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SCHOOL OF PUBLIC HEALTH

Determinants of Successful Vaginal Delivery after Cesarean Section at
Public Hospitals in Hawassa City, Sidama Region, Ethiopia, Unmatched
Case Control study, 2023.

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A research paper to be submitted to Hawassa University College of
Medicine and Health Science School of Public Health in Partial
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Hawassa Ethiopia

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Approval Sheet

Hawassa University College of Medicine and Health Science, School of Public Health and Department of Reproductive Post Graduate Program

This is to certify the thesis entitled Determinants of Successful Vaginal Birth after One Previous Cesarean Section mothers who opted for trial of labor at public hospital in Hawassa City, Ethiopia, 2022 Partial fulfillment of the Requirement for Degree of Masters in Public Health in Reproductive Health Prepared under my guidance by Simegn Anbese (BSc).

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As a member of the MSc research open defense examination, I certify that I have read and evaluated the thesis prepared by Simegn Anbese, and examined the candidate. I recommend that the research paper be accepted as fulfilling the thesis requirements for the degree of specialty in reproductive health.

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Abstract

Background: Vaginal birth after cesarean (VBAC) is giving birth through vagina after giving birth previously by cesarean section. Repeated caesarean deliveries associated with maternal and child complication. It had expanded hospital duration, and high risk of postpartum hemorrhage. However vaginal birth after cesarean is the best choice to reduce repeated CS. But there was insufficiency of evidence to predict determinants of successful vaginal birth after cesarean. So the aim of this study to identify determinants of successful vaginal birth after cesarean section to decreases the overall CS rate and related complication.

Objective: To identify determinants of successful vaginal delivery after Caesarean Section at Public hospital in Hawassa city, Sidama Region, Ethiopia, 2023.

Methodology: A facility based un-matched case control study was conducted at public hospitals in Hawassa city, Sidama region. A total of 107 consecutive cases and 214 controls were included. Data were collected using pre-tested interviewer administered questionnaire and chart reviewing. Then the data were exported to SPSS for analysis. Descriptive statistics analysis was done. A bi variable regression analysis was done for all independent variables. Variables with p-values < 0.25 in bi variable analysis were taken and analyses in multivariable logistic regression. Finally the multivariable logistic regression model were considered statistically significant p-values of < 0.05 with corresponding 95% CI.

Result: In this study 321 mothers were participated from those 107 give birth through birth canal after trial of labour and 214 mothers end the labour with repeated CS. Mothers who have counseling about trial of labour during Anti natal follow up (AOR 2.808; 95%CI 1.543-5.112), mother who have history of successful vaginal birth after cesarean section (AOR 4.170; 95%CI 2.317-7.504), membrane ruptured on admission (AOR 4.891; 95%CI 2.728-8.771) and BISHOPE score ≥ 6 (AOR 2.661; 95%CI 1.415-4.881) significantly associated with successful VBAC.

Conclusion Successful VBAC is reduced repeated cesarean delivery and related complication. So in our study counseling about TOLAC during ANC follow up, History of successful VBAC, Membrane ruptured on admission and BISHOPE score ≥ 6 were determinants of successful VBAC.

Key words-TOLAC, VBA

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Abbreviation

ANC	Anti natal care
AFSOL	Active First Stage of Labour
AROM	Artificial Ruptured of Membrane
BMI	Body Mass Index
CS	Caesarean Section
CI	Confidences Interval
CPD	Cephalo-Pelvic Disproportion
CX	Cervix
HUCSH	Hawassa University Comprehensive Specialized Hospital
LFSOL	Latent First Stage of Labour
NRFHR	None Reassuring Fetal Heart Rate
SVD	Spontaneous Vaginal Delivery
SPSS	Statistical Package for Social Science
RCD	Repeated Caesarean Delivery
TOL	Trial of Labour
TOLA	Trial of Labour after Caesarean Section
VBAC	Vaginal Birth after Caesarean Section
VB	Vaginal Birth
WHO	World Health Organization

1. Introduction

1.1. Background

Vaginal birth after cesarean section (VBAC) is the term applied to women who undergo vaginal delivery following cesarean delivery in a prior pregnancy. Patients desiring VBAC delivery undergo a trial of labor (TOL) or trial of labor after cesarean section (TOLAC)(1).

The world health organization (WHO) suggests that in normal populations CS rates should not exceed 10%–15 % (2). However the rate of CS increased worldwide in the last three decades globally which is around 21%. The highest rate in Latin America and Caribbean the lowest CS rates in sub-Saharan Africa country (3).

In Ethiopia According to 2019 Ethiopia demography survey CS rate was 5% but different individual study conducted on 2020 shows the rate of CS range from 29.5% to 39.1% (4-6). Although a study conducted in Tertiary Hospital at Hawassa shows that the overall CS rate was 32.8 % (7). Caesarean rate is increasing in Ethiopia due to the flourishing private hospitals in major towns.

The high caesarean section rate has put effect on the economy of nations and individuals. Current available data from developed countries revealed morbidity and mortality from CS is more than in vaginal delivery for both the mother and fetus. And also mothers who have previous history of cesarean section has increased the rate of CS (8).

Successful VBAC is decreased maternal morbidity and risk of complication in future pregnancy Compared to repeat cesarean delivery and it is associated with no surgical complication, shorter hospital duration, less risk of postpartum hemorrhage (9). However there are different factor which cause field VBAC like advanced maternal age, BMI , BISHOP Score, Counseling on mode of delivery , Presence of meconium, cervical dilatation at admission, rupture of membrane at admission and its duration and position of the presenting part associated with successful vaginal birth after cesarean section (10-13). But still need another research to predict factors of successful VBAC . So research need to continue conducting to know the predictors tool of VBAC and to reduce complication related repeated CS.

1.2. Statement of the problem

Vaginal delivery after cesarean-section (VBAC) is associated with fewer complications than planned repeated caesarean sections. The increasing number of repeated caesarean deliveries associated with maternal and child complication(8). Different study shows that Successful VBAC is related with many factors like Socio demographic, past reproductive history and current obstetric history (10-13).

Globally study conducted in Vietnam shows the main indicators successful VBAC history of successful vaginal delivery after cesarean section or vaginal delivery and BSHOP score >7 is strong association with successful VBAC while fetal distress and low progress of labour are cause failed VBAC (14). While Study conducted in Ghana revealed that the major indications for emergency repeat CS among women undergoing TOLAC is failure to progress (16.0%), severe preeclampsia/eclampsia (15.4%), fetal macrosomia (13.0%), and slow progress of labour (12.5%)(15).

In Ethiopia Study conducted in Bahirdare shows that the commonest indication for emergency CS Or failed VBAC was fetal distress (38.9%) and the other reasons for this inconsistency might be poor preconception, poor ANC counseling, poor encouragement during labor, having experienced long and difficult labor in a previous pregnancy, and poor maternal psychological readiness for TOL(16, 17).

Evidence shows that previous scar in the uterus could contribute to an impaired placentation, which may be the basis of developing future placental-related complications such as placental abruption, preeclampsia, and spontaneous preterm delivery. In addition to this mothers undergoing caesarean delivery the chance of bladder, bowel injuries, blood transfusion, and hysterectomy increase.(1, 10).Consequently, death in postpartum period is higher for mothers who deliver by CS than normal vaginal or instrumental delivery due to anesthesia complications(11).So to reduce those complication VBAC is the best option.

In general, patients with non-recurring indications for cesarean section the rate of women who had successful vaginal birth in their next pregnancy 60% to 80%(9).American College of Obstetricians and Gynecologists states that Women's are preference vaginal delivery after cesarean section need to assessing the likelihood of VBAC as well as the individual risks is important when determining who is an appropriate candidate for TOLAC. Otherwise complication of failed TOLAC increase compared with a successful trial of labor than elective repeat cesarean delivery(18).

However, complications related to TOLAC is increased like uterine rupture and the overall rate of VBAC decreases to 8.6% by the year of 2016(19) .Therefore there is still a reason for high rate of repeated CS and also different researchers gives recommendation on further study needs using strong methodology to know another predictors of successful VBAC .On the other hand all public hospital offered TOLAC in the study area but there is no research conducted regarding to successful VBA. So the aim of this study is identify determinants of successful vaginal birth after cesarean sections which are important to selected candidate of TOLAC and good outcome of VBAC.

1.3. Significance of the study

The cesarean section rate is increasing globally according to WHO report which is risk for maternal mortality and morbidity. Successful VBAC is the best option to reduce CS rate and related complications. So the aim of this study is to give evidence-based practice for candidate mothers of TOLAC to encourage successful VBAC. In addition to this it also created awareness and gave new information for health care providers related to determinants of successful VBAC. Finally this research finding was baseline information for another study.

2. Literature review

2.1. Overview successful VBAC

Vaginal birth after cesarean (VBAC) -means giving birth through your vagina after giving birth previously by cesarean section. Globally according to the American Pregnancy Association, published studies show that 60% to 80% of women who had a cesarean birth have had a successful vaginal birth in their next pregnancy. (1) In sub-Saharan Africa a Study conducted in Sudan revealed that 67.3% had successful VBAC after trial of labour. (32) Although a study conducted at Adis Abeba Ethiopia shows 69.4% participant had successful VBAC after trial of labour. (17) Similarly study conducted in Bahrdari Ethiopia revealed that 35.07% of the women had a successful vaginal birth after one previous cs. (16)

2.2. Sociodemographic factors

Globally a Meta-analysis study conducted in china reveled that advanced age is decrease the rate of successful VBAC Compare to younger age. Younger women, especially those < 35-years-old are more likely to have a successful and safe VBAC(12). Although study conducted at Ambo, Ethiopia shows that maternal age less than 25 years old nine times high chance of successful VBAC than those age >30 and age 25-29 is five time higher rate of successful VBAC than age >30(11).

The study conducted on West Kazakhstan shows that BMI<25 kg/m² was statistically high in successful VBAC is 33.7% compared with unsuccessful VBAC group which is 21.9%. Despite of this study conducted in Turkey shows that BMI of less than 29 were two times likelier to have a vaginal delivery in comparison to obese women. Were as a cross sectional study conducted in Sudan shows that increasing BMI was significantly associated with a lower rate of successful VBAC. Only (2.6%) success rate of VBAC for women BMI>35(13, 21).

According to study conducted on West Kazakhstan shows women admitted in labor with gestational>40weeks was statistically high in unsuccessful VBAC compared with successful VBAC(13).In addition research conducted in Egypt shows gestational age >40 risk factors for unsuccessful TOLAC .However Study conducted in Ghana reveled that gestational age between 34 week and 37 week had high successful rate of VBAC which is 72.2%(15).

Nested case control study conducted in eastern part of Ethiopia shows Women who attend ANC were 3.5 times more likely to achieve VBAC compared with Who have no follow up(22).

2.3. Determinants of successful VBAC related with Reproductive and past obstetric factors.

Across sectional study Conducted in East Wollega, Western Ethiopia result show that counseling regarding TOLAC during ANC follow-up is also a significant determinant of successful VBAC. Which is 4.7 times higher than those not counseled regarding to TOLAC during ANC is louberr end with CS(23).

The study conducted West Kazakhstan reveled that women with inter-delivery interval <2 years was statistically high in unsuccessful VBAC compared with successful VBAC. This result supported by cross sectional study conducted on Eastern Wollega shows that birth interval of greater than 2years is almost 9 times higher successful VBAC than unsuccessful VBAC(13, 23).

A retrospective cohort study Conducted in Turkey shows that women with at least one previous VBAC or vaginal delivery was a significantly higher rate of successful VBAC following TOLAC(21).Similarly Study conducted at Addis Abeba Ethiopia show that mother had successful VBAC after the past caesarean section had a higher chance of success VBAC and have statistical significant association(10).Although a case control study conducted at Ambo ,Ethiopia shows that mothers with a history of previous spontaneous vaginal delivery before the past CS have a 3.85 times higher successful VBAC compared to mothers who had no past spontaneous vaginal delivery(11).

A case control study conducted in three teaching hospitals in Addis Ababa reveled that History of still birth was one parameter which as associated with poor success rate of successful vaginal delivery(10).In the same way study conducted in eastern Ethiopia shows that the women who had a stillbirth history were less likely to achieve success VBAC(22).

2.4. Determinants of successful VBAC related Current obstetric Factors

Globally the study conducted in Turkey shows that BISHOP score at admission significant predictive of successful VBAC. Another study conducted in china shows that high bishop score, associated with a successful VBAC(12, 21).similarly study conducted in Vietnam shows BSHOP score >7 is strong association with successful VBAC(14).

Study conduct in Kazakhstan shows that cervical dilatation >4 cm on admission was significantly high in successful VBAC compared with unsuccessful VBAC(13).while a study conducted at Addis Abeba ,Ethiopia revealed that the strongest factor determining success VBAC was cervical dilatation at admission greater 3cm had a strong likelihood of vaginal delivery than those admitted at cervical diameter of less than or equal to 3 cm(10). A case control study conducted at Ambo ,Ethiopia shows that women's cervical dilatation >4 cm on admission high successful rate (62.2%)than unsuccessful VBAC rate(45.7%)(11).

A case control Study conducted at Addis Abeba revealed that mothers who were admitted after rupture of membrane at active first stage of labor and having occipito-anterior position were having a higher chance of vaginal delivery(10).In the same way study conducted in Bahir Dar, Ethiopia at public hospital shows that laboring women admitting with a history of ruptured membrane increased the likelihood of successful VBAC which is 4.18 times higher than women admitted with intact membrane(16).

The study conducted in western Kazakhstan shows duration of labor ≤ 7 hours was significantly associated with successful VBAC. While a case control study in Ambo, Ethiopia reveled that duration of labor after admission was significantly associated with the success of VBAC(11, 13).

A Meta-analysis study conducted in china shows that macrosomia or estimated fetal weigh >4000 gm have negative impacts on success VBAC (12). A retrospective cohort study Conducted in Turkey reveled that estimated fetal weight birth weight >4000 gm risk for trial of vaginal delivery(21). However the study conducted at Addis Abeba, Ethiopia shows that there was no association between the birth weight of the baby and success of VBAC(10)

2.5. Conceptual Frame work

The Conceptual Frame work constructed by modifying different literatures are summarized as socio demography, reproductive history, past and current obstetric history associated with determinant of successful VBAC.

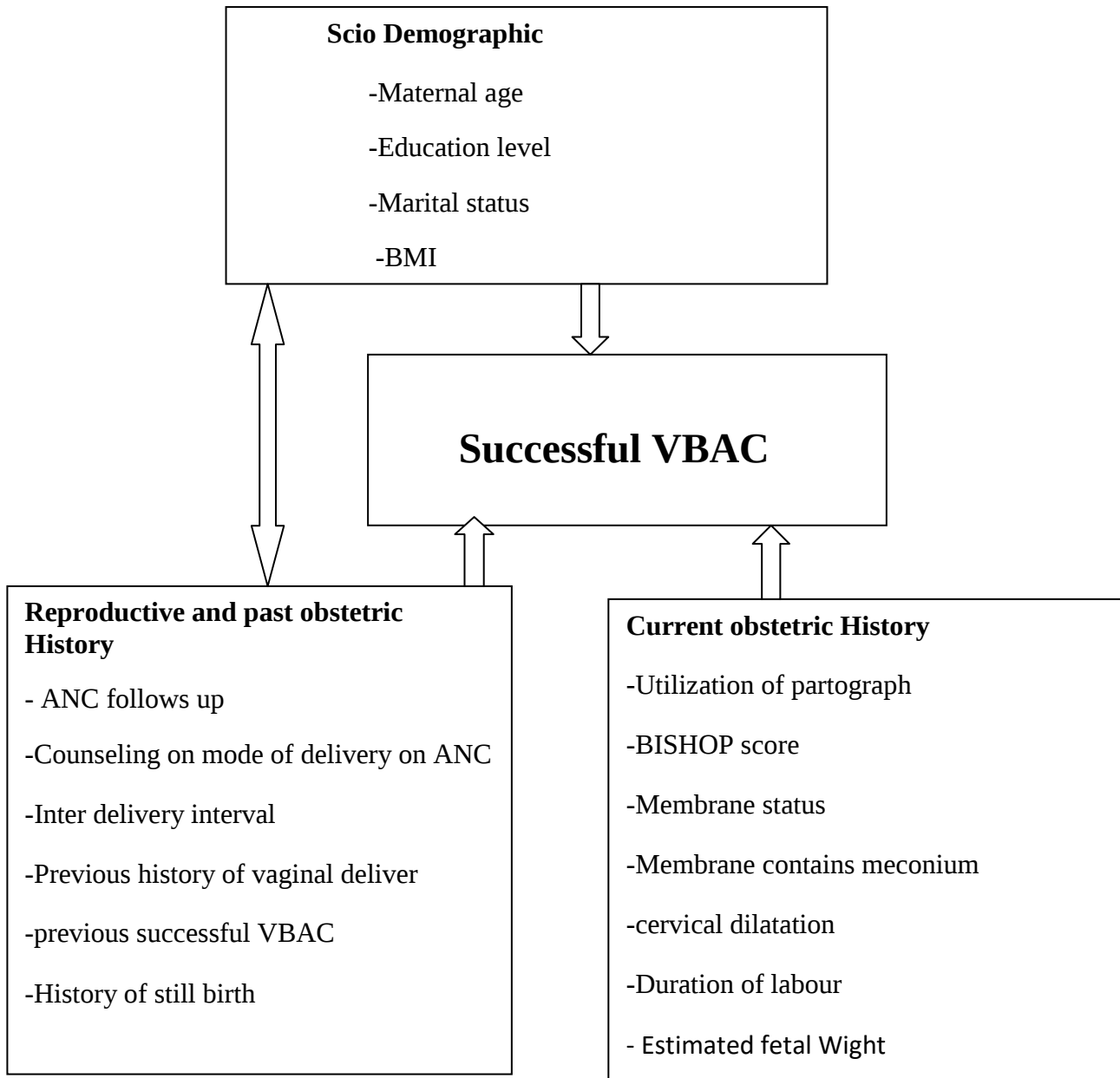


Figure Conceptual frame work of factors associated with VBAC and its outcome. (Developed by principal investigator after reviewing different literature)(10-13).

3. Objective

- To identify determinants of successful vaginal delivery after caesarean Section at Public hospitals in Hawassa city, Sidama Region, Ethiopia, 2023.

4. Methodology

4.1. Study setting and period

The study was conducted at public Hospitals in Hawassa City. Hawassa is a capital of Sidama Region located 275km far from Addis Abeba capital of Ethiopia. It is situated in the Great Rift Valley region in south part of Ethiopia. According to the world bank group SFD report in 2016, the city has population of 351,469(24). Regarding to health facility there are four public hospitals HUCS hospital, Adare general hospital, Motitefura primary hospitals and Tulla primary hospital. All hospitals offer trial of labour (TOL) with patient consent. For this study all public hospitals were included for data collection.

The study was conducted from March –August, 2023.

4.2. Study design

Multi center institutional based unmatched case control study was conducted.

4.3. Source of population

All mothers who had pervious CS need to choice TOLAC admitted at Public Hospital in Hawassa city, Sidama Region, Ethiopia.

4.3.1. Study population

Cases were all mothers who had one previous CS need to choice TOLAC and give birth vaginally admitted in post natal room at public hospital in Hawassa city from March to August 2023.

Controls were all mothers who had one pervious CS need to choice TOLAC and give birth by cesarean section admitted in post natal room in at public hospital in Hawassa city from March to August 2023.

4.4. Inclusion and exclusion criteria for cases

All mothers include who have one CS need to choice TOLAC, came to complain of labour , member rupture or intact at admission and no contraindication to continue follow up and exclusion criteria mother who give birth by instrumental delivery.

4.5. Inclusion and Exclusion criteria for controls

All mothers who have one CS need to choice TOLAC with CPD,NRFHR and mother has mal position during follow up time included and excluded need repeated CS delivery without any indication.

4.6. Sample Size Determination

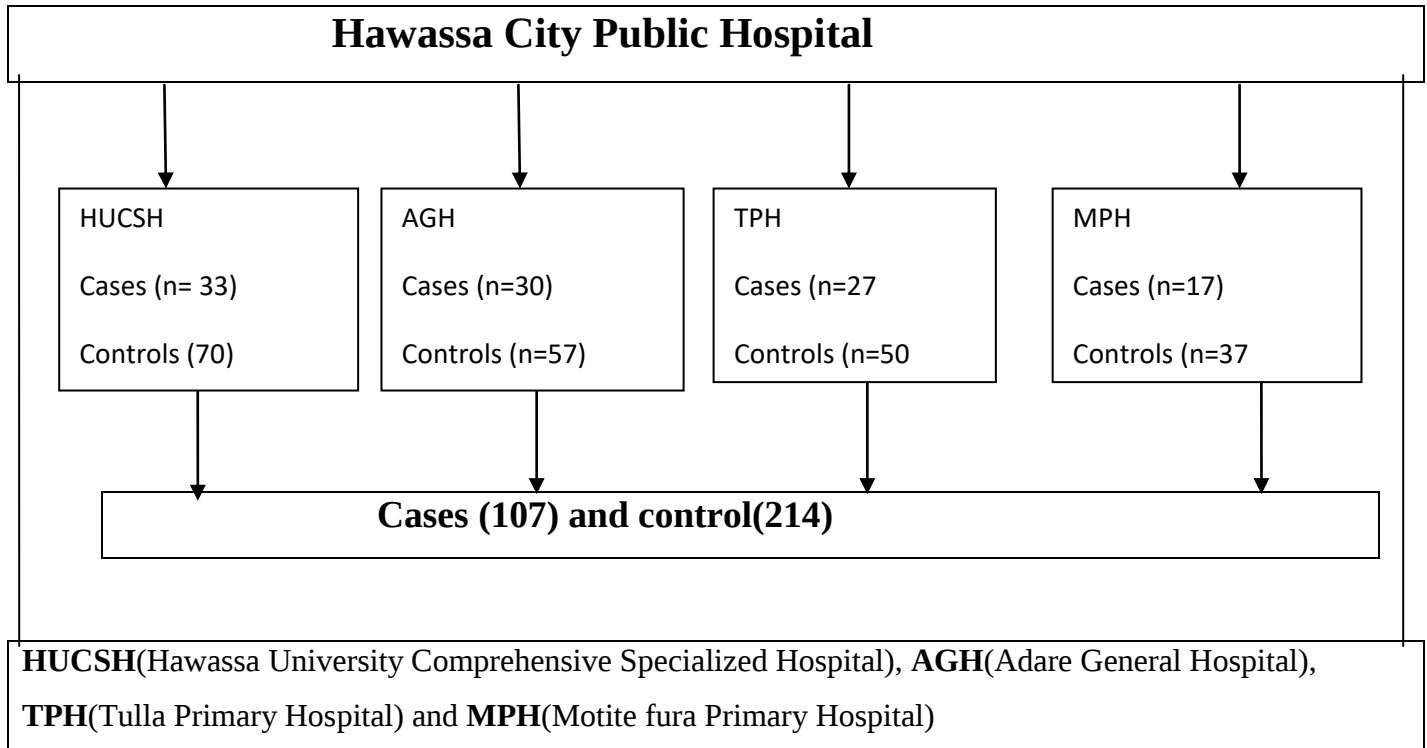
The sample size was estimated by using a double population proportion formula using Epi Info version 7.2.2.6 statically for an unmatched case-control study with the assumptions of a 95% two-sided confidence level (CI), power of 80%, 2:1 ratio of controls to cases, and 45.7% of prior successful VBAC among the controls exposed and odds ratio of 2.05 then finally 5% none response rate add .The sample size calculated from the case-control study done Ambo Town, Oromia Region, Central Ethiopia: Hence, the final sample size was found to be 321 with 107cases and 214controls.

Table 4 Sample size calculation for the study determinants of successful VBAC in public hospitals at Hawassa City, Sidama Region, 2023

Factors	Percent of exposed		AOR	Sample size without non respondent rate			Reference
	Case	control		Case	Control	Total	
Previous VBAC	28.4	16.3	3.01	59	117	176	(11)
SVD Before	32.4	20.4	3.85	35	69	104	(11)
Cx dilatation >4cm	62.2	45.7	2.05	102	204	306	(11)

4.7. Sampling technique and procedure

Consecutive sampling technique was used to undertake for cases of 107 and controls 214 from mothers, who have one previous CS need to choices TOLAC admit in post natal room from all Public Hospital in Hawassa city from March to August, 2023.



4.8. Variables

4.8.1. Dependent variables

- Successful VBAC

4.8.2. Independent variables

➤ Socio demographic variables

Age, Educational level, marital status and BMI

➤ Reproductive and past obstetric variables

- Current ANC follow up, Privacies successful VBAC or SVD, Counseling about TOLAC during ANC visit and History of still birth

➤ Current obstetric history

- Gestational age, Partograph utilization, BISHOP scores, Membrane states, Presence of meconium, cervical dilatation, Duration of Labour and estimated fetal weight.

4.9. Operational Definition

- **Trial of labour after caesarean section (TOLAC)** mean a planned tray of labour after had one previous caesarean delivery with considering outcome are taken as TOLAC (9).
- **Successful VBAC** means a planned trial of labor end with vaginal delivery are taken as successful VBAC for this study (1).
- **Failed VBAC** is a planned trial of labor end with caesarean delivery by unplanned intrapartum are taken as failed VBAC for this study (25).
- **Body mass index (BMI)** should be calculated from pre-pregnancy height and weight. Those with a pre-pregnancy BMI > 30 kg/m² are considered obese for this study(26).
- **Gestational age** is a measure of the age of pregnancy taken from beginning of women last menstrual period or estimated by accurate method like obstetric ultrasound if GA<40week taken as predictors of successful VBAC for these study(27).
- **Antenatal care (ANC)** is the care provided by skilled health-care professionals to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy. If the mother has two or more than two visit for pregnancy follow up in health facility taken as have ANC follow up for this study(28).
- **ANC visit-** if the mothers more mother than 4 visits taken as good predictors of successful VBAC.
- **Partograph** is a graphical record of the observations made of a women in labour(29).
 - complete partograph** in the partograph chart if the membrane status and time recorded ,the fetal heart bet ,contraction and maternal pulse are recorded every 30min,blood pressure ,Cx dilatation ,decent of the head are recorded every 4hr with special considering like membrane rapture and urges to push are taken as proper utilization of partograph for this study.
 - In complete partograph** missing one condition without recording during labour follow up period considering as improper utilization of partograph and show poor follow up of labour progress for this study.
- **Progress of labour** if latent first stage of labour more than 12, if active first stage of labour more than 7hr and if second stage of labour more than 2hr consider as prolonged labour for this study.

- **BISHOPE SCORE** is a calculation used to predict how close you are to labor. It have five components of cervical dilatation, effacement ,station ,position of cervix and consistency of cervix (30). For each component have 0-3 score by adding all components of score during admission. So for this study if bishop score ≥ 6 considering as chance of vaginal delivery is high. If bishop score < 6 considering as poor chance of vaginal delivery(31).

4.10. Data Collection Tool and Techniques

Structured questionnaire was developed from different researches issue to collect the data. The structured questionnaire which consisted of socio-demographic characteristics, reproductive history, past obstetrics and current obstetric history, prepared in English then translates to Amharic and Sidamic language was used for data collection. The data were collected from mother who was admitted to public hospital in the post natal room who has one previous CS need to choice TOLAC and give birth by vaginal (cases) and deliver by CS (control)through interview and review the charts from March to August ,2023.The data was collected by four bachelor degree midwives who has at least two years of work experience are selected as data collectors and two supervisors who have Masters of Sciences in Health supervised the data collection procedure.

4.11. Data Quality Control and Management

A pre-test was done on 5% of the total study participants at Yirgalem General Hospital, which was found 45 kilometers from Hawassa city, a week before the actual data collection. After the pre-test, necessary adjustment was made on the questionnaire. Training for the data collectors and supervisors was given on the objective of the research, contents of tools, how to collect the data from patients and how to fill the questionnaires, and the completeness of the data. The quality of the data collected was assured by checking all filled questionnaires at the end of the day by the principal investigator and the supervisors. After the completeness of each questionnaire was checked, a unique code is given by the principal investigator.

4.12. Data Processing and Analysis

The collected data was coded and entered into Epi data version 4.6 then exported to SPSS version 26. The data was cleaned, categorized and analyzed using SPSS. Descriptive data were generated, including frequency, percent, mean and standard deviation. Cross-tabulation of independent variables with the success of VBAC was done. A bivariable regression analysis was done for all independent variables. Hosmer –lemeshow test was done for checking model of fitness and tolerance and VIF test were done for checking multicollinearity effect. Those variables with p-values less than 0.25 in bivariable analysis were taken and analysed in multivariable logistic regression model to control the possible confounders. Variables at p-values of <0.05 in the multivariable logistic regression model are considered statistically significant and an odds ratio with corresponding 95% CI was reported as the measure of the degree of association. And the findings were displayed using table. The variable partograph completeness was do not full fill the chi-square assumption of bivariable analysis so the variable is dropped.

4.13. Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board Hawassa University college of Medicine and Health Sciences School of public health. The letter of permission was written from the School of public health to HUCSH, Adare General Hospital, Motitefura primary and Tula primary Hospital. Then all chief administrator of health facilities allowed us to collect the data from patient who admitted in post natal room. The study is conducted with individual verbal informed consent since data collection process was done from interviewing patients and reviewing charts which admitted in post natal room.

5. Result

5.1. Characteristics of study participants

In this study 321 participants (107 cases and 214 controls) were interviewed and their charts were reviewed. The response rate was 100%.

5. Socio demographics characteristics

According to this study the age of respondents 15-25 was (33.9%) and age between 25-30 was (37.2%). Regarding to educational status two thirds of cases and three fourths of controls of respondents were educated. More than half of cases and (59.8%) controls of respondents were married.

Table 5- Socio demographic characteristics of determinants of successful vaginal delivery after C/S among post-partum mothers admitted in postnatal room on public hospital at Hawassa city Sidama region, Ethiopia 2023.

Participant category				
Variables	Category	Cases (%)	Controls (%)	Total (%)
Age	15-25	44(41.1%)	65(30.4%)	109(33.9%)
	25-30	39(36.4%)	81(38.0%)	120(37.3%)
	>30	24(22.4%)	68(31.8%)	92(28.7%)
Educational status	Non literate	25(23.3%)	46(21.5%)	71(22.1%)
	Primary	28(26.2%)	68(31.8%)	96(29.9%)
	Secondary	30(28.0%)	70(32.7%)	100(31.1%)
	College and above	24(22.4%)	30(14.0%)	54(16.8%)
Marital status	Unmarried	19(17.7%)	38(17.7%)	57(17.7%)
	Married	66(66.7%)	128(59.8%)	194(60.4%)
	Divorced	22(20.5%)	48(44.8%)	70(21.8%)

5.1.2. Reproductive and past obstetric characteristics

In this study (64.5 %) case and (55.4%) controls have ANC follow up .Regarding to the birth intervals of 73 (34.1%) controls and 28.9% (31) cases were shorter than two years. In contrast, there were 141(65.7%) controls and 76 (71.0%) cases with birth intervals longer than two years. About history of vaginal delivery (63.5%) case and (50.5%)controls have history of vaginal delivery.

Table 6 - Reproductive and past obstetric characteristics of determinants of successful vaginal delivery after C\S among post-partum mothers admit in post natal room on public hospital at Hawassa city Sidama region, Ethiopia 2023.

Participants category				
Variables	Category	Cases (%)	Control (%)	Total (%)
ANC Visit	No	34(35.5%)	96(44.8%)	130(40.5%)
	Yes	73(64.5%)	118(55.4%)	191(59.5%)
Number of ANC visit	<4	30(28%)	64(29.9%)	94(29.3%)
	≥4	43(40.2%)	54(25.2%)	97(31.1%)
Counseling about TOLAC during ANC visit	No	37(34.6%)	116(54%)	153(47.5%)
	Yes	70(65.4%)	98(46.0%)	168(52.5%)
Inter delivery interval	<2 years	31(28.9%)	73(34. 1%)	104(32.4%)
	≥2years	76(71.0%)	141(65.9%)	217(67.6%)
History of successful VBAC	No	26(12.2%)	134(62.4)	160(49.8%)
	Yes	81(75.7%)	80(37.5%)	161(50.3%)
History of vaginal delivery	No	39(36.4%)	106(49.5%)	145(45.2%)
	Yes	68(63.5%)	108(50.5%)	176(54.8%)
History of still birth	No	73(68.2%)	150(70.9%)	223(69.5%)
	Yes	34(31.7%)	64(29.9%)	98(30.5)

5.1.3. Current obstetric characteristics

Regarding to gestational age more than half of case and two third of controls <40wks and (27.1%) case and (35.7%) controls GA was ≥40wks. More than half of case and (31.9%) of controls was membrane ruptured during admission time. About meconium status (25.2%) case and 10.3% controls contain meconium during admission. Near to two third of case and (44.4 %)

control BISHOPE SCORE $\geq$ 6 give successful vaginal birth, and (29 %) cases and more than half of controls BISHPEScore <6 delivery end with repeated c\'. About duration of labour (60.7%) cases and (46.2%) controls latent first stage of labour $\leq$ 12hr and (39.2%) cases and three fourth of the controls duration of latent first stage >12hr.

Table 7-Current obstetric characteristics of determinants of successful vaginal delivery after C\ among post-partum mothers admit in post natal room on public hospital at Hawassa city Sidama region, Ethiopia 2023.

Participant category				
Variables	Category	Cases (%)	Control (%)	Total (%)
Gestational age	<40wks	78(72.9%)	138(64%)	216(67.3%)
	$\geq$ 40wks	29(27.1%)	76(35.7)	105(32.7%)
Partograph utilization	No	43(68.1%)	114(53.3%)	157(48.9%)
	Yes	64(59.8%)	100(46.7%)	164(51.1%)
Membrane ruptured during admission	No	32(29.9%)	146(68.1%)	178(55.4%)
	Yes	75(70.1%)	68(31.9%)	143(44.5%)
Duration of member ruptured	<8	44(41.15)	40(18.7%)	84(26.2%)
	$\geq$ 8	31(28.9%)	28(13.1%)	59(18.4%)
Meconium states present during admission	No	48(44.8%)	46(21.5%)	94(29.3%)
	Yes	27(25.2%)	22(10.3%)	49(15.3%)
If yes, grade	GI	16(14.9%)	5(2.3%)	21(6.5%)
	GII	6(5.6%)	7(3.3%)	13(4.0%)
	GIII	5(4.8%)	10(4.7%)	15(4.8%)
BISHOPE SCORE	<.6	31(29%)	119(55.6%)	150(46.7%)
	$\geq$ 6	76(73.8%)	95(44.4%)	171(53.2%)
Duration of LFSOL	>12 hr	42(39.2%)	115(53.7%)	157(48.9%)
	$\leq$ 12hr	65(60.7)	99(46.2%)	164(51.1%)
Duration of AFSOL	>7hr	40(37.3%)	14(6.5%).	54(31.46%)
	$\leq$ 7hr	67(62.6%)	25(10.7%)	92(31.4%)
Duration second stage of labour	>2hr	37(6.5%)	12(5.6%)	49(15.2%)
	$\leq$ 2hr	70(68.2%)	33(15.4 %)	106(33.%)
Estimated fetal birth weight	<2500g	21(19.6%)	39(18.3%)	60(18.7%)
	2500-4000g	64(59.8%)	127(39.6%)	191(59.5%)
	>4000g	22(20.5%)	48(22.4%)	70(21.8%)

5.1.4. Factors associated with determinants of successful vaginal delivery after C/S

Variables Age, ANC visit, counseling about TOLAC during ANC visit, history of vaginal delivery, history of successful VBAC ,partograph utilization, membrane ruptured during admission, ,BISHOP score during admission and duration of latent stage of labour were found $p\text{-value} < 0.25$ in Bivariable logistic regression. Factors significantly associated with successful VBAC in multivariable logistic regression were Counseling about TOLAC during ANC follow up ,History of successful VBAC ,membrane ruptured on admission and BISHOP score ≥ 6 significantly associated with successful VBAC with $P\text{-value} < 0.05$.

Table 8 -Factors associated with determinants of successful vaginal delivery after C/S among post-partum mothers admit in post natal room in Bivariable and multivariable logistic regression.

Determinates of successful VBAC						
Variables	category	Case	Controls	COR (95%CI)	AOR(95%CI)	P-value
Age	15-25	44	65	1.918(1.050-3.503)	2,037(.966-4.297)	0.62
	25-30	39	81	1.364(.747-2.491)	2.212(.578-2.243)	0.61
	>30	24	68	1	1	
Have you ANC visit	No	34	96	1	1	
	Yes	73	118	1.747(1.072-2.846)	1.638(.905-2.965)	0.10
Counseling about TOLAC during ANC	No	37	116	1	1	
	Yes	70	98	2.239(1.385-3.621)	2.808(1.543-5.112)*	.001
History of successful VBAC	No	26	134	1	1	
	Yes	81	80	5.218 (3.098-8.790)	4.170(2.317-7.504)*	.000
History of vaginal delivery	No	39	106	1	1	
	Yes	68	108	1.711(1.063-2.755)	1.161(.639-2.110)	.625
Partograph utilization	No	43	114	1	1	
	Yes	64	100	1.697(1.060-2.716)	1.220(.678-2.193)	.506

Membrane ruptured during admission	No	32	146	1	1	
	Yes	75	68	5.032(3.040-8.330)	4.891(2.728-8.771)*	.000
BISHOPE SCORE	<6	31	119	1	1	
	≥6	76	95	3.07(1.868-5.049)	2.661(1.415-4.881)*	.002
Duration of LFSOL	≥12hr	42	115	1	1	
	<12hr	65	99	1.798(1.121-2.882)	1.770(.981-3.193)	.058

P-value <0.05 significant association and P-value <0.001 strongly significant association

Counseling about TOLAC during ANC, History of successful VBAC, membrane ruptured on admission and BISHOPE score ≥6 significantly associated with successful VBAC were P-value<0.05 with 95%CI.

6. Discussion

According to this study in multivariable logistic regression analysis counseling about TOLAC during ANC follow up, History of successful VBAC, Membrane ruptured on admission and BISHOPE score ≥ 6 significantly associated with successful VBAC.

This study reveals that the mothers who counseling about TOLAC during ANC follow up were 2.8 times higher than those who didn't get counseling. This result is supported with a study Conducted in East Wollega, Western Ethiopia and study conducted in Sudan shows that counseled about TOLAC during ANC follow up have positive association (23, 32). Patients with prior cesarean section need to counsel related to potential risks and benefits of TOL and the factors which affect the likelihood of successful vaginal delivery. Due to this Counseling pregnant women who have previous CS during ANC follow up about TOLAC were high psychological readiness for trial of labour than those not informed or counseled (5, 31).

Regarding to this study mothers who have history of successful VBAC 4 times higher than those who have no history successful VBAC. This study supported by study Conducted in, Ambo Ethiopia, Nigeria, America, and China show that mother had history of previous successful VBAC statistical significant association (12, 33-35). This might be mother who has history VBAC less complication like uterine ruptured than those not have history of successful VBAC (1). However this study finding result different a cross sectional study conduct in at Addis Abeba . (17) This might be due to sample size difference and the methodological effects.

The present study also found that mothers who have membrane ruptured on admission 4.9 times higher in odd of successful VBAC than intact membrane during admission. This finding is in line with a case control Study conducted at Addis Abeba, BahirDar and Meta-analysis study in Ethiopia (5, 10, 16). The possible explanation might be rupture of the membrane helps to release the natural prostaglandin and thus may intern facilitate the progress of the labor. (7)

This study also shows that odd of successful VBAC among mothers who have BISHOPE score ≥ 6 were 2.6 times higher than those mothers BISHOPE score < 6 . This result also similar with the study conducted in Turkey, china, and Vietnam (12, 14, 21). High bishop score significantly associated with a successful VBAC. This is might be highly indicates more favorable cervix, which is the best predictor for successful VBAC(10, 33). Besides in this study finding BISHOPE score dissimilar with study conducted in Egypt.(37) This may be due to study sating, methodological and sample size difference.

7. Conclusion, Recommendation and Limitation

7.1. Conclusion

Knowing about determinants of Successful VBAC is reduced repeated cesarean delivery and related complication. So in this study conclude that counseling about TOLAC during ANC follow up, History of successful VBAC, Membrane ruptured on admission and BISHOPE score ≥ 6 were determinants of successful VBAC. Regarding to the study considering that variable and careful selection of the mothers' for TOLAC is increases the success rate of VBAC.

7.2. Recommendation

- Health professionals should be take special attention and must be counsel every ANC visit about trial of labour for pregnant mothers who have one previous C\S.
- During admission if membrane is intact ,the labour inactive first stage and if there is no risk assessment the health provider need to consider about artificial ruptured of membrane (AROM) to facilitate and short the labour duration .
- In addition to this during intrapartum period to select candidate mother for TOLAC considering high BISHOPE score is important for good outcome of successful VBAC.

7.3. Limitation

In this study the limitation was difficult to calculate BMI because there was no recording data on chart and also difficult to measure the mothers because they were post operatives and they feels discomfort.

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Appendices

Annex 1 Subject information sheet

Introduction -Good morning/afternoon, My name is _____ I am working in research team which is conducted by Hawassa University master's degree in Reproductive health student .I am collecting data from mothers who have one pervious cesearn delivery choice to TOLAC admitted at postnatal room at public Hospitals in Hawssa city.

The Objectives of the study;Identify determinates of Successful vaginal Delivery after Caesarean Section at Public Hospitals in Hawassa city

The benefit of the study: There is no financial gift for the participants of the study. But in the long run, the result of the collected data will help local maternal health programmers in planning on successful VBAC & control strategies that decrease maternal morbidity & mortality due to repeated CS delivery.

Risk of the study: Since the proposed research does not have any inhuman treatment it has no harm, social discrimination, psychological trauma, and economic loss.

Confidentiality: To establish a secure safeguard of the collected data, we will use codes during the data collection period instead of using the name. All information will be kept strictly confidential.

Name of investigator: SimegnAnbese

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E-mail:simegnanbese004@gmail. Com

Name of the medical director of the hospital _____ Signature _____

Annex II. Questioner Part
Part.1.Sociodemographic factors

NO	Questioners	Response	Skip	Remark
1	How old are you?	-----		
2	Weight of respondent?	-----		
3	Height of respondent?	-----		
4	Educational level	1.non literate 2.1-8 3.8-12 4.>12		
5	Marital status	1 .Marred 2.Unmarred 3.Divorsed		
	Part .2. reproductive and past obstetric factors			
6	Have you ANC follow up for currant pregnancy	1.yes 2.No		
7	If yes how many visit?	-----		
8	Have you heard about TOLAC during ANC visit?	1.yes 2.No		

9	How many years inter delivery intervals?	1- <2 years 2- $\geq$ 2		
10	Have you before successful VBAC?	1. Yes 2. No		
11	Have you Spontaneous vaginal delivery before?	1. Yes 2. No		
12	Have you history of still birth before?	1. Yes 2. No		
	Parte. 3. Current obstetric factors			
14	Did you given this birth by vagina?	1.yes 2.No		
15	Gestational age	1,<40 wks 2, $\geq$ 40wks		
16	Is the partograph used for follow up?	1.yes 2.No		
17	Is the partograph completed?	1.yes 2.No		
18	Is the membrane ruptured at admission?	1.yes 2.No		
19	If you say yes how many hour until			

	admission?	_____		
20	Is meconium Present on admission	1. Yes, 2. No		
21	if yes, if grade	1.GI 2.GII 3.GIII		
22	Cervical dilatation at admission	0.Closed 1.1-2cm 2. 3-4 3. >5		
23	Effacement of cervix on admission	0.0-30% 1.40%-50% 2.60%-70% 3.>80%		
24	Position of the cervix on admission	0.posterior 1.midposition 2.anterior		
25	Cervical consistency at admission	0.frim 1.midium 2.soft		
26	Station of cervix at admission	1.0= -3 2.1= -2 3.2= -1,0 4.3= +1,+2		
27	Duration of latent first stage	1.≤12hr 2.>12hr		
28	Duration of active first stage of labour	1.≤7hr 2.>7hr		
29	Duration of second stage of labour	1.≤2hr 2.>2hr		
30	Estimated fetal Birth weight	1- <2500g 2- 2500-4000g		

መግቢያ - እንደምን፡አደርሽ/ እንደምን፡ዋልሽ፡ስሜ-----ነው፡፡እኔ፡በሃዋሳ፡ዩኒቨርሲቲ፡
የድህረምረቃ፡መረሀግብር፡ተማሪ፡ስሆን፡በሚካሄደው፡የምርምር፡ቡድን፡ውስጥ፡እስራለሁ፡
ጥናቴ፡የሚካሄደው፡ከዚህ፡ቀደም፡አንድ፡ቀዶጥገና፡በማድረግ፡የወለዱ፡እናቶች፡በሁለተኛ፡እርግዝናቸው፡በማህጠጸን፡
ለመውለድ፡ሙከራ፡ያደረጉ፡እናቶች፡ላይ፡ሲሆን፡በድህረ፡ወሊድ፡ክፍል፡ተገኝተው፡ከሚታከሙ፡እናቶች፡መረጃ፡እየሰበሰበ
ኩነት፡ነው፡፡

የጥናቴ፡አላማ

ከዚህ፡ቀደም፡በቀዶጥገና፡የወለዱ፡እናቶች፡በሁለተኛ፡እርግዝናቸው፡ሞክረው፡እንዳይሳካ፡ያረገወን፡ችግርማወቅ፡ነው፡፡

የጥናቴ፡ጥቅም-

በጥናቴ፡ለሚሳተፉ፡እናቶች፡ምንም፡አይነት፡የገንዘብ፡ክፍያ፡የለለው፡ሲሆን፡ነገረ፡ግን፡ጥናቴ፡ለወደፊት፡የእናቶችን፡ጤና፡
ለማሻሻል፡በተሳካ፡ሁኔታ፡በማህጸን፡ለመውለድ፡የሚያስችል፡እቅድ፡ለመውጣት፡ይረዳል፡በተጨማሪም፡በተደጋጋሚ፡
በቀዶጥገና፡ምክኒያት፡የሚመጡ፡ችግሮችን፡ለመቅረፍ፡ይረዳል፡፡
ጥናቴ በሰወችላይምንምጉዳት የለለውና ማህበራዊ ሲነል በናዊ እና ኢኮኖሚያዊ ጉዳት የለለው ነው፡፡

ምስጢራዊነት-በመረጃ፡ሰጪውና፡በመረጃ፡ተቀባዩ፡መሀል፡ያለው፡ሚስጥር፡በጥብቅ፡የተጠበቀ፡ነው፡፡መረጃ፡
በሚሰበሰብበት፡ወቅት፡በመረጃ፡ሰጪው፡ስም፡ፋንታ፡ሚስጥራዊ፡ኮድ፡ይሰጣል፡፡

የአጥኚዋ፡ስም -ስመኝ፡አንበሰ

ስልክ፡ቁጥር-0923180050

የሆስፒታሉ፡የሕክምና፡ዳይሬክተር፡ስም----- ፊርማ-----

የጥያቄክፍል

ክፍል 1. የሶሻሎግራፊክ ምክንያቶች

ቁጥር	ጥያቄ	ሜላ ስ	የተዘለለ	ማስታወሻ
1	ዕድሜሽ፡ስንት፡ነው	-----		
2	ክብደት፡ስንት፡ነው	-----		
3	ርዝመትሽ፡ስንት፡ነው	-----		
4	የትምህርት ደረጃ	1. ያልተማረ 2. 1-8 3. 8-12 4. >12		
5				
6	የእርግዝና፡ ክትትል ፡ነበረሽ?	1. አዎ 2. አይ		
7	አዎ ፡ከሆነ፡ስንት፡ጊዜ?			
8	በእርግዝና፡ክትትልሽ፡ወቅት፡በማህጸን ለመውለድ፡መሞከር፡እደምችይ፡ተነገሮሻል?	1. አዎ 2. አይ		

ክፍል 2. የስነተዋልዶ፡እና፡የቀድሞ፡የወሊድ፡ምክንያቶች

10	በመጀመሪያውና፡በአሁኑ፡ወሊድ፡ያለው፡ርቀት	1-< 2 ዓመት 2->2 ዓመታት		
11	ከዚህ፡ቀደም፡ስኬታማ፡የ ሆነ፡ከቀዶ፡ጥገና፡በኃላበ፡ ማህጸን፡ወልደሻል?	1. አዎ 2. አይ		

12	ከዚህ፡ቀደም፡በማህጸን፡ልጅ፡ወልደሻል	1. አዎ 2. አይ		
13	በወሊድ፡ ጊዜ ፡የሞተብሽ ፡ልጅ፡ነበረሽ?	1. አዎ 2. አይ		
ክፍል3የ አሁኑ ፡ የ ወሊድ፡ ጊዜ ፡ ሁነታ፡ ምክኒያቶች				
14	የ አሁኑ ንልጅሽን በማህጸን ውስጥ ወለድሽው	1.አዎ 2. አይ		
15	አይከሆነ ማለት በቀደም ፡ ጥገና ፡ የ ወለዱበት ምክኒያቶች ፡ ምን ድንው	-----		
16	የእርግዝ ፡ወራትሽ፡በሰምንት፡ ሰንት ፡ነው	1, <40 ሰም 2, ≥40ሰም		
16	Partograph ተጠቅመዋል	1.አዎ 2.አይ		
17	ተጠቅመውከሆነ Partograph ሁሉምተሞልተዋል	1.አዎ 2.አይ		
18	የእንሽረት፡ወሃ፡ሁንታ፡ምጥ ፡በጀመረሽ፡ሰዓት	1. ፈሳል 2. አለፈሰሰም		
19	ፈሳል፡ከሆነ፡መለሶት፡ስንት፡ሰዐት ፤ሆነ	-----		
20	Pmeconiumአለየእንሽረት፡ወሃፈሰ	1.አዎ 2. አይ		
21	አዎአዎ፡ከሆነ፡	1.GI 2.GII 3.GIII		
22	የማጎጸን ፡በር፡በምጥ፡በጀመረበትሰዓት	1. ተዘግቷል 2. 1-2 3.3-4 3. >5		
23	የ ማህጸን ፡ በር ፡ ማለት ለሰ	0.0-30% 1.40%-50% 2.60%-70% 3.>80%		
24	የማህጸን፤በር፡አቀማመጥ	1.ከጀርባ 2.ከሞላል 3.ፊትለፍት		

25	የማህጸንበረመለጠጥ	1.ያ ለ ሰ ለ ሰ 2.ማከለኛ 3.ያ ለ ሰ ለ ሰ		
26	የልጅ አመጣጥ በምጥ ወቅት ለመወለድ ምን ያክል ርቆል	1.0= -3 2.1= -2 3.2= -1,0 4.3= +1,+2		
27	ለ ተንት፡ የ ቆየ በት ሰ አት	1.≤12ሰት 2.>12ሰት		
28	አክቲብ፡የቆየት ፡ሰአት	1.≤7ሰት 2.>7ሰት		
29	ሰከንድ እስተጅ ፡የቆየበት ፡ሰአት	1.≤2ሰት 2.>2ሰት		
30	የልጅ ክብደት በእርግዝና ፤ ጊዜ፡የተገመተው	1-> 2500 ግ 2- 2500-4000 ግ 3->4000ግ		

Eo :keeregalita\Hositasūmaya-----

yinanniehawaasiyunvristelayinikidigireerosaanchoikkomahuraxiinxalloassinannihugaamoledoloo
seemaxiinxalloassinannihumittehiggegoodowadadhiteiltinomanchoalayinkimeeshogodobbegamet
enniwa'naalanoamuuwuaanaati.

Xiinxallotemixo

Mittehigegodowadadhiteiltinomanchoalayinkimeeshogodobbe gamete
iltinomanchoalayinkimeeshogodobbe gamete iltanogedeassanokokaatubaafateeti.

Xinxallotehoro

Xiintalloassinanniamuuirawaxebaantanikitaiikkasicoyigedelaxiinxalukonnialibiraamuuwufayyim
awoyyinogarinigametenniiltanoirkoaseteetiledotenoxiixalloassinanniamuwiinaxiinxalloassanoh
asaawilemunkkumeereero calla getano.

Xiintalanchusuma – Simegn Anbese

Bilbillukiiro 0923180050

Hospitaaletegashshachusuma-----melaate-----

Xamotekifle

Gafa1 mayimatexamo

kirro	Xamo	dawarro	kubbunoni	Qaago
1	Dirikimeieho	-----		
2	Kilokkimeiete	----- -		
3	Hojjakimeiete	-----		
4	Rosudeeriki	1. 2.1-8 3.8-12 4.>12		
5	Galtetegera	1.galte noosekkita 2.galte nooseta 3.galte tirtinota		
6	Konnegodowityannarafayyimateharunsonoohe	1.ee 2.dee'ni		
7	Eeyiiturome''ehige	----- ---		
8	Konnigodowigatinoheyannaragamettenniillatewonaalate gedekullohe	1.ee 2.dee'ni		
	Gafa 2			
9	Umiqaaqqinnakonniqaaqqimereeronoofanfe	1.<=2 diro 2.>2diro		
10	Konnialbaanigodowadedhiteilitagedensaannigemateilate kayo afiroota	1.ee 2.dee'ni		
11	Konnialbaanigamereniqaaqqoilloota	1.ee 2.dino'e		
12	Ilateaanareyinohewoygodeiminoheqaaqqihoohe	1.ee 2.dino'e		

Gafa 3

14	Konneqaaqqogameteniiiloota	1.ee 2.dee;ni		
15	Godobbekeeshshitaaganalamalatewidira	1.<40lamala 2.>40lamla		
16	Partograatehoronsirino	1.ee		

		2.dee'ni		
17	Horonsirewoikkiropartograafebaalankawonshino	1.ee 2.deeni		
18	Game hanafuheyannarashafote way dunaminohe	1.ee 2.deeni		
19	Du'neminoyiturodunimikume'esaateikkanno	-----		
20	Borrawino(meconium)amadinoshafotewaati	1.ee 2.dee'ni		
21	Eeyituro	1.deera(GI) 2.deera(GII) 3.deera(GIII)		
22	Otoototewaalchi game hanafuyannara	1.ccufamino 2.1-2geeshati 3.3-4geeshati 4.>5		
23	otoototewaalechishaqqima	0.0-30% 1.40%-50% 2.60%-70% 3.>80%		
24	Otootewaalchiofologara	1.badheenit 2.mereeniti 3.albaaniti		
25	Otootatewaalichidiriirima	1.diririnokkiho 2.mereerimaho 3.diriinoaha		
26	Gamete aananooqaaqqushshiqqomageeshaxeertidhino	1.0=-3 2.1=-2 3.2=-1,0 4.3=+1,+2		
27	Otoototefana 4cm ikkitageeshishanooyannasaateteni	1.≥12 seate 2.<12seat		
28	Otoototefana 4seenitmatire ale higginooyanna (active phase)	1.≥7hr 2.<7hr		
29	Ilamsgeeshshanooyonnaseateteni (2 nd stage)	1.≥2hr 2.<2hr		
30	Qaaqqukillogodowugiddoheerenahedotenni	1.<2500 2.2500-4000g 3.>4000g		