RISK FACTORS FOR NEONATAL MORTALITY IN

BUSIA DISTRICT, UGANDA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE AWARD OF MASTER OF PUBLIC HEALTH OF MAKERERE UNIVERSITY
DECLARATION

I, Godfrey Nalugoda (Dr.) hereby declare that to the best of my knowledge, this
dissertation has not been presented to any institution either partially or in total for any
academic award, publication or other use. The works herein are original. Where the
works of others are quoted appropriate references have been given.

I hereby wish to present it for the award of degree of Master of Public Health of
Makerere University.

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Date 13/1/2007
DEDICATION

This dissertation is dedicated to my dear children Tracy Kirungi, Josh Magoola and Fidel Magoola.
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# TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS .............................................. vii
OPERATIONAL DEFINITIONS ............................................................... viii
ABSTRACT .......................................................................................... x

1.0 Introduction and background .......................................................... 1
   1.1 Introduction ................................................................................. 1
      1.1.1 General introduction .......................................................... 1
      1.1.2 Epidemiology of neonatal mortality ..................................... 2
      1.1.3 Factors influencing Neonatal Health ..................................... 3
   1.2 Background .................................................................................. 5

2.0 Literature review ........................................................................... 7
   2.1 Introduction ................................................................................ 7

3.0 Problem statement, justification, conceptual framework ................. 13
   3.1 Problem statement ..................................................................... 13
   3.2 Justification ................................................................................. 14
   3.3 Conceptual framework .............................................................. 15
   3.4 Hypothesis .................................................................................. 18

4.0 Study objectives ............................................................................ 18
   4.1 General objective ....................................................................... 18
   4.2 Specific objectives .................................................................... 18

5.0 Methodology ................................................................................ 19
   5.1 Study area ................................................................................ 19
   5.2 Study population ....................................................................... 19
   5.3 Study design .............................................................................. 20
   5.4 Sample size .............................................................................. 21
   5.5 Sampling procedure .................................................................. 22
   5.6 Study variables .......................................................................... 23
      5.6.1 Dependent variable .............................................................. 23
      5.6.2 Independent variables ......................................................... 23
   5.7 Data collection ........................................................................... 25
      5.7.1 Training of research assistants ........................................... 25
      5.7.2 Tools .................................................................................. 25
      5.7.3 Pre-testing .......................................................................... 25
   5.8 Data management and analysis ................................................... 26
      5.8.1 Data management ............................................................... 26
      5.8.2 Data analysis ...................................................................... 26
   5.9 Ethical considerations ................................................................ 27
   5.10 Dissemination and utilization of the study results ....................... 27

6.0 RESULTS ..................................................................................... 28
   6.1 Socio-demographic characteristics of respondents ....................... 28
   6.3 Neonatal nursing practices and neonatal mortality ....................... 32
      6.3.1 Delivery surface ................................................................. 32
      6.3.2 Sepsis prevention ............................................................... 32
      6.3.3 Hypothermia ..................................................................... 34
   6.4 Maternal health seeking behaviour and neonatal mortality ........... 37
6.5 Household environment and neonatal mortality ........................................ 39
7.0 Discussion ......................................................................................... 45
7.1 Risk factors for neonatal mortality .................................................. 45
7.2 Study Limitations ........................................................................... 48
8.0 Conclusions and recommendations ............................................... 49
8.1 Conclusions ................................................................................... 49
8.2 Recommendation ............................................................................ 49
REFERENCES ......................................................................................... 49
ANNEXES ............................................................................................ 52
Annex I: Focus group discussion guide and consent form .................... 52
Annex II Questions .............................................................................. 53
Annex III Questionnaire for study on Neonatal mortality risk factors in Busia District ....................................................... 56
**LIST OF ACRONYMS AND ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>Antenatal Care</td>
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<tr>
<td>DHO</td>
<td>District Health Officer</td>
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<td>DHT</td>
<td>District Health Team</td>
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<td>FGD</td>
<td>Focus Group Discussion</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<td>HSSP</td>
<td>Health Sector strategic plan</td>
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<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illnesses</td>
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<td>IPT</td>
<td>Intermittent Presumptive Treatment for Malaria</td>
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<td>KI</td>
<td>Key Informant</td>
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<tr>
<td>LBW</td>
<td>Low Birth Weight</td>
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<td>MCH</td>
<td>Maternal and Child Health</td>
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<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NMR</td>
<td>Neonatal Mortality Rate</td>
</tr>
<tr>
<td>PDC</td>
<td>Parish development committee</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of Mother to Child Transmission of HIV</td>
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<tr>
<td>TBA</td>
<td>Traditional Birth Attendant</td>
</tr>
<tr>
<td>TT</td>
<td>Tetanus Toxoid</td>
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<tr>
<td>UDHS</td>
<td>Uganda Demographic and Health Survey</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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OPERATIONAL DEFINITIONS

Antenatal care: Health care provided to the pregnant woman, within a clinic or outreach service context.

Birth weight: Weight of baby within 48 hours of birth (Ideally taken as soon after birth as possible)

Care during delivery: this is the time from onset of labour until completion of the third stage of labour, interventions may include skilled birth attendant, high quality emergency obstetric care and basic resuscitation

Care during pregnancy: care throughout pregnancy until onset of labour including care both at home and in the formal health care system such as in an antenatal clinic

Gestational age: Number of completed weeks of pregnancy since the last menstrual period of the mother: Gestational age can also be assessed by examining the physical characteristics of the baby

Preterm birth: live birth before 37 completed weeks of gestation

Live birth: A baby born with any sign of life regardless of weight or gestation

Low birth weight: Birth weight of less than 2500g

Neonatal period: the first 28 days of life; divided into early neonatal period (first 7 days) and the late neonatal period (day 8-28)

A neonate (Newborn): Baby from birth until 28 completed days of life.

Newborn (neonatal) care: Care from birth until 28th completed day of life including care both at home and in the formal health care system.
Skilled attendant: Individuals with midwifery skills (i.e. doctors, midwives, nurses) who trained to proficiency in the skills to manage normal deliveries, diagnose and manage or refer complicated cases

Neonatal mortality: refers to the death of a live born infant within the first 28 days of life

Neonatal mortality rate (NMR): refers to the number of neonatal deaths per 1000 live births.

Risk factors for neonatal mortality: refers to the factors that are responsible for the neonatal death.

Intermittent Presumptive Treatment 2 (IPT2): refers to receipt by a pregnant woman of at least two doses of Fansidar after the first trimester.

Tetanus toxoid 2 (TT2): refers to receipt by a woman of reproductive age of at least 2 doses of tetanus toxoid vaccine with a one month interval between the doses
ABSTRACT

Introduction: Uganda is one of the developing countries with a high neonatal mortality rate (NMR). In a resource poor country, improving neonatal outcome requires simple preventive measures and prompt newborn care. However, institutional delivery is low (20% for Busia district) and there is little integration of neonatal health into existing Maternal and Child (MCH) programmes. For Busia district, where the majority of births occur at home, simple interventions at community level are very essential for meaningful reduction in neonatal mortality.

Methods: This was a 2-phase study conducted in Busia district. Focus group discussions with mothers, and key informant interviews with traditional birth attendants (TBAs) comprised the first phase. Qualitative information got was used to enrich the study by modifying the questionnaire that was used in the second phase. The second phase of data collection was a community based unmatched case control study with 3 controls per case in 4 selected sub counties. Using multiple sources, 49 cases were identified and 147 neighborhood controls randomly selected for this study.

Results: In total, 196 rural interviewees participated in this study. The risk factors associated with neonatal mortality included: Being a Samia mother (OR 7.45, 95% CI 2.27-24.43); unclean delivery surface (OR 3.85, 95% CI 1.28-11.58); prematurity (OR 8.31, 95% CI 1.77-39.05), non-use of gloves by attendants (OR 18.09, 95% CI 5.08-64.45). Other factors were not cleaning cord at home (OR 161.31, 95% CI 23.80-1093.34); hypothermia (OR 6.08 95% CI 1.77- 20.90) and Unskilled attendants (OR 28.45 95%CI 1.23- 660.82).
Conclusions: Poor neonatal care practices and poor health seeking behaviour were associated with high neonatal mortality.

Recommendations: The DHO, through research should identify risk factors for prematurity. The DHT should sensitize the community about good neonatal practices and should devise incentives for mothers to deliver in health units.
1.0 Introduction and background

1.1 Introduction

1.1.1 General introduction

Neonatal mortality refers to the death of a live born infant within the first 28 days of life (neonatal period). This period is divided into early neonatal period (1-7 days of life) and late neonatal period (8-28 days of life). Neonatal mortality is higher in poor and developing countries than the developed countries, contributing significantly (about 50%) to the under 5 years mortality in these developing countries (WHO, 2005).

Neonatal health has for long been a neglected area, child survival programmes in the developing countries have tended to focus on pneumonia, diarrhea, malaria, and vaccine preventable conditions, which are important causes of death after the first month of life. (Lawn et al 2005)

Until recently there has been little effort to systematically address the specific health problems of newborns; the care of the new born has fallen through cracks, as the continuity between maternal and Child health programmes is often inadequate. Improving the health of newborns however does not just mean inserting a new programme rather it means adapting the efforts of maternal and child health programmes so as to scale up services in a seamless continuum of care (WHO, 2005)
1.1.2 Epidemiology of neonatal mortality

Of the 130 million babies born alive globally every year, about 4 million die during the neonatal period. Most neonatal deaths (99%) occur in low income and middle income countries, and of these, about half occur at home (Lawn et al 2005). About two-thirds of neonatal deaths arise in the African and southeast Asian regions of the World Health Organisation (WHO). The countries with the largest absolute numbers of deaths are mainly in south Asia, because of the large populations in this region; India alone contributes a quarter of the neonatal deaths. However, the countries with the highest neonatal mortality rates (NMRs >45 per 1000 live births) are mostly in sub Saharan Africa. (Lawn et al 2005, The World health report 2005). High NMRs are especially seen in countries with recent civil unrest, such as Liberia and Sierra Leone. In Tanzania, Democratic Republic of Congo and Ethiopia the neonatal mortality rates are 43, 47 and 51 per 1000 live births respectively (Lawn et al 2005). These rates are higher than the Ugandan rate.

In poor communities, many babies who die are unnamed and unrecorded, indicating the perceived inevitability of their deaths. Global estimates for 2000 show that 38% of all deaths in children younger than 5 years occur in the first month of life, thus, the average daily mortality rate during the neonatal period is about 30- fold higher than during the post neonatal period. Globally some three-quarters of neonatal deaths happen in the first week after birth (Lawn et al 2005). Mortality is very high in the first 24hrs after birth, with 25-45% of all neonatal deaths occurring during that period.
In Uganda an estimated 33 neonatal deaths per 1000 live births occur each year. (UDHS 2000-2001) These deaths occur in babies born in and outside health facilities. These deaths are not evenly distributed in all parts of the country; some districts like Busia have a higher neonatal mortality (NMR= 45 deaths per 1000 live births). While others have lower rates such as Bugiri with neonatal mortality of 32 deaths per 1000 live births (DHO report June 2004).

**1.1.3 Factors influencing Neonatal Health**

Neonatal health is influenced by several factors; they include direct causes, indirect causes and underlying causes.

**Underlying factors**

Health system factors are considered as some of the underlying factors. These are factors that affect neonatal mortality by influencing other factors in between, they include; Policies for Control of nutritional deficiencies, immunization facilities, availability of vaccines, Family planning, access to health facilities, staffing levels e.t.c

**Indirect factors**

Indirect factors are the ones that have a direct influence on the direct causes of neonatal mortality. They are subdivided into antenatal, intrapartum and postnatal factors.

These are factors that affect the neonatal health but the mother can have control over them.

**Antenatal factors**

During pregnancy, they include; Immunization against tetanus, Intermittent Presumptive treatment for malaria, Rubella vaccination, Diagnosis and treatment of reproductive tract infections, as well as direct perinatal deaths caused by syphilis. Other factors that
improve on neonatal outcome during antenatal period include Counseling on nutrition, birth preparedness, parenting skills, family planning options after birth, Prevention of mother to Child transmission of HIV (PMTCT). All these important factors do influence neonatal health during the antenatal period.

Intrapartum factors

Intra partum factors are the ones that affect neonatal outcome during the process of child birth. They can be factors that may result from the baby, mother or the environment under which the process of delivery is taking place. These factors include skilled birth attendant, duration of labour, type of delivery, birth weight, etc. During this period, strict asepsis at delivery and cord care reduce risk of infection, resuscitation of babies who cannot breathe at birth and to deal with or refer unpredictable complications as they happen to mother or baby all help to improve the outcome of the pregnancy.

Postnatal factors

All factors that affect neonatal health following the delivery process are included in this group; they include parenting skills such as Breast feeding, care for the preterm and LBW infants (Kangaroo mother care), and resuscitation of newborns. Additional factors include early detection and treatment of neonatal infections, Immunization, general hygiene of the mother and household environment.

Direct factors

Neonatal mortality is caused directly by factors such as congenital abnormalities, Sepsis including tetanus, birth Asphyxia and Prematurity. These factors may act singly or in combination; so in practice it is not very easy to point to one cause of death with a high degree of certainty
1.2 Background

In Uganda, through Integrated Management of Childhood illnesses (IMCI), several interventions have been put in place to address illnesses of post neonatal infants even at community level. A mother is told clearly what she has to do to her sick child at home as she prepares to go to a nearby health facility. No corresponding measures are in place to tackle neonatal illnesses. Uganda is one of the countries that are committed to the millennium development goals, however, she is unlikely to achieve these goals especially MDG-4 unless neonatal mortality is dramatically reduced. Newborn health is an integral part of maternal and child health but unfortunately, both programmes ignore its importance, especially during the first week of life. This has resulted in neonatal mortality significantly contributing to the highest burden of infant mortality.

In 2004, Busia district was employing 129 (45%) health workers, out of the expected staffing norm of 285. This was far below the national (HSSP) target of 70% staffing level. (DHO report June 2004) The district had a total of 12 midwives, 15 nurses, 13 clinical officers, 6 laboratory assistants attending to a total population of approximately 250,000 people as per the projections from population census of 2002.

Expecting 12 Midwives to attend to approximately 12500 deliveries in a year is an enormous task. Implementation of simple interventions with proven effectiveness on neonatal outcomes is low in coverage, its progress is also slow and there is bound to be inequity in service delivery. So there is need to identify the most cost effective interventions to provide care to neonates at community level and promote their implementation.
There is a problem of high of neonatal mortality and the poor status of neonatal health in the district. Given that more than 80% of deliveries (DHO report June 2004) occur at home and not supervised by skilled personnel, it’s important that local and easy interventions to address the problem of neonatal mortality be formulated and implemented where the births occur- at home.
2.0 Literature review

2.1 Introduction

There is an unacceptably high number of neonatal deaths (4 million) that occur every year. It occurs mainly in the developing countries of Sub Saharan Africa and Southern Asia, contributing significantly to childhood mortality. If the millennium development goal for child survival (MDG-4) is to be met, neonatal mortality has to be reduced (Lawn et al, 2005).

Prematurity, congenital anomalies, asphyxia, neonatal sepsis; infection, diarrhea and tetanus are the main direct causes of neonatal mortality (The World Health Report 2005). These causes from region to region but in general, if neonatal mortality rate decreases the proportion of prematurity and congenital anomalies increase whereas improved care results into reducing the proportion of deaths due to infections, tetanus, diarrhea and asphyxia. These causes of neonatal mortality are linked to the health of the mother and the care she gets before, during and immediately after giving birth. So the indirect causes of neonatal mortality include antenatal, intrapartum and postnatal factors.

Interventions like integrated management of childhood illness (IMCI) have been adopted in Uganda but unfortunately, they target infants more than 1 month old. Interventions targeting neonates are yet to be developed and formally instituted in most developing countries, leaving mothers and other care providers ignorant in management of neonatal ill health. Most neonatal deaths are unrecorded in any formal registration system, this
therefore complicates planning and exact rates are mere approximations in the majority of setups, largely dependent on verbal autopsy of variable quality.

2.2 Reasons for high neonatal mortality

According to the World health report (2005), the possible reasons for the high neonatal mortality include most mothers delivering at home with limited access to skilled care, cultural acceptance that it is normal to have high neonatal mortality and lack of support from Global agencies. There is a perceived belief that neonatal health requires expensive, high technological approaches to improve, which is not the case.

According to a reference manual for program managers about promoting quality maternal and newborn care (1998); newborn deaths are thought to occur as a result of a combination of socio cultural factors such as frequent pregnancies/ high fertility rates/ short birth intervals, desire for small babies, gender discrimination beginning in infancy. Others include the 4 delays; delay in problem recognition, delay in deciding to seek care, delay in reaching the health facility and delay in receiving quality treatment at health facility. All these delays occur for various reasons.

Currently, interventions to reduce neonatal mortality belong to two health system programmes: maternal health programmes covering pregnancy, childbirth, and early neonatal care; and child- health programmes, which move on through infancy and into childhood. Addressing neonatal mortality requires continuity between these elements of care, which is lacking in many settings (Lawn et al 2005).
**Socio-demographic**
Al-Hosani et al. (2003), in their study of mortality risk factors in children under 5 years in Abu Dhabi, found significant association of neonatal mortality with young maternal age, first pregnancy, first birth or delivery, low birth weight, < 24 months interval since last pregnancy, preterm birth, history of previous death among siblings and ill health at the time of birth. Lack of formal maternal education and relatively low income also had significant association with neonatal mortality.

**Health seeking behaviour**
Ali A.H and Monir U.B (1999), in a study about mothers’ health seeking behaviour in Bangladesh found that educated mothers were more involved in health seeking behaviour than the uneducated; they are more likely to use health services, feed their children better, and improve the traditional means of health care. These mothers also use more effective contraceptive methods than others. It was evident that survival was higher in children born in proper health facilities and attended by professional staff than those born at home and attended by unskilled people.

Terra et al (2000), in a study in Brazil about mothers’ care seeking behaviour during their infant’s illness, found that 1/3 of deaths occurred in health units and 2/3 occurred at home. Three major groups of factors that appeared to contribute to most deaths were delays in seeking medical care, medical intervention reported as ineffective by the mothers and delay in providing medical care to children who arrived at the hospital too late in the day.
Armida et al (2003), in their study about urban slum-specific issues in neonatal survival, point out late recognition of neonatal illnesses and delay in seeking medical help as factors responsible for increased neonatal mortality. Those who sought care, private practitioners in the locality were the first preference. It is standard practice that ill neonates be admitted in hospital, but 50% of care takers did not comply with advice of hospitalization; reasons included lack of perception that the child was gravely ill, other siblings at home, economic reasons and the unpleasant past experience.

Peterson et al (2004), in their study coping with pediatric referral in Uganda, a study that was conducted in 12 health facilities, only 28% completed referral after 2 weeks. Reasons advanced included lack of money, transport problems and responsibilities at home. Children with incomplete referral continued treatment at referring health units. It was noted that where referral was difficult, more specific IMCI referral criteria should be used and first level health workers should be empowered to manage severely ill children.

Community-based participatory interventions

Neonatal mortality is increasingly becoming an important public health issue in many developing countries. The majority of deaths occur at home and therefore community interventions will go a long way in reducing neonatal mortality.

Manandhar et al (2004), in their study of effect of a participatory intervention with women’s groups on birth outcomes in Nepal, they pair matched 42 geopolitical clusters, selected 12 pairs randomly and randomly assigned one of pair to intervention or control. In each intervention cluster a female facilitator convened nine women’s group meetings every month. Purpose of these meetings was to identify local perinatal problems and to
formulate strategies to overcome them. Other outcomes were stillbirths and maternal births, uptake of antenatal and delivery services, home care practices, infant morbidity and health care seeking. Women in the intervention clusters were more likely than those in the control clusters to have had antenatal care, to have taken haematinic supplements, to have given birth at a health facility with a trained attendant, to have used a clean home delivery kit or a boiled blade to cut umbilical cord and for the birth attendant to have washed her hands. In event of illness, women in the intervention groups were more likely to have visited a health facility. Infection related neonatal deaths were less frequent in intervention clusters.

Bang et al (1999), in their study of effect of home based neonatal care and management of sepsis on neonatal mortality: field trial in rural India, village health workers trained in neonatal care, made home visits and managed asphyxia, premature birth or low birth weight, hypothermia and breast feeding problems. They diagnosed and treated neonatal sepsis, provided home supervisory visits. Case fatality in neonatal sepsis declined from 16.6% before treatment to 2.8% after treatment by village health workers (p< 0.01)

The warmi project- introduced in a rural area of Bolivia with little health infrastructure and wide spread poverty, women worked together to identify key maternal and neonatal health problems (Howard- Grabman, 1993). The women groups went on to prioritize the problems and develop local strategies to address them. Within a period of 3 years, the warmi project had achieved a substantial decrease in perinatal mortality rate from 117 to
44 per thousand births. There was no control group and therefore to draw conclusions is difficult.

In many developing countries, most mothers breastfeed but they rarely do it exclusively. Haider et al (2000), in a study on effect of peer counselors on Breast-feeding in Dhaka Bangladesh, local women received 10 days’ training as peer counselors. Home based counseling visits were scheduled with 2 visits in the last trimester, three early postpartum and fortnightly thereafter until the infant was 5 months. Prevalence of exclusive Breastfeeding at 5 months was 70% in the intervention group and 6% in the control group (95% CI 57%- 71%, p< 0.0001). Therefore, peer counselors can effectively increase the initiation and duration of exclusive Breast-feeding. This therefore means that better health care practices can be adopted by influence of groups.
3.0 Problem statement, justification, conceptual framework

3.1 Problem statement

Neonatal mortality is a significant public health problem in Busia district. In 2003, Busia district reported a neonatal mortality rate of 45 deaths /1000 live births (DHO report, 2004). This rate is very high compared to neighbouring Bugiri district with a neonatal mortality rate of 32 deaths / 1000 live births (DHO report 2004). If the Millennium development goal -4 (MDG-4) is to be achieved by 2015, neonatal mortality which contributes about 50% of all the under 5 mortality (The world health report, 2005) must be addressed.

In Busia district, only 20% of mothers deliver in health facilities. (2003/2004 financial year, DHO report June 2004). This implies that the majority (80%) of mothers deliver at home. Even those mothers who deliver in health facilities are discharged after 1 day following a normal delivery; so the majority of neonatal deaths occur at home and this probably means that the NMR estimate for the district may be lower than the actual.

Factors contributing to the high neonatal mortality in Busia district are not clearly known, but associations with some factors have been proposed. Preterm births, severe infections, complication of asphyxia and congenital abnormalities have all been suggested. Indirect causes of neonatal deaths include poverty, lack of access to skilled and supervised deliveries, poor management of complicated pregnancies and delivering under unhygienic environments among others. Standard advice is to admit every ill neonate to hospital for treatment, but hospitals are inaccessible to rural poor because of practical
difficulties and traditional beliefs. Hence most deaths occur at home, therefore to reduce neonatal mortality ways to provide care at home must be developed.

The high neonatal mortality may compel mothers to reduce on the birth spacing interval thereby increasing the risk of pregnancy complications as well as neonatal deaths. The reduced birth interval also means reduced family planning use and consequently may lead to an increase in maternal mortality. The high neonatal mortality means MDG-4 will not be achieved.

The ability of the mothers to detect neonatal sickness, its danger signs, and to seek appropriate treatment instantly is therefore of paramount importance if neonatal health has to be improved. In Busia district, the health seeking behaviors of mothers, ability of mothers to detect neonatal illnesses and neonatal care practices are not clearly known.

The DHT has attempted to address this problem of neonatal mortality by intensifying health education campaigns in the district; mothers have been encouraged to deliver in health facilities e.g. by distributing free mosquito bed nets to whoever delivers in a health facility. However the response was dependant on the availability of nets and not the importance of delivering in a health facility. This study attempted to identify the health seeking behaviour and neonatal care practices of mothers in Busia so as to promote neonatal health in Busia district.

3.2 Justification

Neonatal mortality is a major public health problem in Busia District and the factors responsible for it are not clear. Therefore, the Study findings will bridge the information
gap and enable the DHT to design appropriate interventions. Once in place, these interventions will address the problem of neonatal mortality, the under 5 mortality will decrease hence addressing MDG-4.

There is no specific policy regarding neonatal health care, information generated from this study may be found useful in the formulation of one at the Ministry headquarters. This therefore means that the study may benefit not only Busia district but the entire country.

3.3 Conceptual framework

A number of factors influence neonatal mortality. Direct causes of neonatal mortality include neonatal sepsis, Preterm birth, asphyxia, and congenital abnormalities. These factors act singly or in combination to cause death. There are other factors such as antenatal, postnatal and intrapartum factors, these are indirect causes of neonatal mortality; which influence neonatal mortality through the direct causes; however some of them may cause mortality directly.

Health system factors such as staff training, lack of delivery kits, immunization facilities, and sensitization of mothers are underlying factors that may pose a barrier to mothers to access adequate and quality antenatal, intrapartum and post natal services. Ministry of health policy issues influence health system factors and in turn have an influence on neonatal health. Policies from the Ministry of health influence neonatal mortality through the health system, it is through the system that intervention measures for improving
neonatal outcome have to be implemented, and therefore wrong policies and non-implementation of the policies will in turn have an impact on neonatal mortality.

Many of the risk factors for neonatal mortality are poor maternal prognostic signs as well; this therefore means that an increase in neonatal mortality could be associated with an increase in maternal mortality as well. Interventions to address neonatal mortality may also reduce maternal mortality. Increased neonatal mortality means MDG-4 will not be achieved and this is an indicator of poor socio economic development.

See Figure 1 below.
Figure 1

MINISTRY OF HEALTH POLICY

HEALTH SYSTEM ACTORS

Immunisation facilities
Access to health facilities
Staffing levels
Health worker communication skills

Delivery materials
Availability of vaccines
Sensitization of mothers

POSTNATAL FACTORS

Resuscitation of newborns
Breast-feeding
Prevention and mgt of hypothermia
Community based pneumonia case mgt
Kangaroo mother care (LBW)
Health seeking behaviour

INTRA PARTUM FACTORS

Antibiotics for premature rupture of membranes
Duration of labour
Detection and mgt of breech
Labour surveillance
Clean delivery practices
Presenting part at delivery
Birth weight
Type of delivery
Maternal fever during labour
Meconium staining of liquor

ANTENATAL FACTORS

TT immunization
Syphilis screening and treatment
Pre-eclampsia & eclampsia prevention
IPT
Detection and treatment of bacteriuria
APH
Maternal anaemia, jaundice
Maternal smoking
ITNs use
Antenatal attendance

PRETERM BIRTH

NEONATAL SEPSIS

ASPHYXIA

ANOMALIES

NEONATAL MORTALITY

17
3.4 Hypothesis

1. Neonatal mortality is high in children whose mothers have maternal characteristics such as lack of formal education, lack of knowledge of danger signs and poor neonatal care practices.

2. Neonatal mortality is high in children where decision to seek treatment is not made by the mother

4.0 Study objectives

4.1 General objective

To establish risk factors for neonatal mortality in Busia district, so as to recommend interventions for the DHT to improve neonatal health.

4.2 Specific objectives

1. To determine the socio-demographic factors influencing neonatal mortality in Busia district

2. To identify neonatal nursing practices that influence neonatal health in Busia district.

3. To identify the maternal health seeking behaviours affecting neonatal mortality in Busia district

4. To compare the household environment in homes where neonatal deaths occurred to those homes where neonatal deaths did not occur.
5.0 Methodology

5.1 Study area

This study was conducted in Busia district. Located in the south-East of Uganda bordered by Kenya in the East and Lake Victoria in the south, the district had 9 sub-counties and 1 Town council. It covered an area of 744 sq. km. This district is one of the underdeveloped and very poor in the country. Most of the people live in rural areas and are subsistence farmers with maize, cassava, millet and sorghum as the main food crops. There was also some small scale retail trade as well as cross border trade with the neighboring Kenyan population. Roads, communications, education and health services were still poor. Most local houses had mud walls and thatched roofs.

Busia district had a population of about 251,571. The majority of the inhabitants were Samia. By June 2004, the district was employing 45% of the expected staff norm of 285. There was no hospital in the district; the population of the district depended on 18 functional health centers, Tororo hospital in the neighbouring district and at times across the border to Kenya for health services.

5.2 Study population

The study population consisted of infants from 4 rural sub-counties: Lunyo, Lumino, Busitema and Buteba. Two sub-counties were randomly selected from each of the two Health Sub Districts that form Busia district. Infants who did or did not survive the neonatal period in the last 1 year prior to time of data collection were identified in every
parish of the selected sub-counties. This was done with the help of Parish Development Committee members (PDCs) in Busia district, mothers attending ANC, Key informants and selected focus groups. Snowball method was also used to identify cases as it was noted that a mother who lost a child most probably knew fellow mothers who had lost theirs as well. Children whose mothers were not of sound mind or not residents of the district by the time of delivery were not selected for the study.

5.3 Study design

This study was an unmatched case-control population based study involving infants delivered within a period of 1 year prior to data collection, in Busia district. The study was comparing factors associated with neonatal mortality in Busia district based on a neonate having survived or not with the aim of improving neonatal health.

A case was a neonate in Busia district who failed to survive the neonatal period in the last 1 year prior to time of data collection and a control was an infant in Busia district who had survived the neonatal period in the last 1 year prior to the time of data collection.

Inclusion criteria

The study included all neonates born in the district and mothers who consented to participate in the study.

Exclusion criteria

The study excluded neonates whose mothers were not of sane mind and those who did not consent for the study. As controls, I excluded from the study babies whose mothers had died.
5.4 Sample size

James Schlessman (1982) states that in case-control studies the number of subjects to be selected in case-control study depends on the specified values below

1. Estimated exposure rate (proportion exposed) among controls = \( P_0 \)

2. A hypothesized relative risk (estimated by odds ratio) associated with exposure that would have sufficient biological/public health importance to warrant its detection, \( R \), which is assumed to be 2.

3. \( Z_\alpha = \) Standard normal value corresponding to the required level of significance for 0.05 = 1.96

4. \( Z_\beta = \) Standard normal value corresponding to required power of study for 80% = 0.84

5. \( n = \) number of the required sample size of the case

6. The desired level of significance for this study \( \alpha \) is 5%

7. The desired power of this study \( \beta \) is 80%

For every case identified, I took 3 controls, because I anticipated not getting very many cases. It was a ratio of 1: 3, cases: controls respectively

Using the formula

\[
n = \frac{(1+1/C) \ P^1 \ Q^1 \ (Z_\alpha + Z_\beta)^2}{(P_1 - P_0)^2}
\]

\[
P^1 = \frac{(P_1 + CP_0)}{(1 + C)}, \text{ but } Q^1 = 1 - P^1
\]

\[
P_1 = P_0 \ R / [1 + P_0 (R - 1)]
\]
C = 3 (the number of controls per case)

P₀ = 46.3% (Interval since last pregnancy < 24 months in a study in Abu Dhabi hospital)

By substituting the figures into the equation;

\[ n = 1.33 \times 0.249 \times 7.84 / 0.067 = 38 \]

So I needed 38 cases and 114 controls for the study

5.5 Sampling procedure

Sampling unit: a sub-county formed the sampling unit

I accurately established the total number of neonatal deaths by validating health units’ records. Considering that many deaths occur outside the health facilities and therefore not recorded, I interviewed women attending antenatal, PDCs, LCs and TBAs if they knew of any mother who lost a neonate. PDCs actually turned out to be resourceful because they had been involved in birth and death registration. Focus Group Discussions were also conducted. A list of 70 cases was generated but I was able to identify 49 cases whose mothers accepted that death occurred in the first month. I followed up these babies who died in the first one month in the period of 1 year prior to data collection, with the guidance of PDCs and area local council officials; I had their mothers interviewed. Controls preferably from the neighboring households were used to cut on the operation costs and time and to control for known and unknown confounding factors related to neighbourhood. Four rural based sub-counties, 2 from each HSD were randomly selected and all the parishes were covered in identifying the cases for this study.
5.6 Study variables

5.6.1 Dependent variable

This was neonatal death. (YES/ NO)

5.6.2 Independent variables

These included; socio-economic and demographic characteristics, detection of sickness and ability to seek for health care, individual neonatal care factors, household environment including accessibility to health care.

Demographic factors

- Mother’s tribe
- Mother’s religion
- Gender of the neonate
- Mother’s educational level
- Mother’s marital status
- Mother’s age
- Birth order
- Birth interval
- Twinning
- Gender of household head
- Household size
- Other deaths in the household in the last 1 year
• Father’s level of education
• Primiparous/ nulliparous women
• Type of delivery; normal, caesarian section, instrument delivery

Socio economic
• Roof type
• Animals kept by the household

Health seeking behavior
• Mother attended antenatal clinic (YES/ NO) how many visits, when was the first visit
• Person attending to the delivery
• Place of birth
• IPT2 administration
• Ability to detect neonatal infection by mother
• Any perceived illness during pregnancy
• Tetanus toxoid immunization in the mother

• Time to reach health facility
• Time to reach shop selling drugs

Environmental factors
• Distance to drinking water supply
• Waste disposal
• Use of soap after visiting toilet, washing the baby
• Latrine
• Parental smoking
- Parental alcohol drinking

5.7 Data collection

5.7.1 Training of research assistants

Research assistants were identified and trained on how to use the various study tools. District health workers (i.e. parish development workers) were recruited as research assistants since they were familiar with the area and fluent in both English and the local languages; they also were actively involved in the birth and death registration.

5.7.2 Tools

Questionnaire, key informant and FGD guides were used to collect both quantitative and qualitative data. Qualitative data was collected in relation to neonatal care practices, detection of the sick neonates, seeking of health care and any hindrances, perception of neonatal deaths in the community and its risk factors. Quantitative data was collected in relation to demographic characteristics, individual neonatal care factors, health seeking behaviour and household factors.

5.7.3 Pre-testing

The questionnaire, key informant and FGD guides were pre-tested prior to data collection for wording, clarity of questions and adequacy of the instruments in addressing the study objectives. Research assistants took part in the pre-testing to ensure hands on training in use of these study tools.
5.8 Data management and analysis

5.8.1 Data management

Prior to analysis, tape recorded information was transcribed and translated into English by a person competent in both English and the local language. The principal investigator cleaned, edited and entered the pre-coded quantitative data into pre-developed data entry screens using Epi Info computer program. Data was regularly backed up in order to minimize loss of information.

5.8.2 Data analysis

Qualitative data analysis involved content analysis. All the transcripts were open coded by the principal investigator. Various codes were then grouped under appropriate sub-themes and themes. Themes were based on the specific study objectives. The master sheet technique was also used. Information has been presented in form of narratives and quotations.

Analysis of the various independent variables was done to produce frequencies using Epi Info. The same software package was used to test for associations between independent and dependent variables. Multivariate analysis was done by SPSS after importing the data set from Epi Info to control for confounding and identify predictors of neonatal mortality.
5.9 Ethical considerations

Permission to conduct the study was obtained from the National Council of Science and Technology. The Makerere University School of Public Health Institutional Review Board reviewed the study. Permission was sought from the district and the local leaders in the study area.

Written informed consent was sought from the respondents after duly explaining the goals and objectives of the study and ensuring that they had properly understood. Access to the data collected was restricted to only those involved in the study, thereby exhibiting confidentiality. The study only involved those participants who consented.

5.10 Dissemination and utilization of the study results

The study findings will be disseminated to Makerere University School of Postgraduate studies, Makerere University School of Public Health Academic staff, Busia District Health team and District Local council and any other interested party. The dissemination will be done through reports and seminars.

The study findings will be used to make recommendations to the DHT to plan and implement feasible/ effective strategies to reduce neonatal mortality.
6.0 RESULTS
A total of 49 cases and 147 controls were recruited into this study.

6.1 Socio-demographic characteristics of respondents
Overall the cases and controls were comparable according to most socio- demographic characteristics assessed except for maternal tribe, the cases were significantly more likely to be Samia than the controls; 73.5% against 53.7% respectively (p= 0.015). Most of the mothers to cases (77.6%) and controls (74.8%) were in the age range 20-34. mean maternal age for cases was 26years (SD=6.4313) while that for controls was 25years (SD=5.7986). Most of the respondents were currently married; 91.8% of the cases and 94.6% of the controls. More than half of the mothers to cases (65.3%) and controls (67.3%) had attained primary education. Majority (73.5%) of mothers to cases and controls (81%) practiced peasant farming. Sixty one point two percent of the fathers to cases (32/49) and 58.5% of the controls (86/147) had attained primary education. Peasant fathers were 69.4% in both cases (34/49) and controls (102/147). Ninety percent of case mothers (44/49) and 84.2% of control mothers (121/147) had had prior delivery experience. Male household headship was 91.8% in cases and 96.6% in controls. Only 94% households (46/49) in which there was a case and 92.5% (136/147) in which there was a control kept some domestic animals. Eighty percent (39/49) of cases and 75% (110/147) of the controls were from houses constructed of mud and wattle.
Table 1: Socio-demographic characteristics of Cases and Controls

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cases (n = 49)</th>
<th>Controls (n = 147)</th>
<th>Total (n=196)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Mother’s age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>6</td>
<td>12.2</td>
<td>25</td>
</tr>
<tr>
<td>20-34</td>
<td>38</td>
<td>77.6</td>
<td>110</td>
</tr>
<tr>
<td>35+</td>
<td>5</td>
<td>10.2</td>
<td>12</td>
</tr>
<tr>
<td>Mother’s tribe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samia</td>
<td>36</td>
<td>73.5</td>
<td>79</td>
</tr>
<tr>
<td>Others ψ</td>
<td>13</td>
<td>26.5</td>
<td>6</td>
</tr>
<tr>
<td>Mother’s marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>45</td>
<td>91.8</td>
<td>139</td>
</tr>
<tr>
<td>Not married</td>
<td>4</td>
<td>8.2</td>
<td>8</td>
</tr>
<tr>
<td>Mother’s Educ level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>14.3</td>
<td>19</td>
</tr>
<tr>
<td>Primary</td>
<td>32</td>
<td>65.3</td>
<td>99</td>
</tr>
<tr>
<td>Post Primary</td>
<td>10</td>
<td>20.4</td>
<td>29</td>
</tr>
<tr>
<td>Mother’s Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peasant farmer</td>
<td>36</td>
<td>73.5</td>
<td>119</td>
</tr>
<tr>
<td>Housewife</td>
<td>8</td>
<td>16.3</td>
<td>20</td>
</tr>
<tr>
<td>Trader</td>
<td>2</td>
<td>4.1</td>
<td>2</td>
</tr>
<tr>
<td>Casual</td>
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<td>2.0</td>
<td>3</td>
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<tr>
<td>labourer</td>
<td>2</td>
<td>4.1</td>
<td>3</td>
</tr>
<tr>
<td>Others ψ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior deliveries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>10.2</td>
<td>26</td>
</tr>
<tr>
<td>1-4</td>
<td>28</td>
<td>57.1</td>
<td>83</td>
</tr>
<tr>
<td>5+</td>
<td>16</td>
<td>32.7</td>
<td>38</td>
</tr>
<tr>
<td>Birth interval</td>
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<td></td>
</tr>
<tr>
<td>0 months</td>
<td>4</td>
<td>8.2</td>
<td>24</td>
</tr>
<tr>
<td>1-12 months</td>
<td>6</td>
<td>12.2</td>
<td>23</td>
</tr>
<tr>
<td>12-24 months</td>
<td>20</td>
<td>40.8</td>
<td>59</td>
</tr>
<tr>
<td>24-72 months</td>
<td>19</td>
<td>38.8</td>
<td>41</td>
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<tr>
<td>Kept animals at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>46</td>
<td>93.9</td>
<td>136</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>6.1</td>
<td>11</td>
</tr>
</tbody>
</table>

ψ Includes Itesot, Ganda, Soga, and Adhola. Φ Includes office workers and teachers.
6.2 Socio-demographic characteristics and neonatal mortality

Neonatal mortality may be influenced by socio-demographic characteristics. In order to identify associations, bivariate analysis was done. Mother’s age, marital status, type of walls and floor were categorized basing on that used in the 2000 UDHS. Mother’s education level was categorized into none, Primary and post primary. Maternal occupation was categorized into peasant farmers and others. Five out of 49 (10.3%) mothers to cases had a non-agriculture related income as compared to 8 out of 147 (5.4%) controls. Forty five out of 49 (91.8%) of cases were from male headed households as compared to 142 out of 147 (96.6%) of the controls.

Results of the bivariate analysis of socio-demographic variables are shown in Table 2. Cases in this study were significantly more likely than controls to have been born by Samia mothers (OR=2.38, 95%CI: 1.11- 5.18). Cases were more likely than controls to have been born premature (OR =3.43, 95% CI: 1.37 – 8.60) The remaining socio-demographic variables of interest, including mother’s age, marital status, mother’s education level, occupation, number of previous deliveries, birth interval and house-hold headship were found not to have statistically significant associations with neonatal mortality.
Table 2: Socio-demographic factors influencing neonatal mortality in Busia District

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cases (n= 49)</th>
<th>Controls (n= 147)</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Mother’s age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 20</td>
<td>11</td>
<td>22.4</td>
<td>39</td>
<td>26.5</td>
</tr>
<tr>
<td>20 years and above</td>
<td>38</td>
<td>77.6</td>
<td>108</td>
<td>73.5</td>
</tr>
<tr>
<td><strong>Mother’s tribe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samia</td>
<td>36</td>
<td>73.5</td>
<td>79</td>
<td>53.7</td>
</tr>
<tr>
<td>Non- Samia</td>
<td>13</td>
<td>26.5</td>
<td>68</td>
<td>46.3</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently married</td>
<td>45</td>
<td>91.8</td>
<td>139</td>
<td>94.6</td>
</tr>
<tr>
<td>Currently not married</td>
<td>4</td>
<td>8.2</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Mother’s educational level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>14.3</td>
<td>19</td>
<td>12.9</td>
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<tr>
<td>Primary</td>
<td>32</td>
<td>65.3</td>
<td>99</td>
<td>67.3</td>
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<tr>
<td>Post primary</td>
<td>10</td>
<td>20.4</td>
<td>29</td>
<td>19.7</td>
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<tr>
<td><strong>Mother’s occupation</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Peasant farmer</td>
<td>44</td>
<td>89.7</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>10.3</td>
<td>139</td>
<td>94.6</td>
</tr>
<tr>
<td><strong>Mother’s prior deliveries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5</td>
<td>10.2</td>
<td>26</td>
<td>17.7</td>
</tr>
<tr>
<td>At least one child</td>
<td>44</td>
<td>89.9</td>
<td>121</td>
<td>82.3</td>
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<tr>
<td><strong>Birth interval</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1-24mths</td>
<td>25</td>
<td>51</td>
<td>78</td>
<td>53.1</td>
</tr>
<tr>
<td>24mths and above</td>
<td>24</td>
<td>49</td>
<td>69</td>
<td>46.9</td>
</tr>
<tr>
<td><strong>Age at birth</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Premature</td>
<td>13</td>
<td>26.5</td>
<td>14</td>
<td>9.5</td>
</tr>
<tr>
<td>Mature</td>
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<td>73.5</td>
<td>133</td>
<td>90.5</td>
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<tr>
<td><strong>Animals kept</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>46</td>
<td>93.9</td>
<td>136</td>
<td>92.5</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>6.1</td>
<td>11</td>
<td>7.5</td>
</tr>
</tbody>
</table>
6.3 Neonatal nursing practices and neonatal mortality

From Table 3 below, Bivariate analysis between nursing practices and neonatal mortality was done and shows the following results;

6.3.1 Delivery surface
Any delivery surface other than a plastic sheet was considered unclean. Over half (57.1%) of the cases were delivered on an unclean surface as compared to 24.5% of the controls. Cases were significantly more likely than controls to have been delivered on an unclean surface (OR= 4.11, 95%CI: 1.98- 8.59).

For Qualitative data, information from the FGDs revealed that a plastic sheet was the most commonly used delivery surface for deliveries that took place in health facilities and at TBAs homes. However, FGDs reported that home deliveries took place on a sack, papyrus mat or just on the ground on old clothes as these are readily available. It was noted that even in the availability of a polythene sheet, at times events unfold quickly giving the mother no chance to prepare.

"I went to a health unit, the nurse told me to take a walk so that I deliver quickly but the pain increased instantly and the baby came out. There was no time for me to use a polythene sheet" (FGD participant- Lunyo Sub County)

6.3.2 Sepsis prevention
Attendants who had not washed their hands as compared to 37.4% of the controls delivered only 67.3% of cases. The cases were statistically more likely than the controls to have been delivered by an attendant who had not washed hands (OR= 3.45, 95% CI: 1.66- 7.25).
Almost two-thirds (63.3%) of the cases were delivered by attendants not wearing gloves as compared to 20.4% of the controls. Cases were significantly more likely than controls to have been delivered by a birth attendant not wearing gloves (OR=6.72, 95%CI: 3.14-14.51).

A new razor blade was used to cut the cord in 79% (38/48) of the cases as compared to 88% (125/142) of the controls. Cases were not significantly different from the controls (OR= 1.90, 95% CI: 0.82- 4.60).

Cord care at home is equally important in the prevention of neonatal infection. Cases (17/49) were statistically more likely than the controls (3/147) not to have had their cords cleaned at home (OR=25.56, 95%CI: 6.48-117.05). Umbilical cord was washed with soap and water in 49% (24/25) of the cases as compared to 55.8% (82/147) of the controls, no significant association was noted (OR= 0.76, 95% CI: 0.38- 1.53). Cases(42/49) were significantly more likely than controls(98/147) to have had their cords not cleaned using salty water (OR=3.00, 95%CI: 1.18-7.92).

In relation to material used to tie the cord, cases were not significantly different from the controls (OR= 0.92, 95% CI: 0.46-1.85). Other variables considered such as breast feeding practices were all found to be not statistically significant (OR= 1.57, 95% CI 0.77- 3.21).

There was general consensus in all FGDs that in Health units and TBAs places, the birth attendants always wore gloves when conducting the delivery and cutting the cord. To confirm this, one participant stated that:
"We find it convenient to deliver at TBAs places because they care for us well and they have gloves just like in the health units" (FGD- Nagabita parish).

In contrast, deliveries that occur at home are attended to by relatives and at times mothers deliver on their own, so practically a mother delivering on her own cannot wear gloves. All FGDs reported hand washing with soap and water in all deliveries that took place in health units, this contrasted deliveries at home where relatives didn’t wash hands or at times some mothers delivered on their own without assistance and under such circumstances it was hard to wash hands.

In all FGDs, mothers reported use of a new razor blade to cut the umbilical cord. However, some due to cultural beliefs use a dry reed or sugar cane peelings.

"A dry reed was used to cut the cord as per instructions from my mother in law" (FGD participant – Lunyo sub county).

Almost all FGDs reported using baby powder on the baby’s cords at home. However due to cultural beliefs still, other substances such as lizard droppings, ash and herbs were applied on the cord.

"I used to put lizard droppings on the cord because I was told it breaks off the cord quickly" (FGD participant- Lumino sub county).

6.3.3 Hypothermia
Hypothermia is one of the factors contributing to neonatal mortality. Forty out of 49 cases (81.6%) as compared to 76/147 (51.7%) controls did not dress their babies in heavy clothes to avoid hypothermia in addition to covering with bed sheets and blankets. Cases were significantly more likely than controls not to have used heavy clothes to prevent hypothermia in their babies. (OR=4.15, 95%CI: 1.78- 9.95). The use of blankets and bed
sheets separately was found to be not statistically significant (OR=1.34, CI: 0.65- 2.73, OR= 1.12, CI: 0.56- 2.24) respectively.

In all FGDs, it was agreed that babies are kept in-doors until the umbilical stump has healed. They reported keeping the babies in bed covered with blankets and bed sheets.

"I also make sure my baby is covered in heavy clothes and an apron to avoid getting cold" (FGD- participant Lumino)
Table 3: Association between neonatal nursing practices and neonatal Mortality

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Cases (n = 49)</th>
<th>Controls (n = 147)</th>
<th>OR</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Delivery surface</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclean</td>
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<td>57.1</td>
<td>36</td>
<td>24.5</td>
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<tr>
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<td>Cord care at home</td>
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* Statistically significant
6.4 Maternal health seeking behaviour and neonatal mortality

It was of interest to test for associations between maternal health seeking behaviour and neonatal mortality. Table 4 below shows the association between various health seeking variables and neonatal mortality. Place of delivery and nature of birth attendant were the only variables that were found statistically significant. Cases were significantly more likely than controls to have delivered outside a health facility (OR=2.4, 95%CI: 1.21-4.65). Cases were statistically more likely than controls to have been delivered by an unskilled birth attendant (OR=2.51, 95%CI: 1.28-4.92).

Fifty seven percent (28/49) of the mothers to cases and 57.1% (84/147) mothers to controls made the final decision to seek health in case of baby’s sickness. Just more than half (55.1%) of cases were from mothers who received less than 2 TT doses as compared to 42.9% of the controls. Majority of cases (61.2%) were from mothers who received IPT2 as compared to 70.1% of the controls. Majority of cases (67.3%) were from mothers who attended less than 4 ANC visits as compared to 51.7% controls.

These findings were found to be in line with the Qualitative data. All FGDs reported antenatal attendance of less than 4 times, reported that majority of deliveries occurred outside health facilities and that they were attended to by unskilled people or at times no assistance at all during the delivery process. Some of the reasons given for not attending ANC 4 times were health workers not being kind as compared to TBAs and that the most important thing is to establish whether the baby was growing well.

"The most important thing is for to know whether the baby is in the right position in the abdomen, after that then I know I can deliver well” (FGD participant- Busitema)
Table 4: Maternal Health seeking Behaviour and Neonatal mortality

<table>
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<tr>
<th>Characteristics</th>
<th>Cases (n = 49)</th>
<th>Controls (n = 147)</th>
<th>OR</th>
<th>(95% CI)</th>
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<td>%</td>
<td>n</td>
<td>%</td>
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* Statistically significant
6.5 Household environment and neonatal mortality

Table 5: Association between household environment and neonatal mortality

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<th>Characteristics</th>
<th>Cases (n = 49)</th>
<th></th>
<th>Cases (n =147)</th>
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<th>OR</th>
<th>(95% CI)</th>
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<td>%</td>
<td>n</td>
<td>%</td>
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<td>(0.60-2.90)</td>
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<td>110</td>
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<td>(0.54-2.50)</td>
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<td>35</td>
<td>71.4</td>
<td>109</td>
<td>74.1</td>
<td>0.87</td>
<td>(0.42-1.79)</td>
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Table 5 above displays the relationship between household environment and neonatal mortality. All the variables were not statistically significant.
Table 6: Stratified analysis  Crude OR = 1.00, 95% CI 0.49-2.02

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<th>Potential confounders</th>
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<th>CI</th>
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<td>22 49</td>
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<td>0.7 - 6.18</td>
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<td>14 30</td>
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<td>Non Samia</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Not mother</td>
<td>15 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mother</td>
<td>6 38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skilled</td>
<td></td>
<td>3.80</td>
<td>1.30 -11.11</td>
</tr>
</tbody>
</table>

$\Psi$ Combined Odds ratios
**Multivariate analysis**

Backward stepwise log likelihood ratio was used to control for confounding. All the risk factors identified during bivariate analysis, all plausible factors and potential confounders for neonatal mortality were entered into a model.

\[
\text{Logit } P(Y) = \alpha + \beta_1 (\text{Mother's age}) \\
+ \beta_2 (\text{Mother's tribe}) \\
+ \beta_3 (\text{Mother's Educational level}) \\
+ \beta_4 (\text{Birth Interval}) \\
+ \beta_5 (\text{Unclean delivery surface}) \\
+ \beta_6 (\text{Gestational age at birth}) \\
+ \beta_7 (\text{Birth attendant wore gloves}) \\
+ \beta_8 (\text{Birth attendant washed hands}) \\
+ \beta_9 (\text{Washed cord with salty water}) \\
+ \beta_{10} (\text{Cord not washed}) \\
+ \beta_{11} (\text{Clothing the baby}) \\
+ \beta_{12} (\text{Unskilled birth attendant}) \\
+ \beta_{13} (\text{Decision to seek treatment made by Mother or not})
\]

Where

Logit \( P(Y) \) is the probability of being a neonatal mortality case that is explained by the variables in the model.

\( \alpha \) is the \( Y \) intercept .

\( \beta \) is the coefficient estimate of the exposure or potential confounder variables in the model.
Table 7 below displays results of the best fitting model. After a log likelihood ratio test, all the 196 respondents were included in the analysis. Overall, 87.8% of the dependent variable was correctly predicted by the variables in the model with a specificity of 93.2% and sensitivity of 71.4%. The -2log-likelihood was 220.435, and the Negelkerke R square was 66.1%. The Hosmer and Lemeshow test revealed a non-significant chi-square (chi-square $\chi^2= 2.45$; df = 8; p-value = 0.964).

After adjusting for confounding and testing for effect modification, the variables that remained significantly associated with neonatal mortality included: Mother's tribe, (OR=7.45, 95% CI: 2.272- 24.40). Delivery surface (OR= 3.85, 95%CI: 1.28 – 11.58). Gestational age (OR=8.31, 95%CI: 1.77 -39.10). Gloves usage (OR= 18.09, 95% CI: 5.08 – 64.45). Not cleaning cord at home (OR=161.30, 95%CI: 23.80 -1093.30). Hypothermia (OR=6.08, 95%CI 1.77 – 20.90). Birth attendant (OR=28.45, 95% CI: 1.23-660.80). Delivery place was found not statistically significant (OR = 0.045, 95% CI 0.002 - 1.03)

Following multiple linear regression, collinearity problem was identified in only 2 variables namely: place of delivery and nature of birth attendant. These variables had tolerance values less than 0.1 (Menard 1995). Myers (1990) also suggests that a VIF (variance inflation factor) value greater than 10 is cause for concern, and these two variables had 13.6 and 13.8 respectively. These variables still had very high variance proportions of 91 and 93% respectively on a very small Eigenvalue 0.018; this is also an indication of collinearity. On this basis of collinearity, I removed the variable place of delivery from the model.
Table 7: Results of the best fitting model for risk factors for neonatal mortality

<table>
<thead>
<tr>
<th>Variable</th>
<th>coefficient</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s tribe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samia</td>
<td>2.008</td>
<td>7.45</td>
<td>2.27- 24.40</td>
<td>0.001*</td>
</tr>
<tr>
<td>Non- Samia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclean</td>
<td>1.349</td>
<td>3.85</td>
<td>1.28 - 11.58</td>
<td>0.016*</td>
</tr>
<tr>
<td>Clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby’s age at birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm</td>
<td>2.117</td>
<td>8.31</td>
<td>1.77- 39.10</td>
<td>0.007*</td>
</tr>
<tr>
<td>Term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendant used gloves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2.895</td>
<td>18.09</td>
<td>5.08 – 64.45</td>
<td>0.001*</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cord care at home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t clean</td>
<td>5.083</td>
<td>161.30</td>
<td>23.80-1093.34</td>
<td>0.001*</td>
</tr>
<tr>
<td>Cleaned</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding hypothermia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Clothing</td>
<td>1.805</td>
<td>6.08</td>
<td>1.77 – 20.90</td>
<td>0.004*</td>
</tr>
<tr>
<td>Clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baby</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth attendant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled</td>
<td>3.348</td>
<td>28.45</td>
<td>1.22- 660.80</td>
<td>0.037*</td>
</tr>
<tr>
<td>Skilled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant
Table 8 shows the unadjusted and the corresponding adjusted odds ratios that were retained in the final model. All the odds ratios were statistically significant except delivery place which turned out to be statistically insignificant. This therefore means that the model was able adjust for confounding in this variable.

Table 8: Comparison of the unadjusted with the adjusted Odds Ratios

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unadjusted OR</th>
<th>95% CI</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother's tribe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samia</td>
<td>2.38</td>
<td>1.11-5.18*</td>
<td>7.45</td>
<td>2.27-24.40*</td>
</tr>
<tr>
<td>Non-Samia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclean</td>
<td>4.11</td>
<td>1.98-8.59</td>
<td>3.85</td>
<td>0.086-0.78*</td>
</tr>
<tr>
<td>Clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby’s age at birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm</td>
<td>3.43</td>
<td>1.37-8.60*</td>
<td>8.31</td>
<td>1.77-39.10*</td>
</tr>
<tr>
<td>Term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendant used Gloves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>6.72</td>
<td>3.14-14.51</td>
<td>18.09</td>
<td>5.08-64.45</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cord care at home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t clean</td>
<td>25.50</td>
<td>6.48-117.05*</td>
<td>161.3</td>
<td>23.8-093.3*</td>
</tr>
<tr>
<td>Cleaned</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding hypothermia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Clothing</td>
<td>4.15</td>
<td>1.78-9.95*</td>
<td>6.08</td>
<td>1.77-20.90*</td>
</tr>
<tr>
<td>Clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth attendant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled</td>
<td>2.51</td>
<td>1.28-4.92*</td>
<td>28.45</td>
<td>1.22-660.80*</td>
</tr>
<tr>
<td>Skilled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant
7.0 Discussion
This study was designed to determine the risk factors for neonatal mortality in Busia district. The factors considered were socio-demographic, health seeking behaviour, neonatal care practices and household environment as further elaborated below.

7.1 Risk factors for neonatal mortality
The risk factors that were found to be significantly associated with neonatal mortality in this study included Mother’s tribe, delivery surface, Baby’s age at birth, use of gloves during delivery, cord care while at home, Hypothermia, nature of birth attendant and delivery place.

Mother’s tribe
Babies born by Samia mothers were more likely to die in the neonatal period than those whose mothers were not Samias.

Sepsis prevention
Neonatal septicemia is one of the main causes of neonatal mortality. A number of factors that contribute to it include unclean delivery surface, unsterile delivery kits and unhygienic care for the cord. In this study, an unclean delivery surface, non use of gloves by attendants while conducting deliveries and failure to clean babies’ cords at home were associated with an increased neonatal mortality rate.

All these findings are in line with previous studies on the same subject. Bang AT et al (1999), in their study of effect of home based neonatal care and management of sepsis on neonatal mortality: demonstrated that neonatal sepsis caused neonatal deaths and case
fatality declined from 16.6% before treatment to 2.8% after treatment by village health workers (p< 0.01)

Armida et al (2003), in their study about urban slum- specific issues in neonatal survival, point out late recognition of neonatal illnesses and delay in seeking medical help as factors responsible for increased neonatal mortality. The World Health Report 2005 attributes neonatal mortality to among others: neonatal sepsis; infection, diarrhea and tetanus. So prevention of sepsis through clean delivery practices can greatly reduce neonatal mortality.

Manandhar et al (2004), in their study of effect of a participatory intervention with women’s groups on birth outcomes in Nepal, Women in the intervention clusters were more likely than those in the control clusters to have had antenatal care, to have taken haematinic supplements, to have given birth at a health facility with a trained attendant, to have used a clean home delivery kit or a boiled blade to cut umbilical cord and for the birth attendant to have washed her hands. In event of illness, women in the intervention groups were more likely to have visited a health facility. And in the end, infection related neonatal deaths were less frequent in intervention clusters.

**Birth attendant**

The World Health Organisation recommends that all deliveries should be conducted by a skilled health worker because timely life saving decisions and actions are taken. This study was able to demonstrate that delivery by unskilled birth attendants resulted into more neonatal deaths than the skilled ones. This is in line with the World Health report 2005, which mentions asphyxia, birth trauma and sepsis as some of the leading causes of
neonatal mortality. This therefore means a skilled birth attendant is better placed to practice aseptic techniques while conducting a delivery, has knowledge to handle asphyxia, can adequately assess a pelvis to minimize birth trauma and can refer a mother for surgical delivery when necessary.

Hypothermia and prematurity

Hypothermia and prematurity are some of the factors contributing to neonatal mortality. This study demonstrated both these factors as contributory to neonatal mortality, a finding which is in agreement with the world health report 2005, Lawn et al 2005.

Al- Hosani et al, (2003); in their study of mortality risk factors in children under 5 years in Abu Dhabi, information was collected on selected biological and obstetric risk factors in addition to sociocultural and economic factors. Biological risk factors were parental age, gravidity, parity, birth order, birth weight, and birth interval, duration of gestation, history of fetal death, and history of deaths among siblings and health of baby at birth. Socio-cultural and economic data included paternal education, maternal occupation, monthly income and crowding index. They found significant association of neonatal mortality with young maternal age, first pregnancy, first birth or delivery, low birth weight, < 24 months interval since last pregnancy, preterm birth, and history of previous death among siblings and ill health at the time of birth. Lack of formal maternal education and relatively low income also had significant association with neonatal mortality. In this study, all of these factors were found not statistically significant except prematurity.
7.2 Study Limitations

This study was not based on Incident cases; therefore, there was a problem of recall bias. It is possible mothers who lost their babies were in position to recall even very trivial incidents during and after pregnancy than their counter parts who did not lose their babies. Inherent in this study was the problem of clearly coming up with the sampling frame. For various reasons, it was not easy to be certain that the sampling frame I came up with was exhaustive of all the neonates who could have died in the period in question for this study. It is possible for some people to emigrate and hence fail to capture them.
8.0 Conclusions and recommendations

8.1 Conclusions
8.1.1. All socio-demographic factors in this study were comparable between cases and controls except prematurity, which was predominantly among cases and babies born to Samia mothers that were found to be associated with high neonatal mortality.

8.1.2. In Busia district, poor neonatal care practices such as conducting delivery on unclean delivery surface, non-use of Gloves during delivery by birth attendants, not cleaning cord at home and poor control of hypothermia were found to be associated with high neonatal mortality.

8.1.3. Poor health seeking behaviour such as delivery outside health units and delivery by unskilled attendants were found to be associated with high neonatal mortality.

8.1.4. All household factors considered in this study were found not to be associated with neonatal mortality in Busia district.

8.2 Recommendation

8.2.1. The DHO Busia should prioritize research to identify factors leading to high prevalence of prematurity in the district and factors associating Samia mothers with high neonatal mortality than the other ethnic groups.

8.2.2. The Busia DHT should sensitize the community about good neonatal care practices with emphasis on hygienic care of the cord, delivery on clean surfaces and general clean delivery practices during and after labour.

8.2.3. Since a big percentage of pregnant women attend ANC, the DHO and midwives should devise incentives to encourage mothers to deliver in health units.

8.2.4. The DHT should continue sensitizing the community about the importance and dangers associated with a poor household environment.
REFERENCES


Lawn JE, Cousins SN, Bhutta ZA et al. Why are 4 million newborn babies dying each year? Lancet 2004; 364: 399-401


Promoting Quality Maternal and Newborn Care: A reference manual for program managers. Cooperative Assistance and Relief Everywhere, Inc. (CARE) 1998

Rudolf Knippenberg, Lawn JE, Darmstadt GL et al. Systemic scaling up of neonatal care in countries. www.thelancet.com published on line March 3, 2005

The Uganda Demographic and Health Survey 2000-2001

ANNEXES

Annex I: Focus group discussion guide and consent form
FGD Identification No. ....... Sub-county ......... District .........

Part I: Consent Form
Good morning/afternoon to you all. I welcome you to this group discussion and thank you for coming.

I am (name of interviewer) .................................................. from the office of the District Director of Health Services Busia. I together with my colleague(s) are conducting a study on neonatal mortality in Busia. The purpose of this study is to look for possible reasons why some babies die in the neonatal period and other do not. We are here to learn from you and gather information about you. My job is to direct the discussion so that you will have a chance to speak your mind.

Let me take this opportunity to introduce Mr/Miss ........................................... She/he will be taking notes and I beg for your permission to let her tape record your comments so that we can be sure that everyone’s opinion is correctly noted. All information collected will be treated confidentially. No one except the research team will hear these comments. The information that you give us will be used by the District health officials together with Ministry of Health to implement interventions that will reduce neonatal deaths from Busia.

We are requesting you to participate in this study. Your participation is entirely voluntary and you are free to withdraw from this study at any time without penalty. You are free to ask questions about this study or what I have just talked to you about.

Please do sign this form if you have accepted to participate in this study.

Thank you for your valuable time.

Signature (or thumbprint) of Respondents:

1) .................................... 5) .................................... 9) ....................................
2) .................................... 6) .................................... 10) ....................................
3) .................................... 7) .................................... 11) ....................................
4) .................................... 8) .................................... 12) ....................................

Signature of interviewer: ........................................ Date: ............................

52
Before we begin there are a few rules for this discussion.

1. Say what is true for you, whether positive or negative. Feel free to speak to your experience and beliefs.
2. Speak one at a time and speak loud enough for all of us to hear what you are saying.
3. Avoid side conversations with the person next to you. Every one should hear your comments.
4. There is no right or wrong answers. I am looking for different points of view. So if you change your mind during the discussion, do let us all know.
5. I need to hear from everyone, though you do not have to answer every question. Try to speak when I call your name. All of you are equally important in this discussion.

Before we begin, does anyone have any questions?

Annex II Questions.

I HEALTH SEEKING BEHAVIOUR:

I would like to begin our discussion with your views/opinions on child delivery and cord care of the baby.

1. How do you pregnant women prepare for child delivery in your community?

Probe for:
- ANC attendance: where, frequency
- Tetanus toxoid vaccination: number of doses, source
- IPT administration
- Ability of mothers to recognize sickness while pregnant and action taken
- Materials that they purchase in preparation for delivery (e.g. mama kits: cost, contents)

2. Where do most of you deliver from?

Probe for:
- Health facilities (government or private)
- Home deliveries
- Traditional birth attendants
• Ability to detect neonatal illnesses and action taken. Establish the order in which they seek treatment, and who normally has decides
• Probe for knowledge of prematurity and LBW and how they manage them in the community

3. What prompts mothers on the choice of a delivery place?

4. What does a pregnant woman do when she goes into labour?

II NEONATAL CARE PRACTICES

Probe for:
• What mothers do to keep their neonates warm
• When do they initiate Breastfeeding
• Recognition of neonatal infections
• Materials used to clean the cord
• How often do you clean the cord
• Do you wet the cord when bathing the baby
• Do you wash your hands before touching the baby
• What substances do you apply on the baby’s cord, how often do you apply them
• Why do you apply these substances

5. Can you describe what happens during the delivery process for those mothers that have home deliveries?
• Whether mother delivers inside or outside house
• Nature of delivery surface
• Who assists the mother during delivery
• Does the birth attendant wash hands with soap and water?
• Does she wear gloves?
• What is used to tie the cord
• What instrument is used to cut the cord
• How is the cutting instrument cleaned to maintain cleanliness
• What do you apply on the cut cord and for what purpose

6. What are the cultural beliefs and customs related to child delivery and cord care that you are aware of?

IV. NEONATAL DEATHS

Let us talk about deaths

11. What are some of the causes of neonatal deaths?

12. What can be done to protect newborn babies from these deaths?

Probe for:

• Role of tetanus toxoid immunization to pregnant women
• Use of clean cord cutting instruments and cord ties/ligatures
• Use of clean delivery surface

13. In your opinion is it a big problem in our community?

Probe for:

• If any one has lost a child in your community in the neonatal period in the last 1 year?
Annex III  Questionnaire for study on Neonatal mortality risk factors in Busia District

Part I:  Consent Form

Good morning/afternoon madam/sir.

I am [name of interviewer] -----------------------------------------from the office of the District Director of Health Services,------------------------ I together with my colleague(s) are conducting a study on neonatal mortality in Busia. The purpose of this study is to look for possible reasons why some babies die in the first 28 days of life and others do not. Mothers to children who died and those who did not die are being interviewed. The interview lasts approximately 30 minutes and you will be questioned about your pregnancy, delivery and cord care practices for your child. Information collected will be treated confidentially and an anonymous indicator will be used instead of participant's name. The information that you give us will be used by the District Health officials together with Ministry of Health to implement interventions that will reduce neonatal mortality in Busia.

We are requesting you to participate in this study. Your participation is entirely voluntary and you are free to withdraw from this study at any time without penalty. You are free to ask questions about this study or what I have just talked to you about.

Please do sign this form if you have accepted to participate in this study.

Thank you for your valuable time.

Signature (or thumbprint) of Respondent:…………………………………………

Signature of Interviewer:…………………………………………

Signature of the witness:…………………………………………

Date:…………………………………………
PART II

QUESTIONNAIRE FOR STUDY ON RISK FACTORS OF NEONATAL MORTALITY IN BUSIA DISTRICT

IDENTIFICATION NO: ..................................................
SUB-COUNTY: ........................................................
PARISH: .................................................................
LC.I: .................................................................
DATE: .................................................................
NAME OF INTERVIEWER: .........................................

1. How old are you (specify age in years) ..................................................

2. What is your tribe: ..................................................... ( )
   1. Samia
   2. Itesot
   3. Adhola
   4. Soga
   88. Other (specify) ..................................................

3. What is your marital status: ..................................................... ( )
   1. Married/living with spouse
   2. Single
   3. Separated/divorced
   4. Widow

4. What is the highest level of education that you have attained? ..................

5. What is the highest level of education that your husband attained? ..............

6. What is your occupation? ......................................................... ( )
   1. Peasant farmer
   2. Housewife
   3. Market vendor/trader
   4. Casual labourer
   88. Other (specify) ..................................................

7. What is your husband’s occupation? ................................................... ( )
   1. Peasant farmer
   2. Casual labourer
   3. Office worker
   4. Market vendor/trader
   88. Other (specify) ..................................................
99. Unknown

8. How many other deliveries have you had?..............................(if none go to Q.11)

9. Did any of these children die within 28 days of life?
   1. Yes
   2. No
   99. Unknown

10. At the time of delivering, how old was the child that this baby immediately
    follows?.....................

11. What is the Gender of household head?
    1. Male
    2. Female

12. Do you keep any domestic animals in this homestead?
    1. Goats
    2. Cattle
    3. Pigs
    4. Dogs
    5. Cats
    6. Chicken
    88. Other (specify)..........................
    10. Nil

13. Checklist for nature of house:
    PLEASE TICK OFF THE CORRECT OBSERVATION IN THE RIGHT COLUMN

   13a Nature of walls
    1. Mud and wattle
    2. Smeared with cow dung
    3. Cement
    4. White washed/painted

   13b Nature of Floor
    1. Mud
    2. Smeared with cow dung
    3. Cement
    88. Other (specify).....................

NEONATAL CARE PRACTICES

14. On what surface was the baby delivered:
    1. Cloth
    2. Plastic sheet
3. Uncovered table
4. Uncovered floor
5. Outside the house on the ground
88. Other (specify) ..................
99. Unknown

15. Do you remember looking at your baby immediately after birth?
   1. YES
   2. NO

16. Do you remember the colour of your baby at birth?
   1. Normal colour
   2. Bluish
   3. Yellowish
   99. Cannot remember

17. How long did it take your baby to cry immediately after birth?
   1. Immediately
   2. After the attendant stimulating it
   88. Other ... (Specify)

18. Did you notice any abnormality on your Baby?
   1. YES (Specify) ..............................
   2. NO

19. Did you deliver the baby at the time you expected?
   1. Yes, the baby was full term
   2. No, the baby was preterm
   99. Do not know

20. Did the birth attendant wash hands prior to delivery and cutting cord? ( )
   1. Yes
   2. No
   99. Do not know

21. What did the birth attendant use to wash hands? ( )
   1. Soap and water
   2. Plain water
   88. Other (specify) ..................
   99. Do not remember

22. Did the birth attendant wear sterile gloves while cutting cord? ( )
   1. Yes
   2. No
   99. Do not remember

23. What was used to cut the baby’s cord? ( )

59
1. New razor blade
2. Knife
3. Scissors
88. Other (specify) ......................
99. Unknown

24. What was the cord tied with? ( )
   1. Piece of cloth
   2. Gauze
   3. Thread
   4. Banana fiber
   5. Sisal
   88. Other (specify) ......................
   99. Unknown

25. What substances were applied on the cord after cutting it? ( )
   1. Surgical spirit
   2. Ash
   3. Herbs (specify) ......................
   4. Cow dung
   5. Lizard droppings
   6. Medicine (if known specify) ........
   88. Other (specify) ......................
   99. Unknown
   10. None

26. How did you clean the baby's cord at home? ( )
   1. Washed with soap and water
   2. Washed with salty water
   3. Washed with plain water only
   4. Antiseptics (specify) ..................
   99. Do not remember
   10. None

27. What substances did you apply on baby's cord during the first 2 weeks of life? ( )
   1. Salty water
   2. Medicated spirit/alcohol
   3. Baby powder
   4. Medicine (if known specify) .........
   5. Herbs (if known specify) ............
   6. Cow dung
   7. Lizard droppings
   88. Other (specify) ......................
   10. None (go to Q.)

28. How often did you apply that substance? ..................
29. Why do you apply these substances? (WRITE ALL GIVEN ANSWERS)

30. How long did you take to start Breast-feeding the baby following delivery?
   1. Immediately
   2. After 2 hours
   3. 3-5 hours

31. If the mother did not initiate Breast-feeding immediately, what was the reason for this delay?

32. What other foods/drinks did you give your Baby within the First month?

33. Describe how you were able to ensure that your child did not feel cold?

34. How do you tell that your newly born baby is sick ie danger signs? (Can tick more than 1)
   1. Not breathing
   2. Skin colour is yellow
   3. Skin colour, palm, soles of feet are Blue (Hypothermia)
   4. Unable to suck
   5. Rigidity
   6. Diarrhoea/ constipation
   7. Red swollen Eyes with discharge
   8. Redness and discharge around the cord

HEALTH SEEKING BEHAVIOUR
35. Describe what immediate actions you take upon knowing that your child is sick?
   1.
   2.
   3.
   4.
   (All the steps taken to be recorded in their order of occurrence)

36. After noticing that the Child is sick and needs treatment, who makes the final decision to seek treatment?
1. Child’s father  
2. Child’s mother  
3. Father in law  
4. Mother in law  
88. Other (specify)

37. Did you attend antenatal clinic during this pregnancy?  
1. Yes  
2. No (go to 39)

38. How many ANC visits did you have during that pregnancy?  
1. One  
2. Two  
3. Three  
4. Four  
5. More than 4  
99. Do not remember  
10. None

39. How many doses of TT did you receive during this pregnancy?  
1. 1 dose  
2. 2 doses  
3. More than 2 doses  
10. Nil

40. How many doses of IPT did you receive during this pregnancy?  
1. 1 dose  
2. 2 doses  
3. More than 2 doses  
10. Nil

41. How many TT doses did you receive prior to this pregnancy? Probe for TT doses received while in school or during the mass TT immunization campaign

42. Where was this child delivered?  
1. Hospital  
2. Health centre  
3. Home  
4. Traditional birth attendant’s place  
8. Other (specify)........................

43. Who delivered the child?  
1. Doctor  
2. Nurse/midwife  
3. Friend/relative  
4. TBA  
88. Other (specify)........................

44. In the Delivery process, did you experience any problems?
1. YES
2. NO (skip to Qn 46)
99. DO NOT REMEMBER

45. If yes, what were the problems?

46. At the time of delivering, do you think the pregnancy was due (full term)?
1. YES
2. NO
99. DO NOT REMEMBER

47. Is this baby still alive?
1. YES
2. NO

48. If NO, did the death occur in the neonatal period?
1. YES
2. NO

49. Did you notice any sickness during this pregnancy?
1. YES
2. NO

50. If yes, what was this sickness?

51. How did you treat this sickness?

52. How long does it take you to reach the nearest health unit?

53. How long does it take you to reach a nearest drug shop?

ENVIRONMENT

54. What is the source of your household Water?
1. Pump
2. Well
3. Tap
88. Other........ (Specify)

55. How do you dispose off your household wastes?
1. Pit
2. Burning
3. Farmland
4. Throw anywhere
88. Other ................. (Specify)

56. Do you have a latrine? (Interviewer to check)
   1. YES
   2. NO
57. Does the latrine have a hand washing facility?
   1. YES
   2. NO
58. Do you have a drying rack for utensils?
   1. YES
   2. NO

THANK YOU SO MUCH FOR YOUR TIME