SCHOOL OF GRADUATE STUDIES

ADVERSE FETOMATERNAL OUTCOMES AND ASSOCIATED FACTORS OF WOMEN AMONG INSTRUMENTAL VAGINAL DELIVERY AT HOSPITALS FOUND IN GURAGHE ZONE, 2023/2024

MSC THESIS

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JAN, 2024

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School of Graduate Studies

Adverse Feto maternal Outcomes And Associated Factors Of Women Among Instrumental Vaginal Delivery At Hospitals Found In Guraghe Zone 2023/2024

A Thesis Submitted To school of graduate studies ,in Partial Fulfillment Of The Requirements For The Degree Of Master Of Science In Maternity And Reproductive Health Nursing

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We hereby certify that we have read and evaluated this Thesis titled **"Adverse Feto Maternal Outcomes and Associated Factors of women among Instrumental Vaginal Delivery at Guraghe Zone Hospitals, Central Ethiopia, 2024"** prepared under our guidance by Tizita Tsegaye.We recommended that the Thesis shall be submitted as fulfilling the requirement for the award of M.Sc degree in Maternity and Reproductive nursing.

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As member of the Board Examiners of Masters of Science Thesis open defence examination, we have read and evaluated this Thesis prepared by Tizita Tsegaye and examined the candidate.We hereby certify that, the thesis is accepted for fulfilling the requirement for the award of the degree of Masters of Since (M.Sc.) In Maternity and Reproductive Nursing.

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ACKNOWLEDGMENT

I would like to thank Wolkite University College of Medicine and Health Science, Department of Nursing, for giving me this opportunity.

I am grateful my dear advisors Keyredin Nurye (assistant professor) and Bisrat Zeleke (assistant professor) for their invaluable guidance and advice throughout the development of this thesis. Their provision of necessary support has helped me to build with a substantial knowledge from the inception of this thesis.

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ABBREVIATIONS AND ACRONYMS

AFMC	Adverse Feto Maternal Complication
ANC	Ante Natal Care
AOR	Adjusted Odd Ratio
B/M	Beat Per Minute
CSA	Central Statistic Agency
COR	Crud Odd Ratio
CTG	Cardio Toco Graph
CI	Confident Interval
ETB	Ethiopian Birr
FHB	Fetal Heart Beat
GA	Gestational Age
IVD	Instrumental Vaginal Delivery
ICH	Intra Cranial Hemorrhage
IEOS	Integrate Emergency Obstetric Surgeon
IRB	Institutional Review Board
IUFD	Intra Uterine Fetal Death
LBW	Low Birth Weight
NRFHRP	Non Reassuring Fetal Heart Rate Pattern
NICU	Neonatal Intensive Care Unit
MSAF	Me conium Stain Amniotic Fluid
PPH	Postpartum Hemorrhage
SVD	Spontaneous Vaginal Delivery

ABSTRACT

Background: Due to instrumental delivery, mothers and their babies in underdeveloped nations like Ethiopia experience varying degrees of morbidity and even death.Unless it is performed by trained and experienced health workers.In our country Ethiopia there are only limited studies and no multi-institutional studies was done on adverse feto maternal outcome of IVD and the results may not be representative of target populations.However this study aimed to fill the existing gap, particularly in this study area.

Objective: This study's objective was to assess adverse feto maternal outcomes and associated factors of women among instrumental vaginal delivery at hospitals found in Guraghe zone. **Methods**: A cross-sectional retrospective investigation was carried out at three hospitals in Guraghe Zone,and Systematic random sampling was employed to review 371 medical records of all women who had instrumental vaginal deliveries from January 1-March 30/2024.Incompletely filled charts were excluded during data review.a check list adapted from previous studies. The collected data was entered in to Epi data version 3.2, and exported to version 25 SPSS for analysis. Those variables with $p<0.25$ in the bi variable analyses were selected for multi variable logistic regression. Adjusted odds ratio (AOR) at 95% confidence interval (CI) with $p < 0.05$ was used to report statistically significant association during multi variable logistic regression.

Results: In this study the magnitude of adverse feto maternal outcomes following IVD was found to be 199/ 53.6%(95%CI: 48.5-59.0).forceps delivery (AOR: 3.89; 95%CI: 1.07, 14.13),fetal heartbeat <120b/m (AOR: 2.37; 95%CI: 1.05, 5.31),induced labour (AOR: 8.11; 95%CI:1.58,41.55),GIIMSAF(AOR:5.35;95%CI:1.48,19.33),episiotomy during labour(AOR:0.32;95%CI:0.56,0.64) and weight <2500gm (AOR:7.58; 95%CI: 2.04,28.18) were significantly associated with adverse feto maternal outcomes of IVD.**Conclusion and Recommendation:**My study revealed that the overall adverse feto maternal outcomes during instrumental delivery are found to be relatively higher in Guraghe zone hospitals than in studies done at other places in Ethiopia In this study episiotomy found to be strongly protective for adverse feto maternal outcomes so liberal use of episiotomy during instrumental delivery is encourage. Vacuum is encouraged and has worldwide acceptance because of technical simplicity to apply and relatively less maternal trauma.And neonates with lower birth weight in IVD are more susceptible to birth injury,cesarean section is recommended to reduces the number of stillbirths and infant deaths.

Keywords: Adverse -feto- maternal- outcome- Instrumental Delivery-Ethiopia.

1 INTRODUCTION

1.1 Background

Maternal mortality is unacceptable worldwide; in 2020, around 287,000 women lost their lives during and after pregnancy and childbirth; nearly 95% of these deaths took place in low- and middle-income nations, and the majority could have been avoided (1).
Ethiopia lost around 12,000 mothers annually as the maternal mortality rate dropped from 871 per 100,000 in 2000 to 401 per 100,000.Eighty-five percent of deaths are due to direct obstetric complications (2).Even though neonatal mortality is declining globally, it is still highest in sub-Saharan Africa, in Ethiopia, with an estimated 26.5 deaths per 1000 live births(3).

6–12% of laboring women require instrumental vaginal delivery interventions to give birth throughout the world (4).

Instrumental vaginal delivery are performed using a vacuum or forceps to deliver the fetus vaginally and to accelerate the second stage of labor in the presence of indications (5).

Prolonged second stage of labor, severe preeclampsia or eclampsia, poor labor progress due to mother exhaustion, and elective second stage labor shortening ,fetal distress or non reassuring fetal heart rate are all indications for IVD (6).

If it is properly implemented and in the right environment, instrumental vaginal delivery contribute to a lower risk of bleeding for mothers, reduce longer hospital stays and newborn admissions to the Neonatal Intensive Care Unit (NICU), less need for analgesic medication, and reduce a higher risk of cesarean section (CS) in the mother's subsequent pregnancy(7).
However, the success of this delivery can be affected by different factors like increased birth weight, second-stage duration, rotational delivery and use of vacuum versus forceps(8). And fetal station ≤0 nulliparous women, history of previous cesarean section and fetal head other than occipitoanterior position were risk factors for failed assisted vaginal delivery (9).

Due to instrumental delivery, mothers and their babies in underdeveloped nations like Ethiopia experience varying degrees of morbidity and even death(10, 11).

Unsuccessful instrumental delivery can lead to adverse feto maternal outcome.Adverse Feto maternal outcome of instrumental vaginal delivery denotes the presence of at least one of the following complications following instrumental vaginal delivery: Fetal minor Adverse outcomes of IVD include soft tissue trauma,cephalohematoma, jaundice, and transient brachial plexus injury. Major fetal Adverse outcomes of IVD include HIE, intracranial and subgaleal hemorrhage, seizures, cranial fracture and permanent brachial plexus injury, admission to the neonatal intensive care unit (NICU) and death(12).Or Postpartum Hemorrhage (PPH), genital tear, need for blood transfusion, urinary bladder injury, bowel injury, need for major surgery, fistula, infection, and death are example of maternal adverse outcomes of IVD (13, 14)

The current study assessed the adverse feto maternal outcome of instrumental vaginal deliveries and determine associated factors at Guraghe Zone Hospitals.

1.2 Statement of problem

Globally the incidence of adverse feto maternal outcome (AFMO) resulting from instrumental delivery is quite low because of increased obstetric case management skills and the availability of high-quality obstetric equipment's (6).

However Sub-Saharan Africa (SSA), where the greatest burden of this adverse feto maternal outcome happens both the woman and her infants at an increased risk (15, 16). Current Ethiopian study showed that about 45.9% mothers develop adverse feto maternal outcomes following instrumental delivery (17).

There is a markedly higher rate of mother and fetal morbidity during instrumental vaginal delivery compared to spontaneous vaginal birth (18).In the review of over 50000 vaginal deliveries at the University of Miami, the rate of (3^{rd} or 4^{th} degree) perineal lacerations were significantly higher in forceps (20%) and vacuum (10%) as compared to the spontaneous vaginal delivery(14, 19).And in comparison to spontaneous deliveries, neonates aided by vacuum delivery had a higher percentage of NICU admissions (4.2% versus 2.2%) and a higher fatality rate (12).

According to AFMO associated factors,rural residence,male sex of the neonate, zero station during instrumental application, Non Reassuring Fetal Heart Rate Pattern(NRFHRP), blood transfusion,were found to be associated with adverse maternal outcomes, <3 visits ANC follow-up, prolonged second stage of labour,Vaginal first-degree tear, and weight of the neonate >4 kg were associated with adverse neonatal outcomes(20).

Adverse feto maternal outcome does indeed not only show maternal and child morbidity and mortality but it affects economically and socially on the entire family and community as a whole(6, 14, 20).For example IVD was a risk factor for dissatisfaction with childbirth and negative birth experience develops fear of childbirth compared to a normal vaginal birth (21).
The overall magnitude of adverse feto maternal outcomes of IVD and associated factors varies significantly in studies done at different settings.(5.25%-45.9) (6, 14, 16, 17, 20, 22-27)

In our country Ethiopia there are only limited studies and no multi-institutional studies was done on adverse feto maternal outcome of IVD (6, 13, 14, 28-30). Most of those studies conducted at single health institution and the results may not be representative of target populations.However this research aimed to fill the existing gap, particularly in this study area, .

The current study assessed adverse feto maternal outcomes of women among instrumental delivery and determine associated factor at Guraghe zone hospitals.

Thus, this study aims to fill the information gap on adverse feto maternal outcomes of IVD and associated factors which need to be adequately studied as some of complications associated with these assisted vaginal deliveries can be prevented by addressing factors that have impact on outcome of IVD. The study will have particular importance to prevention of maternal and neonatal morbidity associated with instrumental delivery.

1.3 Significance of the study

This study intends to close the knowledge gap on the adverse fetal maternal outcomes of IVD and associated factors which need to be adequately studied as some of complications associated with these assisted vaginal deliveries can be prevented by addressing factors that have impact on outcome of IVD.

The finding of this study will be used as an input for health facility admin to design appropriate intervention strategies for the factors that affect maternal and neonatal well being related to instrumental vaginal delivery by addressing factors that have impact on outcome of IVD.

Ultimately benefit for women who give birth through identification of gaps to accessing quality IVD service.

Also be used as an input for any other researchers interested to conduct further research on adverse FMO and its associated factor of instrumental delivery in the area.

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1.4 Objective

1.4.1 General objective

To assess adverse feto maternal outcomes and associated factors of women among instrumental vaginal deliveries at Guraghe Zone Hospitals, Central Ethiopia, 2024.

1.4.2 Specific objective

- To determine the magnitude of adverse feto maternal outcome of women among instrumental vaginal deliveries at Guraghe zone hospitals, 2024.

- To identify factors associated with adverse Feto maternal outcome of women among instrumental vaginal delivery at Guraghe zone hospitals, 2024.

2 LITERATURE REVIEW

2.1 The Overall magnitude of Adverse Feto maternal outcome of assisted vaginal delivery

Magnitude of adverse feto maternal outcome (AFMC) because of their superior obstetric case management skills and availability of high-quality obstetric equipment, the number of documented cases of instrumental delivery in developed nations is quite low (6, 31).
Study conducted at Sweden showed magnitude of AFMO was (8.6%),Vacuum assisted delivery is associated with increased risk for neonatal intracranial hemorrhages (22) .

Another study showed in India, the magnitude of feto maternal outcome among forceps assisted delivery was (5.25%), regarding the maternal outcome, the maternal injuries were noted in 17.5% of the case, vulvovaginal hematoma 2.8% and PPH was most common complication noted in this study and regarding the fetal outcome 50.5% of the babies had NICU admission (23).

In developing country, where the greatest burden of this adverse outcomes happens both the woman and her infants at an increased risk (16, 32, 33).

Study was done in 2018, at a Nigerian hospital showed, 35.6% of underwent instrumental vaginal delivery,7.15% experienced PPH, 11.90% had a perineal tear, and 2.5% had stillbirth, according to those findings, instrumental delivery is linked to more maternal adverse outcomes than quite similar deliveries (25).

According to a recent Ethiopian study, conducted at Gamo and Gofa zones, Southern Ethiopia showed among instrumental delivery,45.9% was develop feto maternal complications(17).

Another study at Felege Hiwot Specialized Hospital, Northwest Ethiopia, study showed 12.1% of mothers experienced complications during instrumental delivery.Second-degree perineal tears (7.4%), third-degree perineal tears (1.5%), cervical tears (1.5%), and

episiotomy extension (1%) were the most common adverse outcomes following forceps-assisted delivery(14).

A study conducted at Western Oromia, Ethiopia, shows complications of instrumental vaginal delivery were 37.2%,Out of all neonates delivered by instrumental vaginal delivery, 24.5% developed complications. Neonatal complications observed in vacuum-assisted delivery were a low APGAR score (45.7%), need for resuscitation (12.4%), caput succedaneum (8.9%), and neonatal death (1.8%) (26).

Other Study conducted at public hospital East Gojjam Zone North West Ethiopia showed nearly 32.9% of women have developed adverse maternal outcomes resulting from operative vaginal delivery.Among them(10.5%) women develops PPH, and 31.3% developed perineal laceration because of procedure.Accordingly the study immediate neonatal outcomes,34.8% of neonates developed bad neonatal outcomes.The most frequently experienced bad neonatal outcome was asphyxia 39.9% followed by neonatal resuscitation(20).

2.2 Factors associated of adverse fetomaternal outcome in instrumental vaginal delivery

2.2.1 Socio demographic factors

A Study conducted in Jos University Teaching Hospital showed maternal age is highly associated with feto maternal outcome(25).

Similar study in southern Ethiopia show women aged 20–34 were over seven times more likely to develop adverse feto-maternal outcomes than women with their counterparts among instrumental delivery(17).

A cross-sectional Study conducted at public hospital East Gojjam Zone North West Ethiopia showed area of rural residency were about twelve times more likely to develop unfavorable maternal outcomes than their counterparts(20).

2.2.2 Obstetric related factors

According to a cross-sectional study at Felege Hiwot Specialized Hospital, primipara women who used an instrument to give birth were 3.5 times more likely to experience maternal complications than multipara women (14).

Another similar study conducted at Gamo zone southern Ethiopia showed primigravida women were over two times more likely to develop adevers feto-maternal outcomes when compared with multigravida women (17).

A cross-sectional study done on 2022 at East Gojjam Zone Public Hospitals, North West Ethiopia showed less antenatal care follow-up has association with adverse fetomaternal out comes(20).Various studies indicated that lack of antenatal care follow-up during pregnancy is associated with various adverse feto maternal outcomes(17).

Study conducted in 2020 at Chitwan Medical College and Teaching Hospital shows episiotomy was protective against obstetric anal sphincter injury in nulliparous women and recommended considering it(27).

Study At Felege Hiwot Specialized Hospital shows,Compared to moms without an episiotomy, those who had one had an approximate 86% lower risk of maternal complications from an instrumental birth (14).

In 2022 a cross-sectional study conducted at public hospital East Gojjam Zone North West Ethiopia show women who had station zero during instrument application were seven times more likely to develop adverse maternal outcomes. women who were blood transfused due to PPH were seven times more likely to develop adverse neonatal outcomes than non-transfused mothers.Prolonged second stage labor 5times maternal out come than normal labour , NRFHRP 5 times develop adverse fetal outcome than normal fetal heart beat. And neonatal resuscitation 2 times maternal out come than non resuscitated neonate(17). Induced labour 5times develop adverse fetal outcome than spontaneous labour. And grade III meconium stained amniotic fluid 4times develop adverse fetal outcome than clear amniotic fluid (25).

2.2.3 Fetal related factors

Health facility-based cross-sectional study conducted at western Oromia showed those mothers who gave birth to the neonate with birth weight>4000 gm are more likely to develop maternal complications when compared to those with normal birth weight (26).

Other facility-based cross-sectional study at southern Ethiopia showed infants whose birth weight was > 4000gm had an increased probability of developing feto-maternal complications than their counterparts(17).

Retrospective record review was conducted at Aga Khan Maternal and Child Care Centre, Hyderabad, Pakistan, and comprised hospital in 2017 showed from total (56.25%) were >40 weeks of gestation develop adverse feto maternal out come (16).A cross-sectional study at public hospital East Gojjam Zone North West Ethiopia showed neonatal sex also has been shown to have association with feto maternal out come, women who deliver male neonates were 2.9 times more likely to develop unfavorable maternal outcomes of operative vaginal delivery compared with women who delivered female neonates(20).

2.2.4. Types of the instrument

Regarding the type of instrument used, a retrospective record review was conducted in 2017 at Aga Khan Maternal and Child Care Centre, Hyderabad, Pakistan, and the hospital showed that maternal soft-tissue trauma is more associated with forceps deliveries as compared to vacuum extraction(16).

A study at Felege Hiwot Specialized Hospital shows in maternal complications between women delivered by forceps more adverse outcome than compared to those delivered by vacuum. Mothers who had forceps delivered were 3.4 times more likely to develop maternal complications than those who had vacuum delivery(14).

Another study conducted at Shire, North-West Tigray, Ethiopia show forceps application has two times increases risk of feto maternal complication than vacuum(6).

2.2.5 Health professional related factors

Health facility based cross-sectional study was conducted at western Oromia and retrospective cross sectional study conducted at feleghiwot hospital types of health personal was association with fetal and maternal complication(14, 26).

2.3 conceptual framework

The conceptual framework has been adapted by reviewing different literature's based on a model for adverse feto maternal outcomes,and its associated factors of instrumental delivery. (6, 14, 16, 17, 20, 24-27)

Accordingly,socio- demographic characteristics; factors determined by age of the mother and place of residence.Maternal and obstetric related characteristics determined by no of gravidity,no of parity ,week of gestation,status of episiotomy, status of liquor,status of ANC follow up,blood transfusion,time of instrument application,vaginal laceration, status of labour,types of labour. Neonatal related factors, birth weight, sex of the neonate,status of fetal heart beat, fetal station,status of neonatal resuscitation. And instrument related factors forceps, vacuum or both. And health professional related factors determined by types of qualification in health personnel; Gynecologist, IEOS ,Midwife ,General practitioner, Health officer, Nurse

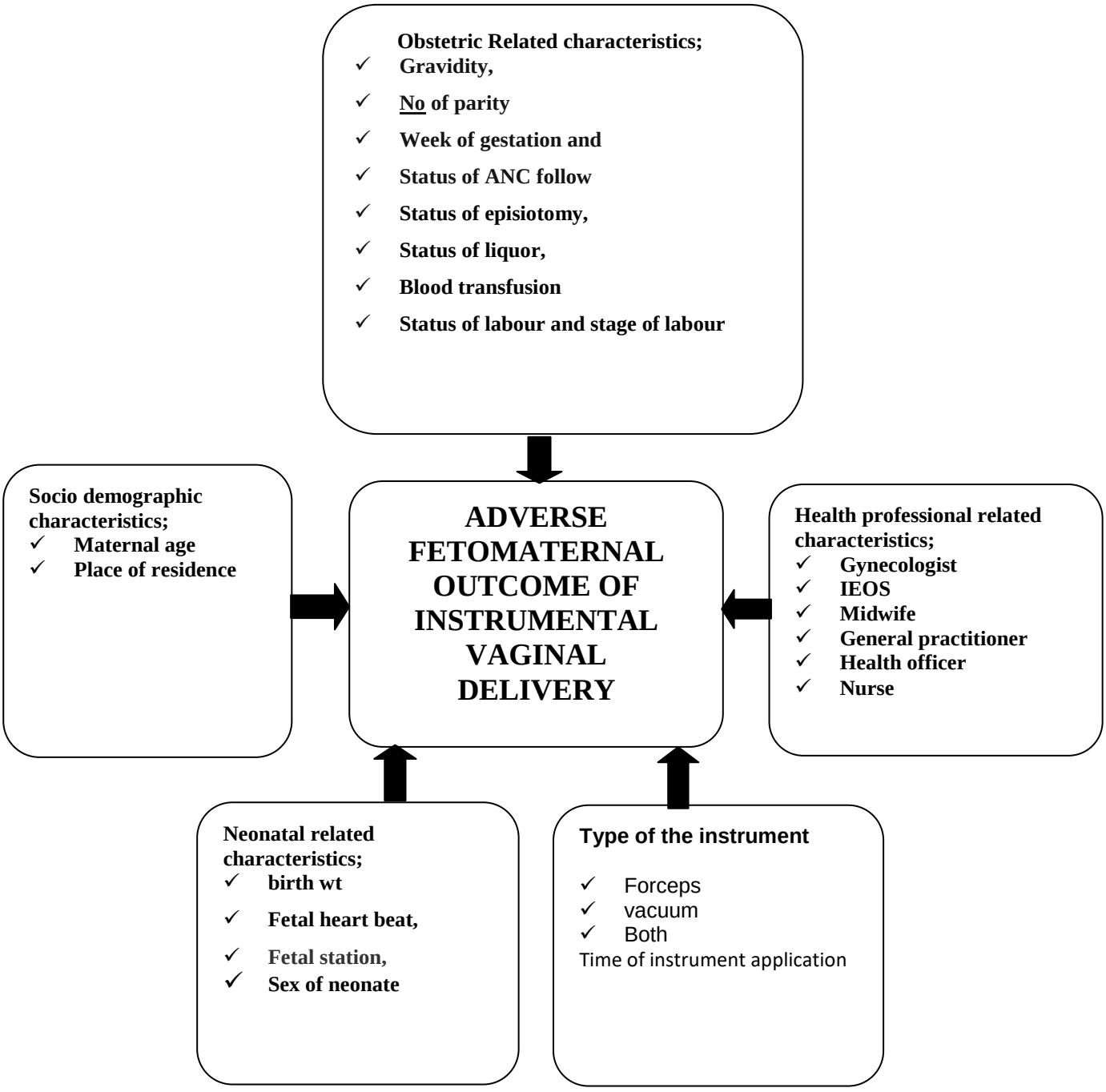

Figure 1 The conceptual framework that shows the relationship between adverse feto maternal out come and its associated factors of instrumental vaginal delivery 2023/24.

3: METHODS

3.1 Study Area and Period

The study was conducted at three hospitals found in Guraghe Zone from January 1/2024–march 30/2024 .Guraghe Zone is located at Regional State of Central Ethiopia, about 158 kilometers southwest of Addis Ababa (34). Bordering the Awash River in the north, the Gibe River, a tributary of the Omo River, to the southwest, and Hora-Dambal in the east.Recent total population was 1,283,789 of whom 654732 are women of this (19.1% are women in reproductive age group).Guraghe Zone has six hospitals.The study was conducted at Attat our lady Lourdes catholic primary hospital, Gunchre primary hospital and Wolkite university specialized hospital.

3.2 Study Design

A facility-based retrospective cross-sectional study design was conducted.

3.3 Source population

Mothers who gave birth from January 2021 to December 2023 in the selected Hospitals..

3.4 Study populations

Mothers who had an instrumental vaginal delivery from January 2021 to December 2023 in the selected Hospitals

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria;

Chart records of women who had instrumental vaginal deliveries with singleton pregnancy, >34 weeks of gestation with vertex presentation, were included from January 2021 to December 2023in the selected Hospitals were included.

3.5.2 Exclusion criteria;

Intra uterine fetal death (IUFD),multiple pregnancy, preterm (<34 wks of gestation) and breech presentation (for forceps in after coming head) .

3.6 Sample size determination

To determine sample size a single population proportion formula was used with the following assumption:

A prevalence (P) value of feto maternal complication of instrumental delivery (45.9%), from previous similar study in southern Ethiopia Gamo zone(17).Margin of error (d) of 5%,confidence interval=95% and Zα/2 = 1.96 (value of Z)at α 0.05 or 95% CI.

The sample size was calculated by using the following formula:

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

$$n = \frac{(1.96)^2 (0.459)(1-0.459)}{(0.05)^2} \qquad n = 381$$

Where:

Z=1.96 (for 95 confidence level)

p=0.459(prevalence)

d = margin of error (0.05)

n=sample size

Table 1 : Sample size determination for associated factor of adverse fetomaternal outcome among instrumental vaginal delivery at Guraghe Zone Hospitals,2024.

Variables	AOR	% of unexposed	Power	CI	Sample size	Reference
Status of liquor	0.4	67%	80%	95%	174	(26)
Type of instrument used	0.22	32	80%	95%	116	(13)
Primi gravida	3.5	15	80%	95%	130	(14)

Based on sample size determination objective 1 sample size=381 objective 2 sample size=174>130>116

After adding 10% for incomplete secondary data and lost charts the final sample size was 420.

3.7 Sampling procedure and Technique

The Study was conducted at three hospitals, Attat our lady Lourdes catholic primary hospital,Wolkite university specialized hospital and Gunchire primary hospital,selected by using simple random sampling technique. 420 charts was allocated proportionally based on instrumental vaginal delivery service given. Annual achievement of instrumental vaginal delivery in 2023 at Attat our lady Lourdes catholic primary hospital was 400 ,wolkite university specialized hospital 200,and at Gunchere primary hospital was 210.Based on the annual achievements,195 charts was revised at Attat our lady Lourdes catholic primary hospital,90 charts was revised at Gunchere primary hospital and 86 charts was revised at Wolkite university specialized hospital, by using systematic random sampling techniques.which means K =N/n, for Attat hospital 210= every 2 charts,for Gunchre hospital 105 =every 2 charts and Wolkite university specialized hospital 105=every 2 charts was revised .

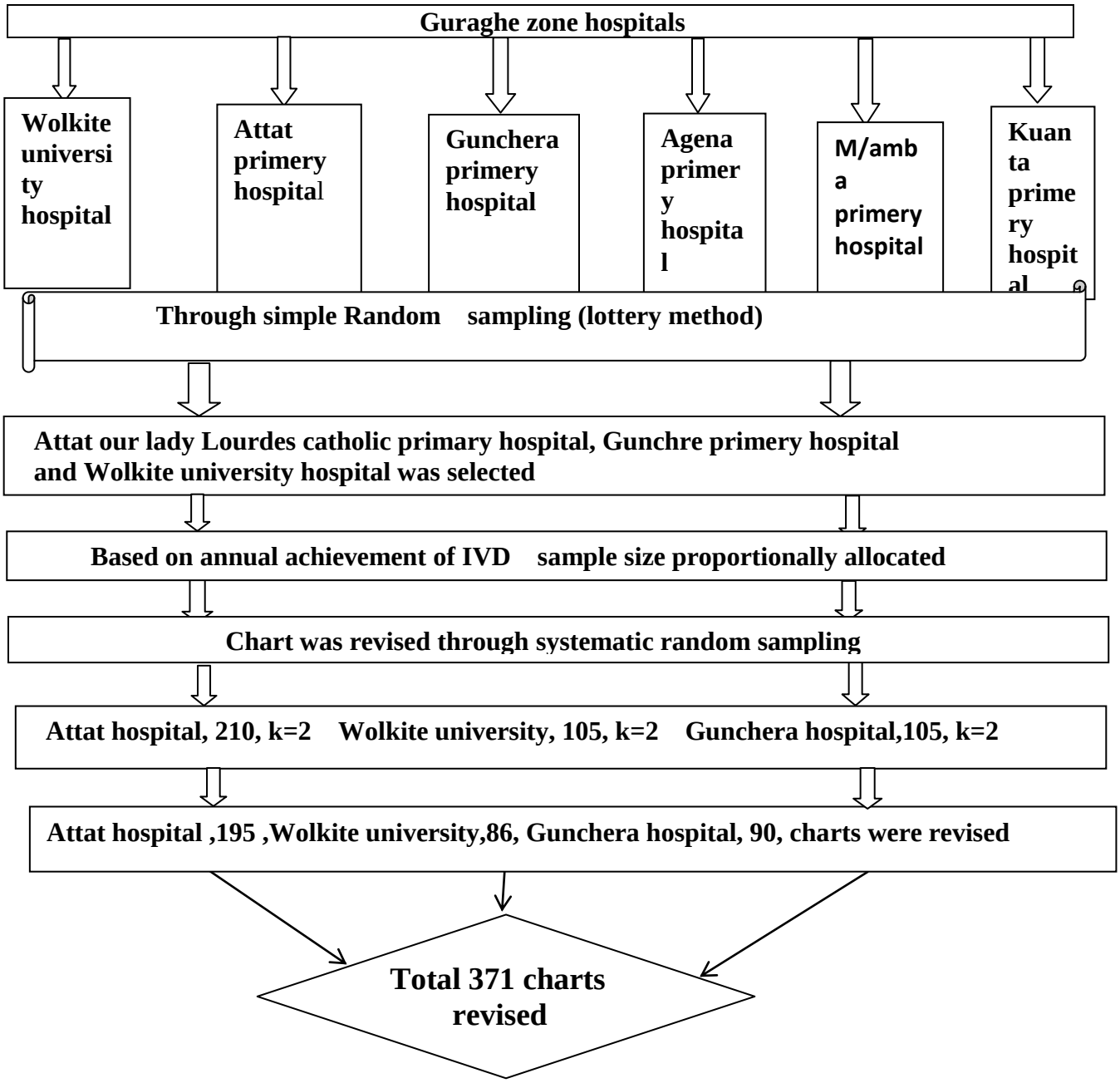

Figure 2 The diagrammatic presentation of the sampling technique was used for the determinants and adverse feto maternal outcome of instrumental delivery in the hospitals found in Guraghe Zones, Ethiopia, 2024

3.8 Study variables

Dependent variable

Adverse feto maternal outcomes of instrumental vaginal delivery

Independent variable

Socio demographic factor like Age, Residency.Maternal and obstetric related factors like gravidity, no of parity, week of gestation ,status of ANC follow up, Status of episiotomy, Status of liquor, Time of instrument application, status of labor and stage of labor.Fatal factors like, fetal heart beat, birth wt, sex of the neonate, fetal station.Health professional related factors like Gynecologist, IEOS, Midwife, General practitioner Health officer, Nurse.Types of instrumental like Forceps, vacuum , both.

3.9 Operational and Term definitions

Adverse feto maternal outcomes; Defined as having at list one maternal complications, like(PPH, maternal laceration due to the procedure, need of blood transfusion, urinary bladder injury).Or neonatal complications, like low APGAR score, the need of resuscitation, skull fracture, intracranial hemorrhage (ICH), admission to Neonatal Intensive Care Unit (NICU),scalp laceration, facial nerve palsy, subgalialhemorrhage, cephal hematoma retinal hemorrhage diagnosed by one of the health care provider(13).

APGAR score: this variable is defined as 7-10 indicates a healthy baby and 0-6 indicates distressed neonates (35).

Gravidity :refers to the total number of pregnancies a woman has had, including any current pregnancy, previous live births, stillbirths, miscarriage number of births where pregnancies reached a viable gestational age, including live births and stillbirths(36).

Parity: The number of births where pregnancies reached a viable gestational age, including live births and stillbirths(37).

Grand multipara ; as a woman who has given birth to five or more babies that weighed more than 500 grams(38).

Gestational age; as the length of a pregnancy in weeks and days from the first day of a woman's last menstrual period(39).

Episiotomy ;is a surgical enlargement of the vaginal orifice by an incision(40)

3.10 Data collection instruments and procedures

The chart was revised retrospectively by using a checklist it was prepared in English. The checklist prepared by the principal investigator by reviewing different litterateurs (6, 14, 16, 17, 20, 24-27).The checklist was contains,Socio demographic,maternal,fetal, types of instrumental and types of profession related characteristics.Incomplete charts were excluded during chart revising time. The chart was revised by three diploma midwifery, supervised by three BSc midwifery and the principal investigator supervised throughout the chart revising period.

3.11 Data quality control

To assure the quality of the data properly designed checklist was prepared.Pre-test of the checklist 19 (5%) of sample size was done at "Butajira general hospital''.

One day Training was provided to chart reviewers and supervisors, concerning how to chart review. The supervisors closely followed the chart revising process throughout the chart revising period, the revised charts were checked for completeness, accuracy, clarity and consistency.

3.12 Data processing and analysis

The collected data was entered using Epi-data version 3.2 and exported to SPSS version 25 for analysis. Frequency median with inter-quartile range were used to describe variables depending on the distribution of the variables. Binary logistic regression model was used for determining the association between dependent and independent variables. First bi variate analysis made between each independent variable with dependent variable and then variables with P value < 0.25 were entered in multivariate logistic regression analysis. In the final model variables with P value < 0.05,Odds ratio with 95% confidence interval non

inclusive of one was used to examine the associations of between independent variables with dependent variable. were considered as statistically significant. Goodness of fit of the final model was checked using Hosmer Lemeshow test of goodness of fit considering good fit at P-value(> 0.05). Finally, the results of the study presented in texts, graphs and tables.

3.13 Ethical clearance

Ethical clearance was obtained from the institutional review board (IRB) of Wolkite University, college of medicine and health science. Letter of permission to conduct the study was obtained from Guraghe zone health office and was given to the respective study hospitals. Permission was obtained from, Attat our lady Lourdes catholic primary hospital, Wolkite university specialized hospital and Gunchire primary hospital.

3.14 Dissemination of results

The result of this study will be submitted and presented in open defense to Wolkite University College of Medicine and Health Science Department of Nursing.

The finding of the current study will also be communicated to all facilities found under the study, furthermore possible effort will also be made for publication.

4: RESULT

Of the 420 mothers managed with instrumental vaginal delivery, 371 of the mothers charts were completely documented; 49 mothers were excluded because of incomplete charts and lost cards, 34 and 15 cards, respectively.

4.1 Socio demographic characteristics

In this study the median age of women with inter quartile range was 25(23-33) years in the vacuum and forceps group. and 67.4% mothers were from rural areas, and 32.6% are from urban areas.(Table 2)

Table 2: Socio demographic characteristics of the study on adverse fetomaternal outcomes and its associated factors among instrumental vaginal delivery at Guraghe Zone Hospitals, 2024, central Ethiopia.

		Frequency	Percent
mother age	**15-25**	**209**	**56.3%**
	26-35	**155**	**41.8%**
	36-45	**7**	**1.9%**
	Total	**371**	**100%**
residence	**urban**	**121**	**32.6%**
	rural	**250**	**67.4%**
	Total	**371**	**100%**

4.2 Obstetric characteristics

In this study, 91.9% of vacuum deliveries and 8.1% of forceps deliveries were carried out. This study also showed that the use of instruments was more frequent in infants with 2500-4000 birth weight, 80.3% of fetal are term gestational age and 63.3% women's were assisted by IESO .(Table 3)

Table 3: Obstetric and related characteristics of the study on adverse feto maternal outcome and its associated factors among instrumental vaginal deliveries at Guraghe Zone Hospitals, 2024, central Ethiopia.

		Frequency	Percent
No of parity	Prim para	172	46.4
	Multi para	184	49.6
	Grand para	15	4
Gestational age	preterm	54	14.6
	Term	298	80.3
	Post term	19	5.1
ANC follow up	Yes	363	97.8
	No	8	2.2
No of ANC contact	No	7	1.9
	1-4 ANC contact	137	36.9
	>4ANC contact	227	61.2
Who assisted the delivery	Gynecologist	36	9.7
	IESO	235	63.3
	Midwifery	42	11.3
	General Practitioner	2	.5
	Resident student(R2)	56	15.1

Times of instrument application	On arrival	129	34.8
	Followed	242	65.2
Fetal heart beat	<120B/min	94	25.3
	120-160B/min	271	73.0
	>160B/min	6	1.6
Types of instrument used	Forceps	30	8.1
	Vacuum	341	91.9
Types of labour	Spontaneous	303	81.7
	Augmented	46	12.4
	Induced	22	5.9
Status of liquid	Clear	286	77.1
	Bloody	3	.8
	Grade I MSAF	16	4.3
	Grade II MSAF	49	13.2
	Grade III MSAF	17	4.6
Fetal station	Mid station	142	38.3
	Low station	82	22.1
	Outlet	147	39.6
Episiotomy done	Yes	299	80.6
	No	72	19.4
Sex of the neonate	Male	215	58.0
	Female	156	42.0
Weight of neonate	<2500	24	6.5
	2500-4000gm	184	49.6
	>4000gm	163	43.9

This study also showed that the commonest indication for IVD was prolonged second stage of labor 52.8%, followed by fetal distress 27.5%.(table 4).

Table 4 Show Indications for application of Instrumental vaginal at Guraghe Zone Hospitals, 2024, central Ethiopia

Indication of use of Instrumental vaginal delivery		Types of instrument used		Total
		forceps	vacuum	
1	Prolonged 2^{Nd} Stage	7(23.3%)	189(55.42)	196(78.72)
2	Fetal distress	14(46.6%)	88(25.8)	102(72.4)
3	Maternal exhaustion	9(30%)	52(15.25)	61(45.25)
4	Others	0	12(3.5)	12(3.5)
Total		30	341	371

4.3: Prevalence of adverse Feto maternal outcomes of instrumental vaginal delivery at Guraghe Zone Hospitals, 2024, central Ethiopia

In this study more than half of instrumental vaginal delivery 53.6% (95%CI: 48.5-59.0) was reported to have adverse feto maternal outcomes. Among these 123(33.2%), 42(11.3%) and 34(9.2%) the complications were fetal, both and maternal complications respectively(Figure 3).

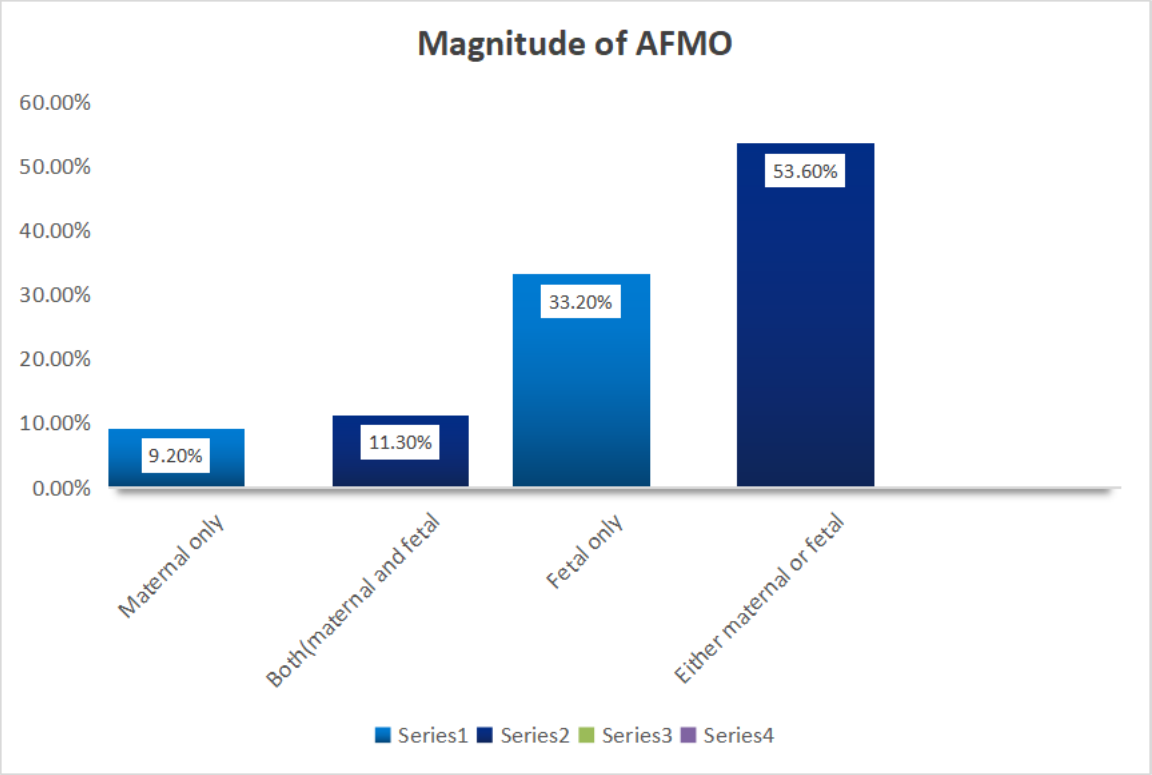

Figure 3: Magnitude of adverse feto maternal outcomes of the woman among instrumental vaginal delivery at Guraghe Zone Hospitals,2024 Central Ethiopia.

Regarding the type of instrument applied during delivery time forceps delivery accounts about 73.3% of adverse feto-maternal outcomes followed by vacuum delivery 26.7%.

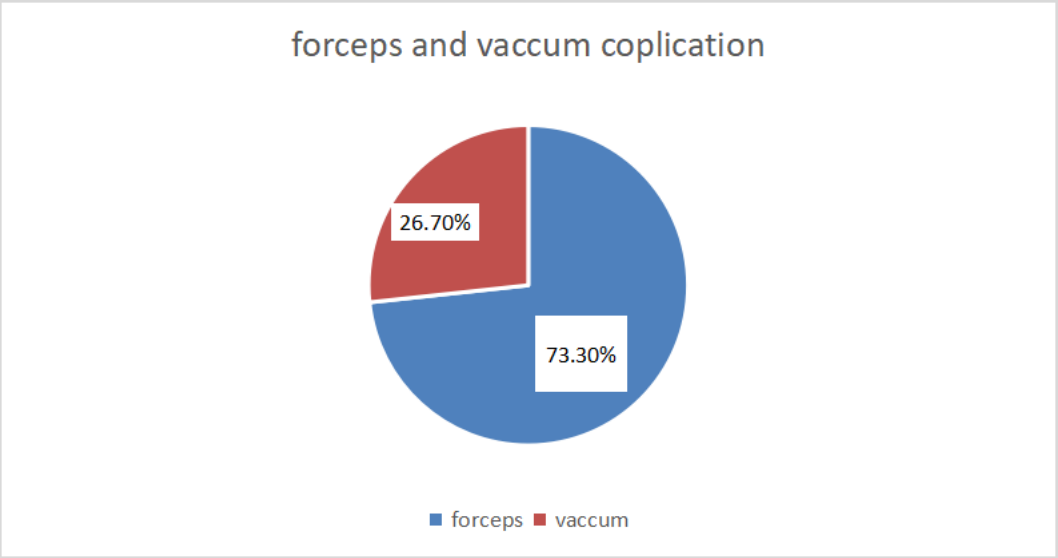

Figure 4: A figure showing vacuum and forceps delivery adverse fetomaternal outcomes of the woman at Guraghe Zone Hospitals, 2024 central Ethiopia.

NICU admissions were more (53.3%) with forceps as compared to Vacuum (28.7%). Maternal laceration due to the procedure more common with forceps than vacuum (table 5)

Table 5: Feto maternal adverse outcomes related to types of instrument used at Guraghe Zone Hospitals, 2024, central Ethiopia

Fetal complication	Types of instrument used		Total
	forceps	vacuum	
NICU admission	16(53.3%)	98(28.7%)	114(30.7%)
Low APGAR score	11(36.7%)	93(27.3%)	104(28.0%)
Need resuscitation	14(46.7%)	69(20.2%)	83(22.4%)
Neonatal trauma due to the procedure	6(6.7%)	43(13.8%)	49(13.2%)
Maternal complication	Types of instrument used		Total
	forceps	vacuum	
Maternal laceration due to the			

procedure	11(36.7%)	60(17.6%)	71(19.1%)
Postpartum hemorrhage	1(3.3%)	14(4,1%)	15(4.0%)
Blood transfusion	0(0.0%)	1(0.3%)	1(0.3%)
Fecal or urinary incontinence due to the producer	0(0.0%)	1(0,3%)	1(0.3)

4.4: Factors associated with adverse feto maternal outcomes of IVD

Factors associated with adverse feto maternal outcomes were identified by binary logistic regression analysis.In bi variable binary logistic regression; types of instrument used, residence, Gestational age ,status of ANC contact, number of antenatal care, who assist the delivery, FHB, liquid status, fetal station, types of labor, indication use instrument, episiotomy done, and weight of the neonate were found to be eligible for multi variable binary logistic regression. Finally, fetal heart beat, types of labor, liquid status, types of instrument used, episiotomy done and neonatal weight were found to be associated with adverse feto maternal outcomes of IVD (P-value<0.05) were identified associated factors with the adverse feto maternal outcomes.

Mothers who had forceps-assisted delivery were 4 times more like to have adverse outcomes than mothers who had vacuum assisted delivery (AOR=3.892, 95% CI 1.072-14.128). Mothers who had episiotomy were less likely risky for maternal adverse outcomes of instrumental delivery than those who had no episiotomy done (AOR= 0.315,95%CI 0.156-0.638). Neonates with <120 heartbeats per minute two times more likely to develop adverse feto maternal outcomes when compared with those 120 -160 beats per minute (AOR=2.365, 95% CI 1.054-5.306).Mothers with grade two MSAF had five times more likely to develop adverse feto maternal outcome (AOR=5.351 95%CI 1.482-19.325) than those with clear amniotic fluid. Induced labor had eight times more likely to develop adverse feto maternal outcomes when compared with those spontaneous labour (AOR:8.107,95% CI 1.582-41.553). In this study a neonate with birth weight <2500gm delivered by instrumental delivery was 7 times more likely develop adverse fetomaternal outcomes (AOR: 7.575, 95% CI 2.036-28.181) compare to 2500-4000gm.

Table 6: Bi variant and multivariate logistic regression analyses of factors associated with adverse feto maternal outcomes of IVD in Guraghe Zone Hospitals, Central Ethiopia 2024

Variables	Adverse feto maternal outcomes		COR (95% CI)	AOR (95% CI)	P value
	Yes	No			
Residence					
Rural	71(58.7%)	50(41.3%)	1.353(0.873-2.099)	1.393(0.794-2.445)	0.248
Urban	128(51.2%)	122(48.8%)	I	I	
Gestational age					
33-36 wk	23(42.6%)	31(57.4%)	0.574(0.320-1.032)	0.664(0.248-1.776)	0.415
>42 wk	8(42.1%)	11(57.9%)	0.563(0.22-1.439)	0.492(0.157-1.540)	0.223
37-42 wk	168(56.4%)	130(43.6%)	I	I	
ANC contact					
Yes	198(54.5%)	165(45.5%)	8.400(1.023-68.971)	455377331.918(0.00-)	0.999
No	1(12.5%)	7(87.5%0	I	I	
Number of ANC contact					
No ANC Contact	2(28.6%)	5(71.4%)	0.321(0.061-1.687)	246949817.779(0.000	0.999
1-4 ANC Contact	71(51.8%)	66(48.2%)	0.862(0.564-1.319)	0.964(0.510-1.821)	0.910
>4 ANC Contact	126(55.5%)	101(44.5%)	I	I	
Who assisted the delivery					
Gynecologist	24(66.7%)	12(33.3%)	2.196(1.049-4.598)	0.391(0.107-1.433)	0.156
Midwifery	25(59.5%)	17(40.5%)	1.615(0.829-3.147)	1.517(0.633-3.636)	0.350
GP	2(100%)	0(0.0%)	1774137574.205(0.000	1690177810.492(0.000)	0.999
Others	36(64.3%)	20(35.7%)	1.977(1.081-3.615)	1.705(0.742-3.920)	0.209
IESO	112(47.7%)	123(52.3%)	I	I	

Fetal heart beat				
<120b/min	**73(77.7%) 21(22.3%)**	**4.374(2.546-2.546)**	**2.365(1.054-5.306)**	**0.037***
>160b/min	**6(100%) 0(0.0%)**	**2032805871.700(000)**	**689016993.606(0.000)**	**0.999**
120-160b/min	**120(44.3%) 151(55.7%)**	**I**	**I**	
Types of labour				
Augmented	**17(37%) 29(63%)**	**0.510(0.269-0.967)**	**0.586(0.232-1.4800**	**0.258**
Induced	**20(90.9%) 2(9.1%)**	**8.704(1.999-37.8910**	**8.107(1.582-41.553)**	**0.012***
Spontaneous	**162(53.3) 141(46.7%)**	**I**	**I**	
Liquid status				
Bloody	**0(0.0%) 3(100%)**	**0.000(0.0000**	**0.000(0.000**	**0.999**
Grade I MSAF	**11(68.8%) 5(31.3%)**	**2.716(0.920-8.017)**	**3.275(0.838-12.803)**	**0.088**
Grade II MSAF	**44(89.8%) 5(10.2%)**	**10.863(4.185-28.197**	**5.351(1.482-19.325)**	**0.010***
Grade III MSAF	**16(94.1%) 1(5.9%)**	**19.750(2.584-150.933)**	**6.864(0.543-86.729)**	**0.137**
Clare	**128(44.8%) 158(55.2)**	**I**	**I**	
Indication of use of instrument				
Prolonged labour	**89(45.4%) 107(54.6%)**	**2.495(0.656-9.497)**	**1.057(0.228-4.908)**	**0.944**
Fetal distress	**80(78.4%) 22(21.6%)**	**10.909(2.719-43.764)**	**1.282(0.240-6.858)**	**0.771**
Maternal exhaustion	**27(44.3%) 34(55.7%)**	**2.382(0.587-9.760)**	**0.861(0.184-4.028)**	**0.849**
Other	**3(25%) 9(75%)**	**I**	**I**	
Fetal station				
Mid station	**67(47.2%) 75(52.8%)**	**0.582(0.365-0.929)**	**0.869(0.390-1.936)**	**0.731**
Low station	**43(52.4%) 39(47.6%)**	**0.719(0.417-1.239)**	**0.839(0.386-1.823)**	**0.657**
Outlet	**89(60.5%) 58(30.5%)**	**I**	**I**	

Types of instrument used					
Forceps	**22(73.8%)**	**8(26.2%)**	**2.548(1.104-5.8820**	**3.892(1.072-14.128)**	**0.039***
Vacuum	**177(51.9%)**	**164(48.1%)**	**I**	**I**	
Episiotomy done?					
No	**47(65.3%)**	**25(34.7%)**	**1.818(1.064-3.106)**	**0.315(0.156-0.638)**	**0.001***
Yes	**152(50.8%)**	**147(49.2%)**	**I**	**I**	
Neonatal weight					
<2500gm	**17(70.8%)**	**7(29.2%)**	**2.482(0.983-6.268)**	**7.575(2.036-28.181)**	**0.003***
>4000gm	**91(55.8%)**	**72(44.2%)**	**1.292(0.846-1.972)**	**1.253(0.713-2.202)**	**0.433**
2500-4000gm	**91(49.5%)**	**93(50.5%)**	**I**	**I**	

***=statistically significant,I=Reference category**

5: DISCUSSION

This study was conducted at Hospitals of Guraghe Zone to assess adverse feto maternal outcomes of IVD and associated factors among mothers who gave birth by IVD in 2024.

The overall magnitude of adverse feto maternal outcomes found in this study was 53.6 %(95%CI: 48.5-59.0).

The magnitude found in this study were high compared with some other studies conducted at southern Ethiopia 45.9%. At Tigray 45.4%, Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital 19%. Jima university 17.3%. At Felgehiwot specialized hospital 12.1% (13, 14, 17, 41, 42).The possible explanation for the difference could be due to the presence of differences in sample size and hospital set-up differences.

This results quietly high compare to developed country; study conducted in tertiary teaching hospital, In India showed 5.25%. In United Kingdom 9.5%.And at Sweden 8.6% (43-45).The possible explanation for difference could be in developed country the incidence of fetal-maternal complications (FMC) resulting from instrumental delivery is quite low because of increased obstetric case management skills and the availability of high-quality obstetric equipment(6).

Mothers who had forceps-assisted delivery were 4 times more likely to have adverse feto maternal outcomes than mothers who had vacuum assisted (AOR=3.892, 95% CI 1.072-14.128).This finding is supported by previous similar studies done in western Oromia,At North-West Tigray,At Felege Hiwot Specialized Hospital, Northwest Ethiopia, At Jos University Teaching Hospital (26, 30, 41, 46).The possible reason for this might be that maternal morbidity was higher in forceps delivery compared to vacuum extraction(6, 14, 16, 19, 25, 26, 47). This is evidenced by vacuum extraction was associated with less pain at delivery and less likely to cause serious injury on the mother (48, 49). however forceps assisted delivery appears, vaginal tear, tear of the muscle or wall of the rectum, difficulty of urination, pelvic organ prolapse, temporal facial nerve palsy skull fracture,bleeding with in the skull (50).

In the current study mothers who had episiotomy were less likely to develop adverse feto maternal outcome of instrumental delivery by (AOR= 0.315,95%CI 0.156-0.638) than those who had no episiotomy. This study supported by different similar studies, done at Felege

hiowt hospital north west Ethiopia, At Chitwan Medical College and Teaching Hospital (27, 30).The possible reasons is that medio lateral episiotomy protected significantly for anal sphincter damage in both vacuum extraction and forceps delivery(51, 52).

In this study neonates with FHB <120 beats per minute were two times more likely to develop adverse feto maternal outcomes when compared with those 120 -160 beats per minute (AOR=2.365, 95% CI 1.054-5.306).This finding is supported by study conducted at Western Oromia (53).The possible explanation for this might be because Instrumental deliveries may affect different locations of cranial hemorrhage; subdural, subarachnoid, intra parenchyma or intra-ventricular due to exerting pressure of a vacuum and forceps extractors can cause brain bleeds on the cranium contributing to intracranial hemorrhage resulting birth asphyxia(54).

Grade two meconium stained amniotic fluid had shown association with adverse feto maternal outcome, mothers with grade two MSAF had five times more likely to develop adverse feto maternal outcome (AOR=5.351 95%CI 1.482-19.325) than those with clear amniotic fluid.This finding was supported by study done at Jima university medical collage(55). The possible reasons might be study revealed that moderate to thick meconium stained amniotic fluid was associated with increased risk of instrumental delivery (56)

In current study induced labor had eight times more likely to develop adverse feto maternal outcomes when compared with those spontaneous labour (AOR:8.107,95% CI 1.582-41.553).This finding was supported by study done at Jos University Teaching Hospital(25).The possible Reasons might be induction of labor increase chance of IVD and NICU admission (57).

This study also pointed out that a neonate with birth weight <2500gm delivered by instrumental delivery was 7 times increase for adverse feto maternal outcomes compared with 2500-4000gm (AOR: 7.575, 95% CI 2.036-28.181).This results was supported by study done at Dilla university referral hospital (28).This might be due to the fact that neonates with lower birth weight are more susceptible to birth injury.Pregnancy outcomes are directly impacted by the methods used to birth LBW babies (58).A cesarean section is not necessarily an appropriate treatment;it is only a method of delivery.Although it reduces the number of stillbirths and infant deaths, problems cannot be totally avoided (59).

6: CONCLUSION AND RECOMMENDATION

5.1 conclusion

My study revealed that the overall AFMO during instrumental delivery are found to be relatively higher in Guraghe zone hospitals than in studies done at other places in Ethiopia.
In this study when compared between the methods forceps delivery has more feto maternal adverse out comes.Fetal heart beat<120 b/m,grade II meconium stained amniotic fluid,induced labour,neonate birth weight <2500gm,mother who didn't have episiotomy and forceps delivery were associated factors for adverse feto maternal outcomes of IVD.

5.2 Recommendation

In this study episiotomy found to be strongly protective for AFMO during instrumental delivery so liberal use of episiotomy during instrumental delivery is encouraged and vacuum has worldwide acceptance because of technical simplicity to apply and relatively less maternal trauma, so using vacuum for instrumental delivery should be encouraged.And neonates with lower birth weight in IVD are more susceptible to birth injury,cesarean section is recommended to reduces the number of stillbirths and infant deaths.Finally further research is needed to predict long-term complications of operative vaginal delivery for the mother as well as the newborn.

5.3 Limitations

This study has some limitations. Firstly, the study used data from secondary sources and some information was incomplete, due to either the absence or poor habits of keeping the clinical records of the woman.
Secondly it was a retrospective study; important variables like Socio demographic status, body mass index of the mother were not addressed in this study
Despite this, the study tried its best to show the key determinants of adverse feto maternal outcomes of instrumental vaginal delivery in the study area.

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8:APPENDICES

8.1 appendix 1

Information Sheet and Consent Form

Title of study'' adverse feto maternal outcome and associated factors of instrumental women among vaginal delivery" at Guraghe Zone hospital,2024.

Name of principal investigator sr Tizita Tsegaye,
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Purpose of study ;to determine magnitude of adverse feto maternal outcome and associated factors of instrumental vaginal delivery at Gurage Zone Hospitals

Benefits of the study; it will provide important suggestions based on the established protocols, which will ultimately result in better patient care and outcome.

It also used as an input data as there is no previous similar study done at this study area.

chart reviser name and signature ----------

8.2 appendix 2

Part I socio- demographic characteristic		
S.N	Question	Response
101.	Age	……..years
102.	Residence	1. Urban 2. Rural
Part II: Obstetric Related Characteristics		
103.	How many times she got pregnant?	_____(number)
104.	How many of her pregnancy was viable (beyond 28 weeks of gestation)?	_____(number)
105.	What is the gestational age of pregnancy?	_____(weeks)
106.	Did she have antenatal care follow-up?	1. yes 2.no
107.	How many antenatal care contact did she have during the her pregnancy?	----------(number)
108.	Who assisted the delivery?	1.Gynecologist 2.IEOS 3.Midwife 4.General practitioner 5.Health officer 6.Nurse 7.Other
Part V-Intra Partum Period		
109.	Duration of second stage labor for primiparous	----------min (hrs.')
201.	Duration of the second stage for multiparous	---------min(hrs)

202.	Fetal heart beat	<120b/min 120-160 >160
203.	Types of labour	Spontaneous Augmented Induced
204.	Status of liquor ?	1.clear ,2.bloody, 3 Gread I MSAF,4.Gread II MSAF,5 GIII MSAF
205.	Times of application	1.On arrival 2. Followed
206.	Indication of use of instrument	1.Prolonged 2.Fetal distress 3.Maternal exhaustion 4.Maternal medication 5.Other
207.	Station at the time of instrument application	--------
208.	Type of instrument used?	1. Forceps 2. Vacuum 3. Both
209.	Type of instrument application?	1.Outlet (Scalp Visible at introits without separating labia) 2.Low(station+2,+3) 3.Mid(station 0,+1)
Part VI- postpartum period- Maternal and neonatal condition		
301.	Was episiotomy done?	1.Yes 2.No

302.	Any laceration due to the procedure. What type of laceration/tear to the mother? (more than one answer is possible)	1.No 2. Cervical tear 3. Vaginal tear------degree 4. Perineal tear. A. First degree B. Second degree C. third degree D. Fourth degree
303.	Does she have fecal or urinary incontinence after the procedure?	1. Yes 2.No
304.	Postpartum hemorrhage due to the procedure?	1. Yes 2.No
305.	Does she require a blood transfusion due to postpartum hemorrhage?	1. Yes 2.NO
306.	APGAR score of the neonate in the 1st and 5th minute?	----- &-----respectively
307.	Sex of the neonate	1. Male 2. Female
308.	Weight of neonate	--------gm.
309.	Does the neonate need resuscitation?	1. Yes 2.No
401.	Does the neonate refer to neonatal ICU?	1. Yes 2.No
402.	If question number 401 is yes, what was the indication for the referral?	----------

403.	Is there any procedural trauma to the neonate? (more than one answer is possible)	1.NO 2. Scalp laceration 3. skull fracture 4. Facial nerve palsy 5. subgaleal hemorrhage 6. cephalhematoma 7. Retinal hemorrhage 8. Others---------