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**DETERMINANTS OF MATERNAL DELIVERY AT RURAL  
HEALTH FACILITIES: A STUDY UNDERTAKEN IN THE  
MPIGI DISTRICT OF UGANDA**

by

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## DECLARATION

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The work for this thesis was undertaken in the School of Child and Adolescent Health of the University of Cape Town.

## LIST OF ABBREVIATIONS

|      |                                      |
|------|--------------------------------------|
| ANC  | Antenatal care                       |
| ARR  | Absolute risk reduction              |
| CI   | Confidence interval                  |
| df   | Degrees of freedom                   |
| MCH  | Maternal and child health            |
| MDG  | Millennium Development Goals         |
| MMR  | Maternal mortality ratio             |
| OR   | Odds ratio                           |
| RD   | Risk difference                      |
| RR   | Relative risk                        |
| SD   | Standard deviation                   |
| SES  | Socio-economic status                |
| SVD  | Spontaneous vaginal delivery         |
| TBA  | Traditional birth attendant          |
| UNDP | United Nations Development Programme |
| WHO  | World Health Organization            |

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## EXECUTIVE SUMMARY

**The setting:** Mpigi District is a rural district in Uganda with high maternal morbidity and mortality.

**Background:** While most pregnant women in Uganda attend antenatal clinics, few ultimately deliver their babies in a health facility. Interventions have not achieved increased utilisation of maternal services. A review of maternal determinants and factors associated with health facility delivery is the focus of this study.

**Objectives:** To determine the reasons why women deliver in health facilities; to identify the maternal determinants or factors associated with health facility delivery; and to determine the socio-demographic characteristics of women who deliver in health facilities.

**Methods:** This quantitative, descriptive, cross-sectional study of 257 women who delivered in the Mpigi District in 2008/2009 used face-to-face interviews at which a questionnaire was administered.

**Results:** Women delivered in health facilities because they expected a safe delivery. Ten factors were found to be significantly associated with a higher possibility of health facility delivery: eight or more years of education ( $P=0.002$ ); previous health facility delivery ( $P<0.0001$ ); first delivery in a health facility ( $P<0.0001$ ); no history of a non-health facility delivery ( $P <0.0001$ ); more than 50% of deliveries in a health facility ( $P=0.007$ ); three or more antenatal care visits ( $P=0.031$ ); above-average socio-economic status ( $P=0.016$ ); living in a household of three or fewer individuals ( $P=0.028$ ); living within 30 minutes' travel time of a health facility ( $P=0.007$ ); and history of contraceptive use ( $P=0.046$ ). These are the maternal determinants of health facility delivery in this rural setting. The mothers that delivered in health facilities were 15 and 29 years old (85.2%), either married or cohabiting (77.5%), had completed eight years or more of formal education (53.5%), lived within a

radius of up to 30 minutes' journey from a health facility (67.2%) and lived in a household of four or more individuals (76.0%).

**Conclusions:** This study shows that there are specific maternal characteristics (socio-demographic descriptors) that are associated with increased possibility of health facility delivery.

**Recommendations:** The maternal determinants of health facility delivery should be compiled into a screening score that will enable health workers to identify pregnant women that are likely to or not likely to deliver in health facilities. This screening process will guide implementation of targeted interventions that will increase the percentage of women that deliver in health facilities.

**Key words:** Determinants, health facility delivery, maternal mortality, mothers, Mpigi District, socio-economic status, Uganda, women.

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## **CHAPTER ONE: INTRODUCTION**

A maternal death is a tragedy with many implications. Not only do children lose a mother, a husband loses his wife, and the family and community lose a loved one and a friend. The good health of a mother is crucial for the welfare of an entire household, especially for the children, who are almost wholly dependent upon their mothers for their own survival, food, care and, most importantly, the emotional and social support they need for healthy growth and development (Filippi et al., 2006). The children left behind are subject to inordinate suffering and irreplaceable loss (*Sunday Vision* reporter, 2010). Since the health and presence of a mother are very important for an entire family, it is vitally important that health providers and professionals minimise all the risks of maternal ill health and death – especially during the events and crises engendered by pregnancy and childbirth.

### **1.1 Background**

Bartlett et al. (2005, p.868) reported that 74% of infants who were born to mothers that died from pregnancy-related conditions also died, and 94% of these deaths occurred within 42 days of birth. The World Health Organization (WHO) has reported a significant increase in the risk of death or poor health and poor development of children associated with death of their mother (WHO, 2005). On the commemoration of Women's Day in 2010, members of the Ugandan Parliament expressed concern over the large numbers of expectant mothers who are dying during childbirth (Namutebi & Bekunda, 2010). In the past two decades, maternal health indicators have remained very poor in Uganda. Mbonye (2000, p.106) reported that the maternal mortality ratio (MMR) was as high as 846 per 100 000 live births in hospitals and health centres. Recent reports show

that the MMR is 435 (ranging from 345 to 524) maternal deaths per 100 000 live births (Uganda Bureau of Statistics, 2006a, p.282; United Nations Development Programme – UNDP, 2010). In order to meet the Millennium Development Goals (MDG) target for maternal health, the Government of Uganda has to reduce maternal mortality by 75%, from 505 (1995 – 2000) to 131 deaths per 100 000 live births by 2015 (UNDP, 2010). In view of this challenge, UNDP Uganda has chosen to undertake disaggregated studies that will provide a better understanding of local problems and a basis for informing well-planned and effective advocacy programmes for the underprivileged areas of the country including rural areas (UNDP, 2010). This study complements these efforts of the UNDP by describing mothers that deliver in health facilities, and identifies key determinants of health facility delivery.

## **1.2 Statement of the problem**

Since 2001, the Uganda Ministry of Health has implemented strategies to improve health service delivery. Regarding maternal health, to reduce MMR by 30%, from 506 to 354 per 100 000 live births, the goal was to increase deliveries supervised by health workers from 38% (2001) to 50% (2005) (Uganda Ministry of Health, 2000).

During the period 2003 - 2006 donor funding for maternal health services increased by 85%, from United States dollars 7.8 to 11.4 per live birth (Greco *et al.*, 2008, p.1273). In 2000, 22.2% and 14.4% of mothers in Uganda delivered in public and private health facilities respectively (Gwatkin *et al.*, 2007, pp. 130-132). In 2003, 19-25.2% of deliveries took place in a health facility, while in 2006 36% of rural women delivered in a health facility (Uganda Ministry of Health, 2003, p.8; Uganda Bureau of Statistics, 2006a, p.125). Despite the progressive increase in access to and resources for maternal health from 2000 to 2009, to date the 2005 target of increasing deliveries in health facilities to 50% coverage has not been achieved.

In sub-Saharan Africa 63% of pregnant women access antenatal care (ANC) at least once, but only 38-42% deliver with skilled assistance (WHO, 1997, p.10; WHO, 2007, p.5). In Kenya, Tanzania and Burkina Faso, for example, only 33%, 45% and 56% of the mothers respectively deliver in a health facility (Perkins *et al.*, 2009, p.292). In Uganda, while 94% of the women attend ANC, only 36-38% deliver with a skilled attendant (Uganda Ministry of Health, 2001, p.28; Uganda Bureau of Statistics, 2006a, p.119, 125; Tann *et al.*, 2007, p.4). While the majority of pregnant women attend ANC, few ultimately deliver in a health facility. Because of the low attendance at birth and other factors, in the past decade the MMR increased from 106 (2000) to 370 (2005) per 100 000 live births in Botswana and from 760 (2000) to 1200 (2005) in Liberia (WHO, 2007, p.28). While the MMR in sub-Saharan Africa reduced by 1.8%, the MMR in Eastern Asia dropped by 47.1% (WHO, 2007, p.17). Under the present circumstances, there is no sign that the targeted 75% reduction in MMR will be achieved by 2015 (Uganda Ministry of Health, 2000 p.24; UNDP, 2007, pp.2, 41).

For as long as there is a low proportion of pregnant women delivering under skilled attendance, the possibility of ever reducing the MMR in Uganda is low. A careful review of all of the determinants and factors that are associated with delivery at a health facility in rural settings is thus required. It is for this reason that this research was undertaken.

### **1.3 Contextualisation of delivery in a health facility**

Annually an estimated 60 million women globally give birth without skilled attendance (Lawn *et al.*, 2006, p.1). Maternal mortality is due to complications that arise out of the process of pregnancy and childbirth, and detection and timely management of these conditions is dependent on the quality, availability and utilisation of maternal health services (Royston & Armstrong, 1989; AbouZahr & Wardlaw, 2001). Timely detection and appropriate management of

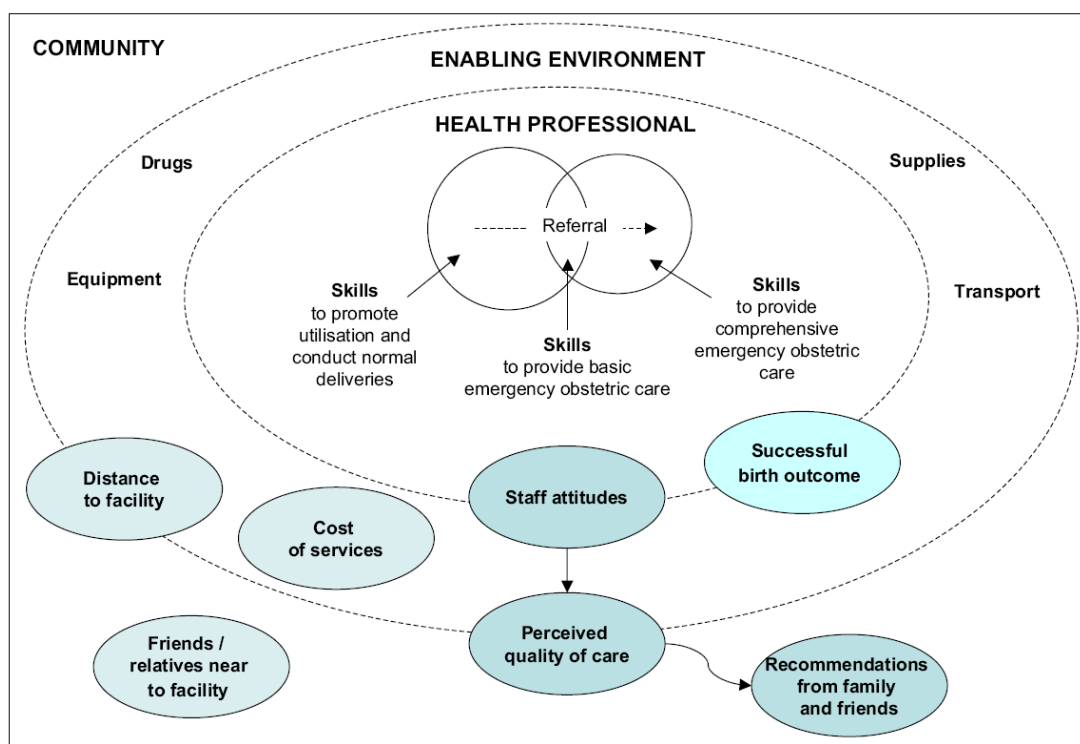


complications in sub-Saharan Africa occurs in public or private health facilities. These facilities should have health care professionals who have received the necessary training and skills, in an environment that has the recommended equipment and medicines to ensure safe childbirth. Skilled attendance at childbirth is the recommended approach for safe maternal delivery, because there is widespread ignorance of the various danger signs that occur during childbirth and lack of transport for emergency referral (Chatterjee, 2007). In Uganda for example, 74.4% of the total maternal mortality is due to haemorrhage (42.3%, n=842), prolonged labour (22.2%) and ruptured uterus (9.9%) (Mbonye *et al.*, 2007, p.222). These conditions are detected and managed in a health facility setting under skilled attendance. That is why delivery in a health facility is the focus of this study.

In 45 developing countries skilled attendance at birth is synonymous with facility-based care – except in Haiti, Indonesia and Madagascar, where skilled home delivery is common (Houweling *et al.*, 2007, p.746). The proportion of births accomplished in a health facility is thus representative of the percentage of all births attended by a skilled health care worker (WHO 2007). If one uses health facility delivery as a criterion for skilled attendance at birth, then in developing countries only 34.3% of women deliver under skilled attendance, compared to 99.4% of women in developed countries (WHO, 2007, p.2). It is thus assumed and from evidence that low utilisation of skilled attendance at birth together with other socio-economic factors have contributed to high maternal mortality in developing settings compared to low mortality in developed settings.

### 1.3.1 Conceptual framework

In order to analyse the concept of health facility delivery or skilled attendance at birth, the researcher made use of a framework of the components of care that women consider important during delivery, and the way in which these components interact with the outcome of health facility delivery.



**Figure 1.1: The components of care that women perceive as important during delivery.**  
(Source: D'Ambruso, Abbey & Hussein, 2005.)

The interaction between the community, the enabling environment and various factors related to health professionals determines the probability of whether a pregnant woman will deliver in a health facility or not. The significance of each of these factors varies from one community to another, depending on the culture, socio-demographic factors, socio-economic factors and health policies. Some of the most critical factors in this interplay (Figure 1.1) include the distance between the woman's home and the health facility, the cost of services, the attitudes of health workers, and the perceived quality of care based on recommendations of family and friends. In

addition to these factors, Magadi, Diamond and Rodrigues (2000) identified ethnic background, birth order, and reproductive behaviour as factors associated with health facility delivery. These factors can be categorised into health facility, environmental and maternal factors. Maternal factors (which are the focus of this study) are dependent upon a woman's demographic and socio-economic characteristics, and influence the decision making process for or against health facility delivery. Maternal determinants of health facility delivery in sub-Saharan Africa are similar, but it is the actual impact of each of these determinants and the sum of several factors in a woman that determines the actual expected outcome of health facility delivery. While health workers routinely capture causes of maternal death, they have limited understanding of the underlying maternal related socio-cultural and demographic factors that contribute to the outcome of a delivery in or outside of a health facility setting (Chatterjee, 2007). This study focuses on this gap in the information available on maternal determinants of health facility delivery.

#### **1.4 Purpose of the study**

Before effective interventions can be designed and implemented to improve overall maternal health needs, it is imperative to devise health and social policies that are informed by reliable and valid epidemiological data (Khan *et al.*, 2006). Strengthening intrapartum care and ensuring that all women deliver in a health facility, especially those most vulnerable to factors related to maternal mortality, are key and quick interventions that can significantly reduce MMR (Filippi *et al.*, 2006). The purpose of this study was to evaluate maternal determinants of health facility delivery that are pivotal in guiding the development of effective interventions that will result in an increase in health facility delivery.

## **1.5 Aim of the study**

The aim of the study was to determine the maternal factors associated with health facility delivery (determinants) and the socio-demographic characteristics of mothers who delivered in health facilities in the Mpigi District of Uganda.

## **1.6 Research questions**

The high MMR in Uganda raises important questions that would fascinate any medical researcher with an inquisitive mind. The researcher compiled the following questions that need to be answered before the impasse and ignorance that have prevented effective action in reducing the MMR can be overcome in sub-Saharan Africa:

- Why do women in rural areas deliver in health facilities?
- What maternal factors enhance or are associated with an increased possibility that a rural mother will deliver in a health facility?
- What are the socio-demographic characteristics of the women who deliver in rural health facilities?

## **1.7 Research objectives**

In order to answer these questions, the researcher set the following research objectives:

- To determine the reasons why women in rural areas deliver in health facilities;
- To identify the maternal determinants or factors associated with health facility delivery in the Mpigi District; and
- To determine the socio-demographic characteristics of women who deliver in rural health facilities in the Mpigi District.

## **1.8 Significance of and justification for the study**

This study presents new information about the maternal determinants of health facility delivery in rural settings in Uganda. It focuses on a rural setting in Uganda because 87% of Ugandans live in rural areas and have a high risk of maternal mortality (UNDP, 2007, p.6). The findings and recommendations of this study provide information that enhances understanding of the maternal determinants of health facility delivery. These will enable district health officers and national policy makers to design interventions that will increase health-seeking behaviour for health facility delivery, thereby reducing maternal mortality.

## CHAPTER TWO: LITERATURE REVIEW

It is estimated that nearly 342 900 (302 100 – 394 300) women worldwide die of causes arising out of pregnancy and childbirth every year (Hogan *et al.*, 2010. p.5). Ninety-nine per cent (99%) of these deaths occur in developing countries - and the majority are avoidable (WHO, 2005, pp. 4, 11). For every maternal death, 20 women develop some form of life-long morbidity or disability because of pregnancy and/or childbirth (WHO, 2004 cited in D'Ambruoso *et al.*, 2005). The high morbidity and mortality burden in developing settings have to be prevented.

### 2.1 Introduction

Concerns relating to maternal mortality and morbidity feature prominently on global health agendas. The fifth MDG is to *improve maternal health*, and the key objectives of this goal are to reduce maternal mortality by three-quarters and achieve universal access to reproductive health services (United Nations – UN, 2010). Two progress indicators monitor this goal: the MMR and the proportion of births attended by skilled health personnel (UN, 2010). The MMR is the measure of obstetric risk associated with each pregnancy: the indicator shows the total number of maternal deaths during a given year per 100 000 live births (WHO, 2007, p.5). WHO (1999, p.9) defines maternal mortality as:

‘Death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management’.

## 2.2 Maternal mortality and maternal health services in Uganda

Uganda is one of the 12 countries that account for two-thirds of the global maternal mortality, with an estimated 10 000 maternal deaths per annum (WHO, 2001, p.16). Uganda is experiencing an estimated shortage of 2000 midwives, with one midwife per 5000 mothers – a factor that contributes to 14 to 16 maternal deaths per day (Maseruka, 2010; Wesaka, 2011). This confirms the perception by Potts and Fosto (2007) that the MDGs are difficult or impossible to achieve in the least developed regions, given the current population growth rates and critical limitations in health service delivery.

In a study of 54 districts and 553 facilities in Uganda, 92.5% of the facilities stipulated as offering comprehensive emergency obstetric care could not even offer basic emergency obstetric care (Mbonye *et al.*, 2007, p.224). In another study only 11% of the facilities that offered delivery services had all the necessary supplies, equipment and medication essential for safe maternal delivery, and only 5% could perform a caesarean section (Uganda Ministry of Health, Uganda Bureau of Statistics & Macro International Inc., 2007, pp.14, 26). This means that 89% of the facilities that offer maternal delivery services are unable to manage the common complications of childbirth and have to refer women to other facilities for care. In Malawi deficiencies in hospital care constituted the principal contributing factor to avoidable maternal mortality in 38% of cases (WHO, 2005, p.11). As in Malawi, it is evident that health facilities in Uganda have limited capacity to manage emergencies and common complications of childbirth, and this situation increases the risk and incidence of maternal mortality.

The endemic weaknesses and deficiencies of the health system have resulted in increasing concern over the persistently high MMR. Mothers have decided to demonstrate their anger at the persistently high MMR in Uganda (see Figure 2.1). Implementation of effective interventions to

increase utilisation of health facilities for childbirth and improvement in service delivery can no longer be treated lightly or delayed.



**Figure 2. 1: Activists protesting the high number of maternal deaths in Uganda.**  
(Photo by Stephen Otage; Wesaka, 2011.)

### 2.3 Causes of the high maternal mortality in sub-Saharan Africa

The high MMR in developing countries is due to high fertility rates and the high risk of maternal death associated with every pregnancy experience (Royston & Armstrong, 1989). In addition, the emphasis on community-based care and the Acquired Immunodeficiency Syndrome (AIDS) scourge have delayed investment in integrated health systems (Lawn *et al.*, 2006). Therefore, in order to reduce maternal mortality in sub-Saharan Africa the factors associated with high fertility and the high risk of maternal mortality must be tackled urgently and concurrently (Hogan *et al.*, 2010).



## **2.4 Key determinants of success in reducing maternal mortality**

To reduce maternal mortality there must be a change in the parity and age patterns of women at the time of delivery (Koblinsky *et al.*, 2008). In Bangladesh, for example, the total fertility of women reduced by 50% from 6.6 births per woman of reproductive age in the mid-1970s to 3.0 births per woman in 2004 (National Institute of Population Research and Training, 2004, p.44; Koblinsky *et al.*, 2008, p.283). Also, skilled attendance at delivery increased by 125%, from 5.6% (1991-1993) to 13% (2005-2007), while surgical deliveries by caesarean section increased by 500%, from 0.9% (1995-1996) to 5.4% (2005-2007) (Koblinsky *et al.*, 2008, p.284). The reduction in fertility, increase in health facility delivery and increase in surgical deliveries resulted in a 37.3% reduction in maternal mortality (Koblinsky *et al.*, 2008, p.281). Maternal deaths are preventable by the prevention of unwanted or unplanned pregnancy, prevention of complications during pregnancy and childbirth, and timely management of complications (WHO, 1999). Therefore increasing the proportion of health facility deliveries is pivotal to reducing maternal deaths. In order to develop interventions to enhance health facility delivery, it is first necessary to determine the maternal factors that are associated with facility-based childbirth.

## **2.5 Maternal determinants of health facility delivery**

Where there is limited access to maternal health services, the rural settings in which the poor live have the least coverage and experience the highest MMR (Houweling *et al.*, 2007). In these rural settings, the critical questions are: 'What are the maternal factors that are associated with health facility delivery?' and 'How can our understanding of these factors guide the development of effective interventions?'

## **2.6 Association between maternal mortality and health facility delivery**

Studies have demonstrated an association between certain maternal factors and health facility delivery. As coverage for skilled attendance at birth increases, women become more proactive in seeking care, and the average mortality rate among those who seek care decreases (Ronsmans *et al.*, 2010). This section examines the different maternal factors that have been associated with health facility delivery and uses this evidence in analysing key determinants in the rural setting under study.

### **2.6.1 The greatest influence on and reason for choice of place of delivery**

The influence of husbands and family members on the possibility of access to services is significant (Grace & Carr, 2009). Notably, 17.0% and 35.6% of women do not seek emergency care because of advice from their husbands and in-laws respectively (Barkat *et al.*, 1995 and Piet-Pelon *et al.*, 1999 cited in Ensor & Cooper, 2004, p.6). This study evaluated the person a woman considers to have influenced the choice of place of delivery and why that option was preferred.

### **2.6.2 Demographic determinants of health facility delivery**

The health-seeking behaviour of women in rural communities has a significant impact on maternal morbidity and mortality patterns (Orji *et al.*, 2001). Demographic characteristics like age, marital status, education level and ethnicity determine health-seeking behaviour, and were examined for their association with health facility delivery.

#### **2.6.2.1 *Mean and median age of mothers at delivery***

Pregnancy between the ages of 20 and 30 years is the safest period for childbearing (Royston & Armstrong, 1989, p.47). In developing settings, the median age at delivery ranges between 25.5 years in Brazil and 27 years in Ghana (Klufio, Lassey & Annan, 2002; Bassani, Surkan & Olinto,

2009, p.17). The mean and median age of women at delivery determines whether most women deliver in the earlier or later part of their reproductive career. Based on this review, the mean age of mothers, the proportion of those that delivered in the “safe delivery period” and the association between age and health facility delivery were determined.

#### **2.6.2.2 Association between age and health facility delivery**

In rural Kenya women aged 30 - 34 years and those who were more than 34 years old were 2.54 [95% CI 1.25-5.15] and 2.85 [95% CI 1.31-6.18] times more likely to deliver outside a health facility compared to women who were 20 - 29 years old (Van Eijk *et al.*, 2006). Wagle Sabroe and Nielsen (2004) also found a statistically significant association between maternal age and the place of delivery. As in earlier studies, the association between age and the possibility of health facility delivery was determined.

#### **2.6.2.3 Association between education and health facility delivery**

A woman’s level of education has an impact on her access to services (Grace & Carr, 2009). In Bangladesh more than eight years of schooling was associated with a 50% reduction in the risk of maternal death (OR 0.36 [95% CI 0.24-0.53];  $P < 0.0001$ ) compared to mothers who had no formal education at all (Chowdhury *et al.*, 2007, p.1324). In another setting skilled attendance at birth was 18.2% and 74.3% among mothers with no formal education and those with 10 or more years of education respectively (Anwar *et al.*, 2008, p.254). This study presents an analysis of the association between educational attainment of the mother and the possibility of health facility delivery.

#### **2.6.2.4 Association between parity and health facility delivery**

The possibility of home deliveries for births of order eight and above was four times that for first-order births (Magadi *et al.*, 2000, pp.165,171,177). In Kenya 60%, 52.9%, 44.8% and 36.6% of women with parity statuses of nulliparous, 2-3, 4-5 and 6 and above respectively delivered in a

health facility (Magadi, *c.* 2002, p.181). These studies show that nulliparous women are more likely to deliver in a health facility than women with a higher parity. Based on this review, the association between parity and health facility delivery was determined.

#### **2.6.2.5 Association between birth interval and health facility delivery**

A child born less than 18 months after his/her older sibling is three times more likely to die compared to a child born 36 months or more after his/her nearest older sibling (Potts & Fosto, 2007, p.354). In addition, 42.9%, 43.8% and 55.8% of women with a birth interval of less than 2 years, 2-3 years and more than 3 years respectively deliver in a health facility (Magadi *et al.*, 2000, p.177; Magadi, *c.* 2002, p.181). The researcher evaluated the average spacing interval in this setting and the association between child spacing and the possibility of health facility delivery.

#### **2.6.2.6 Association between past deliveries and index place of delivery**

Among Nigerian women 16% deliver with a traditional birth attendant (TBA) because they have delivered that way before (Orji *et al.*, 2001, p.483). This finding points to the fact that there is a likely association between previous places of delivery and future places of delivery. To determine the association between past deliveries and the possibility of health facility delivery, the researcher examined four aspects of previous deliveries: venue of previous delivery, venue of first delivery, proportion of deliveries accomplished in a health facility, and any history of non-health facility delivery. These provide the basis for discussion on the influence of previous places of delivery on the possibility of health facility delivery in the index pregnancy.

#### **2.6.2.7 Association between history of stillbirth and health facility delivery**

A woman who has a history of the bad experience of losing her baby, especially if she feels the result would have been different if the service and care she received had been better, tends to consider other options for her subsequent deliveries (D'Ambruoso *et al.*, 2005). Two other studies

have reported no association between a history of a stillbirth and health facility delivery (Wagle *et al.*, 2004; Van Eijk *et al.*, 2006). Since history of stillbirth can influence choice of the place of delivery, this association was evaluated.

### **2.6.2.8 Association between antenatal attendance and place of delivery**

Wagle *et al.* (2004) reported a significant association between not attending ANC and increased probability of home delivery. Fronczak *et al.* (2007, p.481) observed that 84% of women who delivered in a health facility had received ANC, compared to 29% of women who delivered at home. In Kenya Magadi *et al.* (2000) also noted that the rate of home deliveries declined in inverse proportion to the number of antenatal visits. The average ANC attendance of women who delivered in a health facility was compared with that of those that didn't deliver in a health facility. The difference between the two means and the association between average ANC attendance and health facility delivery were evaluated.

### **2.6.3 Socio-economic determinants of health facility delivery**

The socio-economic status (SES) of an individual refers to a combination of social and economic aspects of that individual (Merriam Webster, 2010a). These are experiences and realities that contribute to moulding the individual's behaviour, including the health-seeking behaviour (Chase, 2009). Therefore, cultural characteristics of a woman and her household, which are components of or results of the SES, influence a woman's choice of type of delivery care (Magadi *et al.*, 2000). These factors were analysed in this study.

#### **2.6.3.1 Association between SES and place of delivery**

Women in the lower and middle wealth quintiles are 2.5 times more likely to deliver with a TBA or at home compared to women in the upper wealth quintiles (Fronczak *et al.*, 2007). In Uganda 28% of women in the lowest quintile and 77% in the highest quintile, deliver with a skilled

provider (Uganda Bureau of Statistics, 2006a, p.129). In Kenya high SES is associated with a lower possibility of delivering at home (Magadi *et al.*, 2000). It is therefore hardly surprising that poor people in resource-limited settings account for 65% of all maternal mortality (Houweling, *et al.*, 2007, p.746). Because a woman's SES affects health-seeking behaviour and determines the possibility of health facility delivery, the SES of the women was evaluated.

### **2.6.3.2 Association between household size and health facility delivery**

Household size refers to the number of individuals living in a household that share a common meal (Uganda Bureau of Statistics, 2006b). In Uganda the average household size is 4.7 persons, and 39% of the households in rural settings are poor (Uganda Bureau of Statistics, 2006a, p. 96; Uganda Bureau of Statistics, 2006b, p. xii). Therefore, the larger the family size, the greater the strain on the available resources that must (among other things) provide for good maternal health and the ability to make use of skilled attendance at the time of childbirth (Potts & Fosto, 2007). There is a significant association between the size of a family and the place of delivery (Wagle *et al.*, 2004). The association between family size and health facility delivery was included in the analysis as a possible determinant of health facility delivery.

### **2.6.3.3 Access to health services as a determinant of health facility delivery**

In a narrow perspective, access implies physical reach (Green, 2001). In sub-Saharan Africa women either walk to or rely on whatever means of transport is available to reach a health facility. The time taken to travel to a health facility depends on the terrain, the health and strength of the woman, and the means of transport available. The longer the distance, the more likely it is that a woman will not be able to access those services in times of emergencies, such as the onset of childbirth (Ensor & Cooper, 2004). In Nigeria and Kenya 26% and 49% respectively of mothers who delivered outside a health facility reported difficulties in accessing suitable and affordable transport as a key impediment (Orji *et al.*, 2001; Van Eijk *et al.*, 2006). Women who had spent one hour or more in travel time were 2.1 (1.18-3.61) times more likely to deliver outside a health

facility than those who spent less than an hour in travel time to reach a health facility (Van Eijk *et al.*, 2006). The researcher used the estimated travel time to the place of delivery to determine the association between travel time and health facility delivery.

#### **2.6.3.4 Association between a history of contraceptive use and place of delivery**

In Kenya women who have used modern family planning methods are 60% less likely to deliver at home compared to women who have not (Magadi *et al.*, 2000). The history of contraceptive use in the two years before delivery was evaluated as a factor associated with increased possibility of health facility delivery.

#### **2.6.3.5 Ethnic background as a determinant of health facility delivery**

The influence of ethnic background on reproductive health behaviour of women cannot be underestimated. In Kenya TBA deliveries were more common among the Kamba (31%) and least common among the Meru/Embu people and the Kikuyu (6% and 8% respectively) (Magadi *et al.*, 2000, p.176). In contrast, Wagle *et al.* (2004) reported that ethnicity was not significantly associated with health facility delivery. The association between ethnic background and the possibility of health facility delivery was included in this analysis.

#### **2.6.3.6 Social support as a determinant of health facility delivery**

Educational attainment of the spouse has been associated with lower maternal mortality and a higher possibility of health facility delivery (Evjen-Olsen, Evjen-Olsen & Kvåle, 2009; Grace & Carr, 2009). The researcher analysed the level of educational attainment of the spouse and the marital status of the mother as proxy indicators of social support to the mother to determine whether there is an association between these factors and health facility delivery.

## **2.7 The research gap**

Comprehensive studies of the factors associated with health facility delivery in rural settings in Uganda and sub-Saharan Africa are generally in very short supply. This gap in information has resulted in uninformed and inadequately targeted interventions aimed at increasing health facility delivery. Because of these deficiencies in strategy, there has not been a satisfactory increase in skilled attendance at birth or a reduction in MMR. Further research to determine the unexplained individual and community factors that influence health facility delivery is necessary (Magadi *et al.*, 2000). It is against this background that the researcher carried out this study.



## **CHAPTER THREE: RESEARCH METHODOLOGY**

This is a comparative analysis of the characteristics of women who deliver in health facilities and those who deliver outside of health facilities, to determine the significant factors associated with health facility delivery.

### **3.1 Definition of key terms**

*Delivery* refers to the birth of a baby (Hornby, 2010). *Index delivery* refers to the most recent delivery that was analysed in this study, and enabled the researcher to compare the circumstances under which the mother delivered her last baby in comparison to other mothers and her previous deliveries.

*Demographic characteristics* are characteristics of a particular population - for example, age or race (Macmillan, 2010a).

*Health facility delivery* is a childbirth accomplished in a public or private health facility, irrespective of who attended the delivery (WHO, 1997). *Non-health facility deliveries* are deliveries that occur outside a health facility setting, either at home or with a TBA.

*Grand multiparous* refers to a female that has delivered or given birth seven or more times (Merriam-Webster, 2010b).

*Maternal mortality* is defined in section 2.2.

*Nulliparous* refers to a female that has never delivered a baby (Merriam-Webster, 2010c).

*Parity* is the number of times a female has given birth, counting multiple births as one (Merriam-Webster, 2010d).

*Primigravida* is a female that is pregnant for the first time (Merriam-Webster, 2010e).

*Skilled attendant* is defined by the WHO (2008, p.1) as:

‘An accredited health professional – such as a midwife, doctor or nurse – who has been educated and trained with 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’.

Skilled attendance includes the availability of midwifery skills and an enabling environment with appropriate equipment and medications that might be required to perform a safe delivery (WHO 2007).

*Socio-economic status* is defined in section 2.6.3.

*Stillbirth* is defined by Hornby as (2010, p.1452) ‘A birth in which the baby is [born] dead.’

*Traditional birth attendants (TBAs)* are traditional practitioners (community-based providers) that are not trained in the care of the mother and baby during pregnancy, childbirth and the postnatal period, that present themselves as skilled individuals capable of overseeing childbirth and oversee deliveries in communities (WHO, 2007).

### **3.2 Study design**

This study used a quantitative, descriptive and cross-sectional research design. Numeric data describes the trends and invariable relationships while the descriptive approach describes the key attributes or aspects of the relationships between variables (Bowling, 2002; Creswell, 2003; Glatthorn & Joyner, 2005; Tustin, 2005; Polit & Beck, 2006). The descriptions of variables are presented as frequencies, averages, medians and percentages pertaining to the characteristics of the study population (Glatthorn & Joyner, 2005). The cross-sectional nature of this study refers to

the fact that data were collected from women who delivered during a four-month period which is a point in time (Bowling, 2002).

### **3.3 Study population**

A study population is the entire aggregate of individuals that meet the inclusion criteria of a study, which is all women who delivered in the Mpigi District located in the central region of Uganda (Lewin, 2006; Polit & Beck, 2006). The Ugandan health system is tiered, with a district hospital serving a population of 100 000 to 1 000 000 inhabitants (Uganda Ministry of Health, 2000, p.12). There are 42 health facilities in the Mpigi District, of which 21 (50%) provide ANC and varying degrees of maternal services and emergency obstetric care (Uganda Ministry of Health, 2003, p.14). The district has two hospitals that provide maternal delivery services to more than 50% of its catchment population of 414 757 (Uganda Ministry of Health, 2003, p.14). The crude birth rate (CBR) is 43.9 per 1000 population (Ekman & Gerdtham, 2006, p.11). In 2001, 21.4% of the expected deliveries occurred in health facilities (Uganda Ministry of Health, 2003, p.24), with an annual growth rate of 3.2% (UNDP, 2007, p.21). In 2008 the projected population of the district was 501 039. With a crude birth rate (CBR) of 43.9 per 1000, in 2008 an estimated 21 995 deliveries took place in the district, of which 4 707 (21.4%) were in health facilities. From this analysis 21 995 mothers formed the study population, while the 7 332 deliveries that took place during the four months of the study period are the target population.

#### **3.3.1 Sample size**

A sample is a representative set of a population that is the subject of a study so that the behaviour, attitudes and opinions of the total population can be evaluated (Tustin, 2005; Lewin, 2006). This study used non-probability sampling, which means the sample population was not dependent upon the rationale of probability theory (Trochim, 2006a). This sampling approach was used because it is convenient and economical (Polit & Beck, 2006). The Mpigi District and the two

district hospitals were conveniently accessible, ready and eager to participate (Creswell, 2003, p.156). The high Bacillus Calmette-Guerin (BCG) (90%) and Oral Polio 1 (96%) (WHO, 2010, pp.2-3) immunisation coverage in Uganda renders the MCH clinic a convenient, unbiased opportunity to access mothers who deliver in and outside of health facilities. The sample consisted of all mothers who attended MCH clinics for BCG, Polio 0 or 1 immunisations (these vaccines are provided to all children at birth (BCG), at six weeks (Polio 0) and at 10 weeks (Polio 1). The eligibility criterion was all mothers who attended MCH clinics in the study period between 1 October 2008 and 31 January 2009.

In order to determine the sample size, the researcher used the estimated number of women who delivered in the district in a period of one year (namely 21 995) as the population size. With the percentage frequency of health facility deliveries in the population at 21.4% ( $p$ ) (Uganda Ministry of Health, 2003, p.24), the minimum sample size was determined using the formula below:

$$\frac{n = z^2 [p(1-p)]}{E^2} \text{ therefore } = \frac{1.96^2 [0.21(1-0.21)]}{0.05^2} \text{ therefore } = \frac{3.8416 [0.1659]}{0.0025} = 254.9$$

Where  $p$  is the estimated population proportion (sample statistic),

$n$  is the sample size,

$E$  is the allowable error ( $E=5\%$  or  $0.05$ ), and

$z$  is the number of standard deviations in a normal distribution that will yield the desired level of confidence ( $z=1.96$  at a 95% level of confidence) (Van Wyk 2005, p.372).

Using the formula and assumptions above, the minimum sample size was 254 mothers at a significance level of 0.05, power of 90%. The researcher collected data from 268 mothers and analysed data from 257 mothers whose questionnaires were more than 90% complete. The sample

comprises 3.5% of the women who delivered in the Mpigi District during the study period, and 1.2% of all the women who deliver in the district in one-year.

### **3.4 Study variables**

A variable is a characteristic of an individual or unit under study, and has the capacity to vary in quantity or quality (Creswell, 2003; Rudestam & Newton, 2007). Independent variables influence a specific outcome or have an effect on the value of another variable (the dependent variable) (Creswell, 2003; Lewin, 2006). According to the objectives of the study, the independent variables are:

*Objective 1: The reasons why women deliver in a health facility*

The most significant influence on a woman's decision to deliver in a health facility;  
the main reason why the woman delivered in a health facility.

*Objective 2: Socio-demographic characteristics of the women (mothers)*

The average age of the mothers; the average age of nulliporous women; the age range of the mothers; parity patterns; child spacing patterns; frequency of ANC.

*Objective 3: Socio-economic characteristics of the women (mothers)*

Educational attainment of the woman; time taken to reach a health facility and history of stillbirth. Other variables are: the place of last delivery; history of a non-facility delivery; and contraceptive use in the past two years (a year prior to last pregnancy). The SES variables include the SES of mothers; social support from the spouse; household size and ethnic background.

The dependent variable in this study is the place of delivery.

These variables form the basis for the discussion, conclusions and recommendations.

### **3.5 Validity**

Validity is the state of being true, and for a data collection tool is the extent to which the tool measures the true differences among individuals, situations and groups (Hornby, 2010; Van Wyk, 2005). External validity of the findings is ensured by analysing data from a statistically significant sample of the population (Van Wyk, 2005; Rudestam & Newton 2007). The literature review ensured that the questionnaire focused on those critical components necessary to produce adequate information to answer the research questions. The questionnaire was peer-reviewed by colleagues working in a similar setting and familiar with the objectives of the study (Bowling, 2002). Internal validity was enhanced by piloting the data collection tool (Beaglehole, Bonita & Kjellstrom, 2000). Random verification of the completed data collection questionnaires enhanced internal validity. The researcher is therefore confident that the questionnaire accurately measured that which it was designed to measure, and that with repeated use it will produce similar findings in comparable settings and populations. The four-month window period of deliveries ensured that any possible confounding factors were minimised. Circumstances related to delivery were similar for all the women in the study, and therefore the findings are (largely) attributed to the variables under study.

### **3.6 Reliability**

Reliability is the extent to which a measure yields the same results when its use is repeated in similar circumstances (Merriam-Webster, 2010f). Ambiguity was minimised by using a structured questionnaire and by training research assistants so that they were able to produce consistent results.

### **3.7 Data collection tool**

The questionnaire used was objective, systematic and consistent (LoBiondo-Woods & Haber, 2006). It was composed in English and translated into the most commonly spoken dialect in the district, Luganda. It contained 40 straightforward questions (20 of which were 'yes' or 'no' questions), and six sub-sections that contained 5-10 straightforward questions each (Annexure 3). The sections included demographic aspects, family and social aspects, access to maternal services, obstetric history, ANC history, medical history and social-economic aspects.

### **3.8 Data collection**

Data collection was accomplished by face-to-face interviews. Mothers were interviewed in their local language, unless they preferred to be interviewed in English. The researcher trained three experienced research assistants in the correct methods of collecting the data. He also taught them how to compile the data in the data collection tools and how to comply with the ethical framework and instructions that governed the process of data collection. The research assistants administered each questionnaire after registration of the mother at the MCH clinic, and responses were recorded in the data collection tool. The interviews lasted 20 - 30 minutes each, and on average two to three mothers were interviewed a day in each of the participating hospitals. The mothers provided written consent by signature or thumbprint (see 3.12 below and see Annexure 2). Data was compiled from the completed questionnaires, cleaned and verified. Thereafter data were entered into predesigned SPSS (Statistical Package for the Social Sciences) and Epi Info databases.

### **3.9 Data analysis**

Data analysis involved description, and a thorough investigation of the data variables with the intention of identifying possible relationships or associations (Trochim, 2006b). Making use of descriptive statistics, the researcher interpreted the data through frequency distributions and measures of central tendency (Van Wyk, 2005). These descriptions provide explanations of various phenomena that hitherto had seemed to be related or unrelated in the literature. Data are presented with graphical visual representations so that various complex findings are simplified without forfeiting their importance. The graphic presentation ensures that the reader is in a position to appreciate complex issues by referring to simple and easily comprehensible summaries (Rudestam & Newton, 2007). Bivariate analysis of categorical variables enabled the researcher to determine the association between variables and health facility delivery.

### **3.10 Assumptions of the study**

The assumptions of the study were as follows: (1) the women included in the sample delivered in a four-month period, and still remembered the circumstances under which they accomplished their most recent delivery. They were able to remember the costs incurred, distance travelled, location of delivery and other information related to their last delivery. (2) No direct benefit accrued to the mother for giving the wrong information. Therefore, responses provided by the mothers represent the most realistic perspective of what is happening in rural settings in Uganda with regard to health facility and non-health facility deliveries. (3) The MCH mothers adequately represent a cross-section of mothers who deliver in the Mpigi District. (4) All deliveries that took place in health facilities were attended to by skilled health workers.



### **3.11 Potential sources of bias**

Respondents' accounts of subjective events around pregnancy and childbirth are prone to recall bias. There is also the possibility of courtesy bias. Women may be unwilling to give their true opinions because they might feel that any expression of negative feelings or criticism of the care they received may prejudice their ability to receive adequate care in the future. This bias was minimised by ensuring that the mothers were interviewed in a reassuring and confidential environment, and by informing the mothers that their responses would remain strictly confidential. Participating mothers were also informed that their particulars would not be disclosed to health facility administration or staff. The conveniently selected MCH clinics in the two hospitals are located in the trade hubs of this rural district are poised to have specific characteristics that have a potential to influence the outcomes. Lastly, there are mothers that delivered at home and did not attend MCH clinics. Though mitigations minimised the risk of bias, these factors have a potential influence the outcomes of this study.

### **3.12 Ethics and consent**

The principles of respect for persons, beneficence and justice were ensured in this study (Brink, Van der Walt & Van Rensburg, 2006; Council for International Organizations of Medical Sciences in collaboration with WHO, 2009). Every participating mother was treated with respect and courtesy, and all of them took part voluntarily. They were free to decide whether to or not to participate in the study and could withdraw from the interview at any time without any negative consequences. The study did not involve any kind of invasive procedures; no participant suffered any extraneous kind of physical or intentional emotional discomfort or harm (Brink *et al.*, 2006). To comply with the ethical requirements of this study, the researcher obtained approval from the research and ethical committees of the University of Cape Town (Annexure 4) and Makerere

University (Annexure 8). Clearance was obtained from the Mpigi District administration (Annexure 5), Gombe hospital management (Annexure 6) and Nkozi hospital management (Annexure 7). The District Health Officer and hospital management were provided with comprehensive summaries of the basis of the study and the study protocol. They were aware of the possible benefits that would emerge from the results. Health workers were educated about the objectives of the study and reassured that the processes and procedures of the study did not constitute any kind of audit of their performance. The research assistants signed every data collection tool at the conclusion of the interview, committing themselves that the data compiled therein represented the discussion they had with the mother and were presented in the most accurate way possible.

## CHAPTER FOUR: RESULTS

The findings of this study are presented in three broad sections: firstly, the distribution of mothers by place of delivery and their age-related characteristics; secondly, the reasons why women deliver in a health facility; and thirdly, the socio-demographic factors associated with health facility delivery.

### 4.1 Distribution of mothers by place of delivery

The distribution of mothers by place of delivery describes the patterns of intentional or non-intentional preferences of the mothers in terms of place of delivery in this specific setting.

**Table 4.1: Distribution of mothers by place of delivery**

| <b>Place of delivery</b> | <b>Mothers<br/><i>n</i> (%)</b> |
|--------------------------|---------------------------------|
| Health centre            | 22<br>(8.6)                     |
| Home or TBA              | 56<br>(21.8)                    |
| Hospital A               | 35<br>(13.6)                    |
| Hospital B               | 99<br>(38.5)                    |
| On the way               | 1<br>(0.4)                      |
| Other hospitals          | 13<br>(5.1)                     |
| Private clinics          | 31<br>(12.0)                    |
| <b>Total</b>             | <b>257</b>                      |

Table 4.1 shows that the majority of the women 38.5% (n=257) and 21.8% delivered in Hospital B and at home or with TBAs respectively. The rest of the women delivered in Hospital A (13.6%), in private clinics (12.0%), health centres (8.6%) and other hospitals outside the district (5.1%). Among MCH mothers, 77.8% of the women delivered in a health facility while 22.2% delivered in a non-health facility setting. Because this is not a community-based survey of skilled attendance at birth, these findings are not an indication of the coverage of skilled attendance at birth in this community.

## **4.2 Influence on and reasons why women deliver in health facilities**

The researcher analysed the greatest influence on the mother's choice of place of delivery and the main reason why she decided to deliver in a health facility.

### **4.2.1 Greatest influence on place of delivery**

Most of the women that delivered in a health facility were influenced by their husbands (36.0%) and their mothers (27.5%) (Table 4.2). Friends, neighbours and in-laws influenced 30.5%, while health workers influenced 6.0% of the mothers. Overall, there is no association between individual influence and place of delivery ( $\chi^2=0.86$ , 3 degrees of freedom,  $P=0.84$ ).

**Table 4.2: Greatest influence on place of delivery**

|                               |   | Place of delivery   |                     |              |
|-------------------------------|---|---------------------|---------------------|--------------|
|                               |   | Health facility     | Non-health facility | Total        |
|                               |   | <i>n (%)</i>        | <i>n (%)</i>        | <i>n (%)</i> |
| <b>The greatest influence</b> | <b>Mother</b>                                   | 55 (75.3)<br>(27.5) | 18 (24.7)<br>(32.1) | 73<br>(28.5) |
|                               | <b>Husband</b>                                  | 72 (79.1)<br>(36.0) | 19 (20.9)<br>(33.9) | 91<br>(35.5) |
|                               | <b>Health worker</b>                            | 12 (85.7)<br>(6.0)  | 2 (14.3)<br>(3.6)   | 14<br>(5.5)  |
|                               | <b>Others (friends, neighbours and in-laws)</b> | 61 (78.2)<br>(30.5) | 17 (21.8)<br>(30.4) | 78<br>(30.5) |
|                               | <b>Total</b>                                    | <b>200 (78.1)</b>   | <b>56 (21.9)</b>    | <b>256</b>   |

- Response missing in 1 case.

Women influenced by their mothers compared to those influenced by their husbands have an 81% possibility of delivering in a health facility (OR 0.81 [95% CI 0.36-1.67]). Although not statistically significant, women influenced by health workers are twice as likely to deliver in a health facility as those influenced by their mothers (OR 1.96 [95% CI 0.36 -14.06]).

#### 4.2.2 Main reason for delivering where they did

The main reason why the women delivered in a health facility was because facilities were capable of ensuring a safe and secure delivery (28.7%, n=188) (Table 4.3). Secondly, for 19.7% and 13.8% of the women it was because the health facility was close (accessible) and offered good services respectively.

**Table 4.3: Main reason for delivering in a health facility**

|  | Place of delivery               |                                     |                       |
|--|---------------------------------|-------------------------------------|-----------------------|
|  | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| <b>Referred</b>                          | 2 (66.7)<br>(1.1)               | 1 (33.3)<br>(2.1)                   | 3<br>(1.3)            |
| <b>Facility close by (proximity)</b>     | 37 (88.1)<br>(19.7)             | 5 (11.9)<br>(10.4)                  | 42<br>(17.8)          |
| <b>Good services</b>                     | 26 (100.0)<br>(13.8)            | –                                   | 26<br>(11.0)          |
| <b>Affordability</b>                     | 5 (35.7)<br>(2.7)               | 9 (64.3)<br>(18.8)                  | 14<br>(5.9)           |
| <b>First baby</b>                        | 5 (71.4)<br>(2.7)               | 2 (28.6)<br>(4.2)                   | 7<br>(3.0)            |
| <b>Too late</b>                          | 10 (43.5)<br>(5.3)              | 13 (56.5)<br>(27.1)                 | 23<br>(9.7)           |
| <b>Health worker's advice</b>            | 4 (100.0)<br>(2.1)              | –                                   | 4<br>(1.7)            |
| <b>Fear</b>                              | 16 (100.0)<br>(8.5)             | –                                   | 16<br>(6.8)           |
| <b>Safe delivery and secure services</b> | 54 (84.4)<br>(28.7)             | 10 (15.6)<br>(20.8)                 | 64<br>(27.1)          |
| <b>Choice</b>                            | 12 (80.0)<br>(6.4)              | 3 (20.0)<br>(6.2)                   | 15<br>(6.4)           |
| <b>Other</b>                             | 17 (77.3)<br>(9.0)              | 5 (22.7)<br>(10.4)                  | 22<br>(9.3)           |
| <b>Total</b>                             | <b>188 (79.7)</b>               | <b>48 (20.3)</b>                    | <b>236</b>            |

- Responses missing in 21 cases.

Most women delivered in a non-health facility setting because they were too late to deliver elsewhere (27.1%, n=48); other reasons were that they could safely deliver there (20.8%), the services were affordable (18.8%), and the facility was close (10.4%). The proportion of women that delivered in a non-health facility setting mainly because the services were affordable (18.8%, n=48) was six times the proportion of women that delivered in a health facility setting mainly because the services were affordable (2.7%, n=188). This is an indication that affordability is a major consideration for women that deliver in TBA or home (non-health facility) settings.

### 4.3 Demographic determinants of health facility delivery

Table 4.4 shows that the ages of the women at delivery (of those that delivered in health facilities) were, below 15 years old (0.5%), 15-19 years (22.6%), 20-24 years (39.5%), 25-29 years (23.1%), 30-34 years (7.2%), 35-39 years (6.2%), and 40 years or older (1.0%). For those who did not report a date of birth, their self-reported age was used for this analysis.

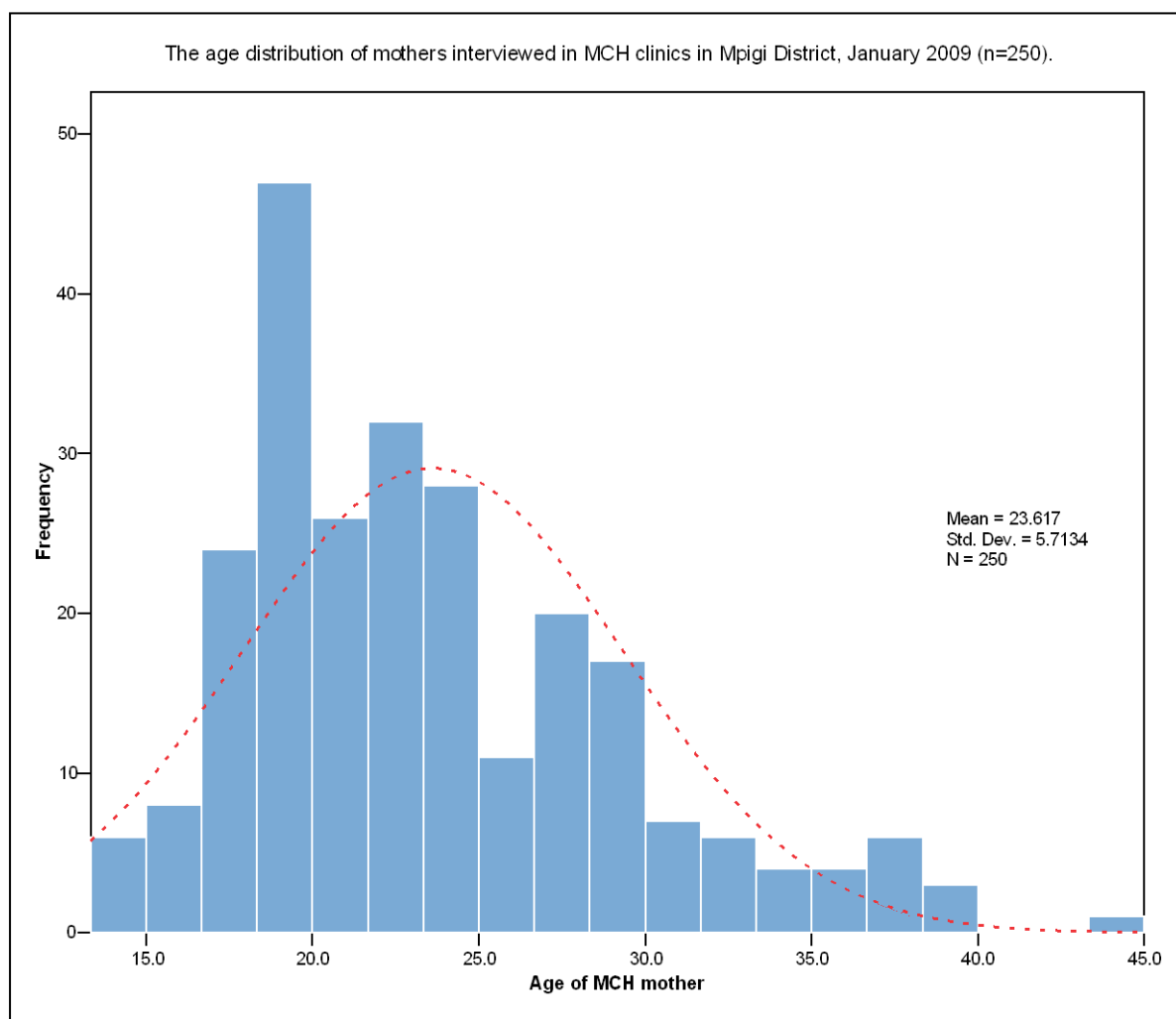
**Table 4.4: Distribution of mothers in terms of age group and place of delivery**

|                | Place of delivery               |                                     |                       | Odds Ratio*               |
|----------------|---------------------------------|-------------------------------------|-----------------------|---------------------------|
|                | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |                           |
| <b>&lt; 15</b> | 1 (33.3)<br>(0.5)               | 2 (66.7)<br>(3.7)                   | 3<br>(1.2)            | –                         |
| <b>15-19</b>   | 44 (72.1)<br>(22.6)             | 17 (27.9)<br>(31.5)                 | 61<br>(24.5)          | OR 0.54[95% CI 0.23-1.25] |
| <b>20-24</b>   | 77 (82.8)<br>(39.5)             | 16 (17.2)<br>(29.6)                 | 93<br>(37.4)          | –                         |
| <b>25-29</b>   | 45 (77.6)<br>(23.1)             | 13 (22.4)<br>(24.0)                 | 58<br>(23.3)          | OR 0.72[95% CI 0.29-1.76] |
| <b>30-34</b>   | 14 (73.7)<br>(7.2)              | 5 (26.3)<br>(9.3)                   | 19<br>(7.6)           | OR 0.58[95% CI 0.16-2.16] |
| <b>35-39</b>   | 12 (92.3)<br>(6.1)              | 1 (7.7)<br>(1.9)                    | 13<br>(5.2)           | –                         |
| <b>≥40</b>     | 2 (100.0)<br>(1.0)              | –                                   | 2<br>(0.8)            | –                         |
| <b>Total</b>   | <b>195 (78.3)</b>               | <b>54 (21.7)</b>                    | <b>249</b>            |                           |

- Responses missing in 8 cases.
- \*The Odds of health facility delivery for the 15-19, 25-29 and 30-34 age group in comparison with the 20- 24 yrs age group.

In Table 4.4, 66.7% (n=3) of the women who were less than 15 years old delivered in a non health facility setting (though the total number is small, the fact that two of three very young mothers delivered outside a health facility is an important factor to take note of). Additionally, 27.9% (n=61) of 15-19 years old delivered in a non-health facility setting. The highest proportion of women that delivered in a health facility were in the 40 years plus age group (100%, n=2), 20-24

years (82.8%, n=93) and 25-29 years (77.6%, n=58). In comparison to the 20-24 years age group, the odds for a health facility delivery for the age groups 15-19, 25-29 and 30-34 years were 0.54 [95% CI 0.23-1.25], 0.72 [95% CI 0.29-1.76] and 0.58 [95% CI 0.16-2.16] respectively.



**Figure 4.1: Age distribution of the mothers**

The mean age of the women at delivery was 23.6 years [SD±5.7] while the median age was 22.3 years, with the most frequently reported age (mode) at delivery being 20 years (Figure 4.1). Twenty percent (20%) of the mothers were aged 19 years and below, 40% were 21 years and below, 60% were 23.9 years and below, and 80% were 28 years and younger. The minimum age of a mother at childbirth was 14.2 years and the maximum age was 45 years.



### 4.3.1 Association between age and health facility delivery

The women were further categorised based on the safe pregnancy period of 20-29 years and those aged less than 20 years to determine the association between age and health facility delivery.

**Table 4.5: Association between age and place of delivery**

|                                 |                             | Place of delivery               |                                     |                             |
|---------------------------------|-----------------------------|---------------------------------|-------------------------------------|-----------------------------|
|                                 |                             | Health facility<br><i>n (%)</i> | Non-health facility<br><i>n (%)</i> | Total<br><i>n (%)</i>       |
| Age of the mother<br>(in years) | Less than 20<br>(high risk) | 45 (70.3)<br>(26.9)             | 19 (29.7)<br>(39.6)                 | <b>64</b><br><b>(29.8)</b>  |
|                                 | 20-29<br>(lowest risk)      | 122 (80.8)<br>(73.1)            | 29 (19.2)<br>(60.4)                 | <b>151</b><br><b>(70.2)</b> |
|                                 | Total                       | <b>167 (77.7)</b>               | <b>48 (22.3)</b>                    | <b>215</b>                  |

- Responses missing in 8 cases (34 mothers aged 30 years or older are excluded from this analysis).
- OR 0.56 [95% CI 0.29 – 1.10].

Table 4.5 shows that 70.3% (n=167) of the women aged less than 20 years delivered in a health facility, compared to 80.8% of the women aged 20-30 years. The odds of delivering in a health facility among the women aged less than 20 years (high risk) are 56.3% (OR 0.56 [95% CI 0.29-1.10]) compared to the 20-29 year age group and are not statistically significant. These results show that the high-risk mothers are less likely to delivery in a health facility but because the findings are not statistically significant, the age of the mother is not associated with increased possibility of health facility delivery.

### 4.3.2 Association between educational attainment and health facility delivery

The Ugandan education system has three levels: primary level - seven years (less than 8 years); ordinary secondary level - years 8-11; advanced secondary and tertiary education level - 12 years and above (Ngolovoi & Marcucci, 2006). Mothers were categorised according to these three

levels of educational attainment and the association between educational attainment and possibility of health facility delivery was determined.

**Table 4.6: Association between formal educational attainment and place of delivery**

|  |                   | Place of delivery        |                              |                | Odds Ratio *                  |
|--|-------------------|--------------------------|------------------------------|----------------|-------------------------------|
|  |                   | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |                               |
| Highest number of years of formal education attained | Less than 8 years | 93 (69.9)<br>(46.5)      | 40 (30.1)<br>(70.2)          | 133<br>(51.7)  |                               |
|  | 8 - 11 years      | 80 (84.2)<br>(40.0)      | 15 (15.8)<br>(26.3)          | 95<br>(37.0)   | (OR 2.29 [95% CI 1.13-4.71])  |
|  | 12 years and more | 27 (93.1)<br>(13.5)      | 2 (6.9)<br>(3.5)             | 29<br>(11.3)   | (OR 5.81 [95% CI 1.25-37.14]) |
|  | <b>Total</b>      | <b>200 (77.8)</b>        | <b>57 (22.2)</b>             | <b>257</b>     |                               |

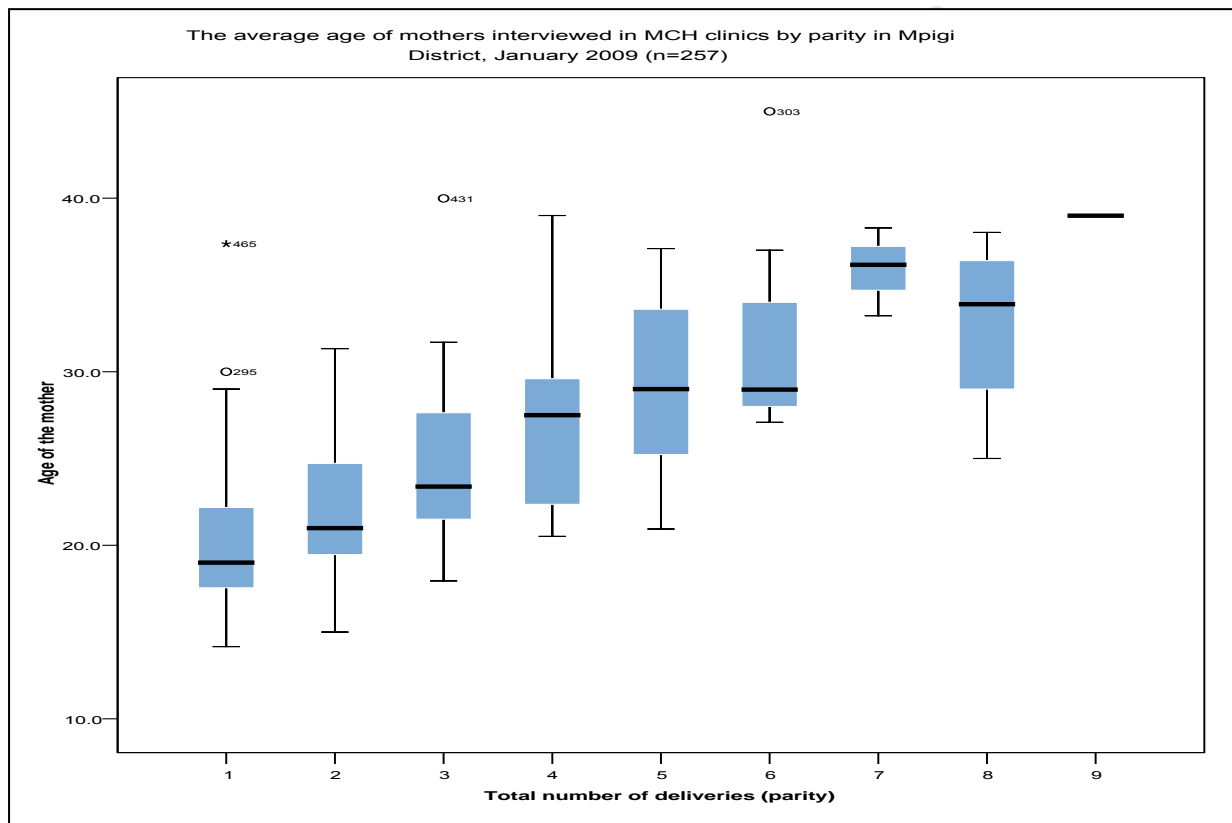
- Overall OR 2.65 [95% CI 1.41 – 4.99];  $\chi^2 = 9.5$ ;  $P=0.002$ .
- \*The Odds of health facility delivery for the 8-11 and 12 years or more of education groups compared to the less than 8 years of formal education category.

Table 4.6 shows that 46.5% (n=200), 40.0% and 13.5% of the women that delivered in a health facility had attained less than 8 years, 8-11 years and 12 or more years of formal education respectively. Of the women that attained 12 or more years and 8-11 years of education, 93.1% (n=29) and 84.2% (n=95) delivered in a health facility – compared to 69.9% (n=133) of women who attained less than 8 years of formal education. Attaining 8-11 years of formal education doubles the possibility of a woman delivering in a health facility in comparison to a woman that has not attained 8 years of formal education (OR 2.29 [95% CI 1.13-4.71]; RR 1.2[1.03-1.37]; RD 14.3% [2.2-24.3];  $\chi^2=6.15$ ;  $P=0.013$ ). For women who attained 12 years or more of education, the possibility of health facility delivery is five times that of those who had not attained 8 years of formal education (OR 5.81 [95% CI 1.25-37.14]; RR 1.33 [1.06-1.44]; RD 23.2% [4.1-30.1];  $\chi^2=6.62$ , Fischer's exact test  $P=0.009$ ). Overall, women who have attained 8 years or more of

education are 2.7 times more likely to deliver in a health facility compared to those who have completed less than 8 years of formal education (OR 2.65 [95% CI 1.41-4.99]; RR 1.23[1.07-1.39]; RD 16.4% [5.5-25.5];  $\chi^2 = 9.5$ ;  $P=0.002$ ).

### 4.3.3 Median age of mothers by parity

The median age of mothers by parity is the best indicator of fertility patterns in this rural community.



**Figure 4.2:** The average age of mothers by parity

Figure 4.2 shows that the median ages of women at delivery by parity were as follows: parity one - 19.3 years; two - 21 years; three - 23.4 years; four - 27.5 years; five and six - both 29 years; and eight - 33.9 years. These findings show that more than 50% of the women delivered their first baby before the age of 20 years and 75% before they are 25 years old. By the age of 30 they had accomplished their sixth birth. The average parity was two (1.7,  $SD\pm 1.7$ ).

#### 4.3.4 Association between parity and health facility delivery

Table 4.7 shows that 33.5% (n=200), 24.5%, 16.5%, 8.5% and 17.0% of the women that delivered in health facilities were nulliparous, parity of one, two, three, and four or more respectively. There is no association between parity and the possibility of health facility delivery ( $\chi^2 = 2.59$ , df.4,  $P=0.629$ ).

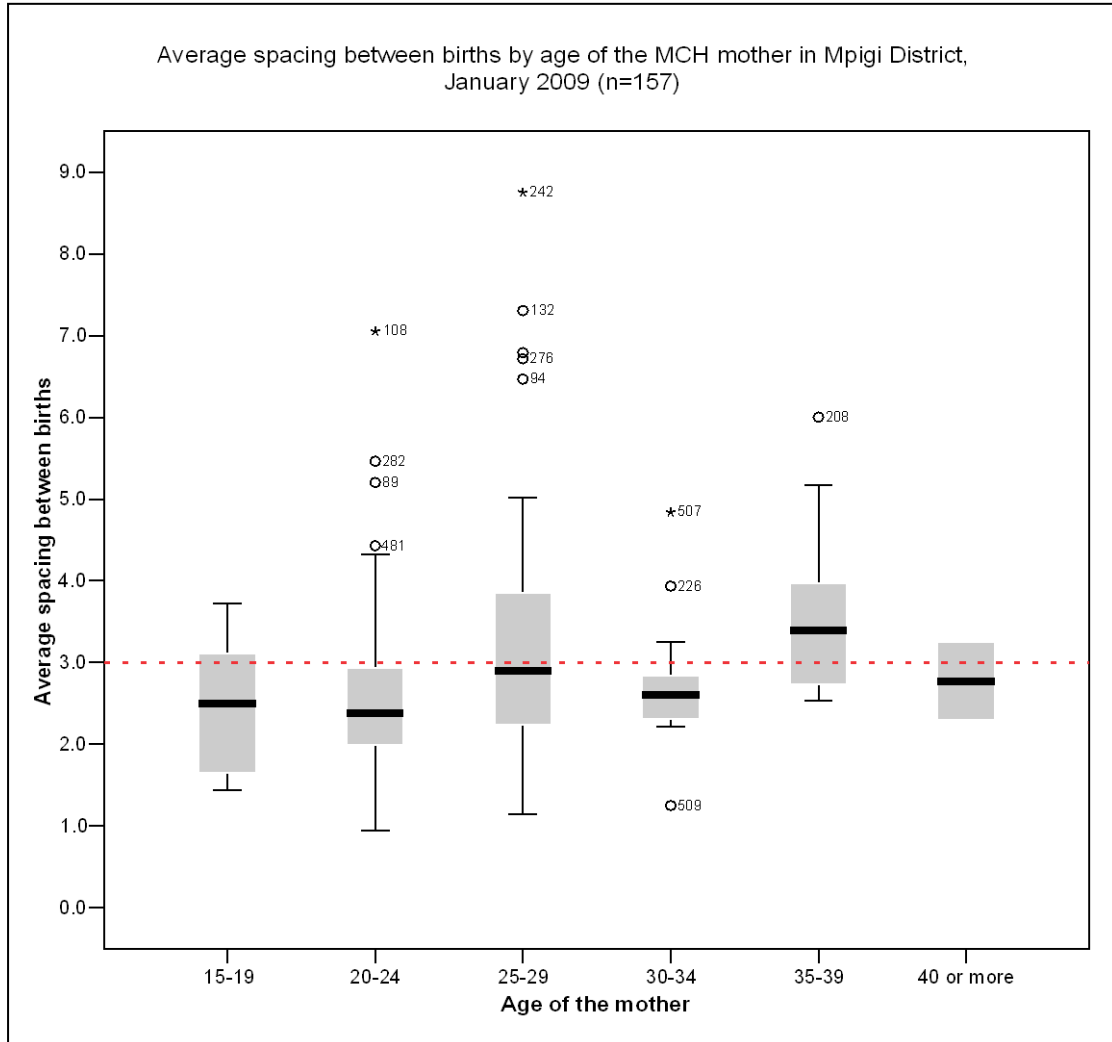
**Table 4.7: Association between parity before index delivery and place of delivery**

|  |              | Place of delivery        |                              |                |
|--|--------------|--------------------------|------------------------------|----------------|
|  |              | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |
| Total number of deliveries before index delivery | Nulliparous  | 67 (81.7)<br>(33.5)      | 15 (18.3)<br>(26.3)          | 82<br>(31.9)   |
|  | 1            | 49 (79.0)<br>(24.5)      | 13 (21.0)<br>(22.8)          | 62<br>(24.1)   |
|  | 2            | 33 (70.2)<br>(16.5)      | 14 (29.8)<br>(24.6)          | 47<br>(18.3)   |
|  | 3            | 17 (73.9)<br>(8.5)       | 6 (26.1)<br>(10.5)           | 23<br>(9.0)    |
|  | 4 or more    | 34 (79.1)<br>(17.0)      | 9 (20.9)<br>(15.8)           | 43<br>(16.7)   |
|  | <b>Total</b> | <b>200 (77.8)</b>        | <b>57 (22.2)</b>             | <b>257</b>     |

- Overall  $\chi^2 = 2.59$ , df.4,  $P=0.629$ .

### 4.3.5 Association between birth interval and health facility delivery

The average child-spacing interval is the number of years between the first and last delivery, divided by the number of deliveries.



**Figure 4.3: Average spacing between births by age of mother**

Figure 4.3 shows that mothers aged 20-24 years had the shortest median birth interval, of 2.4 years (28.8 months). The 15-19 years age group had a birth interval of 2.5 years (30 months), 2.6 years (31.2 months) for the 30-34 years group and 2.8 years (33.6 months) for the 40 years and above age group. The 35-39 years group had a median birth interval of 3.4 years (40.8 months). The average child spacing interval was 2.9 years [SD±1.3] (34.8 months), with a median of 2.5 years (30 months), a minimum of 0.9 years (10.8 months) and a maximum of 8.8 years (105.6

months) (n=157). Only the 35-39 years group had the recommended birth interval of 3.0 years or more (more than 36 months). In determining the association between birth interval and health facility delivery, mothers were further categorised into two-year birth intervals of 0.9-1.9 years, 2-3.9 years, and 4 or more ( $\geq 4$ ) years.

**Table 4.8: Association between child-spacing interval and place of delivery**

|  |                        | Place of delivery        |                              |                |                             |
|--|------------------------|--------------------------|------------------------------|----------------|-----------------------------|
|  |                        | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) | Odds ratio *                |
| Average number of years of child-spacing | <b>0.9-1.9 years</b>   | 24 (82.8)<br>(19.0)      | 5 (17.2)<br>(16.1)           | 29<br>(18.5)   |                             |
|  | <b>2-3.9 years</b>     | 82 (77.4)<br>(65.1)      | 24 (22.6)<br>(77.4)          | 106<br>(67.5)  | OR 0.71 [95% CI 0.21-2.26]  |
|  | <b>4 or more years</b> | 20 (90.9)<br>(15.9)      | 2 (9.1)<br>(6.5)             | 22<br>(14.0)   | OR 2.08 [95% CI 0.30-17.59] |
|  | <b>Total</b>           | <b>126 (80.3)</b>        | <b>31 (19.7)</b>             | <b>157</b>     |                             |

- Responses missing in 18 cases (analysis excludes 82 primigravidas).
- Overall  $\chi^2 = 2.25$ , df.2;  $P=0.324$ .
- \*The Odds of health facility delivery for the 2-3.9 years and 4 or more years birth intervals in comparison with the mothers with an average child spacing interval of 0.9-1.9 years.

Table 4.8 shows that most (65.1%, n=126) women that delivered in a health facility had a birth interval of 2-3.9 years, while 19.0% and 15.9% had birth intervals of 0.9-1.9 years and  $\geq 4$  years respectively. Compared to women with a birth interval of 0.9-1.9 years, the odds of a health facility delivery for women with a birth interval of 2-3.9 years and  $\geq 4$  years were 0.71 [95% CI 0.21-2.26] and 2.08 [95% CI 0.30-17.59] respectively. Birth interval was not associated with health facility delivery ( $\chi^2 = 2.25$ , df.2;  $P=0.324$ ).

### 4.3.6 Association between previous deliveries and index place of delivery

The association between a mother's previous place of delivery and index place of delivery was reviewed (Table 4.9).

**Table 4.9: Association between previous and index place of delivery**

|                            |                     | Place of delivery               |                                     |                       |
|----------------------------|---------------------|---------------------------------|-------------------------------------|-----------------------|
|                            |                     | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| Place of previous delivery | Health facility     | 121 (83.4)<br>(92.4)            | 24 (16.6)<br>(54.5)                 | 145<br>(82.9)         |
|                            | Non-health facility | 10 (33.3)<br>(7.6)              | 20 (66.7)<br>(45.5)                 | 30<br>(17.1)          |
| Total                      |                     | <b>131 (74.9)</b>               | <b>44 (25.1)</b>                    | <b>175</b>            |

- Response missing in 1 case.
- OR 9.90, 95% CI [4.16- 24.69];  $\chi^2=33.0$ ,  $P<0.0001$ .

Table 4.9 shows that 83.4% (n=145) of the women that delivered in a health facility for the previous pregnancy also did so for their subsequent delivery. Of mothers who did not deliver in a health facility for the previous pregnancy, only 33.3% (n=30) delivered in a health facility for the subsequent pregnancy. The possibility of a woman who previously delivered in a health facility delivering in a health facility is 10 times that of a woman who did not previously deliver in a health facility (OR 9.90 [95% CI 4.16-24.69]; RR 2.5 [1.50-4.17]; RD 50.1% [32.2-68.0];  $\chi^2=33.0$ ,  $P<0.0001$ ). Previous delivery in a health facility is associated with increased possibility of health facility delivery.

Table 4.10 shows that 81.3% (n=144) of the women who undertook their first delivery in a health facility compared to 45.2% (n=31) of those that did not, delivered in a health facility for the index pregnancy.

**Table 4.10: Association between first place of delivery and index place of delivery**

|                         |                     | Place of delivery               |                                     |                       |
|-------------------------|---------------------|---------------------------------|-------------------------------------|-----------------------|
|                         |                     | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| Place of first delivery | Health facility     | 117 (81.3)<br>(89.3)            | 27 (18.7)<br>(61.4)                 | 144<br>(82.3)         |
|                         | Non-health facility | 14 (45.2)<br>(10.7)             | 17 (54.8)<br>(38.6)                 | 31<br>(17.7)          |
| Total                   |                     | <b>131 (74.9)</b>               | <b>44 (25.1)</b>                    | <b>175</b>            |

- Response missing in 1 case.
- OR 5.26, 95% CI [2.15-13.00];  $\chi^2=17.6$ ,  $P<0.0001$ .

The probability of a health facility delivery for women who achieved their first delivery in a health facility is five times that of women who delivered their first baby in a non-health facility setting (OR 5.26 [95% CI 2.15-13.00]; RR 1.80 [1.26-2.85]; RD 36.1% [17.5-54.7];  $\chi^2=17.6$ ,  $P<0.0001$ ). History of a first delivery in a health facility was associated with a high possibility of health facility delivery on the index pregnancy.

Table 4.11 shows that 48.8% (n=41) of the women with a history of a non-health facility delivery compared to 84.3% (n=134) of those with no such history subsequently delivered in a health facility for the index pregnancy. Mothers with no history of a non-health facility delivery were six times more likely to deliver in a health facility for the index pregnancy compared to those with any history of a non-health facility delivery (OR 5.65 [95% CI 2.45-13.14]; RR 1.73 [1.29-2.44]; RD 35.5% [17.9-52.0];  $\chi^2=21.6$ ,  $P <0.0001$ ). For women who have ever delivered a baby, no history of a non-health facility delivery is associated with increased possibility of health facility delivery.



**Table 4.11: Association between a history of non-facility delivery and place of delivery**

|   |            | Place of delivery               |                                     |                       |
|---|------------|---------------------------------|-------------------------------------|-----------------------|
|   |            | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| <b>History of TBA or home delivery</b> (non-health facility delivery) | <b>No</b>  | 113 (84.3)<br>(85.0)            | 21 (15.7)<br>(50.0)                 | 134<br>(76.6)         |
|   | <b>Yes</b> | 20 (48.8)<br>(15.0)             | 21 (51.2)<br>(50.0)                 | 41<br>(23.4)          |
| <b>Total</b>  |            | <b>133 (76.0)</b>               | <b>42 (24.0)</b>                    | <b>175</b>            |

- Response missing in 1 case.
- OR 5.65, 95% CI [2.45-13.14];  $\chi^2=21.6$ ,  $P < 0.0001$ .

Table 4.12 shows that 86.5% ( $n=74$ ) and 68.3% ( $n=101$ ) of women with a history of more than 50% of past deliveries in a health facility and those with 50% and fewer deliveries in a health facility respectively delivered in a health facility for the index delivery.

**Table 4.12: Association between proportion of health facility deliveries and place of delivery**

|   |                      | Place of delivery               |                                     |                       |
|---|----------------------|---------------------------------|-------------------------------------|-----------------------|
|   |                      | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| <b>Percentage of deliveries accomplished in a health facility</b> | <b>More than 50%</b> | 64 (86.5)<br>(48.1)             | 10 (13.5)<br>(23.8)                 | 74<br>(42.3)          |
|   | <b>50% or less</b>   | 69 (68.3)<br>(51.9)             | 32 (31.7)<br>(76.2)                 | 101<br>(57.7)         |
| <b>Total</b>  |                      | <b>133 (76.0)</b>               | <b>42 (24.0)</b>                    | <b>175</b>            |

- Response missing in 1 case.
- OR 3.0, 95% CI [1.35- 6.52];  $\chi^2 = 7.69$ ,  $P=0.007$ .

The possibility of a woman with more than 50% of her past deliveries in a health facility having her next baby in a health facility is three times that of a woman with history of 50% or fewer deliveries in a health facility (OR 3.0 [95% CI 1.35-6.52]; RR 1.3 [1.23-1.50]; RD 18.2% [6.2-

30.1];  $\chi^2 = 7.69$ ,  $P=0.006$ ). A history of more than 50% of deliveries in a health facility was significantly associated with increased probability that a woman would deliver in a health facility for the index pregnancy.

#### 4.3.7 Association between history of stillbirth and health facility delivery

In this study, 75% (n=8) of the stillbirths occurred in a hospital and 25% occurred at home. In settings with low coverage of health facility delivery, stillbirths are very likely to occur in a hospital because all mothers that fail to deliver at home, with TBAs and in health centres are referred to hospitals. Even if the intrauterine foetal death occurred during the process of labour before arrival in the hospital, for the mothers interviewed in this study, this death is inadvertently considered to have occurred in hospital. It was therefore difficult to determine whether all the stillbirths that were reported to be hospital stillbirths actually occurred before or after admission.

**Table 4.13: Association between history of stillbirth and place of delivery**

|   |            | Place of delivery               |                                     |                       |
|---|------------|---------------------------------|-------------------------------------|-----------------------|
|   |            | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| <b>History of stillbirth prior to last delivery</b> | <b>Yes</b> | 7 (87.5)<br>(5.3)               | 1 (12.5)<br>(2.4)                   | 8<br>(4.6)            |
|   | <b>No</b>  | 126 (75.9)<br>(94.7)            | 40 (24.1)<br>(97.6)                 | 166<br>(95.4)         |
| <b>Total</b>  |            | <b>133 (76.4)</b>               | <b>41 (23.6)</b>                    | <b>174</b>            |

- Responses missing in 1 case (82 primigravidas were excluded from this analysis).
- OR 2.2, 95% CI [0.27-18.61].

Table 4.13 shows that 87.5% (n=8) of the women with a history of stillbirth delivered in a health facility, compared to 75.9% (n=166) of women with no such history. Women with a history of

stillbirth are two times more likely to deliver in a health facility than women with no such history. The difference is not statistically significant (OR 2.2 [95% CI 0.27- 18.61]).

#### 4.3.8 Association between ANC attendance and place of delivery

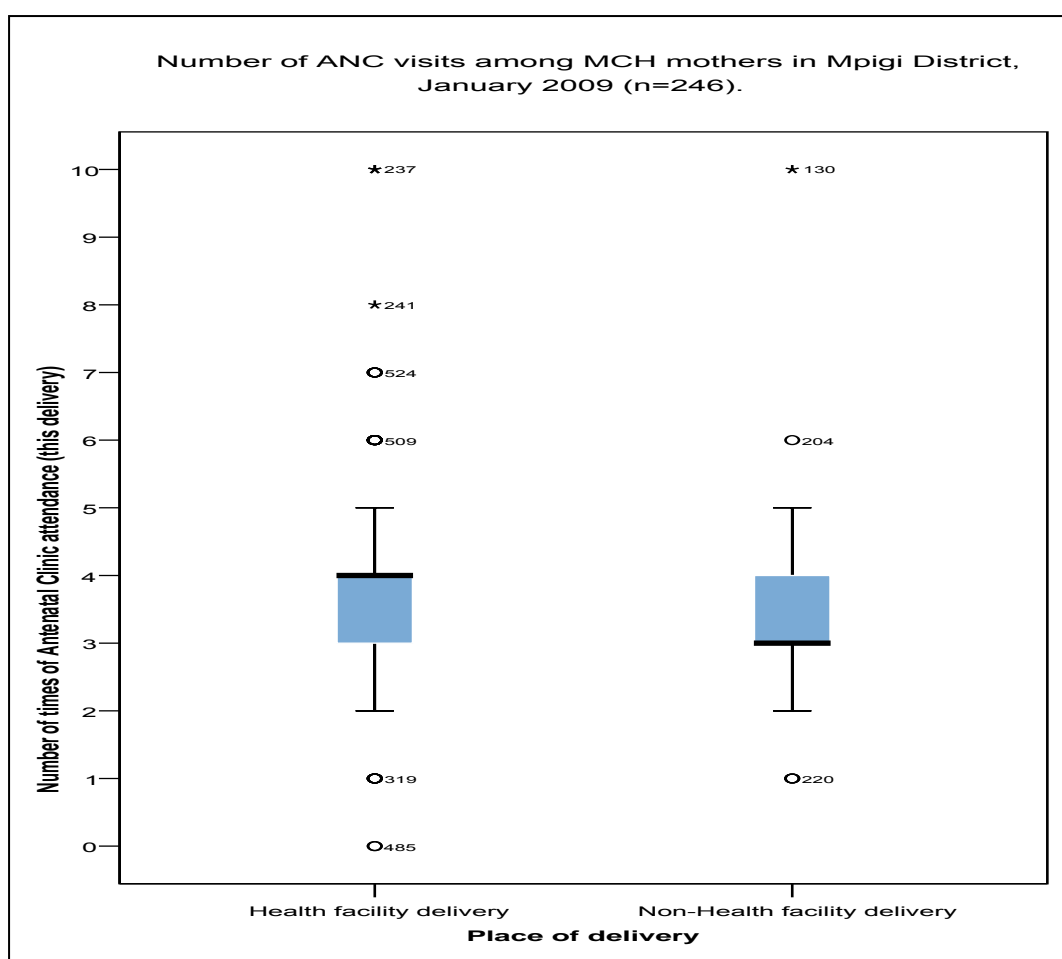
In Table 4.14, 99.2% (n=246) of the women in the Mpigi District attended ANC at least once. The highest proportion of women attended ANC three times (34.6%, n=246), followed by those that attended four times (27.2%), while 4.1% attended once and only 0.8% of mothers did not attend ANC at all.

**Table 4.14: ANC attendance in Mpigi district**

|              | Place of delivery        |                              |                |
|--------------|--------------------------|------------------------------|----------------|
|              | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |
| <b>0</b>     | 2 (100.0%)<br>(1.1%)     | –                            | 2<br>(0.8%)    |
| <b>1</b>     | 7 (70.0%)<br>(3.7%)      | 3 (30.0%)<br>(5.4%)          | 10<br>(4.1%)   |
| <b>2</b>     | 16 (64.0%)<br>(8.4%)     | 9 (36.0%)<br>(16.1%)         | 25<br>(10.2%)  |
| <b>3</b>     | 66 (77.6%)<br>(34.7%)    | 19 (22.4%)<br>(33.9%)        | 85<br>(34.6%)  |
| <b>4</b>     | 52 (77.6%)<br>(27.4%)    | 15 (22.4%)<br>(26.8%)        | 67<br>(27.2%)  |
| <b>5</b>     | 26 (76.5%)<br>(13.7%)    | 8 (23.5%)<br>(14.2%)         | 34<br>(13.8%)  |
| <b>6</b>     | 12 (92.3%)<br>(6.3%)     | 1 (7.7%)<br>(1.8%)           | 13<br>(5.3%)   |
| <b>7</b>     | 6 (100.0%)<br>(3.2%)     | –                            | 6<br>(2.4%)    |
| <b>8</b>     | 1 (100.0%)<br>(0.5%)     | –                            | 1<br>(0.4%)    |
| <b>10</b>    | 2 (66.7%)<br>(1.0%)      | 1 (33.3%)<br>(1.8%)          | 3<br>(1.2%)    |
| <b>Total</b> | <b>190 (77.2%)</b>       | <b>56 (22.8%)</b>            | <b>246</b>     |

- Responses missing in 11 cases.

In Figure 4.4 the median number of ANC visits for women who delivered in a health facility was four (4) visits (mean of 3.8 visits [95% CI 3.6- 4.0] [SD±1.5], n=190). The median number of ANC visits for women who did not deliver in a health facility was three (3) visits (mean of 3.5 visits [95% CI 3.1-3.9] [SD±1.4], n=56). The difference between the two means is not statistically significant (unequal variance, two-tailed student's *t*-test *P*=0.17). The difference in frequency of ANC attendance between women who delivered in health facilities and those that did not was not significant.



**Figure 4.4: Number of ANC visits among mothers in Mpigi District**

With average ANC attendance of three visits, the researcher divided the women into two categories of women: those with fewer than three ANC visits and those with three or more visits (average number and above).

The analysis in Table 4.15 shows that 64.1% (n=39) of the women that attended fewer than three ANC visits, compared to 79.8% (n=213) of the women who attended three or more ANC visits, delivered in a health facility. Attending three or more ANC visits doubles the possibility of health facility delivery and is statistically significant (OR 2.2 [95% CI 1.0-4.89]; RR 1.25 [1.0-1.68]; RD 15.7% [-0.1-33.4]; $\chi^2=4.63$ ;  $P=0.031$ ).

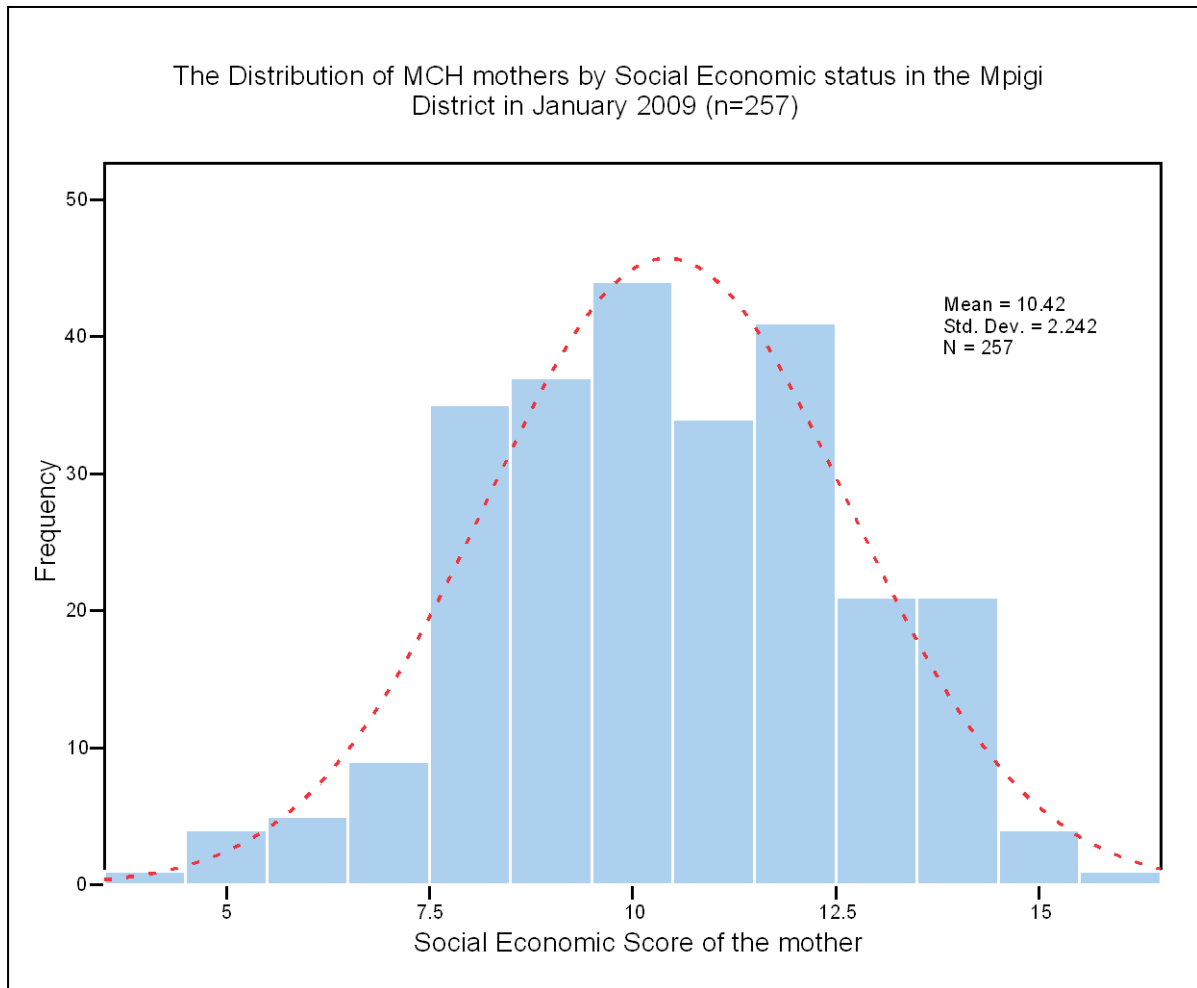
**Table 4.15: Association between ANC attendance and place of delivery**

|                      |             | Place of delivery               |                                     |                       |
|----------------------|-------------|---------------------------------|-------------------------------------|-----------------------|
|                      |             | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| Number of ANC visits | 3 or more   | 170 (79.8)<br>(87.2)            | 43 (20.2)<br>(75.4)                 | 213<br>(84.5)         |
|                      | Less than 3 | 25 (64.1)<br>(12.8)             | 14 (35.9)<br>(24.6)                 | 39<br>(15.5)          |
| Total                |             | 195 (77.4)                      | 57 (22.6)                           | 252                   |

- Responses missing in 5 cases.
- OR 2.2, 95% CI [1.0-4.89]; $\chi^2=4.63$ ;  $P=0.031$

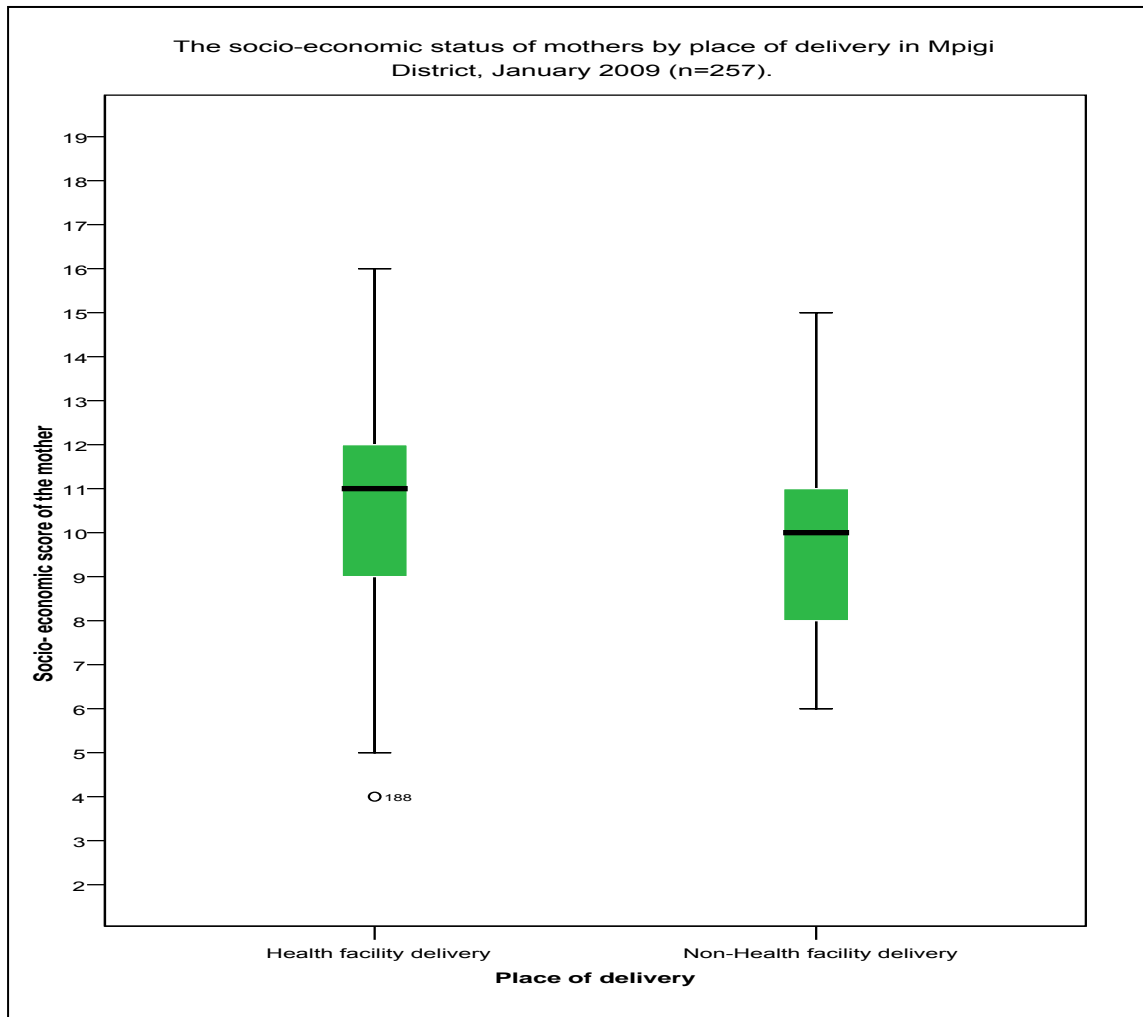
#### 4.4 Socio-economic determinants of health facility delivery

Differences in health status and possibility of access to health facilities depend on SES. The SES of individuals is measured in a number of ways, including an approach that uses income, wealth (assets), education and occupation (Braveman *et al.*, 2005). In Nepal and Kenya the SES of a woman as measured by the number of her durable household possessions was a significant predictor of assisted delivery (Magadi *et al.*, 2000; Gubhaju & Matthews, *c.* 2007). In this study the estimation of SES of a woman is based on a combined score derived from the nature of her domicile or dwelling (focusing on the construction materials) and her home possessions (including domestic animals, means of transport and means of communication) (Odaga & Cattaneo, 2004; Uganda Bureau of Statistics, 2006b) (refer to Annexure 1).



**Figure 4.5: Distribution of mothers by SES**

Figure 4.5 shows the distribution of women according to their SES. The mean SES score is 10.4 [SD±2.2], the median and mode are 10, and the range is 12 [4-16]. In this analysis 25% of the women had an SES of 9 and below, 50% of 10 and below, and 75% of 12 and below.



**Figure 4.6: SES of mothers by place of delivery**

Figure 4.6 shows that women who delivered in a health facility had a higher median SES score of 11 (mean 10.6 [95% CI 10.3-10.9]; [SD±2.3]) compared to women who delivered in a non-health facility setting, with a score of 10 (mean 9.9 [95% CI 9.4-10.5]; [SD±2.0]). The difference between the two means is not statistically significant (due to overlapping confidence intervals) ( $P=0.043$ , unequal variance, two-tailed Student's  $t$ -test) (Student's  $t$ -test, 2009). Therefore, the SES of women who delivered in a health facility was statistically similar to SES of women that delivered in a in a non-health facility setting.

#### 4.4.1 Association between SES and place of delivery

Based on the mean score of 10.4, the mothers were categorised into category one - SES score of 10 and below (average and below-average SES) and category two - SES score of 11 and above (above- average SES).

**Table 4.16: Association between SES and place of delivery**

|                |                               | Place of delivery               |                                     |                       |
|----------------|-------------------------------|---------------------------------|-------------------------------------|-----------------------|
|                |                               | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| SES of mothers | Above-average SES             | 103 (84.4)<br>(51.5)            | 19 (15.6)<br>(33.3)                 | 122<br>(47.5)         |
|                | Average and below-average SES | 97 (71.9)<br>(48.5)             | 38 (28.1)<br>(66.7)                 | 135<br>(52.5)         |
|                | Total                         | <b>200 (77.8)</b>               | <b>57 (22.2)</b>                    | <b>257</b>            |

- OR 2.12, 95% CI [1.10-4.13];  $\chi^2=5.85$ ,  $P=0.016$ .

Table 4.16 shows that 71.9% (n=135) of women in the average and below-average SES category delivered in a health facility compared to 84.4% (n=122) of those of above-average SES status. Above average SES doubles the possibility of a woman delivering in a health facility (OR 2.12 [95% CI 1.10-4.13]; RR 1.18[1.02-1.33]; RD 12.6% [1.6-22.2];  $\chi^2=5.85$ ,  $P=0.016$ ).

#### 4.4.2 Association between household size and health facility delivery

The average number of members in a household in the Mpigi District is 5.8, which is 23.4% higher than the national average of 4.7-5.2 people per household (Uganda Bureau of Statistics, 2006b, pp. xii, 9). The researcher assumed that half of the average household size of three household members was an affordable family size in this resource-limited setting, and categorised



households into those with three or fewer members and with four or more members. Results were analysed for a possible association between health facility delivery and household size.

**Table 4.17: Association between number of individuals in a household and place of delivery**

|   |            | Place of delivery               |                                     |                       |
|---|------------|---------------------------------|-------------------------------------|-----------------------|
|   |            | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| No. of individuals in household in which the mother lives | ≤3 members | 48 (88.9)<br>(24.0)             | 6 (11.1)<br>(10.5)                  | 54<br>(21.0)          |
|   | ≥4 members | 152 (74.9)<br>(76.0)            | 51 (25.1)<br>(89.5)                 | 203<br>(79.0)         |
| <b>Total</b>  |            | <b>200(77.8)</b>                | <b>57(22.2)</b>                     | <b>257</b>            |

- OR 2.68, 95% CI [1.03- 7.43];  $\chi^2 = 4.83$ ,  $P=0.028$ .

Table 4.17 shows that 88.9% (n=54) of the women that lived in a household of three or fewer members delivered in a health facility, compared to 74.9% (n=203) of the women who lived in households with four or more members. Women that lived in households of three or fewer members were 2.7 times more likely to deliver in a health facility than women that lived in households of four or more members (OR 2.68 [95% CI 1.03- 7.43]; RR 1.19 [1.01-1.30]; RD 14.0% [0.4-22.1];  $\chi^2 = 4.83$ ,  $P=0.028$ ).

#### 4.4.3 Access to health services as a determinant of health facility delivery

Access to a health facility is evaluated in terms of travel time to a health facility and categorised into (a) between 0 and 30 minutes, and (b) 31 minutes or more. Table 4.18 shows that 83.1% (n=160) of the women that lived within 30 minutes' travel time from a health facility delivered in a health facility, compared to 68.4% (n=95) of women that lived 31 minutes or more from a

health facility. Living within a radius of 30 minutes' travel time from a health facility is associated with 2.3 times higher likelihood of delivering in a health facility compared to those women living 31 minutes' or more from a health facility (OR 2.27 [95% CI 1.20- 4.32]; RR 1.22 [1.04-1.42]; RD 14.7% [3.2-25.9];  $\chi^2=7.40$ ,  $P=0.007$ ).

**Table 4.18: Association between travel time to a health facility and place of delivery**

|   |                    | Place of delivery               |                                     |                       |
|---|--------------------|---------------------------------|-------------------------------------|-----------------------|
|   |                    | Health facility<br><i>n</i> (%) | Non-health Facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| Travel time to nearest health facility (in minutes) | 30 minutes or less | 133 (83.1)<br>(67.2)            | 27 (16.9)<br>(47.4)                 | 160<br>(62.7)         |
|   | 31 or more minutes | 65 (68.4)<br>(32.8)             | 30 (31.6)<br>(52.6)                 | 95<br>(37.3)          |
| Total   |                    | 198 (77.6)                      | 57 (22.4)                           | 255                   |

- Responses missing in 2 cases. OR 2.27, 95% CI [1.20- 4.32];  $\chi^2=7.40$ ,  $P=0.007$ .

#### 4.4.4 Association between contraceptive use and health facility delivery

Only 40.2% of the mothers reported having used any form of contraceptive in two years prior to delivery.

**Table 4.19: Association between history of contraceptive use and place of delivery**

|   |     | Place of delivery               |                                     |                       |
|---|-----|---------------------------------|-------------------------------------|-----------------------|
|   |     | Health facility<br><i>n</i> (%) | Non-health facility<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| History of any contraceptive use 12 -15 months prior to pregnancy | Yes | 86 (84.3)<br>(43.4)             | 16 (15.7)<br>(28.6)                 | 102<br>(40.2)         |
|   | No  | 112 (73.7)<br>(56.6)            | 40 (26.3)<br>(71.4)                 | 152<br>(59.8)         |
| Total   |     | 198 (78.0)                      | 56 (22.0)                           | 254                   |

- Responses missing in 3 cases.
- OR 1.9, 95% CI [1.01-3.63];  $\chi^2=3.99$ ,  $P=0.046$ .

In Table 4.19, 84.3% (n=102) of the women with a history of contraceptive use delivered in a health facility, compared to 73.7% (n=152) of the women with no history of contraceptive use. The possibility of health facility delivery for women who report a history of contraceptive use is 1.9 times that for women with no history of contraceptive use. This difference is statistically significant (OR 1.92 [95% CI 1.01-3.63]; RR 1.14[1.00-1.28]; RD 10.6% [-0.6-20.0];  $\chi^2=3.99$ ,  $P=0.046$ ).

#### 4.4.5 Association between ethnic origin and health facilities delivery

The role that ethnic background played in determining place of delivery was evaluated.

**Table 4.20: Association between ethnic background and place of delivery**

|                                 |              | Place of delivery        |                              |                | Odds Ratio *               |
|---------------------------------|--------------|--------------------------|------------------------------|----------------|----------------------------|
|                                 |              | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |                            |
| Ethnic background of the mother | Baganda      | 152 (79.6)<br>(76.8)     | 39 (20.4)<br>(68.4)          | 191<br>(74.9)  |                            |
|                                 | Banyankole   | 7 (87.5)<br>(3.5)        | 1 (12.5)<br>(1.8)            | 8<br>(3.1)     |                            |
|                                 | Banyarwanda  | 23 (69.7)<br>(11.6)      | 10 (30.3)<br>(17.5)          | 33<br>(12.9)   | OR:0.59 [95% CI 0.24-1.46] |
|                                 | Basoga       | 11 (64.7)<br>(5.6)       | 6 (35.3)<br>(10.5)           | 17<br>(6.7)    | OR:0.47 [95% CI 0.15-1.54] |
|                                 | Others       | 5 (83.3)<br>(2.5)        | 1 (16.7)<br>(1.8)            | 6<br>(2.4)     |                            |
|                                 | <b>Total</b> | <b>198 (77.6)</b>        | <b>57 (22.4)</b>             | <b>255</b>     |                            |

- Responses missing in 2 cases.
- The Odds of health facility delivery for the Banyarwanda and Basoga in comparison to the Baganda ethnic group

Table 4.20 shows that 74.9%, 12.9% and 6.7% (n=255) of the mothers were from the Baganda, Banyarwanda and Basoga ethnic backgrounds respectively. The highest proportion of women that delivered in a health facility were Banyankole (87.5%, n=8), followed by other ethnic groups

(including Batooro, Bakiga and Bagisu) (83.3%, n=6), Baganda (79.6%, n=191), Banyarwanda (69.7%, n=33) and Basoga (64.7%, n=17). The odds of a health facility delivery for the most common ethnic identities in this setting, when compared to the Baganda, were 47% for Basoga (OR 0.47 [95% CI 0.15- 1.54]) and 59% for the Banyarwanda (OR 0.59 [95% CI 0.24-1.46]). These results were not statistically significant. The ethnic background of the mother was not associated with increased probability of a health facility delivery.

#### **4.4.6 Social support of the mothers as a factor in health facility delivery**

The educational attainment of the husband and marital status are proxy indicators of social support of a pregnant woman. These two indicators also determine the husband's role in the woman's decision whether to or not to deliver in a health facility.

##### **4.4.6.1 *Level of educational attainment of head of the household***

Table 4.21 shows that 73.8% (n=80) of women who lived in a household where the head had completed less than eight years of formal education delivered in a health facility. In comparison, 84.1% (n=113) of women who lived with a head of household who had completed eight or more years of formal education delivered in a health facility. Women living in households headed by individuals with more than eight years of formal education were twice more likely to deliver in a health facility compared to women living with a head of the household with eight or less years of formal education (OR 1.88 [95% CI 0.87-4.05]). Educational attainment of 8 or more years of the head of household was however not statistically associated with increased possibility of health facility delivery.

**Table 4.21: Association between education of the head of the household and place of delivery**

|  |                          | Place of delivery        |                              |                |
|--|--------------------------|--------------------------|------------------------------|----------------|
|  |                          | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |
| <b>Highest level of formal education attained by the head of the household</b> | <b>8 or more years</b>   | 95 (84.1%)<br>(61.7%)    | 18 (15.9%)<br>(46.2%)        | 113<br>(58.5%) |
|  | <b>Less than 8 years</b> | 59 (73.8%)<br>(38.3%)    | 21 (26.2%)<br>(53.8%)        | 80<br>(41.5%)  |
| <b>Total</b>   |                          | <b>154 (79.8%)</b>       | <b>39 (20.2%)</b>            | <b>193</b>     |

- OR 1.88 [95% CI 0.87-4.05].

Therefore, educational attainment of the head of household was not associated with increased possibility of health facility delivery for the index pregnancy.

#### 4.4.6.2 Marital status as a determinant of health facility delivery

The marital status of a woman is another important aspect that enhances understanding of the mental and social support a woman has access to during the period of pregnancy and childbirth.

**Table 4.22: Marital status of mothers in Mpigi District**

|                                     |                                    | Place of delivery        |                              |                | Odds Ratio*            |
|-------------------------------------|------------------------------------|--------------------------|------------------------------|----------------|------------------------|
|                                     |                                    | Health facility<br>n (%) | Non-health facility<br>n (%) | Total<br>n (%) |                        |
| <b>Marital status of the mother</b> | <b>Cohabiting</b>                  | 84 (76.4%)<br>(42.0%)    | 26 (23.6%)<br>(45.6%)        | 110<br>(42.8%) | OR: 1.29 [0.63 – 2.66] |
|                                     | <b>Married</b>                     | 71 (84.5%)<br>(35.5%)    | 13 (15.5%)<br>(22.8%)        | 84<br>(32.7%)  | OR: 2.19 [0.97 – 4.94] |
|                                     | <b>Single</b>                      | 40 (71.4%)<br>(20.0%)    | 16 (28.6%)<br>(28.1%)        | 56<br>(21.8%)  |                        |
|                                     | <b>Other (divorced or widowed)</b> | 5 (71.4%)<br>(2.5%)      | 2 (28.6%)<br>(3.5%)          | 7<br>(2.7%)    |                        |
| <b>Total</b>                        |                                    | <b>200 (77.8%)</b>       | <b>57 (22.2%)</b>            | <b>257</b>     |                        |

- \*The Odds of health facility delivery for married and cohabiting mothers compared to single mothers

Table 4.22 shows that 84.5% (n=84), 76.4% (n=110), 71.4% (n=56) and 71.4% (n=7) of the women that were married, cohabiting, single and divorced or widowed respectively delivered in a health facility. The odds of health facility delivery for married women were twice those for single mothers, but the findings were not statistically significant (OR 2.19 [95% CI 0.97-4.94]). Similarly, there was no significant difference between cohabiting mothers and single mothers in terms of probability of delivering in a health facility (OR 1.29 [95% CI 0.63-2.66]). Marital status was therefore not statistically associated with a health facility delivery for the index pregnancy.

## **CHAPTER FIVE: DISCUSSION**

The results of this study represent findings in a population of mothers that attended MCH clinics. Evidently mothers that deliver in health facilities are very likely to dominate this population of mothers and it is therefore not surprising that 77.8% (n=257) of the mothers that attend MCH delivered in a health facility while 22.2% delivered in a non-health facility setting. MCH clinics therefore present a convenient opportunity to identify mothers that deliver in non-health facility settings short of the long, laborious and expensive exercise of identifying these mothers in the community. It suffices to note that this analysis serves as a basis for further study into maternal determinants of health facility delivery in a community based survey that will validate the findings of this study.

### **5.1 Why do mothers deliver in rural health facilities?**

A woman's spouse and family have a significant influence on the choice of place of delivery (D'Ambruso *et al.*, 2005; Blum *et al.*, 2006 cited in Koblinsky *et al.*, 2008, p.287; Magoma *et al.*, 2010). In this setting most of the women were influenced by their husbands (35.5%, n=256) and mothers (28.5%, n=256). Health workers influenced 6.0% (n=256) of the women, and their influence doubled the possibility of health facility delivery. Unlike previous reports of a significant influence by family on a woman's decision on the place of delivery, individual influence was not associated with health facility delivery and thus not a determinant of health facility delivery.

Women delivered in health facilities because they expected a safe delivery (28.7%, n=188), the facility was close and accessible (19.7%), and they expected good service (13.8%). Only 2.7 % (n=188) of the women delivered in a health facility because services were affordable, compared to 18.8% (n=48) of the women that delivered in a non-health facility setting. Most of the women therefore did not consider the formal health facilities to be affordable.

## **5.2 Demographic determinants of health facility delivery**

While the risk of maternal mortality is lowest among women in the 20-24 year age bracket, the risk increases up to three times in the 35-39 age group and is highest in the 40 years and older age group (Khan *et al.*, 1985, p.326; Chowdhury *et al.*, 2007, p.1324). In this study 60.6% (n=249) of the mothers were between 20 and 30 years old – the period considered to be safest for childbirth (Royston & Armstrong 1989). Thirty two per cent (31.7%, n=249) of the women were either younger than 20 years old or older than 35 years (these are the most at-risk age brackets). In Kenya 20.3% (n=1 927) were in the most at-risk age group (Fosto, Ezeh & Oronje, 2008, p. 433). The proportion of women giving birth in the most at-risk age group in this rural setting in Uganda is 11.4% higher than in a similar setting in Kenya.

The average age of women at delivery was 23.6 [ $\pm 5.7$ ] years, compared to the average age of women at the last pregnancy of 26 years in another setting in Uganda (Tann *et al.*, 2007). In other sub-Saharan settings, the mean age at delivery varies from 23[ $\pm 5$ ] years in Malawi to 29 [ $\pm 6.4$ ] years in Ghana (Klufio *et al.*, 2002; Metaferia & Muula 2009; Zakariah *et al.*, 2009). In this rural setting 50% of the primigravidas delivered before the age of 19.3 years and 80% before they were 24 years old. Evidently, at the point of childbirth (at delivery), women in the Mpigi District were on average young and in the same age range as mothers in Malawi. A significant proportion of mothers were younger than 20, compared to other women in similar sub-Saharan settings like



Ghana. With 50% of the primigravidas delivering before the age of 20 years, the women in the Mpigi district have a high risk of maternal complications.

This study shows that 70.3% (n=167) of women aged less than 20 years delivered in a non-health facility setting, compared to 19.2% of the mothers that were 20-30 years old. It is evident that women that are younger than 20 (adolescent mothers) are largely unaware of the maternal risks related to their pregnancy. In Iraq women aged 25-34 years were 22% more likely to deliver with a TBA compared to mothers aged 35 years and more (Siziya, Muula & Rudatsikira 2009). In contrast to reports of an association between age and health facility delivery (Van Eijk *et al.*, 2006; Wagle *et al.*, 2004), and in agreement with Magadi *et al.*, (2000), the age of the mother was not associated with health facility delivery, and thus not a determinant of health facility delivery.

In Uganda 26% of the women with no formal education, 41% with primary education and 75% with secondary and higher education deliver with a skilled provider (Uganda Bureau of Statistics, 2006a, p.129). This study shows that 93.1% (n=29), 84.2% (n=95) and 69.9% (n=133) of the women that had completed 12 years or more, 8-11 years and less than 8 years of education respectively delivered in a health facility. These findings show a similar pattern to earlier reports of a higher proportion of women delivering in a health facility as number of years of educational attainment increased. In Kenya women with no formal education are six times more likely to deliver at home compared to women with secondary education and above (Magadi *et al.*, 2000, p.169). In this setting, women who have completed 8 or more years of education are 2.7 times more likely to deliver in a health facility compared to women that have attained less than 8 years of formal education (OR 2.65 [95% CI 1.41-4.99],  $P=0.002$ ). Therefore, completion of 8 or more years of formal education was associated with increased possibility of health facility delivery and was thus a determinant of health facility delivery.

Women who deliver on their own are very likely to be of a parity of five and above (OR 5.7 [95% CI 2.8-11.6]), and three times more likely (2.98 [95% CI 1.80-4.96]) to deliver outside a health facility compared to women with a parity of two (Van Eijk *et al.* 2006). In another study, women who delivered in a health facility were more likely to be primigravidas or grand-multiparous (Fronczak *et al.*, 2007). These studies show an association between parity and health facility delivery. This study is consistent with findings by Wagle *et al.*, (2004), which reported that parity is not associated with increased possibility of health facility delivery ( $\chi^2 = 2.59$ , df.4,  $P=0.629$ ). Parity was therefore not a determinant of health facility delivery in this study.

Magadi *et al.*, (2000) reported an association between birth intervals of three or more years with a higher probability of skilled attendance at birth. Of all age groups, only the 35-39 age group had a birth interval of three years or more (more than 36 months), which is the recommended minimum child-spacing interval. Despite earlier findings of an association between child-spacing interval and health facility delivery, there was no association between birth interval and health facility delivery ( $\chi^2 = 2.25$ , df. 2;  $P=0.324$ ). Therefore, birth interval was not a determinant of health facility delivery.

Research conducted in Guatemala and Kenya showed a significant association between a woman's previous experience of giving birth in a health facility and the likelihood that she will repeat such an experience in the future (Magadi *et al.*, 2000; Pebley, Goldman & Rodríguez, 1996). This study shows that the possibility that a woman who delivered in a health facility during a previous delivery would deliver in a health facility for the index pregnancy was 10 times that of a woman who did not deliver in a health facility for the previous delivery (OR 9.90 [95% CI 4.16-24.69],  $P<0.0001$ ). Secondly, women who delivered their first baby in a health facility were five (5) times more likely to deliver in a health facility compared to women who did not deliver their first baby in a health facility (OR 5.26 [95% CI 2.15-13.00],  $P<0.0001$ ). Thirdly, a woman with

no history of a non-health facility delivery was six (6) times more likely to deliver in a health facility for the index pregnancy than a woman with any history of a non-health facility delivery (OR 5.65 [95% CI 2.45- 13.14],  $P < 0.0001$ ). Lastly, women with more than 50% of their past deliveries in a health facility were three times more likely to deliver in a health facility than those with 50% or fewer deliveries in a health facility (OR 3.0 [95% CI 1.35-6.52],  $P = 0.006$ ). From this analysis, the following past health facility delivery patterns are determinants of health facility delivery: (a) having delivered in a health facility on previous delivery, (b) history of delivering the first baby in a health facility, (c) no history of a non-health facility delivery, and (d) a history of more than 50% of past deliveries in a formal health facility.

There is a higher possibility of a mother who delivered in a health facility setting that resulted in a stillbirth delivering in a non-facility setting for subsequent pregnancies (D'Ambruoso *et al.*, 2005; Ronsmans *et al.*, 2010). This study shows that the history of a stillbirth was not associated with increased possibility of health facility delivery (OR 2.2 [95% CI 0.27-18.61]). History of stillbirth was therefore not a determinant of health facility delivery.

Average ANC attendance in this study was 3.6 visits per mother, which is lower than the average of 3.9 visits per mother in Kenya and higher than the average 2.6 visits per mother in Burkina Faso (Magadi, *c.* 2002, pp. 176, 177; Nikiema *et al.*, 2010, p.70). In a study by Fosto *et al.*, (2008, p.435), 52% of women who attended ANC four or more times delivered in an appropriate health facility, compared to 48% and 35% of women who attended three, one or no visits respectively. Similarly, women who attended ANC four or more times were less likely to deliver at home or with a TBA (Fosto *et al.*, 2008, p.437). This study showed that 64.1% ( $n=39$ ) of women that attended ANC less than three times delivered in a health facility, in comparison to 79.8% ( $n=213$ ) of the women who attended ANC three or more times. This difference is statistically significant, with ANC attendance of three or more times associated with a two times higher possibility of

health facility delivery compared to ANC attendance of less than three times (OR 2.21 [95% CI 1.0-4.89];  $P=0.031$ ). Therefore, three or more antenatal visits was a determinant of health facility delivery.

### **5.3 Socio-economic determinants of health facility delivery**

Studies have reported that the possibility of delivery with skilled support increases in proportion to wealth (SES) (Uganda Bureau of Statistics 2006a; Moradi-Lakeh, Ramezani & Naghavi 2007). In 45 developing countries, only 15.6% of mothers in the poorest quintile made use of skilled care during delivery, while 63.3-80% of mothers in the richest quintile delivered in a health facility (Anwar *et al.*, 2008: 254; Houweling *et al.*, 2007, p.746). In Mpigi District, a woman in above average SES had twice the possibility of health facility delivery compared to a woman in the average and below average SES (OR 2.12 [95% CI 1.10-4.13];  $P=0.016$ ). Therefore, similar to earlier reports, above-average SES was associated with a higher probability of health facility delivery and was a determinant of health facility delivery.

Wagle *et al.*, (2004) reported a statistically significantly association between size of family and place of delivery. Similarly, in this study the possibility of a health facility delivery was 2.7 times greater for a woman living in a household of three or fewer individuals (OR 2.67 [95% CI 1.03-7.43],  $P=0.028$ ) compared to a woman living in a household of four or more members. Therefore, living in a household of three or fewer members was associated with and was a determinant of health facility delivery.

In Uganda women walk or rely on whatever means of transport is available to reach health facilities. The further the distance between the woman's home and the health facility, the higher the possibility that she will not be able to access maternal services in time for the delivery (Ensor

& Cooper, 2004). In Nepal women that travelled for more than one hour to a health facility were 50% less likely to deliver with skilled assistance than women that travelled for less than 30 minutes (Gubhaju & Matthews *c.* 2007, p.41). Similar to earlier reports in the literature, living within 30 minutes' travelling distance from a health facility was significantly associated with a two times higher possibility of a health facility delivery compared to living 31 or more minutes from a health facility (OR 2.27 [95% CI 1.26-4.12],  $P=0.007$ ). Therefore, living within 30 minutes' travel time from a formal health facility was a determinant of health facility delivery. Solitary confinement has been reported as a significant factor in determining timely access to skilled attendance at childbirth (Kabakyenga *et al.*, 2011). This study did not examine the different factors that contributed to delayed access to health facilities for childbirth. The purpose was to estimate the travel time between a mother's home and the health facility. Therefore, no deeper analysis of the factors associated with delayed access to skilled is included in this study.

Eighty five per cent (85%) of the females in sexually active heterosexual couples become pregnant within the course of one year if no contraceptive is used (Cleland *et al.*, 2006, p. 1819). It is therefore not surprising that with only 40% of the women in this rural setting having a history of contraceptive use, only 5.2% of the mothers (in the age group 35-39 years) had a child-spacing interval of more than three years between births. With low contraceptive use coverage, the inescapable conclusion is that these women are exposed to a high risk of unplanned and unwanted pregnancies. These pregnancies increase their risk of maternal morbidity and mortality at childbirth. The odds of a health facility delivery for women who had a history of contraceptive use were 1.9 times greater than that for women with no history of contraceptive use (OR 1.92 [95% CI 1.01-3.63],  $P=0.046$ ). These findings are similar to those in a study conducted in Kenya, where women who had used a modern family planning method were 60% less likely to deliver at home than women who had never used any form of modern family planning method (Magadi *et*

*al.*, 2000, p.171). A history of contraceptive use doubled the possibility of health facility delivery and was thus a determinant of health facility delivery.

Magadi *et al.*, (2000) reported a significant association between ethnic background and preference for skilled attendance at birth. In this study there was no evidence of a significant association between health facility delivery and ethnic background. This finding is similar to that by Wagle *et al.*, (2004), when they observed that ethnicity is not significantly associated with the likelihood of a health facility delivery. The ethnic identity of a woman was therefore not a significant determinant of health facility delivery.

Living in a household headed by an individual who has completed eight or more years of formal education was associated with a two times higher possibility of delivering in a health facility when compared to a household headed by an individual with less education than this (OR 1.88 [95% CI 0.87-4.05]). This finding was not statistically significant, and therefore the educational attainment of the head of the household of eight or more years of education was not associated with health facility delivery.

The odds that a married woman would deliver in a health facility were twice those of a single woman doing so. However, this result was not statistically significant (OR 2.2 [95% CI 0.97-4.94],  $P=0.062$ ) and it is contrary to findings from Kenya which reported that single women were more likely to deliver in a health facility setting than their married counterparts (Van Eijk *et al.*, 2006). Similarly, in comparison to single women, cohabiting women had a similar possibility of a health facility delivery (OR 1.3 [95% CI 0.63 – 2.66]). This analysis shows that there is no association between marital status and increased possibility of health facility delivery. Marital status was therefore not a determinant of health facility delivery.

#### **5.4 Socio-demographic characteristics of mothers who delivered in health facilities**

The socio-demographic characteristics of women who delivered in rural health facilities in Uganda were as follows: 85.2% (n=195) were 15-29 years old; 53.5% (n=200) had completed 8 years or more of formal education; 65.0% (n=126) had a birth interval of 2-3.9 years; 58.0% (n=200) were either nulliparous (33.5%) or had given birth once (24.5%); 51.5% (n=200) had above-average SES; 76.0% (n=200) lived in a household of four or more members; 67.2% (n=198) lived within 30 minutes' or less travelling time from a health facility; and 77.5% (n=200) were either married or cohabiting.

#### **5.5 Limitations of the study**

Like any research activity, this study has a number of limitations. Firstly, data were collected from mothers who accessed hospital services. One omission was the number of mothers who did not attend MCH clinics because they had lost their babies either during childbirth or soon afterwards, or for any other unforeseen reason. Future research needs to focus on these mothers to determine the factors that prevent them from delivering in health facilities. The proportion of these mothers constitutes less than 10% of the mothers targeted in this study. This omission is not likely to affect the outcomes of the study significantly, if one takes into account the inordinate costs and time required to identify those mothers in the community.

Secondly, the capacity of the mothers to recall all of the details related to their obstetric history introduced an element of doubt about the accuracy of the data collected. In those cases where there was a possibility that mothers could provide false information, the researcher used indirect and detailed questions to extract the information. Recall bias was minimised by considering deliveries that took place two months before and during the data collection period of two months,

because mothers were more likely to remember the specific conditions and events investigated in this study. The absence of leading or ambiguous questions and training of the research assistants minimised interviewer-related bias.

Thirdly, there is no validation of what the mothers said from the existing medical records. Apart from natural forgetfulness of the mother, no justification or benefit would accrue to any mother who deliberately provided false information. The good consent process and voluntary participation of the mothers ensured that they contributed to the study wholeheartedly and unreservedly. Because of the mitigating interventions, these limitations exerted a minimal impact on the reliability and plausibility of the results of this study.

## 5.6 Conclusions

This study shows that individual influence on a woman's choice of place of delivery was not associated with increased possibility of health facility delivery. Although not statistically significant, health worker influence doubled the possibility of health facility delivery. Most of the women delivered in health facilities because they expected a safe delivery (28.7%) and the facility was accessible (19.7%). Women in this rural setting were young at childbirth, with 40% of them aged 21 or younger and 50% of primigravidas were 19.3 years old or younger exposing them to a high risk of maternal mortality. These young mothers are oblivious of the risk of maternal mortality that they face with 66.7% of them aged 15 or younger and 27.9% of the 15-19 years age group delivering in a non-health facility setting.

The following factors are maternal determinants of health facility delivery;

- History of a previous health facility delivery increased the possibility of a health facility delivery by 10 times (OR 9.90 [95% CI 4.16-24.69],  $P < 0.0001$ ).



- History of a first delivery in a health facility (OR 5.26 [95% CI 2.15-13.0],  $P < 0.0001$ ) and no history of a non-health facility delivery (OR 5.65 [95% CI 2.45-13.14],  $P < 0.0001$ ) increased the possibility of health facility delivery by five to six times.
- Eight years or more of formal education (OR 2.65 [95% CI 1.41-4.99],  $P = 0.002$ ), a history of more than 50% of past deliveries in a health facility (OR 3.0 [95% CI 1.35-6.52],  $P = 0.007$ ) and living in a household of three or fewer individuals (OR 2.68 [95% CI 1.03-7.43],  $P = 0.028$ ) tripled the possibility of health facility delivery.
- Three or more ANC visits (OR 2.21 [95% CI 1.0-4.89],  $P = 0.031$ ), above-average SES (OR 2.12 [95% CI 1.10-4.13],  $P = 0.016$ ), living within 30 minutes' travel time to a health facility (OR 2.27 [95% CI 1.20-4.32],  $P = 0.007$ ) and history of contraceptive use (OR 1.92 [95% CI 1.01-3.63],  $P = 0.046$ ) doubled the possibility of health facility delivery.
- Age of the mother, history of stillbirth, parity, ethnic background, educational attainment of the head of the household and marital status were not significantly associated with an increased possibility of health facility delivery, and are thus not determinants of health facility delivery.

The mothers who delivered in rural health facilities in the Mpigi District of Uganda were mostly between 15 and 29 years old (85.2%), with 77.5% of them either married or cohabiting. The majority (53.5%) had completed eight years or more of formal education, and 67.2% lived within a radius of up to 30 minutes' journey from a health facility. For 65.1% of the mothers the birth interval was 2-3.9 years, 58.0% were either nulliparous or had given birth once, 51.5% of above-average SES and 76.0% lived in a household of four or more individuals.

This study describes the complex maternal factors that influence the possibility of health facility delivery in the Mpigi District in Uganda and therefore, by extrapolation, similar factors occur in

other rural settings in sub-Saharan Africa. It is evident that specific socio-demographic aspects featured prominently in most of the women that delivered in health facilities. Therefore, a pregnant woman's possibility of a health facility delivery can be evaluated and to a degree predicted by analysing the 10 maternal determinants of health facility delivery that were identified in this study. The single determinants have limited capacity to identify the possibility of health facility delivery. It is the evaluation of the combination of these factors in a specific woman that has a higher accuracy of determining the overall possibility of whether or not she will deliver in a health facility.

## **CHAPTER SIX:      RECOMMENDATIONS**

The recommendations of this study will benefit district level managers and Ministry of Health officials, guiding them to benchmark targeted interventions in order to increase the number of women that deliver in health facilities.

This study found that women deliver in health facilities because of the perceived high quality of services and probability of a safe delivery. Strategies should be developed and implemented to ensure that service delivery points meet the expectations of the women, especially in terms of quality and predictability of maternal services. Mothers should be engaged in the decision-making regarding the delivery of maternal health services. Regular exit interviews should be conducted in ANC, MCH clinics and maternity wards to identify gaps and solicit suggestions on how to increase the number of facility deliveries. The exit interviews should determine the degree to which health facilities are meeting the expectations of women that access them. Health workers should use evidence from the exit interviews to develop a structured communication approach that will result in pregnant women considering a health facility delivery as their first option at the start of labour.

The district management teams and Ministry of Health reproductive health managers should design protocols that will enable health workers to make concerted and well-considered efforts to convince women to deliver in health facilities. As this study found, health workers are capable of doubling the possibility that a woman will deliver in a health facility, and this role should be optimised.

It is evident from this study that there are specific determinants that increase the possibility of a woman delivering in a health facility or not. These determinants should be compiled into an antenatal screening score, that should be used to profile pregnant women at their first ANC visit to determine the possibility of their delivering in a health facility or with a TBA/at home. This profiling will designate women as likely and not likely to deliver in a health facility. On the basis of such profiling, those women who have a high risk of morbidity or mortality because of, for example, cephalopelvic disproportion, or because they are “too young or too old”, should be identified. Such an approach will be very effective in identifying those women who are most at risk (having a maternal risk plus a high possibility of delivering with a TBA or at home), that need targeted support and have to deliver in a health facility. This intervention is likely to reduce unexpected emergencies during the process of childbirth and ensure a structured approach to birth planning, right from the first ANC visit. Innovative approaches are necessary to encourage the women that are most at risk to deliver in a health facility.

ANC is the screening point, and the only opportunity to identify possible maternal risks and prevent them by education, counselling, treatment or any other means possible. If a woman has not achieved three ANC visits by the third trimester of pregnancy, and is of below-average SES, she is likely to deliver either at home or with a TBA. If this woman has an additional maternal risk she should be given specific messages and information - for example, the nearest health facility, contact details of health workers and other information that will encourage her to consider a health facility as the best option at the onset of labour. The facilities closest to the pregnant woman should be alerted of the expected date of delivery so that they are prepared to support her during labour and in case of an emergency.

There is a notably high proportion of adolescent females (young females) getting pregnant and delivering before the age of 20 years and in non-health facility settings. This is an indicator of

early sexual activity and limited understanding of the risks associated with childbirth for these very young mothers. It is evident that these young women are unaware of the risks associated with pregnancy and childbirth at their age. Health workers and district management teams should develop and implement strategies that will educate adolescents in schools and through available media such as radio and television about the risks associated with early sexual activity, contraceptive use and childbirth. District health teams should regularly monitor teenage pregnancy rates and identify communities with a high prevalence so that targeted measures to reduce teenage pregnancy rates can be developed and implemented.

This study also shows that mothers have a short birth interval. Specific strategies to increase contraceptive use will increase the average interval between births. The availability, use and monitoring of contraceptives in rural settings should be reviewed regularly and strategies developed to increase contraceptive use. In the ANC, health workers should discuss future child-spacing plans with pregnant women, so that they can be supported to devise long-term reproductive plans and commitments that are beneficial to their health and the well-being of their families. These long-term reproductive plans will enable women to plan child-spacing intervals and control their fertility. Husbands should be involved in these discussions.

Since the factors associated with health facility delivery are not constant, with changing socio-economic and demographic patterns, health teams should periodically evaluate determinants of health facility delivery which will guide them in delivering responsive maternal health services.

Implementation of these recommendations in resource-limited settings will contribute to the detection of women most at risk, enable targeted implementation of interventions and contribute to a reduction in maternal mortality.

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## **Annexure 1: Methodology for estimating the SES of mothers in this study**

The socio-economic status (SES) of a mother moulds her preferences in choice of place of delivery, and contributes to morbidity and mortality patterns. In Uganda, 46.7%, 2.9% and 1% of the adult population possess a bicycle, motorcycle or a car respectively as a means of transport (Uganda Bureau of Statistics, 2006b, p.18). Similarly, 8.3%, 10.0% and 9.4% possess cattle, goats or pigs respectively. It is also reported that 10.6% and 0.2% of Ugandans possess a cellular phone or a fixed-line telephone as a means of communication respectively, and that 86.1% and 13.3% live in rural dwellings with hard-packed earth and cement floors respectively (Uganda Bureau of Statistics, 2006b, pp.17-18). These factors are indicative of a mother's SES and significantly influence the mother's preferences with regard to her choice of a place of delivery. These parameters are used to develop a standardised score that determines the SES of each mother.

In this study, socio-economic factors were examined to determine the possible interaction between these factors and their impact on possibility of health facility delivery and overall impact on health facility delivery patterns in rural settings. The SES of the mothers was determined by using a combined score of the nature of the dwelling (construction materials of the dwelling units) and household possessions (Uganda Bureau of Statistics, 2006). These aspects of possession and home dwellings are used as proxy indicators of a mother's SES.

In this analysis, the nature of a mother's dwelling (considering the type of floor, type of roof, type of walls) and home possessions (including domestic animals, means of transport, and means of communication) were components of a score that ranked mothers from the lowest to the highest in terms of SES. The assignment of codes was based on the fact that SES is defined by a set of parameters that determine the type of floor, roof or walls of the house and the type of possessions.

The higher the score is, the higher the indication that the persons living in this dwelling and possessing this set of economically important assets is of a specific social category. Home dwelling is assigned three scores for the type of floor, with the highest score of 3 for a ceramic-tiled or wooden floor, 2 for a cemented floor, and 1 is for a mud (not cement) floor. The type of walls of the house are assigned the highest score of 4, with stone/cement blocks/baked bricks scoring the highest score of 4, walls made of unbaked bricks scored 3, mud and stick walls scored 2, and walls made of any other materials (like corrugated iron sheets, cardboard or grass) scored 1. The means of transport owned were given a highest score of 3, with ownership of a car (motorised vehicle with four or more wheels) scoring 3, ownership of a motorcycle (any motorised vehicle with less than four wheels) scoring 2, ownership of a bicycle or an animal cart (un motorised vehicle) scoring 1, and having no means of transport scoring zero (0). In reference to ownership of means of communication, the highest score was 2 for owners of a fixed telephone line, 1 for homes that owned a mobile phone, and zero (0) for mothers whose homes/households did not possess a means of communication. Lastly, ownership of a domestic animal of economic value, and based on the value of the animal, is assigned a score, with the highest score of 3 for possession of a cow/s. A score of 2 is accorded for possession of goat/s or pig/s or sheep, 1 for possession of chickens (of any number), and zero (0) for not possessing any domestic animals.

Because we are using these possessions as an indication of SES, in the scoring of household possessions that with highest score was the only score included in the analysis. All scores of each mother were then summed to give a total score (SES score) per mother in this rural setting. This is the score that was used in analysis of the distribution of mothers by SES and the association between SES and health facility delivery.

## Annexure 2: Consent Form

**RESEARCH Questionnaire**  
**Determinants of maternal delivery at rural health facilities: A study undertaken in Mpigi**  
**District of Uganda**  
- By Dr. David Mubiru (Student) and Prof. Benjamin Ssekiti (Supervisor)

### CONSENT FORM

Hello, my name is \_\_\_\_\_ I am conducting a survey to understand why women deliver babies in health facilities so that we can plan programmes to encourage more women to follow your good practice of delivering in health facilities. I would very much appreciate your participation in this survey.

This survey will involve me asking you a few simple questions. No answer is wrong. I therefore request you to respond with utmost truth to the best of your knowledge so that we can capture the reality. Please endeavour to answer all the questions.

This will help us understand what leads to a mother's delivering in a health facility in rural Uganda.

All the responses you give will be kept strictly confidential. By ensuring confidentiality of your identity, your responses will not affect your future access to services in this hospital.

You may refuse to answer any of the questions, and you may stop the interview at any time.

For completing these questions, I will contribute to your transport back home with a total of Uganda Shillings 2,500. Remember that only when you complete this interview will you be given this contribution.

Do you have any questions for me now?

Do you agree to participate? **(Circle)** Yes.....1  
No.....2

Signature of mother \_\_\_\_\_ or Thumbprint

Signature of interviewer \_\_\_\_\_ Names

Date

### Annexure 3: Questionnaire

Study: **Determinants of maternal delivery at rural health facilities:**

*A study undertaken in Mpigi District of Uganda*

Mother's Interview Tool

The health system is challenged by the fact that most pregnant women (mothers) in Uganda attend Antenatal Care (ANC), but very few deliver in health facilities. Unfortunately, in the past 5 years, there has not been a significant increase in the number of deliveries in health facilities despite all efforts to ensure that programs and health facilities encourage women to deliver in health facilities. The objective of this study is to understand why mothers decide to deliver in a health facility. The results of this survey will help health managers understand what leads a woman to deliver in a health facility in rural Uganda.

This will in turn enable health providers to design programmes that encourage those who deliver in health facilities to continue delivering in health facilities and to encourage those that do not, to deliver safely in health facilities.

| QUESTIONNAIRE IDENTIFICATION   |   |
|--|---|
| <p><b>Venue of Interview</b></p> <p>1. MCH Clinic</p> <p>2. Other</p> <p><b>Patient NAME CODE</b> <input type="text"/> <input type="text"/></p> <p>(e.g. <b>R N</b> for Rosemary Nakku)</p> <p><b>Patient's hospital number:</b></p> <p><input type="text"/></p> | <p>Where did this delivery take place?</p> <p>-----</p> <p>(home, hospital, health facility, private clinic etc)</p> <p>If the delivery took place in a health facility, in what health facility (Name) did the delivery take place?</p> <p>-----</p> <p>Is the health facility delivery evidenced by a Birth record</p> <p>Yes - - - - -1</p> <p>No - - - - -2</p> |
| <p><b>DATE OF INTERVIEW :</b></p> <p>____/____/____</p> <p>Day month year</p> <p>Interviewer's signature _____</p>   | <p>Telephone contact/s of the mother</p> <p><input type="text"/></p>  |

| Interview of the mother on family details |  |   |
|---|--|---|
| MD1                                       | <p>What is your date of birth?</p> <p>____/____/____</p> <p><i>Day/ Month/ Year</i></p> <p>Age _____</p> <p>Tribe _____</p>  | <p>Are you?</p> <ul style="list-style-type: none"> <li>• Single ....1      Yes .....1      No .....2</li> <li>• Married ....2      Yes .....1      No .....2</li> <li>• Divorced ...3      Yes .....1      No .....2</li> <li>• Widowed ...4      Yes .....1      No .....2</li> <li>• Cohabiting ...5      Yes .....1      No .....2</li> </ul>  |
| MD2                                       | <p>What is the highest level of education you have ever achieved in school?</p> <p>-----</p> <p>-----</p>  | <ul style="list-style-type: none"> <li>• No formal education .....1</li> <li>• Primary level.....2</li> <li>• Secondary level Senior 1 to 4.....3</li> <li>• Secondary level Senior 5 to 6.....4</li> <li>• Tertiary level Specify_____ 5<br/><i>(Teacher education, university, vocational etc.)</i></li> </ul>  |
| MD3                                       | <p>What is your occupation (profession) or the source of income?</p> <p>-----</p> <p><b><i>(If employed name employer)</i></b></p> <p>-----</p>  | <ul style="list-style-type: none"> <li>• Unemployed.....1</li> <li>• Housewife.....2</li> <li>• Peasant (<i>subsistence farming</i>).....3<br/><i>(growing produce for home consumption or for income)</i></li> <li>• Formal employment.....4<br/><i>(Teacher, nurse, shopkeeper, bar attendant etc)</i></li> <li>• Other informal employment.....5<br/><i>(market vendor, selling fish, etc.)</i></li> </ul> |
| MD4                                       | <p>How many individuals live in your home/household (sleep under one roof and share a meal)?</p> <p><b><i>Adults (More than 18yrs)</i></b></p> <p>_____</p> <p><b><i>Children (less than 18yrs)</i></b></p> <p>_____</p> | <p>Total number of people in the home (<i>sharing the evening meal</i>)</p> <ul style="list-style-type: none"> <li>• 1 – 5 .....1</li> <li>• 6 – 10 .....2</li> <li>• More than 10... .....3</li> </ul>   |

|            |   |   |
|------------|---|---|
| <p>MD5</p> | <p>What is your relationship with the head of the household in which you live? <i>(a mother's home is the place where a mother spent more than 70% of the time in the past 12 months and sleeping in this home)</i></p> <p>-----</p> <p>-----</p> | <ul style="list-style-type: none"> <li>• Husband ..... 1</li> <li>• Boyfriend.....2</li> <li>• Father of the mother .....3</li> <li>• Mother of the mother.....4</li> <li>• Father-in-law.....5</li> <li>• Mother-in-law.....6</li> <li>• <b>Others</b> specify;.....7</li> </ul> <p><i>(Female friend, brother, sister, grandparent, daughter, son, uncle, etc.)</i></p> |
| <p>MD6</p> | <p>Do you have a partner or husband responsible (financially/morally/socially) for this baby?</p>   | <ul style="list-style-type: none"> <li>• Yes ..... 1</li> <li>• No .....2</li> </ul>  |
| <p>MD7</p> | <p>Are you currently living with the partner responsible for this baby?</p>   | <ul style="list-style-type: none"> <li>• Yes ..... 1</li> <li>• No .....2</li> </ul>  |
| <p>MD8</p> | <p>What is the highest level of education the head of the household you are living has ever attained?</p> <p>-----</p> <p>-----</p>   | <ul style="list-style-type: none"> <li>• No formal education ..... 1</li> <li>• Primary level.....2</li> <li>• Secondary level Senior 1 to 4.....3</li> <li>• Secondary level Senior 5 to 6.....4</li> <li>• Tertiary level Specify .....5</li> <li><i>(Teacher education, university, vocational)</i></li> <li>• Don't know .....6</li> </ul>                            |
| <p>MD9</p> | <p>What is the main source of income for your husband or partner responsible for the baby?</p> <p>-----</p> <p><b><i>(If employed, name the employer)</i></b></p> <p>-----</p>  | <ul style="list-style-type: none"> <li>• Business.....1</li> <li><i>( Shopkeeper, fishmonger, transport, etc.)</i></li> <li>• Peasant (subsistence farming).....2</li> <li>• Formal employment.....3</li> <li><i>(Teacher, nurse, shopkeeper, bar attendant, etc.)</i></li> <li>• Other informal employment <i>(market vendor, selling fish, etc.)</i>.....4</li> </ul>   |

| Interview on access to maternal services |   |  |
|--|---|--|
| AC1                                      | <p>In which village do you live in?</p> <p>-----</p> <p>What is the estimated distance between your home and where you delivered this baby from?</p> <p>-----</p>                               | <ul style="list-style-type: none"> <li>• Less than 5 kilometres.....1</li> <li>• More than 5 kilometres.....2</li> <li>• More than 10 kilometres....3</li> <li>• More than 15 kilometres....4</li> <li>• More than 20 kilometres....5</li> </ul> |
| AC2                                      | <p>What is the name of the Sub-County you live in?</p> <p>-----</p>   | <p>Did the mother deliver in the sub-county she lives in?</p> <ul style="list-style-type: none"> <li>• Yes .....1</li> <li>• No .....2</li> </ul>  |
| AC3                                      | <p>What is the name of the Health facility closest to your home (mother's home)?</p> <p>-----</p>   | <ul style="list-style-type: none"> <li>• Level of facility:</li> <li>• Health Centre II.....1</li> <li>• Health Centre III.....2</li> <li>• Health Centre IV.....3</li> <li>• Hospital.....4</li> <li>• Private clinic.....5</li> </ul>          |
| AC4                                      | <p>What are the easiest and most accessible means you use to reach this health facility? (<b>by foot, bicycle, motorcycle – boda boda, by car, by boat, etc.</b>)</p> <p>-----</p> <p>-----</p> | <p>How much time in hours does it take you in travel time from your home to this nearest health facility by the means you usually use?</p> <p>-----</p> <p>-----</p>   |
| AC5                                      | <p>Does the facility nearest to your home offer Maternal Delivery services?</p> <p>-----</p>  | <ul style="list-style-type: none"> <li>• Yes.....1</li> <li>• No.....2</li> <li>• Don't know /not sure.....3</li> </ul>  |

|     |  |  |
|-----|--|--|
| AC6 | <p>How much money do you pay a <i>boda boda</i> from your home to the health facility closest to your home? (<i>Boda Boda</i>)<sup>1</sup></p> <p>-----</p> <p>-----</p> | <ul style="list-style-type: none"> <li>• Less than 1000 shillings .....1</li> <li>• 1000 shillings.....2</li> <li>• 1000 – 2900 shillings.....3</li> <li>• 3000 – 5000 shillings.....4</li> <li>• Other.....5</li> </ul> |
|-----|--|--|

Mother's Obstetric History

|     |  |  |
|-----|--|--|
| OH1 | <p>How many times have you ever delivered in a Hospital?</p> <p>-----</p> <p>-----</p> | <ul style="list-style-type: none"> <li>• None .....1</li> <li>• Once .....2</li> <li>• More than once.....3</li> </ul> |
|-----|--|--|

---

<sup>1</sup> Boda Boda: This is the local name of the commonest means of transport by a motorcycle. The cost of a ride can be used as an approximate distance between one point to the hospital e.g. 500 shillings is the minimum for a distance of 1-3 km, 1,000 shillings is for a distance between 3-6 km, etc.



|    | <b>Date of birth/delivery</b><br><i>(to the nearest month and year)</i> | <b>Sex /Gender</b><br><br>• Male<br>• Female | <b>Place of delivery</b><br><br>• <b>Name of Health facility</b><br>• Home<br>• TBA,<br>• Others | <b>Method of delivery</b><br>•SVD –<br><i>Spontaneous Vaginal Delivery</i><br>•Caesarean Section<br>•Assisted Delivery<br><i>(Vacuum, etc.)</i> | <b>Outcome of the delivery</b><br>• Alive<br>• Stillbirth<br>• Fresh stillbirth<br><i>(died immediately after birth)</i><br>• Macerated stil birth | <b>Current status of the child</b><br>• Alive<br>• Died |
|----|---|--|--|---|--|---|
| 1  |   |  |  |   |  |   |
| 2  |   |  |  |   |  |   |
| 3  |   |  |  |   |  |   |
| 4  |   |  |  |   |  |   |
| 5  |   |  |  |   |  |   |
| 6  |   |  |  |   |  |   |
| 7  |   |  |  |   |  |   |
| 8  |   |  |  |   |  |   |
| 9  |   |  |  |   |  |   |
| 10 |   |  |  |   |  |   |
| 11 |   |  |  |   |  |   |
| 12 |   |  |  |   |  |   |
| 13 |   |  |  |   |  |   |

**Interview on the mother’s Antenatal Care history of the Index delivery**

|      |  |   |
|------|--|---|
| ANC1 | During the pregnancy of this baby, how many times did you attend Antenatal Clinic?<br><br>-----  | <i>Verified by an ANC Card</i><br><br>• Yes.....1<br>• No.....2 |
| ANC2 | Did you attend antenatal care in this Hospital? (Refer to ANC card).<br>If yes – – – – – how many times did you attend ANC in this hospital? ----- | <br><br>• Yes.....1<br>• No.....2                               |

|      |  |
|------|--|
| ANC3 | <p>During the antenatal visits, were you informed by health workers of any risk factor to safe maternal delivery?</p> <ul style="list-style-type: none"> <li>• Yes.....1</li> <li>• No.....2</li> </ul> <p>If yes, which risk/s?</p> <p>.....</p> <p>.....</p> |
|------|--|

### Interview on the mother's Past Medical History

|     |   |   |
|-----|---|---|
| PM1 | <p>How many times have you ever been admitted in any Health facility?</p> <p>-----</p> <p>-----</p>   | <ul style="list-style-type: none"> <li>• Once .....1</li> <li>• Twice.....2</li> <li>• Thrice.....3</li> <li>• More than three times .....4</li> <li>• None .....5</li> </ul> |
| PM2 | <p>How many times have you ever been admitted in this hospital?</p> <p>-----</p> <p>-----</p>   | <ul style="list-style-type: none"> <li>• Once .....1</li> <li>• Twice.....2</li> <li>• Thrice.....3</li> <li>• More than three times .....4</li> <li>• None .....5</li> </ul> |
| PM3 | <p>In the <b>past two years</b>, how many times have any of your children or close relative been admitted in this hospital?</p> <p>-----</p>            | <ul style="list-style-type: none"> <li>• Once .....1</li> <li>• Twice.....2</li> <li>• Thrice.....3</li> <li>• More than three times .....4</li> <li>• None .....5</li> </ul> |
| PM4 | <p>In the <b>past two years</b>, how many times have you been attended to at the Out Patient Department of this Hospital?</p> <p>-----</p> <p>-----</p> | <ul style="list-style-type: none"> <li>• Once .....1</li> <li>• Twice.....2</li> <li>• Thrice.....3</li> <li>• More than three times .....4</li> <li>• None .....5</li> </ul> |



| Interview on other socio-economic and health aspects                 |   |  |           |  |          |
|--|---|--|-----------|--|----------|
|  | <p><b><u>Introduction</u></b></p> <p><b>The following questions are relatively sensitive because they concern your socio-economic aspects. They are however very important questions to us and I request you to answer them honestly to your best ability.</b></p>  |  |           |  |          |
| OT1  | <p>In the past 2 years(15 months before pregnancy), which contraceptive/family planning methods have you used? (<i>list</i>)</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Have you ever used contraceptives?</p> <ul style="list-style-type: none"> <li>• Yes.....1</li> <li>• No.....2</li> </ul>   |  |           |  |          |
| OT2  | <table border="0" style="width: 100%;"> <tr> <td style="width: 60%;">If you become pregnant again, will you deliver in a health facility?</td> <td style="width: 40%;">Yes.....1</td> </tr> <tr> <td></td> <td>No.....2</td> </tr> </table>   | If you become pregnant again, will you deliver in a health facility? | Yes.....1 |  | No.....2 |
| If you become pregnant again, will you deliver in a health facility? | Yes.....1   |  |           |  |          |
|  | No.....2  |  |           |  |          |
| OT3  | <table border="0" style="width: 100%;"> <tr> <td style="width: 60%;">Have you ever advised woman to deliver in a health facility?</td> <td style="width: 40%;">Yes.....1</td> </tr> <tr> <td></td> <td>No.....2</td> </tr> </table>   | Have you ever advised woman to deliver in a health facility?         | Yes.....1 |  | No.....2 |
| Have you ever advised woman to deliver in a health facility?         | Yes.....1   |  |           |  |          |
|  | No.....2  |  |           |  |          |
| OT4  | <p>I am not going to refund for any of these cost you have incurred. Therefore please answer this question honestly.</p> <p>Approximately how much money did you and or your partner pay for this delivery in terms of :</p> <ul style="list-style-type: none"> <li>• Transport -----</li> <li>• Health facility bill -----</li> <li>• Food -----</li> <li>• Others -----</li> <li>• <i>Total</i> <span style="background-color: #cccccc; display: inline-block; width: 100px; height: 1em; vertical-align: middle;"></span></li> </ul> |  |           |  |          |

|      |  |   |
|------|--|---|
| OT 5 | <p>In the <b>past 12 months</b>, have you seen or heard of a woman who died during childbirth in your village?</p> | <ul style="list-style-type: none"> <li>• Yes.....1</li> <li>• No.....2</li> </ul>   |
| OT6  | <p>What is the <b>floor</b> of the house you are living in made of?</p> <p>-----</p> <p>-----</p> <p>-----</p>     | <ul style="list-style-type: none"> <li>• Tiled (Ceramic/PVC/Wooden) .....1</li> <li>• Cemented floor.....2</li> <li>• Mud floor.....3</li> <li>• Others specify.....4</li> <li>• <i>Others include wooden, carpet floors etc.....5</i></li> </ul> |
| OT7  | <p>What are the <b>walls</b> of the house you are living in made of?</p> <p>-----</p> <p>-----</p> <p>-----</p>    | <ul style="list-style-type: none"> <li>• Stone, cement blocks, burnt bricks...1</li> <li>• Mud brick/Clay brick(not burnt) .....2</li> <li>• Mud and stick.....3</li> <li>• Grass.....4</li> <li>• Others specify (tin, grass).....5</li> </ul>   |
| OT8  | <p>What is the <b>roof</b> of the house you are living in made of?</p> <p>-----</p>                                | <ul style="list-style-type: none"> <li>• Tiles .....1</li> <li>• Galvanised iron sheets.....2</li> <li>• Grass thatch .....3</li> <li>• Others specify (cement).....4</li> </ul>  |
| OT9  | <p>Which means of transport do you or your partner own?</p> <p>-----</p> <p>-----</p>                              | <ul style="list-style-type: none"> <li>• Car.....1</li> <li>• Motorcycle.....2</li> <li>• Bicycle .....3</li> <li>• Other specify (<i>boat, truck, animal cart</i>)....4</li> </ul>   |
| OT10 | <p>Which means of communication do you or your partner own?</p> <p>-----</p> <p>-----</p>                          | <ul style="list-style-type: none"> <li>• Mobile.....1</li> <li>• Phone/Fax.....2</li> <li>• Others specify(<i>email, land line, etc.</i>)....3</li> </ul>   |
| OT11 | <p>Which domestic animal do you own and how many in number?</p> <p>-----</p> <p>-----</p> <p>-----</p>             | <p>List</p> <ul style="list-style-type: none"> <li>• -----</li> <li>• -----</li> <li>• -----</li> </ul>   |

|      |  |  |
|------|--|--|
| OT12 | Do you or your partner own the house in which you are living in? | <ul style="list-style-type: none"><li>• Yes.....1</li><li>• No.....2</li></ul> |
|------|--|--|

**Thank you for your time and for contributing to this survey.**

**INTERVIEW: 1 – Complete      2 – Not completed**

Endorsed by supervisor

Date

University of Cape Town

## Annexure 4: University of Cape Town Ethics Committee approval



UNIVERSITY OF CAPE TOWN

Health Sciences Faculty  
Research Ethics Committee  
Room: E52-24 Groote Schuur Hospital Old Main Building  
Observatory 7925  
Telephone: 021 405 6338 • Facsimile: 021 405 6111  
e-mail: [lanzees.majedi@uct.ac.za](mailto:lanzees.majedi@uct.ac.za)

16 September 2008

REC REF: 997/2008

Dr E Mubizi  
School of Child & Adolescent Health

Dear Dr Mubizi

**PROTOCOL: DETERMINANTS OF MATERNAL DELIVERY AT RURAL HEALTH FACILITIES: A STUDY UNDERTAKEN IN MPIGI DISTRICT OF UGANDA.**

Thank you for submitting your study to the Research Ethics Committee for review.

It is a pleasure to inform you that the Ethics Committee has formally approved the above-mentioned study.

Approval is granted for one year, till the 28<sup>th</sup> September 2009.

Please submit an annual progress report if the research continues beyond the expiry date. Please submit a brief summary of findings if you complete the study within the approval period so that we can close our file.

If necessary please ensure that you obtain approval from a Ugandan-based Research Ethics Committee.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC REF in all your correspondence.

Yours sincerely

*PM*  
**PROFESSOR M. HUCKEMAN**  
CHAIRPERSON, HSE HUMAN ETHICS

Federal Wide Assurance Number: FWA00001037  
Institutional Review Board (IRB) number: IRB00001038  
6/10/08

This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH-GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/93) and FDA Code Federal Regulations Part 312.56 and 312.



## Annexure 5: Mpigi District approval

General line : 710079  
Direct lines:  
Chairman District Council : 710092  
Chief Admin. Officer : 0392-715397  
Director of Health Services : 0392-715398  
District Water Officer : 0392-715396  
District Forest Officer : 0414 710036  
Chief Finance Officer : 710051  
Fax : 710111



**MPIGI DISTRICT LOCAL GOVERNMENT**  
www.mpigi.go.ug

Office of .....D.H.O.

.....  
P. O. Box 172,  
Mpigi.

IN ANY CORRESPONDENCE ON

December 15, 2008

THIS SUBJECT PLEASE QUOTE NO. ....

Date: .....

Dr. David Mabirizi  
Senior Technical Advisor (Country Team Lead)  
Management Sciences for Health  
Jan Jonker Heights  
132-134 Jan Jonker Street  
P.O.Box.90027,  
Klein Windhoek, Namibia

Tel: +264813390062 or +26461228016  
Fax: +26461220361  
Email: dmabirizi@msh.org.na  
davidmabs@yahoo.com

Dear Sir,

**RE: Request to carry out academic research work in Mpigi District**

This letter is in response to your request to undertake a study for academic purposes in Gombe and Nkozi Hospitals in Mpigi District with focus on *Determinants of maternal delivery at rural health facilities: A study undertaken in Mpigi District of Uganda.*

This is therefore to inform you that on behalf of Mpigi District administration, your study will provide us important information that will guide us in implementing programs and has therefore been approved. This approval will expire on the 15<sup>th</sup> December 2009. Any serious problems related to the execution of this study should be brought to the attention of the office of the District Health Officer Mpigi District.

This letter serves as a proof of approval and as a reminder for you to submit to the office of the District Health Officer a copy of the final version of the research report.

We acknowledge your interest in the development of our district.

For God and my Country,

Yours

Dr. Ruth Nassanga  
District Health Officer  
Mpigi District

## Annexure 6: Gombe Hospital approval

Telephone: 039-2768589

Telefax:

Email: gombehosp@africaonline.co.ug



THE REPUBLIC OF UGANDA

**GOMBE HOSPITAL**

P.O. Box 145

MPIGI, UGANDA

IN ANY CORRESPONDENCE ON

THIS SUBJECT PLEASE QUOTE NO.

**GH 37/2008**

DATE: 16/12/2008

Dear Dr. David Mabirizi

**RE: Request to Carry out Academic research work at Gombe Hospital**

I am glad to inform you that the Hospital management accepted your request to conduct research on; "Determinants of maternal delivery at rural health facilities", at Gombe Hospital. Arrangements have therefore been made to make sure that your data collection is smooth. Feel free to contact this office in case of any help.

Thank you.

.....  
Dr. Lule Haruna-MBCHE, Msc.HSM  
Medical Superintendent  
Gombe Hospital  
Tel.No. 4256-772-447983  
E-mail: lule\_haruna@yahoo.com/lule\_haruna31@hotmail.com

16 DEC 2008

## Annexure 7: Nkozi Hospital approval



**NKOZI HOSPITAL**  
Our Lady Health of the Sick

Office of the Medical Superintendent  
P.O. Box 4349, Kampala- Uganda  
East Africa  
Tel.: +256 (0) 0392842207; Mob.: 0752556712  
Fax: +256(0) 38 410100  
Email: [nkozi@ucmb.co.ug](mailto:nkozi@ucmb.co.ug)

---

**Date:** 18<sup>th</sup> December 2008

To  
**Dr David Mabirizi**  
P.O.Box 90027  
Klein Windhoek  
Namibia

Dear Sir,

**RE: PERMISSION TO CARRY OUT ACADEMIC RESEARCH WORK IN  
NKOZI HOSPITAL.**

This is to inform you that your request to carry out a study in Nkozi Hospital titled; **“Determinants of maternal delivery at rural health facilities: A study undertaken in Mpigi District of Uganda”** has been approved. You are therefore permitted to carry out this research in Nkozi Hospital, Mpigi District.

The results of this study will be a true picture of what happens in the Hospital during the stated period and will assist the hospital management in planning effective interventions.

By this communication, my office and Hospital management are available to assist you during the data collection period and during implementation of other activities related to this study. We hope to get a final copy of the research report and appreciate your interest in Nkozi Hospital.

We wish you success in your studies.

Yours Sincerely,

**Dr.Lumala Alfred**  
Medical Superintendent  
Nkozi Hospital.

cc. Professor M Blockman  
Chairperson HSF Human Ethics  
Health Sciences Faculty  
Research Ethics Committee  
University of Cape Town

## Annexure 8: Makerere University approval



5<sup>th</sup> January, 2009

**Dr. David Mabirizi**  
University of Cape Town.

Dear Dr. Mabirizi,

**Re: Approval of Protocol #REC REF 2008- 116**  
**"Determinants of Maternal Delivery at Rural Health Facilities: Study**  
**Undertaken in Mpigi district of Uganda"**  
**(Version 1.0 of 8<sup>th</sup> December 2008)**

Thank you for submitting an application for approval of the above referenced protocol. The committee reviewed it and granted approval for one year, effective December 08, 2008. Approval will expire on December 07, 2009.

#### **Continuing Review**

In order to continue work on his study (including data analysis) beyond the expiration date, the Faculty of Medicine Research and Ethics Committee must reapprove the protocol after conducting a substantive, meaningful, continuing review. This means that you must submit a continuing Report form in a request for continuing review.

To best avoid a lapse, you should submit the request six (6) to eight (8) weeks before the lapse date. Please use the forms supplied by our office.

#### **Amendments**

During the approval period, if you propose any change to the protocol such as its funding source, recruiting materials, or consent documents, you must seek Faculty of Medicine Research and Ethics Committee approval before implementing it.

Please summarize the proposed change and the rationale for it in a letter to the Faculty of Medicine Research and Ethics Committee. In addition, submit three (3) copies of an updated version of your original protocol application- one showing all proposed changes in bold or "track changes," and the other without bold or track changes.

**Reporting**

Other events which must be reported promptly in writing to the Faculty of Medicine Research and Ethics Committee include:

Suspension or termination of the protocol by you or the grantor  
Unsuspected problems involving risk to participants or others

Adverse events, including unanticipated or anticipated but severe physical harm to participants.

Do not hesitate to contact us if you have any questions. Thank you for your cooperation and commitment to the protection of human subjects in research.

Final approval is to be granted by Uganda National Council of Science and Technology.

Yours sincerely



Dr. Charles Mungira  
Chairperson, Faculty of Medicine Research and Ethics Committee