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Adverse Neonatal outcomes of Induced and Spontaneous Labor Andassociated Factors Among Womenwho Gave Birth at Public Hospitals of Awi Zone, Northwest Ethiopia, 2022

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Declaration

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I, the undersigned, MSC student declare that this thesis is my original work in partial fulfillment of the requirement for the Master's degree in clinical midwifery.

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Abbreviations and Acronyms

ANC	Antenatal Care
APGAR	Appearance, Pulse Rate, Grimace, Activity & Respiratory Rate
CS	Cesarean Section
IOL	Induction of Labor
IUFD	Intrauterine Fetal Death
MUAC	Mid Upper Arm circumference
NICU	Neonatal Intensive Care Unit
NRFHRP	Non-Reassuring Fetal Heart Rate Pattern
RDS	Respiratory Distress Syndrome
SDG	Sustainable Developmental Goal
US	United States
WHO	World Health Organization

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Abstract

Background: Even though a reduction in neonatal mortality is needed to achieve Sustainable Development Goals 2030, but neonatal mortality is still high in Ethiopia. Induction of labor is still an independent factor for different adverse neonatal outcomes. Researches figure out that induction of labor was a significant factor for neonatal morbidity and mortality, but studiesthat addressed or estimated those adverse neonatal outcomes are limited and specifically, little study was done in the study area.So, this study provides healthcare providers with up-todate and evidence-based recommendations in the intrapartum care.

Objectives: To compareadverse neonatal outcomes of induced and spontaneous labor and its associated factors among women who gave birthat public hospitals of Awi zone,Ethiopia 2022

Methods: A comparative cross-sectional study was conducted at Awi zone public hospitals from May 1 to June 30/2022. A systematic random sampling was employed to select 788 (260 induced and 528spontaneous) women. The collected data were analyzed using SPSS software version 26. A binary logistic regression wasused to assess the level of association and a*P*-value <0.05 was used to declare the statistical significance at 95% confidence interval.

Result: The adverse neonatal outcomes among induced women andwomen who gave birth through the spontaneous onset of labor was (41.1%) and (10.3%) respectively. The odds of adverse neonatal outcomes in inducedlabor were1.89 times higher compared to spontaneous labor (AOR=1.89, 95% CI: 1.108, 3.222 with p-value=0.019).No education (AOR=2.001, 95% CI: 1.564, 6.444), chronic disease (AOR =3.988, 95% CI: 1.866, 8.524), male involvement (AOR=2.228, 95% CI: 1.225, 4.055), preterm gestation (AOR=25.836, 95% CI: 8.74, 76.374), operative delivery [instrumental (AOR=8.58, 95% CI: 4.629, 15.901), CS (AOR=4.167, 95% CI: 1.939, 8.952)] and labor complication (AOR= 5.156 , 95% CI: 2.895, 9.181) were significantly associated factors with adverse neonatal outcomes.

Conclusion and recommendation: Adverse neonatal outcomes in the study area were higher. Composite adverse neonatal outcomes were significantly higher in inducedlaborcompared to spontaneous labor. Community engaged education, promotion of preconception risk factors, and early detection and management of complications of labor are recommended.

Key words: **Adverse neonatal outcomes, induced labor, spontaneous labor, Ethiopia**

1. Introduction

1.1 Background

Childbirth by its nature carries potential risks for the women and her baby regardless of the route of delivery(1).Induction of labor is initiation of uterine contraction artificially to accomplish delivery prior to the onset of spontaneous labor for the purpose of delivering the fetus vaginally after the age of fetal viability(1–3). Induction of labour is not risk-free and many women find it to be uncomfortable.It should be performed with caution since the procedure carries the maternal and neonatal risk of complication(3).The procedure can be done using different methods of induction(surgical, medical and mixed methods(4). Each method of induction of laboris associated with complications of neonate and mother(5).Despite it is a controversial obstetric procedure, induction of labor necessarily reduces some risks of an ongoing pregnancy like intrauterine fetal death (IUFD) of unknown cause if done in elective manner(6). In meanwhile woman who undergone expectant management may go into spontaneous labor or may require indicated induction of labor at a future gestation(7).

According to estimates by Maternal and Child Epidemiology Estimation group, adverse neonatal outcomes like neonate deaths were predominantly associated with preterm birth and intrapartum-related complications and infections,24% of deaths were associated with intrapartum related events, such as birth asphyxia(8).In most developed countries, complications of pregnancy are lower; in turn outcomes of the gestation are also favorable for both mother and infant, while adverse outcomes are far more frequent in the developing world(9).

Induction of labour is associated with perinatal deaths,neonatal intensive care unit (NICU) admissions and low Apgar scorescompared to expectant management, the adverse neonatal outcomes are far more frequent in induced labor(10).The perinatal mortality rate encompasses both stillbirths(fetal death in the intrapartum period) and early neonatal deaths(11).The rate of stillbirth is associated with the incidence of induction of labor at term compared to spontaneous labor(12).Adverse birth outcomes (still birth, preterm birth, intrauterine fetal death, and low birth weight, low Apgar score and NICU admission) are major public health problems of both induced and spontaneous labor in Ethiopia(13).The adverse outcomes of induced and spontaneous labor were significantly associated with different factors(13–17).

1.2 Statement of problems

World Health Organization (WHO) global survey on maternal and perinatal health, which included 373 health care facilities in 24 countries and nearly 300000 deliveries, showed that 9.6% of the deliveries involved labour induction(3).The rate of labor induction has increased significantly since the early 1990 and the occurrence of adverse neonatal were consistently increased with induction procedure(18). Induction of labor is certainly one of the most frequently performed obstetric procedures and its incidence is steadily increasing with adverse pregnancy outcomes, in industries countries approximately one out of four pregnant women has their labor induced(19).The safety of induction of labor compared to spontaneous labor for both mother and infants could not be confirmed, the determinant factors of the birth outcomes are not clearly evidenced(6).The composite adverse outcomes following induction were consistent to the rate of the procedure and complications of neonate were still high, evidence on factors that significantly determined the neonatal outcomes following induction and spontaneous labor is required to improve the neonatal complication and increase the chance of newborn survival following labor,so this cross sectional comparative study will improve existing gaps.

The optimal timing and cautionforconduction of induction to women warrants further investigation regarding to the adverse outcomes of newborn, as does further identification of risk profiles of women and their values and preferences is required.It is associated with fewer (all-cause) perinatal deaths including intrapartum fetal death and early neonatal deaths(10). In developed countries, up to 25% of all deliveries at term now involve induction of labour due to this the adverse birth occurred increasingly(3).

The birth outcomes of pregnancy implicated the general situation in the intrapartum and measures healthat birth, the birth outcomes were improved dramatically worldwide in the past 40 years. Yet there is still a large gap between the outcomes in developing and developed countries(20).More than a quarter of birth outcomes were unfavorable in developing countries(21).The adverse birth outcomes are a major public health problem and far more frequent following induction of labor(13,22) and adverse neonatal outcomes are the major causes of neonatal morbidity and mortality(23).The adverse birth outcomes was found to be significant in Ethiopia(24,25), although substantial progress has been made in reducing neonatal mortality since 1990, increased efforts to improve progress are still needed to achieve the SDG target by

2030(26).Although neonatal death is a global burden, but it is the highest in sub-Saharan African countries including Ethiopia(27).The first week of life accounted for about 3/4 of deaths with majority of deaths attributable to birth asphyxia as result of intrapartum complications(28).Accelerated improvements are most needed in the regions and countries with high NMR (neonatal mortality rate), particularly in sub-Saharan Africa(26).

Induced deliveries showed an increased risk of delivering an infant with APGAR of <7 at 5^{th} minute, respiratory distress syndrome (RDS) and neonatal intensive care unit (NICU) admission, and increased risk of uterine rupture following induction of labor(29).The existing evidence were mainly descriptiveand didn`t quantify the associated factors, so evidence that quantify the adverse birth outcomes and identifies associated factors in induced and spontaneous labor using the available data is needed.

Non-reassuring fetal heart rate pattern was significantly higher in induced women compared to spontaneously delivered mother(30,31). Antenatal Care (ANC), maternal age, medical chronic diseases, residence, history of malarial infestation, Hemoglobin level, previous history of adverse pregnancy outcomes, inter-pregnancy interval, MUAC, educational status, marital status, prenatal substance use, mode of delivery, and lack of knowledge about danger signs of pregnancy weresubstantially associated factors with neonatal morbidity and mortality**,** due to this they areindependent determinants of adverse birth outcomes(13,22,24,25,32,33). Identification of factors that increase the occurrence of adverse neonataloutcomes and complications following induction of labor is not clearly defined literatures.GlobalSDG progress for neonatal survival and health cannot be achieved without addressing of immediate neonatal outcomes following labor and delivery, so this study will provide comparative evidence on the immediate neonatal outcomes following induction and spontaneous labor.

1.3 Significance of Study

By the year 2030, the Sustainable Development Goals (SDG) target is to reduce neonatal deaths to 12 per 1000 live births, and under-five deaths to less than 25 per 1000 live births by eliminating preventable child deaths. Therefore, updating the evidence helps to achieve the strategy of the SDG(26). To achieve these aims, this study provide healthcare providers, health managers, policy makers and other stakeholders with up-todate and evidence-based recommendations to inform clinical policies and practicesin the intrapartum care.

Up-to-date evidence and information is required to strengthened efforts to reduce morbidity and mortality in pregnancy and childbirth by optimizing quality of care, and enabling improved healthcare outcomes,this research will expands published workin themultifaceted strategies to improve neonatal outcomes in the intrapartum period in order to increase neonatal survival. There is limited comparative evidence in the frequency of adverse neonatal outcomes and its associated factors among women who gave birth in the study area. Thus, the aim of this studyis to compare composite adverse neonatal outcomes and factors associated with it among women who gave birth at awi zone public hospitals.

The result will be used as a secondary source of data for further study conducting on the same issues.Reduction of neonatal mortality is one of the major SDGs needed to be achieved by 2030. But, neonatal mortality is still unacceptably high, specifically in Ethiopia(34). This study will assess the neonatal outcomes following induction which could determine gaps in health policy and care that need to be addressed to improve neonatal health. These research outcomes can inform health care providers, women and population health experts about the neonatal outcomes of induction compared to spontaneous labor.

1.4 Literature Review

1.4.1 Adverse Neonatal Outcomes

Adverse birth outcome is a critical health issue in developing countries and resulted in many bad consequences of neonatal morbidity and mortality(35).Prospective study conducted in India showed that cesarean section is higher (33.3%) in induced labor than in spontaneous group (11.1%). Apgar score ≤7 at 5 minutes, RDS, Admission to NICU and neonatal jaundice were high in induced group compared to spontaneous labor(30,36). Another prospective observational comparative study in India found that the rates of caesarean section (CS) delivery (33% v. 12%) and neonatal intensive care unit (NICU) admissions (4% v. 1%) fetal distress and Meconium staining of liquor were more in the induced group compared with the spontaneous group(37).This could be due to development of different maternal complication(38)But, another observational study in India showed that, induced labour is comparable to spontaneous labour regarding fetomaternal outcomes(39).

Two studies conducted in US determined that the non-reassuring fetal heart rate pattern (NRFHRP) was independently increased following induction(40,41)due the increased maternal complicationsof uterine tachysystole(5). A systematic review in USA showed that induction of labor was consistently associated with increased risk for hyper stimulation with and without FHR changes compared to placebo(42). Two prospective studies that was conducted in Pakistan found that emergency caesarean section rate was higher for women followinginduction(43,44).Studies conducted in Netherlands and japanfound that active management of labor at 39 weekswas associated with higher incidence of meconium-stained amniotic fluid(MSAF) and fetal resuscitation, but no other significant difference was noted between the two groups(6,45).

Cohort studies in Switzerland and Belgium found that induction of labour was associated with more frequent rate of neonatal resuscitation, admission to the intensive care unit and phototherapy compared to spontaneous labor. In women with uncomplicated pregnancies greater risk of resuscitation, admission to NICU and phototherapy for babies born to women who had their labour induced was noted(46,47).

Retrospective cohort and meta-analysis studies conducted in Australia showed that; induction of labor is associated with an increased risk of adverse outcomes including emergency cesarean section and increased the chance of the infant requiring level 2 nursery cares(48,49). Retrospective comparative observational study conducted in South Australia found thatthe NICU admission [128 (11.7%) Vs 34 (20.6%)] and the adverse neonatal outcomes were significantly increased in induced labor **[**144 (13.2%) Vs 37 (22.4)](50).Retrospective cohort study conducted in Sweden showed that; induction of labor was associatedwith an increased risk for emergency cesarean, but no significant difference in risk for emergency cesarean section between the two methods ofinduction (PGE2 and trans-cervical catheter)(51).Anotherretrospective study conducted in Sweden found that low Apgar score was more common after induction compared to spontaneously started labors (1.0 vs. 0.7%)(52).

Retrospective study conducted in Spain found that Oxytocin administration was associated with risk of neonatal outcomes after induction of labor like neonatal admission to neonatal intensive care unit and Apgar score <7 and need of neonatal resuscitation is also relatively higher in women whose labor was induced through oxytocin(53).Retrospective cohort study conducted in United Kingdom showed the induction of labourwas associated with increased rate of neonatal admission to neonatal intensive care or special care(31).

Prospective cohort study conducted in Nigerian determined that the requirement of neonatal intensive care unit (NICU) admission following induction of labor was higher (54). But, two studies conducted in Nigeria showed that the mean Apgar scores were significantly better among induced labour babies compared to induced labor(55,56). Retrospective cohort studies conducted in Northern Tanzania and Nigeria found that the increased risk of having infants with Apgar scores <7 at 5th minutes and newborn admission to intensive care unit was lowered in the induction of labor(29,57). A prospective comparative study conducted in Sudan showed the presence of bite increments in stillbirth in induced groups compared to spontaneous labor (2.5% Vs 0.5%) and requirement of neonatal resuscitation (16% Vs 12.5%) as result of birth asphyxia. The respiratory complications were higher in induction of labor (21[10.5]Vs 15[7.5%])(58).

A cross sectional study conducted in Mekele Tigray showed that early neonatal complications like NRFHRP, low Apgar score, and early neonatal death following induction of labor is high(38).

Similar study conducted in suhul, Tigray region showed that, the adverse birth outcome in the area is high 96(22.6%), for this outcomes different associated factors are determined among this induction of labor one of the factors(59).

1.4.2Associated Factors of Neonatal Outcomes

Studies conducted in India(60), USA(61), Italy(62), Canada(63), Ethiopia(13,64) showed that the degree of adverse neonatal outcomes were significantly associated with maternal educational status, so lower level or no maternal education was associated with elevated risk of adverse neonatal outcomes like stillbirth and neonatal death in the first 24 hours.Prospective observational and comparative study conducted in India found that; Age, parity, GA, and cervical dilatation are important predictors of successful vaginal delivery following induction(37).Retrospective analysis in US showed that, parity, cervical status, oxytocin usage, GA and birth weight are determinant factors of outcomes following artificial induction of labor(40).Another study conducted in USA showed that; low incomes, education level and environmental factors including chemical exposures play an important in the etiology of adverse pregnancy outcomes(61). Studies conducted in Denmark(65), Ethiopia(66)and hawassa(25)found that the women who have had pre-existing chronic disease have higher risk of adverse neonatal outcomes.

Retrospective cohort in South Australia found that; parity, maternal race and age are factors influencing both maternal and infant health outcomes(48).Studies conducted in Madrid, Barcelona Spain found that bishop score and parity were the determinant factors for the outcomes of induction of labor(67,68).)Another mini review report conducted in Barcelona Spain showed that cervical status remains the most important predictor of IOL outcome. Therefore, other predictive tools should be studied in order to improve IOL outcome in terms of health and economic burden(54). A prospective study conducted in north Jordan Saudi Arabia showed that Parity and cervical status are the main predictors of successful labour induction(69). Prospective cohort studies conducted in Saudi Arabia and Nigeria found that parityisassociated with risk of CS following induction of labor(54,68). Studies conducted in Australia(70), UK(71), Iran(72) and Kenya(73) found that male partner`s role during pregnancy directly affects the pregnant outcomes of pregnant women.

A retrospective study conducted in Tanzania showed that prim parity, advanced maternal age, postdates were independent risk factors for adverse neonatal outcomes(29). Gestational age was also another independent risk factor for adverse neonatal outcomes(74).The likelihood of adverse neonatal outcomes in the post term pregnancy was significant compared to term pregnancy(75) and determinant factors for adverse fetomaternal outcomes(76).Retrospective cohort studies conducted in Tanzania and Nigeria found that null parity and postdates were factors associated with induction of labor in women`s(29,57). A prospective comparative study conducted in Sudan found that the significant association between induction of delivery and the maternal variables (age, level of education, parity and frequency of antenatal care visits)(58). Systematic review and meta-analysis report in Ethiopia determined that unfavorable Bishop Score ,and primiparous were the factors that determine the outcome of induction(77).

Two years' retrospective analysis in Jimma found that only gravidity and Bishop Score at admission were independent predictors of outcome of induction with oxytocin(78).A hospital based cross **s**ectional study conducted in mekele Tigray region showed that bishop's score significantly predicted the outcomes and success of induction(79). Similar study conducted in Tigray region showed that premature rapture of membrane, pregnancy induced hypertension, antenatal visits at private clinics are determinants of birth outcomes(80).

A facility-based cross-sectional study conducted in Harari determined that the variables such as age, parity, pre-induction Bishop Score, methods of induction of labor, non-reassuring fetal heartbeat pattern were significantly associated with the outcomes of induction of labor(81).Furthermore, neonatal outcomes also determined by adverse neonatal outcomes in both spontaneous and induced labor(66). A multicenter cross-sectional study conducted in Amhara region, showed that the outcomes of induction of labor is determined by the factors like pre-induction bishop score, method of induction, gestational age and hypertensive disorder of pregnancy(79).

1.5 Conceptual Framework

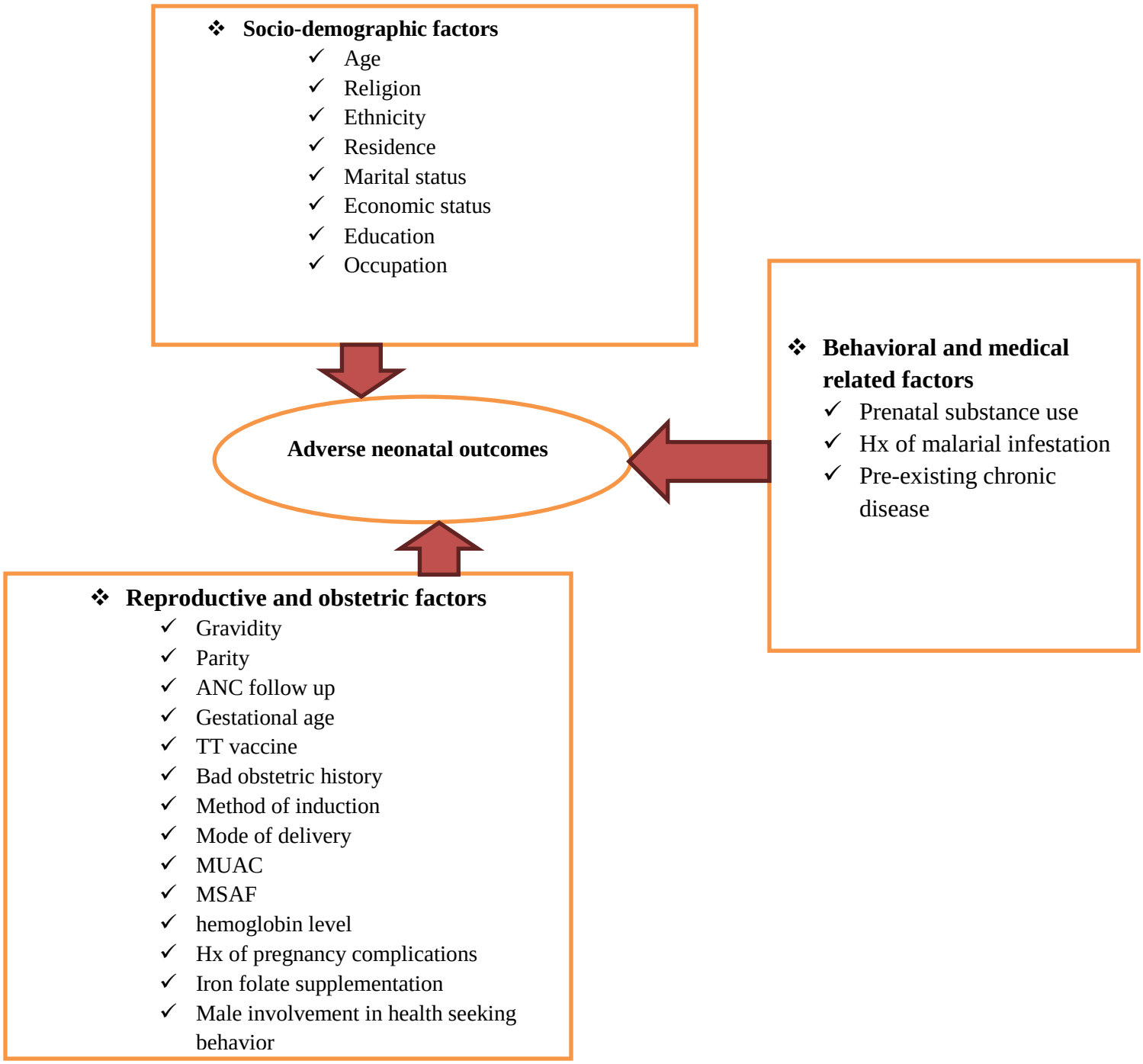


Figure 1:-Conceptual framework adapted from different literatures on adverse neonatal outcomes and associated factors of induced and spontaneous labor

Source: (6,30,36,54,55,58,68,82)

2. Objectives

2.1 General objective

- To compareadverse neonatal outcomes of induced and spontaneous labor andassociated factors among women who gave birth at public hospitals of Awi zone, NorthwestEthiopia 2022

2.2 Specific objectives

- To compare adverse neonatal outcomes of induced and spontaneous laboramong women who gave birth at public hospitals of Awi zone, NorthwestEthiopia 2022
- To identify factors associated with adverse neonatal outcomes ofinduced and spontaneous labor among women who gave birth at public hospitals of Awi zone, NorthwestEthiopia 2022

3. Method and Materials

3.1 Study area and study period

This study was conducted at Awi zone public hospitals, Northwest Ethiopia. Awi zone is one of the zones found in Amhara Regional State of Ethiopia.Among 232,443 reproductive aged groups (15-49), 114,660 were adult women and 58,306 were advanced aged women. According to the 2018/19 annual report of Awi zone health office, there are five public hospitals and 47 health centers that serve for a total population of around 1,077,144(83). The last year annual delivery report of public hospitals in the Awi zone was 10,547.The study wasconducted from May 1to June30/2022.

3.2 Study design

A comparative hospital based cross-sectional study was conducted

3.3 Population

3.3.1 Source population

All women'swhogave birthin the public hospitals

3.3.2 Study population

All women's who gave birth in the public hospitals during data collection period

3.4 Eligibility criteria

3.4.1 Inclusive criteria

All women's who gave birth in the public hospitals during data collection period was included in the study.

3.4.2 Exclusion Criteria

- ✓ women who had intrauterine fetal deathwas excluded from both group
- ✓ women who have sever and critical illness wasexcluded from both group
- ✓ women who was being interviewed and referred to the other hospital within awi zone or referred from one hospital to the other hospital was excluded

3.5 Sample size and sampling procedure

3.5.1 Sample size determination

Based on the following assumptions for estimating the difference between two population proportions with precision, D= 5%,95% two sided level of confidence

Anticipated population proportions	**P1 and P2**
Confidence level	**100(1-a)%**
Absolute precision required on either side of the true value of the difference between P1 and P2 100(1-a)% the proportions (in percentage points)	**D**
Intermediate value	**V=P1 (1-Pd+P2 (1-P2)**

Usingmarginal value of D, the sample size required wascalculatedwith P1 and P2 values equal to 50%, choice of 0.5 was used in both cases. Based on the values given; D= 5%,95% two sided level of confidence and both P1& P2 value of 50%, the sample sizewas calculated as follows;-

$$\boldsymbol{N = (Z1^2 - @/2)\,[P1\,(1 - P1) + P2(1 - P2)]/D2}$$

$$\boldsymbol{N = (Z1^2 - @/2)\,V/D2}$$

Where,**V=P1 (1-P1) + P2 (1-P2), Intermediate value**

$\boldsymbol{N = (1.96)^2\,[0.5\,(1 - 0.5) + 0.5(1 - 0.5)]/(0.05)^2}$**= 806.72~ 807**

Based on the above calculation, the total sample size drawn for the study was 807 women with 5% non-response rate (538 spontaneous and 269 induced women with 2:1 ratio).

3.5.2 Sampling procedure

All five public hospitals found in Awi Zone wereincluded in this study. The previous year average delivery report of each hospitals was used to proportionally allocate the calculated sample size and getting sampling fraction (k) (calculated using population size divided by sample sizethe calculated k-value is~2, similar for all public hospitals). The first mother was selected using simple random sampling technique among mothers who gave birthin the first day of data collection.

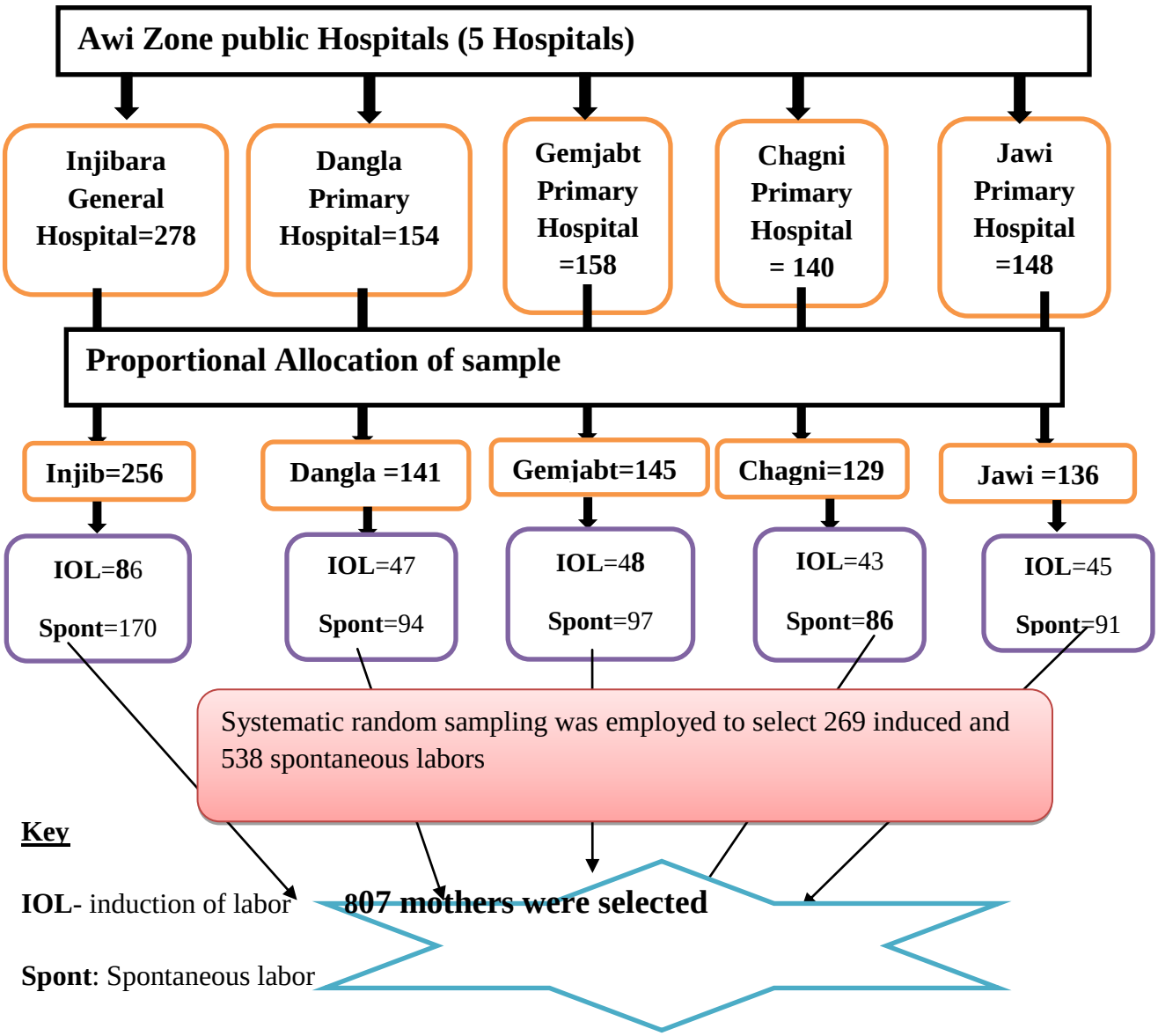


Figure 2:- Schematic presentation of sampling procedure to select women from public hospitals in the Awi Zone, Ethiopia 2022

3.6Variables of the study

Dependent Variable

Adverse neonatal outcomes

Independent Variables

Sociodemographic variables: -age, residence, educational status, occupation, religion, ethnicity, marital status, income

Reproductive and obstetric variables: -Gravidity, Parity, Gestational Age, ANC, Iron Folate Supplementation, Bad obstetric history, Method of induction, pregnancy complication, MUAC and Hemoglobin level, male involvement in health seeking behavior,

Behavioral and Medical relatedvariables: -Existence of Chronic Disease, Hx of malarial infestation and Hx of prenatal substance use

3.7Operational definitions

Adverse/unfavorable neonatal outcome is the occurrence of at least one of the following:need of resuscitation following delivery,low Apgar score at first or fifth minutes, fetal death during intrapartum, immediate neonatal death, RDS, birth asphyxia, NICU admission, and neonatal jaundice within 24hrs of delivery(30,37,46,47,50,58,84).

Stillbirth: - Death of a fetus before delivery, but after initiation of labor (fetal death during the intrapartum time before delivery)(85).

Immediate/Early neonatal death: - the death of a newborn or death of a neonate within 24 hours of delivery(86).

Bad obstetric history is considered when the woman had at least one of the following conditions in a previous pregnancy: still birth, early neonatal death, and recurrent abortion (87).

Favorable Cervical Condition:- when the Bishop score is ≥ 6,cervical condition and induction is likely to succeed(2).

Unfavorable Cervical Condition:- when the Bishop score is ≤ 5, cervical status is unlikely to yield for induction(4).

3.8Data collection tools and technique

Before actual data collection 10 data collectors wererecruited from the governmental health institution (five midwife and five health extension workers). Two data collectors for each hospital wereselected (one midwife and one health extension worker) and the data were collected by using pretestedsemi-structured questionnaire and checklist, which were prepared and customized after reviewing different relevant literatures. The data were collected at the time of exit or after 24 hours of postpartum period of women's."Epicollect5" software was used to collect data after adequate training of data collectors regarding to application usage. The actual data werecollected after obtaining of informed written consent from the mothers who gave birth at the public hospital and, also data collection training wasgiven for supervisors. The prepared questionnaires' weretranslated in to local language that is Amharicbefore the conduction of study through language experts.

3.9 Data Quality Assurance

The questionnaires werepretested on Durbtie primary hospitalexpected to be similarwith study population of Awi zone hospital using 5% (19 spontaneous and 9 induced laboring women) sample of women before two weeks.An additional adjustment in the sequence and wording of the questionnaires was made based on the results of the pre-test.Confusing and unclear questions werechecked and edition wasdone accordingly before actual data collection. Regular checkup for completeness and consistency of the data wasperformed on every two day; the questionnaires were prepared in English and become translated to Amharic language. Principal investigator, supervisors and data collectors weretaken a discussion after data collection to ensure completeness. After data collection was completed, the questionnaires were translatedback to english with language experts for analysis purpose. During entry of data, the requirement's was created in the epicollect5 software and after collection was completed the data entries were downloaded into excel in the CSV format, then exported to SPSS for analysis. During analysis, data werecleaned carefully; missing values werehandled not to be excluded in analysis by checking again and again through data exploration.

3.10 Data processing and analysis

Data werecleaned to check its completeness, consistency, presence of missed values and appropriate coding of variables. The adverse neonatal outcomes and socio-demographic characters wereanalyzed through descriptive chi-square cross tabulationanalysis using SPSS software version 26.Chi square and independent t-test was used to compare categorical and continuous variables between induced women and spontaneously delivered women respectively. In addition, Logistic regression analysis (bivariate and multivariate regression analysis) wasused in the analysis to assess significance of association. After conducting of bivariate analysis the p-value 0.2 at 95% confidence interval was used for conduction of multivariate analysis. To determine the significance of association between outcome variables and explanatory factors in the final analysis (multivariate analysis), p-value 0.05 at 95% confidence intervalwas used to declare the significance of association. Percentages, frequency distribution tables, and figureswereused for data presentation. Model fit test was conducted using Hosmer and Lemeshow test and multicollinarity diagnostics was conducted through linear regression with backward stepwise conditional analysis using variance inflation factor (VIF).

3.11 Ethical consideration

An ethical clearancewasobtained from institutional review board of Bahir Dar University and formal permission letter was alsoobtained from each public hospital office of obstetrics and gynecology department ward. Informed written consent wasobtained from each participant after informing the objective, expected risk and benefit, confidentiality issue of study and freely decided to participate in the study. Furthermore,the collected data were maintained in the private creator's project and the results of study were used only for study purpose.

4. Results

4.1 Sociodemographic Characteristics of Participants

A total of 788 participants (528 spontaneous and 260 induced women)from the intended 807 women were included in the study, giving a response rate of 97.6%. The mean age ± standard deviation (SD) of induced women and spontaneously gave birth women was 27.91(±6.123) and 26.92(±5.469) respectively. Of the participant's, 145 women who gave birth through spontaneous labor had no formal education, only 45 induced women had greater than 2ry education. From induced women, 214(82.3%) women had male partner involvement in their health seeking behavior compared to 474(89.7%) women inspontaneous labor (**Table-1).**

Table 1: Socio-demographic characteristics of mothers who gave birth in Awi Zone Public Hospitals, Northwest Ethiopia: 2022

Variables		Induced labor (n=260)	Spontaneous labor (n=528)	Total (n=788)	
		Frequency (%)	Frequency (%)	Frequency (%)	χ^2
Age of respondent's	<20 years	21(31.3%)	46(68.7%)	67(8.5%)	0.032
	20-34 years	196(31.4%)	429(68.6%)	625(79.3%)	
	>= 35 years	43(44.8%)	53(55.2%)	96(12.2%)	
Residence	Rural	106(33%)	215(67%)	321(40.7%)	0.989
	Town	154(33%)	313(67%)	467(59.3%)	
Marital status	Single	5(29.4%)	12(70.6%)	17(2.2%)	<0.001
	Married /union	229(31.2%)	506 (68.8%)	735(93.3%)	
	Others[a]	26(72.2%)	10(27.8%)	36(4.6%)	
Maternal education	No education	91(38.6%)	145(61.4%)	236(29.9%)	0.173
	Primary education	63(30%)	147 (70%)	210(26.6%)	
	Secondary education	61(30%)	142(70%)	203(25.8%)	
	> Secondary education	45(32.4%)	94(67.6%)	139(17.6%)	
Male involvement	No	44(44%)	56(56%)	100(12.7%)	0.006
	Yes	214(31.1%)	474(68.9%)	688(87.3)	
Religion	Orthodox	219 (32.2%)	461(67.8%)	680(86.3%)	0.489
	Muslims	33(38.4%)	53(61.6%)	86(10.9%)	
	Others[b]	8 (36.4%)	14(63.6%)	22(2.8%)	
Ethnicity	Awi/Agew	133(31.4%)	291(68.6%)	424(53.8%)	<0.001
	Amhara	88 (29.6%)	209(70.4%)	297(37.7%)	
	Others[c]	39 (58.2%)	28(41.8%)	67(8.5%)	
Maternal occupation	House wife	70 (33.3%)	140(66.7%)	210(26.6%)	0.977
	Farmer	83(32.7%)	171(67.3%)	254(32.2%)	
	Governmental employee	31(34.8%)	58 (65.2%)	89(11.3%)	
	Others[d]	76(32.3%)	159(67.7%)	235(29.9%)	
Family monthly income(ETB)	<500 ETB	77(41.4%)	109(58.6%)	186(23.6%)	0.039
	500-1000 ETB	92(29.3%)	222(70.7%)	314(39.8%)	
	1001-2000 ETB	26(33.8%)	51(66.2%)	77(9.8%)	
	>2000 ETB	65(30.8%)	146(69.2%)	211(26.8%)	

[a]Divorced and widowed, [b]Oromo and BenshaguleGumez, [c]Muslim and no religion, [d]Student, merchant and daily laborers/private employee, SD= standard deviation

4.2 Behavioral and pre-existing medical problems

From the participants, 54(20.7%) induced women had prenatal substance use compared to 66(12.5%) women who gave birth through spontaneous labor.The percentage of chronic disease in the induced and spontaneous labor was 28(10.8%) and 26(4.9%) respectively (**Table- 2).**

Table 2: Lifestyle and medical related characteristics of mothers who gave birth in Awi Zone Public Hospitals, Northwest Ethiopia: 2022

Variables		Induced labor (n=260)	Spontaneous labor (n=528)	Total (n=788)	
		Frequency (%)	Frequency (%)	Frequency (%)	χ^2
Prenatal substance use	Yes	54(45.8%)	64(54.2%)	118 (15%)	0.001
	No	206(30.7%)	464(69.3%)	670 (85%)	
Chronic disease	Yes	28(51.9%)	26(48.1%)	54(6.9%)	<0.001
	No	232(31.6%)	502(68.4%)	734(93.1%)	
Types of pre-existing chronic disease[R]	Pre-gestational Diabetes mellitus	7(87.5%)	1(12.5%)	8 (1%)	<0.001
	Chronic hypertension	8 (80%)	2(20%)	10(1.3%)	
	Anemia	3(50%)	3(50%)	6(0.8%)	
	Others[*]	10(33.3%)	20(66.7%)	30(3.8%)	
History of malarial infection	Yes	79(37.3%)	133(62.7%)	212(26.9%)	0.122
	No	181(31.4%)	395(68.6%)	576(73.1%)	

[*]Asthma, tuberculosis and HIV/AIDS, [R]More than one choice possible,

4.3 Obstetric Characteristics

The proportion of bad obstetric history among women who gave birth through induced and spontaneous onset of labor was 54(20.7%) and 76 (14.4%) respectively. Two hundredfour (78.5%) induced women had get iron with folic acid supplementation compared to four hundred forty eight (84.8%) spontaneously labored study participants, 520 (98.5%) spontaneously labored women had ANC follow up. The mean GA(±SD) of Induced women and spontaneously delivered mothers was 39.61(±2.061) and 38.04(±1.642) respectively.Among women whose labor was induced, 75(28.8%) womenencountered complications during labor -delivery, but only 41(7.8%) spontaneously delivered women face complications during labor-delivery (**Table-3).**

Table 3: Obstetrics characteristics of mothers who gave birth in Awi Zone Public Hospitals, Northwest Ethiopia: 2022

Variables		Induced labor (n=260)	Spontaneous labor (n=528)	Total (n=788)	
		Frequency (%)	Frequency (%)	Frequency (%)	χ^2
Gravidity	Primigravida	104(32.7%)	214 (67.3%)	318(40.4%)	0.556
	Multigravida	124(32.2%)	261(67.8%)	385(48.9%)	
	Grand multigravida	32(37.6%)	53(62.4%)	85(10.8%)	
Parity	Primipara	104(32.5%)	214(67.3%)	318(40.4%)	0.727
	Multipara	125(32.5%)	260(67.5%)	385(47.5%)	
	Grand multipara	31(36.5%)	54(63.5%)	85(10.8%)	
Bad obstetric history	Yes	54(41.5%)	76(58.5%)	130(16.5%)	0.023
	No	206(31.3%)	452(68.7%)	658 (83.5%)	
Types of bad obstetric history[R]	Abortion	40(45.5%)	48(54.6%)	88(67.7%)	0.058
	Immediate neonatal death	5(27.8%)	13(72.2%)	18(13.8%)	
	Stillbirth and IUFD	9(37.5%)	15(62.5%)	24(18.5%)	
ANC follow up	No	6(42.9%)	8(57.1%)	14(1.8%)	0.428
	Yes	254(32.8%)	520(67.2%)	774(98.2%)	
GA of ANC initiation	After 12th weeks	182(30.1%)	423(69.9%)	605(78.2%)	0.002
	Within 12th weeks	72(42.6%)	97(57.4%)	169(21.8%)	
Number of ANC visit	1-3 ANC visit	74(40.2%)	110(59.8%)	184(23.8%)	0.014
	>=4 ANC visit	180(30.5%)	410(69.5%)	590(76.2%)	
TT vaccination	No	22(34.9%)	41(65.1%)	63(8%)	0.735
	Yes	238(32.8%)	487(67.2%)	725(92%)	
Iron with folic acid supplementation	No	56(41.2%)	80(58.8%)	136(17.3%)	0.026
	Yes	204(31.3%)	448 (68.7%)	652(82.7%)	
Duration of iron with folic acid supplementation	< 3 months	74(28%)	19(72%)	264(40.5%)	0.025
	>= three months	130(33.4%)	259(66.6%)	389(59.5%)	
Pregnancy complications	Yes	141(74.2%)	49(25.8%)	190(24.1%)	<0.001
	No	119(19.9%)	479(80.1%)	598 (75.9%)	
Types of pregnancy complications[R]	Pregnancy Induced hypertension	84(82.4%)	18(17.6%)	102 (53.7%)	<0.001
	Antepartum hemorrhage(APH)	26(60.5%)	17(39.5%)	43(22.6%)	
	PROM	12(60%)	8(40%)	20(10.5%)	
	Others*	19(76%)	6(24%)	25(13.2%)	
Maternal MUAC	=<22 cm	54(32.1%)	114(67.9%)	168(21.3%)	0.791
	>=23 cm	206(33.2%)	414(66.8%)	620(78.7%)	
Maternal Hgb	=<10 mg/dl	15(57.7%)	11(42.3%)	26(3.3%)	0.006
	>=11 mg/dl	245(32.2%)	517(67.8%)	762(96.7%)	
Gestational age	Preterm	13(54.2%)	11(45.8%)	24(3%)	<0.001
	Term	221(30%)	515(70%)	736(93.4%)	
	Post term	26(92.9%)	2(7.1%)	28(3.6%)	
MSAF	Yes	158(87.3%)	23(12.7%)	181(23%)	<0.001
	No	102(16.8%)	505(83.2%)	607(77%)	
Mode of delivery	Instrumental delivery	84(77.1%)	25(22.9%)	109(13.8%)	<0.001
	Emergency CS delivery	66(85.7%)	11(14.3%)	77(9. 8%)	
	SVD	110(18.3%)	492(81.7%)	602(76.4%)	
Complication	Yes	75(64.7%)	41(35.3%)	116(14.7%)	<0.001

during labor – delivery	No	185(27.5%)	487(72.5%)	672(85.3%)	
Types of labor delivery complications[R]	Precipitated labor	42(87.5%)	6(12.5%)	48(41.4%)	<0.001
	Prolonged labor	22(44%)	28(56%)	50(43.2%)	
	Postpartum hemorrhage	11(57.9%)	8(42.1%)	19(16.4%)	

[*]Gestational DM and related complications,[R]More than one choice possible, PROM (**premature rupture of membrane)**
SD=standard deviation

4.3 Newborn Characteristics

The proportion of fetal death in the intrapartum period and neonatal death in the 1st 24 hours of birth among womenwho gave birth through induced and spontaneous labor was 13(5%)and 6(1.14%) deathsrespectively. The mean 1st minute Apgar score(±SD) among induced and spontaneously delivered newborn was 6.86(± 1.363) and 7.44(± 0.909) respectively and the mean 5th minute Apgar score(±SD) among induced and spontaneously delivered newborn was 8.44(± 1.747) and 8.88(±1.033) respectively through independent T test. The mean newborn birth weight (±SD) in grams among induced and spontaneously delivered newborn was 3073.08(±372.778) and 3067.8(±323.268) grams respectively.The significant proportion of newborn born through induced labor hadlow first minute Apgar score 77(29.6%) compared to the newborn delivered through spontaneous labor 33(6.3%). A significant percentage of newborn delivered through induced laborwere admitted to NICU compared to newborn delivered through spontaneous labor[40(15.4%) and30(5.7%) respectively] (**Table-4).**

Table 4: Newborn characteristics of mothers who gave birth in Awi Zone Public Hospitals, North west Ethiopia: 2022

Variables		Induced labor (n=260)	Spontaneous labor (n=528)	Total (n=788)	
		Frequency (%)	Frequency (%)	Frequency (%)	χ^2
Birth outcome	Dead	13(68.4%)	6(31.6%)	19(2.4%)	0.001
	Alive	247(32.1%)	522(67.9%)	769(97.6%)	
Sex	Male	129(36.9%)	221(63.1%)	350(44.4%)	0.039
	Female	131(29.9%)	307(70.1%)	438(55.6%)	
Newborn birth weight in gram	< 2500	12(66.7%)	6(33.3%)	18(2.3%)	0.002
	2500-4000	244 (31.9%)	520(68.1%)	764(97%)	
	>4000	4(66.7%)	2(33.3%)	6(0.7%)	
First minute APGAR score	Low APGAR score (<7)	77(70%)	33(30%)	110(14%)	<0.001
	Normal APGAR score (>=7)	183(27%)	495(73%)	678(86%)	
Fifth minute APGAR score	Low APGAR score (<7)	21(67.7%)	10(32.3%)	31(3.9%)	<0.001
	Normal APGAR score (>=7)	239(31.6%)	518(68.4%)	757(96.1%)	
Need of resuscitation	Yes	93(69.4%)	41(30.6%)	134(17%)	<0.001
	No	167(25.5%)	487(74.5%)	654(83%)	
NICU admission	Yes	40(57.1%)	30(42.9%)	70(8.9%)	<0.001
	No	220(30.6%)	498 (69.4%)	718(91.1%)	
Indication of NICU admission[R]	Asphyxia	16(64%)	9(36%)	25(35.7%)	<0.001
	Prematurity	5(41.7%)	7(58.3%)	12(17.1%)	
	Jaundice	7(50%)	7(50%)	14(20%)	
	Others[*]	12(63.2%)	7(36.8%)	19(27.2%)	
Newborn jaundice	Yes	13(56.5%)	10(43.5%)	23(2.9%)	0.015
	No	247(32.3%)	518(67.7%)	765(97.1%)	
Newborn outcome	Favorable	153(24.4%)	474((75.6%)	627(79.6%)	<0.001
	Unfavorable	107(66.5%)	54(33.5%)	161(20.4%)	

[*] Infection, hypothermia and respiratory distress syndrome, [R]More than one choice possible,SD= standard deviation

4.4 Adverse neonatal outcomes

The adverse neonatal outcomes among women who gave birth through induction was 41.1 (95% CI: 34.8, 46.7), compared to 10.3 (95% CI: 8.1, 13.3) in women who gave birth spontaneously.The overall magnitude of adverse neonatal outcomes among women who gave birth at the public hospitalsof awi zone was 20.4 (95% CI: 17.8, 23.0) (**Figure-3 and Figure- 4).**

Figure 3: General neonatal outcomes among induced and spontaneously delivered mothers at Awi zone public hospitals, Northwest Ethiopia: 2022

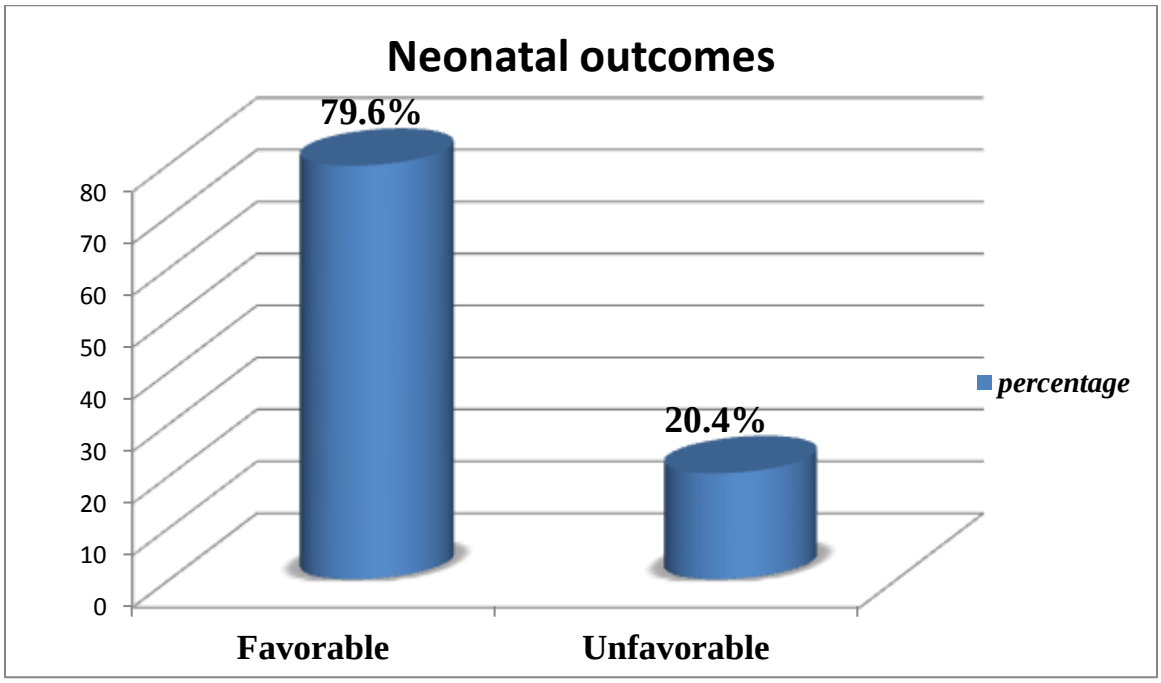
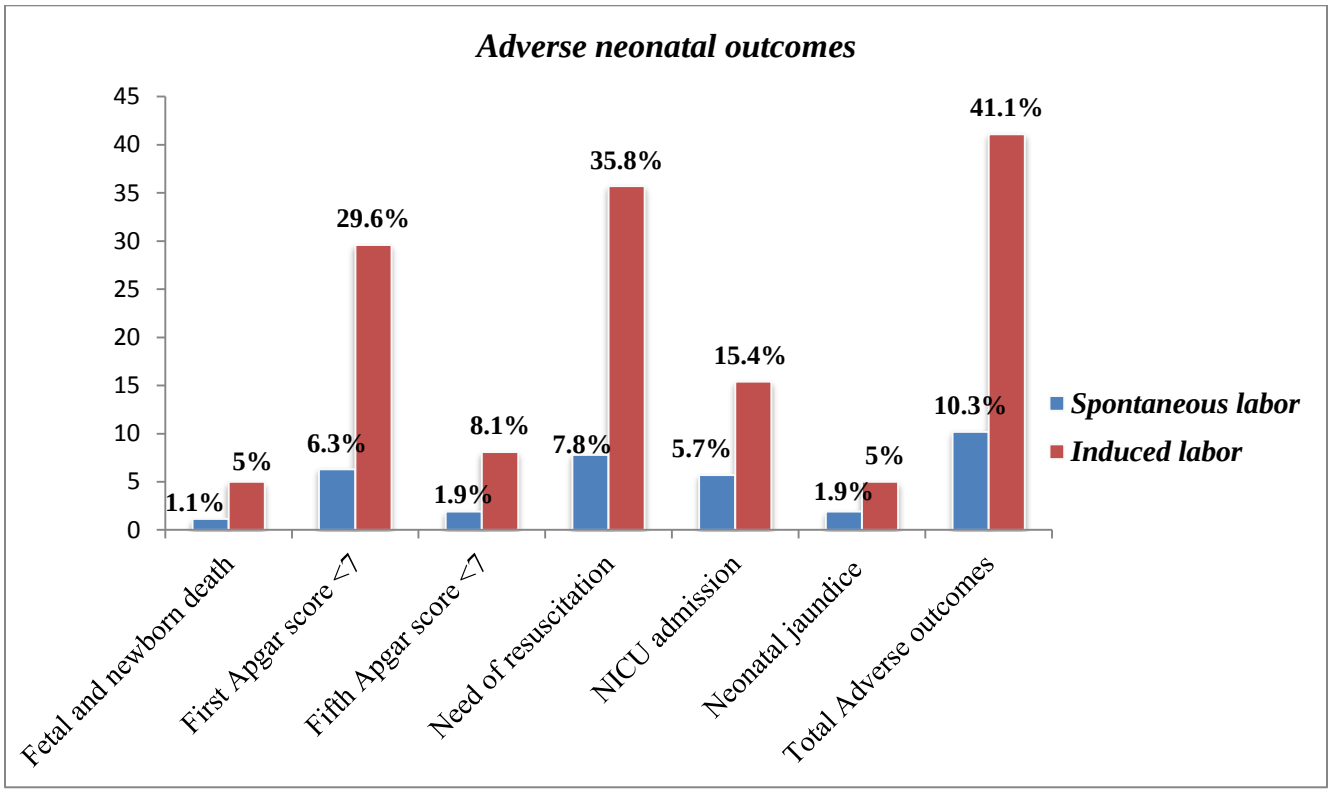


Figure 4: adverse neonatal outcomes among induced and spontaneously delivered mothers at Awi zone public hospitals, Northwest Ethiopia: 2022



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4.5 Factors Associated with Adverse Neonatal Outcomes

A binary logistic regression model was employed to evaluate the association between independent variables and adverse neonatal outcomes. Maternal age, marital status, educational status, monthly income, prenatal substance use, chronic disease, history ofmalarial infection, gravidity, parity, ANC follow up,bad obstetrical history, iron folate supplementation, complication during recent pregnancy, male involvement, hemoglobin, gestational age, onset of labor, MSAF, mode of delivery and complication during labor-delivery werevariables those shown association in the bivariate analysis atp-value ≤ 0.2. Then, these variables are further analyzed with multivariable logistic regression using backward stepwiseconditional method for controlling possible confounders, but educational status, chronic disease, male involvement, gestational age, onset of labor, mode of delivery and complication during labor-delivery

areidentified as variables significantly associated with adverse neonatal outcomesin the final step of analysis with p-value < 0.05.

Model fitness was tested with Hosmer and Lemeshow Goodness of Fit test and fit with p-value>0.2. In addition, there is no inter-explanatory variable relationships (multicollinarity) since the variance inflation factor is less than two (VIF<2) for all variables.

After adjusting possible confounding variables, the odds of adverse neonatal outcomes in the inducedlabor were**1. 89**times higher compared to spontaneous labor (AOR=1.89, 95% CI: 1.108, 3.222 with p-value=0.019). The likelihood of developingadverse neonatal outcomes among women who had no formal education were **2**times higher compared to women having greater than secondary educational level (AOR=2.001, 95% CI: 1.564, 6.444with p-value=0.001). The women who had chronic disease were **3.9** times more likely to have adverse neonatal outcomes compared to the women who had no chronic disease (AOR=3.988, 95% CI: 1.866, 8.524with p-value<0.001).

In addition, women who had no partner involvement in their health seeking behavior were **2** times more likely to have adverse neonatal outcomes compared to women who had partner involvement in their health seeking activity(AOR=2.228, 95% CI: 1.225, 4.055with p-value=0.009). The likelihood of developing adverse neonatal outcomes among women who encounter complication during labor-delivery were **5** times higher compared to women who had no labor-delivery complications (AOR=5.156, 95% CI: 2.895, 9.181with p-value <0.001).The odds of adverse neonatal outcomes among women who gave birth through cesarean section were **4** times higher comparedto women who gave birth through spontaneous vaginal delivery (AOR=4.167, 95% CI: 1.939, 8.952with p-value <0.001). The odds of adverse neonatal outcomes among women who gave birth through instrumental delivery were **8**times higher compared to women who gave birth through spontaneous vaginal delivery (AOR=8.58**,** 95% CI: 4.629,15.901, with p-value <0.001) (**Table- 5).**

Table 5: Logistic regression to identify factors associated with adverse neonatal outcomes among women who gave birth through induced and spontaneous labor at Awi Zone public hospitals, Northwest Ethiopia: 2022

Variables		Adverse neonatal outcomes				
		Frequency (%)		COR (95% CI)	AOR (95% CI)	p-value
		Yes	No			
Onset of labor	Induced	107(41.2%)	153(58.8%)	6.139(4.221, 8.927)*	1. 89(1.108, 3.222)	**0.019**
	Spontaneous	54(10.2%)	474(89.8%)	1	1	
Maternal age	<20 years	18(26.9%)	49(73.1%)	1.664(0.934, 2.965)	1.294(0.816,3.943)	
	20-34 years	113(18.1%)	512(81.9%)	1	1	
	>=35 years	30(31.3%)	66(68.8%)	2.06(1.278, 3.319)	1.124(0.557, 2.267)	
Maternal educational status	No education	70(29.7%)	166(70.3%)	2.021(1.2, 3.402) *	2.001(1.564, 6.444)	**0.001**
	Primary	35(16.7%)	175(83.3%)	0.958(0.542, 1.695)	_	
	Secondary	32(15.8%)	171(84.2%)	0.897(0.502, 1.601)	_	
	Greater than secondary	24(17.3%)	115(82.7%)	1	1	
Marital status	Single	6(35.3%)	11(64.7%)	2.381(0.866, 6.549)	0.446(0.101, 1.963)	
	Married	137(18.6%)	598(81.4%)	1	1	
	Others	18(50%)	18(50%)	4.365(2.213, 8.609)*	1.167(0.424, 3.207)	
Monthly income in ETB	<500	53(28.5%)	133(71.5%)	1.937(1.199, 3.129)*	1.017(0.418, 2.473)	
	500-1000	59(18.8%)	255(81.2%)	1.125(0.712, 1.776)		
	1001-2000	13(16.9%)	64(83.1%)	0.987(0.492, 1.98)		
	>2000	36(17.1%)	175(82.9%)	1		
Prenatal substance use	Yes	39(33.1)	79(66.9)	2.217(1.441, 3.412)	1.204(0.652,2.224)	-
	No	122(18.2%)	548(81.8%)	1	1	
Chronic disease	Yes	28(51.9%)	26(48.9%)	4.866(2.763, 8.57)	3.988(1. 866, 8.524)	**<0.001**
	No	133(18.1%)	601(81.9%)	1	1	
Hx of malarial infection	Yes	54(25.5%)	158(74.5%)	1.498(1.031, 2.176)	0.854(0.502, 1.452)	-
	No	107(18.6%)	469(81.4%)	1	1	
Gravidity	Primigravida	63(19.8%)	255(80.2%)	1.038 (0.714,1.51)	0.477(0.107,2.135)	
	Multigravida	74(19.2%)	311(80.8%)	1	1	

	Grandgravida	24(28.2%)	61(71.8%)	1.654(0.967,2.826) *	1.118(0.314, 3.977)	
Parity	Primipara	66(20.8%)	252(79.2%)	1.199(0.824, 1.747)	0.931(0.543, 1.597)	
	Multipara	69(17.9%)	316(82.1%)	1	1	
	Grandpara	26(30.6%)	59(69.4%)	2.018 (1.188,3.428) *	1.874(0.601, 5.838)	
ANC follow up	No	7(50%)	7(50%)	4.026(1.391,11.648)	1.959(0.494, 7.772)	-
	Yes	154(19.9%)	620(80.1%)	1	1	
Bad obstetric history	Yes	48(36.9%)	82(63.1%)	2.823(1.823,4.253)	1.483(0.808, 2.722)	
	No	113(17.2%)	545(82.8%)	1	1	
Iron folate suplementation	No	37(27.2%)	99(72.8%)	1.591(1.04, 2.435)	0.666(0.342, 1.299)	
	Yes	124(19%)	528(81%)	1	1	
Complication during Pregnancy	Yes	77(40.5%)	113(69.5%)	4.17(2.879, 6.038)	0.981(0.554, 1.739)	
	No	84(14%)	514(86%)	1	1	
Male involvement	No	39(39%)	61(61%)	2.966(1.897, 4.638)	2.228 (1.225, 4.055)	**0.009**
	Yes	122(17.7%)	566(82.3%)	1	1	
Maternal Hgb	<= 10 mg/dl	14(53.8%)	12(46.2%)	4.881(2.211, 10.774)	0.7(0.199, 2.458)	
	>=11 mg/dl	147(19.3%)	615(80.7%)	1	1	
Gestational age	Preterm	18(75%)	6(25%)	14.071(5.476,36.158)	9.83 (8.74, 76.374)	**<0.001**
	Term	126(17.6%)	591(82.4%)	1	1	
	Post term	17(36.2%)	30(63.8%)	2.658(1.422, 4.967)	2.43(1.226, 6.139)	**0.014**
MSAF	Yes	76(42%)	105(58%)	4.445(3.059, 6.459)	0.675(0.364, 1.252)	
	No	85(14%)	522(86%)	1	1	
Mode of delivery	Instrumental	61(56%)	48(44%)	12.39(7.763, 19.777)	8.58(4.629,15.901)	**<0.001**
	CS	44(57.1%)	33(42.9%)	13(7.663, 22.054)	4.167(1.939, 8.952)	**<0.001**
	SVD	56(9.3%)	546(90.7%)	1	1	
Complications during labor and delivery	Yes	75(64.7%)	41(35.3%)	12.465(8.005, 19.409)	5.156 (2.895, 9.181)	**<0.001**
	No	86(12.8%)	586(87.2%)	1	1	

* Significant at P<0.2 bivariate regression analysis in the variable having categories.

5. Discussion

In this study, the magnitude of adverse neonatal outcomes among women who gave birth through induction of labor was 41.1% compared to 10.3% of women who gave birth through spontaneous onset of labor. The overall percentage of adverse neonatal outcomes among the participants was found to be 20.4%.This figure is comparable with the findings of a study conducted in the Tigray region(59).This figure could be implicated that adverse neonatal outcome is still a public health threat and efforts should be addressed.Thisstudy confirmedthat adverse neonatal outcomeswere significantly higher in induced labor than in spontaneous labor. This figure is in agreement with studies conducted in the Tigray region(38), Australia(50), Sudan(58),and India(30). This consistence might bedue to the evidence that induction of labor is associated with a range of obstetrical complications(3).

Regarding specific adverse neonatal outcomes, the composite proportions of fetal death in the intrapartum and immediate neonatal death were significantly higher among women who gave birth through induced labor compared to the women who gave birth through spontaneous labor (5% Vs 1.1%). This figure is in agreement with studies conducted in Australia(48), Sudan(58), and Ethiopia(58). This might be due to evidence that induction of labor is associated with different early neonatal complications like birth asphyxia, respiratory complications(58),and occurrence of NRFHRP (37)that result in neonatal co-morbiditiesand death of neonatesin the immediate neonatal period.

The study confirmed that the percentage of Apgar scores less than 7 in the first minute and the fifth minute of delivery was significantly higher among womenwho gave birth through induced labor compared to women who gave birth through spontaneous labor [(29.6% Vs 6.3% and 8.1% Vs 1.9%) in the 1st and 5th minute respectively]. The findingswerecomparable to studies conducted in Australia(48), India(37), Tanzania, and Nigeria(29,57). The findings might beincreased occurrence of NRFHRP following induction of labor(40,41)which results in a lowering of Apgar score particularly the 5th-minute score.But studies conducted inBarcelona and Nigeria showedthat induction of labor (with oxytocin) reduces the risk of an Apgar scoreof less than7(53,55,56).The findings of a study conducted in Indiastrengthened the findings that 1st and 5th minute Apgar scores were significantly higher in spontaneous labor (36). The possible explanation might bedue to the evidence that adverse maternal complications were high

following induction (precipitated labor and uterine overactivity)that cause NRFHRP, in turn, end up in Apgar scores less than 7(38).

The additional findings of the study showed thata significant percentage of a neonate born through induced labor requires immediate resuscitation after delivery (35.8% Vs 7.8%). This figure is comparable to the studies conducted in Switzerland(88), Belgium(47), and Barcelona Spain(53). The possible explanationis due to the increased rate of MSAF and NRFHRP (birth asphyxia) following induction of labor (37), the US(40), and Japan(79). Furthermore, this study showed that the rate of NICU admission among babies born through induction of labor was significantly higher compared to the spontaneously born newborn (15.4% Vs 5.7%). The figure is in track with a study done in Jordan with a neonatal admission rate of 14.7%(69) and studies conducted in Australia(48,50), India (30,37), Switzerland(46), Belgium(47), andNigeria(29,57). The possible explanation could be the fact that induction of labor was associated with early neonatal complications (birth asphyxia and respiratory complications) and increased risk of neonates requiring nursery care/treatment(38,49,58,82). The study finding was also strengthened with studies conducted in Spain(53) and Nigeria(54).

Regarding factors associated with adverse neonatal outcomes, the study found that babies born through induced labor were more likely to have adverse neonatal outcomes compared to babies born through spontaneous labor. This finding is in tract with studies conducted in India(30), Sweden(52), Australia(50,82), Switzerland and Belgium(46,47), Sudan(58),and Ethiopia(58). The possible explanation could be the fact that Induced labor is associated with adverse neonatal outcomes like Birth asphyxia, NRFHRP, and MSAF, and respiratory complications during the labor-delivery process(37,38,58)following the complication the neonate requires treatment in NICU(49,82).In addition, it might be due to increased maternal complications like tetanic uterine contraction (tachysystole) and precipitation of labor following induction of labor(38).

Concerning maternal education, the women who had no formal education were more likely to have adverse neonatal outcomes compared to women who had greater than secondary educational level. The finding is comparable to the findings of studies conducted in India(60), Italy(62), the USA(61),and Ethiopia(64). The possible explanation could be the fact that the education of women has been identified as an important factor for making a timely decision regarding prenatal complications(60)and women having higher educational levels may receive

adequate counseling as well as information regarding care(63), In addition, this could be due to lack of knowledge and awareness on danger signs of pregnancy that predispose them for different adverse outcomes among women who had no formal education(13).

The odds of adverse neonatal outcomes among women who have had the chronic disease were significantly higher compared to women who had no chronic medical illness. This figure is comparable to studies conducted in Denmark(65)and Ethiopia(66). This could be due to the associationof chronic disease to placental insufficiency and deviation fromthe normal physiology of pregnancy(25).The odds of adverse neonatal outcomes among women who had no male partner involvement in their health-seeking decision were significantly higher compared to women who had male partner involvement. This figure is in the tract with the studies conducted in Australia(70) and Kenya(73). The possible explanation could be the fact that Male partners/fathers are key support persons for childbearing women(71). Adverse pregnancy outcomes as a result of Stress on mothers during pregnancyareimproved with the involvement of a partner(72).

In addition, the study found that the women who gave birth before the expected age of gestation (before 37^{th} completed weeks) were more likely to have adverse neonatal outcomes compared toterm delivery. This figure is comparable to a study conducted in Israel(89). The possible explanation is that infants born before the expected age had increased risk for different adverse birth outcomes as a result of physiological and physical immaturity(74). The odds of adverse outcomes among newborn delivered in the post-term period was significantly higher compared to term birth. The figure is comparable to studies conducted in Addis Ababa(75).The possible explanation is due to the fact that the post term pregnancy is associated with neonatal adverse birth outcomes as result of utero-placental insufficiency(76). The study also evidenced that the odds of adverse neonatal outcomes among new born delivered through operative delivery (instrumental assisted delivery and emergency CS) were higher compared to the neonate delivered through spontaneous vaginal delivery. This figure is in tract with a study conducted in Sekota(66). The possible explanation could be the fact that operative deliveries were conducted among women who developed particular complicationsor indications for operative delivery are associated with increased odds of adverse neonatal outcomes(48).

The likelihood of adverse neonatal outcomes was significantly higher among babies delivered from mothers who developed labor-delivery complications compared to their counterparts. This figure is comparable to a study conducted in Sweden(74). This could be due to the increased application of instrumental delivery(74). In addition, it could be dueto increased complications of tetanic uterine contraction (tachysystole) and precipitation of labor following induction of labor(38).

Strength and limitation of the study

Consideration of large sample size which is good to detect outcomes and possible associated factors is considered as strength of the study. In addition, use of electronic data collection technique with Epicollect 5 software fordata collection purpose also considered as strength of this study.

This study was not conducted without limitations; therefore this study shares the limitation of a cross-sectional study that may not indicate a causal relationship. In addition,a study may miss additional variables (neonatal and health professional related factors) because of a lack of data which could have an association with birth outcomes. A study misses adverse neonatal outcomes after 24hr of birth, as results of this study may not be generalizable to other populations; however, they provide regional evidence of the adverse neonatal outcomes and associated factors in Ethiopia.

6. Conclusion

Generally, one out of five newbornsdevelops adverse neonatal outcomes within 24 hours of birthin the study area. The odds of adverse neonatal outcomes among induced women were significantly higher compared to women who gave birth through spontaneous onset of labor. In addition, immediate newborndeath and fetal death during labor, NICU admission, need for resuscitation, first minute and fifth minute Apgar scores less than 7, and neonatal jaundice were evidenced more frequently among women who gave birth induced labor compared to women who gave birth through the spontaneous onset. No formal education, no male partner involvement, presence of chronic disease, preterm and post-term delivery, complications during labor, and mode of delivery were factorssignificantly associated with adverse neonatal outcomes.

7. Recommendations

- To Awizone health bureau:-
  - ✓ Should design strategies and provide community engaged health education for reproductive age women in the community.
  - ✓ Should provide health promotion activityliving with the chronic disease before pregnancy.
- To health care providers:-
  - ✓ Intervention regarding to maternal and neonatal health should focus on the women who had no formal education
  - ✓ Should anticipate and prepare for management of possible complication after induction
  - ✓ Should avoid unnecessary early intervention in the intrapartum period without clear evidence
  - ✓ Should monitor the progress of labor properly for early detection and management of labor-delivery related complications
  - ✓ Should consider early identification and management of preconception risk factors
  - ✓ Should conductthe procedure with caution and clear evidence since it carries maternal and neonatal risks.
- To researchers:-
  - ✓ Finally, a longitudinal or cohort study evaluating neonatal outcomesis recommended to identify causal relationships between variables.
  - ✓ Incorporating neonatal outcomes after 24 hours of life is also recommended.

8. Reference

1. Smfm A, Care O. ACOG / SMFM Consensus Safe prevention of the primary. YMOB [Internet]. 2014;210(3):179–93. Available from: http://dx.doi.org/10.1016/j.ajog.2014.01.026
2. On R, Federal O, Republic D, January H. M p s o t. 2010;
3. WHO, Department of Making Pregnancy Safer W technical consultation – held in, Switzerland on 13–14 A 2010. recommendations for Induction of labour. 2010;1–2.
4. Management protocol on selected obstetrics topics for hospitals. 2020;(December).
5. Objectives L. F OURTH E DITION OF THE ALARM I NTERNATIONAL P ROGRAM CHAPTER 20. :1–10.
6. Vierhout ME, Out JJ, Wallenburg HCS. Elective induction of labor : a prospective clinical study ,!: Obstetric and neonatal effects. 1985;13.
7. Services H, Caughey AB, Sundaram V, Kaimal AJ, Cheng YW, Gienger A, et al. Maternal and Neonatal Outcomes of Elective Induction of Labor. 2009;(176).
8. Maternal WHO. Child Epidemiology Estimation Group Child Causes of Death 2000–2017. WHO Geneva, Switz. 2018;
9. Kramer MS, Zhang X, Platt RW. Practice of Epidemiology Analyzing Risks of Adverse Pregnancy Outcomes. 2014;179(3):361–7.
10. Middleton P, Shepherd E, Crowther CA. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane database Syst Rev [Internet]. 2018 May 9;5(5):CD004945–CD004945. Available from: https://pubmed.ncbi.nlm.nih.gov/29741208
11. Survey H. Ethiopia. 2016.
12. Sue-a-quan AK, Hannah ME, Cohen MM, Foster GA, Liston RM. Effect of labour induction on rates of stillbirth and cesarean section in post-term pregnancies. 1999;1145–9.
13. Gebremeskel F. Determinants of Adverse Birth Outcome among Mothers who Gave Birth at Hospitals in Gamo Gofa Zone , Southern Ethiopia : A Facility Based Case Control Study. 2017;(October).
14. Lyell DJ. Official reprint from UpToDate ® www.uptodate.com ©2017 UpToDate ® Interpregnancy interval and obstetrical complications. 2017;
15. Cedergren MI. Maternal Morbid Obesity and the Risk of Adverse Pregnancy Outcome. 2004;103(2):219–24.
16. Access O. Open Access. 2019;8688:1–10.
17. Mothers D, Hospital R, East N, Cherie N, Mebratu A. Nursing and Health Care Adverse Birth Out Comes and Associated Factors among. 2018;3(1):1–6.
18. Lange I, Ab C, Lee L, Bc V, Muise S, On ST. Induction of Labour. J Obstet Gynaecol Canada [Internet]. 2013;35(9):840–57. Available from: http://dx.doi.org/10.1016/S1701-2163(15)30842-2

19. Marconi AM. Recent advances in the induction of labor [version 1 ; peer review : 2 approved]. 2019;8:1–11.

20. Bailey BA, Byrom AR. Factors predicting birth weight in a low-risk sample: The role of modifiable pregnancy health behaviors. Matern Child Health J. 2007;11(2):173–9.

21. Eshete A, Birhanu D, Wassie B. Birth outcomes among laboring mothers in selected health facilities of North Wollo Zone , Northeast Ethiopia : A facility based cross-sectional study. 2013;5(7):1141–50.

22. Kassahun EA, Mitku HD, Getu MA. Adverse birth outcomes and its associated factors among women who delivered in North Wollo zone , northeast Ethiopia : a facility based cross ‐ sectional study. BMC Res Notes [Internet]. 2019;1–6. Available from: https://doi.org/10.1186/s13104-019-4387-9

23. Adane A. adverse birth outcomes among deliveries in Gondar university hospital, 14:90 http://www.biomedcentral.com/1471-2393/14/90. 2014;1–8.

24. Fy T. Attended Maternity Ward at Negest Elene Mohammed Memorial General Prevalence and associated Factors of Adverse Birth Outcomes among Women Attended Maternity Ward at Negest Elene Mohammed Memorial General Hospital in Hosanna Town , SNNPR , Ethiopia Journal. 2019;(January 2016).

25. Tsegaye B, Kassa A. Prevalence of adverse birth outcome and associated factors among women who delivered in Hawassa town governmental health institutions , south Ethiopia , in 2017. 2018;1–10.

26. Ma LH, Alexander M, You D, Alkema L, Group UNI, Estimation M. Articles National , regional , and global levels and trends in neonatal mortality between 1990 and 2017 , with scenario-based projections to 2030 : a systematic analysis. Lancet Glob Heal [Internet]. 2019;7(6):e710–20. Available from: http://dx.doi.org/10.1016/S2214-109X(19)30163-9

27. Aynalem YA, Shiferaw WS, Akalu TY, Dargie A, Assefa HK, Habtewold TD. The Magnitude of Neonatal Mortality and Its Predictors in Ethiopia : A Systematic Review and Meta-Analysis. 2021;2021.

28. Abdul-mumin A, Cotache-condor C, Agyeiwaa S, Id O. Timing and causes of neonatal mortality in Tamale Teaching Hospital , Ghana : A retrospective study. 2021;1–12. Available from: http://dx.doi.org/10.1371/journal.pone.0245065

29. Tarimo CS. Prevalence , associated factors , and outcomes for labor induction at a tertiary hospital in Northern Tanzania : A retrospective cohort study 2000 - 2015. 2020;1–15.

30. Kumari G, Poonia K, Rani D. Prospective study to assess the fetal and maternal outcome in cases of low risk primigravida in induced versus spontaneous onset of labour. 2018;2(3):68–72.

31. Duffy A, Ford I. Outcomes of elective induction of labour compared with expectant management : population based study. 2012;2838(May):1–13.

32. Hailemichael HT, Debelew GT, Alema HB. Determinants of adverse birth outcome in Tigrai region , North Ethiopia : Hospital- based case-control study. 2020;1–9.

33. Singh GK. ^ Adverse Pregnancy Outcomes : Differences between US- and Foreign-Born Women in Major. 1995;

34. Ethiopian Public Health Institute (EPHI) and ICF. 2019. Mini Demographic and Health Survey 2019: key Indicators. Institute F ministeryof H and EPH, editor. Rockville, Maryland, USA: EPHI and ICF. 2019. 35 p.

35. Howson CP, Kinney M V, McDougall L, Lawn JE. Born too soon: preterm birth matters. Reprod Health. 2013;10(1):1–9.

36. Granese R, Calagna G, Sollano A, Mondello S, Sicilia A, Grasso R, et al. Data comparison between pharmacological induction of labour and spontaneous delivery . A single centre experience. 2016;87(10):697–700.

37. Vinod V, Bs MB, Obg DNB, Bhat RG, Bs MB, Bhat P V, et al. Induction of labour – a misused blessing : Prospective study of factors influencing the success of induction and comparison of fetomaternal outcomes with spontaneous labour. 2020;26(3):84–8.

38. Lueth GD, Kebede A, Medhanyie AA. Prevalence, outcomes and associated factors of labor induction among women delivered at public hospitals of MEKELLE town-(a hospital based cross sectional study). BMC Pregnancy Childbirth. 2020;20(1):1–10.

39. Gupta S, Shekhawat U, Mital P MM. To Study the Fetomaternal Outcome and Progress of Labour among Induced versus Spontaneous Labour in Nulliparous Women (Using Modified WHO Partograph). Sch J Appl Med Sci. 2014;2(5A):1577–80.

40. Prysak M, Castronova FC. Elective Induction Versus Spontaneous Labor : A Case-Control Analysis of Safety and Efficacy. 1998;92(1):47–52.

41. Glantz JC. Apr2005: Elective Induction vs. Spontaneous Labor. 2014;(April 2005).

42. Mozurkewich EL, Chilimigras JL, Berman DR, Perni UC, Romero VC, King VJ. Methods of induction of labour : a systematic review. 2011;

43. Kazi S, Naz U, Naz Sr U, Hira A, Habib A, Perveen F. Fetomaternal Outcome Among the Pregnant Women Subject to the Induction of Labor. Cureus. 2021;13(5).

44. Raja A, Andleeb M, Sohail N, Subuktageen B. COMPARATIVE ANALYSIS OF FETOMATERIAL OUTCOME IN INDUCED VS SPONTANEOUS LABOR IN NULLIPAROUS WOMEN AT TERM. Pakistan Armed Forces Med J. 2021;71(3).

45. Amano K, Saito K, Shoda T, Tani A, Yoshihara H, Nishijima M. Elective Induction of Labor at 39 Weeks of Gestation: A Prospective Randomized Trial. 1999;25(1):33–7.

46. Boulvain M, Marcoux S, Bureau M, Fortier M, Fraser W. Elective induction of labour: complicating the uncomplicated? 2001;(May).

47. Cammu H, Martens G, Ruyssinck G, Amy J-J. Outcome after elective labor induction in nulliparous women: a matched cohort study. Am J Obstet Gynecol. 2002 Feb;186(2):240–4.

48. Grivell RM, Reilly AJ, Oakey H, Chan A, Dodd JM. Maternal and neonatal outcomes following induction of labor: a cohort study. Acta Obstet Gynecol Scand. 2012;91(2):198–203.

49. Sotiriadis A, Petousis S, Thilaganathan B, Figueras F, Martins WP. Maternal and perinatal outcomes after elective induction of labor at 39 weeks in uncomplicated singleton pregnancy : a meta-analysis. 2019;(October 2018):26–35.

50. Bmedsc SR, Bs MB, Frcog BP, Doddi J, Bs MB, Queen T, et al. Outcomes of Induced Labur. 1995;16–9.

51. Andolf E, Kaijser M. Induction of labor and the risk for emergency cesarean section in nulliparous and multiparous women Induction of labor and the risk for emergency cesarean section in nulliparous and multiparous women. 2011;(June).

52. Lindegren L, Stuart A, Fagerberg MC. Retrospective study of maternal and neonatal outcomes after induction compared to spontaneous start of labour in women with one previous birth in uncomplicated pregnancies ≥ 41 + 3. 2021;49(1):23–9.

53. Espada-Trespalacios X, Ojeda F, Perez-Botella M, Villarroel RM, Martinez MB, Soler HF, et al. Oxytocin administration in low-risk women, a retrospective analysis of birth and neonatal outcomes. Int J Environ Res Public Health. 2021;18(8).

54. Isah AD, Adewole N, Agida ET, Omonua KI, Wong JYY, Gold EB, et al. Fibroid Uterus : A Case Study. Am Fam Physician. 2017;08(4):725–36.

55. Orji EO, Olabode TO. Comparative study of labour progress and delivery outcome among induced versus spontaneous labour in nulliparous women using modified WHO partograph. Nepal J Obstet Gynaecol. 1970;3(1):24–8.

56. Bett KCN. Fetomaternal outcomes for mothers undergoing labor induction at term at Moi teaching and Referal hospital, Eldoret, Kenya. Moi University; 2015.

57. Setting P, Lawani OL, Onyebuchi AK, Iyoke CA, Okafo CN, Ajah LO. Obstetric Outcome and Significance of Labour Induction in a Health Resource Poor Setting. 2014;(January).

58. Kheir A, Ali R. COMPARISON OF NEONATAL OUTCOME ASSOCIATED WITH INDUCED LABOUR VERSUS PLANNED VAGINAL DELIVERY IN A LOW-RISK OBSTETRIC COMPARISON OF NEONATAL OUTCOME ASSOCIATED WITH INDUCED LABOUR VERSUS PLANNED VAGINAL DELIVERY IN A LOW-RISK OBSTETRIC POPULATION. 2016;(January).

59. Adhena T, Haftu A, Gebreegziabher B. Assessment of Magnitude and Associated Factors of Adverse Birth Outcomes among Deliveries at Suhul Hospital Shire , Tigray , Ethiopia From September , 2015 to February , 2016. 2017;1(7).

60. Saleem S, Tikmani SS, Mcclure EM, Moore JL, Azam SI, Dhaded SM, et al. Trends and determinants of stillbirth in developing countries : results from the Global Network ' s Population-Based Birth Registry. 2018;15(Suppl 1).

61. Id KKF, Rosario Z, Mcelrath TF, Ve C. Demographic risk factors for adverse birth outcomes in Puerto Rico in the PROTECT cohort. 2019;

62. Cantarutti A, Franchi M, Compagnoni MM, Merlino L, Corrao G. Mother ' s education and the risk of several neonatal outcomes : an evidence from an Italian population-based study. 2017;1–10.

63. Luo Z, Wilkins R, Kramer MS, Health I, Group S. R esearch on birth outcomes : a population-based study. 2006;174(10):1415–21.

64. Kebede AS, Muche AA, Alene AG. Factors associated with adverse pregnancy outcome in Debre Tabor town , Northwest Ethiopia : a case control study. BMC Res Notes [Internet]. 2018;1–6. Available from: https://doi.org/10.1186/s13104-018-3932-2

65. Epidemiology C, Christian H, Children A. Prevalence of maternal chronic diseases during pregnancy – a nationwide population based study from 1989 to 2013. 2016;

66. Town S, Seyoum E, Bekele A, Tsegaye AT, Birhanu S. Magnitude and Determinants of Adverse Perinatal Outcomes in Tefera Hailu Memorial Hospital ,. 2021;

67. Cole RA, Howie PW, Macnaughton MC. Elective induction of labour: a randomised prospective trial. Lancet. 1975;305(7910):767–70.

68. Al-shaikh GK, Wahabi HA, Fayed AA, Esmaeil S. Factors associated with successful induction of labor. 2012;(March).

69. Obeidat RA, Almaaitah M, Sadon A Ben, Istaiti D, Rawashdeh H, Hamadneh S, et al. Clinical predictive factors for vaginal delivery following induction of labour among pregnant women in Jordan. BMC Pregnancy Childbirth [Internet]. 2021;1–10. Available from: https://doi.org/10.1186/s12884-021-04151-3

70. Forbes F, Wynter K, Zeleke BM, Fisher J. Male partner involvement in birth preparedness , complication readiness and obstetric emergencies in Sub-Saharan Africa : a scoping review. 2021;1–20.

71. Alice M, Daniele S, Alice M, Daniele S. Male partner participation in maternity care and social support for childbearing women : a discussion paper. 2021;

72. Medicine N. AC. 2019;7058.

73. Mangeni JN, Mwangi A, Mbugua S, Mukthar VK. MALE INVOLVEMENT IN MATERNAL HEALTHCARE AS A DETERMINANT OF UTILISATION OF SKILLED BIRTH ATTENDANTS IN KENYA. 2012;89(11):372–83.

74. Sandström A, Altman M, Cnattingius S, Johansson S, Ahlberg M, Stephansson O. Durations of second stage of labor and pushing , and adverse neonatal outcomes : a population-based cohort study. 2017;(December 2016):236–42.

75. Ababa A. Post term pregnancy at teaching hospitals in Addis Ababa , Ethiopia POST TERM PREGNANCY AT TEACHING HOSPITALS IN. 2021;(November 2006).

76. Linder N, Hiersch L, Fridman E, Klinger G, Lubin D, Kouadio F, et al. Post-term pregnancy is an independent risk factor for neonatal morbidity even in low-risk singleton pregnancies. 2015;8–13.

77. Melkie A, Addisu D, Mekie M, Dagnew E. Heliyon Failed induction of labor and its associated factors in Ethiopia : A systematic review and meta-analysis. Heliyon [Internet]. 2021;7(November 2020):e06415. Available from: https://doi.org/10.1016/j.heliyon.2021.e06415

78. Girma W, Tseadu F, Wolde M. Outcome of Induction and Associated Factors among Term and Post-Term Mothers Managed at Jimma University Specialized Hospital : A Two Years ' Outcome of Induction and Associated Factors among Term and Post- Term Mothers Managed at Jimma University Special. 2016;(June).

79. Debele TZ, Cherkos EA, Badi MB, Anteneh KT, Demssie FW, Abdo AA, et al. Factors and outcomes associated with the induction of labor in referral hospitals of Amhara regional state, Ethiopia: a multicenter study. BMC Pregnancy Childbirth. 2021;21(1):1–8.

80. Rade BK, Mitku YM, Weldemicheal AB, Zenebe ZM, Desalegn AY, Bitsu BD. Journal of

Pregnancy and Child Induction of Labor and Its Determinant Factors : Retrospective Cross-Sectional Study from a Public Hospital in Ethiopia. 2018;5(5).

81. Beshir YM, Abdurke M, Id K, Egata G, Roba T. Outcome of induction and associated factors among induced labours in public Hospitals of Harari Regional State , Eastern Ethiopia : A two years ' retrospective analysis. 2021;1–16. Available from: http://dx.doi.org/10.1371/journal.pone.0259723

82. Grivell RM, Reilly AJ, Oakey H, Chan A, Dodd JM. Maternal and neonatal outcomes following induction of labor: a cohort study. Acta Obstet Gynecol Scand. 2012 Feb;91(2):198–203.

83. Ababa A. Federal Democratic Republic of Ethiopia central statistical agency population projection of Ethiopia for all regions at Wereda level from 2014–2017. Addis Ababa Cent Stat Agency. 2014;

84. Cherie N, Mebratu A. Adverse birth out comes and associated factors among delivered mothers in dessie referral hospital. North East Ethiop. 2018;1–6.

85. Stringer EM, Vwalika B, Killam WP, Giganti MJ, Mbewe R, Chi BH, et al. Determinants of stillbirth in Zambia. Obstet Gynecol. 2011;117(5):1151–9.

86. Getiye Y, Fantahun M. Factors associated with perinatal mortality among public health deliveries in Addis Ababa , Ethiopia , an unmatched case. 2017;1–7.

87. Singh G, Sidhu K. Bad obstetric history: a prospective study. Med J Armed Forces India. 2010;66(2):117–20.

88. Caughey AB, Sundaram V, Kaimal AJ, Gienger A. Annals of Internal Medicine Systematic Review : Elective Induction of Labor Versus Expectant Management of Pregnancy. 2009;

89. Linder N, Hiersch L, Fridman E, Lubin D, Kouadio F, Berkowicz N, et al. The effect of gestational age on neonatal outcome in low-risk singleton term deliveries. 2014;7058:1–6.

9. Annex

Appendix-I Declaration

Author

This thesis proposal is my original work and has not been presented for award of MSc Degree or for any similar purpose in any other institutions.

Melaku Laikemariam Signature: _____ Date: _____

Address: PHONE:+251918487740/+251929329026

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Advisors:

This thesis will be submitted for review with my approval as University supervisor.

Sr. Almaz AkliluSignature: _____Date: _____

Mr.Fekadu wolteniguse Signature: _____Date: _____

Sr. AsterayAsemieSignature: _____Date: _____

Appendix-II principal investigator assurance

I certify that the statements herein are true, complete, and accurate to the best of my knowledge. I certify that individuals or organizations named herein are aware of their planned or potential involvement. I agree to accept responsibility for the scientific conduct of this proposal and to provide the required progress proposal if needed.

Melaku Laikemariam Signature----------date -------

Appendix- III Information sheet and consent form

Introduction: Hello, how are you? My name is _____. I am working as data collector in a survey conducted by Melaku Laikemariam at Awi Zone public hospitals. The research thesis was supported in collaboration of Bahir Dar University, College of Medicine and Health Sciences, Midwifery Department to identify adverse neonatal outcomes and associated factors among women with induced and spontaneous labor in the public hospitals at Awi zone, Ethiopia 2022. You are invited to participate in this study and I kindly request your active involvement in this survey in order to provide me the necessary information. So thank you for your contribution.

Study topic- Adverse neonatal outcomes of induced and spontaneous labor and associated factors among women who give birth at public hospitals of Awi zone, NorthwestEthiopia 2022

Objective of the study-To compare adverse neonatal outcomes of induced and spontaneous labor and associated factors among women who give birth at public hospitals of Awi zone, NorthwestEthiopia 2022

Study period- April 30 to June 30/2022

Process of study: as part of this study different questions are prepared to be interview with you. For unclear questions, if you need clarification you can ask any time. Since your participation in this survey is totally depends on your voluntary basis you have the full right to refuse, to participate and to stop at any time.

Advantage and disadvantage: There is no payment or any special privilege given for your participation in this study but your honest answer to these questions is very important to complete this study that will have impact on reduction of neonatal morbidity and mortality. Also you are not obliged to participate or give information you don't want. If you are not feeling good any time, please don't worry to ask to stop the procedure.

Confidentiality: Certainly I assure that your name or your newborn baby's name will not be mentioned/ recorded anywhere. The confidentiality of the information you provided to me will be maintained and couldn't be accessed by third party but it's used for the purpose of research only. If you have any questions regarding this study, you can call me with **0918487740;**

Could I have your permission to continue? Yes ☐ No ☐

Signature of the data collector certifying that informed consent has been given verbally by respondent_____

Questionnaire code_____ Data collector name _____ Date _____

Part 1: Socio economics and demographic factors

serial no	Questions of study variable's	Choice of answers	Skipto
101	How old are you?	----------years	
102	Place of residence?	A. Town B. Rural	
103	Current marital status?	A. Single B. Married C. divorced D. Widowed	
104	Your religion?	A. Orthodox B. Protestant C. Muslim D. Others specify.....	
105	To which Ethnicity do you belong to?	A. Agew B. Amhara C. Benshagule gumez D. Oromo E. Others specify…..	
106	Your educational status?	1. Unable to read and write 2. Read and write 3. Elementary 4. Secondary 5. More than secondary	
107	Current occupation?	6. House wife 7. Farmer 8. Merchant 9. Governmental Employee 10. Private and others	
108	Your monthly income?	……. ETB per months	

Part 2: Life Style and Medical History Related Factors

s. no	Questions	Alternative answers	Skip to
201	Habit of prenatal substance use?	A. Yes B. No	
202	Did you have pre-existing chronic medical disease?	A. Yes B. No	
202	If yes for Q203-- type of pre-pregnancy disease?(more than one answer possible)	11. Hypertension 12. Diabetic mellitus 13. Chronic renal disease 14. Anemia 15. TB 16. HIV/AIDS 17. Others (specify)…….	
203	Did you have history malarial infection?	A. Yes B. No	

Part-3 Obstetric history of the respondents

S.no	Questions	Answers	Skip To
301	Gravidity	_____in number	
302	Parity	_____in number	

303	Did you have any bad obstetric history?	A. Yes B. No	
305	If yes for Q 304, type of bad obstetric history? (More than one answer possible)	---------- write types of bad hx	
306	Did you attend ANC follow up during pregnancy?	A. Yes B. No	
307	If yes for Q306, GA you started ANC?	_____months	
308	If yes for Q306, number of ANC visits?	_____ in number	
309	Did you receive tetanus injection during pregnancy?	A. Yes B. No	
310	If yes for Q309, how many times did you receive?	---------- in number	
311	Did you receive Iron folate during Pregnancy?	A. Yes B. No	
312	If yes for Q311, how many months?	---------- in months	
313	Did you develop any complication during pregnancy?	A. Yes B. No	
314	If yes for Q313 type of complication? (more than one answer possible)	A. Preeclampsia B. Eclampsia C. Antepartum hemorrhage D. Premature rapture of membrane E. Others, specify _____	

CHECKLISTS TEMPLATE

Part-1 obstetric related chart review questions

serial no	Questions	Alternative answers	Skip To
401	Maternal body weight	…….. In Kg	

402	MUAC	…… in centimeter	
403	Maternal hemoglobin level	……Mg/dl	
404	GA at birth	---------- in Weeks	
405	Onset of labor	A. Spontaneous B. Induced	
406	If onset induced, Bishop score	A. Favorable B. Unfavorable	
407	MSAF	A. Yes B. No	
408	Method of induction	……(medical, surgical & both surgical and medical or mixed methods)	
409	Dose of induction drugs	……mg/ml (oxytocin or misoprostol)	
410	Duration of induction	……. Hours	
411	Mode of delivery	A. Spontaneous vaginal delivery B. Emergency cesarean section C. Instrumental Delivery D. Other procedure, specify…….	
412	Did she develop any complication during delivery?	A. Yes B. No	
413	If yes for Q415, what type of complication)?	A. Obstructed labor B. Prolonged labor C. Post-partum hemorrhage D. Precipitated labor E. Shoulder dystocia F. Others specify----	

Part 2:Neonatal outcomes chart review checklist questions

serial no	Questions	Alternative answers	Skip to
501	Outcomes of newborn?	A. Dead	

		B. Alive	
502	If dead, type of death?	A. Still birth B. Early neonatal death	
503	If dead, cause of death?	A. Asphyxiation B. Prematurity C. Unknown cause	
504	Sex of the newborn?	A. Male B. Female	
505	Weight of newborn?	_____in grams	
506	APGAR score 1st& 5th minute after birth respectively?	---------- (write the score)	
507	Did the newborn resuscitated?	A. Yes B. No	
508	Was the newborn admitted to NICU?	A. Yes B. No	
509	If yes for Q-509, reason of admission?	A. Prematurity B. Infection C. Asphyxia D. Neonatal jaundice E. Other (specify) _____	
510	Does the newborn have jaundice in the first 24 hrs?	A. Yes B. No	

<u>አማረኛ ቅጅ</u>

ተጨማሪመረጃ-1 የስነድማረጋገጫ

<u>ተመራማሪዉ</u>

ይህየምርምርንድፈሀሳብየራሴ፣ትክክለኛስራእናሌላቦታሁለተኛዲግሪለማግኘትወይምለሌላአላማያልቀረበመሆኑንአረጋግጣለዉ፡፡

መላኩላእከማሪየምፊርማ----------ቀን-------

<u>አማካሪወች</u>

ይህየምርምርነድፈሀሳብእንደዩኒበርስቱአማካሪገቢተደርጎልኝክለሳማድረጌንአረጋግጣለዉት፡፡

አቶፍካዱፊረማ----------ቀን---------

ወ/ሮአልማገዘፊረማ----------ቀን----------

ወ/ሮአስተራይፊረማ----------ቀን----------

ተጨማሪመረጃ-2 የዋናተመራማሪዉዋስትናማረጋገጫ

ከዚህፅሁፍላይያሉመግለጫወችበሙሉእኔእስከማቀዉድረስእዉነት፣ትክክልእናየተሙአሉመሆናቸዉንአረጋግጣለዉ፡፡ከዚህጥናትላይ ስማቸዉየተካተቱግለሰቦችወይምድርጅቶችተሳትፎአቸዉንእናእቅዳቸዉንእነደሚዉቁአረጋግጣለዉ፡፡ይህንሳይንሳዊጥናትለመስራት ሙሉሀላፊነትእንደምወስድእናየጥናቱንሪፖርትበሚፈለግበትጊዜእንደማቀርብበሙሉእምነትአረጋግጣለዉ፡፡

መላኩላእከማሪየምፊርማ----------ቀን-------

ተጨማሪመረጃ-3 የመረጃቅፅናየስምምነትመጠይቅ

ባህዳርዩኒቨርስቲ፣ህክምናጤናሳይንስኮሌጅ፣ሚድዊፈሪት/ትክፍል

መግቢያ፡-ሰላምእንዴትነዎት? እኔስሜ ---------- ይባላል::በአዊዞንየህዝብሆስፒታሎችላይአቶመላኩላእከማሪየምበሚሰራውጥናትየመረጃሰብሳቢሁኜእየሰራሁነው፡፡ጥናቱበባህዳርዩኒቨርስቲ፣ህክምናጤናሳይንስኮሌጅ፣ሚድዊፈሪት/ትክፍልትብብርናድጋፍበአዊዞንየመንግስትሆስፒታሎችበተፈትሮእናበምትመርፌየሚወለዱጨቅላህፃናትየሚጋጥሙአቸዉችግሮችእናተጎጂችምክናየቶችበሚልርስይካሄዳል፡፡በዚህጥናትውስጥለመሳተፍእናአስፈላጊውንመረጃበመስጠትትብብርአንድታደረጉበአክብሮትእጠይቃለሁ፡፡ ለሚያደርጉትአስተዎፅኦከልብአመሰግናለሁ፡፡

<u>የጥናቱርዕስ፡-</u>በአዊዞንየመንግስትሆስፒታሎችበተፈትሮእናበምትመርፌየሚወለዱጨቅላህፃናትየሚጋጥሙአቸዉችግሮች

<u>የጥናቱአላማ፡-</u>

በአዊዞንየመንግስትሆስፒታሎችበተፈትሮእናበምትመርፌየሚወለዱጨቅላህፃናትየሚጋጥሙአቸዉችግሮችንለመለየትእናለመነጻጸር.

የጥናቱጊዜ፡ከግንቦት1 - ሰኔ 30/2014

የጥናቱሂደት፤-

ለዚህጥናትመሳካትበቀጥታግንኙነትያላቸውየተለያዩመጠይቆችተዘጋጅተዋል፡፡ለማቀርባቸውጥያቄዎችተጨማሪማብራሪያከፈለጉበማ
ንኛውንምግዜመጠየቅይችላሉ::ተሳትፎወትበፈቃደኝነትላይየተመሰረተስለሆነበማነኛወምስአትማስቆምወይምማቋረጥይችላሉ፡፡ለም
ጠይቅዎጥያቄየሚያምኑበትንናትክክለኛመልስዎንእንዲሰጡኝእጠይቃለው:: ይህመጠይቅለማጠናቀቅቢበዛለ10-25
ደቂቃአብረንእንቆያለን፡፡

<u>የጥናቱጥቅምናጉዳት፡-</u>

በዚህጥናትበመሳተፍዎየሚከፈለወትክፍያወይምቀጥተኛጥቅምአያገኙም፡፡ግንየእርስዎአውነተኛመልስለዚህጥናትአላማበጣምጠቃሚ
ነው፡፡በተጨማሪምበጥናቱበመሳተፍዎምንምአይነትችግርወይምጉዳትእንደማደርስበወትአረጋግትለወታለዉ.
መመለስያልፈለጉትንጥያቄአለመመለስይችላሉ፡፡እናምመጠየቁንበፈለጉትጊዜካልተመችዎትማስቆምይችላሉ፡፡

<u>ሚሲጢራዊነት፡-</u> በመጠይቁላይየእርስዎእናየልጅወስምአይመዘገብም፡፡እርስዎየሰጡንመረጃየሚወለዉለጥናቱአላማብቻነዉ፡፡
ከጥናቱአጥኝበስተቀርለሌላተላልፎአይሰጥም፡፡

ጥናቱንበተመለከተጥያቄካለዎትበ0918487740
ስልክቁጥርመደወልይችልሉ::በተጨምሪምለባህዳርዩኒቨርስቲየጥናትስነምግባርኮሚቴበ----------ስልክቁጥርመደወልይቻላሉ፡፡

- መጠየቁንለመመሳትይስማማሉአይ
- ተሳታፊወችየቃልስምምነትማድረጋቸዉየሚረጋገጥየመረጃሰብሳቢዉፊርማ----------
  የመጠይቁመለያቁጥር ----------
  የጠያቂውስም---------- ፊርማ----------መጠይቁየተሞላበትቀን ----------
  ያረጋገጠውሱፕርቫይዘርስም----------

ተጨማሪመረጃ-4የአማረኛቅጂመጠይቆችእናከመዝገብየሚወሰዱመረጃወችቅፅ

የአማረኛቅጂመጠይቆች

ክፍል 1. የተጠያቂማህበራዊባህሪያትበተመለከተየሚጠየቁጥያቄዎች			
ተ.ቁ	ጥያቄዎች	መልስ	ይዘለል
101.	እድሜ	_____አመት	
102.	መኖሪያቦታ	1. ከተማ 2. ገጠር	
103.	የጋብቻሁኔታ	1. ያገባች 2. ያላገባች 3. አግብታየፈታች 4. የሞተበት	
104.	የትምርትሁኔታ	1. ያልተማረች 2. አንደኛደረጃየተማረች 3. ሁለተኛደረጃየተማረች 4. ከሁለተኛደረጃበላይየተማረች	
105.	ጎሳ /ብሄር	1. አማራ 2. ቤኒሻንጉል 3. ኦሮሞ 4. ሌላ(ይግለጹ)_____	
106.	ሃይማኖት	1. ኦርቶዶክስ 2. ፕሮቴስታንት 3. ሙስሊም 4. ሌላ (ይግለጹ) _____	
107.	ሥራ	1. የቤትእመቤት 2. አርሶአደር 3. የመንግስትተቀጣሪ 4. የግልተቀጣሪ 5. ነጋዴ 6. ሌላ (ይግለጹ)_____	
108.	የእርስዎቤተሰብወርሃዊገቢ (በኢትዮጲያብርይገለፅ)	----------ብር	
ክፍል 2. የአኑኑርዘይቤእናለረጅምጊዜየሚቆይበሽታየተያያዙመጠየቆች			
201	በአሁኑእርግዝናአለኮልጠጥተዉያዉቃሉ	1. አወ 2. የለም	
202	ከእርግዝናበፊትለረጅምጊዜየሚቆይህመምአለብወት	1. አወ 2. የለም	
203	ለጥያቂ 201 አወከሆነ፣ምንአይነትህመምነዉ(ከአንድበላይመልስይቻላል)	1. ደምግፊት 2. የስኳርበሽታ 3. የኩላሊትበሽታ 4. የደምማነስ 5. ሌላይገለፅ---	
204	የእናቲቱየላይኛዉክንድመሀልዙሪያበሴንቲሜትር	1. 23 ሴንቲሜትርእናከዛበላይ 2. ከ23 ሴንቲሜትርበታች	
205	የወባበሽጣነበረሽ	1. አወ 2. የለም	
ክፍል 3. ስለፅንስእናየወሊድታሪክንበተመለከተመጠየቆች			
301.	የአሁኑንእርግዝናጨምሮስንትጊዜአርግዘሽታውቂያለሽ (ከሰባትወርበፊትንሁሉንም)?	----------በቁጥር	
302.	ሰባትወርከሞላዉበሁላስንትጊዜወልደዉያዉቃሉ (ይህንንጨምሮ)?	----------በቁጥር	
303.	ከአሁንበፊትበነበረዉእርግዝናያጋጠመወትችግርነበረ	1. አዎ, 2. የለም	
304.	ለጥያቂ 303 መልስወትአወከሆነ፣ምንአጋጥመወትያወቃል?(ከአንድበላይመልስይቻላል)	1. ለተከታታይማስወረድ 2. ፅንሱማህጸንወስጥሙቶመዉጣት 3. ከተወለደበሃላበ7 ቀናትመሞት	

		4. ሌላካለይጠቀስ----------	
305.	በአሁኑየእርግዝናወቅት፣የቅድመወሊድእንክብካቤ/ክትትልአድርገሽነበር	1. አወ 2. የለም	
306.	ለጥያቄ 305 አወከሆነመለሱ፣ክትትልሲጀምሩእርግዝናዉስንተኛወርወይምሳምንትነበር	-------ወር -------ሳምንት	
307.	ለጥያቄ 305 አወከሆነመለሱ፣ስንትጊዜክትትልአደረጉ	በቁጥር------	
308.	በዚህየእርግዝናወቅት፣የቴታነስመከላከያክትባትበክንድሽተሰጥቶሽያውቃል?	1. አዎ 2. የለም	
309.	ለጥያቄ 308አወከሆነ፣በዚህእርግዝናወቅትቲታነስመርፌለምንያህልጊዜነውየወሰድሽው?	_____ ጊዜ	
310.	በዚህእርግዝናወቅትየ" አይረንእናፎሊክአሲድ" (ለደምማነስችግርንለመከላከልየሚወሰድ) እንክብልመድሃኒትአግኝተሻል/ወስደሻል?	1. አዎ 2. አልወሰድኩም	
311.	መልሱአወከሆነ፣ለስንትወርወሰዱት	----በወር	
312.	በአሁኑየእርግዝናወቅት፣ያአጋጠሽችግርነበር	1. አዎ 2. የለም ⟹	317
313.	ለጥያቄ 312 አወከሆነከአጋጠመወትከሚከተሉትችግሮችመካከልየትኞቹአጋጥመወታል?(ከአንድበላይመልስይቻላል)	1. የደምግፊትመጨመር (<160/110) 2. ከፍተኛየደምግፊትመጨመር 3. ራስንመሳትናመንቀጥቀጥ 4. ከብልትየሚወጣደምመፍሰስ(በእርግዝናሰአት) 5. የእንሽርትዉሀመፍሰስ (ምጥከመጀመሩቀድሞ) 6. ሌላ፣ይጠቀስ_____	
ከመዝገብየሚወሰዱመረጃወች			
ክፍል-1 ስለፅንስእናየወሊድታሪክንበተመለከተየተዘጋጁቅፆች			
101.	ይህልጅሲወለድየእርግዝናእድሜዉስንትነበር?	-------በሳምንት	
102.	የእናትየደምብዛት	----------mg/dl	
103.	ምጡሲጀምር	1. በራሱጊዜ 2. በምጥማስጀመሪያ	
104.	በምጥማስጀመሪያከሆነየመዳሀኒቱመጠን	--------ሚግ/ዴሲ.	
105.	የምጥማስጀመሪያመዳሀኒትየተሰጠበትየስአትረዝማኔ		
106.	አሁንሲወልዱበምንመነገድነዉየወለዱት?	1. በማህፀንበር (ያለምንምአገዛ) 2. በቀዶጥገና (በድንገተኛ) 3. በማህፀንበር (በመሳሪያታግዞ)	
107.	በዚህምጥአናወሊድጊዜያጋጠመችግርነበር?	1. አወ 2. የለም ⟹	
108.	ለጥያቄ 107 አወከሆነ፣ምንአይነትችግርነበር (ከአንድበላይመልስይቻላል)	1. የተቀረቀረምጥ 2. ረጅምስአትምጥ (ከሚፈቀደዉበላይ) 3. ከወለዱበኃላየደምመፍሰስብዛት 4. ሌላ፣ይገለፅ----	
ክፍል-2. ከጨቅላህፃኑጋርየተያያዙመጠየቆች			
201.	የጨቅላህፃኑፆታ	1. ወንድ 2. ሴት	
202.	የጨቅላህፃኑዉጤትምንድንነዉ?	1. በህይወትያለ 2. የሞተ	

203.	ለጥያቄ 202 የሞተከሆን፣	1. መ·ቶየተወለደ 2. ከተወለደበ24ሰአትወሰጥየሞተ	
204.	ተወልዶየሞተከሆነ፣ምክንያቱ (ከአነድበላይመልስይቻላል)	1. መዉለጃሰአቱሳይደርስመወለድ 2. ብክለት 3. መታፈን(በኦክስጅንእጥረት) 4. ሌላ፣ይገለፅ------	
205.	የጨቅላህፃኑክብደትስንትነዉ	-----በግራም	
206.	የመጀመሪያአንድደቂቃአፕጋርዉጤት	------በቁጥር	
207.	ከተወለደአምስትደቂቃላይአፕጋርዉጤት	------በቁጥር	
208.	አዲስየተወለደውህጻንየማንቂህክምናተደርጎለታል	1. አወ 2. የለም	
209.	ህፃኑወደጨቅላማሞቂያእናመቆያክፍልገብቶነበር	1. አወ 2. የለም	
210.	ለጥያቄ 209 አወከሆነ፣ምክንያቱምነድንነበር	1. መዉለጃሰአቱሳይደርስመወለድ 2. ብክለት 3. መታፈን(በኦክስጅንእጥረት) 4. የሰውነትግረጣትወይምቢጫነት 5. ሌላ፣ይገለፅ------	

ከልብአመሰግናለዉ!!