3.9 Pre-testing and Piloting

The study instrument was pre-tested at MTRH new born unit .It is a referral hospital and admits neonates with similar characteristics to those at KNH though KNH is a much bigger facility covering a vast area and receives neonates from east and Central Africa .The pre-test gave valuable feedback to the researcher on whether all the areas required in the study had been adequately captured well. Omissions were identified and need for addition of some items for adequate information gathering in the study was done.

3.10 Data management and analysis plan

This section describes the processes of data editing, classification and tabulation of data that was collected so that the process of analysis could be done . Data analysis refers to the computation of certain measures along with the searching for patterns of relationships that exist among the data groups.

A careful scrutiny of the completed questionnaire was done and, data that was missing from a given section of the questionnaire was not be included in the analysis of those particular areas . Editing to detect errors and omissions was also done and this assured accuracy and consistency with other facts that was gathered.

Tabulation of data involved arranging data in concise and logical order. This was important because it conserved space, reduced explanations, and facilitated comparison, summation and detection of errors as well as providing a basis for various statistical computations.

Data collected by questionnaire was coded and analyzed by statistical package for social scientist (SPSS). Qualitative data from key informant were analyzed based on themes which were then presented as direct quotes from the respondents. Descriptive statistics included measures of central tendency such as mean, percentages and median. Categorical data was analyzed using chi square test .

Quantitative data was presented in percentages and frequency tables while qualitative data is presented as direct quotes.

3.11 Study limitations

The sample was derived from a single site, and may reflect length of hospital stay patterns unique to a single institution thus making it difficult to generalize the findings .Time factors may have limited the study but the researcher endeavored to maximally use the available time to meet the deadline.

3.12 Ethical Considerations

Prior to the study approval was sought from the Joint University of Nairobi and Kenyatta National Hospital Research and Ethics committee (Appendix 5). The purpose of the study was explained to participants and consent form signed.

Confidentiality of the respondents was maintained by ensuring the subjects remained anonymous and their individual identity did not feature in the study. All information obtained was treated with utmost confidentiality and respondents were not identified by their names but coding was done .The data will be kept under lock and key and for digital data ,secure computing practices like use of a password was done .

Full information on the purpose of the study, any foreseen risk and benefits was given to the participants to ensure voluntary informed consent and participation. Participation in this study was purely voluntary in nature and as such, it was clarified to the participants that they were free to participate or even withdraw their participation at any point during the study without any explanation or coercion .Parental approval was obtained in order to protect the Neonates. Assurance was given to them that there was no penalty for refusal or withdrawal , study did not pose any physical or psychological harm ,though data on Clinical diagnosis was considered

confidential by some ,as such, participants were free to consent or to decline without any prejudice or any consequences whatsoever. Written informed consent to participate in the study was obtained from all the participants.

3.13 Ensuring Study Reliability and Validity

Reliability of the research was ensured through pre- testing of the study tool and this assisted in ensuring that the questions on the data collection tool were able to collect the intended data by the researcher. The validity of this research was made possible by using a standard collection tool with clear instructions for all the neonates' mothers a standard interview guide for all the HCWs interviewed.

The questionnaire had very clear instructions on how to respond. This ensured all the respondents were subjected to the same questions.

The researcher was also the only person filling all the questionnaire and therefore any information bias were avoided when asking or interpreting the questions.

CHAPTER FOUR: RESULTS

4.0 Introduction

The chapter reports on the study findings based on quantitative and qualitative data obtained from 122 mothers of neonates admitted at the New born Unit and 5 Key informants during the period of study. The first part presents quantitative data (section 4.1 to 4.5) while the second part presents qualitative data (section 4.6).

Statistical analysis was done using Statistical Package for Social Sciences software (SPSS) version 20. Qualitative data from key informant were analyzed based on themes which were then presented as direct quotes from the respondents.

PART ONE

4.1 Demographic characteristics of the mothers and Neonates

4.1.1 Maternal age

As shown in **Table 1,** majority of the neonates' mothers in the study belonged to the age group of 26 – 35 75(61.5%)

4.1.2 Marital status

The married respondents were 92(75.4%) while 21(26.3%) were never married and 4(3.27%) were separated.

4.1.3 Parity

The respondents who were para 2 and above were more**(** 65.6%)than those who were having their first pregnancy (35.7%)

Table 1: **Demographic characteristics of the mothers**

characteristic	category	Frequency	Percentage
Age of the mother (Years)	15-25	27	22.1
	26-35	75	61.5
	36-45	20	16.3
Parity	1	42	34.4
	2	56	65.6
Marital status	Never married	26	21.3
	Married	92	75.4
	separated	4	3.27

Demographic characteristics of the Neonate

From table 2.below, the study findings were as follows:-

4.1.4 Neonates age

This ranged within one (1) and 28 days and of those admitted to the unit majority aged between 15 to 21 66(54.1) days with a small majority aged below 7 days 5(4.1%).

4.1.5 Neonates weight

Many of the neonates had a birth weight below 1500gms 66(54.1%),While ≤ 1600 -3000gm were 32(26.25%) ,those> 3001 were 24(19.7%)

4.1.6 Sex of the neonates

Neonates of the male sex were 71 (61.5%) whereas the female were 47(38.5%)

4.1.7 Mode of feeding

Breastfeeding was more common among the mothers compared to supplemental mode of feeding 67(54.9%) and 55(45.1%) respectively.

4.1.8 No. of days admitted /discharge status

The study findings showed that most of the neonates at data collection had been admitted to the unit for a period of 8 – 14 days 62(50.8%) and a small number had been discharged 16(13.1%) yet they had not left for the hospital. When the mothers were asked why they had not taken their neonates home after discharge, most cited financial constrains and others were awaiting clearance by finance department.

Table 2: Neonates demographic characteristics

characteristic	Category	Frequency	Percentage
Age of neonate (Days)	1-7 days	5	4.1
	8-14days	13	13
	15 – 21days	66	54.1
	22 – 28days	38	31.1
Weight of the Neonate	≤ 1500 gms	66	54.1
	≤ 1600 -3000gm	32	26.2
	> 3001	24	19.7
Neonates' sex	Female	47	38.5
	Male	75	61.5
Mode feeding	Supplemental	55	45.1
	Breastfeeding	67	54.9
Days admitted	0-7	32	26.2
	8-14	62	50.8
	15 – 21	23	18.9
	22 – 28	5	4.1
Neonate discharged?	No	106	86.9
	Yes	16	13.1

4.1.9 Demographic factors versus length of neonatal hospital stay.

Table 3 Shows cross-tabulation results of demographics against the length of stay. The mean age of the neonates who took shorter length of stay (4.56±2.8) was different from those with longer stay (14.76±4.99) with $P<0.05$. The neonates length of stay was associated with mothers level of education ($p<0.001$). Most of the neonate who had a longer stay in the unit belonged to mothers who were never married (57.4%; $p<0.064$).More male neonates than female were admitted to the unit but showed no association to the length of stay ($p<0.71$) the same pattern was noticed in parity of the mother.

Table 3: **Demographic factors influencing length of stay**

Variables	Length of stay		χ^2	P-value
	Short (0-7 days)	Long (> 7days)		
Age in days	4.56±2.8	14.76±4.99	T=14.41	0.0001
Education level				
Primary	14(29.2%)	34(70.8%)		
Secondary	12(25.0%)	36(75.0%)	0.134	0.001
Tertiary	13(50%)	13(50%)		
Marital status				
Never married	40(42.6%)	52(57.4%)		
Married	16(61.5%)	10(38.5%)	5.479	0.064
Separated	0	4(100%)		
Parity				
One	27(64.3)	15(35.7%)	4.793	0.035
2	33(59.6%)	23(40.4%)		
3 or more	9(37.5%)	15(62.5%)		
Sex of the baby				
Female	28(59.6%)	19(40.4%)	0.3	0.71
Male	42(54.5%)	33(45.5%)		

4.2 Causes of neonatal admission to the unit that influenced length of hospital stay

From **Table 5.** Ninety five of the neonates (77.8%) had a gestation of below 37 weeks while 27(22.2%) were born at gestational period >37 weeks. Neonates with a birth weight below 1500grams were sixty six(54.3%),1501-3000gm were 32(26%) while those above 3001gms were 24(19.7%).Those on supplemental feeding were 55(45.1%) while neonates breastfed 67(54.9%).On the mode of delivery most neonates were delivered through a caesarean section 75(61.5%) while normal delivery 47(38.5%). Majority of the neonates were referred 74(59.7%) from health facilities while 48(40.3%) were admitted from KNH labor ward/theaters. From the neonate files, Major reasons for the neonatal admission were concentrated on prematurity 60(49.2%), clinical problems eg neonatal sepsis 50(40.9%), low birth weight 4(3.3%), small for dates 5(4.1%) and big baby 3(2.5%). From the neonates' files, neonatal health status showed that majority had neonatal sepsis 50(40.1%) Respiratory distress19(15.6%), Neonatal jaundice 49(40.2%), while others accounted for 4(3.3%).

Table 4: **Causes of neonatal admission**

Category	Number	Percentage
Gestational age		
< 37 weeks	95	77.8
>37 weeks	27	22.2
Neonatal weight		
<1500gm	66	54.3
1501-3000gms	32	26
>3001gms	24	19.7
Neonatal health status		
neonatal sepsis	50	40.1
Respiratory distress	19	15.6
neonatal jaundice	49	40.2
others	4	3.3
Mode of feeding		
Breast feeding	67	54.9
Supplementary	55	45.1
Mode of delivery		
Normal delivery	47	38.5
Caesarian	75	61.5
Neonate referral		
Yes	74	59.7
No	48	40.3
Admission reasons		
Prematurity	60	49.2
Clinical problems	50	40.9
Small for dates	5	4.1
Low birth weight	4	3.3
Big baby	3	2.5
Neonate found with problem		
Yes	100	82
No	22	18

In **table 6** below, the neonates with a gestational age below 37 weeks were 2 times more likely to have a longer hospital stay(OR 2.758 CI 1.312-2.733 P value 0.003)compared to those delivered at a gestational age above 37 weeks .While the neonates delivered through caesarean section were one times more likely to have a longer hospital stay compared to those delivered normally (OR 1.159; 95% CI 0.852-1.576; p<0.347) though this was not significant.

Those neonates on supplemental feeding were 3 times more likely to have a longer stay at the newborn unit compared to those breastfed(OR 3.329 CI 1.518-7.298 p<0.002) while the neonates admitted below 7 days of age were 43(58.1%) had one times likelihood to be admitted for a longer period compared to those that were not referred (OR 0.001; 95% CI: 0.780-1.483 p value 0.003).

The same pattern was noted in the neonatal health status with neonatal sepsis 47(38.5%) being the most common ailment (OR 0.178; CI 0.003-0.042)

There was a significant difference observed on influence of neonatal complication in terms of hospital length of stay by the neonates (OR 0.85; 95%CI: 0.591-1.227).

Table 5: Association of neonatal characteristics by length of stay

Variables	Length of stay				
	Short (0-7 days)	Long (> 7days)	odds Ratio	95%CI	P-Value
Gestational age					
< 37 weeks	42(34.4%)	53(43.4%)	**2.758**	1.312-2.733	0.003
>37 weeks	14(11.5%)	13(10.7%)			
Neonatal weight					
<1500gm	24(19.7%)	42(34.4%)	**1.111**	**0.02-0.449**	**0.002**
1501-3000gms	14(11.5%)	18(14.8%)			
>3001gms	21(17.2%)	3(2.5%)			
Neonatal health status					
Neonatal sepsis	3(2.46%)	47(38.5%)	**0.178**	**0.003-0.042**	**0.029**
Respiratory distress	5(4.09%)	14(11.5%)			
Neonatal jaundice	15(12.3%)	34(27.9%)			
Others	2(1.63%)	2(1.63%)			
Mode of feeding					
Breast feeding	34(27.8%)	33(27.1%)			
Supplementary	13(10.7%)	42(34.4%)	**3.329**	**1.518-7.298**	**0.002**
Mode of delivery					
Normal delivery	29(61.7%)	18(38.3%)			
Caesarian	41(53.3%)	36(46.8%)	1.159	0.852-1.576	0.347
Referred					
Yes	43(58.1%)	31(41.9%)	**1.076**	**0.780-1.483**	**0.001**
No	27(54%)	23(46%)			
Neonate found with problems					
Yes	52(61.2%)	44(46.8%)	0.851	0.591-1.227	0.039
No	14(63.6%)	8(36.4%)			

From the table **6 ,** Majority of the neonates' mothers were aged between 26-35 and were more likely to have a shorter length of stay unlike those aged between 15-25 and 36-45 respectively (OR 0.615:CI 0.225-1.677)though this was not significant

There was a significant association between parity of the mother and neonatal length of hospital stay (OR 4.1;CI 1.910-8.01:Pvalue <0.003 in that a large number of those who were Para one 41 (33%) took a longer stay compared to Para two and above 16 (13.1 %)

A significant association existed between the marital status and length of neonatal hospital stay

(OR 4.71 ;CI 1.897-11.015 Pvalue <0.001)

Table 6: Association of maternal characteristics and Length of neonatal hospital stay

	Length of stay				
Variables	**Long (>7 days)**	**Short (<7days)**	**OR**	**95%CI**	**p Value**
Age of the mother (Years)					
15-25	19	8	0.615	0.225-1.677	0.042
26-35	36	39			
36-45	12	8			
Parity					
One	41	25	4.1	1.910-8.01	**0.003**
>2	16	40			
Marital status					
Unmarried	20	10	4.71	1.897-11.015	**0.001**
Married	28	64			

4. 3 SOCIO-ECONOMIC FACTORS INFLUENCING LENGTH OF HOSPITAL STAY

When respondents were asked if they had attended antenatal care during pregnancy 106(86.8%) said they had attended while 16(13.2%) said they had not attended the clinic. Among the reasons given for not attending clinic by the young respondents was that they were in school and did not want to be known to be pregnant. Home deliveries accounted for 34(27.9%) while majority delivered within the hospital set up 88(72.1%). Most mothers cited to have had maternal obstetrics complication prior to delivery 72(59). Of the respondents interviewed 50(40.9%) were employed while 72(59.1%) were unemployed and as such 96(78.6%) of the respondents reported to have had a monthly expense of less than 3000 on basic commodities such food, clothes and shelter. Personal insurance 6 (4.9%) was cited as the least mode of payment among the respondents while majority used NHIF cards to pay the hospital bill 62(50.8%) as shown on **table 7**

Table 7: Socio-economic factors influencing neonates 'length of hospital stay

Characteristic	Category	Frequency	Percentage
Health seeking behaviors			
Antenatal attendance			
	Yes	106	86.8
	No	16	13.2
Place of delivery	Hospital	88	72.1
	Home	34	27.9
Obstetrics complication	Yes	72	59.0
	No	50	41.0
Occupation	Employed	50	40.9
	Unemployed	72	59.1
Monthly expenses	>3000	26	21.4
	<3000	96	78.6
Hospital bill payment	NHIF	62	50.8
	Personal insurance	6	4.9
	Cash payment	54	44.2

4.3.2 Relationship between Socio-economic factors versus length of hospital stay

In terms of socio-economic factors shown on **table 8**, there were more employed (66.7%) than unemployed (64%)respondents that took shorter length of stay than longer stays (33.3%; p<0.006). There was no difference in families which had a monthly expenditure of below or more than 3,000 in terms of length of stay (P=0.004)

Table 8: Socio-economic factors versus length hospital stay

Variables	Length of stay		χ^2	P-value
	Short (0-7 days)	Long (> 7days)		
Occupation				
Formally Employed	4(66.7%)	2(33.3%)		
Farmer	0	3(100%)	0.573	0.006
Self employed	33(52.4%)	30(47.6%)		
Unemployed	32(64%)	18(36%)		
Family monthly income				
Below 3,000	51(57.3%)	38(42.7%)	0.04	0.004
3,000 and above	16(55.2%)	13(44.8%)		

PART TWO

4.4 Qualitative Data Results

4.4.1 Institutional factors that influenced length of hospital stay

Key informant interviews were conducted among 5 nurses who were team leaders at the various units of NBU. All the interview sessions were audio recorded and notes taken.

From the interview, the major ward round is done twice a week except the very sick neonates who are seen daily by the registrars. Key informant nurse at the units affirmed that consultant

doctors do not perform the daily major rounds except for the neonates in NICU and all the new admissions are seen daily while the rest of the neonates are seen on Mondays and Thursdays.

The admission at NBU according to key informants interviewed was done by registrars and some responses from them were:-

"*Our Registrars admit our neonates into the unit although some are referred from other health facilities .Others are seen by consultants and sent to the NBU*

"Our neonates who come through the labor ward or pediatric emergency unit are seen initially by registrar and occasionally the admitting consultant"

The major review /ward round done at the NBU occasionally from the informants interviewed was

"Only the neonates in NICU and all the new admissions are seen daily, the rest of the neonates are seen during a major ward round only twice a week on Thursday and Monday"

Another key informant responded:-

"Major ward rounds are done twice a week though the new admissions and those in NICU are reviewed daily"

When key informants were asked how the teaching status and hospital ownership impacted on the neonatal length of hospital stay, the responses were;

> *"We cannot really say we have evidence, but it has been observed that whenever we have many students in the NBU, the neonates acquired other infections or deteriorate hence add on the length of hospital stay"* .
>
> *"Well, KNH is a government hospital and all neonates who are referred are taken in, we do not turn them away even if over stretch and we have no option but have the ones that are not very sick share the cots"*

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 DISCUSSION

5.1.2 Introduction

This chapter discusses the findings of the study and compares them with others' findings on the subject from published literature.

The aim was to determine the factors that influence neonatal length of Hospital stay among neonates admitted at the newborn unit, KNH. Respondents interviewed during the study were 122 mothers of neonates admitted at KNH NBU and Five Key informants from the Nursing team.

5.1. 3 Characteristics of the study population

Neonate's characteristics

The findings of this study showed that majority of the neonates admitted were of the male gender, this is in agreement with a study by Rahim et al (2007), that also showed the predominance of males for both admissions and deaths .

This biological fragility in males is little understood and may not be widely known. Some evidence suggests an increased male vulnerability to adverse outcomes during the postnatal period, especially when maternal stress factors are present(Kirchengast et al,2009)

The study findings showed that most of the neonates at data collection had been admitted to the unit for a period of 8 – 14 days 62(50.8%) and a small number had been discharged 16(13.1%)

Considering that KNH is a government referral facility ,those who had been discharged and had not gone home may have been facing financial constraints .At the time of data collection ,the government had not introduced the fee waiver for maternal and child services

Characteristics of Neonates' Mothers

Findings from this study indicate that majority(61%) of the neonates' mothers in the study belonged to the age group of 26 – 35years .

This is in agreement with the KDHS data of 2003 that states that childbearing age in the country has dropped drastically(KDHS 2003).

The fact that Kenya generally is going through some transitional phase in its economic performance and the society has empowered women to pursue education .A possible explanation is that early motherhood interferes with educational attainment and renders women jobless and poor.

The study also showed that married mothers were more than those who were unmarried. Of significance is the unmarried mothers whose neonates tended to have a longer hospital stay ($p<0.001$) **.**

This could be attributed to the fact that unmarried mothers take up the role of heading the family and being a sole bread winner hence the likelihood of encountering challenges such as meeting the cost of care unlike their married counterparts.

The other finding of the study is that the respondents who were Para 2 and above were more than those who were having their first neonate and they also took a shorter length of stay comparatively(Pvalue < 0.003). This is in contrast to an Australian study by Mcleese et al (1994) that established that early-discharge mothers were more likely to be multiparious.

5.1.4 Causes of neonatal admission to the unit that influence length of hospital stay

The first objective of the study was to establish the causes of neonatal admission to the unit that influenced length of hospital.

It was found that most of the neonates with a gestational age below 37 weeks were more likely to have a longer hospital stay(P value< 0.003) unlike those delivered at a gestational age above 37 weeks .

This totally agrees with some documented study by Rawlings in 1996 that had shown that, length of stay in the neonatal intensive care unit (NICU) is influenced by a number of factors but is most strongly affected by gestational age (GA) and weight at birth(Rawlings,1996). These preterm infants require a prolonged stay in the neonatal intensive care units in order for the organs to mature. Other risk factors that the neonate are prone to include hypoglycemia amongst others (McGowan ,1999).

Findings from a study done in South Nepal showed that hypothermia at birth is one of the most important risk factors for morbidity and mortality in newborn infants of all gestational ages (Mullany et al, 2001) which is not the case in this study.

This study also found that most of the neonates(62.5%) delivered through caesarean section were more likely to have a longer hospital stay compared to those delivered normally though this

was not significant .Few studies exist to prove this correlation of mode of delivery and length of neonatal stay,

Another finding in the study is that whereas breastfeeding was more common among the mothers compared to supplemental mode of feeding, the neonates on supplemental feeding were more likely to have a longer stay at the newborn unit compared to those breastfed.

This variation can be explained by the fact that breastfeeding the infant has been scientifically proven to provide advantages with regard to general health, growth, and development,(Drane,1997).

The finding concurs with a study (Ganapathy et al 2011) that reported an expected lower NICU length of stay and total NICU cost savings when feeding infants exclusively on breast milk, (Ganapathy, Hay & Kim, 2011).

In this study, majority of the neonates admitted were referral cases(59.7%),this could be attributed to the fact that the surrounding government run health institutions don't have the infrastructure and the human resource needed to manage some neonatal complications and therefore referrals are made to KNH.

This study findings found a correlation between neonatal health status and Length of hospital stay . The neonates who had been diagnosed with neonatal sepsis tended to stay longer ($p < 0.029$),this was followed by neonatal jaundice ,respiratory distress, and others.

This findings agrees with another study that found that the overall cumulative incidence of neonatal infections rose dramatically with decreasing birth weight, with the smallest infants, experiencing an overall risk of neonatal sepsis (Freeman et al,1990)

This finding is almost similar to other situations in the developing countries as reported in a study by Kumar et.al, 2010 ,it found the main causes for referrals from other health centers to be pre-maturity, infections and birth asphyxia who also tended to be admitted for long duration.

5.1.5 Socioeconomic factors that influenced Length of Neonatal Hospital Stay

The second objective aimed at establishing whether socio-economic factors influenced neonatal length of hospital stay.

This study found that more employed mothers of neonates than the unemployed stayed longer in the hospital($p<0005$) .

This may be explained by the fact that these mothers request to go home to continue with their job and visit the neonates twice a day.

From the study, there was no significant relationship between the family income and length of stay in neonates' from families which had a monthly expenditure of more or less than Kshs. 3,000 .

It is a common fact that monthly earnings that can sustain the entire family in turn translates to better health for the neonates unlike in deprived situations .

Finding from this study did not show any significant relationship between the family income and length of stay in neonates' from families which had a monthly expenditure of more or less than Kshs. 3,000 .

It is a common fact that monthly earnings that can sustain the entire family in turn translates to better health for the neonates unlike in deprived situations .

5.1.6 Institutional factors that influence length of neonates' hospital stay

The third objective aimed at determining the institutional factors that influence neonatal length of hospital stay. Minimal literature exists on the relationship between neonatal length of hospital stay and institutional factors.

Findings of this study showed that the major ward rounds are done only twice a week which can be attributed to low doctor patient ratio of 1:1700 way below the WHO recommended numbers of 1:1000.

A study by Higgins et al (2003) demonstrated that the presence of a full-time physician doing daily rounds has been associated with a reduced likelihood of prolonged length of stay.

In a South African study that assessed collaboration of care during ward rounds, it was found that when doctors and other professionals made care decisions jointly during the rounds ,there was shortened average length of hospital stay (LOS) from 6.06 to 5.46 days (Zwarenstein et al,2009)

In this study a key informant respondent when asked about the impact of the teaching status of the hospital on neonatal length of stay affirmed that it had been observed that whenever the students were doing their clinical rotations at the unit ,neonates' length of stay was higher though no conclusive evidence was available.

This observation could be explained by the fact that neonates are at risk for nosocomial infections because their defense mechanisms are not fully developed ,this is further supported by another study that found that neonates' precarious nature puts them at an increased risk associated with physiological characteristics amongst other factors(Lawn 2005).

5.2 CONCLUSION

1. In this study, neonates born at a gestational age below 37 weeks had a longer length of stay at the newborn unit unlike those born after 37 completed weeks.
2. Low birth weight amongst the neonates admitted contributed to their prolonged hospital stay
3. Neonatal health status had an impact on LOS, those neonates who had been diagnosed with clinical illness like neonatal sepsis stayed longer in the unit
4. The study observed that there was a lower neonatal doctor contact unlike the WHO recommended ration of 1:1000 and this contributed to a longer duration of stay at the newborn unit.
5. Most neonates were referrals from other health institutions and this was attributed to the fact that the surrounding government run health institutions don't have the infrastructure and the human resource needed to manage some neonatal complications and therefore referrals are made to KNH.

5.3 RECOMMENDATIONS

1. KNH should act to reduce the causes of neonatal admissions by early identification of risk factors for neonates' problems
2. KNH must advocate for capacity building in the lower level hospitals in terms of infrastructure and personnel training, this will enable only the referral of complicated neonatal conditions and unnecessary Length of stay can be minimized

3. Strategies must be put in place to reverse the worrying trend of inadequate staffing given that the doctor –patient ratio is way below that which is recommended WHO which in turn worsens the neonates outcome and length of hospital stay

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ISHO

KIAMBATISHO 1(a): FOMU YA MAELEZO KUHUSU IDHINI

Kwa Mhusika,

Jina langu ni *BRIGID CHERUIYOT*. Mimi ni mwanafunzi katika Chuo Kikuu cha Nairobi ambapo ninanuia kuhitimu na shahada ya juu ya uuguzi. Nafanya utafiti kuhusu mambo yanayochangia kulazwa Kwa watoto wachanga Kwa muda mrefu. Utafiti huu umeidhinishwa na kupitishwa na Kamatii ya Maadili ya Utafiti ya hospitali ya Kenyatta na chuo Kikuu cha Nairobi.

Ilikupata habari kuhusu swala ninalo tafitia, nimeunda dodoso ama fomu ya maswali.Pia. nitaomba niweze kuangalia rekodi yako ya uuguzi. Ombi langu kwa unyenyekevu ni kuwa utashiriki Kwa kujibu maswali.Pia yaliyoko katika fomu hii. kushiriki kwako kutakuwa kwa hiari na hakuna adhabu kwa kudinda kushiriki. Hakuna hatari ya kushiriki katika utafiti huu. Majibu katika fomu hii yatashughulikiwa kwa siri kama inavyoruhusiwa kisheria. Haitaji kuandika jina lako au kitambulisho cha aina yoyote katika fomu hii. Pia, unaruhusa ya kujitoa katika utafiti huu katika hatua yoyote bila hofu ya uonevu.

Matokeo ya utafiti huu .Ikiwa utapenda kujua matokeo ya utafiti huu unahaki ya kuyapata. Unaweza kuuliza maswali yoyote kuhusiana na haki yako kama mshiriki au kitu kingine chochote kuhusu utafiti huu ambacho unahisi si wazi. Shukran Kwa kukubali kushiriki.

Ikiwa unamaswali, maoni au mapendekezo yoyote au ufafanuzi jisikie huru kuwasiliana na mpelelezi mkuu kwa nambari ya simu 0729-493907 au wasiliana na Katibu wa KNH/UON-ERC kwa nambari ya simu 2726300/ 44,102.

Asante.

Brigid cheruiyot (mtafiti).

Ridhaa ya kushiki utafiti

Nimesoma na kuelewa maelezo yote katika fomu hii kuhusu utafiti unaofanywa na ninakubali kwa hiari yangu kushiki.

Sahihi ya mhusika _____ Tarehe_____

Mtafiti mkuu/mtafiti msaidizi_____ Tarehe_____

APPENDIX 1(b): CONSENT EXPLANATION AND CONSENT FORM FOR THE CARETAKERS OF NEONATES

Dear Respondent,

My name is **Brigid Cheruiyot**. I am a student at the University of Nairobi pursuing a Master's degree in Nursing (Pediatric Nursing). I am carrying out a research on **" Factors influencing length of hospital stay of neonates admitted to the newborn unit at Kenyatta national hospital"** The research has been approved by the Ethics and Research committee of KNH and permission to carry out the research granted by the Hospital.

In order to obtain the information, I have developed a questionnaire. I am kindly requesting you to participate in the study by filling in the questionnaire. Participation is voluntary and there is no penalty for declining to participate. There are no risks involved in participating in this study. The information you provide will be treated with confidentiality as permitted by law. You are not required to write your name or any other identification number on the study questionnaire. You are free to withdraw from the study at any stage without fear of victimization.

The results of the study may be used to inform quality care which will hopefully reduce unnecessary length of neonatal hospital stay. The results of the study will be availed to you after the study is completed in case you wish to know the findings. You may ask any questions about your rights as a participants or anything else about the research that is not clear. Your participation will be highly appreciated.

In case of any questions or clarifications feel free to contact the principal investigator on mobile number 0722345807 or contact the Secretary to the KNH/UON- ERC at 2726300 Ext 44102.

Thank you.

Brigid Cheruiyot (INVESTIGATOR).

Respondent's consent

I have read and understood the above details about the research. I voluntarily agree to participate in the study.

Respondent's signature …… Date ……

If participant is a child, indicate relationship…….

APPENDIX 2: QUESTIONNAIRE

Title: Factors Influencing Length Of Hospital Among Neonates Admitted to the Newborn Unit at Kenyatta National Hospital.

Questionnaire number …….

Date: _____

PI/designee initials ……

INSTRUCTIONS

Please do not write your name anywhere in the questionnaire.

Put a tick (√) in box next to the right response

Where no responses/choices are provided please write the response in the spaces provided.

PART 1. DEMOGRAPHIC FACTORS INFLUENCING LENGTH OF NEONATAL HOSPITAL STAY

1.What is the age of the mother?(specify)_____

2 What is the mother's marital status?

1.Married ☐

2.Never married ☐

3Separated ☐

4. What is the age of the neonate in days?(please specify)_____

5What was the weight of the neonate at birth in kilogram (specify)_____

6 What is the sex of the baby

1 Male ☐

2Female ☐

7. What is the neonate's mode of feeding?

1. Breast feeding ☐

2. Supplemental feeding ☐

8. How many days has the neonate been in the Unit?_____

9. Has your neonate been discharged from the New born Unit?

1.No ☐

2.Yes ☐

11. If yes ,Why haven't you taken the baby home? (please explain)_____

PART 2. CAUSES OF NEONATAL ADMISSION

11.Has the neonate been referred from another hospital/ KNH `Labor ward?

1.Yes ☐

2.No ☐

12.If yes to (11) above, specify the hospital/ ward, if (2) above skip_____

13.What was the reason for admission of your newborn?

1 Prematurity ☐

2 Clinical problems ☐

3 Large for dates ☐

4.Low birth weight ☐

5.Big baby ☐

Others (specify)_____

14.Has the neonate been found to have any specific problem?

Yes ☐

No ☐

15. If yes, which one? _____

(Verify with the diagnosis in the file…….)

15.Did you experience any problems before you delivered?(please specify)_____

PART 3 SOCIO-ECONOMIC FACTORS INFLUENCING LENGTH OF HOSPITAL STAY

17.How many children have you given birth to?(specify)

18.Did any of the children experience similar problems as this neonate?

1. Yes ☐

2. No ☐

If Yes ,For how long was the child admitted? Specify_____

19. Did you attend antenatal clinics during the pregnancy with this child?

1. Yes ☐

2. No ☐

If No to above, Why didn't you attend? Please explain

_____

20. Where did the delivery of the neonate take place?

Hospital' ☐

Home ☐

21. Do you have a history of medical or obstetric complications?

1Yes ☐

2No ☐

If the answer above is yes please explain_____

2.What is the highest level of education attained?

1.Primary level ☐

2.Secondary level ☐

3 Tertiary level ☐

22. What is your occupation?

1. Employed ☐

2.Unemployed ☐

23. What is your family monthly Income?

1Below 3,000

2 .3,000 and above

24 .How will the hospital bill be settled?

1NHIF card ☐

2. Personal insurance ☐

3. Cash payment ☐

25.What is the frequency of the doctor ward rounds in a day?_____

APPENDIX 3: CONSENT EXPLANATION AND CONSENT FORM FOR HEALTH CARE WORKERS

Dear Respondent,

My name is **Brigid Cheruiyot**. I am a student at the University of Nairobi pursuing a Master's degree in Nursing (Pediatric Nursing). I am carrying out a research on **" Factors influencing length of hospital stay of neonates admitted to the newborn unit at Kenyatta national hospital"** The research has been approved by the Ethics and Research committee of KNH and permission to carry out the research granted by the Hospital.

In order to obtain the information, I will conduct a key informant interview. I am kindly requesting you to participate in the study by taking part in the interview.

Participation is voluntary and there is no penalty for declining to participate. There are no risks involved in participating in this study. The information you provide will be treated with confidentiality as permitted by law. You are not required to write your name or any other identification number on the study questionnaire. You are free to withdraw from the study at any stage without fear of victimization.

The results of the study may be used to inform quality care which will hopefully reduce unnecessary length of neonatal hospital stay. The results of the study will be availed to you after the study is completed in case you wish to know the findings. You may ask any questions about your rights as a participants or anything else about the research that is not clear. Your participation will be highly appreciated.

In case of any questions or clarifications feel free to contact the principal investigator on mobile number 0722345807 or contact the Secretary to the KNH/UON- ERC at 2726300 Ext 44102.

Thank you.

Brigid Cheruiyot (INVESTIGATOR).

Respondent's consent

I have read and understood the above details about the research. I voluntarily agree to participate

in the study.

Respondent's signature …… Date ……

If participant is a child, indicate relationship……..

APPENDIX 4: KEY INFORMANT'S INTERVIEW GUIDE

Factors influencing Length of Hospital stay Among Neonates admitted at the New Born Unit at Kenyatta National Hospital.

Introduction

I am Brigid Cheruiyot. I am pursuing my master's degree in nursing sciences at the University of Nairobi. Presently I am conducting a study on **"Factors influencing Length of Hospital stay Among Neonates admitted at the New Born Unit at Kenyatta National Hospital** ". The aim of the study is to explore the factors influencing length on Neonatal Hospital stay among neonates admitted at the New born Unit at Kenyatta National hospital. The results of the study may be used to inform quality care which will hopefully reduce unnecessary length of neonatal hospital stay.

We are going to ask you a few questions. We expect this session to be as interactive as possible. Be as truthful as you can. In the process of discussions tape recording of the proceedings may take place. In all issues respect, confidentiality, dignity and responsible behavior will be observed. All issues discussed will be only for the purposes of this research and will not be mentioned in any other forum. In case you don't understand any of the questions kindly seek clarification. Let us now discuss each of the following questions.

1. Who admits the neonates into the new born Unit?

2. How often is the major round/review done?

3. What are some of the factors that influence neonatal length of hospital stay

4. How does the length of stay at the New born unit affect the general unit activities such as staffing ratios?

APPENDIX 5: LETTER OF APPROVAL

KENYATTA NATIONAL HOSPITAL
APPROVED
05 JUL 2013
ETHICS & RESEARCH COMMITTEE

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link:www.uonbi.ac.ke/activities/KNHUoN

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/192

5th July, 2013

Brigid Cheruiyot
School of Nursing Sciences
College of Health Sciences
University of Nairobi.

Dear Brigid

RESEARCH PROPOSAL: FACTORS INFLUENCING LENGTH OF HOSPITAL STAY OF NEONATES ADMITTED TO THE NEWBORN UNIT AT KENYATTA NATIONAL HOSPITAL (P137/3/2013)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 5th July, 2013 to 4th July, 2014.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Yours sincerely

PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c. Prof. A.N. Guantai, Chairperson, KNH/UoN-ERC
The Deputy Director CS, KNH
AD, Health Information, KNH
The Principal, College of Health Sciences, UoN
The Director, School of Nursing Sciences, UoN
Supervisors: Dr. Margaret Chege, Mrs. Kivuti-Bitok