College of Medicine and Health Sciences
School of Medicine

University Avenue P.O. Box 217 Butare, Huye – Rwanda
Tel: +250 252530475 Fax: +250 252530328

MMED Program

Department of Gynecology and Obstetrics

RISK FACTORS ASSOCCIATED WITH STILLBIRTHS AT KIBAGABAGA HOSPITAL, IN THE CITY OF KIGALI.

Presented in order to fulfill requirements

to obtain MMED degree in Gynecology and Obstetrics.

By: **Dr. David MWESIGYE**

SUPERVISOR: Dr.Stephen RULISA

JUNE, 2014

DECLARATION

I hereby declare to the best of my knowledge that the work presented in this dissertation has not been presented for any a ward in any institution and has never been published any where. I'm therefore presenting it for the award of Degree of Masters of Medicine in Gynecology and Obstetrics in the University of Rwanda.

……. Date…….

Dr David MWESIGYE

This dissertation has been submitted for examination with approval from the supervisor:

……. Date……..

Dr Stephen RULISA

Senior Lecturer,

Head of Academic Department of Obstetrics and Gynec

DEDICATION

To the almighty GOD, provider of intelligence and wisdom

This book is dedicated to My Father Rudonyoli John for his role in my education in varius capacities, My Late Mother Nyagati Rose and, my wife Mrs Abakunda Robinah and my Daughter Dushime Delight for their support and patience and understanding during the time I was unable to be with them.

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May the almight God reward all your effort and bless you.

Dr MWESIGYE David

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LIST OF ABBREVIATIONS

DH: District Hospital

MoH: Ministry of Health

UTHK: University Teachig Hospital of Kigali

CHUK: Centre Hospitalier University de Kigali

HC: Health Center

ANC: Antenatal Care

APH: Antepartum Heamorrhage

CCS: Case Control Study

C/S: Cesarean section

SB: Stillbirth

FSB: Fresh stillbirth

HIV: Human Immunodeficiency Virus

Kg(s): Kilograms

MSB: Marcerated stillbirth

NCHS: National Centre for Health Statistics

SVD: Spontaneous Vertex Delivery

TB: Tuberculosis

MUSA: Mutuel de la sante

USA: United States of America

RSSB: Rwanda Social Security Board.

TORCH: Toxoplasmosis, Rubeole, Cytomegary Virus and Herpes Virus

OPERATIONAL DEFINITIONS:

- In this study according to Kibagabaga's environment, Stillbirth is defined as the Delivery of a fetus weighing 1000g or completed gestation weeks 28 or more with no signs of life at or after birth.

- Fresh Stillbirth: is the Delivery of a fetus where intrauterine [fetal] death has occurred during labor/delivery or within the last 24hrs of delivery and the skin appears normal.

- Macerated stillbirth: is the Delivery of a fetus where intrauterine [fetal] death has occurred more than 24hrs before onset of labor/delivery and the fetus shows degenerative changes.

- Stillbirth rate: is the number of stillbirths per 1000 total births.

  $$\frac{\text{Stillbirths}}{\text{Total births}} \times 1000$$

- Total Birth is the total number of live births plus stillbirths.

- Perinatal mortality: is the death of a fetus weighing atleast 1000g [or after 28 completed weeks of gestation] plus death occurring during the first seven days of extrauterine life.

- Perinatal Mortality rate: is the number of perinatal death per 1000 total birth

  $$\frac{\text{Number of perinatal death}}{\text{Total births}} \times 1000$$

- Case: A mother who delivered a stillbirths during the study period

- Controls: The next two mothers, who delivered live health babies with Apgar score ≥ 8 at 5 minutes after the case, lie within the same age and Parity block and the same mode of delivery as the case.

ABSTRACT

Introduction: Kibagabaga Hospital serves as a District Hospital for Gasabo found in the City of Kigali. It is surrounded by 17 health centres which it serves.The number of deliveries normally outskips the available resources and this affects the quality of health care offered. A study focusing on Stillbirth may more easily identify factors that aid in prevention, enabling intervention and better quality of intrapartum care [7, 12], thus lowering the high perinatal mortality.

Objective: The general objective of the study was to identify the risk factors associated with Stillbirths in Kibagabaga District Hospital, in City of Kigali.

Method:

Study design: Matched Case Control study [The cases and Controls were matched for age, parity and mode of delivery]. Study Site; Kibagabaga District Hospital, Gasabo District, in the city of Kigali in the Department of Gynecology and Obstetrics.Study Population; Mothers who delivered in Kibagabaga Hospital, Gasabo District, in City of Kigali

Participants; Cases were Mothers who delivered Stillbirths during the study period.

Controls were mothers who delivered health babies with Apgar score ≥8 at 5minutes after the case.The cases and the controls lie within the same age, parity block and had the same mode of delivery. The ratio of cases to controls was 1:2.Study Variables were: Socio-demographic characteristics, obstetric performance [past &present], maternal medical conditions, Referral status. The Odds ratio [OR] for varius variables were calculated using statistical package for social sciences [SPSS] and presented with their 95% confidence interval[CI] and P-values. A total of 130 cases and 260 controls were analysed.

Results: The major risk factors associated with SB were: referral status ($p < 0.001$), complications of labor $p<0.05$ [mainly obstructed labor, cord prolapsed, prolonged labor, febrile illnesses and pre-eclampsia].Gestational age and the delay in seeking health care $p<0.05$, No TORCH screening $p<0.05$ and low level of education $p<0.05$.

Conclusion: The quality of care showed deficiencies on mothers using Mutuel de la santé [MUSA]. Greater attention thus needs to be given the strategies that focus on improving the quality of Obstetrical care provided at Kibagabaga hospital and the Health centres that the hospital serves.

CHAPTER ONE:

1. INTRODUCTION

1.1 Background

Kibagabaga Hospital is a District Hospital in Gasabo District, in City of Kigali with 17 health centres.

It handles all difficult case from all the 17 health centres. 16 are government health centers and one private.

Stillbirth is both a medical and lay term for a fetus that is born dead. The World Health Organization's (WHO) Classification of the Diseases (ICD)[1], defines stillbirth (fetal death) as ''death before the complete expulsion or extraction from its mother of the product of its conception, irrespective of the duration of pregnancy, which is indicated by the fact that after such separation, the fetus does not show evidence of life.'' Clearly these definitions are difficulty to apply in the collection of data on perinatal death.

One third to one fourth of all stillbirths is estimated to take place during delivery [4, 5]. The remaining proportion of stillbirths is estimated to occur before delivery, and these stillbirths are due to a variety of factors of maternal and fetal origin, including infection and environmental hazards which may affect maternal health during pregnancy and fetal development and survival.

Even when evaluating only women who had received adequate prenatal care, Vintzileos et al found that in the United States black women still had twice the risk of stillbirth when compared with white women [6]. The excess of stillbirths was attributed to higher rates of diabetes, hypertension, placental abruption, and premature rupture of Membranes.

The stillbirth rate, as the perinatal mortality rate, is an important indicator of the quality antenatal care and obstetric care during labor and delivery. Knowledge of the causes and risk factors of this unfortunate problem will help in designing preventive measures to reduce its incidence [7].

Changes in maternal health and obstetrical practice have resulted in a 70% decline in rate of fetal death among pregnant women of all ages since 1960s, in US [8]. Advancing maternal age, however, continues to be a risk factor for fetal death.

In Rwanda, Malaria has a negative effect on pregnant outcome, causing low births weight, premature births and stillbirths particularly in areas with high malaria transmission [9].

Further improvement in socio-economic status and nutritional status, improves pregnant outcome especially weight [9].

Perinatal mortality remains a challenge in the care of pregnant women worldwide, particularly in the developing countries [10]. To address the problem of perinatal mortality, factors associated with stillbirth, a major contributor of over 50% of perinatal death in developing countries, [10] must be understood.

According to the medical literature, it's known that many factors have been identified as risk factors for fetal death, and many of them could be preventable, controlled or treated. In addition, it is necessary to study the relative importance of these risk factors in different populations [11].

1.1.2 Problem Statement

WHO estimates that worldwide 3.3 Million stillbirths occur each year accounting for over half of perinatal deaths [4, 5]. The majority of these deaths take place in developing countries. Even though stillbirths represent a large proportion of perinatal deaths, direct and indirect causes of stillbirths are poorly understood, particularly in developing countries [4, 12 and 13]. In the setting where women receive appropriate care during childbirth, intrapartum deaths represents less than 10% of stillbirths and are mainly due to unexpected complications [5]. Some authors have reported that the incidence of stillbirths in developing countries is about 10 times than that in developed world [7].

In Zimbabwe, the perinatal mortality remains unacceptably high. In Harare, the capital city, perinatal mortality declined from 83 per 1000 live births in 1978, to 34 per 1000 live births in 1984 and has changed little since then [10].

Between 24 and 27 weeks of gestation, the most common causes of stillbirth were related to infections (19%), abruption (14%) or significant lethal anomalies (14%) and 21% were unexplained [14]. A fetal death that is unexplained by fetal, placental, maternal or obstetric factor is the most frequent type of fetal demise.

In Rwanda, the prospective studies done at University Teaching Hospital of Kigali, one from 1992 to 1993 found out that Chorioamnionitis was associated with stillbirths and premature rupture of membranes in HIV Negative pregnant women [15]. The second study done in Rwanda, same University Teaching Hospital, from 1992 to 1994, by mid August 1993, in 384 pregnant women attending Antenatal clinics, who were HIV positive, there were 10

stillbirths recorded[16]. In this similar study, 381 women attending antenatal clinic in the same hospital who were HIV negative, 08 stillbirths were recorded (p=0.60).

The number of stillbirths (fetal death at ≥ 20 weeks' gestation) is nearly equal to number of infant death in the United States in the 2005. Many of the factors associated with stillbirths need to be addressed early in the pregnancy [17].

As women pursue educational and career goals, they are more likely to delay childbearing. In the United States from 1976 to 1986, the rate of first births among women 40 years of age or older has doubled, but the effect of advanced maternal age or birth order (parity) on fetal outcome is not clear [18]. A study in Dundee, Scotland showed that 58% of stillbirths in 1991 to 1992 were classified as unexplained antepartum stillbirths even though the postmortem rate for unexplained antepartum stillbirth was high(86%)[19].

In developing countries, case fatality rate of up to 14% is reported in relation to eclampsia compared to 0% to 1.8% in developed countries [20]. The stillbirth rate in Scotland is 5.7 per 1000 births for years 1996 to 2000 and 5.3 per 1000 births in 2005[19]. Pre-clampsia and eclampsia are the major causes of maternal and perinatal morbidity and Mortality [20].

In low income countries a significant proportion of stillbirths occur in the intra-partum period and these deaths are commonly attributed to avoidable factors related to inadequate maternity care [21]. Recent studies have shown that the most risk factors for perinatal mortality in developing countries are not detected during antenatal care but can be observed only shortly before or during labor[22].

1.1.3 Justification of the study

Like most of African countries, Rwanda has not had recent research on factors associated with stillbirths aimed at preventing them. Understanding the stillbirths may help us identify the quality of antenatal and obstetric care available to pregnant women and prioritize appropriate intervention strategies, bearing in mind that macerated stillbirths are often associated with insults occurring in utero during the antenatal period, while fresh stillbirths may suggest problems with care available during labor and Delivery [7].

This subsequent study will address pregnancy predictors of stillbirths' risks in Rwanda as has been previously done in other nations, like in the United States [17]. Data on the frequency and distribution of adverse births outcome are important for planning and execution of maternal and child health care intervention services in developing countries; information on local patterns of Stillbirths will help in improving perinatal care at local levels [21].

Rwanda suffers from all the ills common to developing countries, including high rate of stillbirths and stillbirths are the result of difficulty deliveries, poor health status of the mother lacking prenatal care, inadequate nutrition and perhaps intestinal parasites or Malaria [23].

Data on stillbirth from developing countries are scarce and often not reliable, and, as for many other public health conditions, the`` inverse information and care law'' is valid: ``the communities with the most fetal death have the least information on these deaths and the least access to cost-effective interventions to prevent them.''[24]

Therefore, such study has to be done to understand the recent factors associated with stillbirths in Rwandese population, so as to try to prevent them if possible. Stillbirths therefore remain an important public health issue, with little change in its rate over the past two decades [25]. Although a small proportion of children die today than at any other times within the last 100 years, stillbirth and infant death are still a major concern, and the search for preventable causes is one of the utmost importance. Exposure to tobacco smoke in utero is one of the possible preventable factors with potential influence on stillbirth and infant death [26].

1.1.4 Research question

What are the risk factors associated with Stillbirths at Kibagabaga Hospital in the Kigali city?

1.1.5 Goal and Objectives

1.1.5.1 Goal

To identify the risk factors associated with Stillbirths at Kibagabaga Hospital in Kigali city.

1.1.5.2 Specific objectives

- To determine the obstetric factors that are associated with Stillbirths.
- To determine the maternal medical conditions that are associated with stillbirths.
- To determine the socio-demographic factors that are associated with Stillbirths.
- To determine the healthcare system factors that are associated with Stillbirths.

1.2. LITERATURE REVIEW

National protocol of Rwanda protocol definition of stillbirth as a fetus weighing 500g 0r completed 22weeks gestation and above as opposed to the WHO definition of viability, that is a births weight of at least 500gram, gestation age of at least of 20weeks or above [2].

The United States National Center for Health Statistics defines stillbirth as the delivery of a fetus showing no signs of life as indicated by absence of breathing, heart beats, pulsation of umbilical cord, or definite movements of voluntary muscles (3). There is not complete uniformity among states with regard to birth weight and gestational age criteria for reporting fetal deaths. However, the suggested requirement is to report fetal deaths at 20weeks or greater of gestation (if gestation age is known), or a weight greater than or equal to 350grams if the gestational age is not known. The cutoff of 350grams is the 50th percentile for weight at 20weeks of gestation [3].

In the District Hospital like Kibagabaga in a developing Country like Rwanda, fetal death included those with a presumed gestational age of 28 weeks or weight of 1 000grams.

This suggests that stillbirths are closely linked to the use and quality of maternal services: higher stillbirths rates in socioeconomically disadvantaged populations may be a reflection of the absence or poor quality of care women receive during pregnancy and delivery. Hence, stillbirth rate could be an indicator of access to, and quality of maternal health services. It is also regarded as development indicator [12].

Some of the known risk factors associated with stillbirths are categorized as:

- Obstetric factors,
- Maternal medical conditions,
- Maternal socio-demographic factors,

1.3.1 Obstetric factors

These can be divided into:

- Maternal
- Fetal
- Feto maternal

i) Maternal factors:

- **Antepartum haemorrhage**; these include among others placenta praevia and abruptio placenta, which are the commonest obstetric causes and can occur during

  labour. Over 16% of all stillbirths in the UK are caused by antepartum haemorrages

• **Pre-ecIampsia / eclampsia**; this disorder of pregnancy has many effects on the mother but fetal risk is the greatest; intrauterine hypoxia due to uteropacental insufficiency can be made worse by the maternal cyanosis which accompanies an eclamptic fit, or by the premature placental separation (abruptio placenta). 1000 babies in the UK die each year from the effects of pre-eclampsia; many of these are stillbirths [7]. Perinatal mortality increases with the severity of Preeclampsia and doubles if the fetus is small for gestational age [6].

• **Ruptured uterus;** these can be due to a previous uterine scar or other predisposing factors e.g. excessive use of oxytocic drugs e.t.c. The fetus dies due to hypoxia secondary to the blood loss.

• **Hypertonic** or too frequent contractions to allow for proper oxygenation of the fetus during labour e.g. use of local herbs.

ii**) Fetal factors:**

- **Cord accidents;** these include: cord prolapse, nuchal cords and cord knots. They can occur during labour causing fetal death.
- **Prematurity Preterm labour**; this is delivery before 37 completed weeks of gestation. Babies born early, particularly very premature babies, may not survive the stress of labour.

- **Post maturity**; this is delivery after 42 completed weeks of gestation. The placenta' aging predisposes to intra uterine fetal hypoxia, which can lead to fetal demise during labour. They are predisposed to acute cord compression and meconium aspiration due to oligohydramnios, macrosomia due to continued growth over extra two or more weeks, especially obese or diabetic mothers [31].

- **Fetal birth weight**s, babies weighing 4kgs or more at birth are at risk of death during delivery due to birth trauma e.g. shoulder dystocia. Of the deliveries that were complicated by shoulder dystocia 59% had stillbirths [7]

- **Fetal abnormalities e**.g. undiagnosed hydrocephalus, can lead to obstructed labour and its complications including stillbirth.

- **Multiple pregnancies**: Deaths due to retained second twin, placental separation, locked twins, malpresentations, cord accidents and prematurity; the risk may even be increased by pregnancy-induced hypertension. The risk of preterm labour is 7-10 times above singleton rates, frequency of hypertension complication is 2-5 folds and that of abruptio placenta is 3 fold over singleton pregnancy. [31].

iii) **Feto-maternal factors:**

Malpresentation; particularly breech. Vaginal delivery of breech contributes 10.8% of labour related deaths [6]. The risk of death is four times higher at delivery than vertex delivery and this is mainly due to trauma [intracranial haemorrhage] and intrauterine hypoxia. Other malpresentations include shoulder and brow, all can be associated with SB due to trauma or asphyxia.

- Obstructed labour; this is a labour in which progress is arrested by mechanical factors, necessitating operative delivery. It can be due to malpresentation, malposition, contracted pelvis or cephalopelvic disproportion; all can result in SB if operative delivery is delayed.

- **Prolonged labour**; this is active labour with regular uterine contractions for more than 12 hours. It can be associated with dehydration, acidosis and exhaustion of the mother as well as fetal distress, which can lead to SB if intervention is delayed.

1.3.2 Maternal socio-demographic factors:

These factors include: age, level of education, marital status, parity and occupation; all these have influence on the outcome of pregnancy which may be SB. They affect health seeking behaviour [e.g. antenatal clinic attendance where risk factors like contracted pelvis, previous scars etc can be identified and delivery planned earlier], referral system e.g. the working class can easily afford transport where money is the problem compared to the non working or unmarried ones. Mothers with high level of education tend to get in facilities where there is a doctor [12].

Information on SB in particular is not available but studies done on perinatal mortality showed the following:

• Social deprivation and disadvantages continue to affect the perinatal health. Lack of antenatal care is significantly linked to increased perinatal mortality [9].

• The effect of parity on perinatal losses is that the primegravida and multipara tend to have high perinatal losses [7].

Age: Some Studies have found no increase in risk of fetal death or perinatal infant mortality for older as compared with younger pregnant women, but these studies lacked statistical power and focused on women in relatively high socioeconomic groups [18].
Age 35yrs and above form 3% of all deliveries and tend to contribute up to 6.5% of the losses [7]. The percentage loss due to SB however is not yet known.

1.3.3 Maternal medical conditions:

Pre-existing medical conditions or intrapartum infections [especially febrile illnesses] are risk factors that can predispose to SB. Some of these include:

- **Maternal diabetes:** this is associated with: preterm labour [which is twice as common among diabetic mothers as in general population, predisposing the babies to the complications of prematurity], macrosomia, which can lead to shoulder dystocia or Obstructed labour and associated complications. There is also higher risk of congenital anomalies and hypertension. The fetus may experience sudden death especially if severe hyperglycemia occurs or the fetuses whose mothers develop ketoacidosis about 50% die. [31].

- **Maternal cardiac diseases**; these are associated with premature labour and their occurrence associated with a high fetal wastage [6].

- **Febrile illnesses**: e.g. malaria, urinary tract infections, chorioamnionitis etc which may present during labour may result into SB.

Maternal hypertension; this may be made worse by superimposed pre- ecclampsia Commonly lead to preterm delivery and its associated complications such as abruptic Placentae, intrauterine growth retardation e.t.c.

- **Sickle Cell disease**; in pregnancy this is associated with a worsening of most parameters. Perinatal outcome is quite poor. The frequency of stillbirth is 5% to 15% [9]. Any severe anemia may cause intrauterine death from asphyxia; it also increases the likelihood of prematurity.

1.3.4 Healthcare system factors:

A number of factors within the healthcare system are known to be associated with intrapartum fetal death. Most of these factors affect the quality of healthcare offered to the mothers during labour and delivery.They include: Inadequate resources for the amount of workload, Knowledge and skills in the management of labour and delivery and Delay in the referral system.

CHAPTER TWO

2. METHODS

2.1 Study design

It was a Matched Case Control Study. The cases and controls were matched for age, parity and mode of delivery.

2.2 Study setting

The study was carried out in a district Hospital of Kigali city.

2.3 Population

2.3.1 Study population

This consisted of mothers who delivered in Kibagabaga Hospital during the study period.

2.4 Sampling method

i) Cases: All the mothers who had SB deliveries were approached by the interviewer seeking for consent to be recruited in the study before discharge. Those who consented were consecutively recruited i.e. assigned numbers, interviewed and questionnaires filled until the desired sample size was achieved.

ii) Controls: These were selected from the same health facility as cases. The next two mothers with live healthy babies with Apgar score 8 at 5 minutes delivered after a case were requested to participate in the study and those who consented were interviewed and the questionnaires filled. Controls were within the same age and parity block as the case as well as having delivered in the same way.

The blocks were categorized as follows:

Age: 1. <20yrs, 2. 20 -29yrs, 3. 30- 35yrs, 4. >35yrs.

Parity: 1. Prime, 2. 2 —4, 3. > 4.

The delivery modes were: SVD, C/S, V/E and Breech delivery,

2.5 Sample Size and Calculation.

According to James Schlesselmaflfl [1982], the number of subjects to be selected in a Case Control Study depends on the specification of four values:

1. The relative frequency of exposure among controls in the target population [P0]

2. A hypothesized relative risk [estimated by the Odds Ratio] associated with exposure that would have significant importance to warrant its detection [OR]

3. The desired level of significance α [Type I Error]

4. The desired power of the study 1-β [Type II Error]

P0 is estimated to be 50% [No similar study done elsewhere has been identified]

OR = 2

Zα= Z score associated with a 5% level of significance =1.96. The desired level of

Significance [α] is 0.05.

Z [I - β1] =Z score associated with a power of 80% [β = 0.2, 1-β= 0.8]

C = number of controls per case = 2

P1 = P0xOR/ [l + P0 (OR-1)]

P = (P1+(P0)/ (1+C)

Q=1-P

N= Sample Size

Substituting into the Schlesselmann's formula,

N =PQ (1+1/C) x [Zα + Z (1- β)] 2 / (P1— Po) 2

We obtain a sample size of 126.8, rounded to 127. However, it was easier to use an even number and the most convenient one to me was 130. The ratio of cases to controls is

1:2. thus the number of CASES will be 130 and CONTROLS 260.

2.5 Selection criteria

2.5.1 Inclusion criteria

Cases

Mothers who delivered stillbirths during the study period and consented to be involved in the study.

Controls

1. Mothers who delivered live healthy babies with Apgar score 8 at 5mins during the study period
2. Mothers whose age and parity were within the same block and had same mode of delivery as the case
3. Mothers who consented to be involved in the study

2.5.2 Exclusion criteria

1. Multiple pregnancies.
2. Mothers whose babies were taken to Special Care Unit or Apgar score <8 at 5 minutes.
3. Mothers who were unconscious at the time of filling the questionnaire.

2.7 Study Variables

- Socio-demographic characteristics (Marital status, Employment, Medical Insurance, Education)
- Obstetric factors
- Maternal medical conditions
- Referral status

2.6. Data collection

Data was collected using a pre-tested structured and interviewer-administered questionnaire a mother who had a SB [case] and the next two who delivered live healthy babies [control] were approached before discharge and informed about the study by the interviewer. The age and parity of the case and controls were within the same block, delivery modes were also the same. Informed consent was sought, they were interviewed and the questionnaire filled. None refused to be recruited in the study. Details of delivery were obtained from the clinical notes. The principal investigator and the obstetrician on duty reviewed the files to identify gaps n the parent management.

2.7 Data entry and analysis

The data collected was coded, entered in a computer; it was analyzed using the Statistical Package for Social Sciences [SPSS], with the supervision and assistance of a qualified statistician. The numbers and percentages of cases and controls at each level of exposure were presented. Chi square was used to compare proportions. Multivariate analysis: Logistic regression was used to establish the strength of association between exposure variables and fresh stillbirths. All associations are presented as Odds Ratio (OR) corresponding to 95% confidence interval (Cl). OR>1 represents an increased risk and < I represents reduced risk to SB. A p- value of < 0.05 was considered significant.

2.8 Quality control

The internal validity of the study relied on:

- Training all research assistants before the study.
- Getting a large sample size
- The filling out of the questionnaire was crosschecked for completeness by the principal investigator.

2.9 Ethical considerations

Institutional agreement was sought, presented the research protocol to the department of Gynecology and Obstetrics and the ethical and scientific review committee of the faculty of Medicine.

The patient received an explanation about the purpose of research, the procedure, the confidentiality, risks and benefits and the right not to participate or withdraw at any time without any effect to their health or other services. For those patients that cannot consent, like those under age and the critically ill, the Mother, Father, relatives or Guardians could consent for them. After acceptance of participation, they were requested to sign a consent form.

2.10 Dissemination of the results

The results of this study will be availed to the authorities of involved hospital, the faculty of Medicine, NUR main library and Ministry of health and published in a recognized medical journal.

3. 0. RESULTS

The total number of women recruited in the study was 390. Those who delivered SB were 130 and those who delivered normal live babies were 260.

There were more cases among the age group 20-29 (52.3%) and among parity 2(43.1%). Prime gravida contributed 39.2% of all SB.

Table 1: ASSOCIATION OF SOCIO–DEMOGRAPHIC FACTORS WITH STILL BIRTH.

Variables	Cases	Control	OR	95% CI	P.Value
Education of Mother					
Noformaleducation	18(13.8)%	22(8.5%)	1.7	0.81- 3.59	0.18
Primary	63(48.5%)	128(49.2%)	1		
Secondary	44(33.8%	100(38.5%)	0.9	0.56-1.49	0.78
Post secondary	5(3.8%)	10(3.8%)	1	0.39-5.48	0.78
Occupation of the spouse					
Self employed	17(13.1%)	52(20%)	0.6	0.32-1.13	0.1
Professional	3(2.3%)	6(2.3%)	0.9	0.18-4.23	0.81
Housewife	110(84.6%)	202(77.7%)	0.1		
Marital status					
Married	104(80%)	210(80.8%)	1		0.36
Single	25(19.2%)	50(19.2%)	1		
Widowed	1(0.8%)	0(0%)	0		
Education of Spouse					
NoFormalEducation	12(9.2%)	10(3.8%)	2.7	1.01-7.11	0.047
Primary	51(39.2%)	92(35.4%)	1.2	0.76-1.99	0.42
Secondary	62(47.7%)	138(23.1%	1		
Post secondary	5(3.8%)	20(7.7%)	0.6	0.17-1.67	0.37
Occupation of spouse					
Self employed	110(84.6%)	215(82.7%	1		
Peasants	5(3.8%)	8(3.1%)	1.2	0.34-4.24	0.96
Professional	15(11.5%)	37(142%)	0.8	0.40-1.57	0.58

Mothers who delivered SB were similar in all socio-demographic characteristics measured except in education. Mothers whose husbands had no formal education were at an increased risk stillbirth delivery compared to those with secondary level of education

(OR 2.7; p = 0.047).

Table 2: ASSOCIATION OF MATERNAL MEDICAL DISEASES WITH STILLBIRTH

Variables	Cases	Control	OR	95% CI	P. Value
Medical conditions					**0.005**
Hypertension	11(8.5%)	10 (3.8%)	2.6	0.99-6.84	
Diabetes mellitus	5(3.8%)	3(1.2%)	3.9	0.8-21.6	
Malaria	12(9.2%)	8(3.1%)	3.5	1.3-9.8	
TB	1(0.8%)	1(0.4%)	2.4	0.0-87.05	
None	101(77.7%)	238(91.5%)	1		
HIV status					**0.18**
Not Tested	94(72.3%)	162(62.3%)	1.47	0.89-2.4	
Tested Negative	34(26.2%)	86(33.1%)	1		
Tested Positive	2(1.5%)	12(4.6%)	0.42	0.06-2.16	

The presence of a medical disease such as diabetes, malaria, Hypertension and TB during pregnancy were significantly associated with delivery of SB (p = 0.005). Malaria was the leading condition (9.2%), followed by hypertension (8.5%), although diabetes had the highest risk (OR 3.9, CI 0.8 —21.16). Mothers with HIV were associated with 0.42 times risk of SB (Cl 0.06-2.16) compared to HIV negative mothers. However, p>0.05 thus the comparison is not statistically significant

Table 3: ASSOCIATION OF PAST OBSTETRIC PERFORMANCE WITH STILLBIRTH.

Variables		Cases	Control	OR	95% CI	P. Value
Outcome of previous pregnancy						**0.31**
Alive / Term		70(88.6%)	139(88%)	1		
Premature		1(1.3%)	1(0.6%)	2	0.0-73.9	
SB		5(6.3%)	4(2.5%)	2.5	0.56-11.4	
Abortion		3(3.8%)	14(8.9%)	0.4	0.09-1.65	
Mode of delivery						**0.66**
SVD		62(78.5%)	126(79.7%)	1		
C/S		17(21.5%)	30(19%)	1.2	0.56-2.36	
AVD		-	2(1.3%)			
Duration since last pregnancy						
Less than 2 years		35(44.3%)	61(38.6%)	1.3	0.71-2.27	
More than 2 years		44(55.7%)	97(61.4%	0.1		

The past obstetric experiences of the mothers were found not to be very good indicators for re-occurrence of SB, though previous SB and premature delivery showed increase in the risk (OR 2.5, and 2.0 respectively) compared to live and term deliveries. This comparison is not statistically significant, $p>0.05$.

Table 4: ASSOCIATION OF CURRENT OBSTETRIC FACTORS WITH STILLBIRTH

Maternal factors					
Variables	**Cases**	**Control**	**OR**	**95% CI**	**P. Value**
Delay in HC					**0.005**
Yes	20(15.4%)	17(6.5%)	2.6	1.25-5.44	
No	110(19.2%)	243(93.5%)	1		
Medical Insurance					**0.000**
RSSB	41(39.1%)	142(65.5%)	1		
MUSA	35(33.3%)	27(12.4%)	4.5	2.34-8.67	
Private	29(27.6%)	48(22.1%)	2.1	1.13-3.88	
Referral status					**0.000**
Referred	92(70.8%)	98 (37.7%)	4	2.48-6.47.	
Not referred	38(29.2%)	162(62.3%	1		
TORCH Screening					
No	43(46.7%)	13(13.3%)	5.7	2.67-12.5	
Yes	49(53.3%)	85(86.7%)	1		
Complications of labour					**0.000**
Nil	22 (16.9%)	232(89.2%)	1		
Obstructed Labour	17(13.1%)	3(1.2%)	59.8	14.82-280.4	
Cord prolapse	14(10.8%)	0(0%)	0		
Malpresentations	7(5.4%)	1(0.4%)	73.8	8.42-1671.4	
Prolonged labour	9(6.9%)	0(0%)	0		
Pre-eclampsia	8(6.2%)	2(0.8%)	42.2	7.56-308.68	
Ruptured uterus	5(3.8%)	2(0.8%)	26.4	4.17-210	
Febrile illness	9(6.9%)	1(0.4%)	94.9	11.3-2094.3	
Others	39(30%)	19(7.3%)	21.6	10.18-46.63	
Fetal factors					
Gestational Age					**0.0019**
Less than 37	23(17.7%)	19(7.3%)	2.7	1.36-2.42	
37-42	107 (82.3%)	240(92.3%)	1	065-2.08	
More than 42	-	1(0.4%)	1		
Birth weight					**0.000**
Less than 2.5	**29(22.3%)**	10(3.8%)	7.4	3.25-17.6	
2.5-3.5	73(56.2%)	186 (71.5%)	1		
3.5-4	23(17.7%)	47(18.2%)	1.2	0.68-2.28	
4 and above	5(3.8%)	17(6.5%)	0.7	0.23-2.27	
Sex of babies					
Female	59 (45.4%)	133(51.2%)	0.1		
Male	21(54.6%)	127(48.8%)	0.37	0.21-0.67	

Many factors in the current pregnancy and delivery were associated with SB.

Medical Insurance used for delivery, delay at home, referral status, complications of labour. Gestational age and birth weights were associated with increased risk of SB ($p<0.05$).

Sex of the babies were not associated with SB ($p>0.05$).

The referral Status and reason for delay in HC were all significant factors ($p<0.05$).

Mothers who had delay in HC due to had the highest risk of SB compared to those with no delays.

Transfer to Kibagabaga Hospital depends on the risk assessment at the Health Centre from where referral is made and also some who come direct due to proximity.

CHAPTER FOUR

4.0 Discussion:

During the study period of 10 months (March, 2013-December 2013), a total of 3,695 deliveries were conducted in Kibagabaga hospital, an average of 12 deliveries per day. Deliveries with SB contributed 3.5% of the total deliveries; a SB rate of 35.2/1 000 total births i.e. 1 in 29 babies was a SB. This study showed the markedly high and rising stillbirth rate in Kibagabaga hospital. This could be due to the increasing number of deliveries that out skips the available resources thus resulting into deterioratoin in the quality of health care given to the mothers.

Socio-demographic factors:

From the study, the level of educational of the mother, occupation of the Mother, Marital status status and occupation of the spouse were found not to be risk factors for delivery of SB (p>0O5).

However, the level of education of the spouse was found to be significantly associated with SB, p<0.05. A number of other investigators found smilar results [27, 28]. This could be explained by the fact that the health seeking behavior of a number of mothers in our community still depends on the decision of the spouse. Husbands have been identified as "gate keepers" who impede women's access to modern health care [9]. The more educated the spouse, the more exposed to health care information thus improvement in the health seeking behavior of the family as well as income. Otherwise, Socio- demographic characteristics and other markers of social diversity such as religion, tribes etc are rarely significantly associated with perinatal mortality [29].

Maternal medical condition:

Among the mothers who had stillbirths, malaria was the leading medical condition present during pregnancy 12 (9.2%) followed by hypertension 11(8.5%). This was found to be significantly associated with SB, p<0, 05. Malaria is therefore still a major factor contributing to the high perinatal mortality [27, 30]. Comparing risk between the presence and absence of medical conditions, it was found that mothers with diabetes mellitus have highest risk (3.9 times), followed by malaria (3.5 times) and Hypertension (2.6 times' p<0.05. An increased rate of stillbirth has also been attributed to Diabetes mellitus (12, 18). Diabetes mellitus has

been found to be associated with prematurity, sudden death of the fetus due to severe fetal hyperglycemia or maternal ketoacidosi [31].

This calls for more effort to improve on the quality of antenatal care service given to the mothers. Routine investigations and examinations should be done at all levels of care. Advocacy for intermittent presumptive treatment of malaria to be continued.

The presence or absence of malaria was however based on the history of fever; Blood smear positive and malaria treatment during pregnancy. Diabetes mellitus and hypertension diagnosing on admission and the medications they were on from the HC.

This study found no relationship between maternal HIV infection status and stillbirth, p>0.05. The majority of the study population had not tested for HIV infection and the reason was not sought. Only 27.7% of the cases were tested and out of this only 1 .5% were positive. The result could have been affected by the small number of mothers tested or improvement in the health seeking behaviour of the infected mothers such that they programmed for Elective Cessarean Delivery. A large study done in Nairobi showed an independent association between maternal HIV infection and both intra uterine and intrapartum fetal deaths, after controlling for the presence of other sexually transmitted infections, while in developed world, HIV infection has been reported to have little effect on pregnancy outcomes or complications [32].

Past Obstetric Performance:

The study has also shown that past obstetric experience, in particular outcome of previous pregnancy, mode of delivery and duration since last pregnancy were not significant risk factors for stillbirth; p value >0.05. This could be explained by the fact that additional care and watchfulness may prevent a complication arising or enable its early detection and management.

The study has also shown that spacing by less than 2 years is associated with 1.3times risk of SB compared to spacing by more than 2 years, however this was not statistically significant, p value 0.66. Better obstetric care may overcome the effect of short spacing on SB. Spacing by two years has been found to improve odds ratio of infant survival by about 50% and less than two years associated with poor pregnancy outcome e.g. prematurity, low birth weights etc [6].

This study showed that obstructed labour, cord prolapse, prolonged labour, and febrile illness and pre-eclampsia were the major complications associated with high risks of SB. This probably explains why this group was most affected.

Current Obstetric Factors

Prematurity was found to be a risk factor for SB, $p<0.05$. Cases that were premature were 23(17.7%) compared to controls, 19(7.3%). Preterm pregnancies are found to be associated with 2.7 times risks of SB delivery compared to term pregnancies.

Low Birth weight has also been shown to be statistically significant, $p<0.05$. There were 29(22.3%) cases that weighed less than 2.5kg compared to controls, 10(3.8%), Birth weights less than 2.5kg have been found to be associated with 7.4 times risks of SB delivery compared to those between 2.5 and 3 5kweights are risk factors associated with stillbirth. Low birth weights contributed 50.1% of the early perinatal mortality in Kibagabaga hospital [(27].

Delay in the Health centres by the referring health workers was found among 20[15.4%] cases compared to 17[6.5%] controls and this was statistically significant, $p<0.05$.This delay to decide on referral could be due to failure by the health provider to recognize a problem early as a result of inadequate knowledge and skills or due to economic reasons. The mothers' Medical Insurance was also significantly associated with SB, $p=0.000$.

The majority of cases, 41(39.1%) were with no insurance and with MUSA while the majority of controls, 142(65.5%) had RSSB as their Medical insurance. Those with MUSA were associated with 4.5 times risks of SB delivery compared to those with RSSB. Where the majority of the cases were in a facility inappropriate for the level of maternal risk [9, 12, 27]. This is likely to be a reflection of inadequate facilities and care provided at the primary level of health Centre. These are the ones who probably develop complications delays in receiving the necessary emergency obstetric care thus deliver SB.

Antenatal care coverage has also been found to be strongly associated with the woman's education. Better-educated women are more likely to have ANC and more likely to be attended to by a doctor than less educated women [7, 12]. This study showed no significant difference. This could be due to the majority of the study population being at the lower level of education (i.e. primary level).

Labour complications pose the greatest risk for perinatal mortality, contributing to 53% of all the perinatal deaths [7, 21]. In this study, there were more complications of labour recorded among cases (78%) than controls (10.9%). The complications were found to be risk factors for SB. p<005. The major were:

- Obstructed labour 17(13.1%)
- Cord prolapse 14(10.8%)
- Prolonged labour 9(6.9%)
- Febrile illnesses 9(6.9%)
- Pre-eclampsia 8(6.2%)

Obstructed labour is still the major factor contributing to perinatal mortality. It contributed up to 10% of the early perinatal mortality [27]. However a mother with febrile illness has the highest risk of SB (94.9 times) followed by malpresentation (73.8 times) obstructed labour (59.8 times) compared to one with no complication.

Health care systems:

Kibagabaga hospital being a District referral hospital, referral status has been shown to be a highly significant factor in this study, p<0, 05. 92(70.8%) cases were referred compared to 98 (37.7%) controls. Related findings were reported where many perinatal deaths were found to occur among babies of women who are referred on developing life threatening obstetric complicatior [29].

No TORCH screening was found among 43(46.7%) cases compared to 13(13.3%) controls, and this was statistically significant, p<O.05. This is likely to be a reflection of inadequate facilities, socio-economical status of mothers and also the care provided at the primary and secondary levels of health care [9].

CHAPTER FIVE

5.1 CONCLUSION

The risk factors were adjusted for confounding using logistic regression analysis. The following factors were found to be the ones associated with stillbirth:

Education level of the spouse: Mothers whose husbands had no formal education were at risk of stillbirth delivery 2.7 times compared to controls ($p = 0.04$). This also reflects on the family income.

Prematurity: Preterm pregnancy was 2.7 times at risk of stillbirth compared to term pregnancy

[$p = 0.002$]

Referral status: Referred mothers were found to be 4 times at risk of stillbirth compared to mothers who were not referred ($p < 0.001$). These were referred as obstetric emergences with complications of labor.

Complication of labour: This was also found to be significant. Mothers with complications were more at risk of stillbirth compared to those with no complications ($p < 0.001$). The major complications included: Obstructed labour (13.1%), cord prolapse (10.8%), prolonged labour (6.9%), febrile illnesses (6.9%) and pre-eclampsia (6.2%). Mothers with febrile illnesses had the highest risk of SB, followed by malpresentation, obstructed labour and pre-eclampsia (94.9, 73.8, 59.8 and 42.2 times respectively).

No TORCH screening: These were also significant ($p<0, 05$). The delay at home was due to the poor health seeking behaviour of the mothers. The No TORCH screening was due to the poor quality of health care provided in the primary, secondary health care levels and the socioeconomic levels of mothers.

Those risk factors that were not associated with the risk of SB included; the rest or the sociodemographic factors (excluding education of husband/spouse as above), maternal medical conditions and past obstetric history.

The majority of the significant factors were intrapartum. Adequate intrapartum care and early referral from health centres can prevent SB.

Stillbirth in Kibagabaga District Hospital was therefore found to be associated with multiple risk factors operating at different levels and current obstetric factors. The quality of care showed deficiencies with mothers using Mutuel de la santé and improving on it will reduce the high SB rate thus, lowers the perinatal mortality.

Greater attention needs to be given to the quality of obstetric care provided in Kibagabaga Hospital and the peripheral health centres.

5.2 RECOMMENDATIONS

The risk factors for stillbirths in Kibagabaga District hospital in Gasabo District of City of Kigali are multifactorial. Both the community and the health care providers have been found to play a role. An integrated multisectorial approach, cutting across all the levels of healthcare is the way forward.

Due to the increased demand for service as evidenced by increasing number of deliveries, sufficient resources need to be mobilized to ensure that standards of care do not suffer. Mothers who are referred to get timely and appropriate care

TORCH screening services should descend to District Hospitals and mothers with high risk pregnancies, using MUSA, should be given faster care and transfer.

To establish and strengthen community sensitization programs about reproductive health matters with emphasis on the causes and prevention of SB. Male involvement in Reproductive Health matters to be emphasized. This can be through programs in the mass media. The health seeking behaviour of the community can be improved.

Encouragements of girl/women education need to be increased. This is because education reduces the twin problem of low socioeconomic status and ignorance amongst our women, thereby increasing their awareness.

Enhance on refresher courses for the midwives in the primary levels of health care so that they are updated on the modern obstetrics care. This will improve on the quality of ANC, emergency obstetric care and partly the referral system.

More research is needed to include other hospitals in Kigali city and in country wide to address the predictors of stillbirths' risks in Rwanda to improve on perinatal care at all level.

5.3 Study Limitations:

- Matching for vacuum extraction and breech deliveries was difficult as these were very rare.
- Assessment of skills and knowledge of healthcare providers was not possible in this study.
- Time and finance to be able to cover up in other hospitals within the city of Kigali.

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4. APPENDIX

4.1 Consent form

Title of the study: Factors associated with stillbirths at Kibagabaga Hospital in the City of Kigali.

Introduction: I am Dr MWESIGYE David, a Senior Resident in Gynecology and Obstetrics, National University of Rwanda. I am conducting a study on Factors associated with stillbirths at Kibagabaga Hospital in the City of Kigali. This research will help identify the closely associated factors and try to prevent them during antenatal consultation or during labor.

Purpose: To identify factors associated with stillbirths at Kibagabaga Hospital in the City of Kigali.

Risks: There is no risk for you to participate in the study.

Benefits: This study will contribute to better outcome of pregnant women in Rwanda.

Costs: You will not be paid any incentive for your participation in the study.

Participant's right: Participation in the study is voluntary. You may refuse to participate in the study and it's your right to withdraw from it at any time. The refusal to take part in the study won't have any negative effect.

Confidentiality: We shall identify the patient with a code number and her names will not be used. All information received from your patient's file will be kept confidential and will be used for research purposes only.

Contact persons: If you have any questions or information for which you may need clarification, contact the following:

Dr MWESIGYE David, Tel: +250788433962

Dr.RULISA Stephen, Tel: +250788571436

Statement of consent:

The purpose and nature of this study have been explained to me and I understand that my participation in the study is voluntary and that no consequences will result if I refuse to participate. I agree that information contained in the file be used for the research.

I
(Mother/Husband/)……
……

Do hereby consent to participate in the above study.

……..
……..

Signature /Thumb mark of Participant Date

……..
……

Signature /Thumb mark of Witness Date

4.2 Data collection form **File number: ……..**

THE STUDY OF RISK FACTORS ASSOCIATED WTH STLLBIRTHS AT KIBAGABAGA HOSPITAL IN THE CITY OF KIGALI.

A. IDENTIFICATION CASE/CONTROL [code]

1. study number……..

2 .Home District …….

3. Age of mother (years)……

- Under 20years
- 20-29
- 30-35
- Above 35

4. Marital status……

- Married
- Single
- Widowed
- Divorced

5. Education level of the Mother.

- No formal education
- Primary
- Secondary
- Post secondary

6. What Medical Insurance does the Mother have?

- MUSA
- RSSB
- PRIVATE
- OTHERS

7. Occupation of the mother……..

8. Age of Spouse [Husband] (years)……

9. Education level of the Spouse.

- No formal education
- Primary
- Secondary
- Post secondary

10. Occupation of the Spouse/Husband……..

B. HISTORY OF MEDICAL DISEASE [tick]

- Diabetes mellitus [
- Hypertension [
- Cardiac diseases [
- Sickle cell disease [
- Tuberculosis [
- HIVIAIDS status [

a) Un Known

b) Known [positive/negative]

- Malaria
- Urinary tract infection
- Asthma
- Others [specify]

C, PAST OBSTETRIC HISTORY

1. Parity
    1. Prime
    2. 2-4
    3. >4
2. Outcome of last pregnancy
    1. Alive/Term
    2. Premature /Alive
    3. Premature/Died
    4. SB/Term
    5. SB/Preterm
    6. Abortion
3. Mode of delivery in the last pregnancy
    1. Spontaneous Vertex Delivery [SVD]
    2. Assisted Vaginal Delivery [Vacuum or Forceps delivery]
    3. Caesarian section [C/S]
    4. Breech delivery
4. Number of caesarian section scars

5. Indication for the C/S [specify]

1. Recurrent

2. Non-recurrent

6. Duration since last pregnancy

1. <2years

2. 2 or more years

D. CURRENT PREGNANCY

1. Gestational age [Weeks]……..

2. TORCH Screening done

1. No

2. Yes

E.LABOUR

1. Evidence of delay at home?

1, Yes

2. No

3. Reason for delay [specify]

2. Onset of Labor [

1. Spontaneous

2. Induced [specify drug(s) if used]

3. Referral status [

1. Not Referred

2. Referred

4. Delay in Heath Centre [referral]

1. Yes

2. No

5. Complications in labor (tick

1. Pre eclampsia

2. Eclampsia [

3. Ruptured uterus

4. Obstructed labour [

5. Cord prolapse [

6. Nuchal cord [

7. Premature labour [

8. Post term labour [

9. APH- Placenta praevia [PP] [

-Abruptio placenta [API

10. Prolonged labour [

11. Malpresentation [specify] [

12. Any febrile illness? [Specify] .

13. Others [specify]…….

6. Mode of delivery [

1. Spontaneous Vertex Dehvery

2. Caesarian section

3. Breech delivery

4. Vacuum extraction

5. Forceps delivery

6. Other [specify

7. Birth weight [Grams']

8. Sex

    1. Female

    2. Male

Approval letter