Wolkite University College of medicine and health sciences

Department of Medicine

Success Rate of Trial of Labor after Cesarean Delivery and Its Determinants at Wolkite University Specialized Teaching Hospital, Retrospective Study (2years)

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Declaration (Assurance of Investigators)

We, the undersigned students, declare that this research report is our original work in partial fulfillment of the requirement for the degree of Doctor of Medicine.

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This research report has been submitted for examination with our approval as Advisors.

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Abbreviations

ACOG American college of obstetricians and gynecologists

CPD- Cephalopelvic Disproportion

CS Cesarean Section

ERCD- Emergency Cesarean delivery.

NIH- National Institute of Health.

NRFHRP- Non reassuring Fetal Heart Rate Pattern.

SPSS- Statistical Package of Social Sciences TOLAC- Trial of Labor after Cesarean delivery.

TOLAC Trial of Labor after Cesarean Delivery

VBAC- Vaginal Birth after Cesarean.

WHO- World Health Organization

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Abstract

Background

Cesarean section (C-section) is a surgical procedure performed when vaginal delivery poses a risk to the mother or child, either as a planned elective procedure or an emergency during labor. With rising global C-section rates, Trial of Labor after Cesarean (TOLAC) has become a key focus in obstetrics, offering women with a prior cesarean the possibility of a vaginal birth in subsequent pregnancies, having a success rate of 60–80%. The success of TOLAC depends on factors like previous vaginal delivery, spontaneous labor, maternal age, and favorable cervix, with careful selection of candidates crucial to ensuring positive outcomes. This research examines the predictors of TOLAC success and aims to contribute to better clinical decision-making in managing pregnancies following a previous cesarean delivery.

Objective

Determine the success rate of TOLAC based on maternal and neonatal outcome and its determinant factors in WUSTH from the time period of November, 2022 to November 2024.

Methods

The study was a retrospective study on women with one previous scar who were admitted to maternity and labor ward, WKUSTH from the time period of November, 2022 to November 2024. Data was collected from patients' charts after tracing by medial record number from registry of deliveries. The information was collected using a semi structured questionnaire by document review. Data was entered and analyzed using SPSS version 27 computer software packages.

Result

A successful Trial of Labor after Cesarean (TOLAC) was achieved in approximately two-thirds of women with one previous cesarean section (CS), resulting in a success rate of 61.2% (120 women). This success rate aligns with findings from other studies, where TOLAC success rates typically range from 60.0% to 80.0%. However, our success rate is slightly lower compared to a study conducted across three teaching hospitals in Ethiopia. Meanwhile, 38.8% (76 women) of the participants required an emergency repeat cesarean section (ERCS), with the majority of

these cases attributed to non-reassuring fetal heart rate patterns (NRFHRP) (46.1%), and followed by failure to progress in labor (36.8%) and malpresentation (14.4%). The majority of mothers who attempted TOLAC had a prior vaginal delivery, were between the ages of 25 and 29, and had a previous cesarean section for non-recurring indications. These findings are consistent with global data, which suggest that successful TOLAC candidates typically have a history of vaginal delivery, are relatively younger, and have undergone a cesarean for reasons that are not likely to recur. Among the neonates delivered by mothers who underwent TOLAC, 93.9% (184 neonates) had an APGAR score of 7 or higher, while 6.1% (12 neonates) had an APGAR score of 6 or lower. Of these, 2.5% (5 neonates) experienced early neonatal death, with 3 deaths occurring in the ERCS group and 2 in the successful TOLAC group.

Conclusion

In conclusion, this study demonstrated a TOLAC success rate of 61.2%, consistent with the success rates reported in the literature, though slightly lower than findings from a multi-center study conducted in Ethiopia. Parity and previous CS indication were found to be significantly associate with success rate of TOLAC. The primary indications for emergency repeat cesarean sections were non-reassuring fetal heart rate patterns and failure to progress in labor. Neonatal outcomes were favorable, with the majority of neonates achieving an APGAR score of 7 or higher, although early neonatal mortality was observed in both the TOLAC and ERCS groups.

Chapter One: Introduction

1.1.Background

A cesarean section (C-section) is a surgical procedure used to deliver a fetus, placenta, and membranes through incisions made in the abdomen (laparotomy) and uterus (hysterectomy), typically performed when a vaginal birth would pose a risk to the mother or child[1].

C-sections can be planned, either as an elective procedure before labor begins due to known complications, or they can be emergent, performed during labor when unforeseen complications arise that make vaginal delivery unsafe. There are several types of C-sections, with the most common being the transverse incision. The classical incision, which is a vertical incision made in the upper part of the uterus, J and T type are other notable ones [1].

The choice of incision depends on the presentation of the baby, the mother's health, and any previous uterine surgery. Advances in surgical techniques have made the low transverse incision the preferred method due to its lower risk of complications in future pregnancies.

As cesarean birth rates continue to rise globally, Trial of Labor after Cesarean Delivery (TOLAC) remains a critical area of focus in modern day obstetrics, offering women with a history of one cesarean delivery, regardless of the outcome, the potential to experience a vaginal birth in subsequent pregnancies, and reducing the overall rate of cesarean deliveries which are associated with longer recovery times, increased risk of surgical complications, and potential adverse outcomes in future pregnancies.

It comes with the advantages of decreased anesthesia risk, avoidance of abdominal surgery, decrease surgical complications such as infections and hemorrhage, shorter maternal recovery, shorter hospital stay, lower cost, early mother child bonding [2], and has improved maternal and fetal outcomes when compared with delivery by repeated cesarean Section [3]. However, TOLAC is not without risk, with uterine rupture being the most serious complication.

Choosing the route of delivery after one previous cesarean section depends on the preferences of women, and past and present obstetric history.

Candidates for a VBAC are women with low transverse hysterectomy, and singleton pregnancy with no contraindication for vaginal delivery [4, 5].In addition, It should be in a facility where resources to conduct an emergency repeat cesarean section (ERCS) within a reasonable time frame, is available. Ideally, within ten minutes of the decision. These resources include a skilled clinician who can monitor labor and perform an ERCS, a clinician who can administer obstetric anesthesia, nursing personnel to assist with the ERCS, and a clinician who can perform neonatal resuscitation if necessary [2]. Careful selection of women for trial of labor after cesarean section delivery (TOLAC) remains a wise clinical decision as failed TOLAC has the worst maternal outcomes [6].

The predictive factors for a successful TOLAC include vaginal delivery before CS, spontaneous onset of labor, history of vaginal birth after CS, favorable cervix (higher Bishop score), fetal station, a non-recurrent indication of previous CS, maternal age less than 40 years, inter-delivery intervals ≥ 18 months, residence, rupture of membrane, fetal weight less than 4 kilograms, gestational age, and singleton pregnancy [7-10].

1.2. Statement of Problem

Cesarean section is significantly increasing though the WHO recommended the optimal rate of cesarean section to be between 5 and 15% [4]

According to the World Health Organization (WHO), cesarean section rates have risen from approximately 12% of all births in 2000 to more than 21% in 2015 globally, with some countries reporting rates as high as 40% or more. Recent studies in Ethiopia done in 2022 shows the prevalence of cesarean section among women who gave birth at health institutions was 29.55% [11].

Previous cesarean delivery is one of the most common indications for repeat cesarean section [12], and one of the strategies proposed to reduce the rate of cesarean section and its complication is TOLAC. Because such repeated procedures are associated with extended surgical durations, increased risk of severe adhesions, higher blood loss, and elevated transfusion needs. Furthermore, post-operation women may face complications such as infertility, high-risk subsequent pregnancies, postpartum menorrhagia, and dysmenorrhea [13, 14].

While successful TOLAC is associated with the least maternal morbidity, the hazards of failed TOLAC surpass those of planned repeat C-Section [15]. But the proportion of women attempting TOLAC are declining in many countries, fueled by negative reports on the increase in the risk of maternal and infant complication and due to this, the rate of Elective repeat cesarean section has increased substantially. Studies on success rate of trial of labor are few and from these most are done in developed countries and are difficult to generalize.

This Research seeks to examine the success rate of TOLAC and its determinants in Wolkite University Specialized Teaching Hospital, by evaluating current clinical guidelines, reviewing maternal and neonatal outcomes, and engaging with both patients and healthcare providers.

1.3. Significance of the study

The significance of this study on Vaginal Birth after Cesarean (VBAC) lies in its potential to improve maternal and neonatal health outcomes by exploring and promoting a safer, patient-centered alternative to repeat cesarean sections. Cesarean delivery is a major surgical procedure that carries risks mentioned above. Additionally, repeated cesareans increase the risk of complications in future pregnancies, including placenta accreta, uterine rupture, and surgical adhesions [13, 14]. By examining the feasibility, safety, and success rates of TOLAC, this study aims to identify factors that can guide healthcare providers in offering informed, evidence-based recommendations to women who have previously undergone a cesarean section.

For the decision to attempt TOLAC must be made in the context of individual patient health, obstetric history, and available healthcare resources.

We believe this study's findings may contribute insights on the success rate TOLAC and maternal and fetal outcome in WKUSTH and In turn, help us to focus on key areas to increase the success rate, decrease adverse outcome and reduce unnecessary repeat cesareans, thereby decreasing maternal healthcare costs, and empower women with more choices in their birthing plans.

Additionally, the study's significance extends to public health, as it may shed light on how best to balance the increasing cesarean delivery rates with the need to provide safe, accessible, and effective alternatives like VBAC.

Chapter Two: Literature Review

2.1. Success rate of TOLAC

The overall success rate for a population of women undergoing TOLAC appears to be in the 60% to 80% range although some data suggest this rate may be lower in contemporary practice. (1, 2, 16)

The VBAC rate of hospitals in sub-Saharan Africa is between 37 to 97%. A Meta-analysis done, in sub-Saharan countries showed a VBAC success rate of 63–75% [21].

According to a study done in Ethiopia in 2020 in 3 teaching hospitals (Black Lion Hospital, Zewditu Memorial Hospital, and Gandhi Memorial Hospital) Out of 268 women who participated in the study, 186 (69.4%) (95% CI 57.5-81.3) had successful VBAC. [11]

2.2. Determinants of success rate of TOLAC

2.2.1 Maternal demography

Factors associated with VBAC in the setting of TOLAC are Maternal, demographics (such as Race, age, BMI, and insurance status) have all been demonstrated to be associated with the success of TOLAC. (15, 17)

In a multicenter study of 14,529 term pregnancies in which TOLAC was attempted, white women had a 78% success rate, compared with 70% in nonwhite women. Obese women are more likely to fail a TOLAC, as are women older than 40 years. (15, 17, 18)

In a study done across tertiary hospitals in 2024 in Ethiopia it was concluded that women aged 35 years or older were three times more likely than their counterparts to give a vaginal birth after a cesarean section.(22)

2.2.2 Previous Indication of CS

Success rates for women whose first cesarean delivery was performed for a nonrecurring indication (breech, non-reassuring fetal well-being) are similar to vaginal delivery rates for nulliparous women. (15, 19)

In contrast, prior cesarean delivery for cephalopelvic disproportion (CPD) or failure to progress (FTP) has been associated with success rates that range from 50% to 67 %.(15, 17)

In one systematic review and meta-analysis done in 2020 at 3 teaching hospitals in Ethiopia; obstructed labor, cephalopelvic disproportion, multiple pregnancies, non-reassuring fetal heart rate pattern (NRFHRP), failed induction and augmentation, malpresentation and malposition, and antepartum hemorrhage are the most common indications of Caesarean section. In this systematic review and meta-analysis, cephalopelvic disproportion (CPD) is the most common indication of Caesarean section followed by non-reassuring fetal heart rate pattern (NRFHRP), and obstructed labor in Ethiopia.(11)

2.2.3 Prior Vaginal delivery and fetal condition

Prior vaginal delivery, including prior VBAC, is one of the greatest predictors of successful TOLAC. In one series, women with a prior vaginal delivery had an 87% TOLAC success rate, compared with a 61% success rate in women without a prior vaginal delivery. Birthweight greater than 4000 g, in particular, is associated with a higher risk for failed VBAC. (15, 19)

In one institutional-based cross-sectional study conducted at tertiary hospitals in northwest Ethiopia the success rate of the trial of labor after one cesarean section was 56.3% (95% CI, 51.3%, and 61.2%). Maternal age ≥ 35 years, the fetal station at admission ≤, vaginal delivery before cesarean section, and successful vaginal birth after cesarean delivery were found to have a significant association with the success rate of trial of labor after cesarean section. (22)

In one case control study conducted in East Wollega, Western Ethiopia in 2020, the study revealed that rural residence, having no history of stillbirth, prior vaginal birth after cesarean, counseling about a trial of labor after cesarean during antenatal follow-up, and birth interval of >2years were found to be determinants of successful vaginal birth after cesarean. Given these factors, it is recommended that care providers should advocate delaying pregnancy for at least 2years and counseling women about trial of labor after cesarean during antenatal care follow-up. (23)

2.3.Maternal and Neonatal Outcomes

Although the absolute rates of adverse maternal and neonatal outcomes are low, TOLAC is associated with a higher rate of both maternal and neonatal morbidity and mortality compared with ERCD.(16)

The most feared complication of trial of labor after cesarean delivery is uterine rupture, which can have catastrophic consequences, including substantial maternal and perinatal morbidity and mortality. Although the absolute risk of uterine rupture is low, several clinical, historical, obstetrical, and intrapartum factors have been associated with increased risk. (20)

In one Canadian study done in 2018, rates of composite severe neonatal morbidity and mortality were higher among women delivering after an attempted VBAC compared with those delivering by ERCD—adjusted odds ratio (aOR) 1.49.(16)

Neonatal sepsis, stillbirth, prematurity, perinatal asphyxia, low Apgar score, and meconium aspiration syndrome were the most common neonatal complications following the Emergency Caesarean section for unsuccessful TOLAC in Ethiopia.(19)

2.4.Conceptual framework

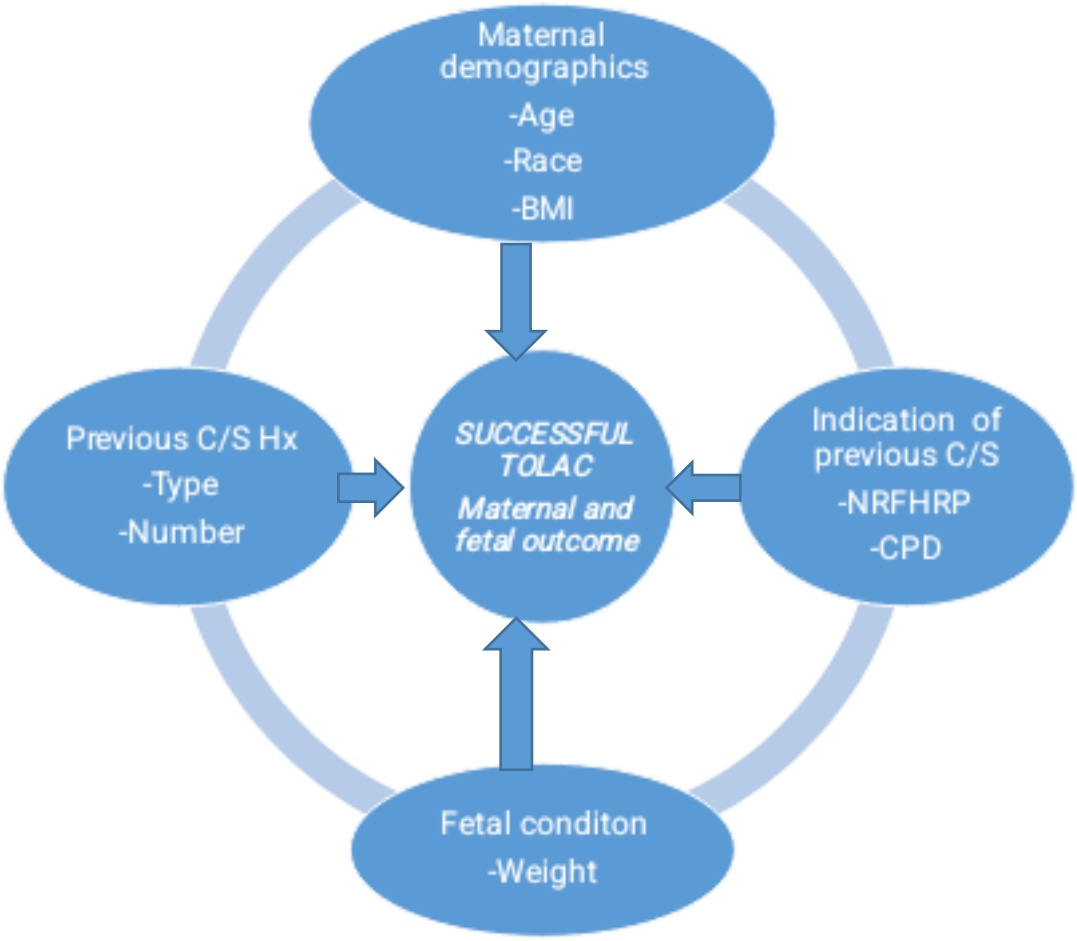

Figure 1 Conceptual framework of factors affecting success rate of TOLAC(25)

Chapter Three: Objectives

3.1. General Objective

Determine the success rate of TOLAC based on maternal and neonatal outcome and its determinant factors in WUSTH.

3.2. Specific Objectives:

- Assess the magnitude of VBAC
- Determine the factors that influence success rate of TOLAC
- Assess maternal and neonatal outcome after TOLAC

Chapter Four: Methodology

4.1. Study setting

The study was conducted at WUSTH in Gubrye, Wolkite town from November 18 to November 25, 2024 G.C.

WUSH is specialized teaching hospital in Gurage Zone, Central Ethiopia, located 12 km from Wolkite town and about 170km from Addis Ababa. The hospital provides services to clients from Wolkite town and its surroundings.

Study was conducted on cases selected from the time period of November, 2022 to November 2024.

4.2. Population

4.2.1. Source population

All pregnant women with previous history of one C.S. delivery admitted to the labor and maternity ward of Wolkite University Specialized Teaching Hospital from 2022 to 2024.

4.2.2. Study population

All pregnant women with previous caesarean delivery and fulfil the inclusion criteria.

4.3. Sample size and Sampling technique

4.3.1. Sample size determination:

Sample size was calculated using single population proportion formula assuming 69% success rate of TOLAC, 95% confidence interval, 5% margin of error and 210 women fulfilling inclusion criteria over a period of 02 years.

$$\text{Sample size} = \frac{(Z\,\alpha/2)^2 * P * (1-P)}{D^2} = \frac{(1.96)^2 * 0.69 * (1-0.69)}{(0.05)^2} =$$

$$\frac{3.8416 * 0.69 * 0.3}{0.0025}$$

$$= \frac{0.822}{0.0025} = 328.68 \sim 329$$

Thus, the minimum sample size was 329.

Applying finite population correction formula,

$$\text{Sample size} = \frac{N*n}{N+n} = \frac{329*386}{329+386} = \frac{126994}{715} = 178$$

The corrected sample size was 178 and with 10% non-response rate, the final sample became 196.

Where: Zα/2 = Critical value

P = Success rate of TOLAC taken from previous studies (0.69)

D = margin of error

P =success rate of TOLAC(11)

4.3.2. Sampling technique

A probability sampling technique (Simple Random Sampling) was used to select samples in the study period.

4.3.3. Inclusion and Exclusion criteria

4.3.3.1. Inclusion Criteria

Women with a single prior C.S. scar presenting in their next pregnancy with a single, live fetus in cephalic presentation, who have reached the national viability criteria and delivered in WUSTH.

4.3.3.2. Exclusion Criteria

All data with incomplete chart.

Mothers who do not have ANC contact in our hospital prior to TOL.

4.4. Study variable

4.4.1. Independent variables

Socio demographic variables: maternal age, marital status, parity, gestational age

Past obstetric variables: indication for the primary c/s, inter delivery interval, prior successful VBAC and SVD, history of still birth.

Current obstetric and fetal factors: status of the membrane at admission, and duration of rupture of membrane, presence of meconium, cervical dilation at admission and position of the presenting part, duration of labor, birth weight and outcome of the baby

4.4.2. Dependent variables

The dependent variable was the success rate of TOLAC.

4.5. Data collection instruments and techniques

Data was collected from patients' charts after tracing by medial record number from nurses and labor ward staff registry of deliveries. The information was collected using a semi structured questionnaire by document review which includes maternal socio-demographic, past and present obstetric experience, mode of delivery and birth outcome variables. Four data collector graduating medical students were recruited. The questionnaire was prepared in English.

4.6. Data quality control

To assure the quality of the data, properly designed data collection instrument and training of both data collectors and supervisor was done. The collected data was reviewed and checked for completeness and relevance by the supervisors and principal investigator daily.

4.7. Data management

The completed questionnaire was checked for completeness and consistency by the principal investigator. Code was given to the completed questionnaire. Data clean-up was performed to check for accuracy, consistencies and values; any error identified was corrected.

4.8. Data Analysis

Data was entered and analyzed using SPSS version 27 computer software packages packages and bivariable and multivariable logistic regression was done. Frequency and percentage was calculated, cross tabulated and results documented using Microsoft word.

4.9. Ethical consideration

Before beginning data collection, ethical clearance was obtained from Wolkite University College of Medicine and health sciences. Official letter was submitted to responsible bodies and the objective of the study was explained. All the information collected from the study subjects

was handled confidentially through omitting their personal identification and the data was used for the research purpose only.

4.10. Dissemination of Findings

The results of this study will be presented to Wolkite University, College of medicine, department of medicine and Wolkite University specialized teaching hospital and will be used as a possible recommendation and guideline for future medical practice in the hospital.

4.11. Operational Definitions

Caesarian section: is birth of fetus, placenta and membrane through incision in the abdominal wall and intact uterine wall after age of viability. (1, 2)

Elective repeat CS: planned CS, whether or not the caesarian section occurred at the scheduled time or not. (1)

Emergency CS: unplanned CS

Trial of labor (TOL): a planned attempt to birth vaginally in a woman who has had a previous c/s. this is also sometimes called a "trial of vaginal birth after caesarian". (1)

Unsuccessful TOL: delivery by caesarian section by a woman who have TOLAC. (4)

VBAC (vaginal birth after CS); vaginal birth following trial of labor after previous CS (1)

Parity – number of delivery experiences (1)

Period of gestation: time period elapsed from conception to delivery or the entire period of pregnancy. (1)

Chapter Five: Results

5.1. Socio-demographic Characteristics

A total of 196 participants were involved in this study. Age distribution of study participants were: age<25 account for37(18.8%) and the leading proportion of the participants were in the age group of 25-29yrs, 80(40.8%), followed by age group of 30-34yrs, 63(32.2%) and the least was in the age group >34yrs 16(8.2%). Majority of participants were from rural 129(66%).All of the participants were married. It was difficult to know the patient's occupation and literacy from patient's chart due to incomplete documentation.

Table 1 Maternal socio demographic status of the study participants in WUSTH from 2022-2024

Socio-demographic characteristics		Number	%
AGE(years)	<25	37	18.8
	25-29	80	40.8
	30-34	63	32.2
	>34	16	8.2
ADDRESS	Rural	129	66
	Urban	67	34
Marital Status	Married	196	100
	Unmarried	0	0

5.2. Obstetric and fetal characteristics

5.2.1. Obstetric characteristics

From 196 mothers who participated in the study most of them are multiparous accounting for 108(55.1%) followed by primiparous mothers 80(40.8%). And 12(6.1%) of them had previous Vaginal birth after cesarean delivery.

Fetal distress was found to be the commonest indication for previous cesarean delivery accounting for 84(42.9%), followed by CS performed for unknown indication 37(18.9%), failure of labor progression 33(16.8%), CPD 18(9.1%), and APH 13(6.6%).

Majority of the participants had 5-8 ANC contact 112(57.1%), 62(31.7%) of them had more than 8 ANC contacts and the least number of ANC contacts were observed in 22(11.2%) of the study participants. 133(67.9%) of the participants were admitted to labor ward at latent first stage of labor, followed by active first stage of labor accounting for 58(29.6%) and 5(2.5%) of them were admitted at second stage of labor.

From 196 study participants, 120(61.2%) of them delivered via VBAC and 76(38.8%) of them delivered through Emergency Repeat cesarean section. 2(2.6%) cases were complicated by scar dehiscence. The commonest indication for ERCD was Non reassuring fetal heart pattern (NRFHRP) accounting for 35(46.1%), followed by failure of labor progress 28(36.8%) and malpresentation 11(14.4%) of the participants who had ERCD.

Table 1 Obstetric characteristics of mothers who tried labor after previous C/S, WUSTH from 2022-2024

Obstetric characteristics		Number	Percentage
Parity	I	80	40.8
	II-IV	108	55.1
	≥V	8	4.1
History of VBAC		12	6.1
Indication for previous Cs	Fetal Distress	84	42.9
	Failure of labor progression	33	16.8
	CPD	18	9.18
	Malpresentation	11	5.6

	APH	13	6.6
	Unknown	37	18.9
		Number	Percentage
No. of ANC contact	1-4	22	11.2
	5-8	112	57.1
	>8	62	31.7
Phase of Labor at Admission	Latent	133	67.9
	Active	58	29.6
	Second stage	5	2.5
Mode of delivery	VBAC	120	61.2
	ERCD	76	38.8
Indication for ERCS	NRFHR	35	46.1
	Failure of labor to progress	28	36.8
	Malpresentation	11	14.4
	Scar dehiscence	2	2.6

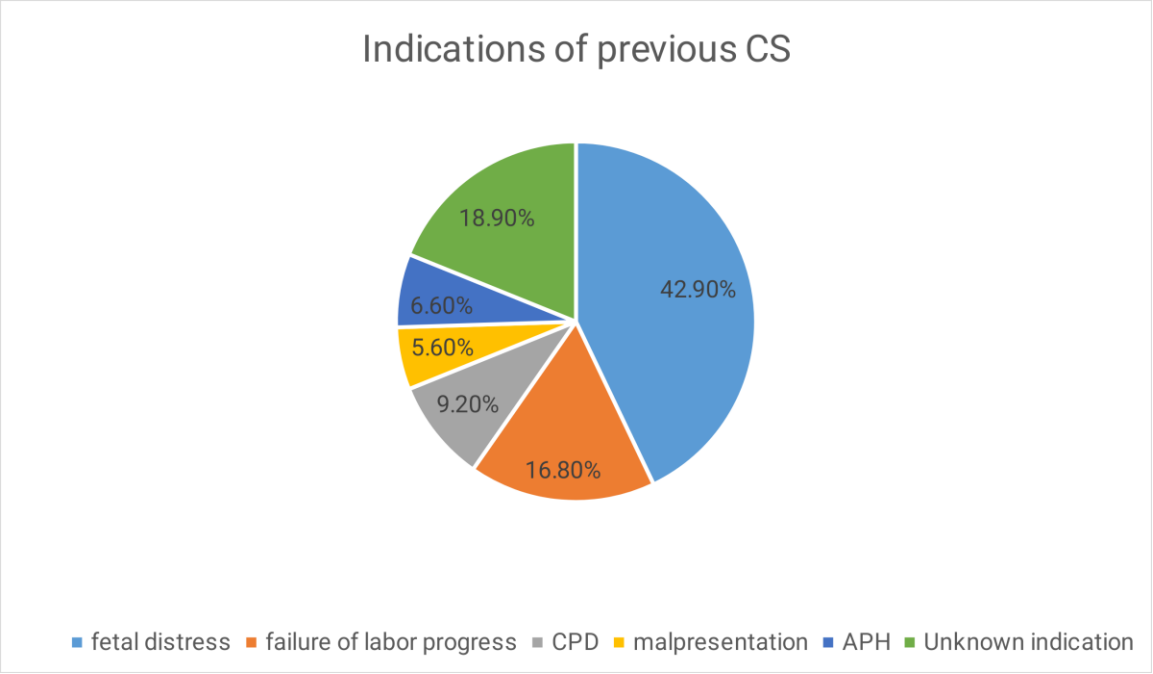

Figure 2 Indications of previous CS in the study participants in WUSTH from 2022-2024

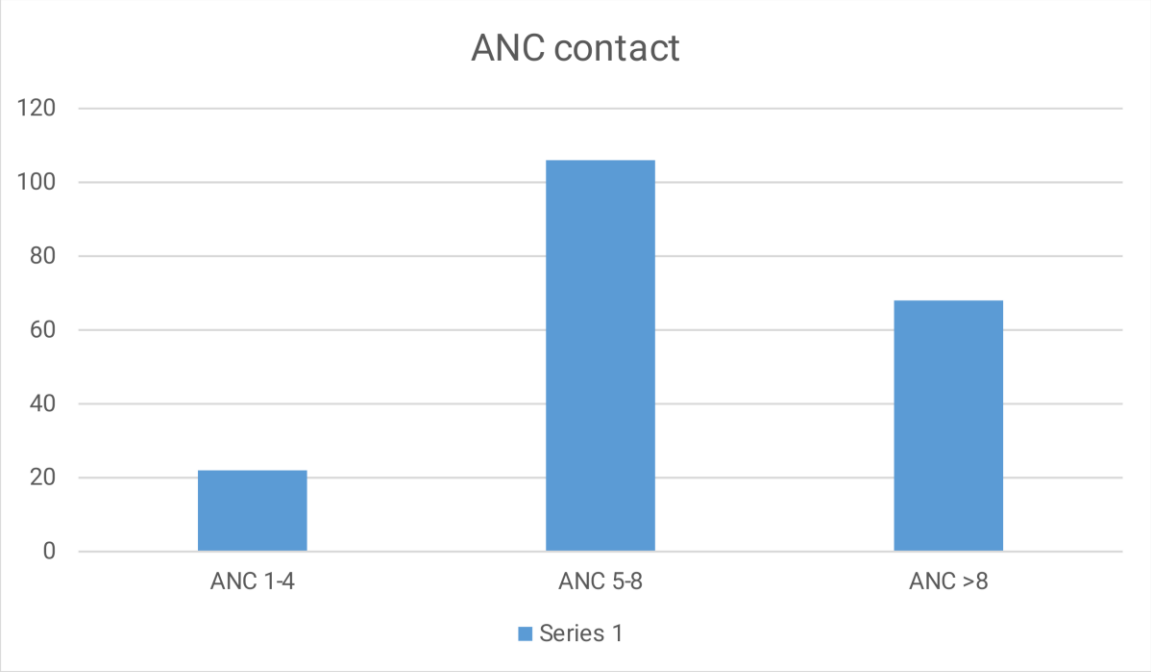

Figure 3 Number of ANC contacts of study participants in WUSTH from 2022-2024

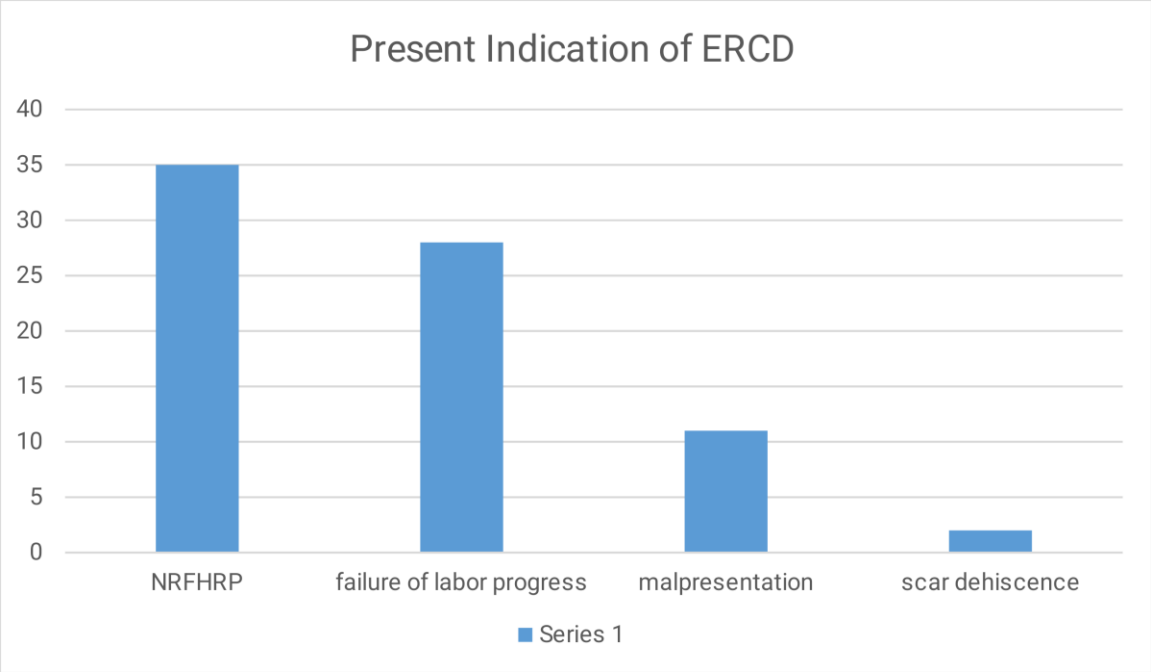

Fig 4 Present indication of ERCD in mothers undergoing TOLAC in WUSTH from 2022-2024

5.2.2. Fetal Outcome

From neonates delivered by mothers who have undergone TOLAC, APGAR score greater than or equal to 7 was found in 184(93.9%) of neonates and 12(6.1%) of them had APGAR score of less than or equal to 6.

Table 2 Fetal outcomes of neonates delivered from mothers who underwent TOLAC in WUSTH from 2022-2024

Fetal condition			Number	Percentage
Previous	Alive		182	92.8
	Dead		14	7.2
Present	Alive		196	100
	Apgar	≤6	12	6.1
		7-8	117	59.7
		>8	67	34.2
	Early Neonatal Death		5	2.5

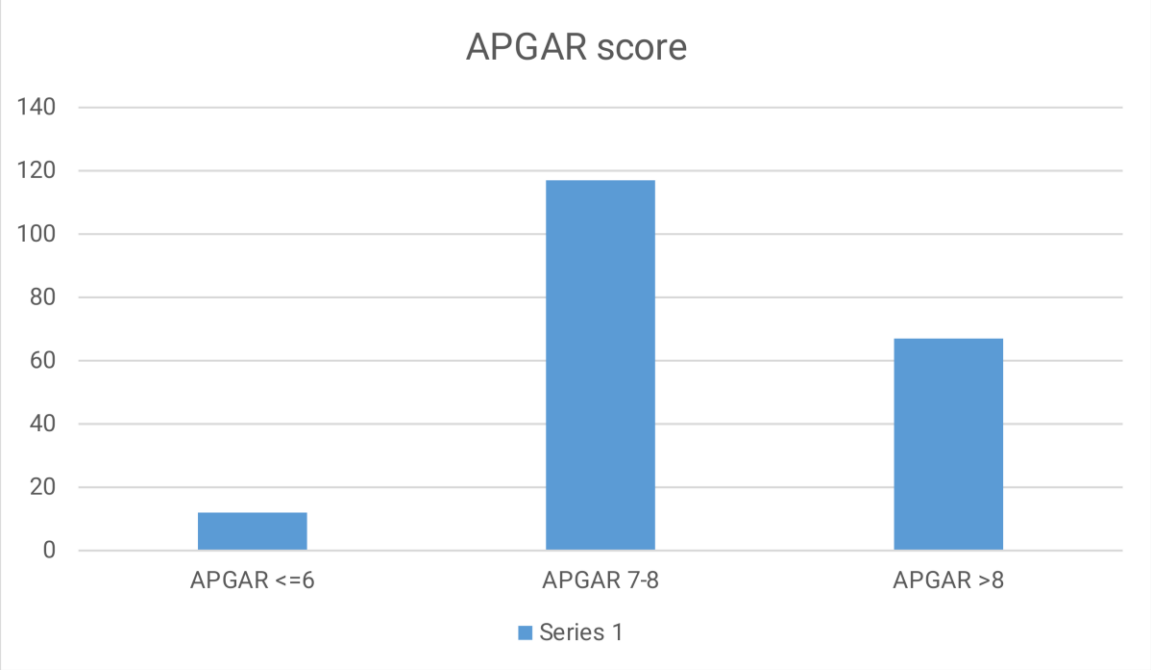

Figure 5 Apgar score of neonates born from participants who have undergone TOLAC in WUSTH from 2022-2024

5.3 Factors associated with success rate of TOLAC

Bivariable logistic regression was performed to identify variables which are candidates for multiple logistic regression and a total of 8 variables were found to be candidates at p-value less than 0.2.

Table 4 Bivariable logistic regression of characteristics of mothers who tried labor after previous CS in WUSTH from 2022-2024

Patient characteristics		TOLAC		P-value	COR (95% C.I)
		Successful	Failed		
Indication of previous C/S	Fetal Distress	77	7	<.001	1
	Failure of labor progression	26	7	.062	2.962 (.949-9.242)
	CPD	9	9	<.001	11.000 (3.296 – 36.709)
	Malpresentation	2	9	<.001	49.500 (8.895-275.457)
	APH	4	9	<.001	24.750 (6.047 – 101.294)
	Unknown	2	35	<.001	192.500(38.040-974.148)
AGE(years)	<25	33	4	<.001	1
	25-29	69	11	.659	1.315 (.389 - 4.443)
	30-34	11	52	<.001	39.00 (11.460-132.722)
	>34	7	9	.001	10.607 (2.532 - 44.440)
ADDRESS	Urban	12	55	<.001	1
	Rural	108	21	<.001	.042 (.019-.093)

Phase of labor	Latent	104	29	<.001	1
	Active	14	44	<.001	11.271(5.438-23.359)
	Second stage	2	3	.072	5.379(.858-33.733)
Parity	I	63	17	<.001	1
	II-IV	52	56	<.001	3.991 (2.072-7.685)
	≥V	5	3	.305	2.224 (.482-10.251)
No. of ANC contact	1-4	14	8	<.001	1
	5-8	94	18	<.033	.335(.123-.915)
	>8	12	50	<.001	7.292(2.493-21.324)
Previous fetal outcome	Alive	115	67	<.001	1
	Dead	5	9	.051	3.090(.994-9.602)
Present fetal outcome	Apgar ≤6	9	3	<.001	1
	7-8	99	18	.395	.545(.135-2.212)
	>8	12	55	<.001	13.750(3.231-58.512)

Table 5Factors independently associated (multivariable LR) with success of TOLAC in mothers who tried labor after previous C/S in WUSTH from 2022-2024

Patient characteristics		TOLAC		COR (95% C.I)	AOR (95% C.I)
		Successful	Failed		
Indication of previous C/S	Fetal Distress	77	7	1	1
	Failure of labor progression	26	7	2.962 (.949-9.242)	1.926(1.468-7.920)*
	CPD	9	9	11.000 (3.296 – 36.709)	.550(.407-15.965)
	Malpresentation	2	9	49.500 (8.895-275.457)	6.757(.359 127.105)
	APH	4	9	24.750 (6.047 – 101.294)	2.917(.222 38.260)
	Unknown	2	35	192.500(38.040-974.148)	24.031(.1847 312.700)
AGE(years)	<25	33	4	1	1
	25-29	69	11	1.315 (.389 - 4.443)	2.211(.463 10.554)
	30-34	11	52	39.00 (11.460-132.722)	13.086(.907 85.311)
	>34	7	9	10.607 (2.532 - 44.440)	2.511(.235 26.792)
RESIDENCE	Urban	12	55	1	1
	Rural	108	21	.042 (.019-.093)	.510(.085 3.050)
Phase of labor	Latent	104	29	1	1
	Active	14	44	11.271(5.438-23.359)	.612(.118 3.175)
	Second stage	2	3	5.379(.858-33.733)	1.562(.083 29.528)

Parity	I	63	17	1	1
	II-IV	52	56	3.991 (2.072-7.685)	1.778(1.209 3.898)*
	≥V	5	3	2.224 (.482-10.251)	3.535(1.031 9.218)
No. of ANC contact	1-4	14	8	1	1
	5-8	94	18	.335(.123-.915)	.419(.067 2.624)
	>8	12	50	7.292(2.493-21.324)	.733(.099 5.417)
Previous fetal outcome	Alive	115	67	1	1
	Dead	5	9	3.090(.994-9.602)	1.788(.200 15.948)
Present fetal outcome	Apgar ≤6	9	3	1	1
	7-8	99	18	.545(.135-2.212)	.270(.037 1.951)
	>8	12	55	13.750(3.231-58.512)	.486(.043 5.550)

In multivariable (multiple) logistic regression, a total of 2 variables were found to be statistically significantly associated with outcome of TOLAC. Those were parity and previous indication for CS.

A mother whose indication for previous C/S was failure of labor progression had 1.9 times more chance of having successful TOLAC (AOR: 1.926, 95% CI: (1.468-7.920)compared to a mother whose indication for previous C/S was fetal distress.

Mothers who had 2 to 4 deliveries had 1.7 times (AOR 1.778, 95% CI (1.209 3.898) and mothers who had ≥5 deliveries had 3.5 times (AOR 3.535, 95% CI (1.031 9.218))more higher chance of having successful TOLAC compared with para one mothers respectively (table 5).

Chapter Six: Discussion

In our study successful TOLAC was achieved in around two-third of women with one previous CS, Success rate was 120(61.2%). This is in accordance with the results found in other studies, which demonstrate success rate of TOLAC ranging from 60.0-80.0%.

The overall success rate for a population of women undergoing TOLAC appears to be in the 60% to 80% range although some data suggest this rate may be lower in contemporary practice. (1, 2)

According to a study done in Ethiopia in 2020 in 3 teaching hospitals (Black Lion Hospital, zewditu memorial Hospital, and Gandhi Memorial Hospital) Out of 268 women who participated in the study, 186 (69.4%) (95% CI 57.5-81.3) had successful VBAC. [11]

But our result showed a slightly lower success rate as compared to the study done in 3 teaching hospitals in Ethiopia. Meanwhile, 76(38.8%0 of the study participants underwent emergency repeat cesarean section (ERCS), where majority of those are due to Non reassuring fetal heart pattern(NRFHRP) accounting for 35(46.1%), followed by failure of labor progress 28(36.8%) and malpresentation (11)(14.4%).

In our study majority of the mothers who underwent TOLAC had prior vaginal delivery, age range was between 25 and 29 and previous CS was done for nonrecurring indications.

Success rates for women whose first cesarean delivery was performed for a nonrecurring indication (breech, non-reassuring fetal well-being) are higher as compared to prior cesarean delivery for cephalopelvic disproportion (CPD) or failure to progress (FTP).(15). The results from our study are in accordance with the global data.

In our study from neonates delivered by mothers who have undergone TOLAC, APGAR score greater than or equal to 7 was found in 184 (93.9%) of neonates and 12(6.1%) of them had APGAR score of less than or equal to 6. Of them 5 (2.5%) of the neonates were complicated by early neonatal death (3 were from ERCD and 2 were from successful TOLAC).

In one Canadian study done in 2018, rates of composite severe neonatal morbidity and mortality were higher among women delivering after an attempted VBAC compared with those delivering by ERCD—adjusted odds ratio (aOR) 1.49.(16) The results from our study contrary to the

Canadian study show better outcomes in participants who had successful TOLAC as compared to ERCD.

In multivariable (multiple) logistic regression, a total of 2 variables were found to be statistically significantly associated with outcome of TOLAC. Those were parity and previous indication for CS. This is in accordance with two studies done in Ethiopia(In one case control study conducted in East Wollega, Western Ethiopia in 2020 and from a cross-sectional study conducted at tertiary hospitals in northwest Ethiopia).(22,23)

Chapter Seven: Conclusion

The cesarean section (C/S) rate has been steadily rising globally, with a previous cesarean delivery identified as one of the most common indications for repeat procedures. One proposed strategy to reduce the rate of cesarean deliveries is the promotion of vaginal birth after cesarean (VBAC). Our study tried to assess several key factors associated with the success of a Trial of Labor After Cesarean (TOLAC), including consistent antenatal care (ANC) follow-up, a non-recurring indication for the previous cesarean (such as breech presentation or non-reassuring fetal heart rate), a prior history of vaginal delivery, and increased parity

It demonstrated a TOLAC success rate of 61.2%, which aligns with global findings, where success rates typically range from 60% to 80%. Although our success rate was slightly lower than a similar study conducted in three Ethiopian teaching hospitals, the results were consistent with established factors influencing TOLAC outcomes, such as a history of vaginal delivery and a previous cesarean for non-recurring indications. The primary reasons for emergency repeat cesarean sections in our study were non-reassuring fetal heart patterns, failure to progress in labor, and malpresentation. Neonatal outcomes were largely favorable, with a high percentage of neonates achieving an APGAR score of 7 or higher, although early neonatal deaths were observed in both the TOLAC and ERCS groups. Multivariable analysis identified parity and the indication for the previous cesarean as significant predictors of TOLAC success, reinforcing findings from other studies in Ethiopia. These results emphasize the importance of carefully selecting candidates for TOLAC and provide further evidence for improving outcomes by focusing on clinical management and patient factors.

Chapter Eight: Limitation and Recommendation

8.1.Limitations of the study

- This study employed a retrospective design utilizing secondary data from a single medical center. As such, the findings may not be representative at regional or national level given the limited scope of data, which is from only one hospital.
- There is no standardized or organized system in place for documenting TOLAC cases, which leads to inconsistencies in data recording and challenges in ensuring comprehensive and accurate documentation.
- The clinical records frequently lacked important socio-demographic and clinical variables, leading to gaps in the data.
- Additionally, some records were either missing or misplaced, which posed challenges in the data collection process.
- The hospital administration and chart organizers were not particularly supportive and, in some cases, posed obstacles to the research process.

8.2.Recommendation

- Successful TOLAC rates are higher when the prior cesarean section was due to nonrecurring indications such as breech or non-reassuring fetal well-being. Therefore, it is crucial to ensure that women with such indications are well-counseled on the possibility of a safe TOLAC.
- NRFHRP was a major reason for emergency repeat cesarean sections (ERCS) in our study, accounting for 46.1% of cases. This emphasizes the need for better monitoring, if possible on CTG, and proper management protocols for fetal well-being during labor for women undergoing TOLAC.

- Given that this study utilized secondary data from a single medical center, We recommend conducting multi-center studies that include a diverse range of hospitals and healthcare settings, which would help to capture a wider variety of patient demographics, clinical practices, and outcomes, enhancing the generalizability of the results.

- We recommend that the medical centers in every level develop registry to document TOLAC cases and improve data collection and record keeping to minimize missing or misplaced data. This will facilitate better tracking, analysis, and improvement of TOLAC practices.

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Annexes

Comprehensive Questionnaire on Success Rate of TOLAC and Its Determinants

Section 1: Sociodemographic Information

1. **Age (at the time of your current pregnancy):**
   a. <24
   b. 25–30
   c. 31–35
   d. 36–40
   e. Over 40

2. **Race/Ethnicity:** (Select all that apply)
   a. Gurage
   b. Amhara
   c. Oromo
   d. Tigreyan
   h. Other (please specify): _____

3. **Level of Education:**
   a. Illiterate
   b. Less than high school
   c. High school graduate
   d. Some college
   e. Bachelor's degree
   f. Graduate degree or higher

4. **Employment Status:**
   a. Employed full-time
   b. Employed part-time
   c. Unemployed
   d. Student

e. Homemaker

f. Other (please specify) _____

5. **Marital Status:**

   a. Single

   b. Married

   c. In a relationship but not married

   d. Divorced

   e. Widowed

6. **Household Income (annual, before taxes):**

   a. Less than 5,000 birr

   b.5,000–10,000

   c. 10,000–20,000

   d. greater than 20,000

   f. unknown

7. **Health Insurance Coverage:**

   a. Government insurance coverage

   b. Private insurance

   c. none

8. Other (please specify) _____

Section 2: Obstetric History

8. **Number of pregnancies (including current):**

   a. 1

   b. 2-4

   c. 5 or more

9. **Number of live births (including current):**

   a. 0

   b. 1

   c. 2

d. 3

e. 4 or more

10. Indication for previous Cesarean delivery (select all that apply):

a. Failure of labor to progress

b. Fetal distress

c. Breech presentation(footling, cord prolapse)

d. Placental abruption

e. Placenta previa

f. Maternal health issues (e.g., preeclampsia, gestational diabetes)

g. Genital tract obstructive mass

h. Invasive cervical cancer

i. Multiple gestation (Twin A breech)

j. Other (please specify) _____

11. Has she previously attempted a TOLAC?

a. Yes, successful TOLAC

b. No, this is the first attempt

Section 3: Current Pregnancy Details

12. Did she had ANC follow up in our hospital

a. Yes

b. No

13. If yes how many times ……..

14. Was she consulted during ANC follow up about TOLAC?

a. Yes

b. No

15. Gestational age at the time of delivery:

a. Less than 37 weeks (preterm)

b. 37–39 weeks

c. 40–41 weeks

d. 42 weeks or more

16. Estimated weight of the fetus (if known):

a. Less than 2500g

b. 2500g–4000g

c. Undocumented

17. Any medical conditions during this pregnancy? (Check all that apply)

a. Gestational diabetes

b. Hypertension/pre-eclampsia

c. Gestational hypertension

d. APH

e. Uterine abnormalities (fibroids, septum)

f. History of preterm labor

g. Fetal growth restriction

h. Amniotic fluid abnormalities

i. Other (please specify) _____

Section 4: Labor and Delivery Experience

18. At what point did she decide to attempt TOLAC?

a. Early in pregnancy

b. During late pregnancy

c. During labor

19. Labor duration during the TOLAC attempt?

a. Less than 12 hours

b. 12–24 hours

c. 25–36 hours

d. More than 36 hours

20. Complications during labor

a. Failure to progress

b. fetal distress

c. Uterine rupture

d. Excessive bleeding

e. Other (please specify) _____

f. No complications

21. The mode of delivery in the current pregnancy?

a. Vaginal birth after Cesarean (VBAC)

b. Assisted vaginal delivery (forceps, vacuum)

c. Emergency Cesarean after attempted TOLAC

22. Outcome of the baby alive or IUFD

23. If alive APGAR score?

a. <=6

b. 7-8

c. >=8