COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

SHORT TERM MATERNAL & NEONATAL OUTCOME OF OPERATIVE VAGINAL DELIVERY AMONG MOTHERS WHO GAVE BIRTH AT THREE TEACHING HOSPITALS IN ADDIS ABABA: A CROSS-SECTIONAL STUDY

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A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY IN PARTIAL FULFILLMENT FOR A SPECIALITY CERTIFICATE IN OBSTETRICS AND GYNECOLOGY.

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Acronyms

AHMC: Adama Hospital Medical College

APGAR score: **A**ppearance, **P**ulse rate, **G**irmace, **A**ctivity & **R**espiratory rate

DURH: Dilla University Referral Hospital

FHCRH: Felege-Hiwot Comprehensive Referral Hospital

GA: Gestational Age

GMH: Gandi Memorial Hospital

IVD: Instrumental Vaginal Delivery

JUMC: Jimma University Medical Center

MSAF: Meconium-Stained Amniotic Fluid

NICU: Neonatal Intensive Care Unit

NRFHR: Non-Reassuring Fetal Heart Rate

OVD: Operative Vaginal Delivery

PPH: Post Partum Hemorrhage

SSOL: Second Stage Of Labor

TASH: Tikur Anbessa Specialized Hospital

UOGSTH: University of Gondar Specialized Teaching Hospital

ZMH: Zewditu Memorial Hospital

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1. Abstract

Background: Operative vaginal deliveries (OVD) are obstetric forceps or vacuum-assisted vaginal births carried out by trained healthcare professionals to speed up the second stage of labor. OVD is carried out when there is a sign of a disorder affecting the mother or the fetus or whenever there is a threat to the mother or the fetus that could be mitigated by second-stage intervention. Fetal distress, protracted labor, maternal tiredness, and any conditions where the mother would not be a good candidate for the Valsalva maneuver are common indications for the use of obstetric forceps and vacuum. OVD can cause severe maternal, neonatal morbidity and even mortality, especially in poor countries like Ethiopia.

Objective: To determine the short-term maternal and neonatal complications related to OVD among mothers who gave birth at three hospitals in Addis Ababa (TASH, ZMH and GMH), Ethiopia.

Method: A facility-based cross-sectional study was conducted at three hospitals in Addis Ababa from January 10, 2024 to July 07, 2024 on 181 mothers who gave birth via OVD and the study participants were recruited using consecutive sampling method. Data was collected from patient interviews, maternal and neonatal charts, the hospital Electronic Data Recording System, and NICU record books by using a structured questionnaire that assesses maternal socio-demographic characteristics, obstetric parameters, the circumstances of labor and delivery, and maternal and perinatal outcomes. Data was entered in to SPSS version 25 software for cleaning and analysis. Bivariate analysis was done to identify candidate variables using p<0.25. Multivariable logistic regression was used to control the effect of confounding variables and to identify factors affecting the feto-maternal outcome. Statistical significance was declared at P<0.05.

Result: Among 10,269 total deliveries at three hospitals in Addis Ababa within six month study period, 217(2.1%) mothers gave birth via OVD. forceps and vacuum deliveries account for 0.5% and 1.6% respectively with a ratio of 1:5. Fetal distress (NRFHRP) was the commonest indication for OVD. The magnitude of unfavorable maternal outcomes is found to be 27.6%. FHB before delivery [AOR=3.8, 95% CI 1.49, 9.54], level of profession performing the delivery [AOR=10.1, 95% CI 1.99, 101.95] & neonatal birth trauma [AOR=13.8, 95% CI 3.9, 48.9] found significant association with unfavorable maternal outcome. The proportion of Unfavorable neonatal outcome of the study is 19.3 %. Number of pulls attempted for delivery [AOR=5.9, 95% CI 1.93, 18.24] and maternal perineal tear [AOR=9.5, 95% CI 2.4, 16.2] found significant association with unfavorable neonatal outcome.

Conclusion: The magnitude of OVD is found to be 2.1% and NRFHRP is the commonest indication. The proportion of unfavorable maternal & neonatal outcome is 27.6% & 19.3% respectively.FHB before delivery, level of profession performing the delivery and neonatal birth trauma are factors that strongly predict maternal unfavorable outcome. Whereas number of pulls attempted for delivery and maternal perineal tear are significant factors associated with unfavorable neonatal outcomes.

2 Introduction

2.1 Background

Operative vaginal Deliveries (OVDs) are common obstetric procedures performed in contemporary obstetrics. It involves the use of obstetric forceps and/or vacuum extractors by qualified healthcare professionals to hasten the second stage of labor. When carried out by well-trained and qualified healthcare professionals, it can decrease complications for both the mother and the newborn. Additionally, it lowers the primary cesarean-section rate [1]. Vacuum extraction is commonly chosen over forceps assisted vaginal delivery; technically, it is easier to learn and is deemed safer, especially for the mother. This reduces the incidence of episiotomies, first- and second-degree perineal tears, and harm to the anal sphincter [3, 5]. Though the overall rate of OVD has been declining, the proportion of vacuum-assisted deliveries has been increasing and now accounts for almost 4 times the rate of forceps-assisted vaginal births [3]. In some countries, OVD makes up 1.5% of deliveries, while in others it can be as high as 15%. According to the current estimate, the incidence of OVD in the United States is 5%,where as, over the previous 10 years, the rates of OVD in Australia, Canada, Scotland, England, and Ireland have ranged from 10% to 15%. In Nigeria and Ethiopia, the prevalence of OVD ranges from 0.69% to 3.7% and 2.10–27.90% respectively.

For both mother and neonate, OVD carries a higher risk of certain short-term and long-term morbidities, particularly when it is applied at a higher station and when a greater degree of rotation is required. Morbidity is most probably comparable to that of cesarean deliveries rather than spontaneous vaginal births. Although both vacuum and forceps deliveries have the potential to harm both the mother and the baby, vacuum births are more frequently linked to shoulder dystocia and cephalohematoma, and forceps births are more frequently linked to third- and fourth-degree perineal lacerations [5, 6, 8]. If OVD is not carried out by a competent and experienced care provider, it can potentially result in severe acute and long-term consequences for both the mother and the newborn. Minor complications from OVD, include laceration of the cervix, vagina, and perineum, which are typically short-lived and do not affect the future health of the mother, while major complications include traumatic hemorrhage, bladder injury, and pelvic floor muscle injury that eventually impair the functions of the urinary, genital, & gastro-intestinal system functions [11]. So, to minimize both maternal and neonatal complications, the operator should have good decision-making ability, basic and necessary skills, and knowledge about

the indication, contraindications, application, and use of the particular instrument. Additionally, it is recommended that OVD be carried out from a low or outlet station [2, 12].

2.2 Statement of the Problem

OVD is one of the key elements of essential obstetric care and also an evidence-based obstetric procedure that can reduce short-term and long-term maternal morbidities, particularly those associated with caesarean delivery, neonatal morbidity, and even mortality, when performed by an experienced and skilled physician for appropriate indications and according to protocol [13, 15]. The goals of OVD are to facilitate vaginal birth with minimal maternal and neonatal morbidity. To achieve this goal, a high level of clinical and technical skill, and therefore, an adequate training is necessary[15]. But currently, studies show that the trend of OVD is alarmingly decreasing without obvious reason and is a major concern in the health care system all over the world because the rate of cesarean delivery is increasing. This progressive decrement in OVD will lead to inadequate exposure of residents over their training years, which results in a low level of clinical and technical skills and poor decision-making capability on the choice of instruments or timing of intervention. And this increases the risk of maternal and neonatal morbidity and mortality. Almost all studies showed forceps and vacuum have been associated with an increased risk of maternal and neonatal injury when compared to normal spontaneous vaginal deliveries[16]. Based on a study conducted at a French tertiary care university hospital on severe short-term maternal and neonatal morbidity, severe maternal morbidity occurred in 5.4% of vacuum attempts and 10.5% of forceps or spatula attempts (P.001), and attempted OVD were not significantly associated with severe neonatal morbidity [4]. A study conducted at JUMC showed that among all OVD, 3.3% were complicated with PPH due to uterine atony, episiotomy extension, and 4th degree genital tears. The proportion of neonates admitted to the NICU was 14.0%, and there were birth injuries like subgalleal hemorrhage, skull fracture, and bruising, with a total of 44.1% injuries of total admission to the NICU [2]. Another retrospective study conducted at Suhul General Hospital showed the rate of maternal-neonatal complications following OVD was 45.4% (maternal = 27.1%, fetal = 18.3%)

[17]. Similarly, a cross-sectional study that was conducted in the east wollega zone found that more than one third (37.2%) of all OVD was complicated.

As per the investigators knowledge, there is no study conducted at GMH & ZMH on maternal-neonatal complications following OVD, and there was only one study conducted at TASH that assessed the trend of OVD and cesarean delivery rates over five years; otherwise, maternal and neonatal outcomes were not assessed. Since then, there has been no study that has assessed the maternal & neonatal short-term unfavorable outcomes following OVD in the study area. Studies that were conducted at different facilities in the country usually focus on either maternal or neonatal complications; others are retrospective in nature with their own limitations. Additionally, the results of studies conducted on maternal-neonatal unfavorable outcomes at different facilities in Ethiopia are highly inconsistent and range from 3.3% to 45.4%. Therefore, this study is intended to assess immediate maternal and neonatal complications following OVD at three hospitals in Addis Ababa; TASH, GMH, & ZMH.

2.3 Significance of Study

The findings of this study will benefit the primary care givers in labor and delivery units, who are involved in OVD, practicing residents and obstetricians in the study hospitals, The Addis Ababa University’s College of Health Science as a teaching institution, the Addis Ababa City Administration Health Bureau, and other regional health bureaus & the federal ministry of health also may benefit from the finding of this study to improve their quality of health care. The generation of local data will help us in counseling mothers on possible short- and long-term unfavorable maternal and neonatal outcomes of instrumental vaginal delivery. At the regional and national levels, including the Ministry of Health (MOH), the data can be used as an input for future studies and even for establishing new protocols based on local evidence.

Above all, knowing the prevalence, short-term neonatal outcomes, and determinant factors for poor maternal-neonatal outcomes will assist the primary care giver in the labor and delivery unit in making evidence-based decisions and providing counseling, which will ultimately improve both maternal and neonatal outcomes.

3 Literature Review

3.1 Prevalence of operative vaginal delivery

The global incidence of OVD rates varies greatly between 1% and 15%, and its practice patterns vary widely, especially instrument choice among the vacuum and forceps [14]. Although there is a global decline in OVD rates, obstetricians and other obstetric care givers in high-income countries perform more OVD procedures at a rate of 10–15% as compared to the OVD rates performed by obstetric care givers in low-and middle-income countries at a rate of 1–1.5% [6]. In developed countries, the rates vary from 10% to 15% in the United Kingdom, Scotland, Ireland, and Australia to around 4.5% in the United States of America, where the rate has decreased by half in the last 20 years. Lower rates are observed in low- and middle-income countries such as India (1.39%), South Africa (1% to 3%), and Nigeria (3.6%) [14]. The prevalence of OVD in Ethiopia varies widely, from 3% to 14.8%.

A retrospective study carried out in Hawassa University Comprehensive Specialized Hospital on the prevalence of operative delivery and instrumental delivery accounts for 3% [19], whereas the prevalence of OVD in Metu Karl Hospital, DURH, JUMC, and Adama Hospital Medical College [AHMC] is 7%, 8.66%, 10.3%, and 14.8%, respectively [14]. At TASH Up to the best of my knowledge, there is only one retrospective study done for 5 years from 2011–2016 on trends of OVD, and according to this study, the prevalence was 11.9%, and the trend of operative vaginal delivery rate declined from 15.8% in July 2011 to 9.9% in June 2016 [9].

3.2 Indications for OVD and Maternal, Neonatal Outcomes

When prerequisites have been met, Termination of the second stage of labor by operative vaginal delivery is indicated in any condition threatening the mother or fetus that could be relieved by delivery. Studies showed that common indications for consideration of either forceps delivery or vacuum extraction are prolonged SSOL, NRFHR, or shortening of the SSOL for maternal benefit [2].

A retrospective study was carried out at a tertiary teaching hospital in India in patients undergoing IVD, and the results of the study showed that the most common indication for IVD was prolonged SSOL (32%), followed by fetal distress (26%), and medical disorders (18%). The commonest maternal complications were cervical lacerations (15%), followed by PPH requiring blood transfusion (13%), and vaginal lacerations (10%). Neonatal jaundice was the most common neonatal complication seen in a study [20].

A retrospective study was conducted on Vacuum Delivery at the Aminu Kano tertiary teaching hospital, Nigeria, and based on the study, the commonest indication for the vacuum delivery was prolonged SSOL (45.2%), followed by Shortening of the SSOL for maternal disease conditions (36.7%), and fetal distress (18.1%). The commonest maternal complication was PPH (9.5%). Fetal complications occurred in about 31% of vacuum deliveries; the most common one was cephalhaematoma, which accounts for 18.1%, followed by fetal asphyxia 4.8% [3].

Retrospective cross-sectional study was conducted on complications of IVD in Suhul general hospital, North-West Tigray, Ethiopia, based on this study, nearly half of IVD (45.4%) was complicated; maternal complications took the lead, accounting for 27.1%; and perineal tears (2nd and 3rd degrees) were the leading maternal complications. The commonest indication for IVD was fetal distress (44.3%). Among neonatal unfavorable outcomes, low Apgar scores were recorded as the commonest fetal complication (83% of all fetal complications) 17].

Similarly, a study was carried out on the prevalence and outcome of OVD in JUMC. Based on the study, the commonest indication for operative vaginal delivery was found to be NRFHR

(56.2%), followed by prolonged SSOL (24.0%) and shortening SSOL (19.8%). The commonest maternal complication was PPH (3.3%) due to uterine atony and episiotomy extension. Neonatal birth weight was a significant factor affecting maternal outcome. The commonest neonatal complication was low 1st & 5th minute Apgar score. The type of instrument used (vacuum) and the presence of MSAF are factors affecting neonatal outcome [2].

On the contrary, a cross-sectional study on immediate unfavorable birth outcomes and determinants of OVD in East Gojjam zone public hospitals, north-west Ethiopia, showed that the commonest indication was prolonged SSOL (41.8%), followed by NRFHR (41.5%). The overall unfavorable maternal outcomes of OVD were found to be 32.9%. No formal education, rural residence, male sex of the neonate, and zero station during instrumental application were factors associated with unfavorable maternal outcomes. The magnitude of unfavorable neonatal outcomes was 34.8%. Vaginal first-degree tears and blood transfusions were statistically significant factors associated with unfavorable neonatal outcomes [12].

Another facility-based cross-sectional study was conducted from February 20 to June 2020 in five public hospitals in the East Wollega zone on complications of IVD and associated factors, according to the study, the commonest indication for IVD was prolonged SSOL (42.9%), followed by fetal distress (31.5%). Maternal complications were observed in 21.3% of mothers, and the leading maternal complication was a perineal tear. The most common neonatal complication is low Apgar score [20]. A facility-based cross-sectional study was conducted on the magnitude, indications, and factors associated with OVD at AHMC, Ethiopia. According to the study, prolonged SSOL (53.8%) was the most common indication for OVD, followed by fetal distress 27.7% and severe preeclampsia/eclampsia (13.8%) [14].

Another cross-sectional study conducted on maternal complications related to instrumental delivery at FHCSH, north-west Ethiopia, notes that the proportion of maternal complications related to instrumental delivery was 12.1%. The most common complication was 2nd-degree perineal tear (7.4%), followed by cervical tear, 3rd-degree perineal tear and episiotomy extension accounts 2%, 1.5% and 1% respectively [11].

3.3 Factors that affect Maternal and Neonatal Outcomes

3.3.1 Type of Instrument Used and Level/Experience of Operator

The poor neonatal outcome is mainly associated with the skill and knowledge of the health care provider or the operator. The major determinant factor that reassures the safety of the instrument is the operator with an appropriate level of expertise and good judgment, rather than the instrument [22].

A 5-year prospective Study conducted at a French tertiary care university hospital on outcomes of OVD managed by residents under supervision (who had less than 5 years of experience) and attending obstetricians (who had 5 years or more of experience), the result notes that delivery managed by a resident was not significantly associated with severe maternal morbidity and was no longer associated with neonatal morbidity[23].

From a retrospective study conducted on the comparison of perinatal outcomes between forceps and vacuum-assisted deliveries and the result showed, the rate of third- or fourth-degree perineal laceration was higher in forceps delivery than vacuum, whereas the rate of cephalohematoma and shoulder dystocia was higher in vacuum deliveries[5].

Similarly, a cross-sectional study that was conducted in five public hospitals in the east wollega zone notes that 67% neonatal complications, such as low Apgar score, need for resuscitation, and caput succedaneum, were caused by vacuum-assisted delivery. Maternal complications developed by forceps include 3rd and 4th degree perineal tears and traumatic post-partum hemorrhage, which were significantly higher than vacuum-assisted deliveries [24].

According to studies conducted at JUMC, the risks of fetal injury mainly depend on the type of instrument used for delivery; 80% of mothers who gave birth by vacuum are less likely to have a favorable neonatal outcome than those with forceps deliveries. The proportion of neonates with birth injuries is higher among vacuum deliveries than forceps deliveries (20% versus 2.6%), and vacuum deliveries account for statistically significantly higher rates of cephalhematoma and subgalleal and retinal hemorrhages [2].

A study carried out on the effect of sequential use of vacuum and forceps for assisted vaginal delivery shows sequential use of vacuum and forceps had significantly higher rates of intracranial hemorrhage, brachial plexus and facial nerve injury, seizure, and a depressed 5-minute Apgar score than spontaneous delivery. The relative risk of sequential vacuum and forceps use was greater than the sum of the individual relative risks of each instrument for intracranial hemorrhage, facial nerve injury, seizure, hematoma, and perineal and vaginal lacerations[13]. Similarly, other studies showed Poor maternal and newborn outcome has also been reported after the sequential use of vacuum and forceps delivery for assisted vaginal delivery [15, 13].

A study done at DURH shows that sequential use of instruments substantially increased the risk of poor Apgar scores. In this regard, 85% (6 out of 7) of the neonates delivered with sequential use had poor Apgar scores [8].

3.3.2 Obstetric Related Factors

Cross-sectional study carried out on the outcome of OVD from December 1, 2016 to May 30, 2017 at JUMC, factors associated with neonatal outcome were analyzed, and among these, **meconium-stained amniotic fluid** showed an association with neonatal outcome, and 90% of mothers with grade III MSAF are less likely to have a favorable neonatal outcome than those with clear amniotic fluid [2]. **Similarly**, another cross-sectional study was conducted at the University of Gondar Specialized Teaching Hospital [UOGSTH] on the prevalence of adverse neonatal outcomes and associated factors among births through OVD, unfavorable neonatal outcomes were 4.13 times higher among births with Grade I or Grade II MSAF and 24.90 times higher with Grade III MSAF when compared to births with clear liquor status [25].

In a cross-sectional study conducted in Arba Minch general hospital from January 2013 to December 2014 on fetal outcome after vacuum assisted vaginal delivery, it was shown that newborns delivered from mothers whose SSOL was < 2 hours had a more favorable fetal outcome than those delivered from mothers whose SSOL was > 2 hours [26].

Based on a study conducted at DURH, **indication** for instrumental delivery and **birth weight** were found to increase the risk of poor neonatal outcomes. Neonates delivered by assisted delivery with an indication for NRFHRP were 2.5 times more likely to have a poor APGAR score compared to those with an indication for poor maternal effort, and those with a birth weight of < 2.5kg were found to be 3 times more likely to have a poor APGAR score when compared to those with a birth weight of more than 4kg [8].

A study done on complications of instrumental vaginal deliveries and associated factors in Suhul general hospital, showed birth weight and indication of instrumental delivery were significantly associated with neonatal complications [17]. Based on a cross-sectional study that was conducted from February 20 to June 20/2020 in five public hospitals in East Wollega zone, birth weight > 4kg was 4 times more likely to cause neonatal complications when compared with neonates with 2.5–3.999 kg, and application of OVD when the **fetal station** is at the low pelvis and at the outlet pelvis is less likely to cause complications than when the fetal station is at the mid pelvis[21]. **On the contrary** study done at JUMC showed birth weight and fetal station at decision both have no effect on the neonatal outcome, but neonatal birth weight has shown a strong association with maternal outcome; 99.6% of mothers who delivered via OVD with a birth weight >4000 grams are less likely to have a favorable maternal outcome when compared to those with normal birth weight [2].

Based on a prospective cohort study conducted on perinatal and maternal morbidity and mortality after attempted operative vaginal delivery at midpelvic stations, the results noted that midpelvic operative vaginal delivery is associated with higher rates of severe birth trauma and obstetric trauma, whereas overall rates of severe perinatal and maternal morbidity and mortality vary by indication and operative instrument [27].

Cross-sectional study carried out on immediate unfavorable birth outcomes and determinants of OVD in East Gojjam zone public hospitals, north-west Ethiopia, station zero during instrument application was 7 times more likely to develop unfavorable maternal outcomes compared with instruments applied at station +3, and women who delivered male neonates

were 2.9 times more likely to develop unfavorable maternal outcomes of OVD compared with women who delivered female neonates [12].

A retrospective study carried out on maternal complications related to instrumental delivery at FHCSH, north-west Ethiopia, **primiparous** women who gave birth with the help of instruments had 3.5 times more risk of maternal complications compared to multiparous women [11]. **Similarly**, a study conducted at UOGSTH on the prevalence of adverse neonatal outcomes and associated factors among births through OVD showed neonates born to primigravida mothers had a 2.49 times higher risk of an unfavorable neonatal outcome compared to neonates born to multiparous mothers [25]. **On opposite** of the above two studies [FHSH and UOGSTH], another study conducted at DURH between September 2013 and august 2015 showed that parity of the mother and station of the fetal presenting part were not associated with poor APGAR scores [8].

A prospective cohort study was conducted on maternal and neonatal morbidity in relation to the use of **episiotomies** at operative vaginal delivery in Two urban maternity units in Scotland and England and showed that the use of episiotomies was associated with higher rates of postpartum hemorrhage (28.5 versus 18.4%), the need for moderate or strong analgesia (90.5 versus 67.6%), and perineal infection [14].

A study carried out on maternal complications related to instrumental delivery at FHCSH showed women who had an episiotomy during instrumental delivery had 86% lower maternal complications compared to women who didn’t have episiotomies [11].

3.4 Conceptual Framework

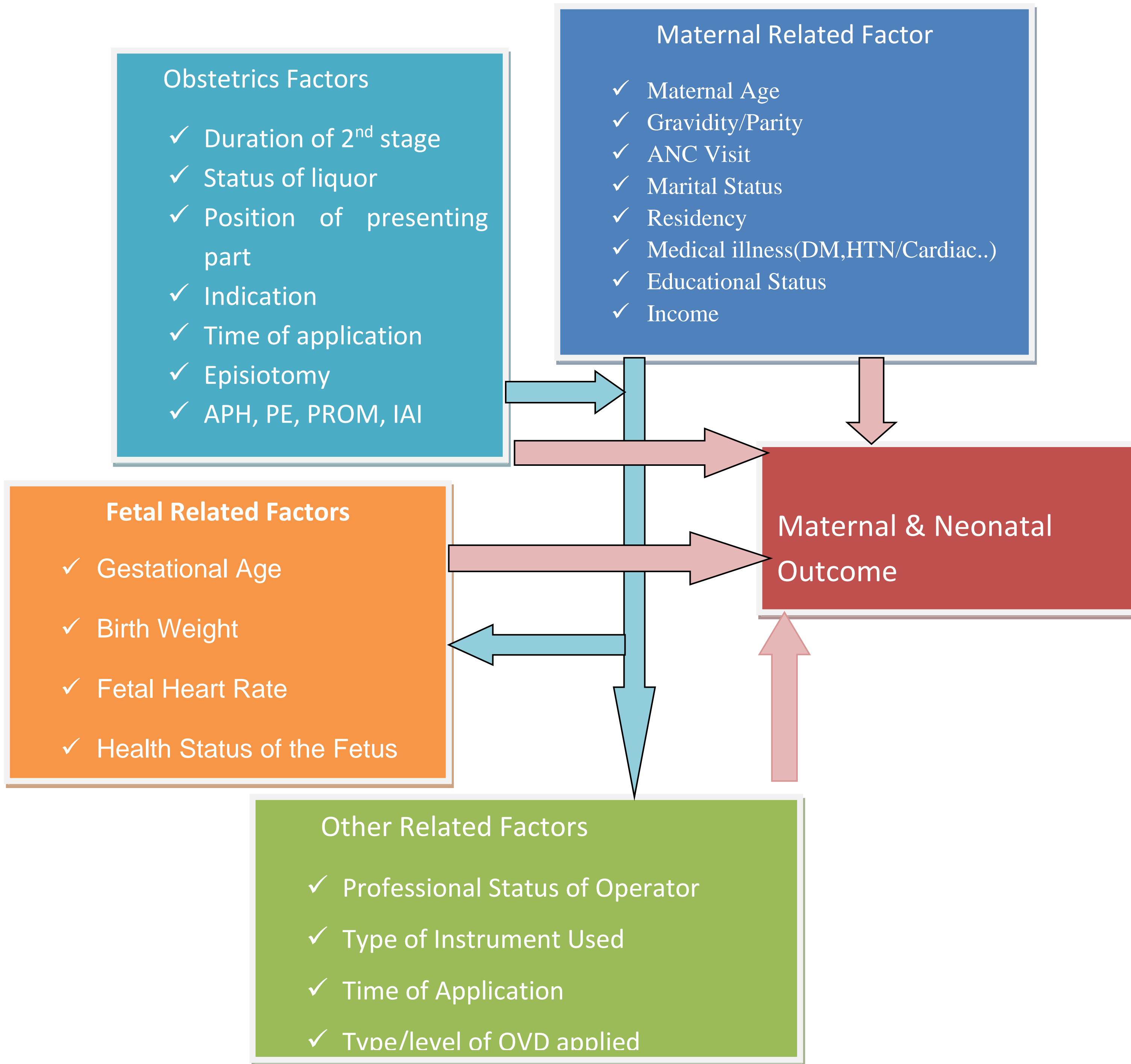

Figure 1: Conceptual Framework of factors affecting Maternal &Neonatal outcome developed based on literature review[21, 25].

4 Objectives

4.1 General Objectives

To assess the immediate maternal-neonatal unfavorable outcome and associated factors of operative vaginal delivery among mothers who gave birth at three teaching hospitals in Addis Ababa Ethiopia.

4.2 Specific Objectives

1. To determine the prevalence of OVD at three teaching hospitals in Addis Ababa Ethiopia.
2. To identify immediate maternal complications & associated factors following OVD at three hospitals in A.A.
3. To Identify immediate neonatal complications & associated factors in OVD at three hospitals in A.A

5 Methodology

5.1 Study Area & Period

The study was conducted in Addis Ababa, the capital city of Ethiopia. As of 2015, the city had 5.7 million inhabitants, with a male-to-female ratio of 0.99. Regarding medical services, the city currently has more than 42 hospitals, 101 health centers, 35 health posts, and more than 500 clinics. There are more than 12 public and more than 25 private hospitals in the city. Of the total 13 public hospitals, the study was conducted at three purposely selected teaching government hospitals in Addis Ababa: Tikur Anbesa Specialized Hospital (TASH), Gandi Memorial Hospital (GMH), and Zewuditu Memorial Hospital. TASH is a tertiary referral and teaching center of Addis Ababa University's College of Health Sciences. GMH and ZMH are also tertiary referral & teaching hospitals under the Addis Ababa Health Bureau, which are affiliated with TASH. The study period was from January 10 to July 07, 2024 G.C.

5.2 Study Design

A facility based cross-sectional study design was conducted at three selected teaching hospitals in Addis Ababa [TASH, GMH & ZMH].

5.3 Source population

Mothers who gave birth in the three selected hospitals in Addis Ababa[TASH, GMH & ZMH] from January 10, to July 07, 2024GC.

5.4 Study population

Mothers who gave birth via obstetric forceps or vacuum extractor and meeting the eligibility criteria as set by the inclusion and exclusion criteria within the study period in three selected hospitals.

5.5 Inclusion & Exclusion criteria

Inclusion criteria: All mothers who gave birth via OVD and also who were volunteer to participate during the study period. Mothers who gave birth via cesarean section, laparotomy or destructive vaginal delivery after failed instrumental attempt were included.

Exclusion criteria: Mothers for whom OVD was indicated but with preterm births(<34 weeks), fetus with congenital anomaly, those out-of–study period and also those who were seriously ill and unable to respond.

5.6 Sample Size

Sample size was estimated using a single population proportion formula $n = z^2 p (1-p)/d^2$ where p (14.8%) was the estimate of the proportion of operative vaginal delivery at Adama hospital medical college. When recommended values entered for each parameter, the sample was estimated to be 193 and when 10% added for expected non response rate, the final sample size becomes 212; unfortunately, the total number of participant within the study period was 181.

5.7 Study Variables

Dependent variables:

Immediate unfavorable maternal outcomes related to OVD: At least one of these; Episiotomy extension, 2nd, 3rd or 4th –degree perineal tears, vaginal/cervical tear (≥3cm),

Traumatic PPH need for blood transfusions, need for major surgery (uterine repair, arterial ligation or hysterectomy).

Immediate unfavorable neonatal outcomes related to OVD: Presence of either one of these; low Apgar score, admission to NICU, need for resuscitation at delivery, birth trauma (fractured bone, subgalleal hemorrhage, cephalhematoma) and neonatal death.

Independent variables:

- **Socio-demographic variables:** age, place of residence, marital status, religion, educational level, family monthly income
- **Obstetrics variables:** gravidity/parity, number of ANC visits, duration of labor, liquor status, presence of obstetric complication (APH, PE, PROM, IAI)
- **Healthcare provider related factors:** Professional of status of the operator
- **Fetal/neonate related factors:** sex of neonate, station, position, weight
- **Type of instrument** used (vacuum or forceps), type of OVD applied (outlet or low), time of OVD applied.

5.8 Operational Definitions

Immediate birth outcomes: are the immediate maternal or neonatal conditions that could be complicated or non-complicated as diagnosed by the attending clinician occurring within the ***first six hours*** of delivery [12].

Operative Vaginal Deliveries (OVD)**:** are vaginal deliveries accomplished with the use of a vacuum device or forceps for maternal and/or fetal indication [2].

Failed OVD: After unsuccessful attempt of OVD tried and then declared failed by the attending clinician and delivery accomplished via Cesarean Section, Laparotomy or destructive vaginal delivery.

Episiotomy Extension: an incision that is deeper or longer than is necessary to permit the birth of newborn [1].

5.9 Data collection instrument

The data was collected by interviewing the participant & reviewing medical records of the parturient & neonate after informed verbal consent taken by data collector. All women who gave birth via OVD and who fulfilled the inclusion criteria during the study period were studied for immediate unfavorable maternal and neonatal outcome. Data was collected immediately after delivery when the parturient became comfortable to respond and before discharge. The data collectors were three midwifes supervised by three residents who were working in the selected hospitals of the study area. The data were collected using self-prepared questionnaire that have had essential components to assess the demographic variables, the maternal and fetal related factors, the overall circumstance of labor and delivery and the maternal, neonatal outcome. The questionnaire was prepared in English version. A head of data collection, onsite training was given for data collectors on the methods of collecting data through interviewing patients, reviewing the charts, and on how to fill the information on the questionnaire, as well as the ethical aspect including keeping the study subjects' confidentiality.

Prior to data collection, the checklist was tested to check the consistency of the checklist format and the ability of the data collector's performance. Pre-test was conducted on 10 patients that gave birth via OVD in three hospitals who was not included as study subjects. Supervision of data collectors was conducted by the investigator. Filled questionnaires were checked regularly by investigator for completeness.

5.10 Data Processing and Analysis

Each questionnaire was checked for completeness before entry then data was coded and entered into SPSS version 25 statistical software later cleaned and analysed. Data were cleaned by removing invalid or duplicated ones. Descriptive statistics was used to describe the main features of the data. The degree of association between dependent and independent variables was assessed using bivariate logistic regression and variables with p-value<0.25 in the bivariate

logistic regression analysis was considered for the multivariate logistic regression analysis. In multivariate logistic regression, 95% confidence interval and p value ≤ 0.05 was reported to declare statistically significant.

5.11 Ethical Consideration and Consent

Ethical clearance was obtained from the Department of Research and Publication Committee (DRPC) of Addis Ababa University, department of Gynecology and Obstetrics. Communication was also made with the medical director of each hospital through formal letter obtained from AAU College of health science, School of Medicine, department of Obstetrics & Gynecology. Then after permission obtained from the medical director of each hospital to conduct the research. After the purpose and objective of the study had been informed to the women, verbal consent was obtained by data collector. In order to keep confidentiality of any information provided by study subjects, the data collection procedure was anonymous and Participation was also on voluntary basis.

6 Results

6.1 Sociodemographic Characteristics

Out of 10,269 mothers who gave birth within 6 months of the study period at three hospitals in Addis Ababa 217(2.1%) were by operative vaginal delivery (OVD). Among 217 women who gave birth via OVD during six month study period, 181 of them were participated making the response rate 85.4%. Among them 118 (65.2%) were in the age group of 20-29 years. Nearly all 174(96.1%) of the study participants were living in Addis Ababa. Almost all 171 (94.5%) of them were married, and majority of them were Self-employed by occupation 67(37%), academically completed primary and secondary school 140(77.3%) and also their monthly household income was 4000-8000 ETB 89(49.2%). (See Table 1)

Table 1: Frequency distribution of sociodemographic characteristics of mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10, 2024–July 07, 2024.

Variable	Variable category	Frequency	Percent
Age in years	<20	6	3.3
	20-29	118	65.2
	≥30	57	31.5
Occupation	Housewife	54	29.8
	Daily laborer	26	14.4
	Self-employed	67	37
	Government employed	29	16
	Others	5	2.8
Educational status	No formal education	9	5
	Primary school	71	39.2
	Preparatory	69	38.1
	College/University	32	17.7
Household income per month in ETB	<4000 ETB	10	5.5
	4000-8000 ETB	89	49.2
	>8000 ETB	82	45.3
Marital status	Single	8	4.4
	Married	171	94.5
	Divorced/widow	2	1.2
Place of residency	Addis Ababa	174	96.1
	Out of Addis Ababa	7	3.9

6.2 Obstetrics and Related Characteristics

According to this study more than half 92(50.8%) of mothers were given birth to their first child in terms of their parity and almost all 177(97.8%) had ANC. The GA of delivery for majority of them 110(60.8%) were between 39 and 41+6 weeks. Most of the respondents 156(86.2%) did not have chronic medical illness. Cardiac illness 15(8.3%) was the leading chronic medical illness that complicate pregnancy. For majority of participants Labor started spontaneously 130(71.8%) and duration of SSOL was also >3 hours 72(39.8%). The commonest indication for OVD was found to be NRFHRP 106(58.6%) which was also followed by prolonged SSOL 58(24.0%). Regarding the types of OVDs, vacuum was more commonly used 150(82.9%) than Forceps deliveries 31(17.1%) with vacuum forceps ratio of 5:1 and also majority of OVD 134(74%) applied on occipitoanterior fetal position; at +2 & bellow station 95(52.5%). More than three-fourths of mothers 153(84.5%) whom OVD applied were being followed at labor ward and delivery were accomplished with in 3 pull 161(89%) and also majority 162 (89.5%) had episiotomy. Nearly all 175(96.7%) OVD were attended by residents and majority 166(91.7%) of the newborns weighing 2500-3999 grams. (See Table 2)

Table 2: Frequency distribution of obstetrics and related characteristics of mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10 to July 7, 2024GC.

Variable	Variable category	Frequency	Percent
Parity	Nulliparous	92	50.8
	Parous	89	49.2
Gestational age in weeks	<37 weeks	5	2.8
	37-38+6 weeks	31	17.1
	39-41+6 weeks	110	60.8
	≥42 weeks	35	19.3
Antenatal Care	Yes	177	97.8
	No	4	2.2
Onset of labor	Spontaneous	130	71.8
	Induced	51	28.2
Duration of SSOL in hours	<2hrs	49	27.1
	2-3hrs	60	33.1
	>3hrs	72	39.8
Status of liquor	Meconium stained	75	41.4
	Clear	95	53.5
	bloody	11	6.1
Grade of meconium	Grade l	16	8.8
	Grade ll	39	21.5
	Grade lll	20	11
FHB prior to delivery	<90 BPM	33	18.2
	90-100BPM	49	27.1
	>100BPM	99	54.7
Indication for OVD	NRFHRP	106	58.6
	Prolonged SSOL	59	32.6
	Shorten SSOL	16	8.8
Station	+2 and below (Outlet)	95	52.5
	+1 (Low)	86	47.5
Position of fetus	Occiput anterior	134	74
	Occiput posterior	14	7.7
	Occiput transverse	33	18.2
Birth weight	<2500gm	8	4.4
	2500-3999gm	166	91.7
	≥4000gm	7	3.9
Time of application	On arrival at labor ward	28	15.5
	followed at labor ward	153	84.5
Number of Pulls	≤3 times	161	89
	>3 times	20	11
Type of Instrument	Vacuum	150	82.9
	Forceps	31	17.1
Level of profession	Resident	175	96.7
	Consultant	1	0.6
	Midwife	5	2.8
Episiotomy done	Yes	162	89.5
	No	19	10.5

6.3 Unfavorable Maternal Outcome and Related Variables

More than one-third of participants in the study who completed college/university (34.4%), labor initiated artificially(33.3%), FHB before delivery <90BPM(42.4%), OVD applied at occipitotransverse position(33.3%), delivery assisted by forceps(35.5%) and when greater than three pulls attempted for delivery(55%) have found unfavorable maternal outcome.

The study revealed that out of 181 women who gave birth via OVD 50(27.6%) developed unfavorable maternal outcomes. Among these 18(10%) developed episiotomy extension (92.7% Episiotomy extension was to the upper third of vagina), 26(14.4%) developed perineal tear (2nd degree perineal tear accounts 93.2%), and five women (2.8%) experienced traumatic postpartum hemorrhage that need transfusion and there was one uterine rupture diagnosed after forceps assisted delivery that finally managed by peri partum Hysterectomy. (See Table 3&4)

Table 3: Frequency distribution of maternal outcome cross tabulated with sociodemographic characteristics of mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10, 2024–July 7, 2024

Variable	Variable Category	Maternal Outcome		Total
		Unfavorable Outcome N(%)	Favorable Outcome N(%)	
Age	<20 years	2(33.3)	4(66.7)	6(100.0)
	20-30 years	35(29.7)	83(70.3)	118(100.0)
	>30 years	13(22.8)	44(77.2)	57(100.0)
Occupation of mother	House wife	9(16.7)	45(83.3)	54(100.0)
	Daily laborer	9(34.6)	17(65.4)	26(100.0)
	Self employed	23(34.3)	44(65.7)	67(100.0)
	Govn. employed	8(27.6)	21(72.4)	29(100.0)
	others	1(20)	4(80)	5(100.0)
Educational Status	No formal educ.	3(33.3)	6(66.7)	9(100.0)
	Primary sch.	14(19.7)	57(80.3)	71(100.0)
	Second. & prep.	22(31.9)	47(68.1)	69(100.0)
	College/University	11(34.4)	21(65.6)	32(100.0)
House hold income per month	<4000 ETB	3(30)	7(70)	10(100.0)
	4000-8000 ETB	25(28.1)	64(71.9)	89(100.0)
	>8000 ETB	22(26.8)	60(73.2)	82(100.0)
Marital status	Single	2(25.0)	6(75.0)	8(100.0)
	Married	48(28.1)	123(71.9)	171(100.0)
	Divorced/Widowed	0(0.0)	2(100.0)	2(100.0)
Place of Residency	Addis Ababa	48(27.6)	126(72.4)	174(100.0)
	Out of AA	2(28.6)	5(71.4)	7(100.0)

Table 4: Frequency distribution of maternal outcome cross tabulated with obstetrics and related characteristics of mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10, 2024–July 07, 2024.

Variable	Variable Category	Maternal Outcome		Total
		Unfavorable Outcome N(%)	Favorable Outcome N(%)	
Parity	Nulliparous	30(32.6)	62(67.4)	92(100.0)
	Parous	20(22.5)	69(77.5)	89(100.0)
GA in weeks	<37 weeks	1(20.0)	4(80.0)	5(100.0)
	37-40+6 weeks	37(26.2)	104(73.8)	141(100.0)
	≥41 weeks	12(34.3)	23(65.7)	35(100.0)
Labor	Spontaneous	33(25.4)	97(74.6)	130(100.0)
	Induced	17(33.3)	34(66.7)	51(100.0)
Duration of SSOL	<2 hours	12(24.5)	37(75.5)	49(100.0)
	2-3 hours	19(31.7)	41(68.3)	60(100.0)
	≥3 hours	19(26.4)	53(73.6)	72(100.0)
Liquor status	Meconium stained	20(26.7)	55(73.3)	75(100.0)
	Clear	27(28.4)	68(71.6)	95(100.0)
	Bloody	3(27.3)	8(72.7)	11(100.0)
Grade of Meconium	GIMSAF	4(25.0)	12(75.0)	16(100.0)
	GIIMSAF	10(25.6)	29(74.4)	39(100.0)
	GIIIMSAF	6(30.0)	14(70.0)	20(100.0)
FHB before Delivery	<90 BPM	14(42.4)	19(57.6)	33(100.0)
	90-100 BPM	15(30.6)	34(69.4)	49(100.0)
	≥100BPM	21(21.2)	78(78.8)	99(100.0)
Indication of OVD	NRFHRP	35(33.0)	71(67.0)	106(100.0)
	Prolonged SSOL	13(22.0)	46(78.0)	59(100.0)
	Shorten SSOL	2(12.5)	14(87.5)	16(100.0)
Station	+2 &bellow	24(24.3)	71(74.7)	95(100.0)
	+1 and above	26(30.2)	60(69.8)	86(100.0)
Position	Occipito anterior	36(26.9)	98(73.1)	134(100.0)
	Occipito posterior	3(21.4)	11(78.6)	14(100.0)
	Occipito transverse	11(33.3)	22(66.7)	33(100.0)
No. of pulls attempted	≤3 Times	43(26.7)	118(73.3)	161(100.0)
	>3 Times	7(35.0)	13(65.0)	20(100.0)
Type of Instrument	Vacuum	39(26.0)	111(74.0)	150(100.0)
	Forceps	11(35.5)	20(64.5)	31(100.0)
Birth weight in gm	<2500gm	2(25.0)	6(75.0)	8(100.0)
	2500-4000gm	46(27.7)	120(72.3)	166(100.0)
	≥4000gm	2(28.6)	5(71.4)	7(100.0)

6.4 Unfavorable Neonatal Outcome and Related Variables

Of all mothers who participated in the study & gave birth by OVD during the study period 35(19.3%) neonates developed Unfavorable neonatal outcome. among these 17(9.4%)neonates were admitted to NICU, 5(2.8%) Apgar score was low & need resuscitation and 13(7.2%) developed birth trauma.

Neonates whose birth weight ≥4000gm (42.9%) and those who were delivered after more than three pulls attempted (45%) during OVD have had high proportion of unfavorable neonatal outcome.

In addition, approximately half (45%) Neonates being delivered in the presence of GIIIMSAF and more than one-third of (35.7%) neonates delivered when OVD applied while mothers immediately arrived to labor ward found to have unfavorable neonatal outcome.

Table 5: Distribution of neonatal outcome cross tabulated with Sociodemographic characteristics among mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10, 2024–July 07, 2024

Variable	Variable Category	Neonatal Outcome		Total
		Unfavorable Outcome N(%)	Favorable Outcome N(%)	
Age				
	≤30 years	21(16.9)	103(83.1)	124(100.0)
	>30 years	14(24.6)	43(75.4)	57(100.0)
Occupation of mother	House wife	6(11.1)	48(88.9)	54(100.0)
	Daily laborer	6(23.1)	20(76.9)	26(100.0)
	Self employed	18(26.9)	49(73.1)	67(100.0)
	Govn. employed	4(13.8)	25(86.2)	29(100.0)
	others	1(20.0)	4(80.0)	5(100.0)
Educational Status	No formal education	2(22.2)	7(77.8)	9(100.0)
	Primary school	13(18.3)	58(81.7)	71(100.0)
	Secondary & preparatory	11(15.9)	58(84.1)	69(100.0)
	College/University	9(28.1)	23(71.9)	32(100.0)
House hold income per month	<4000 ETB	0(0.0)	10(100.0)	10(100.0)
	4000-8000 ETB	18(20.2)	71(79.8)	89(100.0)
	>8000 ETB	17(20.7)	65(79.3)	82(100.0)
Marital status	Single	2(25.0)	6(75.0)	8(100.0)
	Married	33(19.3)	138(80.7)	171(100.0)
	Divorced/Widowed	0(0.0)	2(100.0)	2(100.0)

Table 6: Distribution of neonatal outcome cross tabulated with obstetrics and related characteristics among mothers who gave birth by OVD at Three Selected Hospitals in AA from January 10, 2024–July 07, 2024

Variable	Variable Category	Neonatal Outcome		Total
		Unfavorable Outcome N(%)	Favorable Outcome N(%)	
Parity	Nulliparous	16(17.4)	76(82.6)	92(100.0)
	Parous	19(21.3)	70(78.7)	89(100.0)
GA in weeks	<37 weeks	0(0.0)	5(100.0)	5(100.0)
	37-40+6 weeks	26(18.4)	115(81.6)	141(100.0)
	≥41 weeks	9(25.7)	26(74.3)	35(100.0)
Labor	Spontaneous	24(18.5)	106(81.5)	130(100.0)
	Induced	11(21.6)	40(78.4)	51(100.0)
Duration of SSOL	<2 hours	6(12.2)	43(87.8)	49(100.0)
	2-3 hours	13(21.7)	47(78.3)	60(100.0)
	≥3 hours	16(21.1)	56(78.9)	72(100.0)
Liquor status	Meconium stained	19(25.3)	56(74.7)	75(100.0)
	Clear	13(13.7)	82(86.3)	95(100.0)
	Bloody	3(27.3)	8(72.7)	11(100.0)
Grade of Meconium	GIMSAF	1(6.2)	15(93.8)	16(100.0)
	GIIMSAF	9(23.1)	30(76.9)	39(100.0)
	GIIIMSAF	9(45.0)	11(55.0)	20(100.0)
FHB before Delivery	<90 BPM	7(2.2)	26(78.8)	33(100.0)
	90-100 BPM	8(16.3)	41(83.7)	49(100.0)
	≥100BPM	20(20.2)	79(79.8)	99(100.0)
Indication of OVD	NRFHRP	23(21.7)	83(78.3)	106(100.0)
	Prolonged SSOL	12(20.3)	47(79.7)	59(100.0)
	Shorten SSOL	0(0.0)	16(100.0)	16(100.0)
Station	+2 &bellow	17(17.9)	78(82.1)	95(100.0)
	+1 and above	18(20.9)	68(79.1)	86(100.0)
Position	Occipito anterior	27(20.1)	107(79.9)	134(100.0)
	Occipito posterior	4(28.6)	10(71.4)	14(100.0)
	Occipito transverse	4(12.1)	29(87.9)	33(100.0)
Time of Application	On arrival at L/W	10(35.7)	18(64.3)	28(100.0)
	Being followed L/W	25(16.3)	128(83.7)	153(100.0)
No. of pulls attempted	≤3 Times	26(16.1)	135(83.9)	161(100.0)
	>3 Times	9(45.0)	11(55.0)	20(100.0)
Type of Instrument	Vacuum	28(18.7)	122(81.3)	150(100.0)
	Forceps	7(22.6)	24(77.4)	31(100.0)
Episiotomy done	Yes	31(19.1)	131(80.9)	162(100.0)
	No	4(21.1)	15(78.9)	19(100.0)
Birth weight in gm	<2500	5(62.5)	3(37.5)	8(100.0)
	2500-4000	27 (16.3)	139(83.7)	166(100.0)
	≥4000gm	3(42.9)	4(57.1)	7(100.0)

6.5 Factors Associated with Unfavorable Maternal Outcomes

In bivariate logistic regression; Occupation of the mother, parity, FHB Before delivery, indication for OVD, level of profession performing the delivery, neonatal birth trauma and neonatal admission to NICU were variables identified from bivariate logistic regression analysis and then fitted into the final multivariate logistic regression. After fitting those variables in multivariate logistic regression; FHB before delivery, level of profession performing the delivery & neonatal birth trauma were found to have statistically significant association with unfavorable maternal outcome related to operative vaginal delivery.

FHB before delivery [AOR: 3.8 CI(1.49, 9.54)], Level of profession [AOR: 10.1 CI(1.99, 101.95)] and Neonatal birth trauma [AOR: 13.8 CI(3.90, 48.9)] were significantly associated factor for unfavorable maternal outcome.

6.6 Factors Associated with Unfavorable Neonatal Outcomes

Similarly In bivariate logistic regression; occupation of the mother, duration of SSOL, status of liquor, grade of meconium, Time of application of OVD, number of pulls attempted for delivery, weight of newborn at delivery, Episiotomy extension, perineal tear and traumatic PPH were variables identified as a candidate for the final multivariate logistic regression analysis.

In multivariate logistic regression model; number of pulls attempted for delivery [AOR: 5.9 CI(1.93, 18.24)] and maternal perineal tear [AOR: 9.5 CI(2.46, 16.2)] were found to have statistically significant association with unfavorable neonatal outcome following operative vaginal delivery.

Table 7: Factors contributing for Maternal & Neonatal Unfavorable outcome using multivariate logistic regression among mothers who gave birth via OVD at three hospitals in AA from January 10, 2024–July 07, 2024.

Variable Category	Maternal Outcome		p-value	COR(95% CI)	P-value	AOR(95% CI)
	Unfavor.	Favorab.				
FHB before Delivery						
<90 BPM	14(42.4)	19(57.6)	0.19	2.7(1.18, 6.35)	.005	**3.8(1.49, 9.54)**
90-100 BPM	15(30.6)	34(69.4)	.212	1.6(.76, 3.56)	.076	2.2(.92, 5.22)
≥100BPM	21(21.2)	78(78.8)		1		1
Level of profession						
Resident	46(26.3)	129(73.7)		1		1
Midwife	4(66.7)	2(33.3)	.033	11.2(1.22, 102.9)	.048	**10.1(1.99, 101.95)**
Neonatal Birth Trauma						
Yes	12(70.6)	5(29.4)	.00	7.96(2.64, 24.02)	.00	**13.8(3.90, 48.9)**
No	38(23.2)	126(76.8)		1		1
Neonatal Unfavorable Outcome						
Variable	Neonatal outcome		p-value	COR(95% CI)	P-value	AOR(95% CI)
	Unfavor.	Favorab.				
Number of pulls attempted						
≤3	26(16.1)	135(83.9)		1		1
>3	9(45.0)	11(55.0)	.004	4.25(1.60, 11.27)	002	**5.9(1.93, 18.24)**
Perineal tear						
Yes	13(40.6)	19(59.4)	.001	3.92(1.70, 9.10)	.002	**9.5(2.46, 16.2)**
No	22(14.9)	126(85.1)		1		1

7. Discussion

The average rate of OVD in three hospitals in Addis Ababa is found to be 2.1% during six months study period and the finding is significantly lower than studies conducted at TASH 8 years back and at Adama medical college 2 years back which revealed the rate of OVD was 11.9% and 14.8% respectively. This signifies that the rate of operative vaginal delivery is decreasing alarmingly and also inconsistently practiced; in some countries it is as low as 1.5 % for instance, in Nigeria & Istambule while in others it may be as high as 15% like in Europe. The commonest indication for OVD among 181 women were Fetal distress (58.6%) followed by prolonged SSOL (32.6%), the finding is consistent with other studies done at Tikur Anbesa Specialized Hospital 8 years back, JUMC and tertiary care teaching hospital in Puducherry, India. Of the total 181 OVDs, forceps and vacuum deliveries account for 0.5% and 1.6% of all the deliveries during the study period respectively with ratio of 1:5.

This study also showed that the magnitude of unfavorable maternal outcomes is found to be 27.6%. Among these 14.4% developed perineal tear, 10% developed episiotomy extension, 2.8% of women experienced traumatic postpartum hemorrhage. When compared with other studies the rate of unfavorable maternal outcome were found less than studies conducted at East Wollega Zone and East Gojjam Zone Public Hospitals at which the magnitude were 37.2% & 32.9% respectively. This could be justified by the possible skill discrepancy among the attending clinician and also difference in antenatal care follow up.

Mothers who have had FHB bellow 90 BPM were approximately four times more likely to develop unfavorable maternal outcomes when compared with those whose FHB were greater than 100BPM during operative vaginal delivery. The possible explanation may be related with the urgency of delivering the baby. When there is severe fetal bradycardia it will create a stress on the attending physician to deliver the fetus within

fraction of minutes and this may lead to inappropriate decision making regarding the choice of instrument, application of the device and suboptimal implementation of the basic principles of operative vaginal delivery that might eventually end up perineal tear, vaginal/cervical laceration and/or episiotomy extension..

OVD performed by midwifes were found 10 fold higher unfavorable maternal outcome when compared with OVD attended by residents. This would be best explained by due to major knowledge and skill difference among the two levels of health care provider.

Operative vaginal delivery complicated by neonatal birth trauma has approximately 14 times higher risk of developing unfavorable maternal outcome as compared with OVD did not cause neonatal birth trauma. This is because neonatal birth trauma is one of the features of difficult OVD, so difficult delivery could have adverse effect on both the neonate and the mother too.

The magnitude of Unfavorable neonatal outcome were 19.3%. Among this 14.4% neonates were admitted to NICU, 11.1% neonates were having low Apgar score & need resuscitation and 9.4% developed birth trauma. This rate of Unfavorable neonatal outcome were less when compared with other studies conducted at Dilla University Referral Hospital, at Arba Minch General Hospital and University of Gondar Comprehensive Specialized Hospital at which the proportion of unfavorable neonatal outcome were 42.1%, 24% & 23.1% respectively. But it was higher than a study done at Jimma University Medical Center (JUMC) which was 13.2% and it was consistent to a study done at Aksum saint marry Hospital which was 20%.

When more than three pulls attempted to deliver the neonate during OVD, the magnitude of unfavorable neonatal outcome became approximately six times higher than those neonates delivered within three pulls of attempt. This may be due to mal-position or high station that could potentially need more than three pull and /or additional time to deliver the neonate and because of long lasting pressure applied over

the fetal scalp, this relatively difficult OVD may end up with cephalhematoma, subgaleal hemorrhage or scalp laceration.

The magnitude of unfavorable neonatal outcome in those mothers having perineal tear were found 9 fold higher as compared with those neonates delivered from mothers without perineal tear. This may also be the other manifestation of difficult OVD, since it would have adverse effect on both the neonate and mother. As clearly stated above that having neonatal birth trauma is 14 times higher risk of developing unfavorable maternal outcome as compared with not having neonatal birth trauma and it is vice versa.

8 Conclusion with Feature Research Implication

The magnitude of operative vaginal delivery within 6 months of the study period at three hospitals in Addis Ababa was 2.1%.

The rate of unfavorable maternal outcome among 181 mothers who gave birth via OVD during six month study period was 27.6%. Among these 14.4% developed perineal tear, 10% developed episiotomy extension and 2.8% women experienced traumatic postpartum hemorrhage. FHB before delivery, level of profession performing the delivery & neonatal birth trauma were found to have statistically significant association with unfavorable maternal outcome related to OVD.

The proportion of Unfavorable neonatal outcome during same study period was 19.3 %. Number of pulls attempted for delivery and maternal perineal tear were found to have statistically significant association with unfavorable neonatal outcome in operative vaginal delivery.

Since this study doesn't show the long-term undesirable effect of OVD over the mother and neonate/infant, it needs further study up on it.

Limitations of the Study

The study used short term follow up in the post partum & postnatal period and this makes difficult to predict the subsequent outcome and long term sequel of both mother and neonate.

Since it is cross-section study design it will share the drawback of the study design.

Sample size is not adequate as expected and it has its own negative impact on the interpretation of some of the findings.

9 Recommendations

Thorough training of residents in simulation and on the patient throughout the training years makes them confident, skilled and comfortable when handling operative vaginal deliveries.

This can decreases the maternal fetal complications, decreases the alarmingly increasing cesarean delivery rate and this in turn prevents the ongoing demise of these valuable skill.

10 References

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