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DETERMINANTS OF THE UTILISATION OF DELIVERY SERVICES BY PREGNANT WOMEN IN RWANDA

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of
Master of Science in Medicine (Child Health)

Johannesburg 2010

DECLARATION

I, Yvonne S Umurungi, declare that this research report is my own work. It is being submitted for the degree of Masters of Science in Child Health in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University

……..

Signature

26th day of August, 2010

Dedication

To my husband Anecto Kayitare

To our children Olivier, Thierry, Ynis, Orie and Andy

To all my loved ones

May God bless you all

ABSTRACT

Objective:

To identify determinants for the utilisation of delivery services by pregnant women in Rwanda, considering individual and demographic, socioeconomic and health service factors.

Design:

A secondary data analysis of the third (2005) Rwandan Demographic Health Survey (RDHS III) was conducted. Women who had at least one live birth during the five-year period prior to the survey were included in the analysis. Bivariate and multivariate analyses were undertaken.

Results:

A total of 5235 participants fulfilled the study eligibility criteria and were included in the analysis. Although more than 90% of participants attended an antenatal service, only 30% delivered at a health facility. The predictors of a home delivery were higher parity (OR=5.01, 95% CI: 4.11-6.31 for parity of 6 or more), place of residence (OR=1.86, 95% CI: 1.55-2.23 for rural women), lower household wealth (OR=4.37, 95% CI: 3.43-5.56 for the poorest quintile), lower education level (OR=3.61, 95% CI: 2.73-4.76 for no education), none or one antenatal care visit (OR=3.62, 95% CI: 2.76-4.74 for one antenatal care visit) and the lack of antenatal counselling about pregnancy complications (OR=1.83, 95% CI:1.40-2.40).

Conclusion

Utilisation of maternal health services, particularly health facility delivery services, remains low in Rwanda. The promotion of at least four standard antenatal care visits, as well as efforts targeting specific risk groups, such as higher parity, rural and less educated women living in poorer households are critical if the country wishes to reduce maternal and neonatal mortality and morbidity.

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ABBREVIATIONS

ANC	Antenatal care
CNLS	Commission Nationale de Lutte contre le SIDA
DFID	British Department for International Development
DHS	Demographic and Health Survey
FIGO	Fédération Internationale de Gynécologie Obstétrique (International Federation of Gynaecology and Obstetrics)
Frw	Francs Rwandais (Rwandan francs)
GDP	Gross Domestic Product
GTZ	Gesellschaft für Technische Zusammenarbeit GmbH (German Technical Cooperation)
ICM	International Confederation of Midwives
ICPD+5	International Conference on Population and development+5
IQR	Interquartile range
MAP	Multi-country AIDS Program
MDG	Millennium Development Goal
MEASURE	Monitoring and Evaluation to Assess and Use Results
ORC	Opinion Research Corporation
RDHS	Rwanda Demographic and Health Survey
UNFPA	United Nations Population Fund (formerly United Nations funds for Population activities)
UNICEF	United Nations Children's Fund (formerly United Nations International Children's Emergency Fund)
USAID	United States Agency for International Development
WHO	World Health Organization

1. LITERATURE REVIEW

Utilisation of delivery services by pregnant women

1.1 Introduction

In developing countries, millions of women and newborns die or experience serious health problems related to pregnancy and childbirth each year. Maternal mortality has been difficult to measure accurately in resource-poor settings and, in general, trend comparisons are unreliable. Maternal mortality ratios in most sub- Saharan African countries range from 600 to 999 per 100,000 live births.[1] One explanation for the poor health outcomes among women and children in resource-poor settings is inadequate access to modern health services and poor utilisation of these services by a large number of women.[1, 2] Efforts have been made to identify appropriate process indicators to assess reproductive health. The emphasis has more recently shifted from measuring indicators of health to indicators of access and use of health care systems.[3]

1.2 Where do women in resource-poor settings deliver?

The majority of births in sub-Saharan Africa still occur at home or in other non-hospital settings.[4] Women deliver at home, with or without the assistance of a birth attendant, who may be trained or untrained. In resource-poor settings, home delivery is usually the cheapest option, but is associated with attendant risks of infection and lack of available equipment should complications occur.[5] Health facility deliveries can occur at private or public facilities. Public facilities are usually owned and financed by the government and/or supported by some faith based organisations. In these settings, costs are usually minimal but available amenities are often suboptimal. [5] Although private facilities are more expensive, they are often perceived as having the best amenities and offering the best standard of care.[5] Private facilities are found mostly in urban areas.

1.3 Who does the deliveries?

Skilled attendance at birth has been adopted as a leading indicator of maternal health for numerous international agreements and agencies. It is recognised that in addition

to a range of interventions before, during and after pregnancy, ensuring that all births are attended by a skilled health worker is a key strategy to reduce maternal deaths.[6, 7, 8]

In high income countries, 99% of deliveries are conducted by skilled attendants compared to 59% in low income countries where over 90% of maternal death occurs.[9] According to the World Health Organization (WHO), cited by Letamo and al[1], 60 million deliveries take place annually worldwide where the woman is cared for by either a family member, an untrained traditional birth attendant, or no one at all. Less than 30% of women receive postnatal care.[1] Increasing the proportion of women cared for in health facilities and by skilled health providers during pregnancy and childbirth is critically important for improving the health of mothers and newborns.[10] The main strategy to achieve the fifth Millennium Development Goal (MDG), which aims to improve maternal health, is to ensure that 90% of all births are attended by a skilled attendant in 2015.[9]

1.4 Consequences of delivering in non-health facility settings

Childbirth in a health facility while attended to by trained health professional has been shown to be associated with lower rates of maternal and neonatal mortality and morbidity compared to home births.[11] In poor settings, non- health facility deliveries are associated with increased maternal morbidity and mortality and increased newborn morbidity and mortality.[11,12] In developed countries, some studies have shown an increased maternal or neonatal risk associated with planned home birth. One such study, in Washington State during 1989-1996, had greater infant and maternal risks than did hospital births. Established maternal risks were prolonged labour and postpartum bleeding among nulliparous women, while neonatal risks included elevated risk of neonatal mortality and a very low Apgar score at 5 minutes.[13]

1.5 What do we know about the determinants?

Utilisation of health services is a complex behavioural phenomenon. The use of health services is related to availability, quality and cost of services as well as social structure, health beliefs and personal characteristics of the users. [14]

Age

It is well recognised that women's current age plays an important role in the utilization of medical services. Mothers' age may sometimes serve as a proxy for women's accumulated knowledge of health care services, which may have a positive influence on the use of health services. On the other hand, because of developments in modern medicine and improvements in educational opportunities for women in recent years, younger women might have an enhanced knowledge of modern health care services and place more value upon modern medicine.[7, 8, 14]

Family size

Family size is an important determinant of health care utilisation. Women from large families underutilize various health care services because of excessive demands on their time. Larger families also cause resource constraints, which have a negative effect on health care utilisation.[14]

Parity and birth order

In some studies, birth order and parity were important determinants for the use of maternal health care services: higher births order and higher parity decrease the likelihood of using services. An analysis of the 1993 Turkish Demographic Health Survey, found that low parity women were significantly more likely to select a facility-based delivery.[2] Compiled data from national surveys from all continents done by Stanton et al in 2006, showed that in all continents, low parity women were more likely to seek skilled birth attendance.[8] High birth order was found to be a predisposing factor of home delivery by Thind in India as well as by Navaneetham in four states of southern India; after an uneventful birth of the first child at home, subsequent deliveries are perceived to be low risk thus increasing the likelihood of delivering the subsequent babies at home. [5, 15] However, a Botswanian study that analysed data from the 1996 Family Health Survey found that the proportion of non-use of maternal services among lower parity women was consistently higher than among higher parity women.[1]

Place of residence

Living in urban areas increases the probability of pregnant women using trained professionals for birth deliveries.[1, 2.] In southern India, urban residence increased the likelihood of institutional delivery compared to rural residence.[15] Place of residence was found to be an important predictor for the use of delivery services in Ethiopia as well as in Nigeria, with urban women more likely to use institutional deliveries compared to rural women. [16, 17, 18] Compiled data from different settings in two reviews showed that urban residence increased the use of delivery services. [19, 20] In many sub-Saharan African countries, rural areas have poor road networks, inadequate transportation and fewer health facilities compared to urban areas, making women from rural areas less likely to have access to health facility deliveries.[16,18,20]

Women's education

Women's literacy is an important predictor for the use of maternal health care services.[1, 2, 7, 11, 14, 15] It is well recognized that a woman's educational level has a positive impact on health care utilisation. Increased education influences service use by increasing female decision-making power, increasing awareness of health services, changing marriage patterns, and creating shifts in household dynamics.[11] Women's education may also act as a proxy variable of a number of background variables representing women's higher socioeconomic status, thus enabling them to seek proper medical care whenever they perceive it as necessary.[14] In Afghanistan, low female literacy is associated with lower skilled birth attendant use in a country in which, nationwide, only 6% of women can read. [21]

Partner education

Husband or partner's education and occupation are also important predictors of the use of maternal health care services. Both can be considered a proxy of family income, as well as social status.[15, 22]

Socioeconomic status

Socioeconomic factors such as income, household wealth, education, have been shown to be of greater importance in determining health service use than

demographic factors. [11, 22] Research consistently shows that a low income and the cost of services are important constraints on service utilisation: increased income has a positive effect on the utilisation of modern health care services and low income and the cost of services are important constraints on service utilisation.[1, 8, 22] Huge inequalities in the use of skilled birth attendants are found in developing countries, with the poor being at a stark disadvantage.[21, 22]

Psychosocial factors

Amooti-Kaguna and Nuwaha described a model which predicts various health related behaviours.[23]In the described model (Attitudes-Social influence- Self efficacy model), behaviour such as choice of delivery site is considered to be a result of behaviour intention. Three main psychosocial factors have been identified that predict behaviour intention: attitudes, social influences and self-efficacy. The implication of the model is that a person's health behaviour can be changed, by changing one's attitudes, perception of social norms, and social support and self-efficacy expectations.[23]

The individual's cultural environment provides a strong influence on the extent to which these factors can lead to the use of health services. In a community where most women deliver in a health facility, this has a strong positive influence on other women's decision to seek care for childbirth; the practice is therefore likely to be seen as a norm, influencing individual behaviour.[11] Perception and knowledge of the community members about maternal health problems play a role in their care-seeking behaviour.[24]

Physical accessibility

Several studies found that physical proximity to health care services, especially in developing countries, plays an important role in the utilisation of these services.[2, 3, 7, 10, 14, 23]

Amooti-Kaguna et al, in Uganda found that access to maternity services was an important determinant of the choice of delivery site.[23] In Guatemala the utilization of biomedical care during pregnancy diminished with increasing distance from a government-sponsored clinic and from the capital city. The effect of distance on the use of health services has been attributed to the time and cost of travel, compounded

by unhelpful topography, poor road conditions and a lack of public transport.[25] In Haiti, the use of health facility services for delivery was constrained by geography and distance from the nearest facility. [10]

Antenatal care usage

Frequency of antenatal care (ANC) is a significant positive determinant of facility delivery. This was found in studies done in Botswana, Tanzania and Cambodia as well as in compiled data from developing countries from all the continents.[1, 7, 8, 26]

Health insurance

Having health insurance was found to have an important influence in increasing the probability of both prenatal care use and birth delivery assistance.[2] In Senegal and Mali, community health insurance covering maternity costs was associated with increased facility delivery while in Ghana where the scheme covered only pregnancy complications the association was not found.[27]

Table 1.1: Summary table of studies examining determinants of place of delivery

Factor	Author, ref	Year published	Country in which the study was conducted	Odds ratios / risk increase	Comment
Age	Letamo, et al [1]	2003	Botswana	Teenagers 11 x higher risk of unqualified birth assistant than 35 years and above	Botswana Family Health Survey. N not given
	Mpembeni, et al[7]	2007	Tanzania	Younger women more likely to have facility delivery than older women	Cross sectional study
	Stanton C, et al [8]	2006	USA	Women aged 44-49 less likely to deliver with skilled attendance in all regions except South- East Asia	Compiled data from health surveys from MDG regions
Residence	Letamo, et al [1]	2003	Botswana	Rural women were >5x more likely to have unqualified delivery assistance	Botswana Family Health Survey
	Celik, et al [2]	2000	Turkey	Urban women more likely to have facility delivery	1993 Turkey Demographic and Health Survey.
	Stephenson, et al[11]		Ghana, Cote d'Ivoire,Burkina Faso, Tanzania, Kenya and Malawi	Urban residence more related to health facility delivery than rural residence in 4/6 countries	DHS data from 6 African countries
	Mekonnen, et al[16]	2003	Ethiopia	Women residing in Addis Ababa were about 40 X more likely to receive skilled assistance during delivery than their rural counterparts	2000 Ethiopia Demographic and Health Survey
	Onah, et al[17]	2006	Nigeria	Parturient near health facility more likely to deliver in health facility	Population based cross sectional survey

Factor	Author, ref	Year published	Country in which the study was conducted	Odds ratios / risk increase	Comment
	Babalola, et al[18]	2009	Nigeria	Rural women about 2x more likely to use non-health professionals at delivery.	2005 National HIV/AIDS and Reproductive Health Survey
	Say, et al[19]	2007		Urban women were more likely to use health facility settings for delivery than were rural women	Electronically compiled data from 30 studies from 23 developing countries
Parity	Letamo, et al[1]	2003	Botswana	Use of unqualified delivery assistance higher in low parity women	Botswana Family Health Survey
	Celik, et al[2]	2000	Turkey	Women with higher parity were more likely to use non- health facility delivery	1993 Turkey Demographic and Health Survey.
	Stanton, et al[8]	2006	USA	First birth more likely to receive health professional care	Compiled data from health surveys from MDG regions
	Mekonnen, et al[16]	2003	Ethiopia	Women with higher parity were less likely to have professionally assisted deliveries	2000 Ethiopia Demographic and Health Survey
Women's Education	Letamo, et al[1]	2003	Botswana	Women with no formal education were 11X more likely to have non-health facility births	Botswana Family Health Survey
	Celik, et al[2]	2000	Turkey	Uneducated women more likely to use non - health facility delivery	1993 Turkey Demographic and Health Survey
	Mpembeni, et al[7]	2007	Tanzania	Educated women less likely to have home delivery.	Cross sectional study
	Stephenson, et al[11]		Ghana, Cote d'Ivoire, Burkina Faso, Tanzania, Kenya and Malawi	Communities where women had higher education level (secondary or higher) more likely to seek health care for delivery	DHS data from 6 African countries

Factor	Author, ref	Year published	Country in which the study was conducted	Odds ratios / risk increase	Comment
	Navaneetham, et al[15]	2002	Southern India	Women with high school education or more 2-18X more likely to have health facility delivery in the 4 states.	National family health survey
	Mekonnen, et al[16]	2003	Ethiopia	Women with no education were about 8X less likely to use health delivery care services.	2000 Ethiopia Demographic and Health Survey
	Onah , et al[7]	2006	Nigeria	High educational level related to higher chance of seeking health facility care during delivery.	Population based cross sectional survey
	Babalola, et al[18]	2009	Nigeria	Women with no education 10X more likely to use non- health professionals for delivery compared to those with post secondary education	2005 National HIV/AIDS and Reproductive Health Survey
	Chakraborty, et al [14]	2003	Bangladesh	Education has a net effect on maternal services utilisation	Data from a survey conducted by the Bangladesh Institute of research for promotion of essential and reproductive health and technologies (BIRPERHT)
Partner education	Onah,et al[17]	2006	Nigeria	Percentage of delivery in health facilities increases with the number of years of husband's education	Population based cross sectional survey
	Navaneetham, et al[15]	2002	Southern India	Women whose husband had secondary education or more were more likely to use health services for delivery in 2/4 states	National family health survey
	Houweling, et al[22]	2006		Women whose husband were educated were more likely to get health services care for delivery	Data from World Bank Country Reports from 45 Developing Countries

Factor	Author, ref	Year published	Country in which the study was conducted	Odds ratios / risk increase	Comment
Socio-economic status (Wealth Index)	Letamo, et al[1]	2003	Botswana	Women with low socioeconomic status 4X more likely to have non-health facility births than those with high socioeconomic status	Botswana Family Health Survey
	Celik, et al[2]	2000	Turkey	Women with low socioeconomic status more likely to have non- facility delivery than those with high socioeconomic status	1993 Turkey Demographic and Health Survey
	Stanton, et al[8]	2006	USA	Women from wealthy households more likely to have a skilled attendant at birth than those from less wealthy households.	Compiled data from health surveys from MDG regions
	Babalola, et al[18]	2009	Nigeria	Women from very poor households were 4X more likely to use non-health professionals at delivery compared to those from richer and richest households	2005 National HIV/AIDS and Reproductive Health Survey
	Say, et al[19]	2007		Wealthier women tend to deliver in health facility settings in some countries.	Electronically compiled data from 30 studies from 23 developing countries
	Houweling, et al[22]	2006		Poor women have higher risk of non- use of delivery services in most countries (except Brazil and Dominican Republic, which have high usage of public delivery services)	Data from World Bank Country Repots from 45 Developing Countries.
Physical accessibi-lity	Celik, et al[2]	2000	Turkey	Geographical region was important predictor of health service utilisation: women living in eastern regions were less likely to use skilled birth assistance than those in western regions	1993 Turkey Demographic and Health Survey.

Factor	Author, ref	Year published	Country in which the study was conducted	Odds ratios / risk increase	Comment
	Mpembeni, et al[7]	2007	Tanzania	Longer distance to the health facility was related to home delivery.	Cross sectional study
	Gage, et al[10]	2006	Haiti	Use of delivery care service is constrained by geography and distance to the nearest health facility	2000 Haiti DHS
	Amooti-Kaguna, et al[23]	2000	Uganda	Lack of access to health services and transportation found to be in favour of non - facility delivery	Semi-structured interviews and Focus groups
ANC usage	Mpembeni , et al[7]	2007	Tanzania	Women with 4 or more ANC visits more likely to have skilled attendant at birth	Cross sectional study
	Stanton, et al[8]	2006	USA	ANC usage strongly related to health facility delivery	Compiled data from health surveys from MDG regions
	Stephenson, et al[11]		Ghana, Cote d'Ivoire, Burkina Faso, Tanzania, Kenya, Malawi	ANC usage consistently related to delivery in health facility for the 6 countries.	DHS data from 6 African countries
	Yanagisawa, et al[26]	2006	Cambodia	Antenatal care was a significant positive determinant of facility delivery when the woman had 4 or more ANC visits.	Population-based survey
Health insurance	Celik, et al[2]	2000	Turkey	Having a health insurance increase health facility delivery	1993 Turkey Demographic and Health Survey.
	Smith, et al[26]	2008	West Africa (Senegal, Mali and Ghana)	Membership in a community-based health insurance positively related to use of maternal health services mostly when maternal health care is included in the benefits package.	Cross sectional data from household surveys Small sample

Increasing utilisation of pregnancy and childbirth services requires action on several fronts, including education of the women and their households, improving the quality of services, improving the human resources situation for health service delivery, as well as ensuring that the policies of healthcare institutions and practices within them are sufficiently friendly to the women.[24]

1.6 Strategies advocated for safe deliveries.

Since the 1980s there has been increasing interest on the part of governments and international agencies in improving maternal and child health in poor countries. The international Safe Motherhood Initiative, launched by the World Health Organization (WHO), United Nations Population Fund (UNFPA) and the World Bank, was developed in response to persistently high rates of maternal mortality and morbidity and was aimed at raising awareness about the numbers of women dying each year from complications of pregnancy and childbirth, and to challenge the world to do something.

The underlying logic of this initiative is that the vast majority of the causes of infant and maternal deaths and disabilities can be prevented or treated. Thus the initiative promotes a safe, healthy pregnancy and delivery by women accessing care provided by skilled health personnel before, during and after childbirth.[2, 6] The initiative had set up a goal to "reduce maternal mortality by 50% by the year 2000".[21, 22]

Other international conferences at which the importance of skilled attendance was noted include the 1990 World Summit for Children, the 1994 International Conference on Population and Development, the 1995 Fourth World Conference on Women and the 1999 International Conference on Population and Development+5 (ICPD+5). [8]

A joint statement by the World Health Organization (WHO), the International Confederation of Midwives (ICM) and the International Federation of Gynaecology and Obstetrics (FIGO) also emphasizes the pivotal role played by the skilled birth attendant in the continuum of care that is necessary to ensure the best possible health outcomes for mothers and newborns. The most influential agreement to include this indicator is the UN Millennium Declaration signed in 2001. The proportion of births attended by skilled health personnel is one of the indicators of improved maternal health, thereby reducing maternal deaths which is the fifth Millennium Development Goal (MDG-5). [8]

The Safe Motherhood initiative has been largely accepted by nations as part of reproductive health. The focus was first put on the notion of women at risk and training of traditional birth attendants to improve delivery care at the community

level. This approach was not successful and was shifted to prioritising health sector interventions designed to increase women's access to professional health care, especially for life-threatening complications. Other factors (lack of education for girls; early marriage; lack of access to contraception; poor nutrition and women's low social, economic, and legal status) were identified as contributing to poor maternal health and attempts to address them were recognised as being very expensive. Nevertheless, agencies have worked together to articulate strategic priorities and advocacy messages.[28]

Despite the weaknesses and the perception that the initiative did not achieve its goal for various reasons, it has led to a better understanding of effective strategies to reduce maternal mortality and of the benefits to health systems, to families, and to communities of investing in maternal health. [28]

New opportunities such as the MDGs, the Partnership for Maternal, Newborn and Child Health have arisen to take on the goal of reducing maternal mortality and integrate it with the closely linked issues of newborn and child mortality in a continuum of care.[28] Despite heightened awareness and effort by governments and international agencies to address this issue, maternal mortality ratios in the developing world have fallen only slightly. Analysis of the trends in maternal mortality show that maternal deaths need to decline by 5.5% per annum between 1990 and 2015 to achieve MDG- 5. The decline has been less than 1% per annum between 1990 and 2005. For large parts of the world there is little prospect of these MDGs being reached by 2015. [9, 28, 29]

However, experiences from some countries in the developing world like India, Sri Lanka and Malaysia,show that remarkable achievements can be made in low income countries. India has managed, through different interventions, to decrease its maternal mortality ratio by 24% from 1997-98 to 2001-03. Maternal mortality in Malaysia fell from 534 per 100,000 live births in 1949 to 18 per 100,000 live births in 1991 while in Sri Lanka, maternal mortality fell from 1056 per 100,000 live births in 1947 to 27 per 100,000 live births in 1992. Malaysia and Sri Lanka spent an average of 1.6% of their GDP on health in the early decades, about one quarter devoted to maternal and child health. Poor people received maternal and newborn care free of charge. The critical elements of maternal health care used in both countries, although applied with different tactics, were to remove barriers to

access and to improve utilisation of available facilities. These elements were rooted in key foundations which included the professionalisation of midwifery, monitoring of birth and maternal deaths, high profile advocacy and replication of critical elements of local success.[30]

In conclusion, it has been shown that the choice of place of delivery is consistently associated with maternal and neonatal outcomes. Childbirth in a health facility attended to by trained health professional is associated with lower rates of maternal and neonatal mortality and morbidity than home deliveries.[11] Access to safe antenatal, delivery and postnatal care for the woman and the newborn is therefore crucial in reducing maternal and child deaths, recognising that neonatal deaths account for 38% of all death in children younger than age 5 years.[31]

2. BACKGROUND TO THE STUDY

2.1 Rwanda - profile and health system

Rwanda is small country situated in central Africa immediately south of the equator. In 2002, the population was of just over 8 million, with a high population density of 321 inhabitants per square kilometre.[32, 33] Since the eighties, the government of Rwanda has been implementing primary health care as a key strategy for improving the health of the population. In the nineties, the Ministry of Health made reforms according to the Lusaka Declaration and aimed to provide quality health services that were acceptable and accessible to the majority of people, with their participation.

The health system policy is based upon three strategies: the decentralisation of the health system, using the health district as basic operational unit of the system, the development of the primary health care system through its core components and the reinforcement of community participation in the management and financing of services. Priority interventions have been established by the Rwandan Ministry of Health - among them, to reduce maternal and child mortality and morbidity and to improve geographical accessibility of health services.[32, 34]

2.2 Maternal and child health indicators in Rwanda

Rwandan maternal and child health indicators are among the worst in Africa. In 2005 the:

- Maternal mortality ratio was 750 deaths per 100, 000 births
- Neonatal mortality rate was 37 deaths per 1000 live births
- Infant mortality rate was 86 deaths per 1000 live births
- Perinatal mortality rate was 44 per 1000 stillbirth and live births.[32,35]

Although these figures are high, significant progress has been made recently, with the country's reconstruction, following the aftermath of the destruction of the health infrastructure by the 1994 genocide and war.

2.3 Delivery services and utilisation in Rwanda

Maternal health services, not only face the challenges of insufficiency, but also of poor utilisation of the available services by pregnant women. In 2005, the Rwanda Demographic Health Survey III (DHS III) showed that 90% of Rwandan pregnant women attended antenatal care (range: 1-4 visits) but the majority (70%) delivered outside of health care facilities; mostly at home without the assistance of a skilled birth attendant (44%) or without any help at all (17%). Despite the good ANC attendance, the number of visits is still substandard; more than two-thirds (68%) of the women had 2-3 ANC visits, even though WHO, as well as the Rwandan Ministry of Health recommend four standard ANC visits. Furthermore, the first ANC tended to occur late in pregnancy (median of 6.4 months). The survey also found that 96% of women delivering out of health care facilities did not receive a postnatal (maternal or infant) check within 48 hours after birth. There has been no change in these statistics since the DHS 2000.[32]

This study attempts to identify the reasons why Rwandan women who mostly attend antenatal clinics (although sub-optimally) fail to deliver in health facilities. No such study had previously been done in Rwanda.

2.4 The Rwanda Demographic Heath Survey (DHS)

The Rwanda Demographic Health Survey III (RDHS III) is the third such survey, following surveys conducted in 1992 and 2000. Ordered by the Rwandan Ministry of Finances and Economic Planning, it was conducted by the National Institute of Statistics of Rwanda from February to July 2005, with the technical assistance of ORC Macro, an American company that supervises the international Demographic and Health Surveys programme through the MEASURE DHS project. Financial support for the survey was provided by the United States Agency for International Development, the United Nations Population Fund, the United Nations Children's Fund, the "Commission Nationale de Lutte contre le SIDA" through the World Bank's multi-country AIDS Program, the British Department for International Development (DFID), and the German Technical Cooperation (GTZ). It was conducted on a representative sample of women between the ages of 15 and 49 and men between the ages of 15 and 59. The data was collected using three questionnaires: household, women and men questionnaires.

The Women's Questionnaire was used to collect information on women of reproductive age (15-49 years) and covered a wide variety of topics, including:

- Background characteristics
- Reproductive history
- Knowledge and use of contraceptive methods
- Fertility preferences
- Antenatal, childbirth, and postpartum care
- Breastfeeding and child feeding practices
- Vaccinations and childhood illnesses
- Marriage and sexual activity
- Women's work and husband's background characteristics
- AIDS and other sexually transmitted infections
- Adult mortality
- Domestic violence

The Men's Questionnaire was administered to men age 15-59 years living in every second household of the RDHS-III sample. The Men's Questionnaire collected information similar to that of the Women's Questionnaire, but was shorter because it did not contain questions on reproductive history, maternal and child health, or nutrition.

The sample design is described in the materials and method section of this dissertation. Persons recruited to be interviewers were trained for four weeks followed by three days of practical exercises in areas not selected for the main survey.

Data collection started on 28 February 2005 and was completed on 13 July 2005. Data entry was done on personal computers by a team of data processing personnel recruited and trained for this task. Completed questionnaires were periodically brought in from the field to the National Institute of Statistics in Kigali, where assigned agents checked them and coded the open-ended questions. Next, the questionnaires were sent to the data entry facility and the blood samples were sent to the National Reference Laboratory to be screened for HIV. Data were entered using CSPro, a program developed jointly by the United States Census Bureau, the ORC Macro MEASURE *DHS*+ program, and Serpro S.A.

All questionnaires were entered twice to eliminate as many data entry errors as possible. In addition, a quality control program was used to detect some of the main data collection errors for each team. This information was shared with field teams during supervisory visits to improve data quality. The data entry and internal consistency verification phase of the survey was completed in October 2005.

3. MATERIALS and METHOD

3.1 Aim

The aim of this study was to determine the factors related to the utilisation of delivery services by pregnant woman in Rwanda.

3.2 Objectives:

Using RDHS III data, determine the utilisation of delivery services by pregnant women related to:

- Individual and demographic factors
- Socioeconomic factors
- Health services factors.

3.3 Design:

This was a secondary data analysis of the third Rwanda Demographic Health Survey (RDHS III) conducted in 2005. The RDHS III was a cross sectional survey which selected a nationally representative sample of 10 272 households.[32]

The survey used a two-stage stratified cluster design with primary sampling units based on the list of enumeration areas covered in the 2002 General Population and Housing Census (RGPH); 462 clusters (351 rural and 111 urban) were then selected with a representative probability proportional to size. The second stage involved selecting a sample of households in these enumeration areas. In order to adequately guarantee the accuracy of the indicators, it was necessary to control the total size of households drawn by setting the number of households to be surveyed at 20 in urban clusters and 24 in rural clusters. Because of the non-proportional distribution of the sample among different strata and the fact that the number of households was set for each cluster, weighting was used to ensure the validity of the sample at both national and regional levels. More detail of the survey methods and strategy can be obtained in the RDHS III at www.moh.gov.rw/publication.html.[32]

Participants:

In the primary study, 11 539 women aged 15-49 years were identified as being eligible for the individual interview. Interviews were completed with 11 321 (98%) of these women. For the present study, all women in the age group of 15-49 years who had at least one live birth in the five years prior to the survey were identified. A total of 5235 women fulfilled the study eligibility criteria and were included in the analysis.

3.4 Data collection

In the primary survey, data was collected using three questionnaires: a household, woman and man questionnaire. For this study, only selected data collected using the woman's questionnaire was used.

3.5 Variable definition

Urban and rural

Urban or rural areas are usually defined in relation to the population density. Urban population consists of population that lives in town or cities. During the third Census of Rwanda, an urban population was that which was resident within the limits of the urban administrative units recognised as such by law. There are fifteen towns in Rwanda.[33] In the primary survey, these fifteen towns were classified as urban and the rest of the country was considered as rural. This study maintained the use of this classification.

Wealth index

The wealth index was developed on the basis of household owning durable goods such as a television, radio or car and certain housing characteristics such as access to electricity, source of drinking water, type of toilet facilities, type of flooring material, number of rooms used for sleeping and type of cooking fuel. The households were then classified into five wealth quintiles: highest, second, middle, fourth and lowest quintile. The classification was based on a scoring system developed by the primary study which gave a score to each durable item. These scores were added together to obtain a total for each household. The households

were classified in increasing order of total score and divided into 5 equal categories or quintiles.

3.6 Ethics

Permission was obtained from the National Institute of Statistics of Rwanda to perform the secondary data analysis. Ethical clearance to undertake the secondary data analysis was obtained from the Committee for Research in Human Subjects (Medical) of the University of Witwatersrand – clearance number M071023.

3.7 Statistical analysis

3.7.1 Data re-coding

I was provided with a dataset in SPSS format by the National Institute of Statistics including the woman, household and man questionnaires. As indicated earlier, I elected to only use the woman questionnaire. SPSS Version 15.0 (SPSS Inc, Chicago, USA) was used for selection of relevant variables, recoding and renaming of variables. I recoded the variables to meet the desired classification - for example, in the primary survey, the variable "Number of ANC visits" was recorded as 1, 2, 3, 4, 5 until 12 which was the last number whereas in this study, I classified the same variable as 0, 1, 2, 3 and 4 plus to meet the WHO and national recommendations of 4 standard ANC visits during pregnancy.

3.7.2 Analysis

SPSS 15.0 was used for the calculation of percentages and for the determination of associations in the bivariate analyses, as well as for the multivariate analysis. Epi Info 3.2.2 (Centers for Disease Control, Atlanta, USA) was used to calculate crude odds ratio. The significance level was set at $p<0.05$.

Dependent variables

Place of delivery

Place of delivery was classified into two categories:

- Delivery in a health care facility (public or private),
- Delivery at home (including all women who delivered out of health care facilities: at home, on the road, in neighbour's house, etc.)

Postnatal check up of the mother

Only 118 out of the 3662 women who delivered at home (3.2%) came for a postnatal check up of the mother and the baby by skilled personnel within 48 hours. Of the 1573 women who delivered in a health facility, no one came for routine postnatal check up. Owing to the very small number of women who came for postnatal check up, the analysis brought out non-interpretable results; for this reason, this aspect of the study was omitted from this report.

Independent variables

For this study, independent variables of interest were classified into three categories:

-Individual and demographic factors: maternal age, residence (urban or rural), marital status, parity.

-Socioeconomic factors: maternal education, husband/partner education, occupation; living conditions of the household (evaluated using the wealth index), health insurance.

-Health care related characteristics: antenatal characteristics (gestational age at first visit,, number of ANC visits, cost of ANC visit and related medication, , place of ANC, informed about pregnancy complication during ANC and where to go in case of complications) , wanted pregnancy at the time of conception, previous stillbirth, previous HIV test and received HIV results.

Bivariate analyses

Bivariate analyses were performed to examine the association between the selected independent variables and the place of delivery using crude odds ratios.

Multivariate analyses

The primary dependant variable (place of delivery) being categorical, I used logistic regression to estimate the log odds of pregnant women delivering at home. Significant individual, demographic, socioeconomic and health facilities related factors in the bivariate analysis (at a significance level of $p<0.05$) were entered into multivariate analyses to check for association while adjusting for others.

4. RESULTS

4.1 Study Population profile

4.1.1 Demographic profile

There were 11539 participants in the Rwanda DHS 2005. A total of 5235 participants (46.2%) fulfilled the study eligibility criteria and were included in the analysis. The median age of the women was 30.0 (Interquartile range (IQR =25-36)). The majority (81.0%) of women lived in rural areas while the remaining 19% lived in urban areas. Most (82.3%) of the women were involved in a permanent relationship (married or living together) and the median parity was 4.0 (IQR=2-6). Table 4.1 represents a summary of the demographic profile of the study cohort.

4.1.2 Socioeconomic profile

The majority (90.9%) of the 5235 women had no, or only a primary level, education. Similarly 87.8% of the 4882 partners had no, or only a primary level, education. The education level of the women corresponded to those of their partners (correlated positively) and this was statistically significant (Pearson correlation = 0.38, p=0.01). Most (71.7%) of the women categorised themselves as farmers (table 4.2).

4.1.3 Antenatal visits and place of delivery

Of 5225 women considered, 94.4% attended antenatal care. Most sought antenatal care in the second trimester (2855/4923 [58.0%]) or in the third trimester (1657/4923 [33.7%]) while only 411/4923 (8.3%) attended antenatal care in the first trimester of the pregnancy. More women (3662 [70%]) delivered at home than in health facilities (1573 [30%]).

Table 4.1: Demographic profile of the study cohort

	Number	%
Age group (years)		
15-19	82	1.6
20-24	1008	19.2
25-29	1317	25.2
30-34	1129	21.5
35-39	832	15.9
40-44	623	11.9
45-49	244	4.7
Total	5235	100.0
Residence		
Urban	997	19.0
Rural	4238	81.0
Total	5235	100.0
Marital status		
Single	270	5.2
Married/living together	4310	82.3
Widowed	129	2.5
Divorced/not living together	526	10.0
Total	5235	100.0
Parity		
1	848	16.2
2-3	1634	31.2
4-5	1313	25.1
6+	1440	27.5
Total	5235	100.0

Table 4.2: Socioeconomic profile of the study cohort

	Number	%
Education		
No Education	1476	28.2
Primary	3282	62.7
Secondary and Higher (tertiary)	477	9.1
Total	5235	100.0
Partner Education		
No Education	1374	28.1
Primary	2913	59.7
Secondary and Higher (Tertiary)	595	12.2
Total	4882	100.0
Occupation		
Unemployed	995	19.1
Professional/Technical/management	104	2.0
Clerical/sales	251	4.8
Farmer	3745	71.7
Manual worker	128	2.5
Total	5223	100.0
Wealth index		
Poorest	1098	21.0
Poorer	1055	20.2
Middle	1008	19.3
Richer	1057	20.2
Richest	1017	19.4
Total	5235	100.0
Type of Health insurance		
Rama[1]	106	2.0
Mutuelle[2]	2203	42.1
None	2922	55.9
Total	5231	100.0

[1] Rama: La Rwandaise d'assurance maladie [2] Mutuelle: Mutuelle de santé

4.1.4 Variables with effect modifier

Residence and education

Rural women were less educated than their urban counterpart; 87.3% of rural women were uneducated compared to 12.7 % of urban women (p=0.01)

Residence and socioeconomic status

Urban women were better placed on the wealth index: 73.2% of urban women were classified within the richer and richest categories while only 32.1% of rural women were classified within these categories (p=0.01)

Parity and education

The overwhelming majority of women (95%) with a parity 6 and higher were uneducated or had a primary education. Almost 60% of women with secondary or higher education had parity less than 3.

Education and socioeconomic status

Two thirds of women (67%) in the richest category were uneducated or had a primary education, compared to 97.3% in the poorest category (p=0.01)

4.2 Bivariate Analyses

4.2.1 Individual and demographic factors

Maternal age

The percentage of women delivering in health care facilities decreased with age from 47.6% at 15-19 years to 22.3% at 45-49 years. Older women were more likely to deliver at home, with the odds increasing with increasing age (at 45-49 years, OR=3.61, CI: 2.11-6.16, p < 0.01) (table 4.3).

Residence

Just over half (52.5%) of urban women delivered in health facilities compared to a quarter (24.8%) of rural women. Rural women were significantly more likely to deliver at home than their urban counterparts (OR=3.35, CI: 2.91-3.86, p <0.01)

Marital status

Single women were almost three times more likely to deliver at a health facility than married women (OR=2.59, CI: 1.97-3.24, P < 0.01). While just over half (51.5%) of single women used health facilities for delivery, most (>70%) married women and women living in a permanent relationship did not use health facilities for their delivery.

Parity

Women with higher parity were more likely to deliver at home (Parity 2 and 3, OR = 2.93, CI: 2.46-3.47, p<0.001) with the odds of delivering at home increasing as the parity increased.

Table 4.3: Place of delivery related to individual and demographic characteristics of women

	Total	Home delivery		Health facility delivery		Unadjusted odds ratio	95% confidence interval
	N	n	%	n	%		
Age group (years)							
15-19	*82*	*43*	*52.4*	*39*	*47.6*	*1.00*	
20-24	1008	615	61.0	393	39.0	1.42	0.90-2.23
25-29	1317	894	67.9	423	32.1	1.92**	1.22-3.00
30-34	1129	798	70.7	331	29.3	2.19**	1.39-3.44
35-39	832	633	76.1	199	23.9	2.89**	1.82-4.58
40-44	623	484	77.7	139	22.3	3.16**	1.97-5.07
45-49	244	195	79.9	49	20.1	3.61**	2.11-6.16
Total	5235	3662	70.0	1573	30.0		
Residence							
Urban	*997*	*474*	*47.5*	*523*	*52*	*1.00*	
Rural	4238	3188	75.2	1050	24.8	3.35**	2.91 - 3.86
Total	5235	3662	70.0	1573	30.0		
Marital status							
Single	*270*	*131*	*48.5*	*139*	*51.5*	*1.00*	
Married/living together	4310	3036	70.4	1274	29.6	2.53**	1.97-3.24
Divorced/not living together	526	396	75.3	130	24.7	3.23**	2.37-4.41
Widowed	129	99	76.7	30	23.3	3.50**	2.18-5.62
Total	5235	3662	70.0	1573	30.0		
Parity							
1	*848*	*380*	*44.8*	*468*	*55.2*	*1.00*	
2-3	1634	1150	70.4	484	29.6	2.93**	2.46-3.47
4-5	1313	975	74.3	338	25.7	3.55**	2.96-4.27
6+	1440	1157	80.3	283	19.7	5.03**	4.17-6.07
Total	5235	3662	70.0	1573	30.0		

**= Significant at 99% *= Significant at 95%

Reference categories are the first italicised categories

4.2.2 Socio-economic factors

Woman and partner education

As expected higher percentages of women delivering at health facilities were found among educated women and in those with educated partners (table 4.4).

Profession

Farmers and manual workers were more likely to deliver at home than women working in professional, technical and management areas as well as those in clerical or sales domains. (Farmers OR= 2.98, CI: 1.64-5.42)

Wealth index

Women classified as belonging to the poorer and poorest categories were more likely to deliver at home. (Poorer: OR=7.68, CI: 6.28-9.39) compared to their richer and richest counterparts. Within the richer and richest households, 445/828 women (53.7 %) were uneducated. There was a highly statistically significant difference between the usage of delivery services by the rich uneducated women and the rich educated women (Pearson χ^2 (1) =199.67 P<0.0001). Given the same socioeconomic level, education is important in changing people's attitudes towards the use of health facilities for delivery.

Type of health insurance

Women affiliated to Rama health insurance were 1.6 times less likely to deliver at home compared to those without any health insurance.

Table 4.4: Place of delivery related to socioeconomic factors

	Total	Home delivery		Health facility delivery		Odds ratio	95% Confidence interval
	n	n	%	n	%		
Women's Education							
Secondary/Higher	*477*	*155*	*32.4*	*332*	*69.6*	*1.00*	
Primary	3282	2326	70.9	956	29.1	5.57**	4.52-6.87
No education	1476	1191	80.7	285	19.3	9.57**	7.57-12.09
Total	5235	3662	70.0	1573	30.0		
Partner Education							
Secondary/Higher	*595*	*254*	*42.7*	*341*	*57.3*	*1.00*	
Primary	2913	2107	72.3	806	27.7	3.51**	2.93-4.21
No education	1374	1116	81.2	258	18.8	5.81**	4.70-7.17
Total	4882	3477	71.1	1405	28.9		
Occupation							
Professional/Technical/ Managerial	*104*	*19*	*18.3*	*85*	*81.7*	*1.00*	
Clerical/sales	251	95	37.8	156	62.2	1.34	0.70-2.55
unemployed	995	570	57.3	425	42.7	1.71	0.93-3.12
Manual worker	128	68	53.1	60	46.9	2.20*	1.05-4.60
Farmer	3745	2901	77.5	844	22.5	2.98**	1.64-5.42
Total	5223	3653	69.9	1570	30.1		
Wealth index							
Richest	*1017*	*390*	*38.3*	*627*	*61.7*	*1.00*	
Richer	1057	751	71.1	306	28.9	3.95**	3.28-4.74
Middle	1008	783	77.7	225	22.3	5.59**	4.60-6.80
Poorer	1055	830	78.7	225	21.3	5.93**	4.88-7.20
Poorest	1098	908	82.7	190	17.3	7.68**	6.28-9.39
Total	5235	390	38.3	627	61.7		

	Total	Home delivery		Health facility delivery		Odds ratio	95% Confidence interval
	n	n	%	n	%		
Type of Health Insurance							
Rama[1]	*106*	*19*	*17.9*	*87*	*82.1*	*1.00*	
Mutuelle[2]	2203	1476	67.0	727	33.0	1.58	0.63-3.96
None	2922	2163	74.0	759	26.0	1.60	0.64-4.00
Total	5231	3658	69.9	1573	30.1		

[1] Rama: La Rwandaise d'assurance maladie [2] Mutuelle: Mutuelle de santé

**= Significant at 99%; * = Significant at 95%

Reference categories are the first italicised categories

4.2.3 Health care related factors

Time of first ANC visit and number of ANC visits

Women who started ANC in the first trimester were less likely to deliver at home; they were also more likely to have an adequate number of visits as per WHO recommendations (at least 4 ANC visits).

Cost of ANC

Despite ANC being available at no cost for most women, this did not provide an incentive for them to use health facilities for the delivery; 70% of women who did not need to pay for ANC delivered at home.(OR=18.85; CI: 2.36-150.86, p<0.01)

HIV test during ANC.

Women who had HIV test during ANC were less likely to deliver at home (53.3%) compared to those who didn't (74.8%) (OR=2.60, CI: 2.24-3.02, p<0.01)

HIV test during ANC and received results

Women who had HIV test during ANC and received their results were less likely to deliver at home compared to those who did not receive them (OR=2.26; CI: 1.32-3.86 p< 0.01) irrespective of the results being positive or negative.

Informed about pregnancy complications and where to go for complications

A higher percentage of women (45.8% vs. 30.2%) who were counselled about pregnancy complications during ANC delivered at a health institution.

Time wanted pregnancy

Whether the pregnancy was planned did not influence women's choice of place of delivery. (OR=1.17, CI: 0.95-1.44)

Previous miscarriage

The fact that the woman had previously had a terminated pregnancy was not associated with delivery at a health facility: 72.2% of women who had a previous miscarriage delivered at home. (OR=1.01, CI: 0.70-1.45)

Place of ANC

Women who received ANC in a public health facility (as opposed to a private facility) were 3 times more likely to deliver at home. (OR=3.23, CI: 1.33-7.85)

Table 4.5: Place of delivery by health care related factors

	Total	Home delivery		Health facility delivery		Odds ratio	95% Confidence interval
	N	n	%	n	%		
Time 1st antenatal visit							
1st trimester	*411*	*190*	*46.2*	*221*	*53.8*	*1.00*	
2nd trimester	2855	1912	67.0	943	33.0	2.36**	1.91-2.91
3rd trimester	1657	1292	78.0	365	22.0	4.12**	3.28-5.16
Total	4923	3394	68.9	1529	31.1		
Number ANC visits							
≥4	*681*	*336*	*49.3*	*345*	*50.7*	*1.00*	
3	1964	1288	65.6	676	34.4	1.96**	1.63-2.34
2	1615	1230	76.2	385	23.8	3.28**	2.70-3.98
1	672	545	81.1	127	18.9	4.41**	3.42-5.67
0	292	261	89.4	31	10.6	8.64**	5.69-13.19
Total	5224	3662	70.0	1573	30.0		
Cost ANC (money spent on ANC)							
>1000 Frw	*9*	*1*	*11.1*	*8*	*88.9*	*1.00*	
≤ 1000 Frw	57	32	56.1	25	43.9	10.24*	1.20-87.35
No cost	5169	3629	70.2	1540	29.8	18.85**	2.36-150.86
Total	5235	3662	70.0	1573	30.0		
HIV test during pregnancy							
Yes	*1085*	*578*	*53.3*	*507*	*46.7*	*1.00*	
No	2531	1892	74.8	639	25.2	2.60**	2.24-3.02
Total	3616	2470	68.3	1146	31.7		
Received HIV results							
Yes	*950*	*494*	*52.0*	*456*	*48.0*	*1.00*	
No	69	49	71.0	20	29.0	2.26**	1.32-3.86
Total	1019	543	53.3	476	46.7		

	Total	Home delivery		Health facility delivery		Odds ratio	95% Confidence interval
	N	n	%	n	%		
Counselled about pregnancy complications							
Yes	*308*	*167*	*54.2*	*141*	*45.8*	*1.00*	
No	4629	3229	69.8	1400	30.2	1.94**	1.47-2.55
Total	4937	3396	68.8	1541	31.2		
Informed where to go for pregnancy complications							
Yes	*283*	*151*	*53.4*	*132*	*46.6*	*1.00*	
No	23	16	69.6	7	30.4	2.00	0.80-5.01
Total	306	167	54.6	139	45.4		
Time wanted pregnancy							
At time fell pregnant	*2922*	*2013*	*68.9*	*909*	*31.1*	*1.00*	
Later	1239	903	72.9	336	27.1	1.05	0.88-1.25
Wanted no more pregnancy	1073	746	69.5	327	30.5	1.17	0.95-1.44
Total	5234	3662	70.0	1572	30.0		
Ever had a miscarriage							
Yes	*928*	*670*	*72.2*	*258*	*27.8*	*1.00*	
No	4306	2991	69.5	1315	30.5	1.01	0.70-1.45
Total	5234	3661	69.9	1573	30.1		
Place ANC received							
Private facility	*149*	*81*	*54.4*	*68*	*45.6*	*1.00*	
Government facility	4794	3320	69.3	1474	30.7	3.23**	1.33-7.85
Total	4943	3401	68.8	1542	31.2		

**= Significant at 99%; * = Significant at 95% Frw= Rwandan francs

Reference categories are the first italicised categories

4.3 Multivariate analysis

Associations found to be significant in the bivariate analysis at a p-value <0.05 were included in the multivariate analysis to determine which factors best explained or predicted the non-use of a health facility for delivery.

Included variables were age, place of residence, marital status, parity, the woman's education level, partner education, the occupation of the woman, the wealth index of the household, the time of the first ANC visit, the number of ANC visits, whether the woman was tested for HIV during pregnancy and whether she received her results, the cost of ANC, whether the woman was counselled about pregnancy complications during ANC and the place of ANC.

Place of residence, parity, wealth index, the woman's education, the number of ANC visits and whether the woman was counselled about pregnancy complications during antenatal care were the most predictive factors of the place of delivery. After controlling for other factors, age, marital status, partner's education, the occupation of the woman, the time of the first ANC visit, an HIV test during pregnancy and HIV results given, the cost of ANC and the place of ANC were not found to be significant and were excluded in the subsequent steps of analysis.

Table 4.6 shows the variables included in the last step of the multivariate analysis.

Place of residence

Women living in urban areas were less likely to deliver at home (OR=1.86, 1.55-2.23) compared to those living in rural areas.

Parity

Parity was the strongest predictor of place of delivery with women with 6 or more children about 5 times more likely to deliver at home than a primiparous woman (OR= 5.01, CI: 4.11-6.31).

Education

As expected the higher the education level the less the likelihood of a home delivery. Women with no education were almost 4 times more likely to deliver at home (OR=3.61, CI: 2.73-4.76)

Wealth index

The socioeconomic status of the household was a strong predictor of the woman's decision to deliver at a health facility, with the probability of the poor delivering at home being much higher than the wealthier (OR=4.37 , CI: 3.43-5.56)

Number of ANC visits

The odds of not delivering at home for women who attended ANC and met the goal of 4 standard visits were higher than those who attended only once (OR=3.63, CI: 2.76-4.76). It should be noted that the class of no antenatal care was automatically eliminated from the multivariate coding probably because as the analysis ran, it excluded classes which did not have data for all the variables.

Counselling about pregnancy complications

Women who were not counselled about pregnancy complications during antenatal care were twice more likely to deliver at home (OR: 1.83, CI: 1.40-2.40)

Table 4.6: Multivariate analysis of the predictors of a home delivery in Rwanda

Variable	Odds ratio per unit Exp(B)	95% confidence limit		p value	Significance
		Min	Max		
Residence					
Urban	*1.00*				
Rural	1.86	1.55	2.23	0.00	**
Parity					
1	*1.00*				
2-3	3.44	2.83	4.19	0.00	**
4-5	4.08	3.31	5.03	0.00	**
6+	5.01	4.11	6.31	0.00	**
Woman's Education					
Secondary/Higher	*1.00*				
Primary	2.74	2.14	3.52	0.00	**
No education	3.61	2.73	4.76	0.00	**
Wealth index					
Richest	*1.00*				
Richer	2.56	2.07	3.17	0.00	**
Middle	3.54	2.82	4.44	0.00	**
Poorer	3.56	2.83	4.48	0.00	**
Poorest	4.37	3.43	5.56	0.00	**
Number of ANC visits					
4+	*1.00*				
3	1.79	1.46	2.18	0.00	**
2	2.72	2.20	3.36	0.00	**
1	3.63	2.76	4.76	0.00	**
Pregnancy complications counselling					
Yes	*1.00*				
No	1.83	1.40	2.40	0.00	**

*p<0.05 **p<0.01

5. DISCUSSION

This study investigated individual, demographic, socioeconomic and health services related factors that were associated with the place of delivery. Parity, women's educational level, their wealth index status and the number of ANC visits were most predictive of where the delivery occurred.

5.1 Parity

Primiparous women were significantly more likely to use health services for delivery than multiparous women. Women who are pregnant with their first child are more likely to experience difficulties during labour and delivery. Fear of a complication or lack of confidence in the face of problems may motivate women to use health services for delivery.[1,16] Women of higher parity believe themselves to be more experienced in pregnancy and childbirth and hence are less likely to deliver at hospitals. Lower services utilisation among women of higher parity could also be due to the time and resource constraints faced by those with larger families.[15, 16] It could also be ascribed to the fact that women with higher parity had less education than those with lower parity; about 57% of women within the class of secondary or higher education level had parity less than three.

Stanton et al in a study using data from several developing countries found that women of higher parity women were more likely to receive assistance from unskilled birth attendants.[8] In four out of six countries examined by Stephenson et al, women of higher parity were less likely to have delivered their last child in a health facility.[11] Parity was also an important factor for the use of health facilities for delivery in Ethiopia,[16] south-eastern Nigeria,[17] and Turkey,[2] with women of higher parity less likely to use health facilities for delivery.

In contrast, Letamo et al in Botswana found that low parity women were more likely to have a non- facility delivery.[1] These low parity women were mainly teenage mothers. However, the study failed to report the proportion of teenagers compared to other age groups.

5.2 Place of residence

Place of residence is important in influencing a woman's decision to deliver at a hospital. Urban women were more likely to use the service than rural women. This may be explained by the fact that health facilities are more accessible in urban areas, which also allows urban women greater access to information and knowledge from health promotion programmes. Urban women were better educated and well placed on the wealth index; almost three-quarters of urban women were classified within richer and richest categories while less than a third of rural women were classified similarly. This is consistent with studies done in Botswana, Turkey and in Ethiopia among others.[1, 2, 16]

5.3 Women's education

In this study, women's education was an important predictive factor for usage of delivery services. Education is a key determinant of health facility utilisation for delivery, frequently because education increases the woman's autonomy, understanding and decision making power within the household.[36] It is also likely that educated women will tend to seek out higher quality services. An important finding was that even for wealthier women, education made a significant difference in determining where the woman would deliver. Educated women were significantly more likely to deliver at a health facility.

In the literature, there is strong consistency in the relationship between maternal education and utilisation of health services, including delivery services. A Tanzanian study reported that educated women were more likely to make a wise decision regarding their own health than their less educated counterparts; thus they were more likely to use skilled birth attendants for delivery.[7] In four out of six countries examined by Stephenson et al, women with secondary or higher education were more likely to have delivered their last child in a health facility.[11] Female education was found by both Chakraborty et al and Navaneetham et al in India,[14, 15] as well as researchers in Ethiopia,[16] and Turkey,[2] to be a strong determinant of maternal health services utilisation with uneducated women less likely to use maternal health care services for delivery. Stekelenburg et al in Zambia found that educated women were more likely to deliver in a clinic, however maternal mortality was still high in the district because of poorly equipped and staffed clinics.[37] In

south-eastern Nigeria women with higher educational level were more likely to have an health facility -based delivery.[17] In a retrospective community survey in Uganda, less educated women were less likely to access good quality delivery care.[38] Beegle et al, in Indonesia stressed the importance of partner education in especially influencing the number of ANC visits but this was less significant than the woman education in other component of health service utilisation.[39]

5.4 Wealth Index

In this study, wealth index was one of the most predictive factors of service utilisation. Greater household wealth provides resources and may enable women to seek care and the ability to buy health. The costs of seeking care may act as a significant barrier to women from poorer households. The positive association between wealth index and place of delivery has been reported in several studies.

Say et al, in a study using electronically compiled data from 30 studies in 23 developing countries, found that wealthier women preferred to deliver in health facility settings in some of the studies examined while in others economic status did not affect such practice.[19] In Botswana, women of low socioeconomic status were more likely to have a non- health facility delivery.[1] Stanton et al, using data from several developing countries, found that women from wealthy households were more likely to receive assistance from skilled birth attendants.[8]

Stephenson et al compiled data from demographic health surveys in six African countries examining community level influences on delivery of a child in a health facility. He found that in five out of the six countries there was a relationship between the household amenity index and delivery in a health facility.[11] Similar findings were reported in India where women from families with good economic conditions were more likely to seek maternal care from qualified health care providers.[14] The living standard of the household was a predictor of health facility delivery in 3 of the 4 states studied in southern India, with women from wealthier families more likely to have an health facility delivery.[15] Tann et al, in a retrospective community survey in Entebbe, Uganda, found that poor women were less likely to access good quality delivery care.[38]

5.5 Number of ANC visits

The health impact of antenatal care is, among other factors, dependent on how often women receive antenatal care, and at what point during pregnancy women commence obtaining antenatal care. In this study, women who had four or more ANC visits per pregnancy were significantly less likely to deliver at home. This may be due to the fact that during ANC, especially if started early, women are provided with health education and information about the benefits of having a skilled birth attendant for childbirth.

This finding corroborates the WHO as well as the Rwandan Ministry of Health's recommendation that every pregnant woman should have at least 4 standard ANC visits per pregnancy.

The findings are consistent with Mpembeni et al's findings in Tanzania where women who had four or more ANC visits were more likely to deliver with skilled birth attendance.[7] Yanagisawa et al in Cambodia found that antenatal care was a positive determinant of facility delivery only for women who attended the service four times or more.[26]

5.6 Counselling about pregnancy complications

Although this study did not specifically examine the content or quality of ANC in influencing delivery in health facilities, the finding that women informed about pregnancy complications during ANC visits were more likely to deliver in health facilities suggests that the quality of ANC may influence delivery patterns. In Tanzania, women informed about danger signs during antenatal care were more likely to deliver at a health facility.[7]

5.7 Non significant associations in the multivariate analysis

Age, partner education and health insurance

Although all of these variables significantly influenced the place of delivery in the bivariate analysis, none were significant in the multivariate analysis. With regard to the ownership of health insurance, the ownership of a "mutuelle de santé" (cheaper medical insurance for the non-working population, or those working in low-paid jobs, that covers maternity cost) did not influence the woman's decision to deliver in

a health facility. This may possibly be explained by the fact that the survey covered the period from 2000 to 2004. It was only at the end of this period that the system of "mutuelle de santé" was being implemented. The next DHS may show significant trends on this matter.

Testing for HIV and receiving HIV results

Testing for HIV and receiving HIV results (whether negative or positive) during ANC visits was associated with the place of delivery but these variables were omitted in the final analysis to allow the multivariate analysis to run with a higher number of women included (4926 or 91.3% instead of 3601 or 66.8%).

5.8 Strengths and limitations of study

Strengths

-RDHS III provided reliable data from a nationally representative sample of households

- The sample included in this analysis is large and exceeds that of most studies that have evaluated the same issue

-Ninety eight percent (98%) of all eligible women completed the interview.

Limitations

- This analysis is vulnerable to all the limitations of any questionnaire based study, such as reporting and measurement bias. However, the RDHS uses a well established methodology that is used in many countries and subject to good quality assurance procedures

- Since this study is a secondary data analysis of the RDHS III it cannot provide additional information about many of the other recognised factors related to service utilisation such as cultural influences, psychosocial factors, the influence of family and friends**,** the quality of health services, the attitude of health care providers towards clients, and physical accessibility. Nevertheless, the information collected on the studied variables is valid, and important.

6. CONCLUSION

Maternal and child mortality remain high in Rwanda, despite the progress that has been made in the country in improving maternal and child health in the aftermath of the destruction of the health infrastructure by the 1994 genocide and war.

While many factors contribute to maternal and child health outcomes, the use of maternal health care services provided by well-trained and equipped health professionals is widely recognised as an important protective factor. However, in Rwanda, maternal health services utilisation, especially health facilities for delivery, remains unacceptably low.

This study identified a number of individual, demographic, socioeconomic and health services related factors that influence the use of health services for delivery. The most predictive factors were place of residence, parity, women's education, household wealth, the number of ANC visits and the fact that the woman has been counselled about pregnancy complications during the antenatal care visits. The findings are congruent with many other similar studies reported in Africa and other developing countries.

Recognition of these determinants now allows for more specific targeting of interventions and strategies to identified high-risk groups of women.

7. RECOMMENDATIONS

The findings of this study have important policy implications. The identification of factors that are significantly associated with a woman's decision to deliver a child in a health facility is a first step. This knowledge now needs to be converted into development of adequate interventions that aim to increase service use.

Parity

Parity was the strongest predictor of place of delivery. The strong role of parity points to the need for messages that target specifically higher parity women when establishing safe motherhood programmes. In the Rwandan context, the Ministry of Health in collaboration with the Ministry of Local Administration has put in place four community health workers in each village, among them one in charge of maternal and the neonatal health.

Based on the study findings, it would be appropriate for these community health workers to specifically target higher parity women. Training of these workers requires special attention on the needs of this group of women (e.g. home responsibilities), and how practically these could be overcome so that this group of women would be encouraged to have health facility based deliveries.

The Ministry of Health could also use media to disseminate consistent messages promoting the use of delivery services by all pregnant women and most particularly higher parity women.

Place of residence

Urban women were more likely to deliver in health facilities compared to rural women. Even though the availability and accessibility of health facilities was not formally examined in this study, low usage of delivery health services in rural areas raises the problem of inaccessibility and unavailability of maternal services in rural settings, where the majority (83%) of the Rwandan population live.[33]

More research in this area is needed. However, the Ministry of Health, in collaboration with its partners, should scale up its targets to have at least one health centre in each administrative sector. The Ministry should encourage citizen's

acquisition of membership to a local community transportation scheme for referrals to health facilities.

Education

Education has an impact on the woman's decision to deliver in a health facility, with women with no education or with primary level education respectively about 3.5 and 2.7 times more likely to deliver at home.

Improving education among girls, especially beyond primary school, needs to be strongly encouraged. The Ministry of Education of Rwanda may take the opportunity offered by the "9 years basic education program" introduced in the country and which will be effective from January 2010 to offer messages promoting girls' education as well as discouraging girls dropping out from school.

Media could again be used to promote female education, not only in poor families but also in wealthy families, based on the finding that wealthy uneducated women had more home deliveries compared to wealthy educated women.

Wealth index

In this study, household wealth has a very significant impact on the place of delivery with wealthier families more likely to use the health service. Increasing the economic situation of the population is a long term country objective and goes beyond the responsibility of the Ministry of Health. Nevertheless, the Ministry of Health could align its plan of actions to meet the objectives of the poverty reduction strategy and of the Rwandan vision 2020.

Number of ANC visits

Women who had the 4 recommended standard ANC visits were less likely to deliver at home. Early uptake of ANC visits leading to the completion of the 4 standard visits needs to be promoted. Again, community health workers may play an important role in promoting this.

The Ministry of Health should include in the community health worker package, messages for the promotion of early uptake of ANC visits, completion of 4 standard visits by pregnant women as well as have specific messages targeted to

high risk groups such as higher parity women, rural women, uneducated parents and poor households.

Information about pregnancy complications

Women who were informed about pregnancy complications during antenatal care were more likely to use health facilities for delivery. Community health workers may sensitise pregnant women about danger signs during pregnancy, delivery and postnatal periods but it is crucial to improve the quality of antenatal care in health facilities to ensure client satisfaction. Scaling up the implementation of initiatives such as focused antenatal care and emergency obstetric and neonatal care is likely to yield positive rewards. More research, nevertheless, is needed to evaluate the quality of antenatal care in Rwanda.

Postnatal check up

Only 4% of women, who delivered at home, came for a subsequent postnatal check up involving the mother as well as of the baby. Owing to the fact that the postnatal period carries a high risk of maternal and neonatal mortality, the Ministry of Health should make available clear guidelines regarding the value of routine postnatal care and put in place mechanisms for its use. These mechanisms need to be disseminated to health facilities and be known by the staff and by the pregnant women. Here again there is an opportunity to use community health workers to sensitise women to the benefits of postnatal services.

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9. Appendix

9.1 Appendix 1: WITS University Ethic's clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)
HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Umurungi
CLEARANCE CERTIFICATE
PROTOCOL NUMBER M071023
PROJECT
Determinants of the Utilisation ofDelivery Services by Pregnant Women in Rwanda
INVESTIGATORS
Dr YS Umurungi
DEPARTMENT
Paediatrics & Child Health
DATE CONSIDERED
07.10.26
DECISION OF THE COMMITTEE*
APPROVED UNCONDITIONALL Y
Unless otherwise specified this ethial clearance is valid for 5 years and may be renewed upon application.
07.10.30

CHAIRPERSON ~( )y",

(Prof essors PE Cleaton-Jones, A Dhai, M Vorster, C Feldman, A Woodiwiss)
*Guidelines for written 'informed consent' attached where applicable
. cc: Supervisor:
Prof H Saloojee

DECLARA nON OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** retumed to the Secretary at Room 10005, 10th Floor, Senate House, University.

IIW e fully understand the conditions under which 1 am/we are authorized to carry out the abovementioned research and l/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I1we undertake to resubmit the protocol to the Committee. **1 agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

9.2 Appendix 2: Authorisation from National Institute of Statistics of Rwanda(NISR)

REPUBLIC OF RWANDA

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Kigali,le .

N° .. :5~;.,s.l2007/10/INSR

NATIONAL INSTITUTE OF STATISTIC OF RWANDA BP. 6139 Kigali

To Dr Yvonne Umurungi

RE: Authorisation to use Rwanda DHS 2005

Dear Dr Yvonne Umurungi,

1 am glad to grant you the authorisation of using the Rwandan DHS 2005 for your research project. National Institute of Statistics always encourages Rwandan researchers to use available data and is happy to help them as much as possible.

We will give you access to the database with the possibility of using our statistician or you may use your our statistician, this is up to you.

1 wish you ail the best for your studies.

Regards

Dr. Ir. Louis MUNYAKAZI
Director General