

Predictors and Risks of Vaginal Birth after Cesarean Section: Insights from a Regional Referral Hospital in Uganda

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ABSTRACT

Vaginal birth after cesarean section (VBAC) remains a topic of significant interest due to its potential benefits and associated risks. This retrospective cohort study aimed to identify predictors and risks associated with VBAC compared to elective repeat cesarean section (ERCD) among women delivering at Jinja Regional Referral Hospital in Uganda. We analyzed data from 384 women who had a previous cesarean section and delivered at the hospital between 2022 and 2023. Socio-demographic, obstetric, and medical characteristics were assessed for their association with successful VBAC using logistic regression. Risks of maternal morbidities between VBAC and ERCD groups were compared using Chi-square tests. The study found that BMI <35 kg/m², birth weight <3500g, spontaneous onset of labor, previous safe vaginal birth, and absence of diabetes mellitus were significant predictors of successful VBAC. Women undergoing TOLAC had a higher incidence of uterine rupture (p = 0.030), thromboembolism (p < 0.001), and blood transfusion requirement (p < 0.001) compared to ERCD. However, hysterectomy, hemorrhage, viscus injury, and pelvic floor trauma did not significantly differ between the two groups. Our findings highlight important predictors and risks associated with VBAC compared to ERCD in a regional referral hospital setting. Understanding these factors can aid clinicians in counseling women on their delivery options and managing potential risks associated with VBAC. Further research is warranted to explore strategies for optimizing VBAC outcomes while minimizing associated morbidities.

Keywords: Maternal, Morbidity, Labor, Cesarean Section, Elective Repeat Cesarean Delivery, Jinja, Hospital.

INTRODUCTION

One of the most prevalent surgical procedures is a cesarean delivery, and a significant part of cesarean deliveries are due to elective repeat cesarean delivery (ERCD)[1-3]. To lower the rate of cesarean deliveries and consequent mother morbidity, a trial of labor and subsequent vaginal birth after cesarean delivery (VBAC) has been recommended [3]. According to the WHO, maternal morbidity is any illness that is brought on by or made worse by pregnancy and delivery and has a detrimental impact on a woman's wellbeing. These conditions may have both immediate and long-term repercussions for the mother and the unborn child [4].

Cesarean deliveries were performed in the 18th century to save the fetus from a dead or critically ill mother. In the nineteenth century, mothers' lives were saved through caesarean sections. CS has become a more routine and safe treatment with the introduction of safe anesthesia, suturing methods, antiseptics, a sepsis, blood transfusion, and antibiotics [5]. Once a cesarean, always a cesarean is a famous remark attributed to physician Edwin Bradford

Cragin from 1916, and historically this has proven true [6-8]. However, in 1980, the American Congress of Obstetricians and Gynecologists (ACOG) and the National Institute of Health (NIH) authorized the trial of labor following cesarean delivery (TOLAC), which led to an increase in vaginal birth after cesarean (VBAC) in the US [9]. Increased uterine rupture-related maternal and fetal morbidity was one of the consequences of TOLAC's rising prevalence. Women who want several children are not suitable candidates for elective primary cesarean birth at the mother's request, according to the American College of Obstetricians and Gynecologists [10]. According to organizations like the International Federation of Gynecology and Obstetrics and the Society of Obstetricians and Gynecologists of Canada, a cesarean delivery requested by the mother cannot be justified and should not be made available. The majority of women who try to give birth vaginally after a cesarean delivery will need an emergency cesarean [2].

The Robson classification, which divides all women admitted for delivery into one of 10 groups based on characteristics that are easily identifiable, is what the World Health Organization is proposing to use as an internationally applicable cesarean delivery classification system [11].

Uterine rupture has been linked to VBAC, according to a prior study conducted in the UK. Although uterine rupture is an uncommon and dangerous consequence of VBAC, it's vital to take additional maternal problems into account when comparing ERCS and VBAC. Despite their smaller pool, women with singleton cephalic pregnancies who had previously experienced CS were found to be the biggest contributors to the overall CS rate in Latin America [9]. The United States' cesarean delivery rate climbed from 5% to 31.9% between 1970 and 2016. This dramatic increase was caused by several changes in the practice environment, including the implementation of electronic fetal monitoring and a decrease in operative vaginal deliveries and vaginal breech attempts [6, 12].

In the United States, rates of vaginal birth after cesarean delivery have begun to rise again, from a low of about 8.4% of all births in 2008 and 2009 to 11.3% in 2014; in British Columbia, Canada, the proportion of women who had previously had a cesarean delivery who were considered eligible for vaginal birth after cesarean delivery increased from 75% in 2010 to 80% in 2014 [13]. There has been a wide range of reported success rates (23–85%) for those achieving vaginal birth after a planned VBAC [14]. Published studies on the outcomes for women attempting VBAC report a success rate of 60 to 80%. Middlemore Hospital in New Zealand reported a 73% success rate, while 14 Australian hospitals reported a 43% success rate [14, 15].

There has been no recent study in Uganda, particularly in the western region, comparing maternal morbidity after a trial of labor following a previous caesarean section to maternal morbidity due to elective repeat caesarean delivery. On that

basis, the current study aimed to close a knowledge gap by comparing maternal morbidity after a trial of labor after a previous caesarean section versus elective repeat caesarean section among women who delivered at Jinja Regional Referral Hospital between 2015 and 2023.

Planning the mode of delivery for women who have had a previous cesarean delivery is difficult for both the patient and the care provider [10, 16]. An elective repeat cesarean delivery increases the risk of surgical complications as well as the risk of abnormal placentation in subsequent pregnancies [9, 17]. In the current era of lower cesarean sections, the dictum is that once a cesarean section is performed, a hospital delivery in a well-equipped hospital is required. Rising cesarean section rates are cause for concern, and trialing labor in a previous cesarean section is an appealing alternative [6, 17, 18].

In Uganda, as in other low-income countries, tertiary care hospitals face the challenge of late antenatal attendance as well as unbooked pregnant women presenting in labor. Decisions must be made to select suitable candidates for TOLAC in the absence of a complete prenatal medical record and limited information. The current study aimed to determine the morbidities of TOLAC versus VBAC, as well as to describe the frequency and selected maternal and obstetric factors in women who attempted VBAC for the first time for their second delivery.

This study aimed to compare maternal morbidity after a trial of labor after cesarean section versus elective repeat caesarean delivery in women delivering at Jinja Regional Referral Hospital. It also aimed to determine the incidence of maternal morbidities due to TOLAC and ERCD, examine the risks and benefits of VBAC versus ERCD, and identify potential predictors of successful VBAC among women delivering at Jinja Regional Referral Hospital.

METHODOLOGY

Study design

This was a hospital-based retrospective analytic cohort study that employed quantitative methods of data collection to gather data from the medical records of women who have ever had a previous caesarean section from 2015 to 2023.

Study area

The area of study refers to the specific geographical location where the study is carried out (Enon, 2012). The study was conducted at Jinja Regional Referral Hospital, Uganda. The hospital is located in the center of Jinja, not far from the source of the Nile. It is the Regional Referral Hospital for the districts of

Bugiri, Iganga, Jinja, Kaliro, Kamuli, Luuka, Mayuge, Namayingo, Kayunga, and parts of Buikwe. The hospital is located approximately 84 kilometers (52 mi) east of Mulago National Referral Hospital. The coordinates of Jinja Regional Referral Hospital are: 00°25'52.0"N, 33°12'18.0"E (latitude: 0.431111; longitude: 33.205000).

Study Site

The study was conducted in the maternity ward of Jinja Regional Referral Hospital. Maternity Ward has a team of health workers that consists of nurses, interns, doctors, senior residents, and specialists. On average, there are about 45 patients admitted at any

one time in the ward. Average of 10–15 admissions per day.

Study population

Pregnant women who had a previous caesarean section. The comparison of interest was between elective repeat caesarean delivery and attempted vaginal birth after caesarean delivery.

Systemic random sampling

The main advantages of this method are that it gives results like those of simple random sampling and that it is easy to actually do. A list of women who had planned VBAC and those who had elective caesarean sections after a previous caesarean section was prepared from the medical records, and a number was assigned to each woman. The total number of women was divided by the sample size to give the sampling interval. Files were then picked systematically until the required number of participants was reached.

Sample size determination

The following formula was used for determining the study sample: [19].

$$n = \frac{Z^2 p(1 - p)}{d^2}$$

Where:

n is the sample size

Z is the standard normal deviate or variant (at 5% type 1 error and $p < 0.05$, Z is 1.96)

P is the expected proportion of characteristic being measured in the target population based on previous studies (For this study, it is estimated at 50% or 0.5) since no similar study was done in a local context

d is the absolute error or level of statistical significance (For this study set at 0.05)

Thus, by using this formula,

$$n = \frac{1.96^2 \cdot 0.5(1 - 0.5)}{0.05^2}$$

$$n = 384$$

Therefore, 384 was considered the required sample size.

Inclusion criteria

Files of all women who had undergone a trial of labor after a previous caesarean section and files of all women who had had an elective caesarean section were included in the study.

Exclusion criteria

- Files of women who had a caesarean for the first time.
- Files of women who had normal vaginal delivery for the first time.

Study procedure

The study proceeded after the procedures and purpose of the study were thoroughly explained to the head of the obstetrics department and the head of the records department. The principal

investigator sought permission to access the medical records from the person in charge. Files of interest were withdrawn from among the other files by the research assistants, and the required information was extracted from the files.

Questionnaires

A questionnaire is a written form of questions that are systematically arranged to enable the researcher to come up with clear findings that can answer the research questions. A research questionnaire was prepared following the available literature and was used to capture data as required by specific objectives. A structured and pre-tested questionnaire was used for gathering quantitative data about the study population. For this study, the questionnaire had a section regarding the demographic characteristics of the study participants; another section captured data about maternal morbidities in both TOLAC and ERCS; and the last part of the questionnaire contained information about the determinants of a successful VBAC.

Validity of instruments

Before the instruments were administered to research assistants to start collecting data, they were first scrutinized by the supervisor to ensure that the terms used in the questionnaire and interview were precisely defined. The content validity index was calculated based on judgment by at least two experts in the field. When the result was 0.7 or above, the instrument was deemed valid for use.

Quality assurance and quality control

The accuracy of the data was achieved through intensive training for data collectors. The data collection was closely supervised by the principal investigators and supervisors. To ascertain whether the questions were properly filled out and necessary corrections were made on the spot, each completed questionnaire was checked by supervisors.

Data analysis

The study analyzed data collected from a single day of data collection using Epidata Version 3.1 and STATA 14.0. The comparisons in maternal and infant outcomes were quantified using rates, rate ratios, and 95% confidence intervals. Logistic models included maternal age, diabetes mellitus, hypertension, and labor induction. Adjusted rate differences were calculated from the absolute outcome rates for the elective repeat caesarean delivery group. Post hoc sensitivity analyses were conducted for women at 40 weeks of gestation or more to address potential misclassification. A 2-sided p value less than 0.05 was used to guide inference. The study also tested the calculated rates in exposure groups using the χ^2 test or Fisher's exact test. Multivariable logistic regression analyses were conducted for outcomes with a control group,

including peripartum hysterectomy, sepsis, and failed intubation.

Ethical considerations.

The study was conducted in confirmation of national and international ethical guidelines for biomedical research involving human subjects. Ethical clearance was obtained from an ethical review committee of Kampala International University. Approval was

sought from the executive director of Jinja Regional Referral Hospital and the dean of the faculty of clinical medicine and dentistry. There was no need for informed consent since it was a retrospective cohort study using medical records. Anonymity of the data was maintained by reporting results in a way that would not reveal the identity of the individuals whose medical records were used.

RESULTS

Socio-demographic characteristics of the study participants

A total of 384 women who delivered from Jinja Regional Referral Hospital starting in 2022 and had ever had a previous caesarean section from 2022 to 2023 were sampled from records kept at maternity. The socio-demographic characteristics of study participants are presented in Table 1 below. The majority of the study participants, 40.89% (157/384) were in the age group of 16–23 years, whereas the minority of participants, 05.73% (22/384) were 38 years and older. Regarding the gestational age, the majority of study participants, 92.19% (354/384) had a gestational age of 34 weeks and above, while the minority, 02.08% (08/384) of the study participants, had a gestational age of less than 28 weeks.

On the variable of parity, more than half of the study participants (51.04%; 196/384) had a parity of less than 3, while 48.96% (188/384) had a parity of 3 or above. The study was dominated by participants 72.14% (277/384) who had a body mass index of

<35 kg/m², whereas a minority of the study participants 27.86% (107/384) had a body mass index of ≥35 kg/m². Finally, the majority of study participants (65.10%, 250/384) delivered babies with a birth weight of <3500 g, while 34.90% (134/384) delivered children who had a birth weight of ≥3500g.

Presented in Table 2 are the summary statistics for the continuous variables of age of the study participants and birth weight of the babies. The mean age of the study participants was 25.62 years, with a standard deviation of 5.99 years from the mean. The minimum age was 16 years, while the maximum age was 40 years. The data on the age of the study participants had a variance of 35.97 with a positive skewness of 0.58 and a platy kurtosis of 2.42. Regarding birth weight, the mean was 2,987g, with a standard deviation of 965.43g, a minimum of 900g, and a maximum of 5,000g. The data on birth weight has a variance of 932,056, skewness of 0.13, and kurtosis of 2.28.

Table 1: Frequency table of demographic characteristics of the study participants

VARIABLES	CATEGORIES	FREQUENCY (n)	PERCENTAGE (%)
Age of participants in years	16 – 23 Years	157	40.89
	24 – 30 Years	149	38.80
	31 – 37 Years	56	14.58
	38 Years and above	22	05.73
	TOTAL	384	100
Gestation Age in weeks	<28 weeks	08	02.08
	28 – 31 weeks	08	02.08
	32 – 33 weeks	14	03.65
	34 weeks and above	354	92.19
	TOTAL	384	100
Parity	<3	196	51.04
	≥3	188	48.96
	TOTAL	384	100
Body Mass index (BMI) of mother	<35kg/m ²	277	72.14
	≥35kg/m ²	107	27.86
	TOTAL	384	100
Birth Weight of the baby in grams	<3500g	250	65.10
	≥3500g	134	34.90
	TOTAL	384	100

Table 2: Shows the summary statistics for selected continuous variables of participants

Variable	Mean	Std Dev	Minimum	Maximum	Variance	Skewness	Kurtosis
Age	25.62	5.99	16	40	35.97	0.58	2.42
Birth weight	2,987	965.43	900	5,000	932,056	0.13	2.28

Obstetric Characteristics of the Study Participants

Shown in table 3 below are the obstetric characteristics of the study participants. Results revealed that majority 73.70% (283/384) of the study participants did not undergo augmentation of labor. More than half of the study participants 63.28% (243/384) spent less or equal to 15 hours in the labor. There was spontaneous onset of labor

among 34.38% (132/384) study participants meanwhile 65.63% (252/384) of the study participants never had spontaneous onset of labor. Results of the study further showed that more than half of the study participants 55.47% (213) never had a previous successful VBAC. Finally, 57.55% (221/384) of the study participants had a history of a previous safe vaginal birth.

Table 3: Shows Obstetric Characteristics of the Study Participants

VARIABLES	CATEGORIES	FREQUENCY (n)	PERCENTAGE(%)
Augmentation of labor	Yes	101	26.30
	No	283	73.70
	TOTAL	384	100
Time spent in labor	≥15 hours	243	63.28
	>15 hours	141	36.72
	TOTAL	384	100
Spontaneous onset of labor	Yes	132	34.38
	No	252	65.63
	TOTAL	384	100
Previous successful VBAC	Yes	171	44.53
	No	213	55.47
	TOTAL	384	100
Previous safe vaginal birth	Yes	221	57.55
	No	163	42.45
	TOTAL	384	100

Medical Characteristics of the Study Participants

The medical characteristics of the study participants are shown in table 4 below. As observed from the table, majority 60.94% (234/384) of the study participants never had diabetes mellitus. Similarly,

majority of study participants 73.44% (282/384) never had hypertension meanwhile 26.56% (102/384) had hypertension. Lastly, 15.71% (60/384) of the study participants were HIV positive meanwhile 84.29% (322/384) were HIV negative.

Table 4: Shows Medical Characteristics of the Study Participants

VARIABLES	CATEGORIES	FREQUENCY (n)	PERCENTAGE(%)
Diabetes Mellitus	Yes	150	39.06
	No	234	60.94
	TOTAL	384	100
Hypertension	Yes	102	26.56
	No	282	73.44
	TOTAL	384	100
HIV/AIDS	Positive	60	15.71
	Negative	322	84.29
	TOTAL	384	100

The Incidence of Maternal Morbidities due TOLAC and Maternal Morbidities due ERCD among Women Delivering at Jinja Regional Referral Hospital.

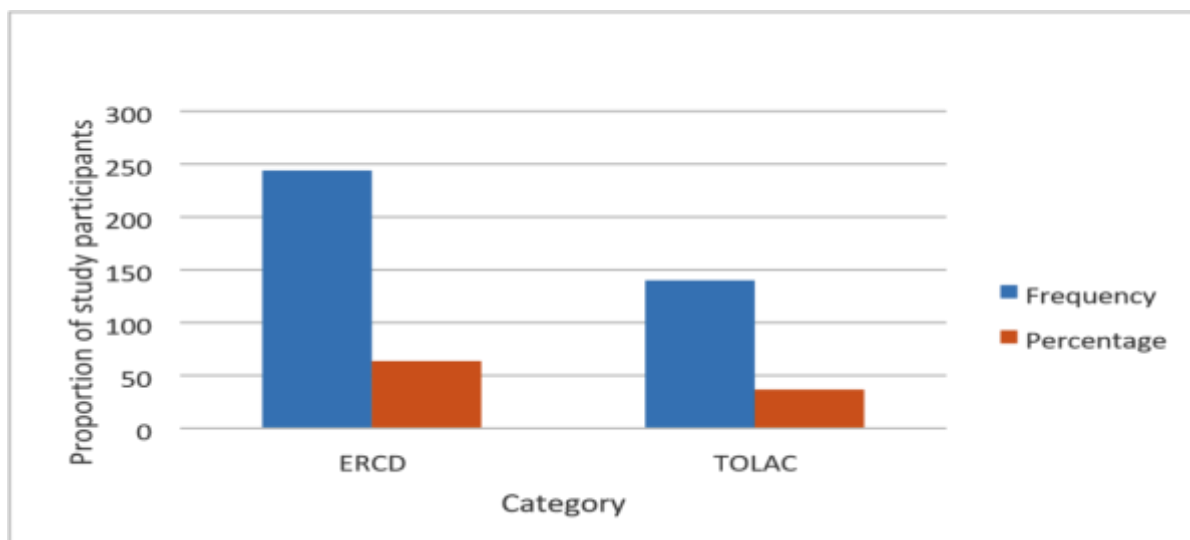
Category of the study participants

Table 5 below shows the proportion of study participants based on the categories of Elective repeat caesarean section and Trial of labor after

caesarean section. It can be observed that majority of the study participants 63.54% (244/384) belonged to the category of elective repeat caesarean section (ERCD) meanwhile 36.46% (140/384) of the study participants belonged to the category of trial of labor after caesarean section (TOLAC).

Table 5: Proportion of the study participants based on category of ERCD and TOLAC

Category	Frequency	Percentage	95% CI
ERCD	244	63.54	58.71 – 68.38
TOLAC	140	36.46	31.62 – 41.29

**Figure 1: Column Graph showing Proportion of the study participants based on category of ERCD and TOLAC****Status in which the baby was delivered**

Shown in table 6 is the status in which the study participants delivered their babies. Majority of the

study participants 94.53% (363/384) delivered babies who were alive meanwhile 05.47% (21/384) delivered dead babies.

Table 6: Status in which the baby was delivered

Status	Frequency	Percentage	95% CI
Alive	363	94.53	92.25 – 96.82
Dead	21	05.47	03.18 – 07.75

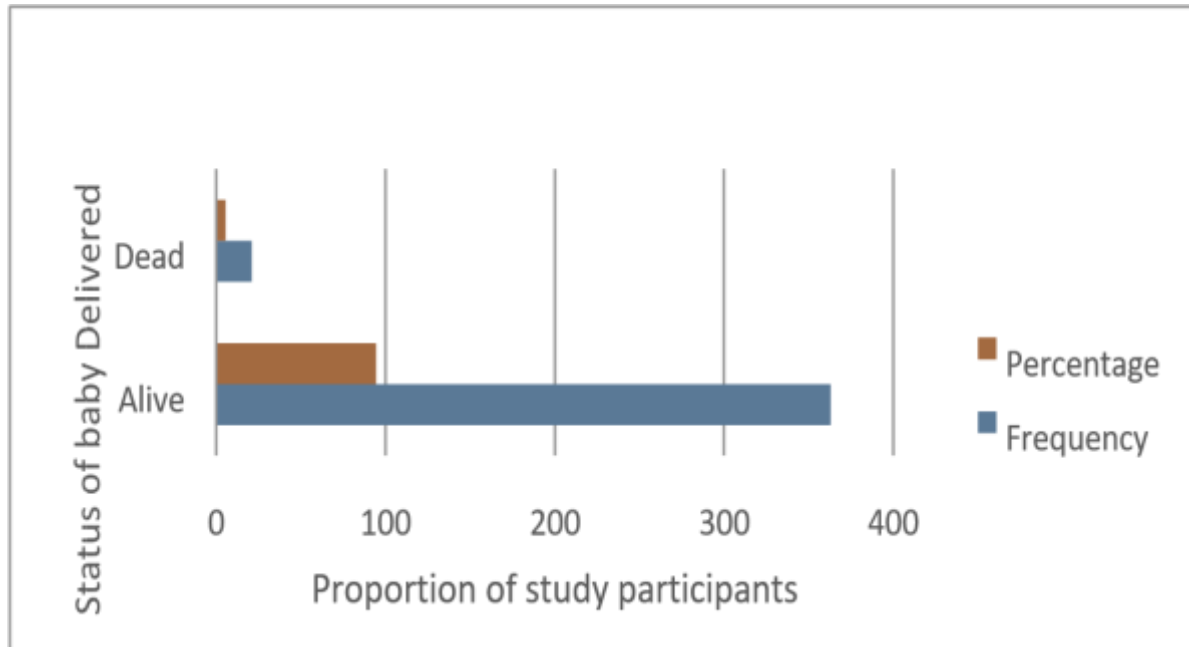


Figure 2: Bar Graph showing Status in which the baby was delivered

The Incidence of Maternal Morbidities due TOLAC and due to ERCD

Table 7 shows the incidence of maternal morbidities due to trial of labor after caesarean section and maternal morbidities due to elective repeat caesarean section. As observed in the table, 168 (68.85%) of the women who underwent TOLAC got uterine ruptures, while 59 (42.14%) of the women who underwent ERCD got uterine ruptures. The difference was statistically significant at a p value of 0.030. Uterine Dehiscence occurred in 52 (21.31%) of those in the category of TOLAC whereas only 26 (18.57%) of those in the category of ERCD got Uterine Dehiscence. Hysterectomy was done to 70 (28.69%) of TOLAC participants and 40 (28.57%) of ERCD participants, the difference was not statistically significant.

Thromboembolism was a morbidity in 28 (11.48%) of those who underwent TOLAC, whereas 77

(55.00%) of those who underwent ERCD developed thromboembolism. The difference was statistically significant at a p value of <0.001. Haemorrhage was experienced by 50 (20.49%) under the TOLAC category and 26 (18.57%) under the ERCD category. Blood transfusion was required by 66 (27.05%) of women in the TOLAC category and 66 (47.14%) of those in the ERCD category; the difference was statistically significant at a P value of <0.001. Viscus injury was experienced by 45 (18.44%) of those under TOLAC and 37 (26.43%) of those under ERCD, whereas endometritis was a morbidity among 64 (26.23%) of those under TOLAC and 55 (39.29%) of those under ERCD, with the difference being significant at a P value of 0.008. Then finally, pelvic floor trauma was experienced by 64 (26.23%) of those under TOLAC and 40 (28.57%) of those with ERCD.

Table 7: The Maternal Morbidities Due TOLAC and Maternal Morbidities Due ERCD

MORBIDITY		OVERALL n (%)	TOLAC n (%)	ERCD n (%)	P VALUE
Uterine Rupture	Yes	135 (35.16)	168 (68.85)	59 (42.14)	0.030*
	No	249 (64.84)	76 (31.15)	81 (57.86)	
Uterine Dehiscence	Yes	78 (20.31)	52 (21.31)	26 (18.57)	0.521
	No	306 (79.69)	192 (78.69)	114 (81.43)	
Hysterectomy	Yes	110 (28.65)	70 (28.69)	40 (28.57)	0.981
	No	274 (71.35)	174 (71.31)	100 (71.43)	
Thromboembolism	Yes	105 (27.34)	28 (11.48)	77 (55.00)	<0.001*
	No	279 (72.66)	216 (88.52)	63 (45.00)	
Haemorrhage	Yes	76 (19.79)	50 (20.49)	26 (18.57)	0.649
	No	308 (80.21)	194 (79.51)	114 (81.43)	
Transfusion requirement	Yes	132 (34.38)	66 (27.05)	66 (47.14)	<0.001*
	No	252 (65.63)	178 (72.95)	74 (52.86)	
Viscus injury (bowel, bladder, ureter)	Yes	82 (21.35)	45 (18.44)	37 (26.43)	0.066
	No	302 (78.65)	199 (81.56)	103 (73.57)	
Endometritis	Yes	119 (30.99)	64 (26.23)	55 (39.29)	0.008*
	No	265 (69.01)	180 (73.77)	85 (60.71)	
Pelvic floor trauma	Yes	100 (26.04)	60 (24.59)	40 (28.57)	0.392
	No	284 (73.96)	184 (75.41)	100 (28.56)	

The Risks of TOLAC versus ERCD among Women Delivering at Jinja Regional Referral Hospital.

Table 8 shows that there were only 3 statistically significant risks of TOLAC over ERCD namely; Uterine rapture, Thromboembolism and requirement for blood transfusion. Participants in the TOLAC category were 1.35 times at risk of getting a uterine rapture than participants who were in the ERCD category (cRR 1.35, 95%CI 1.03 – 1.77,

P=0.028). Women who underwent TOLAC were 4.79 times more at risk of developing thromboembolism than their counterparts who underwent ERCD (cRR 4.79, 95%CI 3.28 – 7.00, P<0.001). Then lastly, those who were under the TOLAC category faced 1.50 times more risk of getting endometritis than those who were in the ERCD category (cRR 1.50, 95%CI 1.12 – 2.01, P<0.007).

Table 8: The Risks of TOLAC versus ERCD among Women Delivering at Jinja Regional Referral Hospital

MORBIDITY		OCCURANCE		cRR	95% CI	P VALUE
		NO	YES			
Uterine Rupture	ERCD	168 (68.85)	76 (31.15)	1.00	Reference	
	TOLAC	81 (57.86)	59 (42.14)	1.35	1.03 – 1.77	0.028*
Uterine Dehiscence	ERCD	192 (78.69)	52 (21.31)	1.00	Reference	
	TOLAC	114 (81.43)	26 (18.57)	0.87	0.57 – 1.33	0.523
Hysterectomy	ERCD	174 (71.31)	70 (28.69)	1.00	Reference	
	TOLAC	100 (71.43)	40 (28.57)	0.99	0.72 – 1.38	0.981
Thromboembolism	ERCD	216 (88.52)	28 (11.48)	1.00	Reference	
	TOLAC	63 (45.00)	77 (55.00)	4.79	3.28 – 7.00	<0.001*
Haemorrhage	ERCD	194 (79.51)	50 (20.49)	1.00	Reference	
	TOLAC	114 (81.43)	26 (18.57)	0.91	0.59 – 1.39	0.651
Transfusion requirement	ERCD	178 (72.95)	66 (27.05)	1.00	Reference	
	TOLAC	74 (52.86)	66 (47.14)	1.74	1.33 – 2.28	<0.001*
Viscus injury	ERCD	199 (81.56)	45 (18.44)	1.00	Reference	
	TOLAC	103 (73.57)	37 (26.43)	1.43	0.98 – 2.10	0.065
Endometritis	ERCD	180 (73.77)	64 (26.23)	1.00	Reference	
	TOLAC	85 (60.71)	55 (39.29)	1.50	1.12 – 2.01	0.007*
Pelvic floor trauma	ERCD	184 (75.41)	60 (24.59)	1.00	Reference	
	TOLAC	100 (71.43)	40 (28.57)	1.16	0.83 – 1.64	0.390

The Potential Predictors of Successful VBAC among Women Delivering at Jinja Regional Referral Hospital

The outcomes among women who underwent Trial of Labor after Caesarean Section

Under this specific objective, data was considered for only women who underwent TOLAC which

accounts for 36.46% (140/384) of the total number of participants in the study. From table 9 below, it can be observed that majority 64.57% (82/140) of the women who underwent TOLAC had a successful VBAC meanwhile 64.57% (82/140) of the women who underwent TOLAC had unsuccessful VBAC.

Table 9: The outcomes among women who underwent Trial of Labor after Caesarean Section

Outcome	Frequency	Percentage	95% CI
Unsuccessful VBAC	45	35.43	27.00 – 43.87
Successful VBAC	82	64.57	56.13 – 72.99

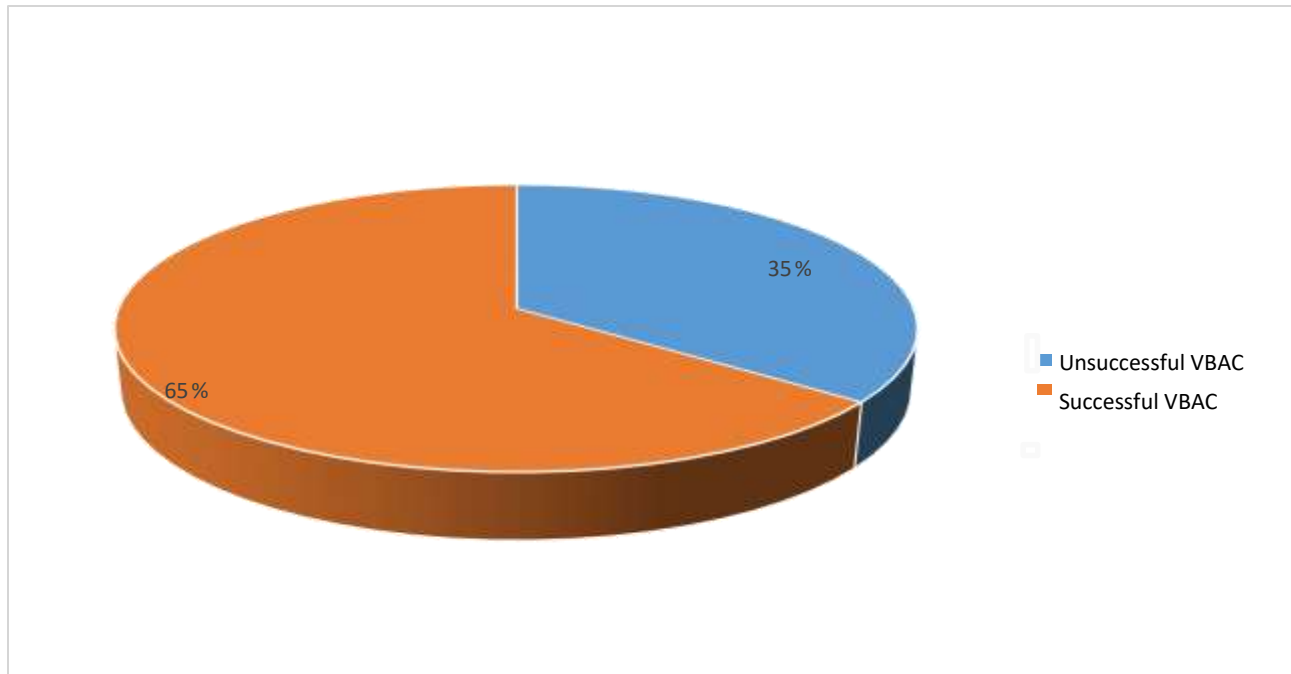


Figure 3: Pie Chart showing the outcomes among women who underwent Trial of Labor after Caesarean Section

The Potential Socio-Demographic Predictors of Successful VBAC

Overall, the study established that there were five predictors of successful VBAC. There were two sociodemographic predictors, namely, the BMI of the mother and the birth weight of the baby. Similarly, two obstetric factors were found to be predictors of successful VBAC, namely, spontaneous onset of labor and previous safe vaginal birth. Lastly,

under medical factors, only diabetes mellitus was found to be a predictor of successful VBAC.

Study participants who had a BMI of <35 kg/m² were 2.25 times more likely to have a successful VBAC than study participants who had a BMI of ≥35 kg/m² (cOR 2.25, 95%CI 1.07–4.75, P = 0.033). Participants who gave birth to babies who had a birth weight of <3500g were 2.93 times more likely to have a successful VBAC than study participants who gave birth to babies with a birth

weight of ≥ 3500 g (cOR 2.93, 95%CI 1.37–6.26, $P = 0.005$).

Those who did not have spontaneous onset of labor were 88% less likely to have a successful VBAC compared to those who had spontaneous onset of labor (cOR 0.12, 95%CI 0.05–0.30, $P < 0.001$). Participants who had a negative history of previous safe vaginal birth were 70% less likely to have a successful VBAC as opposed to their counterparts

who had a positive history of previous safe vaginal birth (cOR 0.30, 95%CI 0.14–0.66, $P = 0.003$).

Finally, findings from the study revealed that study participants who were not suffering from diabetes mellitus were 7.65 times more likely to have a successful VBAC as compared to their counterparts who were suffering from diabetes mellitus (cOR 7.65, 95%CI 3.37–17.32, $P < 0.001$).

Table 10: The Potential socio-demographic Predictors of Successful VBAC

VARIABLE	SUCCESSFUL VBAC		cOR	95% CI	P VALUE
	CATEGORY	NO (n=45)			
Age of participants in years	16 – 23 Years	17 (36.96)	29 (63.04)	1.00	Reference
	24 – 30 Years	17 (30.91)	38 (69.09)	1.31	0.57 – 2.99 0.522
	31 – 37 Years	05 (33.33)	10 (66.67)	1.17	0.34 – 4.00 0.800
	38 Years and above	06 (54.55)	05 (45.45)	0.49	0.13 – 1.85 0.291
Gestation Age in weeks	<28 weeks	02 (40.00)	03 (60.00)	1.00	Reference
	28 – 31 weeks	01 (33.33)	02 (66.67)	1.33	0.07 – 26.62 0.851
	32 – 33 weeks	01 (25.00)	03 (75.00)	2.00	0.11 – 35.81 0.638
	34 weeks and above	41 (35.65)	74 (64.35)	1.20	0.19 – 7.50 0.843
Parity	<3	26 (39.39)	40 (60.61)	1.00	Reference
	≥ 3		42 (68.85)	1.44	0.69 – 2.99 0.333
BMI of mother	≥ 35 kg/m ²	19 (31.15)	56 (71.79)	1.00	Reference
		22 (28.21)			
		23 (46.94)			
	<35kg/m ²		26 (53.06)	2.25	1.07 – 4.75 0.033*
Birth Weight of in grams	≥ 3500 g	21 (26.25)	59 (73.75)	1.00	Reference
	<3500g	24 (51.06)	23 (48.94)	2.93	1.37 – 6.26 0.005*
Augmentation of labor	Yes	08 (27.59)	21 (72.41)	1.00	Reference
	No	37 (37.76)	61 (62.24)	0.63	0.25 – 1.56 0.317
Time spent in labor hours	≥ 15	26 (32.50)	54 (67.50)	1.00	Reference
	>15 hours	19 (40.43)	28 (59.57)	0.71	0.34 – 1.50 0.368
Spontaneous onset of labor	Yes	08 (13.33)	52 (86.67)	1.00	Reference
	No	37 (55.22)	30 (44.78)	0.12	0.05 – 0.30 <0.001*

Previous successful VBAC	Yes	21 (31.34)	46 (68.66)	1.00	Reference	
	No	24 (40.00)	36 (60.00)	0.68	0.34 – 1.42	0.309
Previous safe vaginal birth	Yes	24 (26.97)	65 (73.03)	1.00	Reference	
	No	21 (55.26)	17 (44.74)	0.30	0.14 – 0.66	0.003*
Diabetes Mellitus	Yes	30 (63.83)	17 (36.17)	1.00	Reference	
	No	15 (18.75)	65 (81.25)	7.65	3.37 – 17.32	<0.001*
Hypertension	Yes	12 (35.29)	22 (64.71)	1.00	Reference	
	No	33 (35.48)	60 (64.71)	0.99	0.44 – 2.26	0.984
HIV/AIDS	Positive	07 (43.75)	09 (56.25)	1.00	Reference	
	Negative	38 (34.55)	72 (65.45)	1.47	0.51 – 4.27	0.475

DISCUSSION

The Incidence of Maternal Morbidities Due to TOLAC and Maternal Morbidities Due to ERCD Among Women Delivering at Jinja Regional Referral Hospital.

The study showed that the four morbidities were found to have statistical significance when the difference in their incidence was compared between women who underwent TOLAC and women who underwent ERCD. The morbidities include: uterine rupture 168 (68.85) for TOLAC versus 59 (42.14) for ERCD, $p = 0.030$; thromboembolism 28 (11.48) for TOLAC versus 77 (55.00) for ERCD, $p < 0.001$; transfusion requirement 66 (27.05) for TOLAC versus 66 (47.14) for ERCD, $p < 0.001$; and endometritis 64 (26.23) for TOLAC versus 55 (39.29) for ERCD, $p = 0.008$. The results of the present study are in line with the results of a recent study done in Germany, which indicated that women who had an attempted vaginal birth after caesarean delivery had a considerably greater incidence of uterine rupture compared to those who had an elective repeat caesarean delivery [7]. Furthermore, the current study's findings are consistent with those of an Ethiopian retrospective cohort analysis [18]. However, the current study's findings contradict those of an Indian study [17] and a Chinese study [8], which discovered no significant differences in the rates of maternal morbidities between caesarean deliveries on maternal request and planned vaginal deliveries. Despite the fact that the two studies used the same study designs, the differences in the study findings might be attributed to differences in the study participants as well as differences in the geographical regions where the two investigations were done.

The current findings differ from the findings of a prospective cross-sectional study at an Eastern

Nepal Tertiary Care Center, which revealed that there were three cases of bladder injury as well as wound infection, which was more commonly found in failed VBAC cases, and among them, six had hemoglobin levels of 8 gm%, requiring blood transfusion postoperatively, but none of the patients had significant blood loss intraoperatively [20]. Although both studies were conducted in tertiary care hospitals, the disparity in study outcomes could be attributed to differences in the degrees of expertise of health workers as well as differences in the availability of sophisticated obstetrics equipment in the two study centers.

A systematic review found that the rate of uterine rupture was much lower in population-based studies than in facility-based studies. It was also lower in developed countries compared to less or least developed countries [17]. This study looked at the rate of maternal morbidities in women who had TOLAC and women who had ERCD. The current study's findings contradict those of Cheng et al. [21] and Boatin et al. [17], who discovered no changes in postpartum hemorrhage, thromboembolic disease, or endometritis between the TOLAC and ERCD groups. The difference in results between the current study and the prior study is most likely due to differences in study designs, particularly because the previous study was a systematic review and the current study is a retrospective cohort analysis.

TOLAC is regarded as a safe method of delivery for both women and newborns [12]. TOLAC, on the other hand, is known to raise the chance of uterine rupture. According to expert opinion, TOLAC is the best treatment for women who do not have multiple risk factors [22]. However, the patient should be informed about the availability of an obstetrician and an anesthetist on-site. If the lady still prefers a repeat

caesarean after receiving enough information and time to consider her options, her wishes should be respected [23]. Finally, the capacity of the clinician to forecast if an urgent caesarean will be necessary following TOLAC is critical, as this is the true danger in attempted VBAC [23].

The Risks of TOLAC versus ERCD among Women Delivering at Jinja Regional Referral Hospital.

The study's findings revealed that there were only three statistically significant risks of TOLAC over ERCD, including uterine rupture, thromboembolism, and the need for blood transfusion. Uterine Rupture: Participants in the TOLAC group were 1.35 times more likely to have a uterine rupture than those in the ERCD group (cRR 1.35, 95% CI 1.03–1.77, P = 0.028). The results of this study agree with those of a Canadian study that looked at women who tried to give birth vaginally after having a cesarean section. That study found that the adjusted RR for severe maternal morbidity and mortality was 1.96 (95% CI 1.76 to 2.19) for uterine rupture and 6.41 (95% CI 4.84 to 8.50) for other complications. The current study's findings contradict those of a prospective cross-sectional study conducted at an eastern Nepalese tertiary care center on a trial of vaginal birth after caesarean (VBAC), which found that among 8 cases of scar tenderness, none of the patients ruptured intra-operatively [20] indicating that scar tenderness may not be a reliable indicator of impending or complete uterine rupture.

Despite the fact that three women were suspected of having uterine ruptures before surgery, none of them burst intraoperatively. Women who had TOLAC were 4.79 times more likely to develop thromboembolism than those who had ERCD (cRR 4.79, 95%CI 3.28–7.00, P 0.001). VTE is a serious complication throughout pregnancy, birth, and the puerperium. Thromboembolic events are a significant cause of maternal death, occurring in both caesarean and vaginal birth women [24].

The risk of thromboembolism following vaginal delivery is one in 1,000, but it rises to three in 1,000 after elective caesarean surgery, and the death rate linked with VTE after caesarean section is tenfold higher than in women who have vaginal delivery [6, 8]. Many factors can explain such a disparity in outcome between the different birth modes, including higher immobility following caesarean section versus vaginal delivery. According to one study, postpartum women who had vaginal deliveries were nearly twice as ambulatory as those who had a caesarean section on the seventh day [7].

CONCLUSION

The decision to deliver women who have had past CS is a complicated one that incorporates the

Experts have proposed universal prophylaxis for all women undergoing caesarean sections after noting a rise in maternal deaths owing to thromboembolism and a widespread failure of doctors to follow existing guidelines for prophylaxis based on established risk factors [25]

Participants in the TOLAC group were 1.50 times more likely to develop endometritis than those in the ERCD group (cRR 1.50, 95%CI 1.12–2.01, P 0.007). A large study in China found that there was no significant difference in the rate of endometritis between successful TOL and ERCD (Peto OR = 0.769, 95% CI: 0.433 to 1.367, p = 0.371). These results are different from those of this study. [26]. The gap in study findings could be due to China's very sophisticated and advanced medical equipment, which makes it easier for them to prevent complications such as endometritis.

Similar to the current study's findings, Yang et al. [26] discovered that women with TOLAC (0.8%–30%) had a higher risk of endometritis than those with ERCD (1.2%–18%). According to Horgan et al. (2022), TOLAC is associated with more than twice the odds of endometritis than ERCD (aOR 2.4; 95% CI 1.7–3.5). Women who had an unsuccessful TOLAC had a higher rate of maternal morbidity and endometritis than women who had a successful TOLAC, and a similar pattern was observed by Rotem et al. [6] in their study. In the Maternal-Fetal Medicine Units (MFMU) Network Cesarean Registry, women who had TOLAC were more likely to have endometritis than women who had an elective repeat caesarean (2.9% vs. 1.8%, aOR 1.6, 95% CI: 1.4–1.9) [16]. As a result, health providers must exercise caution to avoid the occurrence of any probable endometritis during TOLAC.

The current study's findings are consistent with the findings of Horgan et al. [27], who discovered that the absence of diabetes mellitus was strongly related to successful VBAC among study participants. Similarly, the findings of another study revealed that VBAC success rates looked to be lower in diabetic women than in non-diabetic women [27]. The current study's findings are consistent with those of Fore et al. [12], who discovered that the relative risk for vaginal birth following caesarean delivery success in women with gestational diabetes mellitus compared to those without gestational diabetes mellitus was 0.94 (95% CI, 0.87–1.00). After controlling for confounding factors, the odds ratio for success with gestational diabetes mellitus was 0.87 (95% CI, 0.68–1.10).

physician's understanding of the available information, expertise, and fear of lawsuit, as well as

the previous mother's experience and knowledge. Any decision taken will have an impact on the

outcome of the current pregnancy as well as the patient's future obstetric performance and fertility.

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