

OBSTRUCTED LABOUR AND BIRTH PREPAREDNESS

Community Studies from Uganda

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To Rachel, Susan & Conrad

Knowledge is indivisible. When people grow wise in one direction, they are sure to make it easier for themselves to grow wise in other directions as well. On the other hand, when they split up knowledge, concentrate on their own field, and scorn and ignore other fields, they grow less wise—even in their own field.

Isaac Asimov (1920-1992)

Abstract

Labour is said to be obstructed when the presenting part fails to descend through the birth canal despite strong uterine contractions. The condition is mostly prevalent in low-income countries where the main causes are cephalopelvic disproportion and malpresentation. The overall aim of this thesis was to investigate the individual, community and health system factors associated with obstructed labour and birth preparedness practices in south-western Uganda.

Analysis of 11,180 obstetric records was conducted to determine factors associated with obstructed labour (*Study I*). Grounded Theory (GT) was used to analyse data from 20 focus group discussions (FGDs) (*Study II*). 764 recently delivered women were questionnaire Interviewed to assess knowledge of key danger signs, birth preparedness and assistance by skilled birth attendants (*Studies III & IV*).

The risk of obstructed labour was statistically significantly associated with being resident of a particular district [Isingiro], with nulliparous status, having delivered once before and age group 15-19 years. The risk for perinatal death as an adverse outcome was statistically significantly associated with districts other than five comprising the study area and grand multiparous status. Analysis of FGDs resulted into a conceptual model, which is presented as a pathway initiated by women's desire to "protect own integrity" (core category), which was closely linked to 6 other categories; taking control of own birth process, 'reaching the limit - failing to give birth, exhausting traditional options, partner taking charge, facing challenging referral conditions, and enduring a non-responsive health care system. The relationship between knowledge of key danger signs during pregnancy and postpartum and birth preparedness showed statistical significance. Furthermore the relationship between women's decision-making on location of birth in consultation with spouse/friends/relatives and assistance by skilled birth attendants also showed statistical significance. Education, household assets and birth preparedness showed clear synergistic effect on the said relationships.

Individual and health system factors are strongly associated with obstructed labour and its adverse outcomes in south-western Uganda. There is a need for health care providers to understand and acknowledge

women's reluctance to involve others during childbirth. Community empowerment and developing capacities of health care providers and health care facilities will increase skilled attendance. A continuum of care needs to be developed between communities and health care facilities. Antenatal care could be used for promoting birth preparedness. Universal primary and secondary education programmes ought to be promoted so as to enhance skilled delivery. Improved maternal health will require multi-sectoral interventions.

Abbreviations

AFR	Adolescent Fertility Rate
ANC	Antenatal Care
AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odds Ratio
DHS	Demographic and Health Survey
EmOC	Emergency Obstetric Care
FGD	Focus Group Discussion
GH	General Hospital
GT	Grounded Theory
HC	Health Centre
HSSIP	Health Sector Strategic & Investment Plan
MDG	Millennium Development Goal
MOH	Ministry of Health
NDP	National Development Plan
NRH	National Referral Hospital
OR	Odds Ratio
PHP	Private Health Practitioners
PI	Principal Investigator
PNFP	Private Not for Profit
RRH	Regional Referral Hospital
TCMP	Traditional and Complimentary Medical Practitioners
TFR	Total Fertility Rate

SBA
WHO
VHT

Skilled Birth Attendants
World Health Organization
Village Health Team

List of Publications

This thesis is based on the following publications which will be referred to by their Roman numerals:

- I. Kabakyenga JK, Östergren PO, Turyakira E, Mukasa PK, Odberg Pettersson K. Individual and health facility factors and the risk for obstructed labour and its adverse outcomes in south-western Uganda. *BMC Pregnancy Childbirth* 2011, 11:73.
- II. Kabakyenga JK, Östergren PO, Emmelin M, Kyomuhendo P, Odberg Pettersson K. The pathway of obstructed labour as perceived by community members in south western Uganda: a grounded theory study. *Global Health Action* 2011, 4:8529
- III. Kabakyenga JK, Östergren PO, Turyakira E, Odberg Pettersson K. Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. *Reprod Health* 2011, 8(1):33.
- IV. Kabakyenga JK, Östergren PO, Turyakira E, Odberg Pettersson K. The effect of birth preparedness and women's decision-making on location of birth and assistance by skilled birth attendants among women in south-western Uganda. *Manuscript submitted for publication.*

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Introduction

Obstructed labour

Labour is said to be obstructed when the presenting part of the fetus fails to descend through the birth canal despite strong uterine contractions [1,2,3]. The major cause of obstructed labour is cephalo-pelvic disproportion which may be due to a small pelvis, a large baby, fetal malpresentation, a tight perineum, or abnormalities or tumours of the uterus, ovary, or vagina [4,5]. Neglected obstructed labour is a major cause of both maternal and newborn morbidity and mortality in low-income countries and accounts for 8% of all maternal deaths globally [6]. In the Global Burden Disease (GBD) study of 1990 obstructed labour accounted for 22% of all maternal conditions and was the most disabling [1]. Maternal complications following prolonged obstructed labour include sepsis, ruptured uterus, haemorrhage and trauma to the bladder. The most distressing and debilitating long term complication following obstructed labour are vesico-vaginal and recto-vaginal fistulae [1,5,7]. This condition condemns the affected women to a wretched existence [8]. The recommended interventions for obstructed labour as well as other causes of maternal morbidity and mortality are availability of emergency obstetric care to women in need. In the infant, neglected obstructed labour may cause asphyxia leading to stillbirth, brain damage or neonatal death [9]. Availability and use of emergency obstetric services coupled with prevalent good nutrition has rendered this complication a rarity in most high income countries [3]. However, long term improvement will largely depend on reducing early motherhood and improvement in nutrition [10]. Although the United Nations Declaration on Millennium Development Goals (MDGs) [11] has put maternal and child health on the global agenda and there are signs of improvement, a recent study reported that most of the sub-Saharan African countries will not meet the 2015 MDG targets [12].

Strategies to reduce obstructed labour

Knowledge of obstetric danger signs

Every pregnancy faces risks more so for women in low-income countries [13,14]. Women individually, their partners and the communities need to be educated on obstetric danger signs so that they can seek appropriate care from skilled providers in time. Studies in low-income countries show that knowledge of obstetric danger signs especially during pregnancy and delivery among women is deficient [15,16]. Studies further report that prolonged labour as a danger sign was reported by the least number of women respondents [15,17,18]. Knowledge that obstructed labour is a danger sign would help the women, their partners, families and communities to seek appropriate care early.

Birth preparedness

Birth preparedness for a woman entails her identifying a skilled birth attendant/health facility with delivery services, making transportation plans, saving money and a blood donor in advance [19]. However the practice of individual women identifying blood donors is discouraged in high HIV prevalence countries where voluntary donation to centralised blood banks is preferred [20,21]. Studies conducted in sub-Saharan countries report low rates of birth-preparedness [22,23,24,25]. High levels of birth preparedness have been shown to be strongly associated with increased levels of use of skilled birth attendants [23,24,25,26].

Skilled birth attendance

Skilled birth attendance is one of the strategies aimed at reducing maternal and new born mortality [27,28,29]. Having a skilled birth attendant at every birth together with an enabling environment has been shown to reduce maternal morbidity and mortality [30,31]. However, in most low-income countries especially those in sub-Saharan region the majority of women deliver at home with assistance of family members, friends or

traditional birth attendants and in some cases with no assistance [32]. The situation is further aggravated by the fact that most health care facilities which offer comprehensive emergency care services are located in urban areas, a distance away from the rural areas where the majority of the population live.

Theoretical framework

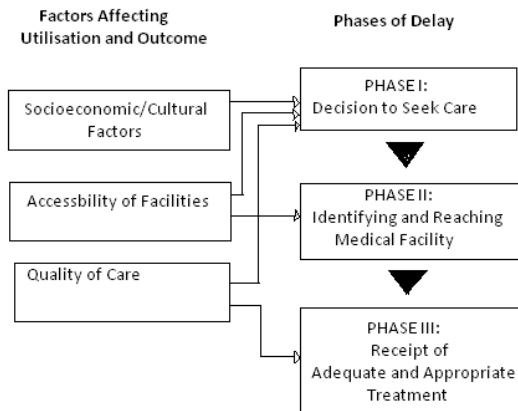
The Three Delays Model

More than 75% of maternal deaths are attributable to direct causes and can be prevented with timely management [6]. Delay by women with obstetric complications in reaching and accessing care is the main cause of maternal mortality. A three delays model was presented by Thaddeus and Maine [33] to explain the chain of factors responsible for the high maternal morbidity and mortality in low-income countries (Figure 1).

The first delay is by the individual, the family or both in making a decision to seek care (delay I). This delay is due to socio-economic/or cultural factors, which include women's status, decision-making, financial and opportunity costs. The second delay is by women failing to reach the health care facility due to physical accessibility, cost of transportation and condition of roads (delay II). The third delay is when women take time to receive appropriate and adequate care once at the health facility due to shortage of resources or competence of personnel (delay III). However Thaddeus and Maine conceded in their review paper that there were large gaps in the literature concerning factors affecting utilisation of maternal health care and made a recommendation that more field-based research be undertaken to elaborate on factors leading to delay in different settings.

Gabrysch and Campbell [34], in a review paper, have used the three delays model to group the determinants of delivery service use into sociocultural, perceived need, economic and physical accessibility. Accordingly studies on women's autonomy, which is a sociocultural factor and health knowledge which is in the perceived need group, have produced mixed results in as far as skilled delivery is concerned. Furthermore there are variations across populations both within countries and across countries on use of maternal health care due to contextual factors, which are related to funding and the organization of health services [35]. Thus, there is a dire need of carrying out context specific studies which might help to design interventions to reduce the three delays and consequently reduce maternal morbidity and mortality.

Figure 1. Three Delays Model (Thaddeus & Maine, 1994)



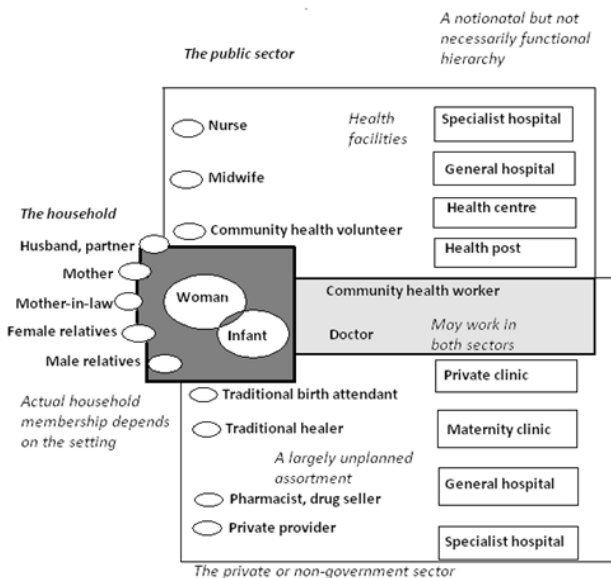
Community Empowerment

A community is characterised by the following elements: membership, mutual influence, shared needs and influence, and shared emotional connection, while empowerment refers to the ability of people to gain understanding and control over personal, social, economic, and political forces in order to take action to improve their life situations [36,37]. Community empowerment enables individuals and organizations within to take collective actions that are aimed at improving their conditions. Communities, which are empowered, are able to put in place mechanisms such as loan schemes to assist their members in times of need. It has been noted that in order to improve maternal survival in low-income countries there is need to scale up community-based interventions [38,39]. There is also need to link families and facilities for care at birth [40]. Community empowerment is also essential in maintaining a continuum of care from communities to health care facilities.

Health system

According to Osrin and Prost [41] a woman experiencing pregnancy in a low-income country has a sort of 'health ecosystem'. This health system includes her family, friends, the non-governmental sector and the wider community (see figure 2). Ordinarily the woman would be able to attend antenatal, natal and postnatal care at a public or non-governmental institution. However, in most places the public facilities are either under resourced or far away [42,43]. Most women end up delivering at home with the assistance of family members, traditional birth attendants or in some instances having solitary delivery. In the recent years the private health care, informal and formal, has come in to offer maternal health services but only to those who can afford the costs. A woman who gets a complication of obstructed labour, more so at home, has to be transported to a facility which offers comprehensive emergency obstetric care (blood transfusion and caesarean sections) which in most cases is located a distance from rural areas. Areas located long distances from health care facilities also have associated factors of remoteness such as poor road infrastructure, poor communication, poor incomes, and limited access to information and strong adherence to traditional values [44].

Figure 2. Potential sources of assistance and health care for mothers and newborn infants in low-income setting [41]



Background

Uganda

Uganda is located in Eastern Africa and borders Kenya to the east, South Sudan to the north, Democratic Republic of Congo to the west, Rwanda to the south-west and Tanzania to the south (figure 3). It occupies a total surface area of 241,550 km² of which 199,807 km² (82%) is area under land while the rest is area under water and swamps [45]. The country has a projected population of 32,000,000 people with population density of 123/km² with only 15% living in urban areas while the majority (85%) living in rural areas. With an average annual population growth rate of 3.2% Uganda has one of the fast growing population in the world [46]. Most of the population depend on subsistence agriculture. The per Capita income is estimated to be around USD 510 with about 30% of the population below the poverty line of earning 1 USD per day. Administratively Uganda is divided into 112 districts. There are 2 levels of governments: central and local (district) governments.

The total fertility (TFR) rate stands at 6.4 while contraceptive prevalence rate is at 23%. The HIV prevalence among pregnant women is estimated to be 7.5% [46]. The maternal and neonatal mortality rates stand at 435 per 100,000 live births and 29 per 1,000 live births respectively [47]. It is estimated that each year 10,000 women die and 130,000 - 400,000 suffer from disabilities in Uganda as a result of pregnancy related complications [48]. The main direct causes of maternal mortality are haemorrhage (42%), obstructed labour (22%), complications of abortions (11%), ruptured uterus 10% and sepsis (7%) [49]. Neonatal health is closely linked to maternal health and the main causes of neonatal mortality are infections (31%), asphyxia (26%), and prematurity (25%) [50]. Whereas the majority (94%) of women attend antenatal care clinics at least once during pregnancy only 42% deliver under the care of skilled birth attendants [47].

The Ugandan health system

The Ugandan health system is divided into the public and the private sector. The public sector includes government facilities under the ministries of health, defence, internal affairs and the local (district) governments. The private sector health system consists of Private Not for Profit (PNFP) providers, Private Health Practitioners (PHP), and the Traditional and Complimentary Medicine Practitioners (TCMPs) [51] (HSSIP 2010). The public health care facilities are grouped into Health Centres (HC), General Hospitals (GH), Regional Referral Hospitals (RRH) and National Referral Hospitals (NRH). The RRHs and NRHs provide specialist care and their running is overseen by the central government through Ministry of Health. The district health system is responsible for the running of GHs and HCs. The GHs provide curative, maternity, preventive and promotive services. The health centres are of four levels starting with HC IV which is a mini-hospital offering emergency surgery and blood transfusion facilities in addition to basic preventive, promotive and curative care given by HC IIIs and HC II. Health Centre I is the lowest level of health care and is occupied by 3-4 volunteers who are called Village Health Team (VHT) members. The VHTs link their respective villages to the formal health system through facilitating health promotion, service delivery, community participation and empowerment. A structure showing the health facility availability standards and the 2009 situation is given in Table 1.

Table 1. National Health facility availability standards and the 2009 situation

Type of Facility	Indicator	
	Health Facility to Population Ratio (Standard)	Health Facility to Population Ratio (2009 Situation)
National Referral Hospital	1: 10,000,000	1: 30,000,000
Regional Referral Hospital	1: 3,000,000	1: 2,307,692
General Hospital	1: 500,000	1: 263,157
Health Centre IV	1: 100,000	1: 187,500
Health Centre III	1: 20,000	1: 84,507
Health Centre II	1: 5,000	1: 14,940
Health Centre I / VHT	1: 1,000 or 1 VHT per 25 households	

Source: MOH, HSSIP 2010 [51]

It is evident from table 1 that in the lower levels of the health system where the greatest need of health services lies is where there is paucity of health care facilities. Comprehensive emergency obstetric services (blood transfusion and caesarean sections) which are essential in managing obstructed labour are expected to be provided by HC IVs and hospitals so as to reduce maternal/neonatal morbidity and mortality. According to the Ministry annual health sector performance report for the year 2010/11 only 24% and 26% of HC IVs were able to offer blood transfusion and caesarean sections services respectively (MOH 2011).

Visions for maternal and neonatal health

The Uganda government has come up with a Road Map for Accelerating the Reduction of Maternal and Neonatal Mortality and Morbidity. The overall goal of the road map is to accelerate the reduction of maternal and neonatal morbidity and mortality in Uganda so as to achieve MDGs by the year 2015. The main objectives of this road map are 1) increase availability, accessibility and use of skilled care by all women during pregnancy, childbirth and postpartum periods, 2) promote and support appropriate

health seeking behaviour among pregnant women, their families and the community, 3) to strengthen family planning information and service provision [52]. One of the strategies to be used to achieve the said objectives is to empower communities to ensure a continuum of care between the household and the health care facility through increasing demand for maternal and neonatal services and strengthening health care facilities to manage these conditions. The roadmap provides impetus for moving maternal and neonatal health to a new level.

The Rationale for the Study

Obstructed labour is responsible for 22% of maternal deaths and 34% of maternal complications due to direct causes in Uganda [49]. The majority of these complications or deaths would be avoided if pregnant mothers prepared for childbirth. The definitive management of obstructed labour requires that a mother with this condition should reach a facility with comprehensive emergency obstetric (EmOC) services within the shortest possible time. With only 32% of the women delivering in health care facilities, the south-western region is among the areas with the lowest proportion of women assisted by skilled birth attendants in Uganda [47]. The improvement of this status requires interventions at the individual, community and health facility levels. The contribution of obstructed labour to the overall maternal mortality in south-western Uganda has not been well studied however at the national level it is the second direct cause of maternal mortality [49]. Studies exploring the factors associated with obstructed labour and its outcome are urgently needed. The community member's comprehension of obstructed labour and actions taken when this complication occurs need to be studied so as to provide policy makers with evidence-based information which may be used to design appropriate interventions. Promotion of birth preparedness and assistance by skilled birth attendants are strategies advocated for reducing maternal morbidity and mortality and yet there is scarcity of information on associated factors in south-western Uganda. Successful implementation of the 'Road map for accelerating the reduction of maternal and neonatal mortality and morbidity for Uganda' will largely depend on evidence based interventions.

Aims

General Aim

The overall aim of this thesis was to investigate the individual, community and health system factors associated with obstructed labour and birth preparedness practices in south-western Uganda in order to provide policy makers and implementers with evidence-based information for designing appropriate interventions.

Specific Aims

- To investigate the role of individual and health facility factors and the risk for obstructed labour and its adverse outcomes in south-western Uganda. (Study I)
- To explore community members' understanding of and actions taken in cases of obstructed labour in south-western Uganda. (Study II)
- To explore the association between knowledge of obstetric danger signs and birth preparedness among recently delivered women in south-western Uganda. (Study III)
- To assess the effect of birth preparedness and women's decision-making regarding location of birth on assistance by skilled birth attendants among women in south-western Uganda. (Study IV)

Methods

Study area and population

The south-western Uganda region is comprised of 14 districts and has an estimated population of 4.0 million people [53]. The area is inhabited mostly by Banyankole, Bakiga and Bafumbira tribes who share similar socio-cultural traditions. The region borders Democratic Republic of Congo to the west, Rwanda to the south-west and Tanzania to the south. The majority of the population in this sub-region like most parts of Uganda depend on subsistence agriculture, which is favoured by relatively good climatic regions. It has good touristic attractions including the rolling hills in the south-west and the area is host to the rare mountain Gorillas in Ngahinga National Park on the border with Rwanda.

Although the south-western region has a high proportion of women attending antenatal care (ANC) at more than 91%, the area has one of the lowest proportions (32%) of women assisted by skilled birth attendants during childbirth [47]. Whereas the region is well known for producing food items to supply other parts of the country it has the highest level (50%) of stunting in children less than 5 years of age in the whole country [47].

Mbarara district hosts the municipality, which is the biggest urban centre in the region. Mbarara regional referral hospital (MRRH) serves as the main referral centre for other health care facilities in the south-western region. The hospital is also the main teaching hospital for Health Science programmes of Mbarara University of Science and Technology.

Study I was conducted in six hospitals located in 5 districts (Mbarara, Kiruhura, Ibanda, Isingiro, Bushenyi) while studies II, III and IV were implemented in Mbarara district.

Study design

Overall the study design involved use of both qualitative and quantitative research methods so as to generate information, which may be used to design appropriate interventions. Hospital obstetric records review was carried out in six hospitals to determine the magnitude of obstructed labour and associated factors in the south-western Uganda. In order to get an understanding of the pathway of obstructed labour a focus group discussion (FGD) study using grounded theory (GT) approach was employed. A survey using an interviewer administered questionnaire was used to get information regarding birth preparedness practices, decision-making on location of birth and assistance by skilled birth attendants from recently delivered women. Table 3 shows a summary of methods used in the four studies.

Table 2. Summary of methods for the four studies

Study	Study design	Study Sample	Data sources	Analysis
I	Cross-sectional Records review	12,463 Obstetric records for the year 2006	6 Hospitals in five districts of south-western Uganda	Descriptive/Analytical
II	Qualitative	65 Women 61 men in 20 FGDs	20 villages of Mbarara district	Grounded Theory analysis
III	Cross-sectional	764 recently delivered women	112 villages of Mbarara district	Descriptive/Analytical
IV				

Data collection

Study I

Twelve thousand four hundred and sixty three (12,463) obstetric records of women who were admitted in the maternity wards of two public and four Private Not for Profit (PNFP) hospitals in five districts (Mbarara, Isingiro, Kiruhura, Ibanda, Bushenyi) for the period January 1 through December 31, 2006 were reviewed. The data collectors were midwives proficiently trained to collect data from women's obstetric files or charts and to validate the diagnosis of obstructed labour using admission, delivery and theatre registers. Data was recorded on case record forms developed by the researchers and pre-tested on 200 maternity records for the year 2007. The case record form was modified to correct observed inconsistencies. The form was used to collect data on socio-demographic variables, labour, delivery and post-delivery periods. Computer data entry was performed using Epidata (Epidata Association, Denmark). After excluding case records of women who had been admitted postpartum (114), whose gestational age was less than 28 weeks (482), and women who were discharged before delivery (687), 11,180 records were eligible for analysis.

Study II

This was a qualitative study, which followed Grounded Theory (GT) approach. GT is commonly used to study a phenomenon about which little is known [54]. Community members' understanding of obstructed labour has previously not been highlighted in the literature. GT, with its' specific feature of simultaneous data collection and analysis, enables the researcher to pursue new ideas emerging during data collection, which in this study was conducted by focus group discussions (FGDs) [55]. Combining group interaction with the pursuit of new ideas through GT techniques such as i) the constant comparison of previous and new data and ii) the distinct coding process described under the analysis section [54] provided excellent tools to explore this topic.

Ten villages, eight rural and two rural, were selected using simple random methods. The informants for the FGDs were selected purposively so as to represent different groups (men/women) in their respective villages. Two focus group discussions (1 with women, 1 with men) were conducted in each of the 10 villages. The FGDs were guided by a piloted guide. Due to simultaneous data collection and analysis [54] the guide that included topics such as perception of obstructed labour, decision process during

care seeking in case of obstructed labour, selection of referral site and experience of skilled care at birth, was revised as new ideas emerged. Information from the earlier FGDs enabled the Principal Investigator (PI) to moderate subsequent discussions. The question, which was posed to start the FGDs was ‘could you discuss amongst yourselves what you understand by obstructed/prolonged labour and what actions are taken in case a woman in your area got this complication?’. All FGDs were tape recorded, transcribed verbatim and thereafter translated into English.

Study III & IV

Two-stage cluster sampling was used to select study participants. In the first stage, a list of villages and the respective number of households was used to independently to select similar number of study villages in Kashari and Rwampara counties. In total, one hundred twelve villages were chosen. In the second stage, women who had either delivered within the previous twelve months or were currently pregnant were selected randomly from each of the chosen villages and approached to participate in the survey. In each village, ten women meeting study criteria were interviewed.

A safe motherhood questionnaire developed by the Maternal Neonatal Program of JHPIEGO was used to correct data [19]. It contained four sections namely; socio-demographic information and reproductive history, knowledge on pregnancy and childbirth, experiences related to last pregnancy and childbirth, and exposure to media and interventions. The questionnaire was adapted to fit the Ugandan context and subsequently pretested in the neighbouring district of Isingiro. Minor modifications were effected after the pretesting. In total 1199 recently delivered and currently pregnant women were interviewed during the survey. All data were coded, and double entered into a database and validated using Epi Data Version 3.1. Further cleaning was done using Stata Version 9 Version 9 (Stata Corp, Texas). The focus of these two studies being knowledge of danger signs, birth preparedness practices and assistance by skilled birth attendants in the most recent birth studies III & IV are based on results for the 764 women who had delivered within 12 months prior the date of the survey.

Measures

Study I

The criteria used for diagnosing obstructed labour in this study was admission to a hospital with a pregnancy of a gestational age of 28 weeks or more and having a clinical diagnosis of obstructed labour in the patient chart or having an operative intervention (i.e. vaginal or abdominal) for failed progress of labour due to cephalopelvic disproportion, malpresentation or malposition. Women for whom the diagnosis of obstructed labour could not be ascertained were classified as non-obstructed labour and still included in the study sample.

The outcome variables were: obstructed labour, cause of obstructed labour, neonatal outcome, maternal outcome. The independent variables were: maternal age, parity, district of residence, occupation of mother, health facility attended.

Study III

The outcome variable was a woman who was ‘well birth prepared’. A woman was classified as ‘well birth prepared’ in the most recent pregnancy if she had accomplished three of the following practices: identified skilled health professional, saved money, identified transport or had delivery kit/materials. A woman who made arrangements for birth in less than three of the four ways was classified as ‘not well birth prepared’. The exposure variables were socio-demographic factors (county of residence, rural/semi-urban, age, marital status, education level attained, occupation, religion, household assets ownership, travel time to health facility) and reproductive variables (ANC attendance, parity). Key danger signs are those that are common, can easily be recognised and are signs of serious complications [19] and they are grouped under three phases; pregnancy, childbirth and postpartum. Knowledge of at least one key danger sign during any of the three phases (pregnancy, childbirth or postpartum) was considered as an exposure variable.

Study IV

Assistance by skilled birth attendant (SBA) in the most recent birth was the outcome variable. WHO defines a skilled birth attendant as “an accredited health professional – such as a midwife, doctor or nurse – who has been

educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns” [56]. The exposure variables were socio-demographic factors (county of residence, rural/semi-urban, age, marital status, education level attained, occupation, religion, household assets ownership, travel time to health facility) and reproductive variables (ANC attendance, parity). Knowledge of at least one key danger sign during any of the three phases (pregnancy, childbirth or postpartum) and the person (s) who made the final decision on the location of birth were included as exposure variable.

Data Analysis

Study I

Women seeking obstetric services in one hospital are expected to be more similar than women who visit other hospitals for the same service. Therefore SVY routines (Stata Version 10 Software) for handling correlated data were utilised to estimate proportions (%) and 95% confidence intervals (CI) of women who had obstructed labour and its outcomes (perinatal death, maternal death, and maternal complications). Crude Odds Ratios (COR), Adjusted Odds Ratios (AOR) and their 95% confidence intervals were calculated by means of multivariate logistic regression analysis taking into consideration the clustering of women at the hospital level. The mixed effects model was applied to determine the adjusted effects of age, parity, and residence on perinatal death and maternal complications among women who experienced obstructed labour assuming a random intercept. It was assumed that hospitals would have different intercepts due to differences in the level of care and some unmeasured health system factors. However the effect of the studied covariates was expected to be similar across hospitals. Cases with missing values were excluded from these analyses. Data was analysed using STATA version 9 (STATA Corporation, College Texas USA).

Study II

Coding of data was accomplished in the three stages suggested by Strauss and Corbin [54]. Open coding, which entailed reading each transcript line

by line in order to identify ideas and attach codes to these. Similar codes were pooled into categories and developed in terms of their characteristics and dimensions i.e. ensuring a rich description of the category (see table 3). Axial coding included linking identified categories to each other and elaborating the conceptual model. Selective coding entailed refining of the categories, which was partly done through comparison of the various data transcripts but also by going back to the community for further information. Selective coding also included identification and labelling of the core category, the key aspect of the story being related.

Table 3. Example of coding process

Codes	Category	Properties (Characteristics)	Dimensions
Difficult finding transport Transport requires money Transport difficult to get at night Roads impassable during wet season	Facing challenging referral conditions	type of transport cost of transport availability of transport state of roads	private - public limited - extensive night time –day time wet season – dry season

Study III & IV

For study III & IV statistical analysis was performed using Stata Version 9 and all analyses accounted for the intra-cluster correlation. The number and proportion of participants were computed and presented in tables for selected socio-demographic and reproductive characteristics. Comparisons of the proportion of women who were birth prepared (Study III) / assisted by killed birth attendants (study IV) by each category of the independent variables were done and statistical significance assessed using the Chi-square test. Odds ratios and 95% confidence intervals were computed using binary logistic regression. Variables whose association to birth

preparedness was statistically significant or if the p-value was less than 0.2 were considered for multivariate analysis. Stepwise multivariable random effects logistic regression with a random intercept was carried out to determine motivating factors for birth preparedness (Study III) / assistance by skilled birth attendants (Study IV). Adjustment was conducted for the following known confounders: age, education, household assets ownership (Study III): antenatal care, parity, education, household assets ownership, residence, county (study IV). Using “the departure from additivity criterion” [57], the potential effect modification of age, education, and household assets ownership was applied on the association between knowledge of at least one key danger sign during pregnancy or postpartum and birth preparedness in study III. Using the same criterion the effect modification of age, education and birth preparedness was applied on the relationship between decision-making and assistance by skilled birth attendants in study IV.

Ethical Considerations

Uganda National Council of Science and Technology and Lund University granted ethical clearance for the four studies. Permission to use obstetric records was given by medical superintendents of the six hospitals included in study I. For studies II, III and IV, which were conducted in Mbarara district, permission was granted by local leaders at the various levels from the district downward to the villages. Researchers and assistants explained the purpose of the studies to informants and that they had the freedom to participate or not. Individual informed verbal or written consent was obtained before the start of the FGDs and interviews. All case record forms (study I), FGD tapes and transcripts (study II) and questionnaires (study III & IV) are kept in a secure office under the care of the PI.

Results

Study I

From the 11,180 records analysed, the prevalence of obstructed labour was found to be 10.5% and the main causes were cephalopelvic disproportion (63.3%), malpresentation or malposition (36.4%) and hydrocephalus (0.3%). Caesarean sections were performed in 91% of the women with obstructed labour and the other methods used were laparotomy, symphysiotomy, forceps and craniotomy. Overall 10.8% of the women with obstructed labour developed complications compared to only 1.4% of those without the condition. The main complications observed among women with obstructed labour were ruptured uterus (7.1%), puerperal sepsis (3.4%), bladder injury (1.8%), postpartum haemorrhage (1.2%) and fistulae (1.4%). The case fatality rate was 1.2% in women with obstructed labour compared to 0.4% in the non-obstructed labour group. The perinatal mortality rate was 141/1000 total births in women with obstructed labour compared to 65/1000 births in the non-obstructed labour group.

Table 4 shows crude and adjusted Odds Ratio (OR) with 95% Confidence Intervals (CI) of the association between age, parity, district of residence and obstructed labour. Women who were in the age group 15-19 years (AOR 1.21, 95% CI: 1.02-1.45), nulliparous (AOR 1.47, 95% CI: 1.22-1.78), women who had delivered once before (AOR 1.57, 95% CI: 1.30-1.91) and women resident in Isingiro district (AOR 1.40, 95% CI: 1.04-1.87) were at a statistically significant higher risk of obstructed labour. However women who were residents of Mbarara (AOR 0.58, 95% CI: 0.45-0.76) and Ibanda (AOR 0.62, 95% CI: 0.42-0.92) had a statistically significant lower risk of having obstructed labour.

Table 4. The association (OR, 95% CI) between age, parity, district of residence and obstructed labour. Result of multivariate logistic regression analysis.

Women Characteristics	n=10,586*	COR (95% CI)	AOR (95% CI)
<i>Age group of woman (years)</i>			
15-19		1.41 (1.20–1.65)	1.21 (1.02–1.45)
20-29		1.0 (ref)	1.0 (ref)
≥30		1.06 (0.90–1.24)	1.17 (0.95–1.43)
<i>Parity</i>			
0		1.53 (1.30–1.80)	1.47 (1.22–1.78)
1		1.51 (1.25–1.82)	1.57 (1.30–1.91)
2-4		1.0 (ref)	1.0 (ref)
≥5		1.32 (1.07–1.64)	1.15 (0.90–1.46)
<i>District of residence</i>			
Mbarara		0.58 (0.45–0.76)	0.58 (0.45–0.76)
Bushenyi		1.0 (ref)	1.0 (ref)
Ibanda		0.60 (0.41–0.87)	0.62 (0.42–0.90)
Isingiro		1.39 (1.04–1.86)	1.40 (1.04–1.87)
Kiruhura		1.02 (0.72–1.45)	1.05 (0.74–1.48)
Other districts		1.08 (0.78–1.49)	1.20 (0.79–1.52)

*Women with complete data on age, parity and district of residence.

Table 5 shows the adjusted Odds Ratio with 95% Confidence Intervals of the association between age, parity, district of residence and obstructed labour. The analysis reveals that grand multiparous status (AOR 1.89, 95% CI: 1.11–3.22) and women resident in other districts (AOR 2.85, 95% CI: 1.60–5.08) were at a statistically significant higher risk of having perinatal

deaths as an adverse outcome. However women with obstructed labour who had never delivered before (AOR 0.40, 95% CI: 0.23-0.68) and those who had delivered one time (AOR 0.40, 95% CI: 0.23-0.70) had a statistically significant lower risk of having perinatal death as an adverse outcome.

Table 5. The association (OR, 95% CI) between age, parity, district of residence and perinatal death. Result of multivariate logistic regression analysis.

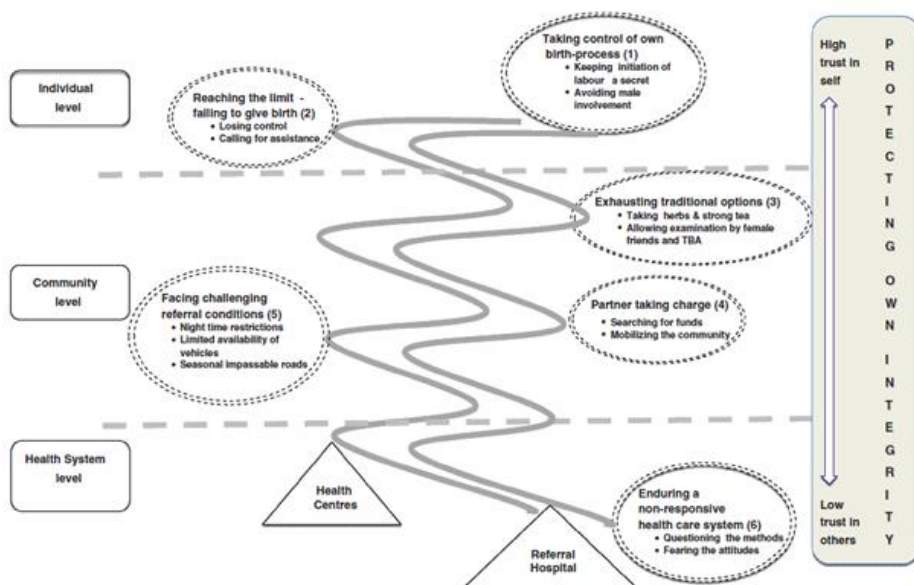
Characteristics (n=1113)	COR (95% CI)	AOR (95% CI)
<i>Age group (years)</i>		
15-19	0.68 (0.42–1.12)	1.02 (0.58–1.79)
20-29	1.0 (ref)	1.0 (ref)
≥30	1.94 (1.31–2.88)	0.91 (0.56–1.50)
<i>Parity</i>		
0	0.41 (0.26–0.65)	0.40 (0.23–0.68)
1	0.39 (0.23–0.68)	0.40 (0.23–0.70)
2-4	1.0 (ref)	1.0 (ref)
≥5	1.76 (1.09–2.83)	1.89 (1.11–3.22)
<i>District of residence</i>		
Mbarara	0.83 (0.49–1.40)	0.92 (0.54–1.58)
Bushenyi	1.0 (ref)	1.0 (ref)
Ibanda	1.41 (0.72–2.76)	1.39 (0.70–2.77)
Isingiro	1.61 (0.93–2.78)	1.62 (0.92–2.84)
Kiruhura	1.60 (0.81–3.15)	1.41 (0.70–2.83)
Other districts	2.58 (1.47–4.51)	2.85 (1.60–5.08)

The results of this study show that individual socio-demographic and health system factors are significantly associated with obstructed labour and its adverse outcome in south-western Uganda.

Study II

After analysing the 20 FGDs held with women and men as representatives for their communities, six categories were identified namely: ‘taking control of own birth-process’, ‘reaching the limit - failing to give birth’, ‘exhausting available traditional options’, ‘partner taking charge’, ‘facing challenging referral conditions’, and ‘enduring the non-responsive health care system’. But the desire by women to ‘protect own integrity’ emerged the core category that mirrored the community’s discussions on the women’s tendency to solitary withdrawal during childbirth. The core category was identified as the factor that starts off a pathway that may eventual lead to obstructed labour. In all the discussions it emerged that the negative experiences and or information gathered from the health care facilities reinforced the women’s notion of ‘protecting own integrity’ through choosing to have solitary childbirth. Figure 4 is a conceptual model which shows the pathway of obstructed labour as described by the community.

Figure 4. Conceptual model of a pathway to obstructed labour as described by the community



Protecting own integrity

The main characteristic of 'protecting own integrity' was 'trust', ranging from high trust in self to low trust in others. The high trust in self appears to originate in traditions and expectations of society i.e. socio-cultural beliefs, as well as previous positive experiences of managing childbirth at home, either alone or with minimal assistance in the final stage of labour. Personal pride, identified as another characteristic of high trust in self, implied women's strong determination to reveal the true state of their condition only when they had something to show for the efforts undertaken, i.e. the baby itself. The low trust in others emanates from a need for privacy, which in turn is linked to aspects such as shame of exposing themselves in an intimate manner and a desire to prevent information related to living conditions from being spread in the community.

Labour marks the climax of a nine-month pregnancy period where trust in self gradually builds up. As long as the labour process progresses normally, a woman is considered to be well prepared to take control by herself (taking control of own birth process). If the labour should stall, the woman will reluctantly agree to seek assistance from the very same community members in whom she has declared her low trust in (reaching the limit - failing to give birth). Despite agreeing to explore options available in the community (exhausting available traditional options), the woman in labour will exercise her own will regarding who should be involved or not. Trust in self is dented but still part of the process. Low trust in others also includes the partner. He is left with no other option but to take charge once the woman seems to be unable to withstand his interference (partner taking charge). Once being in charge, the partner faces a variety of challenges when trying to solve the emergency transport required at this stage (facing challenging referral conditions). The difficulties faced are clearly related to high trust in self and consequent delay in admitting that assistance is required. Finally the low trust in others is further fuelled by hearsay and/or own experience of a non-responsive health care system (enduring the non-responsive health care system). The conceptual model visualises how the high trust emanating from the woman on an individual level, gradually weakens as the pathway moves towards the community level and encounter the non-responsive health care system.

The findings from this study show that there is need understand and acknowledge women's quest to protect their integrity during childbirth and the health care system should provide comprehensive emergency obstetric services closer to communities.

Study III

Regarding knowledge of key danger signs, severe vaginal bleeding was the most frequently mentioned complication by 764 recently delivered women during the following phases; pregnancy (49%), childbirth (64%) and postpartum (57%). Only 18.3 percent of the women interviewed were aware that labour lasting more than 12 hours was a danger sign for maternal complications. Most respondents were able to mention at least one key danger sign in the following phases; during pregnancy (51.8%), childbirth (71.8%) and postpartum (71.6%).

Of the four birth preparedness practices considered in our study; 61% of the respondents had identified a health professional, 91% had saved money and 61% had identified means of transport, while 71% had bought delivery kits/birth materials during their most recent pregnancy. Overall 35% of the respondents were found to have made arrangements in 3 of the four birth preparedness practices and therefore considered 'well birth prepared'.

Women with knowledge of key danger signs are presumed to have used this information to be prepared for childbirth in advance. On bivariate analysis knowledge of at least one key danger sign during pregnancy or during postpartum was statistically significantly associated with birth preparedness. This relationship was further tested in multivariable logistic regression analysis in a stepwise manner by adjusting for age, education, and household assets ownership. The associations between knowledge of one key danger sign during pregnancy/postpartum and birth preparedness persisted after adjusting for possible confounders of age, education and household income. Table 6 shows results of multivariable logistic regression.

Table 6. Association (Odds Ratio, 95% CI) between knowledge of at least 1 key danger sign during pregnancy/postpartum and birth preparedness. Multivariable logistic regression

Birth preparedness	Model 1	Model 2	Model 3
Factors	(Adjusted for Age)	(Adjusted for age and education)	(Adjusted for age, education and household assets ownership)
Knowledge of at least 1 key danger sign during pregnancy: Yes vs. No	1.8 (1.2–2.6)	1.8 (1.2–2.6)	1.8 (1.3–2.7)
Knowledge of at least 1 key danger sign during postpartum: Yes vs. No	1.9 (1.2–3.0)	1.9 (1.2–3.1)	1.9 (1.2–3.1)
Age (years): ≥25 vs. under 25	0.8 (0.6–1.2)	0.8 (0.6–1.2)	0.8 (0.6–1.2)
Education: ≥Secondary vs. <Secondary		1.6 (1.0–2.4)	1.5 (1.0–2.3)
Assets ownership: high vs. low			1.5 (1.0–2.3)

We also investigated the effect modification by age, education, assets ownership regarding the association between knowledge of one key danger sign during pregnancy and birth preparedness. High level of education and young age had a synergistic effect on the relationship between knowledge of at least one key danger sign during pregnancy and birth preparedness. However household assets ownership seemed not to have such synergistic effect on the relationship. The results of this analysis are shown on table 7.

Similarly synergistic effect of age and education were shown on the association between knowledge of one key danger sign during postpartum and birth preparedness (results not shown).

Table 7. Analysis of effect modification between age, education, assets ownership and knowledge of at least one key danger sign during pregnancy regarding birth preparedness presented as adjusted OR with 95 % CI

<i>Age/knowledge of 1 key danger sign during pregnancy</i>	Birth preparedness	
	n (%)	OR (95% CI)
Less than 25 years/no knowledge of key danger sign	43 (16.2)	1.0 (ref)
Less than 25 years/had knowledge of key danger sign	65 (24.4)	2.3 (1.3–4.1)
≥25 years/no knowledge of key danger sign	61 (22.9)	0.9 (0.5–1.6)
≥25 years/had knowledge of key danger sign	97 (36.5)	1.6 (1.0–2.7)
Total	266 (100)	
<hr/>		
<i>Education/knowledge of 1 key danger sign during pregnancy</i>	n (%)	OR (95% CI)
Less than secondary/no knowledge of key danger sign	76 (28.6)	1.0 (ref)
Less than secondary/had knowledge of key danger sign	116 (43.6)	1.6 (1.0–2.4)
≥Secondary education/no knowledge of key danger sign	28 (10.5)	1.0 (0.5–1.8)
≥Secondary education/had knowledge of key danger sign	46 (17.3)	3.7 (2.0–6.8)
Total	266 (100)	
<hr/>		
<i>Household assets ownership/ knowledge of 1 key danger sign during pregnancy</i>	n (%)	OR (95% CI)
Low assets ownership/no knowledge of key danger sign	20 (7.5)	1.0 (ref)
Low assets ownership/had knowledge of key danger sign	43 (16.2)	2.5 (1.2–5.2)

High assets ownership/no knowledge of key danger sign	84 (31.6)	1.9 (1.0–3.6)
High assets ownership/had knowledge of key danger sign	119 (44.7)	3.4 (1.8–6.5)
Total	266 (100)	

The results of this study show that knowledge of at least one key danger sign during pregnancy or during postpartum was statistically significantly associated with birth preparedness. Young age and attaining high level of education had a synergistic effect on these relationships.

Study IV

Of the 764 women interviewed 759 had data on assistance during the most recent childbirth. Sixty eight percent were assisted by skilled birth attendants (midwives/nurses, clinical officers, doctors); while 22 were assisted by non-skilled birth attendants (friends, relatives, traditional birth attendants) and 10% had solitary births. On bivariate analysis decision-making on location of birth and birth preparedness (exposures of interest) were statistically associated with assistance by skilled birth attendants (outcome). This relationship was further tested by stepwise multivariable logistic regression analyses to adjust for possible confounders of age, parity, antenatal care, education level, household assets ownership, residence (rural/small town) and county). The possible confounders were introduced in pairs.

The association between decision-making when other persons are involved and assistance by skilled birth attendants persisted after adjusting for confounders. However the association between birth preparedness and assistance by skilled birth attendants became marginal. Table 8 shows the results of multivariable logistic regression.

Table 8. Association (Odds Ratios, 95% Confidence Intervals) between birth preparedness, decision-making and assistance by skilled birth attendant: Results of multivariable logistic regression analyses

Assistance by skilled birth attendant	Model 1	Model 2	Model 3
Factors	(adjusted for ANC, parity)	(adjusted for ANC, parity, education level and household assets ownership)	(adjusted for ANC, parity, education level household assets ownership, residence and county)
Birth preparedness: Well prepared for birth vs. not well prepared	1.6 (1.1–2.5)	1.5 (1.0–2.3)	1.5 (1.0–2.4)
Decision-making: With others vs. Respondent herself	4.7 (3.1–7.2)	4.3 (2.9–6.6)	4.4 (3.0–6.7)
ANC attendance: 4 or more times vs. less than 4 times	2.2 (1.5–3.2)	2.0 (1.3–3.0)	2.0 (1.4–3.0)
Parity: 1-2 vs. ≥3	2.1 (1.4–3.2)	1.95 (1.3–2.9)	1.9 (1.3–2.9)
Education level : Secondary vs. Less than secondary		2.7 (1.3–3.6)	2.1 (1.3–3.5)
Household asset ownership score: High vs. Low		1.5 (1.0–2.2)	1.5 (1.0–2.2)
Residence: Semi-urban vs. Rural			3.1 (1.6–5.9)
County: Resident of Rwampara vs. Kashari			0.6 (0.4–1.0)

We also investigated the effect modification by age, education, household assets ownership and birth preparedness regarding the association between decision-making on location of birth and assistance by skilled birth attendants (Table 9). The analyses revealed that high level of education, being birth prepared and having high household assets ownership all showed synergistic effect regarding the association between decision-making and choosing assistance by skilled birth attendant.

Table 9. Analysis of effect modification between age, education, household assets ownership, birth preparedness and decision-making regarding assistance by skilled birth attendant

	Assistance by skilled birth attendants	
	n (%)	OR (95% CI)
<i>Age and decision maker of where to give birth</i>		
≥25 years/respondent made decision	76 (15.2)	1.0 (ref)
≥25 years/spouse & respondent or someone else	218 (43.6)	5.5 (3.4–9.1)
Under 25 years/respondent made decision	50 (10.0)	1.4 (0.8–2.6)
Under 25 years/ spouse & respondent or someone else	156 (31.2)	7.4 (4.2–13.0)
Total	500	
	n (%)	OR (95% CI)
<i>Education & decision maker of where to give birth</i>		
Less than Secondary education/respondent made decision	91 (18.2)	1.0 (ref)
Less than secondary education/spouse & respondent or someone else	266 (53.2)	5.4 (3.5–8.4)
≥Secondary education/respondent made decision	35 (7.0)	3.2 (1.5–6.9)
≥Secondary education/spouse & respondent or someone else	108 (21.6)	13.5 (6.8–26.7)
Total	500	
	n (%)	OR (95% CI)
<i>Household asset ownership and decision maker of where to give birth</i>		

Low household asset score/respondent made decision	39 (7.8)	1.0 (ref)
Low household asset score/spouse & respondent or someone else	73 (14.6)	4.4 (2.2–8.6)
High household asset score/respondent made decision	87 (17.4)	1.6 (0.9–2.8)
High household asset score/spouse & respondent or someone else	301 (60.2)	8.2 (4.7–14.4)
Total	500	
	n (%)	OR (95% CI)
<i>Birth preparedness and decision maker of where to give birth</i>		
Not well prepared/respondent made decision	99 (19.8)	1.0 (ref)
Not well prepared/spouse & respondent or someone else	203 (40.6)	4.2 (2.6–6.7)
Well prepared/respondent made decision	27 (5.4)	1.1 (0.6–2.2)
Well prepared/spouse & respondent or someone else	171 (34.5)	8.7 (5.0–15.7)
Total	500	

The results from this study show that the relationship between women’s decision-making on location of birth in consultation with others (husband, friends, and relatives) was statistically significantly associated with assistance by skilled birth attendants. Education, household assets ownership and birth preparedness had a synergistic effect on this relationship.

Discussion

The results of these studies indicate a high prevalence of obstructed labour in south-western Uganda where it is significantly associated with individual and health system factors. Women striving to 'protect own integrity' was identified as a possible cause for the delay in taking a decision to seek care which may result into prolonged labour and consequently labour getting obstructed. The studies also show that knowledge of key danger signs was statistically associated with birth preparedness. The studies further show a strong association between when women's decision making on location of birth in consultation with others (partner, relatives, and friends) and assistance by skilled assistants. High education and young age had synergistic effect on the above associations.

The results should be interpreted within the context in which the studies were conducted. The studies are part of a larger project aimed at strengthening maternal and child health in south-western Uganda thereby contributing towards the Uganda road map for accelerating the reduction of maternal and neonatal mortality and morbidity (2006-2015) [52]. They were designed to provide information, which could be used by policy makers and implementers to design community interventions to reduce the occurrence obstructed labour. Whereas the results may not be generalised to the entire country, they have provided valid insights into factors associated with obstructed labour, birth preparedness practices, decision-making on location of birth and assistance by skilled birth attendants that may apply to other environments with similar sociocultural conditions.

The institutional prevalence of obstructed labour of 10.5% observed in our study is high compared to what other studies [2,58,59,60,61] have reported prevalence rates of between 0.9% - 7%. However this should be interpreted in relation to the findings presented by the most recent demographic and health survey (DHS) for Uganda, where it was reported that only 32% of women in the south-western region delivered in health care facilities [47]. There is likelihood that the majority of women who seek hospital deliveries are those who have a history of complications in previous deliveries or have been referred with complications with the current pregnancy or both. Whereas there are no prevalence studies for obstructed labour for Uganda

in the literature, other researchers have reported that obstructed labour is the second commonest cause of maternal mortality in the country [49,62].

More than 60% women in low-income countries attend ANC at least once [63]. Although the effectiveness of ANC in reducing maternal mortality has been questioned [64] it still provides an avenue for promoting preventive interventions such as birth preparedness [64]. Whereas 73% of the women in our study had four or more than ANC attendances during the most recent pregnancy our results show that the proportion of women who were birth prepared for their most recent birth were very low. Furthermore the knowledge of danger signs which would encourage care seeking from skilled birth attendants was similarly low in the sample.

According to Osrin and Prost [41] women in low-income countries have several options for location of childbirth including home delivery, which may be solitary or assisted by unskilled assistants, and health facility delivery which can either be in a public or private institution. Neema [65] in her study conducted the same region (south-western Uganda) also reported that women find themselves in the dilemma regarding the choice for location of birth as they are torn between delivering at home and healthcare facility. The results from our study IV indicate that women who, individually, decide on location of birth are less likely to be assisted by skilled birth attendants than those who include others (partner, friends, and relatives) in the decision-making. This finding supports the results from study II of this thesis where women reported preference for home/solitary confinement during childbirth in order to protect their own integrity. Women prefer to have childbirth in environments where they are comfortable and in control [66]. However, in low-income home births are inherently risky should a complication like prolonged labour, occur then a possibility of delay to reach a place of appropriate care is highly likely [67,68]. There is also an underlying perception by women in the south-western region of Uganda, that pregnancy and eventually childbirth are natural processes which should not be interfered with [65]. Such perceptions contribute to the delay in deciding to seek care.

Individual and health facility factors associated with obstructed labour

Individual and health facility factors are associated with obstructed labour as indicated in our study. Obstructed labour is a condition, which is mostly encountered by very young women or those who have had many children.

Most of the young women will have conceived while they are still teenagers prior to reaching maturity. Sub-Saharan Africa is a region with the highest prevalence of teenage pregnancies [69,70]. Uganda's adolescent fertility rate (AFR) of 159/1000 (girls age 15 – 19 years) is globally one of the highest [48]. Results from study I show that young women aged 15-19 years or nulliparous and those who had delivered once were at the highest risk of obstructed labour. However older women or grand multipara were more likely to have worse outcomes as a result of obstructed labour. This finding can be attributed to the differences in the physiological processes following obstruction between nulliparous and multiparous women where the later are prone to ruptured uteri [3].

The socioeconomic status of individuals also affects the utilisation of health services. Women who get obstructed are more likely to have low or no education and come from households with low-incomes [71,72]. Furthermore the prevalence of awareness of danger signs and birth preparedness, which would motivate women to seek assistance by skilled birth attendants, was found to be low. When labour is obstructed the definitive treatment lies in prompt access to health care facilities that offers comprehensive emergency obstetric care. Such health care facilities (clinics and hospitals) are usually located in urban areas. The results from our study shows that delays I (delay to seek care) and II (delay to reach the health facility) are attributed to individual, community and infrastructural factors. The quality of services offered in health care facilities, to a large extent may determine whether the population use these facilities for normal or complicated births. The quality of health services eventually may have a negative effect on the utilisation of maternal health services as demonstrated in a study from Angola by Pettersson et al. [73].

Linking communities to health services

Obstructed labour is a condition which, may or may not be predicted during antenatal care period, but once this complication has occurred, management must be in a health facility offering comprehensive emergency obstetric care. Failure to get timely appropriate interventions may lead to fatal maternal as well as neonatal fatal neonatal outcomes, as evidenced by results from study I. However, in low-income countries, where this condition is most prevalent, the majority of the population live in rural areas far from facilities which offer comprehensive emergency obstetric care. In order to improve maternal and neonatal survival in cases of obstructed labour there is dire need to have a continuum of care between the community level and the health care facilities and between the different

levels of the health care system [40]. The continuum of care can be used to minimise delays to reach places of care by increasing the demand for skilled birth attendance services, putting in place transportation systems, as well as reducing health facility costs. The referral system from lower level health centres to hospitals can be strengthened with emergency transport and communication means to enable referred patients reach the healthy facility with appropriate and adequate care [40]. Alternatively the lower health centres can be upgraded to offer comprehensive emergency obstetric care. The Ugandan health services underwent decentralisation about 10 years ago, during which health centres level IVs were upgraded to offer comprehensive emergency obstetric care in addition to other basic health services [74,75]. However, a recently published annual health sector performance report by the Ministry of Health indicate that only 24% of all health centres were able to offer comprehensive obstetric emergency services [76]. Other countries have brought maternal health services closer to the families by providing community midwives which have shown moderate outcomes on maternal health [32,77,78,79,80].

Community resources and community empowerment

Our study findings show that women choose to deliver at home so as to protect their own integrity and this position is further strengthened by the non-responsive health care system. There is a need to use community health workers (CHWs) to link communities to health care system. Available evidence shows that mobilising communities combined with community engagement has increased institutional births and reduced perinatal mortality in some countries [39,40,81,82,83].

The CHWs live within the communities and understand the socio cultural composition and practices of their communities better than the health workers who may be foreign or their training may not have exposed them fully to that aspect of health care. The Ugandan health structure (table 1) provides for establishment of Village Health Teams (VHTs) in all districts in the country and according to the Ministry of Health, VHTs are local people who volunteer to serve their communities by carrying out a range of disease prevention and health promotion activities [76]. As of July 2011, sixty-nine districts (62%) had formed VHTs but only 30 (27%) had fully functional teams as evidenced by activity registers [76]. The VHTs are to be given basic training in maternal-newborn and child health. They are expected support pregnant women and children in their respective communities through health education.

One factor that has been shown to empower communities towards health care utilisation is education. According to Ensor and Cooper [72] education improves the ability of individuals to produce health through better lifestyles, and through increased desire and actual use of health services. In our study high education was significantly associated with knowledge of key danger signs and birth preparedness practices. Several studies conducted in Africa have reported similar findings [15,22,24,25]. Interestingly, a high level of education also seemed to work synergistically with knowledge of key danger signs, meaning that the effect of conveying this knowledge through ANC had much greater effect among women who had high level of education, or conversely conveying knowledge of key danger signs to women with a low educational level had limited effect. This illustrates one facet of the very important general effect of keeping girls in school long enough to provide them with possibly the most important tool for their empowerment; a reasonable level of education. Furthermore female literacy rate is a powerful predictor of maternal mortality with a negative correlation [84]. Universal primary and secondary education programmes being implemented by low-income countries including Uganda will most likely improve maternal health services utilisation.

Communities at various levels have some organisational structures to contribute towards communal activities such as illness, funerals and weddings. These structures ought to be used by health care policy makers/implementers to engage communities in dialogue about how they can actively participate in improving their health. A child health promotion program in south-western Uganda has shown that engaging communities to use their common resources coupled with training of CHWs has improved child health in the project areas [85,86]. Similar approaches could be utilised to promote maternal health programmes such as birth preparedness so as to increase skilled delivery.

Capacity development using birth preparedness

Birth preparedness has been identified as one strategy, which can help to reduce the three delays [40]. Birth preparedness as a concept encompasses knowledge, intentions and actions that affect timely and appropriate use of life-saving obstetric care in low-income countries [19,42]. In order to reduce the delays the women, families, communities, providers plus health care facilities have to be prepared in advance for normal and complicated births. The policy environment should also be conducive to support these activities.

Women must be equipped with knowledge on the danger signs that may indicate life threatening complications and they should be prepared by way of identifying a skilled provider/health facility, transport means to use and identify persons to accompany them when labour initiates. Above all they should be in position to save funds that will be used to procure the requirements at the time of need. Results from our studies show low prevalence of knowledge of key danger signs and low prevalence of birth preparedness practices among women in spite of the fact that the majority of women had attended ANC. The levels of knowledge of danger signs during labour and birth preparedness can be increased through community mobilisation. Community interventions using women's groups have been reported to reduce neonatal and mortality rates in Nepal [87,88] and in Bangladesh [89,90]. Since a high level education had synergistic effect on the relationships regarding birth preparedness and skilled assistance uptake, promotion of girl child education up to and beyond completion of secondary school level would go a long way in increasing maternal health services utilisation.

The individual capacities of health providers, who are the key players in the provision of health care services, need to be developed. Trainings are required to improve knowledge, attitudes and skills of providers so that they are responsive to the needs of women. In order for the providers to be effective, the health care facilities should have the resources to render services they are gazetted to offer at the different levels in the health system structure. The successes achieved with community interventions aimed at improving maternal health have included investing in both the health providers and the facilities [40,81,88,91]. The governance structures of health care facilities needs to incorporate community representatives who are able provide feedback to the health system and government. The policy environment should provide an overall framework for maternal newborn and child health issues to be prioritised. The Ugandan health system structure provides for the involvement of the VHTs as a link between communities and health system. Communities are empowered if they are able to participate in design, planning and implementation of health services. However most of the management committees in Uganda were recently reported not performing to the expected levels due to resource constraints [51].

Methodological considerations

The use of qualitative and quantitative methods in this study was complementary necessity. Whereas the records review and questionnaire interviews aimed at providing answers to specific questions, the FGDs sought to explore knowledge on childbirth practices from the community members. In study I the sample was comprised of all women who delivered in the six hospitals in the specified study period (1year) thereby minimising selection bias. However, data on the variable occupation were missing from a substantial number of case records and as such this variable was not used in multivariable analysis. In the same study there could have been a possibility of different clinicians/hospitals following different criteria of reaching at a diagnosis of obstructed labour but if this was so it was not done systematically to adversely affect the results obtained from the study. On the management of obstructed labour there are contrasting approaches regarding the use of instrumental delivery or caesarean sections for relieving obstructed labour. Some authors have reported use of instrumental methods [2,58,92,93] have included instrumental delivery while others [59,61,94] have only reported caesarean sections as the method used to manage obstructed labour. In our study we chose to include instrumental deliveries since our data showed that these methods had been used in management of obstructed labour by one hospital.

In study II FGDs were used to collect information about childbirth practices in area. FGDs allowed free expression on community norms and practices. Whereas labour starts off as the individual woman's activity, it turns to a community responsibility when a complication occurs. Although the key informants in the study were women, the pertinent issues identified in women FGDs were used to shape the discussions with men informants. Since not much was known about the childbirth practices in this community grounded theory approach as described by Strauss and Corbin [54] was applied as it is flexible and allows the researcher to develop a conceptual model. We chose to use Strauss and Corbin's approach as it is more flexible and allows the researcher to develop a conceptual model to help explain childbirth practices whereas Glaser's approach favours development of a theory [95]. Simple randomization of villages and inclusion of persons with different attributes was used to ensure representativeness and varied experiences of the phenomena being studied. The inclusion of both rural and urban areas was a way of increasing the validity of the sample.

In study III and study IV a questionnaire administered by an interviewer was used to collect data from recently delivered women. We chose to include women who had delivered within the previous 12 months in the

study so as to minimise recall bias. Multistage random sampling was employed to minimise selection bias while known possible confounders were adjusted for in multistage logistic regression analysis.

Implications

We believe results from our studies provide evidence-based information, which may be used for designing the planned interventions in south-western region to reduce the occurrence of obstructed labour thereby contributing to the reduction of maternal/perinatal morbidity and mortality. The individual factors associated with obstructed labour need to be addressed in order to reduce its magnitude thereby preventing the disabling complications or mortality. Education and economic empowerment are key strategies that may empower communities to be able to take care of their own destiny. Promotion of birth preparedness and assistance by skilled birth attendants at birth among women, families and communities will help to reduce the burden of obstructed labour. The health care system needs to be responsive to the demands of the population thereby stimulating increased demand for skilled birth attendance. Furthermore there is need for multi-sectoral collaboration between the health and other sectors to improve maternal health.

Suggestions for future research

Prospective studies on factors associated with obstructed are needed to provide more information not identified in our studies. Further research is proposed to reveal more information regarding obstructed labour and birth preparedness practices. Studies incorporating the use of a labour monitoring chart (partograph) would be appropriate in this area. The conceptual model formulated from FGDs should be tested using qualitative methodologies. Intervention research is needed to test the impact birth preparedness strategies on assistance by skilled birth attendants and subsequent effect on the occurrence of obstructed labour. Male involvement in birth preparedness and assistance by skilled birth attendants requires more research. Innovative studies using the widely available mobile telephones in improving referral are also proposed. Transport and communication are key factors in reducing delay II (reaching the place of care). Research into innovative community

emergency transport schemes and communication schemes using the rapidly spreading mobile phones is also suggested.

Conclusion

The results of the four studies have indicated that obstructed labour with its adverse outcomes is still a major health problem in south-western Uganda. Women's striving to protect their own integrity was identified as one of the causes that may lead to delay in taking a decision to seek care and eventually leading to prolonged labour. Protecting own integrity could have been further strengthened by the poor quality of health services offered by the health care facilities. Whereas the majority of women attend ANC, the prevalence of knowledge of key danger signs and birth preparedness practices among recently delivered women was found to be low. High level of education, young age appeared to improve knowledge of danger signs and increased levels of birth preparedness practices. Furthermore the studies revealed that women who consult others (husband, friends, and relatives) are more likely to deliver under skilled care. Education, household assets ownership and birth preparedness appeared to strengthen decision-making regarding location of birth and assistance by skilled birth attendants.

Reduction of maternal morbidity and mortality due to obstructed labour can only be achieved by a functioning health care system which maintains a continuum of care from the households to health care facilities offering comprehensive emergency obstetric care. Community mobilisation and empowerment through education using the structure of CHWs is hereby recommended. In order for demand of maternal services to be increased, the quality of maternal health services should be improved through capacity development of human resources and facilities. Finally, maternal health improvement requires multi-sectoral interventions especially in the areas of education, poverty reduction, agriculture, and infrastructure development. Education appears to be central in the uptake of maternal health services.

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References

1. Dolea C, AbouZahr C (2003) *Global burden of obstructed labour in the year 2000*. Geneva: World Health Organization.
2. Gessesew A, Mesfin M (2003) Obstructed labour in Adigrat Zonal Hospital, Tigray Region, Ethiopia. *Ethiop J Health Dev* 17: 175-180.
3. Neilson JP, Lavender T, Quenby S, Wray S (2003) Obstructed labour. *Br Med Bull* 67: 191-204.
4. Philpott RH (1982) Obstructed labour. *Clin Obstet Gynaecol* 9: 625-640.
5. Capes T, Ascher-Walsh C, Abdoulaye I, Brodman M (2011) Obstetric fistula in low and middle income countries. *Mt Sinai J Med* 78: 352-361.
6. WHO (2005) *The World health report : 2005 : make every mother and child count*. Geneva: World Health Organization.
7. Wall LL (2006) Obstetric vesicovaginal fistula as an international public-health problem. *Lancet* 368: 1201-1209.
8. Wall LL (2002) Fitsari 'dan Duniya. An African (Hausa) praise song about vesicovaginal fistulas. *Obstet Gynecol* 100: 1328-1332.
9. AbouZahr C (2003) Global burden of maternal death and disability. *Br Med Bull* 67: 1-11.
10. Konje JC, Ladipo OA (2000) Nutrition and obstructed labor. *Am J Clin Nutr* 72: 291S-297S.
11. United Nations (2000), *United Nations Millennium Declaration New York*: United Nations.
12. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, et al. (2011) Progress towards Millennium Development

Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. *Lancet* 378: 1139-1165.

13. Graham W (1998) Every pregnancy faces risks. *Plan Parent Chall*: 13-14.
14. Stevens RD (2000) Safe motherhood: an insight into maternal mortality in the developing world. *Health Millions* 26: 34-37.
15. Pembe AB, Urassa DP, Carlstedt A, Lindmark G, Nystrom L, et al. (2009) Rural Tanzanian women's awareness of danger signs of obstetric complications. *BMC Pregnancy Childbirth* 9: 12.
16. Hasan IJ, Nisar N (2002) Womens' perceptions regarding obstetric complications and care in a poor fishing community in Karachi. *J Pak Med Assoc* 52: 148-152.
17. Anya SE, Hydera A, Jaiteh LE (2008) Antenatal care in The Gambia: missed opportunity for information, education and communication. *BMC Pregnancy Childbirth* 8: 9.
18. Kumbani LC, McLnerney P (2006) Primigravidae's knowledge about obstetric complications in an urban health centre in Malawi. *Curationis* 29: 41-49.
19. Jhpiego (2004) *Monitoring birth preparedness and complication readiness: tools and Indicators for maternal and newborn health*. Baltimore: Jhpiego.
20. World Health Organization (2011) *Blood Safety: AIDE-MEMOIRE for National Health Programmes*. In: Organization, editor. Geneva: Word Health Organization.
21. Hladik W, Kataaha P, Mermin J, Purdy M, Otekat G, et al. (2006) Prevalence and screening costs of hepatitis C virus among Ugandan blood donors. *Trop Med Int Health* 11: 951-954.
22. Hiluf M, Fantahun M (2007) Birth Preparedness and Complication Readiness among women in Adigrat town, north Ethiopia. *Ethiop J Health Dev* 22: 14-20.
23. Moran AC, Sangli G, Dineen R, Rawlins B, Yameogo M, et al. (2006) Birth-preparedness for maternal health: findings from Koupela District, Burkina Faso. *J Health Popul Nutr* 24: 489-497.

24. Mutiso SM, Qureshi Z, Kinuthia J (2008) Birth preparedness among antenatal clients. *East Afr Med J* 85: 275-283.
25. Hailu M, Gebremariam A, Alemseged F, Deribe K (2011) Birth Preparedness and Complication Readiness among Pregnant Women in Southern Ethiopia. *PLoS One* 6: e21432.
26. Mulogo EM, Witte K, Bajunirwe F, Nabukera SK, Muchunguzi C, et al. (2006) Birth plans and health facility based delivery in rural Uganda. *East Afr Med J* 83: 74-83.
27. Starrs AM (2006) Safe motherhood initiative: 20 years and counting. *Lancet* 368: 1130-1132.
28. Starrs AM (2007) Delivering for women. *Lancet* 370: 1285-1287.
29. de Bernis L, Sherratt DR, AbouZahr C, Van Lerberghe W (2003) Skilled attendants for pregnancy, childbirth and postnatal care. *Br Med Bull* 67: 39-57.
30. Koblinsky MA, Campbell O, Heichelheim J (1999) Organizing delivery care: what works for safe motherhood? *Bull World Health Organ* 77: 399-406.
31. De Brouwere V, Tonglet R, Van Lerberghe W (1998) Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West? *Trop Med Int Health* 3: 771-782.
32. Darmstadt GL, Lee AC, Cousens S, Sibley L, Bhutta ZA, et al. (2009) 60 Million non-facility births: who can deliver in community settings to reduce intrapartum-related deaths? *Int J Gynaecol Obstet* 107 Suppl 1: S89-112.
33. Thaddeus S, Maine D (1994) Too far to walk: maternal mortality in context. *Soc Sci Med* 38: 1091-1110.
34. Gabrysch S, Campbell OM (2009) Still too far to walk: literature review of the determinants of delivery service use. *BMC Pregnancy Childbirth* 9: 34.
35. Say L, Raine R (2007) A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context. *Bull World Health Organ* 85: 812-819.

36. Israel BA, Checkoway B, Schulz A, Zimmerman M (1994) Health education and community empowerment: conceptualizing and measuring perceptions of individual, organizational, and community control. *Health Educ Q* 21: 149-170.
37. Swift C, Gloria L (1987) Empowerment: an emerging mental health technology. *The Journal of Primary Prevention* 8: 71-94.
38. Bhutta ZA, Ali S, Cousens S, Ali TM, Haider BA, et al. (2008) Alma-Ata: Rebirth and Revision 6 Interventions to address maternal, newborn, and child survival: what difference can integrated primary health care strategies make? *Lancet* 372: 972-989.
39. Bhutta ZA, Lassi ZS (2010) Empowering communities for maternal and newborn health. *Lancet* 375: 1142-1144.
40. Lee AC, Lawn JE, Cousens S, Kumar V, Osrin D, et al. (2009) Linking families and facilities for care at birth: what works to avert intrapartum-related deaths? *Int J Gynaecol Obstet* 107 Suppl 1: S65-85, S86-68.
41. Osrin D, Prost A (2010) Perinatal interventions and survival in resource-poor settings: which work, which don't, which have the jury out? *Arch Dis Child* 95: 1039-1046.
42. Stanton CK (2004) Methodological issues in the measurement of birth preparedness in support of safe motherhood. *Eval Rev* 28: 179-200.
43. Anson O (2004) Utilization of maternal care in rural HeBei Province, the People's Republic of China: individual and structural characteristics. *Health Policy* 70: 197-206.
44. Hounton S, Chapman G, Menten J, De Brouwere V, Ensor T, et al. (2008) Accessibility and utilisation of delivery care within a Skilled Care Initiative in rural Burkina Faso. *Trop Med Int Health* 13 Suppl 1: 44-52.
45. Uganda Bureau of Statistics (2011) *General Information on Uganda*. Kampala: Uganda Bureau of Statistics.
46. Uganda National Planning Authority (2010) *National Development Plan (2010/11 - 2014/2015)*. Kampala: National Planning Authority. p246-263.

47. Uganda Bureau of Statistics, Macro International Inc. (2007) *Uganda Demographic and Health Survey 2006*. Calverton, Maryland, USA: Uganda Bureau of Statistics and Macro International Inc. p119-181.
48. Population Secretariat ME, Uganda,, (2011) *The State of Uganda Population Report 2011: Population and Reproductive Health: Broadening opportunities for development*. Kampala: Population Secretariat.
49. Mbonye AK, Asimwe JB, Kabarangira J, Nanda G, Orinda V (2007) Emergency obstetric care as the priority intervention to reduce maternal mortality in Uganda. *Int J Gynaecol Obstet* 96: 220-225.
50. Ministry of Health Uganda (2008) *Situation analysis of newborn health in Uganda: current status and opportunities to improve care and survival*. Kampala: Ministry of Health, Save the Children, UNICEF, WHO.
51. Ministry of Health U, (2010) *Health Sector Strategic & Investment Plan: Promoting People's Health to Enhance Socio-economic Development: 2010/11 – 2014/15*
52. Ministry of Health Uganda (2008) *Road map for accelerating the reduction of maternal and neonatal mortality and morbidity in Uganda*. Ministry of Health Uganda.
53. Uganda Bureau of Statistics (2007) *Projections of demographic trends in Uganda 2007-2017*. Kampala: Uganda Bureau of Statistics
54. Strauss A, Corbin J (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. London: SAGE Publications, Inc.
55. Barbour R, Kitzinger J (1999) *Developing focus group research: Politics, Theory, and Practice*: SAGE Publications.
56. World Health Organization (2004) *Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO*. In: Research RHa, editor. Geneva: World Health Organization. pp. 1-5.

57. Aschengrau A, Seage III GR, editors (2008) *Essentials of Epidemiology in Public Health. Second Edition ed. Sudbury, Massachusetts: Jones and Bartlett Publishers. p343-346.*
58. Ali AA, Adam I (2010) Maternal and perinatal outcomes of obstructed labour in Kassala hospital, Sudan. *J Obstet Gynaecol* 30: 376-377.
59. Melah GS, El-Nafaty AU, Massa AA, Audu BM (2003) Obstructed labour: a public health problem in Gombe, Gombe State, Nigeria. *J Obstet Gynaecol* 23: 369-373.
60. Melah GS, Massa AA, Yahaya UR, Bukar M, Kizaya DD, et al. (2007) Risk factors for obstetric fistulae in north-eastern Nigeria. *J Obstet Gynaecol* 27: 819-823.
61. Ozumba BC, Uchegbu H (1991) Incidence and management of obstructed labour in eastern Nigeria. *Aust N Z J Obstet Gynaecol* 31: 213-216.
62. Orach CG (2000) Maternal mortality estimated using the Sisterhood method in Gulu district, Uganda. *Trop Doct* 30: 72-74.
63. Campbell OM, Graham WJ (2006) Strategies for reducing maternal mortality: getting on with what works. *Lancet* 368: 1284-1299.
64. Carroli G, Rooney C, Villar J (2001) How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. *Paediatr Perinat Epidemiol* 15 Suppl 1: 1-42.
65. Neema S (1994) *Mothers and midwives: maternity care options in Ankole Southwestern Uganda*. Copenhagen: University of Copenhagen.
66. Mugweni E, Ehlers VJ, Roos JH (2008) Factors contributing to low institutional deliveries in the Marondera district of Zimbabwe. *Curationis* 31: 5-13.
67. Montagu D, Yamey G, Visconti A, Harding A, Yoong J (2011) Where do poor women in developing countries give birth? A multi-country analysis of demographic and health survey data. *PLoS One* 6: e17155.
68. Penfold S, Hill Z, Mrisho M, Manzi F, Tanner M, et al. (2010) A large cross-sectional community-based study of newborn care practices in southern Tanzania. *PLoS One* 5: e15593.

69. Treffers PE (2003) [Teenage pregnancy, a worldwide problem]. *Ned Tijdschr Geneeskd* 147: 2320-2325.
70. Treffers PE, Olukoya AA, Ferguson BJ, Liljestrand J (2001) Care for adolescent pregnancy and childbirth. *Int J Gynaecol Obstet* 75: 111-121.
71. Karlsen S, Say L, Souza JP, Hogue CJ, Calles DL, et al. (2011) The relationship between maternal education and mortality among women giving birth in health care institutions: analysis of the cross sectional WHO Global Survey on Maternal and Perinatal Health. *BMC Public Health* 11: 606.
72. Ensor T, Cooper S (2004) Overcoming barriers to health service access: influencing the demand side. *Health Policy Plan* 19: 69-79.
73. Pettersson KO, Christensson K, de Freitas Eda G, Johansson E (2004) Adaptation of health care seeking behavior during childbirth: focus group discussions with women living in the suburban areas of Luanda, Angola. *Health Care Women Int* 25: 255-280.
74. Ssengooba F, Rahman SA, Hongoro C, Rutebemberwa E, Mustafa A, et al. (2007) Health sector reforms and human resources for health in Uganda and Bangladesh: mechanisms of effect. *Hum Resour Health* 5: 3.
75. Jeppsson A (2002) SWAp dynamics in a decentralized context: experiences from Uganda. *Soc Sci Med* 55: 2053-2060.
76. Ministry of Health U, (2011) *Annual Health Sector Performance Report: Financial Year 2010/2011*. Kampala: Ministry of Health Uganda.
77. Shankar A, Sebayang S, Guarenti L, Utomo B, Islam M, et al. (2008) The village-based midwife programme in Indonesia. *Lancet* 371: 1226-1229.
78. Ibrahim SA, Omer MI, Amin IK, Babiker AG, Rushwan H (1992) The role of the village midwife in detection of high risk pregnancies and newborns. *Int J Gynaecol Obstet* 39: 117-122.
79. Matthews Z, Ramakrishna J, Mahendra S, Kilaru A, Ganapathy S (2005) Birth rights and rituals in rural south

India: care seeking in the intrapartum period. *J Biosoc Sci* 37: 385-411.

80. Harvey SA, Blandon YC, McCaw-Binns A, Sandino I, Urbina L, et al. (2007) Are skilled birth attendants really skilled? A measurement method, some disturbing results and a potential way forward. *Bull World Health Organ* 85: 783-790.
81. Kaseje D, Olayo R, Musita C, Oindo CO, Wafula C, et al. (2010) Evidence-based dialogue with communities for district health systems' performance improvement. *Glob Public Health* 5: 595-610.
82. Bhutta ZA, Darmstadt GL, Haws RA, Yakoob MY, Lawn JE (2009) Delivering interventions to reduce the global burden of stillbirths: improving service supply and community demand. *BMC Pregnancy Childbirth* 9 Suppl 1: S7.
83. Mushi D, Mpembeni R, Jahn A (2010) Effectiveness of community based Safe Motherhood promoters in improving the utilization of obstetric care. The case of Mtwara Rural District in Tanzania. *BMC Pregnancy Childbirth* 10: 14.
84. McAlister C, Baskett TF (2006) Female education and maternal mortality: a worldwide survey. *J Obstet Gynaecol Can* 28: 983-990.
85. Brenner JL, Godel JC (2005) Capacity building for child health: Canadian paediatricians in Uganda. *Paediatr Child Health* 10: 273-276.
86. Brenner JL, Kabakyenga J, Kyomuhangi T, Wotton KA, Pim C, et al. (2011) Can volunteer community health workers decrease child morbidity and mortality in southwestern Uganda? An impact evaluation. *PLoS One* 6: e27997.
87. Morrison J, Tamang S, Mesko N, Osrin D, Shrestha B, et al. (2005) Women's health groups to improve perinatal care in rural Nepal. *BMC Pregnancy Childbirth* 5: 6.
88. Manandhar DS, Osrin D, Shrestha BP, Mesko N, Morrison J, et al. (2004) Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial. *Lancet* 364: 970-979.
89. Azad K, Barnett S, Banerjee B, Shaha S, Khan K, et al. (2010) Effect of scaling up women's groups on birth outcomes in

three rural districts in Bangladesh: a cluster-randomised controlled trial. *Lancet* 375: 1193-1202.

90. Houweling TA, Azad K, Younes L, Kuddus A, Shaha S, et al. (2011) The effect of participatory women's groups on birth outcomes in Bangladesh: does coverage matter? Study protocol for a randomized controlled trial. *Trials* 12: 208.
91. Hodgins S, McPherson R, Suvedi BK, Shrestha RB, Silwal RC, et al. (2010) Testing a scalable community-based approach to improve maternal and neonatal health in rural Nepal. *J Perinatol* 30: 388-395.
92. Nwogu-Ikojo EE, Nweze SO, Ezegwui HU (2008) Obstructed labour in Enugu, Nigeria. *J Obstet Gynaecol* 28: 596-599.
93. Chhabra S, Gandhi D, Jaiswal M (2000) Obstructed labour - a preventable entity. *J Obstet Gynaecol* 20: 151-153.
94. Adhikari S, Dasgupta S, Sanghamita M (2005) Management of obstructed labour: a retrospective study. *The Journal of Obstetrics and Gynaecology of India* 55: 48-51.
95. Heath H, Cowley S (2004) Developing a grounded theory approach: a comparison of Glaser and Strauss. *Int J Nurs Stud* 41: 141-150.