

**FACTORS ASSOCIATED WITH FAILED VAGINAL DELIVERY
IN WOMEN WITH ONE PREVIOUS CAESAREAN SECTION AT
THE UNIVERSITY TEACHING HOSPITAL, LUSAKA, ZAMBIA**

BY

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Dissertation submitted to the University of Zambia in partial fulfilment of
the requirements for the award of degree of Master of Medicine in
Obstetrics and Gynaecology

The University of Zambia

Lusaka

2019

DECLARATION

I declare that this dissertation is my original work and has never been presented or submitted anywhere for the award of any degree before. I therefore present it for the award of the degree of Master of Medicine in Obstetrics and Gynaecology of The University of Zambia, Lusaka, Zambia.

I further hereby state that this dissertation is entirely the result of my own personal effort. The various sources to which I am indebted have been clearly indicated in the acknowledgements and reference list.

SIGNED

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2019

APPROVAL

This dissertation of **Dr Gibson Nkhata** has been approved as fulfilling part of the requirements for the award of the degree of **Master of Medicine (Obstetrics and Gynaecology)** by the University of Zambia

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ABSTRACT

Trial of labour after one previous caesarean section is safe in appropriately selected women with the addition of adequate intrapartum monitoring and ready access to theatre when emergency caesarean section is indicated. The primary objective of this study was to explore the major obstetric outcomes and factors associated with failed VBAC at UTH- WNH Lusaka Zambia.

This was a comparative prospective cross-sectional study spanning from July 2017 to December 2017. A purposeful sample of 356 consenting women with one previous caesarean section who had a failed VBAC and women who had a successful VBAC in a ratio of 1:1 was studied.

The average annual delivery was 14,835. Successful VBAC accounted for 70.67% while 29.33% had failed VBAC. The data obtained from questionnaires was analysed using Statistical Package for Social Science (SPSS). There were 104(29.3%) women booked at UTH antenatal clinic as compared to 252 (70.7%) women enrolled in this study who were referred to UTH- WNH as it is a tertiary level referral hospital. Furthermore, although not statistically significant, more women with failed VBAC 39 (22%) had low birth weight babies compared to 25 (14%) of those with successful VBAC (p 0.132) and 20 (11%) had birth weight > 4000g versus successful VBAC 12 (7%) with (p 0.323). There was a great association with failed VBAC regarding maternal age, parity, number of ANC visits, gestational age at delivery, birth weight, Apgar score at one minute and Apgar score at five-minutes. TOLAC remains a moderately safe option for child birth at UTH-WNH Lusaka Zambia.

There is a significantly high VBAC success rate among carefully selected women undergoing trial of scar in Zambia although a decreasing trend towards TOLAC and a rising caesarean section rate were determined.

Key Words: Trial of Labour after Caesarean Section, Vaginal birth after caesarean section

DEDICATION

This is for all the faculty members of University Teaching Hospital's Women and Newborn Hospital's Department of Obstetrics and gynaecology and my supervisor

and

My Wife and children; your love and support helped me achieve the impossible. I am forever indebted to you all.

ACKNOWLEDGEMENTS

This dissertation would not have been possible without the unwavering support, encouragement and guidance from my supervisor, Prof. Bellington Vwalika.

I would also like to thank my wife Genevieve and my children Matamando, Mayamiko and Lumbani for their unconditional support and patience with me during the time that I undertook this study.

In addition, I wish to recognize the Department of Obstetrics and Gynecology, especially the labour ward staff, for the diligence and passion in their work.

I am sincerely thankful to my research assistant, Dr Panchal Smiti, for her selfless and invaluable input to the success of this study.

Lastly, but far from least, special acknowledgements go to all the participants for their contribution in this study at UTH's Women and Newborn Hospital.

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ABBREVIATIONS

ACOG	: American College of Obstetricians and Gynaecologists
AOR	: Adjusted odds ratio
ANC	: Antenatal care
BOH	: Bad obstetric history
CI	: Confidence Interval
CPD	: Cephalopelvic disproportion
GDM	: Gestational diabetes mellitus
IUGR	: Intrauterine growth restriction
NICU	: Neonatal intensive care unit
OR	: Odds ratio
RCOG	: Royal College of Obstetricians and Gynaecologists
PE	: Preeclampsia
SPE	: Severe preeclampsia
TOLAC	: Trial of Labour after Caesarean
VBAC	: Vaginal Birth after Caesarean

CHAPTER ONE: INTRODUCTION

1.1 Background

Trial of labour after previous caesarean delivery (TOLAC) provides women who desire a vaginal delivery with the possibility of achieving that goal—a vaginal birth after caesarean delivery (VBAC). TOLAC provides a chance for vaginal delivery in women with one previous caesarean section to achieve a spontaneous vaginal delivery (SVD), the most appropriate mode of subsequent delivery of women with prior caesarean birth, but this continues to be a subject of intense research and debate in contemporary obstetric practice (ACOG, 2010). This remains a major public health issue because the two options for delivery (planned elective repeat caesarean or planned vaginal birth) in a subsequent pregnancy from women with one previous caesarean birth are associated with both significant maternal and perinatal benefits and risks. Vaginal birth after caesarean delivery (VBAC) has long been proposed as a viable measure to reduce overall caesarean delivery rates in both developed and developing countries. It has been found to be safe with careful patient selection and good management of labour with success rates ranging between 60% and 80%.

Trial of labour after previous caesarean delivery (TOLAC) provides women who desire a vaginal delivery with the possibility of achieving that goal—a vaginal birth after caesarean delivery (VBAC). In addition to fulfilling a patient's preference for vaginal delivery, at an individual level VBAC is associated with decreased maternal morbidity and a decreased risk of complications in future pregnancies. VBAC at UTH-WNH is only considered in women who have had only one caesarean section. At a population level, VBAC also is associated with a decrease in the overall caesarean delivery rate. (Obstetrics and Gynecology, 2010)

The term trial of labour refers to a trial of labour in women who have had one previous caesarean delivery, regardless of the outcome. The term vaginal birth after caesarean delivery is used to denote a vaginal delivery after a trial of labour.

In general, prior attempts to develop a means of predicting a successful VBAC trial have not been successful. Vaginal birth after a previous caesarean section is a safe option for many women (Macones GA, 2005). This is true in several countries, especially in the Middle East where the reproductive pattern is characterized by a pregnancy starting at an early age and high fertility throughout the reproductive years.

Therefore, after a caesarean section, many women prefer a vaginal birth in order to reduce the consequences and complications of multiple caesarean sections especially for continuing fertility. However, the proportion of women who opt vaginal delivery globally after a prior caesarean delivery has decreased rapidly because of concern about safety (Guise, 2004). The decline in VBAC is not without clinical implications. Multiple caesarean sections are associated with complications such as placenta praevia and placenta accreta which increases morbidity and mortality. Table 1 shows the various factors associated with successful VBAC.

Table 1: Factors associated with likelihood of successful VBAC

Increased Chance of Success	Decreased Chance of Success
Prior vaginal delivery	Maternal obesity
Prior VBAC	Short maternal stature
Spontaneous labour	Macrosomia
Favourable cervix	Increased maternal age (>40 y)
Nonrecurring indication (breech presentation, placenta praevia, herpes)	Induction of labour
Preterm delivery	Recurring indication (cephalopelvic disproportion, failed second stage)
	Increased interpregnancy weight gain
	Latina or African American race/ethnicity
	Gestational age ≥ 41 wks.
	Preconceptional or gestational diabetes mellitus

Although attempts at a trial of labor after a cesarean birth (TOLAC) have become accepted practice, the rate of successful vaginal birth after cesarean delivery (VBAC), as well as the rate of attempted VBACs, has decreased during the past 10 years. One of the most significant risks women face when considering a trial of labour is that of uterine rupture. This potentially fatal event may have significant maternal and neonatal sequelae. A threshold of acceptable risk has been established between the risk reported in women with prior caesarean delivery (0.5-1%) and that seen in women with a history of a prior classic caesarean delivery (6-12%). The latter patients, along with women who have undergone meteroplasties for uterine anomalies or myomectomies that have entered the uterine cavity, are discouraged from attempting VBAC. (Guise JM, et al, 2010).

Trial of labour after previous caesarean section (TOLAC) is a major health issue in Zambia. Obstetric outcomes of and associated factors of unsuccessful VBAC in women with one previous caesarean section at UTH-WNH were not clearly understood, defined and documented. This study endeavoured to explore this aspect.

1.2 Problem Statement

Although caesarean rate is rising uncontrollably globally, there remains considerable controversy over what constitute the appropriate caesarean section rate for a given maternal population. In 1985, the World Health Organization quantified that there is no justification for any region of the world to exceed caesarean birth rate of 15%. The institutional caesarean section rate at the University Teaching Hospital's Women and Newborn Hospital (UTH-WNH), where the current study was carried out, is high and prior caesarean section is a major contributing factor for a repeat caesarean section. Recent systematic review concluded that VBAC is a reasonable and safe choice for majority of women with prior caesarean section. However, most of the studies included in the analysis were conducted in the developed countries where there is adequate labour monitoring and ready availability of theatre for immediate delivery in emergency situations. (Naji et al, 2013).

Furthermore, there exist real practical challenges in low resource settings such as Sub-Saharan Africa which might result in severe maternal and perinatal adverse outcomes including deaths in women slated for trial of labour after a prior caesarean delivery (TOLAC). Notwithstanding these inherent unfavourable factors for successful VBAC, TOLAC has been practiced for several decades in these areas with significant success although unacceptable untoward outcomes have been reported. The obvious daunting question remains largely unanswered: in Sub-Saharan Africa where the luxury of optimal intrapartum maternal and fetal monitoring barely exists coupled with the lack of adequate preparedness for emergency delivery, if urgently indicated, one wonders if it is still ethically acceptable to practice TOLAC in such settings. It is worth remarking that there is no reliable and demonstrable attribute that always correctly identifies and accurately predicts those women with a prior caesarean who will achieve successful VBAC. (Das and Varma, 2012).

1.3 Study Justification

Trial of labour in women with a previous caesarean section is an important practice that is carried out commonly in modern day obstetrics. The procedure is not always successful and sometimes fails to achieve a safe vaginal delivery. Little was known about factors that lead to failure of VBAC at UTH-WNH. It was over 21 years ago when the last prospective study on outcomes of labour following one previous caesarean section at UTH, Lusaka by Mwanahamuntu (1999). No follow up study had ever been done to look at and address some of the compounding factors observed in that study with some of the recommendations. Gaps still exist in the knowledge on factors associated with failed VBAC at UTH- WNH. The existing information on this topic was deemed inadequate and old. In the meantime, UTH-WNH continued to attend to women with failed VBAC on a daily basis with many of them referred from the local clinics in and around Lusaka for various reasons and pregnancy related complications. In this regard there was need to generate new evidence and establish what was prevailing in terms of associated factors and obstetric outcomes with regard to failed VBAC. This evidence could be used to influence change towards improving obstetric service to women being offered TOLAC. This was a prospective study and the author had complete custody of participants' hospital records and files throughout the study period. This study therefore explored the factors associated with unsuccessful VBAC and may thus enable the institution and the health care providers to have enough data when counselling women for VBAC and also help in forming evidence-based protocols on which candidates in our local setting should they decide to undergo trial of labour after caesarean section.

1.4 Research Question

What are the obstetric outcomes and factors associated with failed VBAC in women with one previous caesarean section at the University Teaching Hospital's Women and Newborn Hospital, Lusaka, Zambia?

1.5 Objectives

1.5.1 General objectives:

The aim of this study was to investigate and compare the major obstetric outcomes and factors associated with failed VBAC at UTH- WNH, Lusaka, Zambia.

1.5.2 Specific objectives:

- i.** To determine the obstetric outcomes associated with VBAC
- ii.** To identify factors associated with failed VBAC
- iii.** To compare the obstetric outcomes and factors associated with failed VBAC

1.6 Definitions

In this study, successful VBAC rate was defined as the percentage of women with prior caesarean section who attempted a trial of labour and achieved vaginal birth. Failed TOLAC (failed VBAC) was defined as the proportion of women who attempted trial of labour after previous caesarean section that resulted in a repeat caesarean delivery. Uterine rupture was defined as the disruption or tear of the uterine muscle and visceral peritoneum, or separation of the uterine muscle with extension to the bladder or broad ligament with or without protrusion of fetus/fetal parts outside the uterus.

1.7 Organisation of the Dissertation

The dissertation is organised as follows:

1. Chapter One is entitled Introduction provides the Background of the subject matter of vaginal birth after caesarean (VBAC) and then summarises the Problem Statement, Justification, Research Question, Objectives and Specific Objectives.
2. Chapter Two is the Literature Review which summarises the relevant global, regional and the local literature around vaginal birth after caesarean.
3. Chapter Three contains the Methodology. This describes the study design, the study site, the target and study population, the inclusion and exclusion criteria, sampling strategies and sample size, study procedures and data collection techniques, data analysis plan, ethical considerations and the study limitations.
4. Chapter Four describes the demographic characteristics of the study participants stratified by successful and failed VBAC, the pregnancy characteristics, indications for caesarean section, and factors associated with failed VBAC.
5. Chapter Five is the Discussion that reviews the results and explains their significance in the local context and also with respect to previously published results from elsewhere.
6. In Chapter Six, the Conclusions based on the findings and Recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The factors associated with failed VBAC are many. As practitioners experience complications related to managing patients undergoing trials of labour after caesarean delivery, they are less likely to allow new patients to undergo a trial of labour after caesarean delivery. In addition, guidelines from the American College of Obstetricians and Gynaecologists (ACOG, 2010) stated explicitly that patients undergoing TOLAC require the presence of an obstetrician, an anaesthesiologist, and/or a staff capable of performing an emergency caesarean delivery throughout the patient's active phase of labour.

However there has been markedly decline in the rates of successful VBAC. Twenty-six percent of all in the United States now result in caesarean section, and this rate has been rising steadily in recent years. However, the rate of vaginal birth after caesarean section (VBAC) has been declining steadily. Among women with previous caesarean section, the likelihood of VBAC was 9% in 2003 compared with 19% in 1989. Whereas academic centres and larger community hospitals are able to comply with these requirements, many smaller hospitals do not offer in-house anaesthesia or obstetric staff. The impact of these changes can be observed in national birth statistics.

2.2 Global perspective

The caesarean delivery rate peaked at 25% in 1988 but then declined to 21% overall in 1996. From 1996 to 2004, however, the caesarean delivery rate increased to 29.2%, while the rate of VBAC declined from 28% to 9%. On the assumption that the overall VBAC success rate is about 70%, this correlates with a decline from 40% to 14% in the number of patients choosing to undergo TOLAC. What once was hailed as a key component of lowering the overall caesarean birth rate (i.e., TOLAC) is losing the support it had in the 1980s. Overall, this has led to a rate of caesarean delivery of 31.1% in 2006, which is the highest rate in US history and shows no signs of decreasing. Approximately 26% of the 4 million births per year in the United States are caesarean deliveries and this number will only continue to grow as the role of elective primary caesarean delivery is further expanded. Over the past 2 decades, obstetricians have been encouraged to offer women with a previous low transverse caesarean an attempt at vaginal birth. Past research has indicated that a strategy of vaginal birth after caesarean

delivery (VBAC) has a reasonable success rate—as high as 60–80% in the overall VBAC population. (Guise JM, 2010). However, these success rates differ based on clinical factors. More recent research has focused on maternal and neonatal risks associated with VBAC, as well as predictors of VBAC success and failure. (Little et al, 2008). Complication rates appear to be greatest in those who fail a trial of labour and subsequently require a caesarean delivery. (Macones GA, 2005). Conversely, safety is greatest in those who attempt a trial of labour after a prior caesarean delivery and are successful.

Several studies have found that many factors are associated with VBAC failure, such as preeclampsia, macrosomia, maternal obesity, and labour induction.

2.3 Regional perspective

In 1985, the World Health Organization quantified that there is no justification for any region of the world to exceed caesarean birth rate of 15%. A study which was done in Ghana showed that caesarean section rate at Korle Bu Teaching Hospital (KBTH) was high (33%) (Tuncalp O, Stanton C, Castro A et al, 2013). A prior caesarean section was a major contributing factor for a repeat caesarean section. A systematic review concluded that VBAC is a reasonable and safe choice for majority of women with prior caesarean section. However, most of the studies included in the analysis were conducted in the developed countries where there is adequate labour monitoring and ready availability of theatre for immediate delivery in emergency situations Guise JM, et al, (2010).

However, there exist real practical challenges in low resource settings such as West Africa which might result in severe maternal and perinatal adverse outcomes including deaths in women slated for trial of labour after a prior caesarean delivery (TOLAC). TOLAC has been practiced for several decades in these areas with significant success although unacceptable untoward outcomes have been reported. (Service Ghana, 2011). The obvious daunting question remains largely unanswered: in West Africa where the luxury of optimal intrapartum maternal and fetal monitoring barely exists coupled with the lack of adequate preparedness for emergency delivery, if urgently indicated, one wonders if it is still ethically acceptable to practice TOLAC in such settings. It is worth remarking that there is no reliable and demonstrable attribute that always correctly

identifies and accurately predicts those women with a prior caesarean who will achieve successful VBAC (Das et al, 2012).

2.4 Local perspective

Although caesarean rate is rising uncontrollably globally, there remains considerable controversy over what constitute the appropriate caesarean section rate for a given maternal population. The caesarean section rate at the University Teaching Hospital's Women and Newborn Hospital (UTH-WNH), where the current study was carried out, is high (33%) and prior caesarean section is a major contributing factor for a repeat caesarean section. Recent systematic review concluded that VBAC is a reasonable and safe choice for majority of women with prior caesarean section. However, most of the studies included in the analysis were conducted in the developed countries where there is adequate labour monitoring and ready availability of theatre for immediate delivery in emergency situations. In a study, 'the outcome of trial of labour and factors affecting outcome in previous caesarean section were assessed at UTH in 352 women who presented with one previous caesarean section over a period of 1 year between October 1995 and October 1996. The findings were that 148 out of 352 (42.0%) had a repeat caesarean section, some of which were elective (57 out of 352-16.2%) of the 265 who had a trial of labour, 204 (76%) managed a vaginal delivery. those who had a vaginal delivery after the primary caesarean had a significant higher chance of delivering vaginally (Odds ratio 3.88 p=0.001). Whereas, 40- 50% of women attempted VBAC in 1996, as few as 20% of patients with a prior caesarean delivery attempted a trial of labour in 2002. This number is drifting down toward the 10% mark with fewer than 10% of women achieving successful VBAC in 2005 (Little et al, 2008).

The decision to undergo TOLAC is an individual one that should be based on careful, thorough counselling. Maternal characteristics and obstetric history can provide a patient a rough estimate of her chance of a successful trial of labour. This same obstetric history can be used to estimate a patient's risk of uterine rupture.

If possible, avoid induction of labour, because induction of labour decreases the probability of success and increases the chance of uterine rupture in a trial of labour after caesarean delivery. Counselling patients who elect to undergo TOLAC should be evaluated early in labour and to manage the pregnancy in a hospital setting in which uterine rupture can be both recognized and managed expediently.

Undergoing 2 prior caesarean deliveries further increases the risks of uterine rupture in a subsequent pregnancy; thus, for a future pregnancy, having had a successful VBAC offers protection after undergoing the risk in the current pregnancy. Because no large, prospective, randomized, controlled trials have been [conducted, most of the risk factors have been determined from retrospective cohort and case-control studies. These studies have been increasingly analysed with multivariate techniques to control for confounding factors. However, control for physician practice is difficult, and physician practice can greatly impact the strength of the association between these risk factors and a successful VBAC.

There are many factors that are associated with the outcome, such as maternal characteristics.

It has been well known that weight and height of a mother does have the effect on mode of delivery. Not surprising, women who are shorter and women who are obese are more likely to undergo caesarean delivery.

Maternal age has also been examined in several studies in VBAC literature. With confounding factors adjusted for, women older than 40 years who have had a prior caesarean delivery have an almost 3-fold higher risk for a failed trial of labour than do women younger than 40 years.

Maternal race or ethnicity has been examined as a predictor for VBAC in the setting of trial of labour and has not generally been noted to be a strong predictor. However, in the recent Maternal-Foetal Medicine Unit (MFMU) Caesarean Registry, both Hispanic ethnicity and African American ethnicity were associated with lower rates of successful trial of labour. Whether this association is due to actual biologic reasons or whether ethnicity is acting as a proxy for some other factor or factors remains to be elucidated. (Varner et al, 2005)

Birth weight greater than 4000g is associated with an almost 4-fold higher risk of caesarean birth among nulliparous women. Several studies have demonstrated a difference in VBAC rates between patients with a birth weight greater than 4000 g and those with a lower birth weight. In accordance with these findings, several studies have demonstrated a higher failure of a trial of labour with increasing birth weight.

Obstetric history is enormously important in terms of risk factors for successful TOLAC. Predictors of increased success include a nonrecurring indication for prior caesarean delivery (e.g. breech presentation, placenta praevia) and prior vaginal delivery. A history of cephalo-pelvic disproportion (CPD), failure to progress, no prior vaginal deliveries, or a prior caesarean delivery performed in the second stage of labour are negative predictors of success in a subsequent trial of labour.

Several studies have examined indications for prior caesarean delivery as a predictor of outcome in subsequent TOLAC. In all studies, CPD had the lowest VBAC success rate (60-65%). Foetal distress (e.g. no reassuring foetal testing) had the second lowest success rate of VBAC (69-73%). Nonrecurring indications, such as breech birth, herpes, and placenta prevail, were associated with the highest rates of success (77-89%). Failure to progress, CPD, or dystocia as indications prior caesarean delivery are also associated with a higher proportion of patients not attempting a trial of labour after caesarean birth. In a meta-analysis of the existing literature prior to 1990, Rosen and Dickinson (1990) showed that women whose prior caesarean delivery was performed for CPD were twice as likely to have an unsuccessful trial of labour.

In an unadjusted comparison, patients with 1 prior vaginal delivery had an 89% VBAC success rate compared with a 70% success rate in patients without a prior vaginal delivery. In comparable comparisons controlling for confounding factors, odds ratios of 0.3-0.5 for rate of caesarean delivery are found. Among patients with a prior VBAC, the success rate is 93%, compared with 85% in patients with a vaginal delivery prior to their caesarean birth but no prior VBAC. These findings have been repeatedly validated by multiple studies.

Only 1 study carefully examines cervical dilation at prior caesarean delivery. In this study, the degree of cervical dilation in the prior delivery is directly associated with the likelihood of success in a subsequent trial of labour. For example, 67% of patients who were dilated 5 cm or less at the time of their delivery had a successful VBAC, compared with 73% of patients who were dilated 6-9 cm.

The success rate is much lower for patients whose labour arrested in the second stage: only 13% of patients who were fully dilated at the time of their prior delivery had a successful VBAC. In a similar study, patients who had their prior caesarean delivery in the first stage of labour had a lower rate of caesarean delivery than those who had their

prior caesarean delivery in the second stage of labour. However, in this study, 66% of patients who had a caesarean delivery for dystocia in the second stage had a successful VBAC. (Rosen and Dickinson, 1990)

Patients who undergo induction of labour are at a higher risk of caesarean delivery than women who experience spontaneous labour. This finding has also been observed in women with a prior caesarean delivery. Several studies have demonstrated that women who are induced in TOLAC have a 2- to 3-fold increased risk of caesarean delivery compared with those who present with spontaneous labour.

The timing between pregnancies has recently become an interesting predictor for a number of obstetric outcomes, VBAC success among them. In 1 analysis, women who had an inter pregnancy interval of more than 18 months had an 86% chance of VBAC success, while women whose inter pregnancy interval was less than 18 months had a VBAC success rate of 79%. This difference was not statistically significant, and it remains unclear whether the inter pregnancy interval actually affects the success rate or whether it affects only the risk of uterine rupture.

Whereas the uterine hysterotomy had traditionally been closed in several layers, in the 1990s physicians at many institutions began closing the Kerr hysterotomy in a single layer. Because the lower uterine segment is quite thin, a single layer often afforded adequate haemostasis. Several recent studies have compared women whose hysterotomy was closed in a single layer with those whose hysterotomy was closed in 2 layers. Adjusted odds ratios of 3 to 4 for uterine rupture have been estimated for women who have a single-layer closure.

Prior vaginal delivery appears to be protective for subsequent uterine rupture. A 2000 study by Zelop et al (2000) demonstrated that patients with a prior vaginal delivery had a 0.2% rate of rupture compared with 1.1% for patients with no prior vaginal delivery. An adjusted odds ratio controlling for confounding factors was 6.2.

No studies have compared the rate of uterine rupture in patients with a prior VBAC with those with a vaginal delivery before their prior caesarean delivery. These findings have been validated in subsequent studies, though the effect size has not been quite as large. A recent study demonstrated that women who had an infection at the time of the caesarean delivery have an increased rate of uterine rupture in a subsequent trial of labour. The assumed causal mechanism is poor healing of the hysterotomy secondary to the infection.

While labour appears to be a risk factor for uterine rupture, many patients experience a uterine rupture prior to the onset of labour. In a large study using birth certificate data, one study found that the rate of uterine rupture before the onset of labour was 0.5%. Patients at greatest risk are those with prior classical hysterotomies. As a result of this potential risk, these patients are usually scheduled for delivery at 36-37 weeks' gestation. (Lydon-Rochelle et al, 2001)

Patients with more than 1 prior caesarean delivery are at increased risk of uterine rupture. The unadjusted rate of uterine rupture for patients with 2 prior uterine incisions ranges from 1.8% to 3.7%. One analysis demonstrated that when potential confounding variables (e.g., prior vaginal delivery) are controlled for, patients who have had 2 prior caesarean deliveries have 5 times the risk of uterine rupture compared with patients who have had only 1 prior caesarean delivery. This finding contradicted several earlier studies that did not control for confounding factors, most importantly prior vaginal delivery.

One of the most significant risks women face when considering a trial of labour is that of uterine rupture. This potentially fatal event may have significant maternal and neonatal sequelae.

A threshold of acceptable risk has been established between the risk reported in women with 1 prior caesarean delivery (0.5-1%) and that seen in women with a history of a prior classic caesarean delivery (6-12%). The latter patients, along with women who have undergone metroplasties for uterine anomalies or myomectomies that have entered the uterine cavity, are discouraged from attempting VBAC. When an operative report of a patient's prior caesarean delivery is unavailable, the obstetric history may be helpful in determining the type of uterine incision. For example, a patient who underwent a caesarean delivery for a breech presentation at 28 weeks' gestation has a much higher risk of a vertical uterine incision than the patient at term with arrest of dilation. Because most caesarean deliveries are via low transverse hysterotomies, the risk of uterine rupture for patients with an unknown uterine scar is usually similar to that of patients with a prior transverse incision. A case-control study of patients with and without uterine rupture did not find unknown hysterotomy to be a risk factor compared with low transverse hysterotomy. (Leung et al, 1993).

According to the 2010 ACOG guidelines, TOLAC is not contraindicated for women with previous caesarean delivery with an unknown uterine scar type unless clinical suspicion of a previous classical uterine incision is high.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study Design

This was a case-control study.

3.2 Study Setting

This study was conducted at the University Teaching Hospitals Women and Newborn Hospital in Lusaka, Zambia, which is the largest tertiary hospital in Zambia with total deliveries of approximately 14,800 per year. Generally, it serves as a referral hospital with a catchment area of about 50km radius and a population of over 3 million. In UTH-WNH, antenatal clinics are conducted for pregnant women on daily basis and women with a previous caesarean section are considered as high-risk obstetric population among others. These women are usually assessed thoroughly in the antenatal period to determine whether they would benefit from planned or elective repeat caesarean section or planned trial of labour after prior caesarean section (TOLAC) based on their individual characteristics such as the past and present obstetric history.

3.3 Target Population

All pregnant women with one previous caesarean section in labour

3.4 Study Population

Pregnant women with one previous caesarean section who delivered at UTH-WNH during the study period, and met the eligibility criteria. Each successful case of TOLAC was matched with another that required caesarean section.

3.5 Inclusion Criteria

- i. Must be singleton
- ii. Cephalic presentation
- iii. Without any other obstetric indication for caesarean section
- iv. Consenting and assenting women to participate in the study.

3.6 Exclusion criteria:

- i. Primigravida
- ii. Individuals with bone or hip disorder
- iii. Multiple pregnancies
- iv. Women without a consent or opted out

3.7 Study Period

This study was carried out between July 2017 and December 2017.

3.8 Sampling Procedure and sample size

The sample size was calculated using Open Epi version 3, a free, web-based, open source, operating system - independent series for use in epidemiology, biostatistics, public health, and medicine that provides a number of epidemiologic and statistical tools for summarising data (Sullivan, Dean, and Soe, 2009). Using this tool and 33% as current magnitude of women undergoing caesarean section due to failed and successful VBAC, a total sample of 356 women was calculated. To provide a 1:1 ratio comparison, 178 women who had one previous caesarean section and failed VBAC and 178 women with successful VBAC, meeting the eligibility criteria were purposefully selected. The degree of certainty (confidence) chosen for this study was 95% (with a cut off value of the appropriate probability distribution of 1.96) and the margin of error at 5%.

3.9 Data collection

Structured interviews were conducted on women with one previous caesarean section undergoing TOLAC at term, at UTH-WNH. Thereafter, they were asked to give voluntary written or verbal consent to take part in the study. The participants were free to seek clarifications and if at any point they felt like withdrawing from the study, they were free to withdraw from the study without penalty. They were informed on the procedure of the interview process. Study participants were identified by serial numbers to maintain their confidentiality. The data obtained will have no impact to faculty employment or student education. The study results are treated confidentially with no personally identifying information exposed.

A questionnaire was used as a data collection tool (Appendix A). This included entering the patient's initials, date, referring centre, education level, age, social status, employment status, religion, gestation age, parity, marital status, successful VBAC and year with outcome, duration of labour, absence or presence of membranes, complications, reasons of caesarean section, and the outcome.

The questionnaire was the same for all participants and was divided into three parts namely demographics, past obstetric history and index pregnancy.

The participants were asked questions according to the questionnaire and in a language they understood. In case of language barrier, an interpreter was used.

3.10 Variables of Interest

Table 2 lists the variables to be analysed.

Table 2: Dependent and Independent Variables

Independent variables (in alphabetical order)	Type (continuous or categorical; if categorical – nominal or ordinal)	Notes
Age	Continuous	Subsequently will be categorised into discrete categories (e.g. <16, 17-19, 20-24 etc).
Birth weight	Continuous	Categorised into discrete categories (e.g.2000g to 2400g, 2500g to 2900g).
Bishop score	Categorical (ordinal)	Categorised into discrete categories (e.g. . 1-2, 2-4, 5 - 7)).
Gestation age	Continuous (nominal)	Categorised into discrete categories (e.g. 37 to 38, 39 to 40).
Liquor foul smelling	Categorical (dichotomous)	Categorised as yes or no.
Marital status	Categorical (nominal)	Married, single, widowed, divorced.
Membranes ruptured	Categorical (dichotomous)	Categorised as yes or no
Primary dependent variables	Type	Notes
Eventual mode of delivery	Categorical (ordered)	Vaginal or caesarean.
Secondary dependable variables		
Uterine hyperstimulation present	Categorical	Categorised as yes or no.
Apgar score at 5min	Continuous variable	<7 at 5min.
Ruptured uterus	Categorical	Categorised as yes or no.

3.11 Data Analysis

While the process of data collection was going on, checking for data accuracy was being done at the end of each day after the data was collected. Double entry of data was also done to minimise typing errors. Quantitative data was captured, cleaned and analysed

using a Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were computed for various variables that were created. The findings on the women with one previous caesarean section for TOLAC were compared between those with successful and those with failed VBAC. Suitable tests of significance were applied for comparing results. The chi-square test was used to test for association among categorical variables with 0.05 as level of significance. To assess the strength of association among the variables, bivariate and multivariate logistic regression was done from which odds ratios were generated at 95% confidence interval.

3.12 Ethical Consideration

Each participant was fully informed about the study and participation in the study was completely voluntary. The risks and benefits of the study were explained to the participants (Appendix B). The importance of the study in adding to the existing body of knowledge and influencing policy makers in protocol formulation was fully explained to all participants. Participants were informed that those who did not want to sign or fingerprint the written consent/ assent forms (for those under 18) (Appendix C and D) would not be interviewed and their refusal/ inability to participate would not have any negative consequences. Confidentiality was maintained throughout the study and anonymity was ensured by usage of initials and number without names. No compensation was given to participants. All documents relating to the study were kept by the researcher.

Approval from the Graduate Public Presentation Forum is appended (Appendix E). Ethical approval for the study was obtained from the Ethics committee of the University of Zambia, School of Medicine Biomedical Ethics Committee (UNZABREC) (Ethics clearance number 010-04-17) (Appendix F).

3.13 Study Limitations

- i. This study was carried out at a referral hospital providing tertiary level of care. The results could therefore have been influenced by the fact that most referrals are made to mothers who already have complications and thus more likely to have poor obstetric outcomes.
- ii. The findings may not be generalized to the whole country due to the nature of the institution at which the study was carried out from which is a tertiary hospital.

CHAPTER FOUR: RESULTS

A total of 6,732 deliveries were conducted at UTH-WNH during the six months study period. Out of these 4,309 (63.89%) and 2,207 (32.73%) were vaginal and caesarean deliveries respectively. The average annual delivery was 14,835. Successful VBAC accounted for 70.67% while 29.33 had failed VBAC. Among the total deliveries, 1,736 (11.7%) had a history of previous caesarean section out of which 587 (33.8%) and 686 (39.5%) were scheduled for planned repeat caesarean section and planned TOLAC respectively.

Socio-demographic characteristics

As tabulated in Table 3, the 356 study participants included 178 women with one previous caesarean section who had failed VBAC and those who had successful VBAC in the ratio of 1:1 aged between 19 and 45 years. The mean age for women failed VBAC and successful VBAC was 31.3 years and 37.6 years respectively. Of those with successful VBAC 87.3% were married while those with failed VBAC 52.7% were married.

Table 3: Socio-demographic characteristics - Successful versus failed VBAC

Variable	Successful VBAC (N=178)	Failed VBAC (N=178)	P value
	No. (%)	No. (%)	
Age(years)			0.001
<35	110(62)	14(8)	
>35	68(38)	164 (92)	
Mean Age	31,3	37.6	<0.001
Education level			0.004
No education:	14(7.9)	0(0)	
Primary	33(18.4)	2(1.1)	
Secondary:	109(61.2)	116(65)	
Tertiary;	22(12.5)	60(33.9)	
Employed			0.002
Yes:	67(37.6)	79(44.4)	
No:	111(62.4)	99(55.6)	
BMI			0.027
<30	56(31.5)	83(46.6)	
>30	122(68.5)	95(53.4)	
Alcohol Drinking			0.001
Yes:	34(19.1)	47(26.4)	
No:	144(80.9)	131(73.6)	

Pregnancy characteristics

As tabulated in Table 4, the study participants that failed VBAC were slightly younger (31.08 vs 30.89 years (p,0.001) and generally of lower parity, gestational age, and Apgar scores at 1 and 5 minutes. However, they were of higher birthweight (3.34 vs 3.29kg, p=<0.001).

Table 4: Pregnancy characteristics - Successful versus Failed VBAC

Variable	Successful VBAC (mean±SD) N=178	P value	Failed VBAC (mean±SD) N=178	P value
Maternal age (years)	31.08 ± 4.99	<0.001	30.89 ± 4.99	<0.001
Gravidity	3.17 ± 1.49	0.124	3.13 ± 1.43	0.206
Parity	1.63 ± 1.10	0.127	1.61 ± 1.07	0.001
Number of ANC visits	7.15 ± 2.54	<0.001	6.78 ± 2.67	0.072
GA at delivery (weeks)	38.74 ± 2.07	<0.001	38.51 ± 2.23	<0.001
Birth weight (kg)	3.29 ± 0.64	<0.001	3.34 ± 0.68	<0.001
Apgar score at 1 min	7.17 ± 1.48	<0.001	6.33 ± 1.73	<0.026
Apgar score at 5 min	8.72 ± 1.48	<0.001	7.56 ± 1.80	<0.019

Indications for repeat caesarean section

The major indications for elective and emergency repeat caesarean section among women undergoing TOLAC are shown in Table 5. There were CPD (16.9%), failure to progress (17.4%), severe preeclampsia/eclampsia (15.7%), fetal macrosomia (14.0%), slow progress of labour (12.4%) and fetal distress (9.6%). Other indications included gestational diabetes mellitus and intrauterine growth restriction.

Table 5 Indications for repeat caesarean section in women with one previous CS

Planned/Elective repeat caesarean section		Failed VBAC	
Indication	N (%)	Indications	N (%)
Malpresentation	19 (10.7)	CPD	30 (16.9).
Antepartum haemorrhage	9(5.0)	Slow progress	22 (12.4)
Preeclampsia/eclampsia	15(8.4)	Failure to progress	31(17.4)
Fetal macrosomia	25(14.0)	Fetal distress	17 (9.6)
Bad obstetric history	18 (10.1)	Big baby	21(11.8)
Previous myomectomy	10(5.6)	Ruptured uterus*	10 (5.6)
Postdates	29 (16.3)	Severe PE/eclampsia	28(15.7)
Contracted pelvis	14(7.9)	Malpresentation	6 (3.4)
Maternal request	6(3.4)	Miscellaneous	13 (7.3)
Prolonged prom	5(2.8)		-
Retroviral infection	10(5.6)		-
Sickle cell disease	4(2.2)		-
GDM	3 (1.9)		-
IUGR	5 (2.8)		-
Miscellaneous	6(3.4)		-
Total	178 (100.0)	Total	178 (100.0)

Effect of Gestational age on success of VBAC

There was a general increasing successful VBAC rate with advancing gestational age from 34 weeks, peaking at 37 weeks, with a successful TOLAC rate of 72.2% as shown in Table 6.

Table 6: Successful and Failed VBAC rates based on Gestational age at delivery

Gestational age at delivery in weeks	Successful VBAC n (%)	Failed VBAC n (%)	Total n (%)
<34	12 (62.7)	7 (37.3)	19 (5.4)
34	3 (55.6)	2 (44.4)	5 (1.5)
35	6 (62.7)	4 (37.3)	10 (2.7)
36	12(60.9)	8(39.1)	20 (5.6)
37	47 (72.2)	18 (27.8)	65 (18.3)
38	60 (69.6)	26 (30.4)	86 (24.1)
39	30(48.0)	32 (52.0)	62 (17.4)
40	36(56.3)	28 (43.7)	64 (18.0)
≥41	12 (48.3)	13 (51.7)	25 (7.0)
Total	178 (61.2)	178 (38.8)	356 (100.0)

Factors associated with failed VBAC-Multivariate analysis

As shown in Table 7, birth weights less than 1.5kg or greater than 3.5kg were associated significantly with higher incidence of failed VBAC and emergency repeat caesarean section. Birth weights ranging from 2.0 to 3.49kg were associated with significantly higher incidence of successful VBAC and reduced emergency repeat caesarean section rate. Birth weight of 2.5-2.99kg was associated with the lowest incidence of failed VBAC and repeat caesarean section. After controlling for confounding factors and using the multivariate logistic regression model, the factors in [Table 4.5](#) below remained significantly associated with failed VBAC. For instance, women who had a CPD in the preceding pregnancy had a 12.7times likelihood of having a failed VBAC than women with one previous caesarean section due to other indications (95% CI: 4.039- 39.906; p < 0.001). In addition, women who had foetal weight of at least 3500g had a 10.111 times likelihood of failed VBAC than weights below 3500g (95% CI: 2.241- 45.627; p 0.003).

Table 7: Multivariate regression analysis- factors associated with failed VBAC

Variable	P - value	Adjusted OR	95% CI	
			Lower	Upper
Advanced maternal age > 40	0.002	4.522	1.758	11.634
BMI > 30	0.053	0.332	0.109	1.012
Foetal Weight > 3500g	0.003	10.111	2.241	45.627
Early marriage	< 0.001	14.6	4.642	45.99
Gestational age > 39 weeks	0.028	0.208	0.051	0.841
Diabetes Mellitus	< 0.001	0.053	0.017	0.164
Bishop Score	< 0.006	0.229	0.08	0.652
CPD in preceding pregnancy	< 0.001	12.696	4.039	39.306
Grandmultiparity	0.032	6.944	1.187	40.637
Early rupture of membranes	< 0.001	0.576	0.475	0.698
Short stature height < 150cm	< 0.001	14.631	5,154	41.533

CHAPTER FIVE: DISCUSSION

The study findings suggest that several factors and adverse obstetric outcomes are associated with failed VBAC at UTH-WNH. There has been a reduction in the number of women undergoing VBAC and an increased rate of caesarean section (33% in 2017) from 26% in 1996. (Mwanahamuntu, 1999). The findings of increasing caesarean section rate may be partly due to the general global increase in caesarean section in contemporary obstetric practice. The overall caesarean section rate determined in this study was 33% which is unduly high and most of these were due to high rate of primary caesarean section resulting in large numbers of women with a previous caesarean section. (Dodd and Crowther, 2004). A recent study that validated women's self-report of emergency caesarean section in UTH-WNH showed that 35% parturients had a history of a previous caesarean section. The excessively high caesarean section rate determined in the hospital might be partly attributed to the fact that UTH-WNH is a tertiary referral centre for most of the clinics and first level health facilities in Lusaka and nearby towns. Most of the complicated labour cases and high-risk pregnancies are referred for specialized clinical management at UTH-WNH where consultants' input to the overall care is readily available. In Zambia, most of the normal and uncomplicated obstetric cases which do not require specialist consultation are managed successfully at the peripheral health institutions whereas the complicated ones are referred to the tertiary hospitals such as UTH-WNH.

5.1 Socio-demographic characteristics of the study participants

The majority i.e. 155 (87.3%) of the women with successful VBAC were married compared to 94 (52.7%) women who had failed VBAC. The mean age for women with unsuccessful VBAC was 37.6 years (p 0.001). Mean age for successful VBAC was 31.3 years giving an odds ratio of 0.345 (95% CI: 0.219- 0.544). In this study 84(47.3%) unmarried women had failed VBAC while 23 (12.7%) unmarried women had successful VBAC. Advanced age at TOLAC was statistically and significantly associated with failed VBAC (p <0.001) A woman with one previous caesarean section after the age of 37 was 14.6 times more likely to experience a failed VBAC than the one below 31 years (AOR 14.6, 95% CI: 4.642- 45.990). From the participants with successful VBAC 23 (12.7%) were single while 84 (47.3%) women with failed VBAC were single. Regarding educational background 32 (9.0%) had not received any formal education, 36 (10.1%) had primary, 241 (67.8%) had secondary school and 46 (13.0%)

had tertiary level education. The women with successful VBAC comprised 14 (7.9%) no formal education, 33 (18.4%) primary, 109 (61.2%) secondary while 22 (12.5%) had college education as compared to those with failed VBAC 0(0%) no formal education, 2 (1.1%) primary, 116 (65%) and 60 (33.9%) college education. The 178 women who had failed VBAC represented (21.3%) of the total deliveries (p <0.001, AOR 14.6; 95% CI: 5.15-41.53).

5.2 Successful versus failed VBAC

There were 104 (29.3%) women booked at UTH antenatal clinic as compared to 252 (70.7%) women enrolled in this study who were referred to UTH- WNH as it is a tertiary level referral hospital. Furthermore, although not statistically significant, more women with successful VBAC 39 (22%) had low birth weight babies compared to 25 (14%) of those with unsuccessful VBAC (p 0.132) and 20 (11%) had birth weight > 4000g versus women with successful VBAC 12 (7%) (p 0.323). In addition, out of the 34 participants with age above 40, 27 (80%) were among women with successful VBAC (p 0.052). Women with incomplete data, no delivery plan and multiple pregnancies were excluded from the final analysis and these constituted 26.7% (183) of the one previous caesarean population. Although the overall institutional caesarean section rate in UTH-WNH is high the country-wide rate is about 15% which is within the optimum caesarean section rate of 5-15% specified by WHO. Although the WHO stated that there is no justification for caesarean section rate of greater than 15% in any part of the world, current WHO assessment indicated that caesarean section rate has exceeded the specified maximum limit of 15% in most countries with as high as 45% reported in some countries. WHO asserts that caesarean section rate is still increasing uncontrollably and is often performed without an absolute medical indication resulting in potential maternal and perinatal short- and long-term health problems. The appropriate choice regarding the mode of delivery for women with a previous caesarean section remains unresolved because the two options (planned repeat caesarean section and TOLAC) for subsequent route of birth are associated with significant maternal and perinatal risks. The most worrying complication of TOLAC is uterine rupture which might result in peripartum hysterectomy with significant blood loss and or maternal and perinatal morbidity and mortality. In the current study 4.3% of women who underwent TOLAC had uterine rupture and this is far higher than the estimated rate of 0.7% for such cohort of women undergoing TOLAC. The major obstacle in deciding to embark

on TOLAC has always been the prediction of the success rate of vaginal delivery as well as knowing accurately when to abandon the trial of labour to avert serious obstetric outcomes. In the developed world it is relatively easy to go around this obstacle, but the situation is completely different in low resource settings like Sub-Saharan Africa where myriads of health system challenges as well as clinical management-related problems abound. The major underlying confounder to all these inherent issues revolves around severe poverty, high illiteracy rate and deep-rooted cultural practices. Notwithstanding the enumerated challenges TOLAC has been practiced in these regions for ages with significant success rates although there have also been major unacceptable and avoidable perinatal and maternal adverse outcomes including loss of lives. In all these successes and failures, it is worth remarking that no overwhelming dominance exists from current evidence to recommend a preferred mode of childbirth for expectant mothers with a history of a previous caesarean section. This cohort of women can opt for vaginal birth after caesarean section (VBAC) or elective caesarean section following adequate counselling and discussion with the attending Physician. The final decision on the mode of birth should be made before the expected delivery date, ideally by 36 weeks of gestation. The preference for mode of delivery opted for by the woman following antenatal counselling and provision of sufficient information should be duly respected and documented.

There have been a lot of models with multiple variables developed to predict the probability of successful VBAC but none of these has gained global popularity in contemporary obstetric practice due to lack of high predictability power and reproducibility. (Guise et al, 2010). In the Sub-Saharan African settings where adequate labour monitoring with cardiotocograph and immediate access to theatre in emergency situations are not readily available adequate education and counselling of the mother should be the ultimate in deciding the route of childbirth. Although we have recorded some successes, avoidable “near misses” and actual “misses” have occurred in our attempt at achieving VBAC in our sub-region. The daunting question is whether we should continue to practice TOLAC in the mist of real and potential mishap associated with this option. The other side of the coin is the entrenched perpetuation of poverty and lack of logistics which obviously precludes provision of caesarean section for all women with one previous caesarean section in the mist of the characteristic high fertility rate in our region. Other researchers have, therefore, recommended non-practice of TOLAC in such situations but the opposite is probably not realistic.

(Wanyonyi et al, 2013) recently identified specific concerns related to the conduct of TOLAC in East Africa such as poor maternal education, inefficiencies in healthcare delivery systems, inadequate human resources, lack of unit guidelines, and inadequate fetal monitoring. They recommended that the practice of VBAC should not be encouraged in the region unless these concerns have been resolved.

This study helped to determine that TOLAC still has a significant place in Sub-Saharan Africa (SSA) following appropriate patient education and counselling to allow informed choice with guidance from the attending physicians, coupled with well dedicated skilled birth attendants for optimum intrapartum monitoring. (Aisien et al, 2004). This is necessary because the merits of VBAC are well documented and these include low incidence of blood loss at delivery and transfusion, thromboembolism, puerperal infections, shorter duration of hospitalizations among others. There are, however, well documented factors associated with unsuccessful TOLAC such as advanced maternal age, gestational age greater than 40 weeks, maternal obesity, preeclampsia, short inter-pregnancy interval and increased neonatal birth weight and recurring indication like cephalopelvic disproportion (CPD).

The current study has determined a general downward trend of success rate of TOLAC over the study period with the overall rate of 61.2%, ranging from 52.8 to 70.1%. The high success rate recorded in our study might partly be ascribed to the specific methodology and strict inclusion criteria adopted. We specifically included women who were slated for TOLAC by the obstetricians during the antenatal period. (RCOG, 2007). All other women with a history of a previous caesarean who either delivered vaginally or via caesarean section but were not scheduled for TOLAC antenatally were excluded from the analysis. The idea behind these strict criteria of inclusion was to determine the true proportion of successful VBAC in order to assess the relativity between proper selection protocols and the associated failure rates and complications. This criteria-based inclusion and the subsequent success rate are very vital in the practice of VBAC in low resource settings like Sub Saharan Africa where the luxury of continuous and adequate monitoring of labour in general and specifically in TOLAC population is not readily attainable. In this study as much as 26.7% of the previous caesarean section population did not have any well- defined delivery plan stated in their medical records prior to onset of labour (either planned repeat caesarean section or TOLAC). This study has shown that with appropriate patient selection based on specific

criteria coupled with generous labour monitoring a higher VBAC rate can be achieved even in low resource settings like Zambia.

5.3 Successful and failed VBAC rates based on gestational age at delivery

From the study, factors associated with unsuccessful TOLAC have been outlined. In this regard we recommend careful history taking and physical examination, review of past medical records, discussing the options of delivery with women with a prior caesarean section and indicating the patient preferred choice in her medical notes, bearing in mind that the initial choice of the patient may change in the course of the pregnancy.

The VBAC success rate determined in the current study correlates with the rate of 64% previously reported over 10 years ago in the same hospital and this might be attributed to the stricter inclusion criteria used in our methodology in which we included only women with antenatally determined mode of delivery. It may also be due to general improvement in obstetric care in recent times as more women are slated for elective repeat caesarean section with only those with comparatively higher chances of vaginal birth being scheduled for TOLAC. In this study, women who had successful TOLAC were generally younger, with higher parity, lower GA and smaller birth weights. The highest percentages of successful VBAC occurred between the gestational ages of 37 and 38 weeks with a sharp decline at 39 weeks and beyond. We found a gradual improvement in the trends of VBAC rate from a gestational of 34 weeks peaking at 37 weeks with a successful TOLAC rate of 72.2%.

The current study was restricted to TOLAC in women with only one previous caesarean section at UTH-WNH although there have been publications in which successful vaginal deliveries have occurred after more than one prior caesarean section with varying success rates which indirectly correlate with the increasing number of previous caesarean section. In fact, other organizations recommend TOLAC in women who have had more than one previous low transverse caesarean deliveries based on the availability of adequate continuous intrapartum fetal monitoring coupled with ready access to theatre for emergency repeat caesarean section when it is urgently needed. (Mwanahamuntu,1999). At UTH-WNH and most Sub-Saharan African countries women with a prior history of two or more low transverse caesarean section are considered absolute contraindications to TOLAC based on the principle of significant increase in the risk of uterine rupture and relative lack of optimum intrapartum

monitoring. We recommend that two or more previous caesarean section remain absolute contraindication to TOLAC in the developing world where these challenges continue to exist. Other absolute contraindications include previous classical, low vertical T-and J uterine incisions as these are associated with increased risk of intrapartum uterine rupture.

In the conduct of TOLAC we recommend strict monitoring of patient on the WHO partograph as this has been shown to significantly reduce both maternal and perinatal morbidity and mortality. The use of the WHO partograph results in early detection of deviations from normal labour such as primary dysfunctional labour, secondary arrest of cervical dilatation which might signify early indication of CPD which is a major cause of uterine rupture. It is important to emphasize that adequately timed intermittent fetal heart auscultation in the conduct of VBAC is acceptable in areas where continuous monitoring is not readily accessible.

5.4 Indications for repeat caesarean section in women with one previous caesarean section

Among the women who had failed VBAC, CPD, slow progress and failure to progress constituted 45.4% of the indications for emergency repeat caesarean section. Severe preeclampsia/eclampsia accounted for 15.4% of the indications for caesarean section. In UTH-WNH, preeclampsia/eclampsia constitutes a very prevalent high-risk obstetric condition with significant adverse maternal outcomes, and it is therefore not surprising that it accounts for a significant proportion of caesarean indications.

Significant proportion of women had planned repeat caesarean section on account of maternal request, and this might be due to fear of childbirth (Tocophobia) which is partly attributed to fear of labour pain, concerns over poor outcome for mother or baby, or previous birth experiences. In general, the issue of maternal request as an indication for caesarean section is still debatable especially when there is no other obstetric indication. However, maternal request for caesarean section in the background of a previous caesarean section is generally considered as a veritable caesarean indication and should not be misconstrued as controversial. In such cases adequate patient education and counselling should be undertaken to ensure clear patient understanding of the risk-benefit ratio associated with TOLAC recounting that both options are not without maternal and fetal complications. We recommend that patient education and counselling in the process of informed decision making towards TOLAC or otherwise

should be initiated early in the antenatal period to enhance adequate comprehension of the realities related to the chosen mode of delivery. It is worth noting that such patient education might have a significant impact if initiated at the time of the primary caesarean section and revisited during the early stages of subsequent pregnancies.

We, also, found that previous adverse pregnancy outcome, commonly designated as bad obstetric history (BOH), constituted 9.2% of women who were excluded from TOLAC and that might have been influenced by maternal desire to avoid vaginal delivery. In this study the major reasons for exclusion from TOLAC were suspected fetal macrosomia, fetal malpresentation, preeclampsia/eclampsia, post- date, recurring indication and BOH.

The limitation of the study revolves around the prospective nature of the design which did not allow for detailed information about the study participants to be obtained as the decision for TOLAC was made by the attending doctor. There was very little direct contact with the study participants to obtain their views about the quality of care they received in the course of the TOLAC to avoid biasness. The strength of our study hinged on the large number of participants included in the study coupled with the stringent inclusion criteria with exclusion of women whose delivery plans were not adequately spelt out during the antenatal period. We recommend a large prospective study in our indigenous women to better understand the relativity of TOLAC and the associated complications and risks. This would inform policy and provide physicians with vital up-to-date information in helping women with one previous caesarean delivery to make informed decision regarding the mode of childbirth in subsequent maternities especially in our region. This will result in increased VBAC rates and improved quality of care among women undergoing TOLAC.

5.5 Multivariate logistic regression analysis of factors associated with failed VBAC

In the current study, birth weights of less than 1.5kg, and 3.5Kg or greater were associated significantly with higher incidence of failed TOLAC and emergency repeat caesarean section. On the other hand, birth weights ranging from 2.0 to 3.49kg were associated with significantly lower incidence of failed TOLAC and higher chances of successful VBAC. More specifically, birth weights between 2.5 and 2.99kg were associated with the lowest incidence of failed TOLAC and highest chances of successful VBAC. Mwanahamuntu et al 1996 determined that fetal weight greater than

3.45 kg tripled the odds of having a repeat caesarean section over 10 years ago at UTH-WNH hospital and this is comparable to the 3.5 kg or greater determined in our study. Factors associated with failed VBAC in women with one previous caesarean section undergoing trial of labour noted from the study included BMI above 30 (95% CI: 0.109- 1.012; $p < 0.001$), early rupture of membranes ($p < 0.001$; 0.576, 95% CI: 0.475- 0.698), advanced maternal age > 40 ($p < 0.002$; AOR 4.522, 95% CI 1.758-11.634) and CPD in preceding pregnancy ($p < 0.001$; AOR 12.70, 95% CI 4.04-39.91) at admission. Presence of malposition, increased maternal age and IUFD were also associated with failed VBAC. (Gregory et al, 2008). Increasing gestational age is associated with a decreased rate of successful VBAC. Three potential factors are related to the association of increasing gestational age with an increased rate of caesarean delivery: increasing birth weight, increased risk of fetal intolerance of labour, and increased need for induction of labour. Not surprisingly, patients who present to labour and delivery with advanced cervical examination findings have a greater success rate of vaginal birth. Several components of the cervical examination have been investigated, including cervical dilation and cervical effacement. Not surprisingly, the more advanced the cervical examination finding is upon initial presentation, the higher the rate of successful VBAC. Flamm et al study (1997) demonstrated that patients presenting with dilation greater than or equal to 4 cm had an 86% rate of VBAC.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

There is a significantly high vaginal birth after caesarean section (VBAC) success rate among carefully selected women undergoing trial of scar in UTH-WNH although a decreasing trend towards trial of labour after caesarean section (TOLAC) and a rising caesarean section rate were determined. Factors associated with unsuccessful VBAC included postdates, cervical dystocia, slow progress and CPD. TOLAC remains a viable option for childbirth in low resource settings like Sub-Saharan Africa even though there are specific clinical and management related challenges to overcome. Adequate patient education and counselling in addition to appropriate patient selection for TOLAC remains the cornerstone to achieving high VBAC success rate with minimal adverse outcomes in such settings.

6.2 Recommendations

The Ministry of Health and health care providers need to ensure that all women with previous caesarean section are identified early enough in their pregnancies as high-risk pregnancies and referred to appropriate health facilities where they can receive optimal care.

The Ministry of Health through health providers to provide full antenatal package with all investigations that need to be carried out at different gestations ages carried out.

The Ministry of Health needs to find ways of ensuring that those expectant mothers who cannot afford even the small fees such as for doing ultrasound scans and laboratory investigations are exempted and have these investigations done and not sent away or deterred from going for antenatal care for lack of having money to pay these fees. Such exemptions should be accessed easily without going through a tedious process that makes these mothers give up. The exemption could for example be done by the attending clinicians.

To ensure that hospitals are well staffed and high-risk pregnancies are seen at the level of registrar and above with a proper delivery plan in place.

The Ministry of Health to ensure that labour wards and operating theatres are well equipped and staffed at every level whenever a decision to offer TOLAC is made to reduce morbidity and mortality to women and new-born babies.

The Ministry of Health and stakeholders to enhance and improve the referral system by providing ambulances and support services.

REFERENCES

- ACOG. Gynecologists American. Vaginal birth after previous caesarean delivery. ACOG Practice bulletin no. 115 in *Obstet Gynecol.* 2010;116(2):450–463.
- Aisien AO, Oronsaye AU. Vaginal birth after one previous caesarean section in a tertiary institution in Nigeria. *J Obstet Gynaecol.* 2004;24(8):886–890.
- Amen Ness. *Obstetric Evidence Based Guidelines.* Informa UK Ltd; 2007. Vaginal birth after cesarean; pp. 99–106. Edited by Vincenzo Berghella.
- Das M, Varma R. Vaginal birth after caesarean section: a practical evidence-based approach. *Obstet Gynaecol Reprod Med.* 2012;22(7):177–185.
- Dodd J, Crowther C. Vaginal birth after Caesarean versus elective repeat Caesarean for women with a single prior Caesarean birth: a systematic review of the literature. *Aust N Z J Obstet Gynaecol.* 2004;44(5):387–391.
- Flamm BL, Geiger AM. Vaginal birth after cesarean delivery: an admission scoring system. *Obstetrics and Gynecology.* 1997;90:907–910.
- Gregory KD, Korst LM, Fridman M, Shihady I, Broussard P, Fink A, et al. Vaginal birth after cesarean: clinical risk factors associated with adverse outcome. *Am J Obstet Gynecol* 2008;198:452.e1–10; discussion 452.e10–2.
- Guise JM. Vaginal delivery after caesarean section. *BMJ.* 2004 Aug 14;329(7462):359-60. doi: 10.1136/bmj.329.7462.359. PubMed PMID: 15310587; PubMed Central PMCID: PMC509330.
- Guise JM, Denman MA, Emeis C, Marshall N, Walker M, Fu R, Janik R, Nygren P, Eden KB, McDonagh M Vaginal birth after cesarean: new insights on maternal and neonatal outcomes. *Obstet Gynecol.* 2010 Jun;115(6):1267-78.
- Leung AS, Farmer RM, Leung EK, Medearis AL, Paul RH. Risk factors associated with uterine rupture during trial of labor after cesarean delivery: a case-control study. *Am J Obstet Gynecol.* 1993 May;168(5):1358-63.
- Little MO, Lyerly AD, Mitchell LM, Armstrong EM, Harris LH, Kukla R, Kuppermann M. Mode of delivery: toward responsible inclusion of patient preferences. *Obstet Gynecol.* 2008 Oct;112(4):913-8. doi: 10.1097/AOG.0b013e3181888fd8.

Lydon-Rochelle M, Holt VL, Easterling TR, Martin DP. Risk of uterine rupture during labor among women with a prior cesarean delivery. *N Engl J Med.* 2001 5;345(1):3-8.

Macones GA, Peipert J, Nelson DB et al. Maternal complications with vaginal birth caesarean delivery. *Obstet Gynecol.* 2005, 193(2) 1656-1662.

McMahon MJ, Luther ER, Bowes WA Jr, Olshan AF. Comparison of a trial of labor with an elective second cesarean section. *N Engl J Med.* 1996 Sep 5;335(10):689-95.

Mwanahamuntu M. Outcome of labor following one previous caesarean section at the University Teaching Hospital, Lusaka. MMed Dissertation, 1999, University of Zambia, Lusaka.

Naji O, Wynants L, Smith A, Abdallah Y, Stalder C. Predicting successful vaginal birth after Cesarean section using a model based on Cesarean scar features examined by transvaginal sonography. *Ultrasound Obstet Gynecol.* 2013;41:672–678.

Obstetrics and Gynecology. Vaginal Birth After Cesarean: New insights. National Institutes of Health Consensus Development Conference state. 2010 115(6) 1279-1295

RCOG. Royal. Green-top guideline no 45. London: RCOG Press; 2007. Birth after caesarean birth.

Rosen MG, Dickinson JC. Vaginal birth after cesarean: a meta-analysis of indicators for success. *Obstet Gynecol.* 1990 Nov;76(5 Pt 1):865-9.

Service Ghana. Final Report. Accra, Ghana.: 2011. Ghana Multiple Indicator Cluster Survey with an Enhanced Malaria Module and Biomarker. https://www.unicef.org/ghana/Ghana_MICS_Final.pdf

Sullivan KM, Dean A, Soe MM. OpenEpi: a web-based epidemiologic and statistical calculator for public health. *Public Health Rep.* 2009 May-Jun;124(3):471-4. Pub

Tuncalp O, Stanton C, Castro A, Adanu R, Heymann M, Adu-Bonsaffoh K, Lattof SR, Blanc A, Lange A. Measuring Coverage in MNCH: Validating Women’s Self-Report of Emergency Caesarean Sections in Ghana and the Dominican Republic. *PLoS ONE.* 2013;8(5):e60761.

Varner MW, Leindecker S, Spong CY, Moawad AH, et al. The Maternal-Fetal Medicine Unit cesarean registry: trial of labor with a twin gestation. *Am J Obstet Gynecol.* 2005 Jul;193(1):135-40.

Wanyonyi SZ, Mukaindo AM, Stones W. Perspectives on the Practice of Vaginal birth after Caesarean Section in East Africa. *East African Medical Journal.* 2010;87:335–339.

(WHO cited in Lancet) Appropriate technology for birth. *Lancet.* 1985;2(8452):436–437. PMID: 2863457

WHO. Organization World. World Health Statistics. 2010. http://www.who.int/gho/publications/world_health_statistics/EN_WHS10_Full.pdf
http://www.who.int/gho/publications/world_health_statistics/EN_WHS10_Full.pdf

WHO. World. News release: Caesarean sections should only be performed when medically necessary. [April 15, 2015]. <http://www.who.int/mediacentre/news/releases/2015/caesarean-sections/en/>
<http://www.who.int/mediacentre/news/releases/2015/caesarean-sections/en/>

Zelop CM, Shipp TD, Repke JT, Cohen A, Caughey AB, Lieberman E. Uterine rupture during induced or augmented labor in gravid women with one prior caesarean delivery. *Am J Obstet Gynecol.* 1999 Oct;181(4):882-6.

Zelop CM, Shipp TD, Repke JT, Cohen A, Lieberman E. Effect of previous vaginal delivery on the risk of uterine rupture during a subsequent trial of labor. *Am J Obstet Gynecol.* 2000 Nov;183(5):1184-6.

Zelop CM, Shipp TD, Cohen A, Repke JT, Lieberman E. Trial of labor after 40 weeks' gestation in women with prior cesarean. *Obstet Gynecol.* 2001 Mar;97(3):391-3.

Zelop CM. Uterine rupture during a trial of labor after previous caesarean delivery. *Clin Perinatol.* 2011 Jun;38(2):277-84. doi: 10.1016/j.clp.2011.03.009.

APPENDICES

Appendix A: Questionnaire

Factors associated with failed trial of labour in women with a previous caesarean section for term and post-term pregnancies at UTH Lusaka

Socio-demographic and baseline health information

1. Participant ID _____
2. Date: _____
3. Age (years).....
4. Parity.....
5. Marital Status
 - a. Single ()
 - b. Married ()
 - c. Widowed ()
 - d. Divorced ()
 - e. Other (Specify) -----
6. Education Level.....
7. Occupation Type
 - a. Unemployed ()
 - b. Formal Employment ()
 - c. Informal Sector ()
 - d. Other (Specify) -----
8. Religion
 - a. Christian ()

- b. Muslim ()
- c. Hindu ()
- d. Other (Specify) -----

9. Residential Address _____ (write name of compound)

- a. High Density ()
- b. Medium Density ()
- c. Low Density ()
- d. Rural ()

10. Gestation age in weeks (indicate).....

11. Membranes already ruptured (tick)

- a. Yes ()
- b. No ()

12. Liquor foul smelling...

- a. Yes ()
- b. No ()

13. Bishop's score (indicate).....

14. Uterine hyperstimulation present (as recorded in notes)

- a. Yes ()
- b. No ()

15. Foetal heart rate non-reassuring following decision for VBAC

- a. Yes ()
- b. No ()

16. Change of colour of liquor to meconium stained

- a. Yes ()
 - b. No ()
17. Mode of delivery (tick)
- a. Vaginal delivery ()
 - b. Caesarean section ()
18. If delivery by caesarean section, indication:
- a. Cervical dystocia ()
 - b. Foetal distress ()
 - c. Cephalo-pelvic disproportion ()
 - d. Malposition ()
 - e. Others indicate.....
19. Birth weight in grams.....
20. Apgar score at 5 min.....
21. Admission to NICU after delivery
- a. Yes ()
 - b. No ()
22. Reason for admission to NICU (mention).....
23. Perinatal death
- a. Yes ()
 - b. No ()
24. Ruptured Uterus present
- a. Yes ()
 - b. No ()
25. Any other serious maternal morbidity (indicate).....

Appendix B: Participant Information Sheet

1. Introduction: My name is Gibson Nkhata. I am a postgraduate student studying at the School of Medicine, Department of Obstetrics and Gynaecology, University of Zambia. I am gathering information on the factors associated with failed vaginal birth in women with one previous caesarean section (VBAC) at the University Teaching Hospital's Women and Newborn Hospital (UTH-WNH), Lusaka, Zambia. The study is being done in partial fulfillment of the Master of Medicine, Obstetrics and Gynaecology (MMed O&G) degree from the University of Zambia. To participate in this study, one needs to have had one previous caesarean section and provide a written consent and delivering from UTH during the study period.

2. Confidentiality: The answers you volunteer to any of the questions asked will be completely **confidential**. Your name will not be written on any form and none of the information you give will ever be linked back to you or anyone you mention during the interview as it will be anonymous. It will not be possible to identify the information you give me when I write up the report

3. Risks / Benefits: For your information, there are no known risks associated with participating in this study. As a participant, you may not immediately benefit from the study, but the information given will help in improving the health care services provided and help in the formulation of a protocol for clients undergoing VBAC countrywide. There is also no compensation for participating in this study.

4. Voluntary participation: Participation in the study is completely voluntary

5. Right to withdraw or seek clarification: Furthermore, you do not have to answer questions you are not comfortable with, and you can choose to end the interview at any

time if you wished to. You are also free to ask for clarifications on any issue you are not clear about.

6. Provision of standard of care: there will be no negative consequences if you would prefer not to answer certain questions. The usual standard of care will be provided to you like any other patient regardless of your responses given. The care given to you will not be negatively affected by anything that relates to this study.

7. Contact details: If you have any questions about the research and your participation, you can contact me on the following address: Dr Gibson Nkhata, University Teaching Hospital's Women and Newborn Hospital, P/B RW1X, Lusaka. Mobile number: +260966559170/+260977559156; Email: nkhatagibson@yahoo.com or the Chairman UNZABREC, Ridgeway Campus, PO Box 50110, Lusaka, Phone number; +260211256067.

Appendix C: Record of Informed Consent

I confirm that I have been fully informed on the study ‘factors associated with failed vaginal birth in women with one previous caesarean section’ at the University Teaching Hospital (UTH), Lusaka, Zambia”. Its purpose is also clear to me. I am aware that my participation in the study is purely voluntary and that my answers to any of the questions will remain completely confidential. I also know that I do not have to answer any questions I do not want to and I can choose to end the interview at any time if I wished to. My name will not be written on any form and none of the information I give will ever be linked back to me or anyone I might mention during the interview as it will be anonymous. It will not be possible to identify the information I give when the report is completed.

Participant’s signature:Date:



Participant’s thumbprint:

Date:

Witness: Date:

Appendix D: Informed Assent Form for Pregnant Adolescents Aged 10 – 18 Years Willing to Participate in the Study

I am aware that the research is looking at factors associated with failed vaginal birth in women with one previous caesarean section at the University Teaching Hospital (UTH), Lusaka, Zambia. I also know that I will be interviewed for about 10 to 15 minutes. I had the information read to me and i have had my questions answered and know that I can ask questions later if I have them.

I agree voluntarily to take part in the research.

Name of participant:

Signature of participant:

Date: Place:

If unable to write:

A literate witness will sign. Participants who are illiterate will include their thumb print as well.

I have witnessed the accurate reading of the assent form to the participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness (not a parent): and

Thumb print of participant



Signature of witness:

Date:

Place:

I have accurately read the assent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given assent freely. I confirm that the individual has not been coerced into giving assent and the assent has been given freely and voluntarily

Name of researcher:

Date...../...../.....

Appendix E: GPPF Clearance



THE UNIVERSITY OF ZAMBIA

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Lusaka, Zambia

21 June 2016

Dr. Gilbert Nkhata
Department of Obstetrics and Gynaecology
University of Zambia
LUSAKA

Dear Dr. Nkhata,

RE: GRADUATE PROPOSAL PRESENTATION FORUM

Following the presentation of your dissertation entitled "Factors Associated with Failed Vaginal Delivery After Caesarean Section at the University Teaching Hospital", your supervisor has confirmed that the necessary corrections to your research proposal have been done.

You can proceed and present to the Research Ethics.

Yours faithfully,

Dr. S.H. Nzale

ASSISTANT DEAN, POSTGRADUATE

cc: HOD, Obstetrics & Gynaecology

Appendix F: UNZABREC Approval



THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
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Assurance No. FWA00000338
IRB00001131 of IORG0000774
13th July, 2017.

Ridgeway Campu
P.O. Box 50110
Lusaka, Zambia

Your Ref: 010-04-17.

Dr. Gibson Nkhata,
University Teaching Hospital,
Department of Obstetrics
and Gynaecology, P/Bag
RW IX, Lusaka.

Dear Dr. Nkhata,

RE: RESUBMITTED RESEARCH PROPOSAL: "FACTORS ASSOCIATED WITH
FAILED VAGINAL
DELIVERY AFTER ONE PREVIOUS CAESAREAN SECTION AT UNIVERSITY
TEACHING HOSPITAL, LUSAKA." (REF. No. 010-04-17)

The above-mentioned research proposal was presented to the Biomedical Research
Ethics Committee on 26th April, 2017. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee. • If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat). • Ensure that a final copy of the results is submitted to this Committee.

Yours sincerely,