

Thesis for doctoral degree (Ph.D.)
2009

Care of The Newborn in Uganda

Studies of the use of simple affordable effective interventions



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The cover picture shows a postpartum mother practicing Skin to Skin contact. The back picture depicts a traditional birth attendant homestead where deliveries are conducted.

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“We must accept finite disappointment, but we must never lose infinite hope.”
Martin Luther King Jr.

ABSTRACT

Background: There are evidence based cost effective interventions available, which could decrease neonatal mortality, if scaled up and delivered under ideal conditions.

Aim: To determine the causes of perinatal deaths, risk factors for neonatal hypothermia and explore the acceptability and feasibility of recommended perinatal practices in hospital and community settings in Uganda.

Settings: St. Raphael of St. Francis Hospital, Nsambya in Kampala and rural villages in Ntungamo, Kayunga and Soroti district.

Methods: The study period was from 1997-2008. A data form with a checklist and structured written questionnaires were used to collect data for studies I, II, III. 235 hospital records of women who had experienced a perinatal death in study I were reviewed. A perinatal audit and feedback was also conducted in study I. In studies II and III, 300 babies and 249 babies were recruited, and rectal and tympanic temperature measurements were performed on babies at specific time points post delivery in both studies. Babies of mothers in study III were randomized to receive early bathing after 1 hour or no bathing. Purposive sampling was done and Focus group discussions conducted in studies IV and V. In addition six in depth interviews were performed for selected respondents in study V. Uni-, bi- and multi-variable analyses were carried out, using Epi info and Stata 10 for studies I, II and III, and content analysis for studies IV and V.

Findings A high perinatal mortality was noted in the hospital at 68.3 per 1000 total births. The still birth rate was 40.9 per 1000 total births, and the early neonatal death rate was 29.3 per 1000 live births in study I. In study II the proportions of hypothermic newborns at 10, 30, 60 and 90 minutes were 29%, 82%, 83%, and 79 %, respectively. Babies who had not been bathed were associated with an odds reduction of experiencing hypothermia of 68% at 70 minutes (OR 0.32; 95% CI 0.17-0.60) and 63% at 90 minutes post delivery (OR 0.37; 95% CI 0.20-0.67) compared to bathed babies in study III. The odds of being exposed to hypothermia for a baby weighing less than 2500 grams was five times greater compared to a baby with a birth weight of more than 2500grams over the different time points. The odds of being exposed to hypothermia if a baby was female increased more than 1.5 times at the different time points. This gender difference was also observed at 90 minutes in study III. Some of the recommended newborn practices were deemed to conflict with traditional and cultural practices. It was noted that promotion of delayed bathing and dry cord were unlikely to be accepted without local adaptation. In studies IV and V, cultural and spiritual beliefs were attached to the use of local herbs for bathing or smearing of the baby's skin. Traditional birth attendants reportedly did engage in a number of positive practices when caring for newborn babies, which were in agreement with biomedical recommendations, including thermo-protection of the newborn, early referrals to the health units and advising mothers to take the newborns for immunization in study V.

Conclusion: There was a high perinatal mortality rate at the hospital. Thermo-protective guidelines were not being practiced well, and the prevalence of hypothermia was high. Bathing of babies within the first hour of life is associated with an increased risk of hypothermia. It may be necessary to modify some of the recommended evidence based practices, before they are accepted at community level.

Key words: neonatal mortality, newborn, hypothermia, skin to skin, Uganda.

LIST OF PUBLICATIONS

- I. **Byaruhanga R.N.** Improving healthcare by Perinatal mortality audit and feedback. *Tropical Doctor* 2000;30: 94-97
- II. **Byaruhanga R,** Bergström A, Okong P. Neonatal Hypothermia: Prevalence and Risk Factors. *Journal of Tropical Pediatrics* 2005; 51:212-215
- III. Bergström A, **Byaruhanga R,** Okong P. The impact of newborn bathing on the prevalence of neonatal hypothermia in Uganda: A randomized, controlled trial. *Acta Paediatrica* 2005; 94:1-6
- IV. **Byaruhanga R.N,** Bergström A , Tibemanya A, Nakitto C, Okong P. Perceptions among post delivery mothers of skin to skin contact and newborn care in a periurban hospital in Kampala. *Midwifery*, 2008; 24:183-189
- V. **Byaruhanga R.N,** Nsungwa S J, Kiguli J , Balyeku A, Nsabagasani X, Peterson S. Hurdles and Opportunities of Newborn Care in Rural Uganda. Submitted 2009

The papers will be referred to by their Roman numbers I-V

CONTENTS

1	Introduction	1
1.1	Perinatal mortality	1
1.2	Causes of newborn deaths.....	2
1.3	Strategies to reduce newborn deaths.....	2
1.4	Simple Effective interventions.....	4
1.4.1	Thermo protective practices.....	4
1.5	Gender issues and newborn care.....	5
2	Enhancing newborn survival.....	6
2.1	Health system: goals and function	6
2.2	Quality of health care	6
2.3	Audit	7
2.4	Behaviour change models	8
2.5	Emic and Etic views	9
2.6	Uganda demographic and socio-economic context.....	10
2.6.1	The Uganda health care system	11
2.6.2	Specific policies along the continuum of care	13
3	Rationale for studies.....	14
4	Aim and objectives.....	15
4.1	General aim.....	15
4.2	Specific objectives.....	15
5	Methods	16
5.1	Study area and population.....	16
5.2	Overall Study design	17
5.3	Data collection techniques and tools.....	18
5.3.1	Studies using quantitative methods	20
5.3.2	Studies using qualitative methods	22
5.4	Data analysis.....	22
5.5	Triangulation	23
5.6	Ethical considerations.....	24
5.7	Summary of methods	25
6	Results	26
6.1	Potentially avoidable deaths (I).....	26
6.2	Prevalence and risk factors for neonatal hypothermia (II).....	27
6.3	The impact of early bathing of newborns (III)	29
6.4	Perceptions on STS among post delivery mothers (IV).....	31
6.5	Acceptability and feasibility of practices in the community (V)....	33
7	Discussion.....	36
7.1	Missed opportunities	36
7.2	The delivery, post partum period and task shifting	36
7.3	Translating evidence based knowledge to practice	37
7.4	The beliefs of the mothers, caregivers and the social network	38
7.5	Future areas for research	39
7.6	Methodological considerations	40
8	Conclusion.....	42
9	Implications	43

10	Acknowledgements	44
11	References.....	47

LIST OF ABBREVIATIONS

DALY	Disability adjusted life years
ELBW	Extremely low Birth Weight
FGDs	Focus Group Discussions
FSB	Fresh Still Birth
GNI	Gini Coefficient
HSSP I	Health Sector Strategic Plan I
HSSPII	Health Sector Strategic Plan II
IDIs	In depth Interview
IPTp	Intermittent Preventive Treatment for malaria in pregnancy
IMCI	Integrated Management of Childhood Illness
IMR	Infant Mortality Rate
IOM	Institute of Medicine
LBW	Low Birth Weight
MDG-4	Fourth Millennium Development Goal
MOH	Ministry of Health
MSB	Macerated Still Birth
NMR	Neonatal Mortality Rate
PHC	Primary Health Care
OR	Odds ratio
PMNCH	The Partnership for Maternal Newborn and Child Health
PMR	Perinatal Mortality Rate
PMTCT	Prevention of Maternal to Child HIV Transmission
PNFP	Private Not for Profit Organization
PPP	Purchasing Power parity
QA	Quality Assurance
RR	Relative Risk
STS	Skin to Skin contact
TFR	Total Fertility Rate
U5MR	Under 5 Mortality Rate
UDHS	Uganda Demographic and Health Survey
UNFPA	United Nation Population Fund
UNICEF	United Nation Children's Fund
WHO	World Health Organization
W.B	World Bank
VLBW	Very Low Birth Weight

TABLES AND FIGURES

Table 1: Estimates of newborn deaths by major cause of death which could be prevented if essential MNCH packages were provided to 90 percent of women and children in Africa

Table 2: Trends of selected demographic, health, social economic indicators

Table 3: Health Sector structures for delivery of health services

Table 4: Participants, methods and time frame

Table 5: Characteristics of perinatal deaths

Table 6: Grades of hypothermia at different time intervals using rectal thermometry

Table 7: Characteristics of newborn found to be hypothermic at different time intervals postpartum

Table 8: Potential risk factors of hypothermia at different time intervals postpartum

Table 9: The effect of bathing of newborns on the development of hypothermia at different time intervals postpartum

Table 10: Potential risk factors after bathing on incidence of hypothermia at different time intervals postpartum

Table 11: Attributable risk percent of early bathing

Table 12: Summary of themes, categories and codes derived during analysis

Figure 1: Progress towards MDG-4 in Africa

Figure 2: The continuum of care and linkage for maternal newborn and child care

Figure 3: Map of Uganda showing location of study sites

Figure 4: Time frames for studies and relevant key events at policy level

Figure 5: Trial Profile for study

OPERATIONAL DEFINITIONS

Perinatal period: Commences at 22 completed weeks of gestation (the time when the birth weight is normally 500g) and ends seven completed days after birth (WHO, 2006b)

Neonatal period: Commences at birth and ends 28 completed days after birth (ICD-10, 2004)

Neonatal deaths: This is the death of a newborn during the first 28 completed days after birth. Early neonatal death occurs within the first seven days of life and late neonatal death occurs after the seventh day, but before the 28 completed days of life (ICD-10, 2004)

Perinatal mortality rate: Is the number of deaths of foetuses weighing at least 500g or more or after 22 completed weeks of gestation or with a crown heel length of 25cm, plus the number of early neonatal deaths, per 1000 total births (WHO, 2006b)

Perinatal mortality rate, weight-specific: Is the number of deaths of foetuses weighing 1000g and over, plus early neonatal deaths weighing 1000g and over at birth, per 1000 total births weighing 1000g and over (WHO, 2006b)

Early neonatal mortality rate: Is the number of neonatal deaths occurring within the first seven of life per 1000 live births (WHO, 2006b)

Neonatal mortality rate: Is the number of neonatal deaths (early and late neonatal deaths) per 1000 live births (ICD-10, 2004).

Skin to Skin contact: Is the practice of placing the naked body of the baby on the mother's bare chest at birth or soon after. A blanket is placed across the baby's back (Moore et al., 2007).

PREFACE

Numbers are an important component of our day to day descriptions of events. However, the human experience of an event, especially with regard to maternal newborn and child ill health, is traumatic to the millions of women, children and families in the world who experience them firsthand.

In 1992, my wife and I contributed to that statistic when we experienced a perinatal death. We were later to have three lovely children, though two of these were born preterm they have now grown up, and are a blessing to us. Over the years, my interest focussed on the management of high risk pregnancies and of infectious diseases during pregnancy, with a bias to perinatal health care. After my training as an Obstetrician /Gynaecologist, I returned to Uganda with the vigour of youth and the need to use evidence based practices in our day to day clinical work.

With the encouragement and assistance of Associate professor Pius Okong who is head of the department of Obstetrics and Gynaecology, and Dr Paul Kizza, the previous medical superintendent of the hospital, several changes were made within the hospital. These were in terms of staffing, setting up protocols, continuous medical education and strengthening the existing outpatient and inpatient service points for maternal and newborn care. Maternal and perinatal audit reviews were started, as well as a high risk clinic, to specially care for those with recurrent obstetrical and perinatal complications. I later on met Professor Staffan Bergstrom and Associate Professor Stefan Peterson, who introduced me to the field of global public health, and the need to look beyond the clinical dimension. This is my journey through the training for the PhD, focussing on the perinatal and newborn period.

The perinatal and newborn mortality and morbidity rates are still high. The evidence is available for effective interventions. We can do better, we must endeavour each day to avoid omissions/commission and continue the struggle for improved care for our future generation.

1 INTRODUCTION

1.1 PERINATAL MORTALITY

It is estimated that globally about 4 million neonatal deaths and 3.3 million stillbirths occur each year and that 98% of these are in low and middle income countries (WHO, 2006b). Among low and middle income countries perinatal conditions are the leading cause of burden of disease using disability adjusted life years (DALY), compared to high income countries where ischemic heart disease is predominant (Lopez et al., 2006). The causes of stillbirths and early neonatal deaths are intrinsically linked not only to the provision of effective obstetric and neonatal care but also to other health determinants in the community (Geirsson and Patel, 1984, Lawn et al., 2009). Twenty five to forty five percent of neonatal deaths occur within 24 hours of birth, and three quarters of the deaths occur within the first week of life, estimated at 2.7 million annually (UNICEF, 2009). The largest number of neonatal deaths occurs in South Asia. However, the highest rates of neonatal mortality are in Sub Saharan Africa, estimated at 41 neonatal deaths per 1000 live births (Lawn and Kerber, 2006, WHO, 2006b). In order to attain the fourth Millennium Development Goal (MDG-4) by 2015, existing and additional strategies to address the mortality in the neonatal period need to be intensified and devised. To reach this target of the MDG-4, Sub Saharan Africa will need to achieve an annual average reduction in the under-five mortality of at least 8 percent per year.

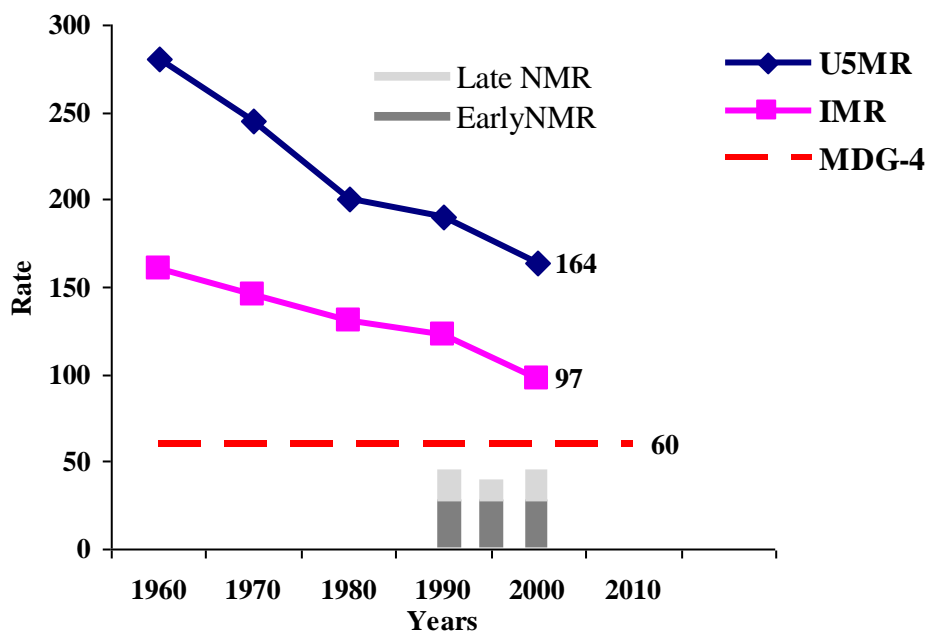


Figure 1: Progress towards MDG-4 in sub Saharan Africa

Source: (Lawn and Kerber, 2006)

1.2 CAUSES OF NEWBORN DEATHS

Globally, 86% of neonatal deaths arise from infection (36%), preterm births (27%), and asphyxia (23%). Of the remaining 14%, half are related to congenital abnormalities, the other half to a combination of different causes (Lawn et al., 2005). The distribution of causes varies between countries. In very high mortality settings, where the neonatal mortality rate (NMR) is greater than 45, almost 50% will be due to severe infection, tetanus and diarrhoea. At low NMR levels (NMR<15), sepsis /pneumonia account for less than 20% of the deaths. The majority of these deaths occur at home and are not recorded in the National birth or death registers. In Africa, less than 40% of pregnant women deliver with a skilled attendant.

Equity in health is the absence of systematic disparities in health, or in major social determinants of health, between groups with different levels of underlying social advantage or disadvantage (Braveman and Gruskin, 2003). However, maternal and child delivery interventions in many low resource countries depict inequities with 20% of the poorest population receiving the least coverage (Gwatkin et al., 2004, WHO, 2006c). Poverty is therefore an underlying determinant for ill health.

The majority of neonatal deaths occur in the first week of life, with an estimated 50% occurring within 24 hours of birth, and 75% of the other neonatal deaths in the first week of life. It is estimated that out of the 1.16 million African neonatal deaths, 800,000 of these deaths could be averted if established interventions that are already part of policy in most African countries were made available and utilized by 90% of the mothers and their babies (Lawn and Kerber, 2006)

Table 1: Estimates of the newborn deaths by major cause of death which could be prevented if essential MNCH packages were provided to 90 percent of women and newborns in Africa

		CAUSES OF DEATHS			All neonatal deaths in Africa
		All infections (sepsis, pneumonia, tetanus, diarrhoea)	Preterm birth complications	Birth Asphyxia	
Lives Saved	Upper	195,000-330,000	110,000-	110,000-	430,000-
	Lower		205,000	200,000	800,000
	Range reduction from current deaths	49-84%	37-71%	39-71%	37-67%

Source: (Lawn and Kerber, 2006)

1.3 STRATEGIES TO REDUCE NEWBORN DEATHS

Success in decreasing neonatal mortality rates (NMR) does not require high technology, and is possible in low income countries. Countries such as Sri Lanka, Vietnam, Nicaragua, Moldova, Indonesia, and Honduras, in spite of having a low gross

domestic product, have implemented successful programs, which have decreased perinatal and neonatal deaths (Martines et al., 2005).

Several cost effective interventions with proven efficacy exist that can have an impact on decreasing neonatal mortality, if combined and scaled up in the health system (Darmstadt et al., 2005a). Universal coverage through a continuum of care, aims to integrate maternal, newborn and child health care, delivered through the health system. The focus is to deliver essential services in integrated packages at critical points in the life cycle of the mother and child, in a functional health system that spans key locations, and is supported by a community that respects and recognizes the rights of women and children (UNICEF, 2009).

The continuum of care has two dimensions. In one dimension, there is the provision of care at specific time periods, and other dimension relates to the approach and place of how care can be administered to an individual. The key points for service delivery are adolescence, pre-pregnancy, pregnancy, birth, post-partum, neonatal, infancy and childhood. Along these points, essential maternal, newborn and child health services are delivered through several modes of services including hospital inpatient, clinical outpatient, outreach services, household and community care (Kerber et al., 2007).

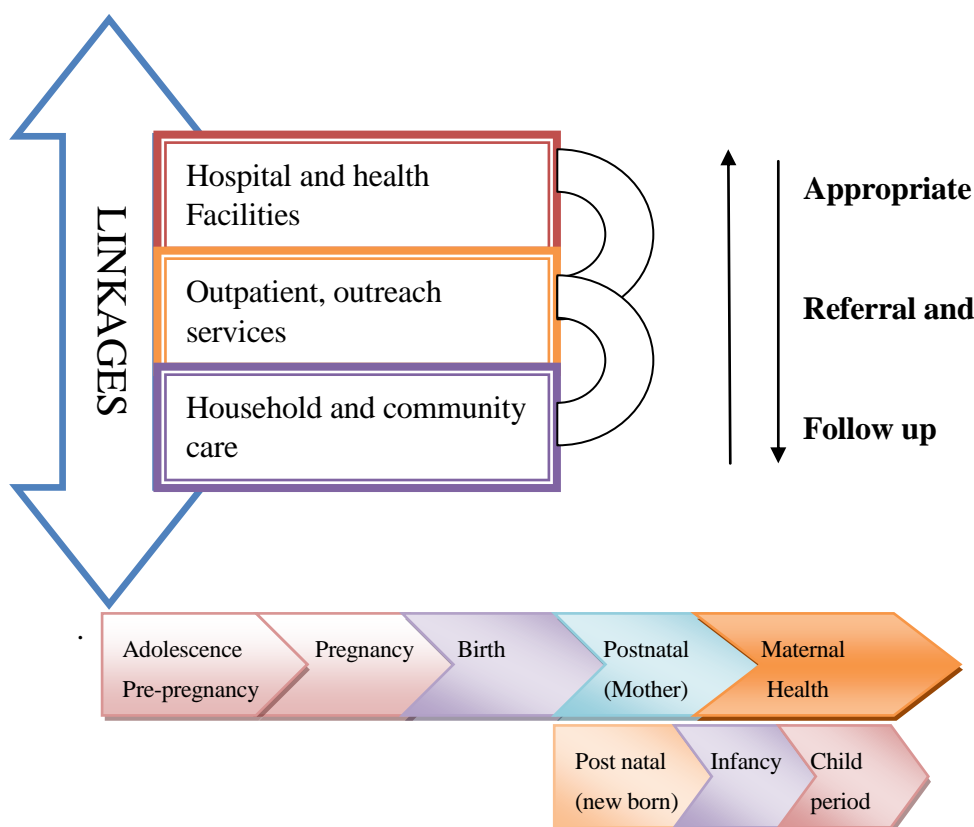


Figure 2: The continuum of care and linkage for maternal newborn and child care
 Source. Adapted from (Kerber et al., 2007)

Sixteen interventions with proven efficacy have been identified, and it is estimated that universal coverage given through the continuum of care, employing these interventions, may avert an estimated 41-72% of neonatal deaths, in 75 countries, which currently have high neonatal deaths statistics (Darmstadt et al., 2005a).

1.4 SIMPLE EFFECTIVE INTERVENTIONS

The sixteen interventions referred to, are part of a list of essential newborn care interventions developed by WHO, that are considered simple, affordable and designed to provide the minimum level of care in order to avert common causes of perinatal and neonatal mortality (Davanzo, 2004, WHO, 1994). The interventions identified, by Darmstadt in the neonatal survival Lancet series, are:

In the pre-conceptual period: *Folic acid supplementation.*

In the antenatal period: *Tetanus toxoid immunisation, syphilis screening and treatment, prevention of pre-eclampsia and eclampsia with calcium supplementation, intermittent preventive treatment for malaria, detection, treatment of asymptomatic bacteriuria.*

In the intra-partum period: *Antibiotics for pre-labour preterm rupture of membranes, corticosteroids for preterm labour, detection and management of breech, labour surveillance (with a partograph) for early diagnosis of complications, clean delivery practices.*

In the postnatal period: *Resuscitation of the newborn, breast feeding, prevention and management of hypothermia, Kangaroo Mother Care, community based pneumonia case management.*

Although the list of interventions suggests they are “simple”, their actual implementation has been difficult. A slow pace at scaling up of these interventions in several low and middle income countries has led to several of the countries being off track in achieving the MDGs 4 and MDG-5. The reasons for this vary, and include: human resource deficits, insufficient financial resources, lack of political will, armed conflicts and high HIV prevalence in some of the countries (Bryce et al., 2008).

1.4.1 Thermo protective practices

Neonatal hypothermia, defined as temperature $<36.5^{\circ}\text{C}$, if prolonged, can lead to morbidity and mortality (Elliott and Mann, 1957, Gandy et al., 1964). Factors that influence neonatal hypothermia at birth are related to the physical characteristics of the baby (large surface area in relationship to body weight, thin layer of insulating fat) and environmental factors in the delivery place, which affect thermal balance by conduction, convection, evaporation and radiation (McCall et al., 2005, WHO, 1997).

Mechanisms to prevent heat loss in the newborn include manipulation of the environment and performing procedures to decrease heat loss. The delivery should be conducted in a warm environment, with immediate drying of the baby, skin to skin

contact (STS), covering of the baby with a dry warm cloth, delaying weighing and bathing of the baby (Soll, 2008, WHO, 1997). Early STS helps initiate early maternal affectionate behaviour and promotes early initiation and maintenance of breastfeeding. The release of oxytocin during this phase causes a temperature rise of the mother's skin over the breast area, and hence provides warmth (Moore et al., 2007, Ransjo-Arvidson et al., 2001, Uvnas-Moberg, 1998, Winberg, 2005).

For low birth weight babies, defined as weight at birth of less than 2,500grams irrespective of gestational age, Kangaroo Mother Care technique can be utilized. It consists of early, continuous and prolonged STS after initial stabilization of the baby, along with frequent and exclusive or nearly exclusive breast-feeding. It is initiated in hospital, continued at home and enables an early discharge from hospital (WHO, 2003). It is associated with a decreased risks of noscomial infections at 41 weeks of gestation, or of severe illnesses, as well as a lower risk of respiratory tract infections at 6 months follow up, and increased weight gain per day, compared to LBW babies nursed using incubators (Conde-Agudelo et al., 2003).

1.5 GENDER ISSUES AND NEWBORN CARE

Gender refers to women's and men's roles and responsibilities that are socially determined. Gender is related to how we are perceived, how we are expected to think and act as women and men, because of the way society is organized, and not because of our biological differences (Lindstrand et al., 2006). To achieve gender equality, there is a need to provide and encourage the advancement of education of female children, delay the age of first marriage, end harmful traditional practices, improve nutrition of girls and women, eliminate gender based violence, foster responsible gender sensitive attitudes for boys and girls, and share responsibility for care giving. There is also a need for universal access to family planning methods to avoid unintended pregnancies, empowering people to have safer sex, and improving the quality of medical services during pregnancy and during the non reproductive period (Collins, 2009). The integration of gender into reproductive health programmes has had a positive impact on improving reproductive health outcomes in terms of increasing knowledge of contraceptives, use of contraceptives, increased use of a skilled attendant at birth, educating women about sexually transmitted diseases such as HIV/AIDS, and continuous dialogue with men in order to improve their knowledge about health and pregnancy related issues (IGWG, 2005).

In some parts of Asia, sex selective abortions and infanticide are a major problem due to a social preference for giving birth to boys, and because of the national policy of limiting the family size (Zhu et al., 2009). Also in Asia, in India, a gender bias exists in the neonatal period in terms of the care seeking process when an illness arises, with rural households tending to seek care from trained health providers for the boy neonates more frequently than for girl neonates (Ahmed et al., 2001, Willis et al., 2009).

2 ENHANCING NEWBORN SURVIVAL

Some of the simplest affordable interventions are behavioural in nature, with changes that can be manipulated at an individual or community level, while others require the presence of health facility units. The type and quality of care given, as well as the barriers, constraints and facilitating factors for behavioural change, can determine the effectiveness of the interventions regarding newborn survival.

2.1 HEALTH SYSTEM: GOALS AND FUNCTION

WHO defines a health system as one which includes all actors, organizations, institutions and resources whose primary purpose is to improve health (WHO, 2004b, Lindstrand et al., 2006). A well functional health system is critical to the development and delivery of interventions that affect public health and health outcomes. The defining goals of a health system are to improve the health of the population, enhance the responsiveness of the system to the expectations of the people and be fair when it comes to financial contributions. Four key functions determine the way inputs are transformed into outcomes that people value: resource generation, financing, service provision and stewardship (Murray and Frenk, 2000).

In several countries, health systems are bottlenecks that hinder the delivery of cost effective maternal child and neonatal interventions (Freedman et al., 2005). Key constraints to achieving appropriate levels of health care in the community are due to low coverage for many priority interventions in the country, poor coordination, weak infrastructure, poorly planned policies, conflicting donor programmes, brain drain and diversion of trained workers to high profile initiatives in some areas (Okunzi, 2004). One of the determinants of access is the cost of health care. A large proportion of the total amount spent on health is out of pocket in several low resource countries. These kind of payments for services cause inequality and act as a barrier to health care for the poor (Peters et al., 2008). The introduction of user fees as a source of financing had negative effects on the utilisation of services (Willis and Leighton, 1995, Blas and Limbambala, 2001). In Uganda, the abolition of user fees led to an increased use of curative, and preventive health care services that disproportionately benefitted the poor (Burnham et al., 2004, Nabyonga et al., 2005).

As health systems are revitalized in a given country, it is important to prioritize and ensure that equity is observed, so that the poorest in society reap the benefit of public health interventions (Victora et al., 2003, Gwatkin et al., 2004).

2.2 QUALITY OF HEALTH CARE

Quality of health care is an important tenet for delivery of health care services to a population. Quality of health care can be defined in several ways:

“Quality of care is the extent to which actual care is in conformity with present criteria for good care” (Donabedian, 1966)

“The degree to which health services for individuals and populations increase the likelihood of desired outcomes and are consistent with current professional knowledge” (IOM, 2001)

A simpler definition is” Doing the right things right to the right people at the right time” (Kennedy, 2005, Gray, 1997).

Quality of health care is important in all settings, and more so in areas with poor health indices. Several deficiencies in areas of interpersonal communication, knowledge, treatment, and diagnosis of both mother and newborn, are documented in several low resources settings in sub Saharan countries (Christensson et al., 1988, Amooti-Kaguna and Nuwaha, 2000, Kaye, 2000). Quality health care is comprehensive and multifaceted. It is often addressed with the help of quality assurance (QA). These are a set of activities carried out to set standards and their performance is monitored so that the care provided is as effective and safe as possible (DiPrete-Brown et al., 1990). The QA activities may address one or more dimensions, such as technical competence, access to services, effectiveness, interpersonal relations, efficiency, continuity, safety, and amenities. The assessment of quality of care can be carried out under three categories: structure, process, and outcome (Donabedian, 1980).

Structure- Denotes the attributes of the setting in which care occurs. This includes the attributes of material resources, of human resource and of organizational structures.

Process- Denotes what is actually done in giving and receiving care. It includes the patient’s activities in seeking care and carrying it out, as well as the practitioner’s activities in making a diagnosis and recommending or implementing treatment.

Outcome- Outcome denotes the effects of care on the health status of patients and populations. Improvements in the patient’s knowledge, and salutary changes in the patient’s behaviour, are included under a broad definition of health status as is the degree of the patient’s satisfaction with the care received.

The QA activities are geared to four main tenets that are oriented towards meeting the needs and expectations of the patient and the community: These focus on systems, processes, use of data to analyze services delivery processes and encouraging a team approach to problem solving and do quality improvement (DiPrete-Brown et al., 1990).

2.3 AUDIT

The potential of audit to improve the quality of health care delivery has been documented in several low resource settings (Wilkinson, 1997, Ward et al., 1995, Bugalho and Bergstrom, 1993). Clinical audit is defined as the systematic, critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources and the resulting outcome, as well as the resulting quality of life experienced by the patient (Johnston et al., 2000). The perceived benefits

of audit include improved communication among colleagues, improved patient care, increased professional satisfaction and better administration. However, some disadvantages of audit expressed by health care workers are increased workload, restriction of clinical freedom, fear of litigation, hierarchical and territorial suspicions as well as professional isolation (Johnston et al., 2000, Okong et al., 2006).

In a review article on the use of perinatal audit to promote change (Mancey-Jones and Brugha, 1997) found conflicting outcomes and conclusions with regard to the effects of audit to promote change. They pointed to the need to identify factors which determine the effectiveness and sustainability of perinatal audit in different low resource settings. A recent meta-analysis found that the effects of audit and feedback was likely to be greater when the baseline health professional's adherence to recommended guidelines or practices was low and when audit and feedback was provided more intensively with or without educational meetings (Pattinson, 2006).

In this thesis, perinatal audit was used as the starting point to identify gaps in maternal perinatal and newborn care in the health unit and the community.

2.4 BEHAVIOUR CHANGE MODELS

Several guidelines for health care providers have been developed over the years based on evidence based care. However, it does not necessary translate that the guidelines will be followed (Francke et al., 2008). Research from some high income countries suggests that about 30 -40% of patients receive care based on the present scientific evidence and 20-25% receive care that is not needed or is potentially harmful (Grol and Grimshaw, 2003). Translating evidence to practice is complex, and the most effective and efficient way to do so is unclear (Grol and Grimshaw, 2003).

A number of models have been developed that help explain how, when, and why people change behaviour or seek care. These models help one to understand behaviour change within groups, organisations and communities, and have helped in the development of strategies for various public health interventions (Hausmann-Muela et al., 2003, Dekker, 2008)

1. Social cognitive theories on health behaviour

These theories mainly address how health behaviour is determined by expectations of the outcome of the behaviour.

- *The Health Belief Model.* The actions in this model is guided by :
 - - beliefs about the impact of illness and its consequences (threat perceptions).
 - - beliefs about the consequence of health practice and the possibility of efforts for change.
 - health motivation , or readiness to concerned about health matters.
 - -beliefs and health motivation are influenced by socio demographic and psychological factors of the person as well as cue to action before a behaviour action is undertaken (DiPrete-Brown et al., 1990).

- *The Theory of Planned Behaviour /Theory of Reasoned Action* This model centres on factors which lead to a specific intention to act or a behavioural

intention, which the model places between the attitudes and the behaviour. The behavioural intention is determined by attitudes towards the behaviour, the subjective norms or the belief in whether other relevant persons will approve of one's behaviour, as well as by the perceived behavioural control and the socio-demographic factors as well as personality traits which condition attitudes, subjective norms and perceived behavioural control (Fisbein and Ajzen, 1975).

2. Theories on motivational determinants of behaviour change

These theories describe how behavioural change is dependent on an individual's characteristics, on health information, and on the provider of the information.

- *The Transtheoretical model of behavioural change.* It proposes that behavioural change occurs in five distinct stages through which people move in a cyclical or spiral pattern. The stages one moves through are pre contemplation, contemplation, preparation, action and maintenance. The behaviour is further influenced by social, cultural, ethical and spiritual values (Prochaska and DiClemente, 1992).

3. Theories on contextual determinants of health behaviour

This category is concerned with the impact of social support, occupational factors, the physical environment and with health policy regarding health and disease.

- *The Social ecological model.* The key ideas informing this model are that people are influenced by the social context they are in, along with a series of complex interactions with their surroundings (the Ecology). The factors that affect human behaviour are multiple, and it is essential to understand and address barriers and constraints to behavioural change at multiple levels. Interventions for planned change should address all four levels to be effective: individual, social network, community, societal. Communication interventions can overcome barriers at each level and facilitate change (Panter-Brick et al., 2006).

These models help to explain and shed light on the behaviours of individuals, the community's norms and on health workers responses to the need to adhere to guidelines. The other factors that influence the adoption of various interventions at the facility level, are dependent on the quality of the supporting evidence, whether the guidelines require few skills, the degree of organization change that would be required or changed. Whether there are simple instructions to follow. Multifaceted strategies are favoured combining different actions to address potential obstacles, and facilitate the adoption, acceptance and implementation of a given intervention or practice (Grol et al., 2002, Haines et al., 2004).

2.5 EMIC AND ETIC VIEWS

The interpretation of a person's behaviour or a society's organizational activities can be viewed from two broad angles.

An Emic or inside view: Describes behaviour or activities as seen from the perspective of cultural insiders, in constructs drawn from their self understanding. It describes the cultural system as a working whole.

An Etic or outside view: Describes behaviour from a vantage point external to the culture, in constructs that apply equally well to other cultures. It describes the ways in which cultural variables fit into general causal models of particular behaviours (Morris et al., 1999, Etkin, 1988).

Both views are complementary to each other, and are important in the design of studies, their interpretation, and in the formulation of policies and programs that target behaviours and a society's cultural norms.

2.6 UGANDA DEMOGRAPHIC AND SOCIO-ECONOMIC CONTEXT

The Republic of Uganda is a landlocked country located in East Africa. It covers an area of 241,551 sq km. It is bordered on the East by Kenya, on the west by the Democratic Republic of Congo, in the north by Sudan, in the south by Tanzania and on the south west by Rwanda. It is a well watered country with about one fifth of the total area of 41,743 sq km covered with open fresh water, or swampland (UBOS, 2008).

It has a tropical environment and has had generally two rainy and two dry seasons during the year. The country has natural resources in form of copper, cobalt, hydro electric power, limestone and recently large oil reserves were discovered in the Lake Albert region in western arm of the rift valley. The total population (2008 midyear) was estimated at 29.6 million, with an urban population of 14.9%. Forty nine percent of the population is below 15 years of age. The population growth rate is at 3.2%. The main source of income is from agriculture (UNFPA, 2008, UBOS, 2008). From the late 1960s up to 1980, Uganda underwent political turmoil and economic instability. In the last 23 years under the present government there has been relative stability in most of the country, except for civil strife in the Northern part of the country.

The country has seen rapid economic growth of 6% per annum, over the past decade, and the poverty rate has decreased from 56% in 1992 to 38% in 2002. The Gross National income(GNI) per capita (PPP international U\$) is1500.The income inequality (Gini Coefficient) is at 0.41 (WB, 2006). However, the significant economic gains made have not benefited the majority of women and children in Uganda. This is partly due to the low contraceptive rate (24%) and a high total fertility rate (TFR) at 6.9 children per woman in her life time. There has been no significant reduction of TFR in the last two decades. The high TFR and rapid population growth is fuelled by early childbirth among adolescents, who have too many children too frequently, and this significantly contributes to the slow pace of reduction of maternal and newborn morbidity and mortality in Uganda (UBOS, 2006).

Table 2 below presents key Ugandan demographic, health and socio economic indicators.

Table 2: Trends of selected demographic, health, social economic indicators in Uganda.

Indicator	1991	1995	2002	2007
U5MR per 1000 live births	203	147	152	137
IMR per 1000 live births	122	81	88	76
MMR per 100,000 live births	527	506	505	435
Deliveries by Skilled attendant (%)	38	38	38	41
HIV prevalence (%)	30	15	6.1	6.4
Literacy rate (%)	54	65		69
Access to Safe water source (%)	44	54	61	68
Life expectancy at birth (years)	48.1	46	51.4	51
Population below poverty line, Under U\$ 1 (%)	56	35	38	31

Source:(UBOS, 2008, UNFPA, 2008)

2.6.1 The Uganda Health care system

The Ministry of Health (MOH) provides stewardship and is responsible for policy, programmes and supervision of health services in the country. However it depends wholly on the central government for resource allocations for its budget, which is estimated at 10.3%, equivalent to U\$8 per capita, below the target recommended by the Africa head of states in Abuja (MOH, 2005). In 2000, through the Health Sector Strategic plan I (HSSP I) the National health policy shifted its emphasis to primary health care with funds being allocated to the lower health units located in the community. Health service delivery was decentralized to districts and to Health sub districts. This served to bring health services closer to the people, and allowed for increased involvement of the community in managing the health services(MOH, 2000). One of the strategies currently being promoted for the delivery of selected cost effective interventions, is the use of a Village Health Team (VHT). A VHT consists of community volunteers selected by the members of the community in a village. Their task is to provide health information, to mobilize the community on health related matters, and to link up with the local health services in the area (MOH, 2005).

Health services in Uganda are delivered by government supported health units, private not for profit organizations (PNFP), private for profit units and also by traditional and complementary medicine practitioners. Overall, the financial requirement for HSSP II implementation is far from being met This translates into significant under financing of HSSP priorities including the minimum health package for delivery of essential

maternal newborn and child services, human resource and health infrastructure development (Odaga and Lachoro, 2006).

These constraints in the country have slowed progress towards attaining the MDG-4 by 2015 of reducing U5MR to 56 deaths per 1000 live births as well as the MDG-5 of reducing the maternal mortality rate (MMR) to 131 per100, 000 live births respectively. Twenty six percent of the U5MR in Uganda are due to neonatal deaths (WHO, 2006c). Approximately, 45,000 newborns die every year in Uganda. The NMR is estimated at 29 per 1000 live birth and the distribution of causes of death is similar to other countries in sub Saharan Africa with a high neonatal mortality of greater than 45 deaths per 1000 live births (Lawn and Kerber, 2006, MOH, 2008). Perinatal and maternal conditions contribute 20.4% of Uganda Burden of disease (MOH, 2005). Only 41% of the deliveries are by a skilled attendant. There are gaps nationally in the implementations of several existing policies on maternal ,newborn and child health at health facility, community level and universal coverage has not yet been attained (MOH, 2008). This is further compounded by low utilisation of services, poor health care seeking behaviours by pregnant women during labour and the post natal period. There is lack of adherence to guidelines for pregnancy and newborn care by health providers and cultural barriers. Some of these barriers concern gender issues such as disempowerment of women who do not control resources and have to seek permission of their spouse to go to health facilities. In addition there are human resource constraints with few health workers, negative perceptions on the part of care givers with regard to some of the recommended interventions and difficulty for families to refer a sick child even when a health unit is accessible (Mbonye et al., 2006, MOH, 2008, Amooti-Kaguna and Nuwaha, 2000, Peterson et al., 2004). In its Health Sector Strategic plan II (HSSP II) the Government of Uganda has reinforced and placed a high priority on scaling up strategies for interventions in relation to maternal, newborn and child health with core interventions for the newborn(MOH, 2005)

Table 3: Health Sector structures for delivery of health services in Uganda

Health Unit	Physical structure	Location	Catchment Population
Health Centre I	None	Village	1000
Health Centre II	Outpatient services only	Parish	5000
Health Centre III	Outpatient services, maternity ,general ward and a laboratory	Sub county	20,000
Health Centre IV	Outpatient services, inpatient, laboratory, theatre, blood transfusion	County	100,000
General Hospital	Hospital, laboratory, diagnostic services -X-rays	District	500,000
Regional Referral Hospital	Specialist Services	Region (3-5 districts)	2,000,000
National Referral Hospital	Advanced Tertiary care	National	27,000,000

Source (MOH, 2005)

2.6.2 Specific policies along the continuum of care

Over the last decade, several policies have been drafted which deal with various interventions targeting diseases and pregnancy related problem.

The prevention of mother to child transmission of HIV (PMTCT) services initially began in 1999 in 7 pilot sites and spread out to 334 sites by 2006. At present, the services are being scaled up to the level of health centre III. The HIV prevalence in pregnant women peaked in 1992 to 25 % and is now down to 6.4% (UAC, 2007). The PMTCT services include promotion of primary prevention of HIV, provision of comprehensive maternal and child health services, voluntary counselling and testing which is presently an Opt out approach. It also includes provision of antiretroviral drugs, support for infant feeding options and optimal obstetrical procedures that include universal precaution, delayed artificial rupture of membrane, avoiding invasive foetal monitoring procedures, minimising the use of instrumental vaginal deliveries, performing an episiotomy only if absolutely necessary. In situations where the serology status for HIV infection of the mother was known or when a mother had not had a test done, it was recommended that early bathing be carried out after delivery. The post delivery part of the PMTCT package included family planning, support of infant feeding and counselling services.

Intermittent preventive treatment for malaria in pregnancy using Sulphadoxine /Pyrimethamine was adopted as a strategy to decrease morbidity and mortality in pregnancy in 2000 by the malaria control program in the Ministry of Health (MOH, 2001).

In its 2005 five year health sector strategic plan (HSSP II), the Ministry of Health prioritized newborn health and survival in the national minimum health care package, with a plan for scaling the provision of essential newborn care interventions nationally (MOH, 2005). In line with this a situation analysis of newborn health in Uganda was effected in 2008 so as to determine the level and trends of newborn mortality and morbidity, assess current practices in health facilities and in the communities and to also highlights gaps in policies, programmes and services in the country (MOH, 2008). A key gap identified was in the postpartum period where a low number of mothers attended the 6 week post natal visit. Only 23% are reported to have received PNC within the 48 hours post delivery (UBOS, 2006) At present, the policy is being altered so as to cater for the critical period for newborn survival and to have post natal visits done with 24 hours after birth, on the third and later on the seventh day post delivery. In the community, home visits by the community health volunteer will be encouraged and are being scaled up.

3 RATIONALE FOR STUDIES

Innovative ways to bridge the gap so as to translation of evidence based knowledge into policy and practice are required, especially in low resource settings (Haines et al., 2004, Tugwell et al., 2006). Part of the difficulty in bridging this gap is due to the poor coverage of health services, shortage of health care providers, and issues related to access to referral services (Bahl et al., 2009, WHO, 2005, Boschi-Pinto et al., 2009). Use of appropriate simple interventions has been shown to have an effect on decreasing mortality and morbidity (Bhutta et al., 2005). Some of the interventions have to be delivered by a health care delivery system. Others are related to behaviour and practices of individuals and the communities. Uganda has adopted some of the evidence based low cost effective interventions into policy and plans. However, several of these interventions will require behavioural changes of health workers, women and communities (MOH, 2005, MOH, 2006). Understanding which practices or behaviours are acceptable in a given cultural context is of great importance for any intervention to be acceptable and sustainable in the community.

Several knowledge gaps prompted these studies:

There was lack of information on the causes of perinatal deaths and an absence of information on the use of evidence based practices to prevent potentially avoidable perinatal death.

A proposed modified obstetrical newborn practice for PMTCT recommended that pregnant women whose serology status for HIV infection was known or those who had had no HIV test done in the ANC were being advised to have their babies bathed immediately after delivery. Hence it was important to know the effect of this on thermoregulation in this context and assess the risk of adopting this practice.

Several of the recommended newborn practices are behavioural in nature especially thermo protective practices and there is a need to understand the perceptions of post partum women, caregivers and the community regarding acceptability and adoption of this and other practices at the hospital as well as at community level in the Ugandan context.

4 AIM AND OBJECTIVES

4.1 GENERAL AIM

The aim of this thesis is to determine the causes of perinatal deaths, risk factors for neonatal hypothermia and explore the acceptability and feasibility of recommended perinatal practices in hospital and community settings in Uganda

4.2 SPECIFIC OBJECTIVES

- I. To determine potentially avoidable perinatal deaths using an audit feedback cycle.
- II. To determine the prevalence of neonatal hypothermia and associated risk factors in a periurban hospital.
- III. To evaluate the impact of early bathing on the incidence of hypothermia among newborn babies exposed to skin to skin contact.
- IV. To explore the perception among post delivery mothers of skin to skin and newborn care in a hospital setting.
- V. To explore the acceptability and feasibility of adopting recommended newborn practices in the community.

5 METHODS

5.1 STUDY AREA AND POPULATION

This thesis is based on studies done in four districts of Uganda namely Kampala, Ntungamo, Soroti, and Kayunga (Figure: 3)

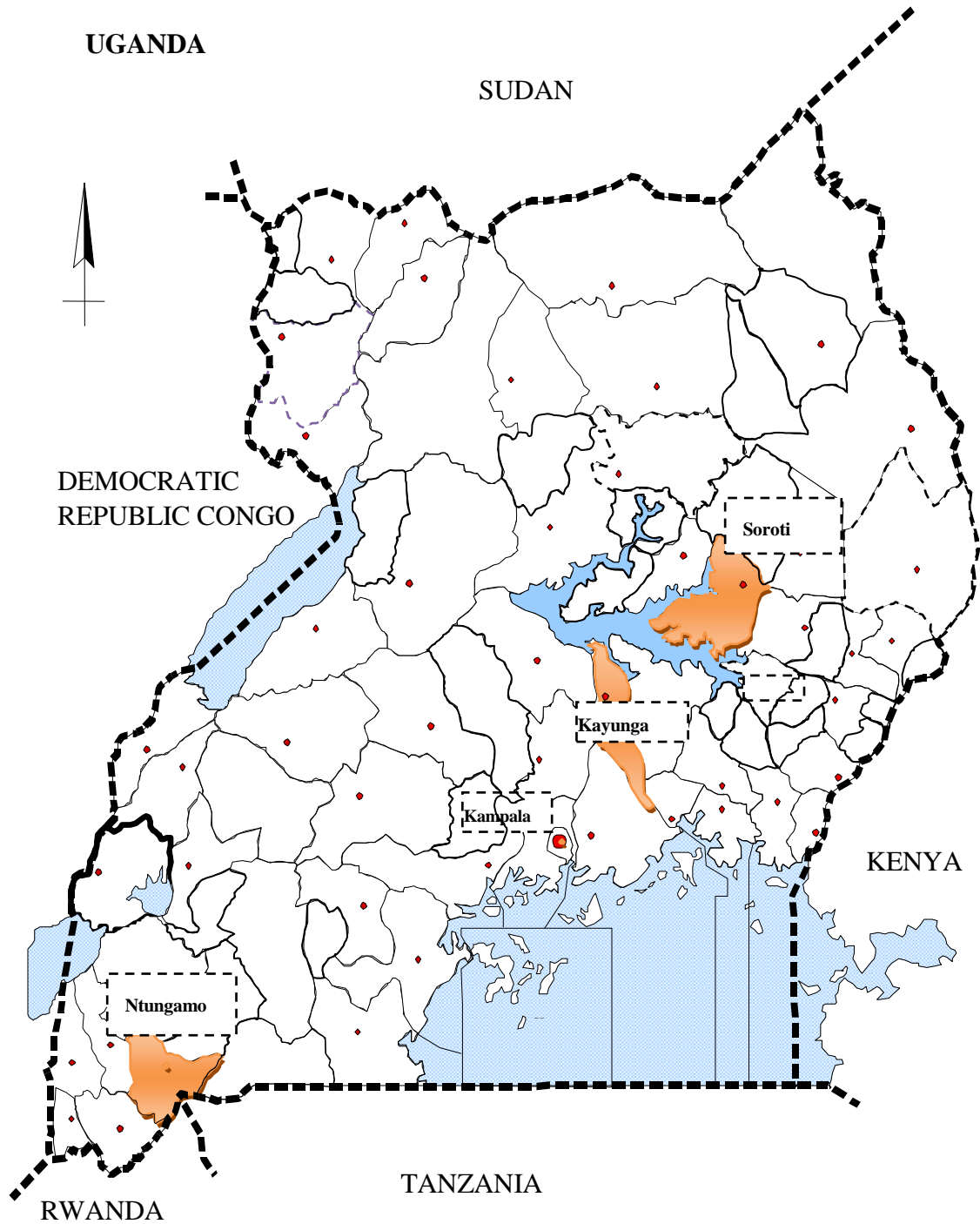


Figure 3 Map of Uganda showing location of study sites

Kampala District is on the northern shores of Lake Victoria. It is host to the commercial and administrative capital of Uganda, Kampala City with an estimated population of 1,200,000 people. It borders Mukono district in the east and is surrounded by Wakiso district in West, North and South. The area has a diverse number of different tribes with 60% arising from Buganda. The district is administratively divided into 5 divisions namely Rubaga, Nakawa, Kawempe, Central and Makindye. Twelve percent of Uganda population resides in the urban area with 40 % of this located in Kampala City (UBOS, 2002).

Kayunga district is located in the central part of the country with a population of 294,613, Ntungamo district is in the South western part of the country with a population of approximately 379,987 people and Soroti district is in the East, 365 km from Kampala City with a population of 369,789. The main activity of the population in Ntungamo, Soroti and Kayunga districts is subsistence farming with cattle rearing in the Ntungamo and Soroti districts. Soroti district over the past five years has experienced episodes of insecurity due to insurgence and famine with relatively higher poverty than other parts of the country (UBOS, 2006).

The three districts have poor maternal and newborn indicators with a reported delivery by skilled attendants of 32%, 41%, 51% and a perinatal mortality rate, weight specific of 38, 22, and 22 per 1000 total births for Ntungamo, Soroti and Kayunga district respectively (UBOS, 2006). In spite of these poor indices, Soroti district during the period 2000 to 2006 through the Making Pregnancy initiative funded by WHO was able to reduce the Maternal mortality ratio (MMR) from 750 to 190 deaths per 100,000 live births (WHO, 2006a)

Studies I, II, III, IV were conducted in San Raphael of St. Francis Hospital Nsambya located in the peri urban region of Kampala City. It is a General hospital, private non for profit (PNFP) with a bed capacity of 361, has an annual delivery of 7,500 and is responsible for several of the public health preventive activities in Makindye division. In addition it offers training for intern doctors, nurses, midwives as well as laboratory technicians. It is owned by the Catholic Church.

Study V was conducted at Kishami, Asuret, Kayunga sub counties located in the rural communities of Ntungamo, Soroti and Kayunga districts respectively. These districts were chosen as they represent communities with different tribes, socio cultural economic, and demographic characteristics (Emwanu, 2007). They represent communities with different newborn care practices and contexts and may require different adaptation of evidence based interventions.

5.2 OVERALL STUDY DESIGN

Quantitative and qualitative research methods were utilized for this thesis. Studies I, II, III were intended to quantify the problem of perinatal, newborn death, the prevalence of hypothermia and assess the impact of one of the early bathing of the newborn. The qualitative studies helped the investigators get an understanding of the perceptions, beliefs, motivations, constraints and practices of the post partum women and other caregivers regarding newborn care at the health facility and in the rural communities.

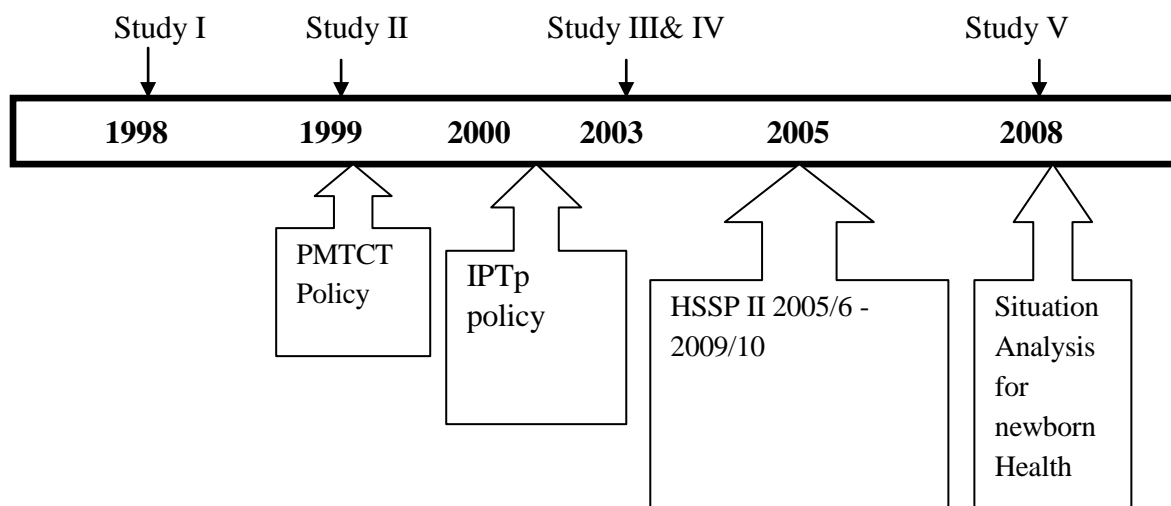


Figure 4: Time frames for studies and relevant key events at policy level

5.3 DATA COLLECTION TECHNIQUES AND TOOLS

Several data collection methods and tools were utilized to obtain information from the different participants in the five studies in this thesis.

Checklists and questionnaires

A data form with a checklist was used to obtain information from the hospital clinical records. Information was obtained from the clinical records of women who had delivered and experienced a perinatal death in study I. The data form was subdivided into fixed areas with fixed questions not allowing for adjustment in the content, wording or order. The advantage of using this data collection tool is that it is inexpensive and permits examination of trends over the past. It has the disadvantage that the data may be inaccessible; information may be imprecise and ethical consideration regarding confidentiality may arise (Varkevisser et al., 2003)

Structured written questionnaires were used to collect data from participants in studies, II, and III. In addition opened ended questions on knowledge and perceptions about thermo protection as well as newborn practices were added in Study III (Varkevisser et al., 2003).

Focus group discussions

Focus group discussions are utilized in qualitative research so as to obtain people's views, knowledge and experiences about a defined area of interest from a selected group in the population (Kitzinger, 1995, Krueger, 1994). The interaction in the group during the interviews makes it possible to explore people's own experiences and the way they think about a problem as well as how their views are expressed and constructed in a given context (Dahlgren et al., 2004). The advantages of FGDs is that they do not discriminate against people who cannot read or write, they encourage participation from those reluctant to be interviewed on their own and they encourage

contributions from people who feel they have nothing to say or who are deemed unresponsive respondents (Kitzinger, 1995).

The disadvantages with FGDs include that minority opinions may not always be expressed, the researcher has less control in the group interview, it requires a carefully trained moderator to run the discussion and data analysis can be difficult (Krueger, 1994). In study IV FGDs were used to explore the perceptions among post delivery mothers of skin to skin contact and newborn care. In study V FGDs were used with post delivery mothers, elderly care givers (older women, mothers in law, grandmothers) and partners or fathers of recently delivered mothers in order to explore the acceptability and feasibility of newborn care practices within household in the rural community.

In-depth interviews

A standardized interview guide covering specific thematic areas on newborn care practices at time of delivery, the post partum period and areas related to thermo protection, birth asphyxia, skin, cord care, was used for in-depth interviews (IDIs) with the traditional birth attendants (TBA) in study V (Dahlgren et al., 2004). This method was chosen so as to provide information regarding practices done at births by the TBA. The interview guide was developed in this fashion as the information was to be collected by more than one research assistant in the field, with the need of an interpreter in certain areas. It facilitates that information obtained by the different interviewers was covering the same topic and was consistent with minimal variation. It has the added advantage that interview can be more systematic and comprehensive by limiting the issues to be discussed in the interview (Patton, 1990).

All the research assistants received one week's training on newborn care and on the use of the interview guide seven days prior to the field work. The training was performed by two of the study investigators. One disadvantage of using a standardized interview guide is that it does not permit the interviewer to easily explore topics or issues that were not anticipated at the time the guide was designed (Patton, 1990).

Measurement of temperature

Temperature measurements of the newborns in Studies II and III were taken using two methods. A digital rectal thermometer with the tip covered with a thin polythene sheath was placed in the rectum of the newborn and a Braun Thermo scan tympanic membrane thermometer was utilized to assess the temperature of the newborn. The tympanic measurement was performed by gently pulling the pinna backward and inserting the probe directing it towards the ear. The probe was held into position until the device beeped and the temperature displayed was recorded.

The digital rectal thermometer was placed in the rectum for three minutes prior to taking the recording. As the core temperature of the body could not be measured, the standard reference point using rectal thermometry was used. Infra red tympanic thermometry was combined with rectal temperature measurements in view of the fact that rectal temperature has a lag period related to changes in blood temperature (Robinson et al., 1998). The infra red tympanic thermometry has the added advantage of being quick, convenient and easy to utilize in a busy clinical setting (Edge and Morgan, 1993).

5.3.1 Studies using quantitative methods

Study I-Improving health care by perinatal mortality audit and feedback

A cross sectional descriptive study was carried out at the hospital for 9 months from 1997 to 1998. Perinatal death audit was not an established routine practice prior to this period. A retrospective analysis of hospital case notes was carried out by an audit team, consisting of an obstetrician, a paediatrician, medical officers, interns and midwives. The audit meetings were held weekly. Consensus was reached on deciding on quality of care given at that time. The Nordic Baltic Classification was used instead of other perinatal audit classifications as it focused on categories that could easily be documented as well as on the identification of potentially avoidable perinatal deaths (Elamin et al., 2003, Langhoff-Roos et al., 1991). The criteria used for assessing quality of care were based on the grading used by Confidential Enquiries into Stillbirths and Deaths in infancy (Tham et al., 1999). The team identified relevant systems factors related to sub optimal care which could have prevented an adverse outcome that was potentially avoidable (grade II or III suboptimal care). Factors of sub optimal care related to clinical practice, structure, equipment, staffing or delays by patient or family were identified in each case and graded as follows:

Grade 0. No sub optimal care

Grade 1. Sub optimal care but different management would have made no difference to the outcome

Grade II. Suboptimal care, different management might have made a difference to the outcome.

Grade III. Different management would reasonable be expected to have made a difference to the outcome. A clearly avoidable factor implying that any adverse outcome could have been prevented.

The audit cycle involved six steps so as to provide a continuous cycle of evaluation and improvement in care.

Step 1: Identify perinatal deaths and also ensure all births are recorded in delivery registers.

Step 2: Collect information on the causes of death and identification of cases with sub optimal care or potentially avoidable factors using a Nordic Baltic Classification.

Step 3: Analyze the results and generate mortality rates and trends over time.

Step4: Recommend solutions to address the avoidable /modifiable factors and record these on the data form.

Step5: Implement recommendations arising from the avoidable/modifiable factors identified. The feedback about implementation was received at the subsequent audit meeting.

Step6: Evaluate and refine the process.

During this period, 3442 deliveries occurred and 235 perinatal deaths were documented and audited by the audit team. The data collected was entered and analyzed using EPI info version 6.04

Study II-Neonatal hypothermia in Uganda: Prevalence and Risk factors

A cross sectional descriptive study was done in 1999 at the hospital. A total of 920 women were admitted in the labour ward over the study period and were approached and screened to participate in the study. Non-random consecutive sampling was done and three hundred pregnant women were enrolled in the study after obtaining informed consent. Each pregnant mother had the labour process monitored and managed according to the protocol of the hospital. After delivery, the newborn babies were assessed for body temperature using two measurements: a digital rectal thermometer covered with a thin plastic sheath and an infrared ear thermometer (Braun Thermo scan).

Temperature measurements were taken at different time interval of 10, 30, 60 and 90 minutes post delivery. Information on socio-demographic characteristics, labour progress, type of delivery, time, place where the baby was located were entered into a structured questionnaire by two research assistants with the help of one of the investigators during the day and night. The data collected was entered and analyzed using EPI info version 6.04 by the principal investigator

Study III-The impact of newborn bathing on the incidence of neonatal hypothermia in Uganda: A randomized, controlled trial.

A randomized controlled trial was performed in 2003 to assess the impact of bathing among the newborns who had received skin to skin (STS) care technique.

The sample size calculation was based on the previous cross sectional study in the hospital where the prevalence of hypothermia at 60 minute post partum was 83% in a setting where STS was not routinely performed. Assuming that if STS is constantly performed, the prevalence at the same time would be reduced by 20% to 66%. With a hypothesis that bathing of babies immediately after birth at 60 minutes was significantly increase hypothermia by 20%. Using a 95% CI, a 80% power the sample size was estimated at 226 .Assuming a 10 % loss follow up or withdrawal from the study, the sample size was increased by 24 to 250.

Consecutive pregnant women admitted in labour were approached and the study explained to them. Those eligible and willing to participate had an informed consent was obtained prior to enrolment. Simple unrestricted randomization and allocation concealment was performed by one of the investigator not involved in the recruitment process. Sequentially numbered opaque sealed envelopes were used for the individual treatment allocation. After delivery, the mother were randomized to either Group A or B. Newborns without signs of asphyxia were selected. All newborn were subjected to STS care. At 60 minutes, those allocated to Group A had their babies bathed with warm water which was assessed before each bath by midwife with her elbow and the babies were bathed for 1 minute and later dried with a towel. Group B did not have the babies bathed. All the babies in the study had temperatures measured using a digital rectal and an infrared tympanic thermometer at 60, 70 and 90 minutes post partum by two research assistants assisted by one of the investigators during the day and night The data collected was entered and analyzed using EPI info version 6.04 by the one of the investigators.

5.3.2 Studies using qualitative methods

Study IV-Perceptions among post delivery mothers of skin to skin contact and newborn baby care in a periurban hospital in Uganda.

Thirty post delivery mothers were purposively sampled from 249 mothers in the previous study in the postnatal ward at the hospital (Patton, 1990). Five FGDs were conducted with post delivery mothers who had had a normal delivery. The study was performed in 2003 and the mothers selected were from those recruited in the randomized controlled trial. The FGD were performed in a secluded area in the post natal ward and the FGD were conducted with a moderator (a social scientist), a midwife who acted as a note taker and an obstetrician as an observer. A standardized interview guide was used for all the FGDs. Questions were raised and the respondent/respondents were encouraged to express their opinions openly about the issues with the moderator encouraged all the women to give their individual opinions. A point of saturation was deemed to have been reached when no new information was being obtained during the interviews.

Study V-Hurdles and Opportunities for newborn care in rural Uganda

In-depth interviews and focus group discussions were used. Respondents were purposively selected from rural communities in 3 districts. They were selected from different villages and parishes with the assistance of the district health visitor, community health workers and local community leaders in the area.

Six in-depth interviews targeting traditional birth attendants were performed. The FGDs conducted were nine in number and consisted of 10-15 respondents composed of either post partum women, elderly female care givers and partners or husbands of recently delivered women. All the post partum women involved had had normal vaginal deliveries in the rural community with unskilled birth attendants. A standardized interview guide covering specific thematic areas on newborn care practices at time of delivery, the post partum period on areas related to thermo protection, birth asphyxia, cord care, was used. Questions were raised and the respondent/respondents were encouraged to express their opinions openly about the issues with the moderator ensuring that all the women and men participated. A point of saturation was deemed to have been reached when no new information was being obtained during the interviews.

5.4 DATA ANALYSIS

Statistical analysis

All the data was initially double entered using Epi info 6.04 software (CDC, Atlanta).The data was transferred to Stata 10 (Stata Corp, College , Texas, USA) for analysis. Background characteristics of the participants were summarized using frequencies and percentages for categorical variables and continuous variables were also categorized using appropriate cut-offs for Study I, II, and III. Chi Square and Fisher's exact tests were used to compare between outcome (hypothermia) and other demographic characteristics at the different time interval when temperature was measured in studies II and III.

We defined neonates to be hypothermic if rectal temperature was $<36.5^{\circ}\text{C}$ at different time intervals of measurement.(WHO, 1997) We defined low birth weight (LBW) as

weight below 2500grams (WHO, 2004a). We also defined time of delivery as day if the pregnant mother delivered between 0700hours and 1859 hours and night if she delivered between 1900hours and 0659hours East African time. Odds ratios and the 95% Confidence Intervals (95%CI) were used to assess the association between potential risk factors and hypothermia.

Univariate and bivariate analysis were done. Chi-square and Fisher's exact tests were used to screen for variables to be included in the adjusted (multivariable model). The inclusion criterion used was that of the P-value from these tests <0.10. We included sex and age because they are known to be important prognostic variables (Kirkwood and Sterne, 2003) All such variables were then initially included in a multivariable model, and removed using a backward elimination type algorithm, if their removal was not significant at the 10% level using a likelihood ratio test. Predictors of hypothermia were established by fitting both unadjusted and adjusted logistic regression models. We used the same procedures at the different time intervals that is 10, 30, 60, and 90 minutes post delivery for study II as well as at the different time intervals of 60, 70, and 90 minutes for study III.

Qualitative data analysis

Content analysis was used for studies IV and V (Graneheim and Lundman, 2004). Audio tapes and field notes were translated and transcribed into English by the research assistants (moderators and note takers).

The text was read several times to identify the meaning units. Key words, phrases were underlined, condensed meaning units formed and the codes were formed. Categories and later themes were constructed during the analysis. This was done by JT and RNB and AB and PO contributed to the discussion and drafting of the article in study IV (Graneheim and Lundman, 2004). In study V, the analysis was done independently by three authors R.N.B, J.K, and J.N. R.N.B drafted the manuscript and J.K, J.N.S, X.N, A.B, and S.P. revised the manuscript and all agreed regarding the final manuscript.

5.5 TRIANGULATION

Different methods were used to obtain a better understanding of adoptions of guidelines for newborn care both at facility and at the community level. Triangulation was utilized in studies III, IV, and V. This refers to the use of a combining use of different kinds of methods to cross check information and conclusions.

We used: (1), investigator triangulation –using different investigators for evaluating the finding in Study IV and Study V;(2) methodological triangulation – the use of multiple of methods to study a problem -both quantitative and qualitative methods were used to study aspects of STS for thermo-protection in study II, III, IV, and V .In addition in study V we different respondents, post partum women, elderly female care takers and husbands or partners of recently post delivered mothers (Mays and Pope, 2000, Patton, 1990). This facilitated analysis and interpretation of the different findings in order to change and make recommendations for interventions for the future.

5.6 ETHICAL CONSIDERATIONS

Ethical clearance was obtained for Studies I, II, III and IV from the institutional Research Review Board of the San Raphael of St. Francis Hospital in 1997, 1999 and 2003. Study V had ethical clearance from Uganda National Council of Science and Technology no HS-403 in 2008.

Information regarding each study was given to the pregnant women by one of the research assistants and participation was voluntary. All procedures to be carried out on the newborn were explained. The risks associated with the discomfort that could arise using a digital rectal or infrared ear thermometer as well the possible risk of injury to the rectal mucosa in studies II and III were mentioned. The probes for the infrared ear thermometer were changed after every reading. Similarly, in order to avoid transmission of infection, a polythene sheath was used to cover the tips of the rectal thermometer and changed after each measurement.

All participants had the right to withdraw from the studies without it affecting the care they would receive from the health providers or from the community leaders. Confidentiality was ensured and all information obtained in all studies was secured and locked in a safe area.

For study V, additional permission was sought from the district and local community leaders. Informed consent was obtained from all participants in studies II and III and verbal consent for the respondents in study IV and V. Permission was obtained from the hospital administration to access and use the data from the records in study I

5.7 SUMMARY OF METHODS

Table 4: Participants, methods and time frame

Study	Setting	Design	Methods	Time	Year
I	Facility based Hospital in Kampala	Cross sectional descriptive	3442 deliveries with 235 perinatal deaths that were audited	9months	1997- 1998
II	Facility based Hospital in Kampala	Cross sectional descriptive	300 newborns consecutively recruited from pregnant mothers delivering at the hospital	2 months	1999
III	Facility based Hospital in Kampala	Randomized controlled trial	249 newborns enrolled and allocated to two Groups A and B	2 months	2003
IV	Facility based Hospital in Kampala	Qualitative - Explorative	5 FGDs performed with 30 post delivery mothers	2 months	2003
V	Rural communities in Ntungamo, Kayunga and Soroti districts	Qualitative- Explorative	Six IDIs and 9 FGDs were performed among TBA, post delivery mothers, elderly care takers, and husbands of post delivered mothers	1 month	2008

6 RESULTS

6.1 POTENTIALLY AVOIDABLE DEATHS (I)

There were 3442 deliveries during the nine months period in the hospital. The perinatal mortality rate (PMR) was 68.3 per 1000 total births. The stillbirth rate was 40.9 per 1000 total births, while the early neonatal mortality rate was 29.3 per 1000 live births. Forty-two pregnant women had intra partum foetal death with an intra partum foetal death rate of 12.2 per 1000 total births. The PMR did not change over these months.

The mean gestational age for pregnant women registering at the ANC was 25 weeks and the mean number of visits was 5. The caesarean section rate was 16.7%. The stillbirth/early neonatal death ratio (SBR/ENMR ratio) was 1.5. There were 40.6 percent of babies who died weighting more than 2500grams. (Table: 5). The odds of experiencing a perinatal death was a reduced by 74 % if one had attended antenatal care (OR 0.26; 95% 0.19-0.36).

Table 5: Characteristics of perinatal deaths in a periurban hospital.

Characteristic	n=235
Sex (%):	
Male	51.5
Female	48.5
Birth Weight, mean (SD)	2088g (1109)
Weight categories: (%)	
ELBW <999g	25.3
VLBW 1000-1499g	12.8
LBW 1500-2499g	21.3
>2500g	40.6
Intra uterine growth retardation (%)	15.5
SBR/ENMR ratio	1.5
Perinatal deaths n (%)	
MSB	55 (23.4)
FSB	86 (36.6)
Early neonatal deaths	94 (40)
Potentially Avoidable deaths n (%)	96 (41)

As no autopsies were performed, the deaths were only linked to immediate clinical sequence of events in the ante partum, intra partum or post partum period that could have directly or indirectly contributed to demise. In the stillbirth category, unexplained normal formed stillbirth, malaria, placenta abruption and hypertensive disorders of pregnancy were the most common cause of death .In the neonatal period respiratory distress syndrome, intra partum asphyxia and septicaemia were more common

The Nordic Baltic Classification assisted the team in classifying and highlighting areas where mortality was high and in identifying potentially avoidable perinatal deaths. A slight variation occurred in the different categories over the time period.

6.2 PREVALENCE AND RISK FACTORS FOR NEONATAL HYPOTHERMIA (II)

The demographic characteristics of the 300 pregnant women recruited in the study showed a mean age of 24.5 years and a mean gestational age of 38.5 weeks. Ninety percent of the participants had attended at least one ANC visit during pregnancy. The mean number of ANC visits was five. The mean birth weight was 3218g with 6.4 % having a weight of less than 2500g.

A high prevalence of hypothermia was found over the different time periods both with measurement taken rectally and by tympanic thermometry. Rectal temperatures taken at 10, 30, 60, 90 minutes showed that newborns were hypothermic by a percentage of 29, 82, 83, and 79 respectively. After subdividing the degree of hypothermia at each time interval, those with moderate hypothermia (32.0 - 35.9 °C) were 37.2, 63.7, 74.3, 68.1 percent respectively. Only one newborn was documented as having a temperature of < 32 degree observed at 10 minutes (Table 6)

Table 6: Grades of hypothermia at different time intervals using rectal thermometry.

Characteristics	10 minutes n =300	30 minutes n =300	60 minutes n =300	90 minutes n =300
Mild Hypothermia (36-36.4 °C) n (%)	53 (61.6)	89 (36.2)	64 (25.7)	76 (31.9)
Moderate Hypothermia (32-35.9 °C) n (%)	32 (37.2)	156 (63.8)	185 (74.3)	162(68.1)
Severe Hypothermia (<32 °C) n (%)	1 (1.2)	0	0	0

The physical location of the hypothermic newborns and type of body contact with the newborn could only partly explain the high prevalence of hypothermia at 30-90 minutes, (Table7).

In spite of maternal body contact following an increasing trend, reaching 71.3 percent at 90 minute, no significant decline of hypothermia was noticed over the time period.

Table 7: Characteristics of newborns found hypothermic at different intervals post partum

	10minutes n=86	30 minutes n=245	60 minutes n=249	90 minutes n=238
Location of newborn (%)				
General labour ward	75.9	75	66	59.8
Private labour ward	5.7	9.8	8.9	9.2
Theatre	18.4	4.2	0.4	0
Special care unit	0	9.8	17.8	21.8
Postnatal ward	0	1.2	6.9	9.2
Body contact with mother (%)	13.8	36.1	54.6	71.3

In the multivariate logistic regression analysis, three independent variables were consistently associated with hypothermia. The odds of being exposed to hypothermia if the baby was less than 2500 grams was five times compared to a baby with a birth weight of greater than 2500grams over the different time points, while the odds of being exposed to hypothermia if the baby was female increased more than 1.5 times at the different time points (table 8)

Table 8: Potential risk factors to hypothermia at different time points postpartum

Variable	Sub Category	10 minute aOR(95% CI)	30 minutes aOR(95% CI)	60 minutes aOR(95 % CI)	90minutes aOR(95%CI)
Age of Mother	16-19	1	1	1	1
	20-34	0.66(0.28-1.2)	0.72(0.36-1.45)	0.56(0.26-1.21)	0.74(0.35-1.55)
	35+	3.26(0.64-17)	0.65(0.19-2.21)	0.30(0.09-1.03)	0.17(0.04-0.67)
Birth weight	NBW	1	1	1	1
	LBW	3.85(1.1-14.3)	3.23(0.87-12.5)	7.69(0.99-50)	4.17(0.87-20)
Sex	Male	1	1	1	1
	Female	1.46(0.72-3.0)	2.12(1.26-3.60)	1.73(1.0-3.00)	2.19(1.25-3.84)

6.3 THE IMPACT OF EARLY BATHING OF NEWBORNS (III)

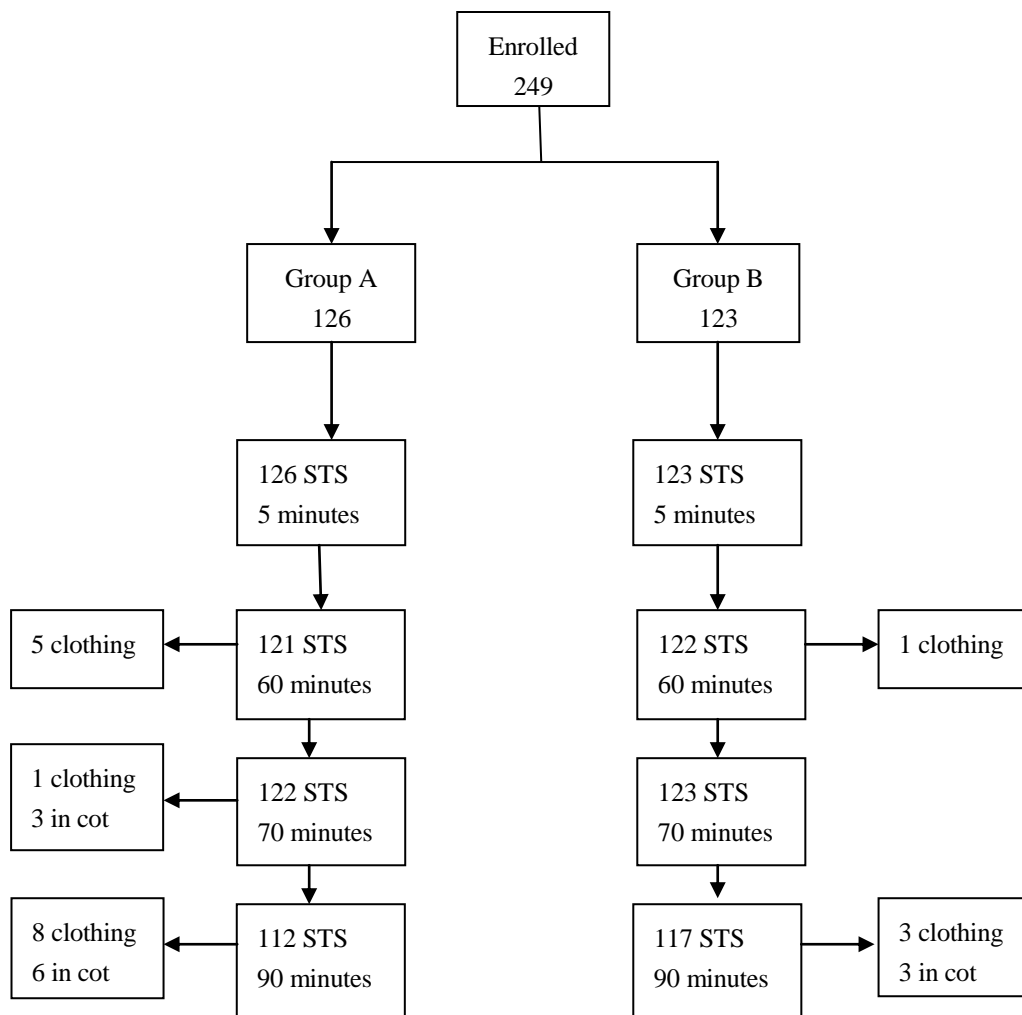


Figure5: Trial profile for the early-bathing study.

249 pregnant women were recruited for the trial in the hospital. Ninety percent attended antenatal care clinic. The demographic characteristic between the two groups was similar. With regard to the pregnant women’s knowledge about STS only 28% had ever heard about it in both groups and 20% of these enrolled had received health education about the practice from the health providers in the ANC. Ninety percent of those enrolled thought it was a practice good from them. No difference was observed between the groups at 5 or 60 minutes post delivery with regard to hypothermia.

In the bivariate analysis, the effect of bathing of the newborn resulted in a significant increase in hypothermia at 70 minutes post partum (10 minutes after bathing) in group A compared to group B where bathing was not done. This difference in hypothermia was sustained at 90 minutes (Table 9).

Table 9: The effect of bathing of newborns on the development of hypothermia at different time intervals postpartum.

Characteristic	Group A (Bathed) n =126	Group B (Not bathed) n =123	Relative Risk	95% CI
Hypothermic babies at 70 minutes post partum. n				
Rectal temp	82	48	1.7	1.3<RR<2.23
Tympanic temp	96	50	2.25	1.65<RR<3.1
Hypothermic babies at 90 minutes post partum n				
Rectal temp	70	36	1.68	1.32<RR<2.2
Tympanic temp	83	40	1.97	1.51<RR<3.1

Using multivariable logistic regression, babies of mothers in group B had an odds reduction of experiencing hypothermia by 68% at 70 minutes (OR 0.32; 95% CI 0.17-0.60) and 63% at 90 minutes post delivery (OR 0.37; 95% CI 0.20-0.67). (Table 10).

Table 10: Potential risk factors after bathing for hypothermia at different time interval postpartum

Variable	Sub group category	70 minutes aOR(95% CI)	90 minutes aOR(95% CI)
Age	15-24	1	1
	25-34	0.78(0.04-1.52)	1.06(0.55-2.02)
	35+	1.86(0.54-6.37)	1.34(0.42-4.25)
Group	Bathed(A)	1	1
	Not bathed(B)	0.32(0.17-0.60)	0.37(0.20-0.67)
Mother's occupation	Housewife	1	1
	Peasant	0.59(0.21-1.64)	1.01(0.39-2.66)
	Employed	0.37(0.15-0.90)	0.36(0.14-0.92)
	other	0.78(0.21-2.94)	0.97(0.26-3.63)
Room temperature	<25 °C	1	1
	25 °C +	0.92(0.37-2.27)	0.88(0.34-2.25)
Birth weight	NBW	1	1
	LBW	1.30(0.44-3.85)	2.50(0.73-8.33)
Sex of Baby	Male	1.	1
	Female	1.5(0.78-2.9)	2.39(1.27-4.5)

The odds of being exposed to hypothermia if the baby was female were 2.4 times greater compared to the male babies at 90minutes.

Calculating the attributable risk percent (AR%), 40.1% and 48.1% of babies who were hypothermic at 70 and 90minutes, respectively, could have been prevented if bathing was not done (Kaelin and Bayona, 2004).(Table 11). The number needed to harm was 4. We would need to bath about 4 babies to have one hypothermic baby at both time intervals.

Table 11: Attributable risk percent of early bathing.

	70 minutes		90 minutes		AR % at 70min	AR% At 90min
	<36.5	≥36.5	<36.5	≥36.5		
Bathed	82	44	70	56	40.1	48.1
Not Bathed	48	75	36	87		

Note: <36.5= hypothermia

≥36.5=Non hypothermic

6.4 PERCEPTIONS ON STS AMONG POST DELIVERY MOTHERS (IV)

Five FGDs were conducted in study IV to explore the perception among post delivery mothers of skin to skin contact and newborn baby care. Two main themes emerged from the FGDs: ‘Acceptability of health practices are influenced by knowledge and sensitization’ and ‘Pregnant women’s choice are dependent on social, cultural and economic factors.

Mothers expressed varying opinions about the usefulness of STS: some knew about its use to reduce the risk of hypothermia; others were ignorant, and some believed STS was an intervention used to distract mothers from pain in the post delivery.

“To me I know it was just a trick to make us not disturb them when they are stitching. I imagined it was that. But when I made the comment the nurses told me that was my thinking but I believe they know no mother can throw away the baby despite the pain. So they made us have them on the chest such that when they are stitching, we don’t disturb them”.
(FGD 1)

“The truth is that I really did not understand but the nurse said that putting the baby on the chest enabled it to get warm” (FGD 4)

Mothers were fearful of and expressed concerns regarding the spread of HIV infection to the child in case one was HIV positive. STS technique was thought to be a problem in such a scenario as blood and fluid contact with the raw area of the umbilicus was possible

“HIV infection can be prevented by stopping the mother from touching the baby, mostly the umbilical cord .That is why I got concerned when that thing was made to touch me. The baby can easily get HIV and that

was what was happening. However, I had gone for the test and knew my status and it did not worry me. “(FGD 1)

Information regarding pregnancy and newborn care was obtained from several sources mainly the health workers or elderly caretakers, mothers, mother in-laws or relatives.

“When you come for antenatal, they give you lectures and are given tetanus toxoid immunization. You are checked properly for seven to eight months. You are taken for a scan to know the position of the baby in the womb. So by the time you give birth you know the status of your baby”. (FGD 3)

“Most of the times the elders advise us .The mother in law or the elders help us during delivery and teach us how to handle the baby, how to place the baby on the breast and how to hold and carry it”. (FGD 3)

The STS technique was considered to give a mother immediate access to her baby. It enabled her to feel close to the baby and helped her initiate breast feeding quickly. It was also said to be very natural. In many cultures, it is common to calm and soothe the baby on the chest when the baby is crying or sick. The following excerpts from the discussion highlight some of the mother’s attitudes and experience with STS:

“I think it teaches us to start loving our babies from the very beginning they are born because, like for my case I told you already the pain had made me hate the baby. I even told the nurses in the labour ward I do not think I will have love for this child. However, to my surprise after telling them, they still place the baby on my chest and somehow the affection came naturally so I think it is good despite the umbilical cord.” (FGD 1)

“This is better because when they put the baby on the chest, there is a way you feel happy immediately after delivery. But if the baby is far, you feel like a visitor in the hospital who has come to check on her friend”. (FGD 2)

In some instance the mother’s choice was not respected and mother had to contend with the decision of the health provider after delivery

“The problem I found was that when I finished delivering. I was in one position for a long time and yet I was feeling pain .I wanted to change position but when I told the nurse, she told me to wait. I was uncomfortable; she took her time and eventually removed the baby later.”(FGD 5)

Most of the mothers had attended antenatal care more than once and knew of its importance especially in regard to the health care providers being able to detect a complication during pregnancy, give health education and prepare mothers for birth. The choice of place for delivery depended mainly on the husband as he was considered responsible for the pregnancy, finances and the final decisions maker in the family, a repeated quotation in the focus group discussions. The social family network of the mother- in- law, the mother’s mother, aunts, grandmother, proximity to the place of

one's residence, and previous experience in a health unit were also key factors influencing the choices one made.

“I have to tell my husband because he is the one who has to work an all those issues. He is the owner of the problem. If he is not around I have to consult with the sister I live with my mother or mother in law about the hospital” (FGD 4)

“On my first delivery I went to a hospital but they made me suffer because I did not know about giving birth. Whenever I called the nurse when I got pain they said that I was unnecessarily shouting yet I felt that the child was about to come out but they were not caring. They just look at you even when the baby is about to come out. But when I came here I was alone and the nurses kept checking on me regularly. That made me very happy.” (FGD 2)

6.5 ACCEPTABILITY AND FEASIBILITY OF PRACTICES IN THE COMMUNITY (V)

Study V was carried out to explore the acceptability and feasibility of a number of newborn care practices at household and family level in rural communities in different regions of Uganda with regards to birth asphyxia, thermo protection and cord care. Below is Table 12 depicting themes that were created.

Table 12: Summary of themes, categories and codes form analysis

Codes	Categories	Themes
Cleanliness Foundation of life Evil spirits & misfortune Wind for care Experience	Beliefs & practices	Barriers to Change
Speeds healing Multiple functions	Superior Traditional medication	
Transmission of disease Resistance to change No finances Payment in kind	Constraints for adoption	
Recommended practices Identification of risk	Conforming to care	Windows of Opportunities
Easy to accept Modification Prompt referral	Adjustment from old to new	
Responsibility	Support from men	

Some of the recommended newborn practices were deemed to conflict with traditional and cultural practices. Promotion of delayed bathing as a thermo-protection measure and dry cord care were unlikely to be accepted and spiritual beliefs were attached to use of local herbs for bathing or smearing of the baby's skin.

“The newborn baby is dirty with whitish substances around the neck and armpits. The newborn comes with water that is dirty and smelly and most

of all slippery. That's what makes us bath the newborn immediately.” (FGD with mothers, Soroti district.)

The practice of dry cord care was seen as difficult to adopt in the community as the traditional way of caring for the cord was thought to be superior. Slow cord healing would delay the return to the gardens and to performing other household chores.

“They cannot accept, because if they use that method of dry cord care, the cord will take long to fall off. Sometimes, they use herbs like “Akatooma” so that the cord can get off in a few days”. (IDI, TBA Ntungamo)

However, there were windows of opportunities that could be built on and could possibly tilt to the balance so that the community could take up the recommended practices. There is an understanding that the babies are vulnerable to cold and respondents highlighted preparations during the pregnancy period or at the time of delivery to prevent this. Endeavouring to have a cloth, a blanket, a baby shawl or other heavy clothes for thermo-protective purposes was common in all the regions as illustrated by the following quotes.

“If you have clean clothes, a baby shawl or a soft blanket, you use it to cover the baby and even when you don't have one, you can use ‘a kitenge.’ [A dress commonly worn by mothers]. (FGD with care takers, Ntungamo)

“Because it feels very, very cold at that time of birth, I wrap it round and round from head to toe only leaving the face.” (FGD with caretakers, Soroti district).

“For us in the village, after birth, you fear that the baby may get shock when you put it in water and something bad can happen to it, so you just cover it. Long time ago, they used to bath the baby but now we have been enlightened. Even someone said that you can spend a week without bathing and the baby will still be fine”. (FGD with caretakers, Ntungamo district)

Some of the recommended newborn practices could easily be adopted provided some modifications were made. The practice of STS was one such area.

“No, they cannot accept to do a thing like that (Skin to skin contact) because the baby gets cold. They can only accept when the baby is wrapped with a cloth before placing it to the chest of the mother”. (IDI, TBA Ntungamo)

The alternative given for ease of acceptability could be if the mother had a bath first instead of the baby being bathed and later practice skin-to-skin contact.

“I think it has no problem because, if the mother is not dirty, or if she bathes immediately after birth, then I think it's ok to put the baby on the

body of the mother because even if the mother sweats it would have no problem". (FGD with fathers, Ntungamo district)

The husbands or partners were found to be informative about the practices that occurred during birth and in some instance were supportive to the promotion of the recommended practices.

"If there is no doctor around at the time of delivery, I will get clothes, place the baby on and make sure it does not touch the ground. I will then cut off the umbilical cord, cover the baby, remove dirty things from the mouth" (FGD with fathers, Kayunga district)

"Yeah, cleaning the cord with water and letting it to dry can work. I remember on my second newborn we used that method only as I had no money and it worked." (FGD with fathers, Soroti district)

7 DISCUSSION

We found that a number of perinatal deaths might have been prevented if evidence based guidelines were used. There was inappropriate use of thermo protective practices by health workers (I, II, III). Resistance to accepting of some of the newborn practices in the hospital and the rural communities were expressed by the mothers, care givers and husbands as these practices were deemed to conflict with traditional and cultural practices (IV, V) However, there is the opportunity to build on traditional practices that are in agreement with biomedical evidence as an avenue to negotiate and change the other practices associated with the risk of morbidity and mortality (V).

7.1 MISSED OPPORTUNITIES

We found fewer perinatal deaths amongst those who had received antenatal care (ANC) compared to those had not (I). Similar findings elsewhere are indicative of the positive attributes obtained from ANC (Jansone et al., 2001, Ebrahim et al., 2000). However, although more than four visits to the ANC was reported by 50% of the participants recruited in studies I, III, health education on thermo protection was rarely provided to the pregnant women by the health providers (III). The antenatal period is key along the path of the continuum of care, where opportunities for the health education, sensitization, and provision of some of the recommended practices are being missed. This omission with regard to thermo-protective messages may also reflect on some of the shortcoming in services recommended in the ANC. Repeated missed opportunities such as this and for other interventions increases the risk of the pregnant women and their babies experiencing morbidity or mortality (Ndyomugenyi et al., 1998, Tann et al., 2007, Kiuwua and Mufubenga, 2008, Boller et al., 2003, Tawiah-Agyemang et al., 2008).

Post partum respondents identified health providers as potentially important informants to provide health related messages (study IV). There is need to encourage health workers to exploit and use ANC as a crucial period during which interventions for the pregnant woman and education of herself, her partner and other care givers who will be involved in the care of the newborn can commence (Kirkwood et al., 2008).

7.2 THE DELIVERY, POST PARTUM PERIOD AND TASK SHIFTING

We found a high number of intra partum foetal deaths and asphyxia related neonatal deaths, which on several occasions after an audit were indicative of a deficiency in the management of labour, intra-partum foetal monitoring, and neonatal resuscitation (I). The reasons attributable to this were a human resource problem and lack of appropriate equipment for use during foetal monitoring and resuscitation.

The workload in terms of midwife to patient ratio was 1:3 and this ratio was worse during the night (I). This workload contributed at times to poor monitoring of the mothers in labour. It highlights the dilemma of the few skilled workers available in many low resource settings. In Uganda, the need for additional formally trained health providers to fill the positions at health centre II-IV and general hospital is estimated at one thousand eighty two. This coupled with the brain drain puts further strain on the

proper delivery of health services in the health units (MOH, 2005, Nguyen et al., 2008). There is therefore need to consider task shifting within different ranks of the health professionals in order to facilitate a continuum of care. At facility level in labour wards, nursing aides can be employed to help in the monitoring and delivery of babies. In settings with few doctors or none, operative procedures such as caesarean section can be delegated to trained medical assistants (Pereira et al., 1996, Pereira et al., 2007)

In view of the fact that the majority of deliveries occur in the rural community without the assistance of a skilled attendant, the strategy of task shifting in this area is paramount. Traditional birth attendants (TBA) with previous training responded positively regarding the need for early referral and use of some of the recommended newborn care practices (V). Elsewhere a meta-analysis of the impact of training TBAs reported a 6% decrease in perinatal mortality and an 11% decrease in birth asphyxia associated mortality among mothers cared for or living in areas served by trained vs. untrained TBA (Bhutta et al., 2009, Bang et al., 2005). As stakeholders in the community, their contributions toward maternal newborn care with regard to advocacy, conducting deliveries, referrals and influencing behaviour change for newborn care is important and need to be reconsidered.

Other cadres such as community volunteers, nursing aides, lady health workers, women's' group have been used in other settings with a positive impact on decreasing perinatal and neonatal mortality (Baqui et al., 2009, Bhutta et al., 2008, Kumar et al., 2008, Manandhar et al., 2004). Village health teams have been piloted and are being scaled up in Uganda. Defining their terms of reference with regard to newborn care, training, remunerations, balancing the work load related to other health issues and support supervision are important prerequisites for effectiveness.

A change in technology may also be considered. Use of intermittent auscultation with a pinard stethoscope is ideal in many low resource countries. Complementing this with a hand Doppler to identify babies with a non- reassuring foetal heart pattern was introduced in the hospital (I). In other low resource setting it has been found to be associated with a decrease in neonatal seizures compared with the use of a pinard stethoscope alone and one that needs to be considered for use in other health units in the country (Hofmeyr et al., 2009, Mahomed et al., 1994)

7.3 TRANSLATING EVIDENCE BASED KNOWLEDGE TO PRACTICE

The use of thermo protective guidelines by health providers was inadequate (II, III). The lack of adherence to the guidelines by health providers is a concern considering the immediate and long term association of hypothermia with neonatal mortality and morbidity (Sodemann et al., 2008, Elliott and Mann, 1957, Gandy et al., 1964). Knowledge and practice of thermal control measures by health professional in several low and middle income countries have been found to be insufficient and this problem needs to be addressed (Dragovich et al., 1997).

The reason for the slow uptake by the health workers was not explored in the studies. Translating evidence-based knowledge into practice is a challenge. Multiple strategies

have been advocated to facilitate the translation of evidence into clinical practice but with mixed effects. The intensity of dissemination process, social marketing, regular supportive supervision, application of quality assurance, use of local leaders in the society may help in the increased usage of evidence-based care (Haines et al., 2004, Doumit et al., 2007). Factors related to the work environment, poor team work across cadres of health workers, failure to confront poor practice when witnessed, lack of interest, difficulties in changing old practices and expectations for payment hinder adoption of guidelines (Nzinga et al., 2009).

7.4 THE BELIEFS OF THE MOTHERS, CAREGIVERS AND THE SOCIAL NETWORK

Bathing of babies after birth was associated with an increased risk of hypothermia, even when the baby was kept skin-to-skin (III). Adherence to the WHO guidelines of delayed bathing and skin-to-skin needs to be reinforced (WHO, 1997). The challenges faced regarding the practice of early bathing of babies after birth and performing STS are related to the belief that vernix caseosa is dirty and that vaginal fluid is infectious (Studies IV V). Most mothers had divergent views of the acceptability of adopting delayed bathing and putting the newborn skin-to-skin. Modification of the recommended practice by e.g. using a damp cloth to clean the baby and by placing a cloth between the baby and mother's skin was deemed to be more acceptable (study V).

Some of the traditional practices are deeply rooted in the culture. The use of various substances for cord care, an obvious risk to infection is still prevalent in most rural communities in Uganda (Waiswa et al., 2008, Nsungwa-Sabiiti et al., 2008). Although health providers advocate for dry cord care, (WHO, 1998, MOH, 2006), the community had divergent views of its acceptability and its adoption was rejected by most of the respondents (V). As behaviour change messages are developed, a possible strategy could be to encourage the use of an alternative application of a topical antiseptic or chlorhexidine as opposed to the use of potentially infectious substances (Mullany et al., 2006).

Female babies were more likely to be hypothermic over the different time periods in (II, III). The reasons for this are not clear. In other settings a significantly lower temperature with males babies compared to female babies has been found at different time points over a 5 day observation period (Nagy, 2001). In other regions where hypothermia was detected, no difference was observed between female and male babies (Baqui et al., 2007, Osrin et al., 2002, Zayeri et al., 2007). The male neonate is more vulnerable at birth with an increased perinatal and neonatal mortality and morbidity especially with low birth-weight neonates (Stevenson et al., 2000, Cuestas et al., 2009). The developmental biology for this disadvantage is currently unknown. It is possible that the difference noticed between male and female babies in this setting may have arisen from other factors related to thermo control like the different types of clothing used to cover the newborn babies depending on gender. Here we offer no explanation, but call for further research.

The family network was instrumental regarding decisions relating to the utilisation of health care services (IV). Other negative cultural practices such as seclusion of the baby and mother during the first week of life were noted to be a deterrent to accessing health care, if a newborn developed an illness (V). Behaviour change communication interventions need to target not only the pregnant woman but also the social family network especially the husband, the mother in law and other elderly female care takers of the newborn who influence what is done to the newborn as well as influence the acceptance and adoption of recommended practices (IV, V).

Behavioural change theories can act a framework through which to initiate, scale up and sustain behavioural change interventions both at a community and at facility level. The social ecological model incorporates components of the theory of planned behaviour by Fishbein interacting with enabling factors, local factors, external investments and constraints factors that would support culturally acceptable and effective interventions (Panter-Brick et al., 2006). Examining the Uganda situation using this model there is political commitment and the government through the ministry of health over the last 5 years has prioritized maternal, newborn and child health with the formulation of various policies and strategies. At community level VHTs are being scaled up and will be used to initiate home visits, offer education and do appropriate referral in first week of life.

However, we found that direct and indirect costs of services for care of pregnant women at the health units and the acceptability of the services in the previous pregnancies were observed to affect utilisation (study IV). Several innovative financial strategies to enable the poor to access care need to be tried apart from the abolition of user fees in government hospital in Uganda (Nabyonga-Orem et al., 2008). The use of vouchers, community loans, community insurance system, conditional transfers and contracting out and pay for performance have met with some success in other low resource settings compared to Uganda where low uptake of community insurance was observed (Basaza et al., 2007, Bhutta et al., 2009). Further trials are called for to examine which of these mechanisms will enable access to care in Uganda settings.

7.5 FUTURE AREAS FOR RESEARCH

The use of local herbs is strongly rooted in the Ugandan culture and these are utilised for different purposes during pregnancy, childbirth and in the newborn period. Some of these have been identified as detrimental and for others no biomedical evidence is available regarding their safety or risk (Kamatenesi-Mugisha and Oryem-Origa, 2007, Hamill et al., 2003). The skin performs an important function of acting as a barrier between the body and the external environment. The skin barriers for a preterm is not fully developed and emollients or solutions used on the skin can increase or decrease trans-epidermal water loss or be a source of infection for the preterm (Rutter, 2003, Darmstadt et al., 2005b). What are the effects of the use of the herbal solution Ekyogero or Eshabiko) in this regard on the newborn baby's skin.

Application of various substances for care of the umbilical cord was noted to be prevalent in the community and is a potential source of infection. A key area for future research is finding ways to bring about a decrease in neonatal infection and sepsis that

can arise from various sources during the birth process and post partum period. Research is needed to determine the role of and the scaling up of use of local application of disinfectants to prevent umbilical infection and sepsis in low resource settings (Bahl et al., 2009).

There is also a need to understand better methods to facilitate the process of uptake and implementation of evidence based guidelines by different health providers. There is further need for more studies designed to prevent, detect and improve management of babies born with asphyxia at community and facility level. Studies are also required to assess if there is a gender difference at birth in relation to new born thermoregulation and protection.

7.6 METHODOLOGICAL CONSIDERATIONS

Information bias In order to prevent measurement errors that could arise from the measurement of temperature at the different points in study II and III, the research assistants involved in the study underwent training prior to the commencement of the studies. Standard operating procedures were designed on how measurement of both rectal and tympanic thermometry were to be performed. The thermometers utilized were new and strictly used for the study. However, no calibration was done for both thermometers during the trial period (Rothman, 2002, Bhopal, 2002)-

Triangulation: This refers to a method of cross checking information and conclusions through the use of multiple procedures and sources to assess whether the different sources are in agreement. Methodological triangulation was used to assess the respondents' knowledge on STS in studies III and IV. Data triangulation using different data sources to understand the subject of interest was performed using in depth interviews and focus group discussions for study V. In both studies IV and V different investigators were used. These consisted of two obstetricians (RNB, PO) a social scientist (JT) and a researcher assistant (AB) for study IV. While in study V an obstetrician (RNB), a paediatrician (JNS), an anthropologist (JT), a social scientist (XN), a public health specialist (AB) and a public health specialist in global health (SP) were utilized.

Member checking and peer debriefing: After data collection and analysis member checking was carried out to a sample of some of the respondents regarding the findings that had emerged in study V in the districts of Soroti and Ntungamo. Peer debriefing was performed to other peers (researchers and professional colleagues) for study IV and V.

Reflexivity: This refers to the need for self-awareness and critical reflection of the part of the researcher, given the potential for bias in the research process and in the conclusions reached. In this thesis this was minimised through a process of triangulation by investigators in both studies IV and V. In study IV, the fact that two of the health providers worked in the hospital, one an obstetrician (RNB) and the other a midwife (CN) and that the interviews were performed on the hospital premises may have affected the responses from the respondents in the FGDs. In study V, four of the

investigators had a medical background (RNB, JNS, AB, and SP); one was an anthropologist (JK), the other was a social scientist (XN).

Transferability or external validity refers to the extent to which the findings can be transferred to other settings beyond the context in which the study was performed (Graneheim and Lundman, 2004). By carefully describing the study settings in both studies, the descriptive details of the study processes and the findings, we give the reader a chance to judge whether results could be transferable to other settings (Johnson, 1997).

Four out of the five studies were conducted in the hospital, a private nongovernmental not for profit general hospital located in a periurban area and where all patients pay for their medical fees. Study I, II done in this hospital may not represent findings in other hospitals within the country. The findings of the randomized controlled study III may be generalized based on the understanding of the underlying physiology related to thermoregulation and effect of bathing on the newborn (Gray, 1997, Rothman, 2002).

8 CONCLUSION

The key conclusions of this thesis are:

- There is a high perinatal mortality at the health facility studied and the failure to adhere to evidence based guidelines could have contributed to some of the potentially avoidable perinatal deaths.
- There is a high prevalence of hypothermia in newborn babies and thermoregulatory guidelines are poorly executed.
- Bathing of babies within the first hour of life is associated with an increased risk of hypothermia
- The practice of skin to skin contact was not appreciated by some of the post partum mothers in the hospital.
- The acceptance and adoption of some of the thermo-protective practices and cord care practices in the rural communities may be possible only after modification.
- Targeting relatives and other caretakers of the newborns apart from the pregnant woman may influence the acceptance and adoption of the use of the recommended newborn care practices.

9 IMPLICATIONS

- Hypothermia is a common problem. Thermo-protective practices need to be promoted. Avoidance of bathing the babies in the first 24 hours of life should be promoted.
- As newborn care interventions are being scaled up nationally and further efforts are made to encourage more pregnant women to deliver at health facilities, it is necessary to also improve the quality of care given by health providers
- Presently, national maternal and perinatal death audit guidelines have been established at the ministry of health and renewed effort to train health workers in the country is are being organized. Stewardship, support from the administrations of the units, supervision from the districts and a multifaceted approach involving strategies such as educational seminars, audit feedback, use of opinion leaders, support supervision, reminders, mass media campaigns, and patient mediated interventions are needed to encourage health workers to adhere to the guidelines.
- As behaviour change messages and interventions are initiated, there is a need to build on those practices already correlating well with biomedical recommendations, tailor certain practices commonly performed in some regions and modify some of them for increased acceptability, in order to facilitate adoption and scaling up.

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