HARAMAYA UNIVERSITY

COLLEGE OF HEALTH AND MEDICAL SCIENCES DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

Magnitude and factors associated with success of vaginal birth among mothers who had trial of labour after one previous cesarean delivery in Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia

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A thesis submitted to School of Graduate Studies Department of Obstetrics and Gynecology for partial fulfillment for the requirement of specialty certificate in Obstetrics and Gynecology

January, 2021

Harar, Ethiopia

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Acknowledgments

I would like to express my deepest gratitude to my advisors Dr.Leta Gedefa (MD) and Dr. Abera Kenay (PhD), for their dedication, advice, reviewing and commenting and technical support for successful completion of this thesis. I would like to extend my thanks to Haramaya University for giving me this chance.

I would also like to take this opportunity to express my deepest appreciation to all individuals who supported and encouraged me during this research work.

My gratitude also goes to Hiwot Fana Specialized University Hospital for supplying necessary data and documents used in the development of this thesis. Last but not least, my appreciation goes to all health professionals working in study area for their dedicated assistance and support during the study.

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ACRONYMS AND ABBREVIATIONS

ACOG	American Congress of Obstetricians and Gynecologists
AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odds Ratio
CS	Cesarean section
EFW	Estimated fetal weight
ERCD	Emergency Repeated cesarean delivery
HFSUH	Hiwot Fana specialized university hospital
LSCS	Lower segment cesarean section
NIH	National Institute of Health
OPD	Out Patient Department
RCS	Repeated Cesarean Section
TOLAC	Trial of labor after cesarean
VBAC	Vaginal birth after cesarean section

ABSTRACT

Background: Caesarean section (CS) is becoming the most frequently performed surgical procedure worldwide. Even though, variation exists in the rates of CS across and within countries, it ranges from 10% to 40%. The increase in CS, especially primary CS is further contributed to repeated CS. As such, vaginal birth after cesarean section (VBAC) is emerging as a strategy to reduce repeated CS. VBAC is often associated with shorter maternal hospitalizations, less blood loss and fewer transfusions, fewer infections, and fewer thromboembolic events than cesarean delivery. Although VBAC is becoming common, level of its implementation and success rates is less studied in eastern Ethiopia.

Objective: the objective of this study was to assess the magnitude and factors associated with success of vaginal birth among mothers who had trial of labour after one previous CS in Hiwot Fana Specialized University Hospital, 2020

Methods: A facility based cross-sectional study design was used. All records of women who underwent TOLAC from September 2019 to August 2020 in Hiwot Fana Specialized University Hospital were reviewed. Data on socio-demographic conditions, obstetric and reproductive conditions, delivery related information (mode of delivery, delivery outcome and indications for CS) were collected by trained midwives using a standard data abstraction sheet. All collected data were entered and analyzed using SPSS 20. Binary and multiple logistic regression were used to identify factors associated with successful trial of labor (vaginal delivery). All variables with p-value <0.05 in the multiple logistic regression were considered statistically significant.

Results: Of a total 224women who underwent TOLAC, 210(93.8%) with complete information were included in this study. The success rate (vaginal delivery) was 61.4%. Among women with failed TOLAC, the most common indication for emergency repeated CS was dystocia (59%). Successful vaginal birth after cesarean was more likely among women with ruptured membrane on admission (AOR=2.490; 95% CI: 1.404-44.18), cervical dilation >4cm on admission (AOR= 3.113;95% CI: 1.585-6.112), prior successful VBAC (AOR=6.807 ; 95% CI: 2.282-20.30) , SEFW between 1500-2499gm (AOR 7.589; 95% CI 3.158-18.234)

Conclusion: We found that the success of TOLAC in our study area was 61.4%. Women with prior successful VBAC, cervical dilatation > 4cm on admission, ruptured membrane and SEFW < 2.5 kg will be more likely to have successful VBAC.

CHAPTER ONE INTRODUCTION

1.1 Back ground information

Caesarean delivery is an operation done to deliver a baby through an incision in the uterus. It is the most frequently performed surgical procedure worldwide. Cesarean section is one of life saving procedures and intervention attributed to decrement of the maternal mortality and morbidity rates(Siraneh and assefa (2018).

The dictum “once a cesarean, always a cesarean” was well followed in the United States for the greater part of the 20th century. By 1980, 98 percent of women who’d had a previous cesarean delivery (CS) underwent a routine repeat cesarean for any subsequent pregnancy. Decades later, this old maxim still holds true for some and contributes to the overall rise in cesarean delivery rates seen today (Cunningham et al., 2010).

Cesarean delivery rates have increased dramatically worldwide. In the United States, cesarean section (CS) rates increased from 5% of all deliveries in 1970 to a high of 31.9% in 2016 (Joyce et al, 2017, p.287).Although efforts were made to reduce the number of CS, it failed to achieve the 15%ate recommended by the World Health Organization(WHO, 2015).

Women undergoing cesarean section have a higher morbidity and mortality rate than those having vaginal birth, such as massive postpartum hemorrhage, need for blood transfusion, anesthesia-associated complications, surgical risks (intestinal obstruction, wound dehiscence, wound scars, infection, etc.), and obstetric complications in subsequent pregnancies. Recently, with the dramatic increase in the rate of cesarean deliveries worldwide, several attempts have been made to reduce this rate, including trial of labor after cesarean delivery(Tapsamuthdechakorn (2017).

All over the world, the concern about the increasing rate of caesarean delivery, has focused on Trial of Labour after Caesarean Section (TOLAC) or Vaginal Birth after Caesarean(VBAC).An important consideration while contemplating trial of labour after caesarean is the risk of uterine rupture. Because of concerns about this complication, the rate of attempted TOLAC continues to fall all over the world (M. MADAAN (2011).

Among women who attempted a trial of labor after a previous low transverse cesarean section, 60 to 80 percent had vaginal deliveries, and morbidity is lower among women who have had a vaginal delivery after a previous CS than among women who elected to undergo a second CS(Gabbe et al., 2017, p.445).

NIH began requesting that more women be offered trial of labor after cesarean (TOLAC) in hopes of decreasing the rates of cesarean delivery. However, little is known about factors that could predict the delivery outcome of an attempted VBAC, which means that women cannot be guaranteed a successful outcome from a TOLAC. Because of this uncertainty, the NIH requests that research be done to formulate predictive models for women hoping to attempt vaginal birth after cesarean (NIH Consensus Statement, 2000).

While a variety of medical and non-medical factors have been said to be associated with successful VBACs, no model has been able to use these factors to consistently predict Delivery outcomes

1.2 Statement of the problem

There is a constant increase in caesarean section rate for varied indications worldwide. Though the safety of caesarean section has improved the morbidity rates are still high in compared to the vaginal delivery. Associated morbidities like abnormal placentation, post-operative pain, infection, long hospital stay are still rampant even after advancements in operative techniques and broad spectrum antibiotics (Lee SI, Khang YH et al. (2016).

Previous Caesarean section is a common indication for planned caesarean section. Therefore, making VBAC as a safe and successful option has been proposed as an effective way of reducing the planned Caesarean section rate. It has been introduced in to clinical practice I n many obstetric units worldwide(Madhavi N, Sujatha VV et al. 2014).

Vaginal birth after cesarean section (VBAC) is an alternative to repeated CSs. It peaked during the mid-1990s along with a lower total CS rate. However a dramatic drop of the percentage of VBAC since that point of time accompanied with a steady increase of CS rates was explored till the present time (Hsiu-Ting Tsai (2017).

In Ethiopia the national cesarean section rate increased from 0.7% in 2000 to 1.9% in 2016, with increases across seven of the eleven administrative regions of Ethiopia. Addis Ababa had the highest cesarean section rate (21.4%) in 2016 and the greatest increase since 2000. In the adjusted analysis, women who gave birth in private health facility had a 78.0% higher risk of cesarean section (adjusted prevalence ratio (aPR) (95% CI) 1.78 (1.22, 2.58) compared to Women who gave birth in public health facility. In the mean time the cesarean section rate among women with higher education increased from 18.8 % in 2000 to 20.8 % in 2016(Engida Yisma, G. et al. (Nov 2017).

Because of the increasing cesarean rate and thus complications associated with it, VBAC is a safe alternative that is endorsed by international organizations. However factors associated with the success of VBAC were not adequately studied in the study area. So, this study aims to fill the gap by identifying factors determining success of VBAC.

1.3 Significant of the study

The findings of this study will give paramount importance for Hiwot Fana Specialized University Hospital, stakeholders from Harari and Oromia health bureau, nongovernmental organizations (NGOs) working on maternal and child health and local policy makers to plan intervention programs.

The result of the study will greatly help the residents, midwifes and General practioners working in Obstetric ward of HFSUH in developing an evidence based model and approach that enables, appropriate counseling of mothers and appropriate selection of candidates for TOLAC. IT will also help the department of GYN-OBS of HFSUH develop and adopt evidence based guideline on the management of mothers with previous cesarean delivery.

In addition, findings of this study will provide the basic framework and a base line for any high scale study to be done at the national level.

1.4. Objective

1.4.1. General objective

To assess the magnitude and factors associated with success of vaginal birth among mothers who had trial of labour after one previous cesarean delivery in Hiwot Fana Specialized University Hospital from September, 2019 up to August, 2020

1.4.2. Specific objectives

- To assess the magnitude of success of vaginal birth after cesarean among who delivered in HFSUH from September, 2019 up to August, 2020

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- To assess factors associated with success of vaginal birth after cesarean among mothers who delivered in Hiwot Fana Specialized University Hospital from September, 2019 up to August, 2020

CHAPTER TWO: LITERATUER REVIEW

2.1. Vaginal birth after cesarean section

A 2013 study compares rates of trial of labor after Cesarean delivery (TOLAC) and rates of successful TOLAC between 1990 and 2009. Serial cross-sectional analyses were performed using the National Hospital Discharge Survey data to compare rates of TOLAC and TOLAC success between1990 and 2009.according to the study TOLAC success was at its highest rate in 2000, 69.8 % (95 % CI 65.2–74.3 %) and its lowest was in 2008, 38.5 % (95 % CI 28.1–48.8 %). The Join point regression identified a single significant join point, in 2000. The rate of TOLAC success increased significantly between 1990 and 2000 at 0.6 % points per year (95 % CI 0.1–1.1, p = 0.013), but declined significantly thereafter approximately 3.4 % points per year (95 % CI 2.5–4.3,p =\0.0001) (Uddin and Simon (2012).

.A retrospective study evaluated all women who underwent trial of labor after cesarean (TOLAC) following primary cesarean delivery by a general obstetrician gynecologist in the Tamshui Branch of MacKay Memorial Hospital (Taipei, Taiwan) between 2006 and 2015. The rate of successful VBAC among the women who chose TOLAC was 84.93% (Hsiu-Ting Tsai (2017).

An observational, cross sectional and hospital based study was conducted between (January-December 2015) in Ibrahim Malik Teaching Hospital- Khartoum-Sudan, involving 342 pregnant women with one previous C/S. pregnancy. Among 342 pregnant women involved in this study, the success rate for VBAC was 67.3%(JA, K et al. (2018).

A 2019 systematic review and meta-analysis of over 94 studies involving (239,006 pregnant women with 163,502 VBAC was undertaken to evaluate Evidence for the relationship between maternal and perinatal factors and the success of vaginal birth After cesarean section (VBAC). In total, 239,006 women who attempted a TOLAC were included; the successful rate of VBAC was 68.4%(Yanxin Wu, Yachana Kataria et al. (2019).

2.2 Factors associated with successful vaginal birth after cesarean section (ante partum and intrapartum)

In a 2005multicenter 4-year prospective observational study done in Houston, Texas Fourteen thousand five hundred twenty-nine women underwent TOL, with 10,690 (73.6%) achieving successful VBAC. Women with previous vaginal birth had an 86.6% success rate compared with 60.9% in women without such a history(Mark B. Landon, John C. Hauth et al. (2005).
Caughey and colleagues reported that for patients with a prior VBAC, the success rate was 93%, compared with 85% in women with a vaginal delivery before their cesarean birth but who had not had a successful VBAC.

A prospective multicenter registry collected at 19 clinical centers from 1999 to 2002, selected women with one prior low transverse cesarean delivery who attempted a VBAC in the current pregnancy. Among 13,532 women meeting eligibility criteria, VBAC success increased with increasing number of prior VBACs: 63.3%, 87.6%, 90.9%, 90.6%, and 91.6% for
Those with 0, 1, 2, 3, and 4 or more prior VBACs, respectively (P<.001) (Brian M. Mercer, Sharon Gilbert et al. (2008).

Hospital based retrospective cohort study of 9960 women with a singleton gestation and a history of one previous cesarean delivery. The overall vaginal birth after cesarean delivery success rate for the cohort was 74%.The overall vaginal birth after cesarean delivery success rates for groups 1, 2, 3, and 4 were 65%, 94%, 83%, and 93%, respectively. An analysis of neonatal birth weights of <4000 g, 4000 to 4249 g, 4250 to 4500 g, and >4500 g in showed a reduction in vaginal birth after cesarean delivery success rates from 68%, 52%, 45%, and 38%, respectively (Mohammed A. Elkousy, Mary Sammel et al. (2013).

A systematic review and meta-analysis involving94 eligible observational studies (239,006 pregnant women with 163,502 VBAC)demonstrated factors were associated with successful VBAC with the following odds ratios (OR;95%CI): age (0.92;0.86–0.98), obesity (0.50;0.39–0.64), diabetes (0.50;0.42–0.60), hypertensive disorders complicating pregnancy (HDCP) (0.54;0.44-0.67), Bishop score (3.77;2.17–6.53), , Macrosomia (0.56;0.50–0.64), previous vaginal birth before cesarean section (3.14;2.62–3.77), previous VBAC (4.71;4.33–5.12), the indications for the previous cesarean section (cephalopelvic disproportion (0.54;0.36–0.80),

dystocia or failure to progress (0.54;0.41–0.70), failed induction (0.56;0.37–0.85), and fetal mal-presentation (1.66;1.38–2.01)(Yanxin Wu, Yachana Kataria et al. (2019).

Risk factors associated with statistically significant decreased likelihood of VBAC were the following**: Age** (OR, 0.92; 95% CI, 0.86–0.98; adjusted OR, 0.85; 95% CI, 0.78–0.92, **BMI** (OR, 0.63; 95% CI, 0.53–0.74; adjusted OR, 0.94; 95% CI, 0.91–0.98**, diabetes** (OR, 0.50; 95% CI, 0.42–0.60), **Macrosomia** (OR, 0.56; 95% CI, 0.50–0.64; adjusted OR, 0.53; 95% CI, 0.49–0.59**), labor induction** (OR, 0.58; 95% CI, 0.50– 0.67; adjusted OR, 0.57; 95% CI, 0.46–0.70) , Black race compared to the White (OR, 0.54; 95% CI, 0.19–1.54; adjusted OR,0.51; 95% CI, 0.44–0.60. **Advanced age** (age ≥ 35years-old) is associated with VBAC failure (OR, 0.97; 95% CI, 0.85–1.11; adjusted OR, 0.75; 95% CI, 0.65–0.86**). Pre-pregnancy BMI, BMI at first prenatal visit or BMI at admission** before delivery of women with successful VBAC were lower than those of women with failed VBAC. Obesity (BMI ≥ 30 kg/m2) was a risk factor for failed VBAC (OR, 0.50; 95% CI, 0.39–0.64). Both pre-existing diabetes (OR, 0.42; 95% CI, 0.33–0.55) and gestational diabetes mellitus GDM) (OR, 0.53; 95% CI, 0.43–0.66) were identified as risk factors for failed VBAC (Yanxin Wu, Yachana Kataria et al. (2019).

The effect of gestational age on VBAC success was evaluated by a 5-year retrospective cohort study in 17 universities in the United States and community hospitals of women with at least 1 prior cesarean delivery. The entire cohort included 25,076 women who were pregnant with a history of at least 1 prior cesarean and delivered at 1 of the study hospitals. There were13,614 women who attempted a VBAC past 24 weeks of gestation, for an overall VBAC attempt rate of 54%.Women who were at or past their Expected date of delivery were more likely to attempt VBAC (79.1% compared with44.7%, relative risk [RR] 1.77, 95% confidence interval [CI] 1.73–1.81). However, in the unadjusted analysis, VBAC failure was significantly increased in the women attempting VBAC at 40 or more weeks of gestation(22.1% vs. 31.3%) (Kara M. Coassolo, David M. Stamilio et al. (2005).

A 2016prospective study done GCS Medical College and Hospital, Ahmedabad, Gujarat, India involved 75 women with one prior low transverse cesarean delivery who wished to attempt a VBAC in the current pregnancy. 57.3 %(43 out of 75) of total included cases underwent trial of labour after caesarean section (TOLAC). In this study, factors favoring VBAC were fetal weight

<3kg, fetal head engagement at the onset of labour, good bishop`s score, with intact membranes, and prior vaginal deliveries. 81% VBAC cases delivered new born of less than equal to 3 kg... In 90.5% VBAC cases, cervical dilatation was 4 cm at the time of presenting in spontaneous labour and 28% cases had prior vaginal deliveries. Out of all cases, 85.7% of VBAC cases had more than 3 years interval between previous C.S. and present delivery(Pooja S. Singh, Jaishree Bamaniya et al. (2011).

According to an observational, cross sectional and hospital based study conducted between (January-December 2015) in Ibrahim Malik Teaching Hospital- Khartoum-Sudan, Factorsaffecting success rate of the VBAC in study were; BMI between 25-30 was (67.8%), previous successful VBAC was(54.3) % and birth weight between 3.6-4 kg was (56.5%)(JA, K et al. (2018). Factors associated with decreased success were age <20years (13.5%), irregular ANC (36.1%), low socio-economic status(56.1%)(JA, K et al. 2018).

A retrospective institution based case-control study was conducted to identify factors associated with successful VBAC among mothers with one previous CS and offered trial of labor was done in Asella teaching Hospital. According to this study success rate of VBAC in age group of 18-25 years was small (17.4%), while it was highest in the age group of 25-35 years of age (60.4%).Factors associated with successful VBAC accordingly were: multiparty(50.7%), inter-delivery interval >24 months(58.5%), prior successful VBAC(86.8%), occiput anterior position (84%), cervical dilation > 4cm at admission and rupture of membrane on admission were factors associated with increased success(TESHOME (2018).

A case control study was conducted to compare the factors associated with successful VBAC in teaching hospitals in Addis Ababa in one year period. The cases were those successfully delivered vaginally and the controls were those with failed VBAC and delivered by caesarean section. The sample size of the cases was 101vaginal Deliveries and the controls were 103 failed VBAC patients which made the case to control ratio of 1:1.In this study independent factors determining successful VBAC were, history of successful VBAC in the past (OR, 3.39; 95% CI, 1.27–9.34),rupture of membrane at admission (OR, 1.67; 95% CI, 0.92–3.03), prior SVD (OR, 1.32; 95% CI, 0.62–2.79), cervical dilatation of more than 3cm at admission (OR, 5.53; 95% CI, 2.91–10.56). Presence of

meconium, mal-position and history of stillbirth were associated with failed VBAC(Birara and Gebrehiwot (2013).

2.3 Conceptual Frame work

Based on review of literatures done in different parts of the world, success of VBAC identified by socio-demographic factors, ante partum, intra partum factors, and obstetric factors as shown in fig. 1.

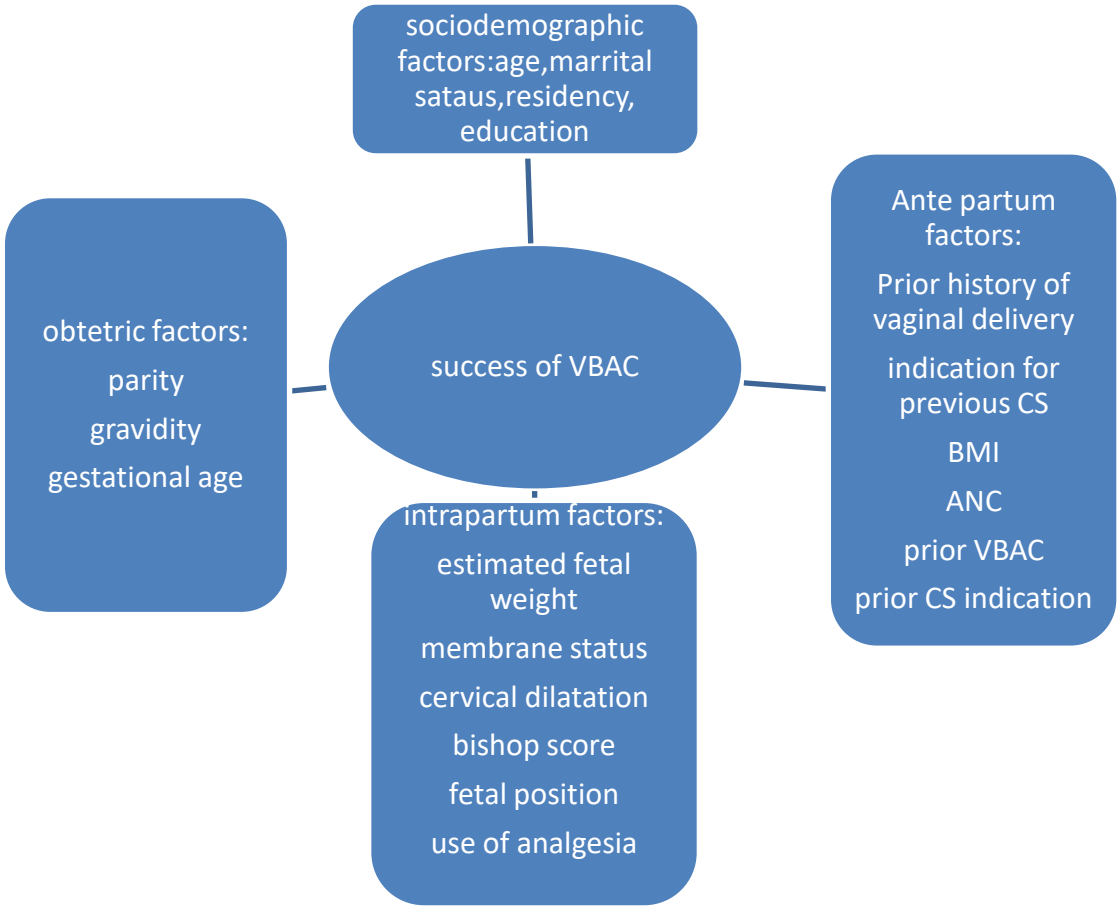

Figure 1. Conceptual frame work of factors associated with VBAC and its outcome. (Developed by principal investigator after reviewing different literature)

CHAPTER THREE: METHODS AND MATERIALS

3.1 Study area and period

This is a hospital based study and was undertaken in Hiwot Fana Specialized University Hospital which is one of the federal hospitals located in Harar town of Harari Regional State, which is located at 526 km east of Addis Ababa.

According to the projection from the 2007 census, the region has a population of 183,344 people. (CSA, 2019).

According to the regional health bureau report, there are two government hospitals (HFSUH & Jugal hospital), one military hospital (Army Hospital), one Federal Police Hospital, two private hospitals, one Fistula Hospital, eight health centers**,** 29 private clinics, twenty six health posts, and one regional laboratory**.**

The study was conducted in HFSUH, an affiliate of Haramaya University since 2014. HFSUH serves as the referral hospital for the region and the nearby Eastern Hararghe Zone and Somali Region. The hospital has a total of 210 beds and about 250 different categories of health professionals who are serving the community. The hospital is expected to serve about 5,000,000 populations like other referral teaching hospitals according to the Federal MOH hospital structure guide line. It is very clear to understand the enormous responsibility that hospital shoulders to give advanced health care to such a huge number of populations(bureau 2018).

The study was conducted in the department of obstetrics. The obstetric unit is well equipped with six senior consultants, 32 residents, 3 general practitioners, and 25 midwives. Medical interns and midwives are usually responsible for following normal labor, under the supervision of residents and consultants. The hospital serves both referral and self-referred cases.

The study was done from September, 2019 up to August, 2020.

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3.2 Study design

Hospital based retrospective cross-sectional study was conducted

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3.3 Population

3.3.1 Source population

Women with prior cesarean delivery who were admitted to obstetrics ward for delivery services in HFSUH

3.3.2 Study population

All Women who had trial of labour after prior cesarean delivery at HFSUH from September, 2019 up to August, 2020

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion criteria

- All women who had TOLAC at HFSUH during the study period with complete information

3.4.2 Exclusion criteria

- All patients that had no complete information
- Patients with lost card.

3.5 Determination of Sample size

- A double proportion sampling technique was used to determine sample size using EPIInfo version 7.1.4.0. (30) Sample size was determined using observational, cross sectional and hospital based study conducted in Ibrahim MalikTeaching Hospital, Khartoum-Sudan where the TOLAC success rate was 85%.

- The expected margin of error (d) taken was 0.05 with the confidence level ($Z\alpha/2$) of 95%. The number of samples of women to be included in the study was calculated based on the following formula.

$$n = \frac{(Z\alpha/2)^2 P(1-P)}{d^2} = 195 + 10\% \text{ non response rate (19)} = 214$$

3.6. Sampling procedure and Sampling technique

Considering the proportion of low TOLAC, all women who had TOLAC during the study period were included until the required sample size was fulfilled by using convenient sampling technique.

3.7 Data Collection Method

3.7.1. Data Collection Instrument

A pretested and structured checklist and data extraction tools was developed after reviewing relevant literatures to the problem under study was used. The checklist was designed to obtain information on the main variables demographic, obstetric, maternal medical, fetal and health related factors.

3.7.2 Data Collectors

Data was collected by four data collectors including two midwives and two residents.

3.7.3. Data collection procedures

The data source for the study was hospital medical record review (History, physical examination, ultrasound finding and outcome) recorded.

3.8. Variables

3.8.1 Dependent variable

- Successful vaginal birth after cesarean section

3.8.2 Independent variables

- Socio demographic variables: Maternal age, marital status, Parity, Gestational age and Address.

- Past Obstetric variables: Indication for the primary C/S, inter delivery interval, Prior Successful VBAC and Spontaneous vaginal delivery (SVD), history of still birth.

- Current obstetric and fetal factors: Status of membrane at admission and duration of rupture, presence of meconium, cervical dilatation at admission and position of the presenting part, duration of labor and birth weight.

3.9 operational definitions

TOLAC: A planned attempt to labour by a woman who has previously undergone cesarean delivery and desires subsequent vaginal delivery.

Failed TOLAC: a failed attempt to deliver vaginally ending in repeat cesarean delivery

Successful VBAC: spontaneous or assisted (vacuum or forceps) vaginal delivery following attempted TOLAC.

3.10. Data quality control

To maintain the data quality, questioner was developed from related published literatures. Before analysis data was coded and cleaned for consistency and completeness. Two midwifes and two

residents were assigned as data collectors and two supervisors were recruited and trained for two days. 5% of total sample was used as pretest to check questioner validity and to facilitate the data collection and maintain the context

3.11. Data processing and analysis

All filled checklist were checked for completeness and consistency, and double data entry was made using the Epidata 3.1 software. Then the data was exported to the Statistical Package for Social Sciences (SPSS) version 20 for analysis. Frequencies, proportion, and summary statistics was used to describe the study variables in relation to relevant variables and presented in tables. Bivariate analysis was carried out to identify variables that are significantly associated with successful VBAC. Co linearity was diagnosed using VIF and tolerance and also Hosmer-Lemeshow and Omnibus test was performed to test for model fitness. Those variables in bi-variate analysis with a p-value less than 0.05 were included in multivariate logistic regression to remove confounding factors. Finally, variables with a p-value less than 0.05 in multivariate logistic regression were considered as statistically significant association.

3.12 Ethical consideration

Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences, Institutional Health Research Ethics Review Committee (IHRERC).Then Official letter was written to Hiwot Fana Specialized University Hospital from the college for permission and support. Informed, voluntary, written and signed consent was obtained from the head of the Hospital. Confidentiality of the information collected from the cards was maintained and no identifiers were taken.

3.13 Expected outcome

This study shows the prevalence of TOLAC and factors affecting successful VBAC among woman who will deliver at HFSUH.

3.14 Result dissemination plan

The results of the research will be presented to relevant staffs and other members of the medical college and the hospital at the staff and student research workshop. Findings will also be presented at conferences and professional society meetings such as the Ethiopian Society of Obstetricians and Gynecologists, and Ethiopian Medical Association annual conferences. The findings will also be published in a relevant scientific journal and disseminated online. The data will also be used as a base line for future similar studies and interventions.

4. Results

4.1 Socio-demographic characteristics

Of a total of 224 records of women who underwent TOLAC identified during the study period, 210 (93.8%) with complete information were included. Among the 210 women who were offered TOLAC, 129(61.4%) had successful VBAC while 81(38.6%) had either repeat emergency CS or laparotomy for uterine rupture (n=3).

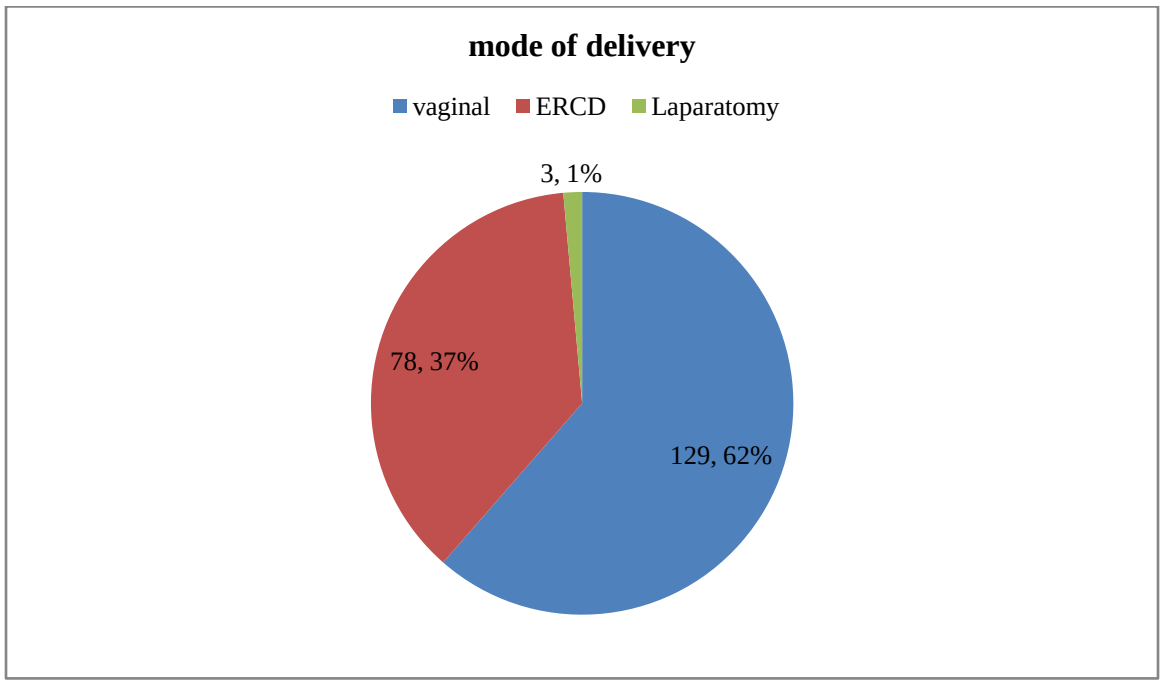

Figure 1 shows the modes of delivery among women with had failed TOLAC in HFSUH during the study period

The mean age of participants was 26.10 (±4.54) years. The mean gravidity of the participants was 3.20 (± 1.80). Majority (72.4%) were from rural part of the country while 41% of the participants had no formal education

Table 1: Socio-demographic conditions of women who underwent TOLAC in HFSUH, 2020.

Variable	Categories	Frequency (%)
Residence	Outside Harar	152(72.4%)
	Harar	58(27.6%)
Age (yrs)	18-24	76(36.2%)
	25-34	125(59.5%)
	>35	9(4.3%)
	mean ± SD = 26.10 (±4.54)	
Educational status	No formal education	86(41%)
	Primary school	39(18.6%)
	Secondary school	27(12.9%)
	Higher education	17(8.1%)
	Not recorded	41(19.5%)
occupation	Government employee	22(10.5%)
	Self employed	8(3.8%)
	Merchant	4(1.9%)
	Farmer	9(2.8%)
	House wife	130(61.9%)
	Not recorded	36(17.1%)

4.2 Obstetric and reproductive health conditions

Majority of the study participants received ANC (88.6%), admitted with cervical dilation of > 4 cm (44.3%), SEFW between 2500-3499 gm (69.5%), and intact membrane (49.5%) (Table 2).

Table 2 : Obstetric and reproductive conditions of women who underwent TOLAC in HFSUH, 2020.

Variables		Frequency (%)
ANC	Yes	186(88.6%)
	No	24(11.4%)
BMI (in kg/m2)	18-24.9	47(22.4%)
	25-29.9	14(6.7%)
	>=30	4(1.9%)
	Not recorded	145(69%)
Parity	I	112(53.3%)
	II-IV	78(37.1%)
	≥V	20(9.6%)
Prior vaginal delivery	yes	98(46.7%)
	no	112(53.8%)
Prior successful VBAC	Yes	44 (20.6%)
	No	166 (79.4%)
SEFW (gm)	1500-2499	16(7.6%)
	2500-3499	146(69.5%)
	3500-3999	49(22.9%)
Cervical dilation on admission (cm)	<4	116(55.2%)
	≥4	94(44.8%)
	mean ± SD	4.22(±2.40)

variables		Frequency (%)
Previous CS indications	Unknown	85(40.5%)
	Fetal distress	32(15.2%)
	APH	18(8.6%)
	Failed induction	10(4.8%)
	Failure of labour progress	16(7.6%)
	CPD/Obstructed labour	27(12.9%)
	Malpresentation	16(7.6%)
	Macrosomia	4(1.9%)
	Others	2(1%)
Gestational age(Wks)	<37	6 (2.9%)
	37-42	64(30.5)
	>42	0
	Unknown	140 (66.6%)
Membrane status	Intact	106(50.5%)
	Ruptured	104(49.5%)

4.3. Outcome of TOLAC

Among women who had underwent TOLAC, 129 (61.4% (95% CI: 54.8%, 67.6%)) had successful VBAC. In women with failed TOLAC, 59% were performed for dystocia. There was Two cases of scar dehiscence and one uterine rupture. Indications for the emergency CS among women with failed TOLAC is summarized in figure 2.

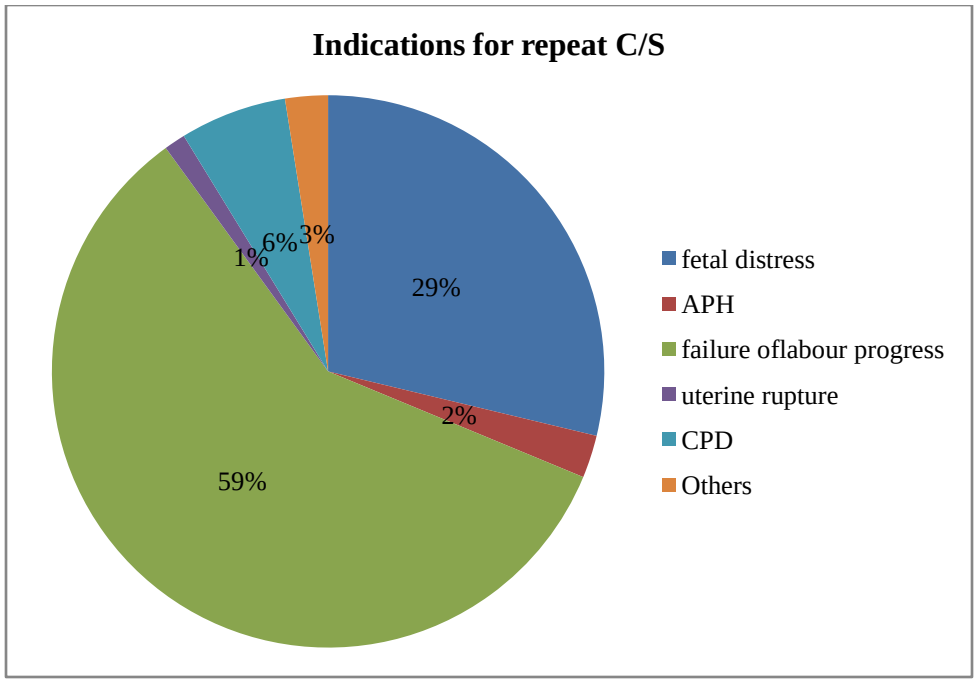

Figure 2 shows the indications for ERCD among women with had failed TOLAC in HFSUH during the study period

Perinatal outcome of the TOLAC are summarized in Table 3. There were 206 (98.01%) live births and 4 Stillbirths (1.99%). The mean birth weight was 3199(±493) gm.

Table 3: Perinatal outcomes of women who underwent TOLAC in HFSUH, 2020

Variables		Frequency (%)
Weight at birth (in gm)	<2500	18(8.6%)
	2500-4000	172(81.9%)
	>4000	20 (9.5 %)
	Mean ± SD = 3199(±493) gm	
Vital status at birth	Live birth	206 (98.01)
	Still birth	4 (1.99%)

First minute APGAR score	<7	17 (8.1%)
	≥7	193 (91.9%)
Fifth minute APGAR score	<7	8 (3.89%)
	≥7	198 (96.21%)

4.4 Factors associated with success of TOLAC

In the binary logistic regression, women with prior TOLAC, parity greater than 4, ruptured membrane on admission, cervical dilatation of >4cm and SEFW between 1500-2499 gm were candidate for the multiple logistic regression (p ≤0.25) (Table 4). After checking for multi-collinearity, only prior TOLAC, ruptured membrane, cervical dilatation of >4cm and SEFW between 1500-2499 gm were remained statistically significant (Table 5)

Table 4: Factors associated with success of TOLAC in HFSUH, 2020

Variable	Successful		COR	p-value
	Yes, n (%)	No, n (%)		
Membrane status at admission				
Intact	54(50.9%)	52(49.1%)	1	
Ruptured	75(72.1%)	29(27.9%)	**2.490(1.404-44.18)**	**0.002****
Prior successful VBAC				
Yes	39(88.6%)	5(11.4%)	**6.587(2.473-17.546)**	**<0.0001****
no	90(54.2%)	76(45.8%)	1	
Cervical dilatation on admission(in cm)				
<4 cm	**56(48.3%)**	**60 (51.7%)**	1	**<0.0001****
≥4 cm	**73(77.7%)**	**21(22.3%)**	**3.724(2.030-6.833)**	
SEFW				
1500-2499 gm	15(93.8%)	1(6.2%)	**5.772(2.592-12.854)**	0.001
2500-3499 gm	100(68.5%)	46(31.5%)	1.093(0.520-2.299)	**0.01**
3500-3499 gm	14(29.2)	34(70.8%)	1	
ANC				
No	15(62.5%)	9(37.5%)	**1**	0.909
Yes	114(61.3%)	72(38.7)	**1.053(0.438-2.531)**	
Area of residence				
Urban	37(63.8%)	21(36.2%)	**1**	0.664

Rural	92(60.5%)	60(39.5%)	**1.149(0.614-2.150)**	
Age in years				
18-24	44(57.9%)	32 (42.1%)	**0.909(0.226-3.655)**	
25-34	80(64%)	45 (36%)	**0.703(0.180-2.752)**	0.5
>35	5(55.6%)	4 (44.6%)	**1**	
Parity				
I-IV	112(58.9%)	78 (41.2%)	**1**	**0.033**
>V	16(85%)	3 (15%)	**3.946(1.118-13.926)**	
Birth weight(kg)				
<2.5 kg	16(88.9%)	2(11.1%)	1	
2.5-4 kg	107(62.2%)	65(37.8%)	0.054(0.009-0.309)	0.003
>4kg	6(30%)	14(70%)	0.260(0.095-0.711)	

Table 5 Factors associated with successful VBAC in HFSUH (multivariable logistic regression)

Variable	**Successful**		**AOR**	**p-value**
	Yes, n (%)	No, n (%)		
Membrane status at admission				
Intact	54(50.9%)	52(49.1%)	**1**	0.288
Ruptured	75(72.1%)	29(27.9%)	**1.508(0.707-3.218)**	
Prior successful VBAC				
Yes	39(88.6%)	5(11.4%)	**6.807(2.282-20.30)**	**0.007****
no	90(54.2%)	76(45.8%)	**1**	
Cervical dilatation on admission(in cm)				
<4 cm	**56(48.3%)**	**60 (51.7%)**	**1**	**0.001**
≥4 cm	**73(77.7%)**	**21(22.3%)**	**3.113(1.585-6.112)**	
SEFW				
1500-2499 gm	15(93.8%)	1(6.2%)	**7.589(3.158-18.234)**	**<0.0001**
2500-3499 gm	100(68.5%)	46(31.5%)	0.996(0.451-2.200)	**0.993**
3500-3499 gm	14(29.2)	34(70.8%)	1	
Parity				
I-IV	112(58.9%)	78 (41.2%)	**1**	**0.714**
>V	16(85%)	3 (15%)	**3.01(0.616-14.703)**	

Discussion

The aim of this study was to assess the magnitude of and factors associate with successful VBAC among women with one prior CS who underwent TOLAC in HFSUH. We found that the success rate of TOLAC was 61.4%. Women with parity>4, prior successful VBAC, ruptured membrane on admission, and cervical dilatation > 4cm on admission were more likely to have successful TOLAC. For a third of women who had failed TOLAC, emergency CS was performed for the indications of dystocia (59%) and fetal distress (29%).

Our findings of Success rate of TOLAC was 61.4% (95% CI: 54.8%- 67.6%) which is comparable to studies done in Sudan (Amir et al., 2020) and a global standard of 60-80%. Having more stringent patient selection criteria upon admission will improve the VBAC success rate. The method of intra-partum fetal monitoring in our study was intermittent auscultation with fetscope as oppose to continuous fetal heart tracing done with CTG in the other studies which leads to far fewer unnecessary interventions

n this study strong association towards successful VBAC were women with ruptured membrane on admission, cervical dilation > 4cm on admission, prior successful VBAC, SEFW between 1500-2499gm.

In this study, one of the strongest predictors in determining success of VBAC was cervical dilatation at admission. Women admitted with a cervical dilatation of > 4cm are were 3 times more likely to have successful VBAC than those with < 4cm (AOR=**3.113, 95%CI :(1.585-6.112).** Similar findings was observed in a study done in England and three teaching hospitals in Addis Ababa, Ethiopia (Yanxin Wu et al.,2019 ; Birara et al., 2013) . Hospital admission at earlier cervical dilatation is more likely to lead to increased intervention for dystocia.

Women with prior CS were almost 7 times more likely to have successful VBAC than those with no prior history (AOR=6.80, 95% CI: (2.282-20.30). women with ruptured membrane on

Admissions were 50% more likely to have successful VBAC compared to those with intact membrane (AOR=1.508, 95% CI: (0.707-3.218). These findings are similar to findings in study done in three teaching hospitals in Addis Abeba.

In this study, women whose primary CS was performed for fetal distress had the highest rate of successful VBAC (75%) in contrast to primary cesarean section done for the indication of failure of labour progress had the lowest rate of success (25%) which was the same result with Havana Specialist Hospital and Lagos, teaching hospitals (Siraneh, 2019).

Perinatal and maternal outcome of labor were recorded among women who had trial of VBAC in this study were One uterine rupture , 2 scar dehiscence and 4 still births.

Uterine rupture reported from various studies range from as low as 0.5% (Gregory et al. 1999) to as high as 4.2% (George et al. 2004). However, uterine scar rupture in our study was found to be 0.4%. There were no maternal deaths in the study.

Strengths and limitations

Strengths:

- This study may be considered the first to asses factors associated with successful VBAC and its outcome in HFSUH
- Multiple logistic regression was used to control associated factors in order to assess independent variables
- The data was collected by trained midwifes and resident

Limitations:

- Comparison and discussion was difficult. Due to shortage of similar studies carried out in Ethiopia

- The study was limited by the retrospective use of a database, allowing only the available variables to be used. In this particular hospital, for example, information on general medical and all past obstetric history were not routinely and clearly recorded.

Conclusion and recommendation

Conclusion

We found that the success of TOLAC in our study area was 61.4%. Women with prior successful VBAC, cervical dilatation > 4cm on admission, ruptured membrane and SEFW < 2.5 kg will be more likely to have successful VBAC.

Recommendations

Base on our findings, we recommend the following:

To HFSUH

- The hospital should facilitate availability of facilities for assessing maternal and fetal well-being such as equipping the wards with CTG machines.
- The hospital should develop its own Evidence-based clinical practice guidelines (TOLAC protocol) for mothers who had previous CS, attending trial of labor and monitor its implementation.

Future researchers

- Should be directed to conducting a prospective multicenter study of similar objectives to provide national data set for evaluating and monitoring this important intervention, and provide information for health services provision.

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CHAPTER SEVEN

Annex 7.1: Information Sheet and voluntary Consent for HFSUH administration

How are you?

My name is Dr.Henok Wale. I am a Medical doctor OBGYN resident at HFSUH, College of Health and Medical Science of the Haramaya University. I am going to do my research for the partial fulfillment of the specialty in obstetrics and Gynecology on identify factors associated with success of vaginal birth among mothers who had trial of labour after one previous cesarean delivery HFSUH, obstetrics department. I kindly request you to give me your willingness to explain about this study.

The Study Title: retrospective review factors associated with success of vaginal birth among mothers who had trial of labour after one previous cesarean deliveryHiwotFana Specialized University Hospital, Harar, Eastern Ethiopia

The purpose of the Study: The purpose of this study is to establish hospital based information on assessing factors associated with success of vaginal birth after cesarean section in HFSUH. The finding of this study will help to provide information to the professionals improving the quality of care and appropriate candidate selection. It will also help as baseline data for HFSUH for farther study. Moreover, the main aim of this study is to write a thesis as a partial fulfillment of specialty in obstetrics and gynecology.

Procedure and Duration: I will be retrieving charts of patients by using data from logbook in operation theatre and MRN from card room and clerk the data from charts by using check lists, a chart will stay with me for about 20 minutes for review and clerking.

Risk and Benefit: the risk is very minimal, only taking patients chart out of card room for few minutes. But the findings from this research will reveal very important information for the local and in general national health planners, health care providers and public.

Confidentiality: The confidentiality of the patients will be kept by using anonymous data extraction check list and the collected data will be locked and accessed only by authorized personnel only.

Rights: You have full right to permit or not for this research to be done or not in this hospital. If you decide to permit you have again the right to stop the study any time without providing written or oral warning.

Contact Address: If you have any questions or inquiries about the study any time you can contact me by using my mobile phone number: +251-0913622291 or

E-mail:henokwale24@gmail.com

Declaration of Informed Voluntary Consent I have clearly understood the purpose of the study, the procedure, the risk and benefit of the study, and issues of confidentiality. The contact address was given to me for any queries. I have been given the opportunity to ask questions about things that have been unclear. Therefore, I declare my voluntary on behalf of Hiwot Fana Specialized University Hospital Management to allow this study to be conducted in our Hospital with my signature.

Name of the Manager: _____Signature: _____ Date: ____/____/2020

Name of data collector:----------Signature----------

Annex 7.2 DATA EXTRACTION TOOL

Retrospective study on factors affecting successful VBAC in mothers admitted to HFSUH

1. Maternal socio-demographic factors

1.1 Maternal age:

- ☐ **15-19 yrs**
- ☐ **20-24 yrs**
- ☐ **25-29 yrs**
- ☐ **30-34 yrs**
- ☐ **35-39 yrs**
- ☐ **> 40 yrs**

1.2 **Marital statuses**:

☐ Married ☐ divorced ☐ cohabitation

☐ Widowed ☐ single ☐ other (specify)

1.3 **Education level**

☐ None ☐ primary school

☐ Secondary school ☐ higher level educated

1.4 **area of residence**:

☐ Urban ☐ rural

1.5 Occupation

☐ Un-Employed ☐ Employed (self)

☐ House wife ☐ ther (specify)

II. Past obstetric factors

Total number of pregnancies (including current)		**No of pregnancies > 28 weeks**	**Live birth**		**No of pregnancies <28 weeks**	**miscarriage**	
			Still birth			**termination**	
			Early neonatal death(<7days)				
Place of delivery: Hospital (**H**), Clinic(**C**), Home/dwelling(**D**), Other(**O**) **Mode of delivery**: Vaginal **(V),** Cesarean(**C**), Instrumental **(I**)			**Complications**: None (**N**), ante-partum hemorrhage(**APH**), Pregnancy related hypertension (**PRH**), Post partum hemorrhage(**PPH**), Uterine rupture(**UR**), **other(other)**				

	Delivery date(MM/YY)	Place of delivery	Mode of delivery	Born alive	Birth weight	GA	sex	Pregnancy complication	
1		**H☐ C☐ D☐ O☐**	**V ☐ C☐ I☐**	**Y☐ N☐**	**……..Kg**		**M☐ F ☐**		
2		**H☐ C☐ D☐ O☐**	**V ☐ C☐ I☐**	**Y☐ N☐**	**……..Kg**		**M☐ F ☐**		
3		**H☐ C☐ D☐ O☐**	**V ☐ C☐ I☐**	**Y☐ N☐**	**……..Kg**		**M☐ F ☐**		
4		**H☐ C☐ D☐ O☐**	**V ☐ C☐ I☐**	**Y☐ N☐**	**……..Kg**		**M☐ F ☐**		
5		**H☐ C☐ D☐ O☐**	**V ☐ C☐ I☐**	**Y☐ N☐**	**……..Kg**		**M☐ F ☐**		

6		H☐ C☐ D☐ O☐	V ☐ C☐ I☐	Y☐ N☐	……..Kg		M☐ F ☐		
7		H☐ C☐ D☐ O☐	V ☐ C☐ I☐	Y☐ N☐	……..Kg		M☐ F ☐		

III. Past cesarean section related factors

3.2 Indication for the primary C/S:

☐ Fetal distress ☐ Ante partum hemorrhage ☐ failed induction

☐ Failure of labor progress ☐ Mal-presentation ☐ other (specify)

3.3previous successful VBAC:

☐ Yes ☐ No

3.4 if yes the number of previous successful VBAC:

☐ 1 ☐ 2

☐ 3 ☐ >3

3.5Inter-delivery interval:

☐ <24 months ☐ 24-60 months

☐ >60 months

3.6 prior C/S incision type:

☐ Low transverse ☐ low vertical

☐ Unknown type

IV.ANTENATAL AND MEDICAL FACTORS

4.1 ANC in current pregnancy:

☐ Yes ☐ No

4.2 If yes, frequency of ANC:

☐ **one** ☐ **two** ☐ **three** ☐ **Four** ☐ **> four**

4.3 Place of ANC follow up:

☐ **Health center** ☐ **hospital** ☐ **private clinic** ☐ **other (specify)**

4.4 pre-existing medical condition:

☐ **None** ☐ **overt DM/GDM** ☐ **chronic hypertension renal disease**

☐ **Cardiac disease** ☐ **other (specify)**

4.5 Use of medications in current pregnancy:

☐ **None** ☐ **NSAIDS** ☐ **Steroids** ☐ **Asprin** ☐ **Anti-hypertensive**

☐ **Insulin** ☐ **other (specify)**

4.6 social habits:

☐ **Smoking** ☐ **alcohol**

☐ **Chat** ☐ other(specify)

V. Obstetric and fetal factors (Intrapartum):

5.1 **BMI on admission**:

☐ < 18.5 kg/m2 ☐ 18.5-24.9

☐ 25-29.9 ☐ >30

5.2 Gestational age:

☐ <37 wks ☐ 37-42wks

☐ > 42wks

5.3 If GA known, Gestational age determined by:

☐ LNMP ☐ US <24wks

☐ SFH ☐ current US

5.4 Status of membrane at admission:

☐ Ruptured ☐ Intact

5.5 If membrane ruptured, Duration of rupture:

☐ 30-240 min ☐ 241-480 min

☐ 4 81-720 min

5.6 Cervical dilatation at admission:

☐ Closed ☐ 2-4 cm ☐ >4 cm

5.7 Station on admission:

☐ Un-engaged (station above -0) ☐ Engaged (station -0)

☐ Below station 0

5.8 fetal presentation:

☐ **Vertex** ☐ **non vertex**

5.9 If vertex, position:

☐ Occiput- anterior ☐ occiput-posterior

☐ Occiput transverse

5.9 intrapartum FHB monitoring:

☐ Intermittent auscultation (fetscope) ☐ continuous electronic fetal monitoring (CTG)

5.10 use of intra-partum analgesia/anesthesia:

☐ None ☐ opioid analgesia ☐ epidural

☐ Spinal ☐ combined epidural/spinal

5.11 intrapartum use of any medication:

☐ **None** ☐ **magnesium sulphate** ☐ **Steroids** ☐ **calcim channel blockers**

☐ **Insulin** ☐ **other (specify)**

VI. Outcome of current pregnancy

6.1 Mode of delivery

☐ **Vaginal (successful VBAC)** ☐ **Repeat emergency CS** ☐ **aparotomy**

6.2 if repeat emergency CS/Laparotomy, documented indication:

☐ Fetal distress ☐ scar dehiscence ☐ uterine rupture

☐ Dystocia ☐ Other (specify)

6.3 operative vaginal deliveries:

☐ Yes ☐ no

6.4 Delivery attended by:

☐ Medical intern ☐ resident ☐ midwife ☐ senior OBGYN

6.5 Delivery complications:

☐ None ☐ APH ☐ PPH ☐ uterine ruptures ☐ CPD/obstructed labour

☐ Scar dehiscence ☐ other (specify)

6.6 Estimated blood loss……ml

6.7 post-partum hemoglobin/Hct: ……..mg/dl

6.**6 Need for blood transfusion**:

☐ YES ☐ NO

6.7 Mother final outcome:

☐ Discharged home ☐ left against medical advice ☐ Died

6.8 length of hospital stay: …….

VII. Neonatal outcome

sex	M ☐ F ☐	**NICU admission**	Yes ☐ NO ☐
Weight	……..Kg	**still birth**	Fresh ☐ macerated ☐
Live birth	Yes ☐ NO ☐	**Birth related injury**	Yes ☐

APGAR score	1st min……..		no ☐
	5th min……..		
	10thmin……..		
Resuscitation	None ☐ 02☐ BMV ☐ CPR☐		

7.3 CURRICULUM VITAE (CV)

NAME: Henok Wale Sewalem

ADDRESS: Telephone mobile: +251913622291/+251996671469,

Email:henokwale24@gmail.com Harar, Ethiopia

GENDER: Male

MARITAL STATUS: Married

DATE AND PLACE OF BIRTH: FEB 13, 1992 GC, A.A, Ethiopia

NATIONALITY: ETHIOPIAN

ACADEMIC QUALIFICATION AND DATES:

Medical Doctor (MD), 26/December/2017, Haramaya University, Harar Campus, Ethiopia

- **WORK HISTORY: OBGYN resident: January 2017 - PRESENT**

Medical Intern 2015 to 2016