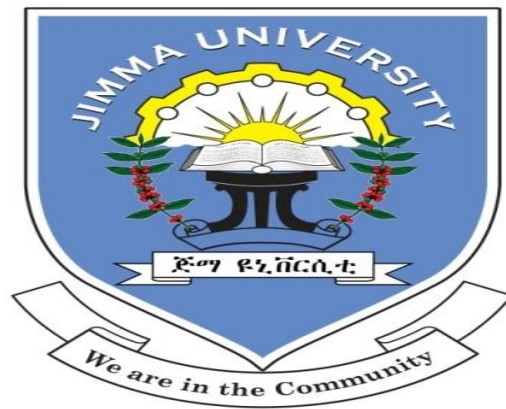


**DETERMINANTS OF FAILED INDUCTION OF LABOR AMONG  
INDUCED PREGNANT MOTHERS IN  
METTU KARL HOSPITAL OROMIA  
REGIONAL STATE, SOUTH WEST, ETHIOPIA:CASE CONTROL STUDY**



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**A RESEARCH THESIS SUBMITTED TO JIMMA UNIVERSITY  
INSTITUTE OF HEALTH DEPARTEMENT OF INTEGRATED  
EMERGENCY SURGERY AND OBSTETRICS IN PARTIAL  
FULFILLMENT OF THE REQUIREMENT FOR DEGREE OF MASTER  
OF SCIENCE IN INTEGRATED EMERGENCY SURGERY (OBSTETRICS,  
GYNECOLOGY AND GENERAL SURGERY).**

OCTOBER, 2018

JIMMA, ETHIOPIA

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## ABSTRACT

**Background:** Induction of labor refers to techniques for stimulating uterine contractions to accomplish delivery prior to the onset of spontaneous labor. It is common obstetric procedure primarily employed when the benefits of delivery outweigh the risks of continuing the pregnancy.

Higher rates of induction of labor may also contribute to lowering caesarean section rates without increasing other adverse pregnancy outcome. Minimizing caesarean section rates without increasing other adverse pregnancy outcomes is a priority consideration in low income countries where available resources need to be judiciously utilized

Elective induction of labor refers to the initiation of labor for convenience in an individual with a term pregnancy that is free of medical or obstetrical indications.

**Objective:** To Identify Determinants of failed Induction of labor among induced pregnant mothers at Mettu Karl Hospital 2018.

**Methods:** Institutional based case control study was conducted among 270 induced mothers. From which 90 cases (failed induction) and 180 controls(successful induction) were selected by consecutive sampling technique in which the data was collected by structured questionnaire and analyzed by SPSS v. 21 to identify frequency distributions, mean with standard Deviation and multivariate logistic regression which was used to identify Determinants of failed induction. A 95 %confidence interval and 5% level of precision was utilized to declare presence of association between dependent and independent variables in final model.

**Result:** For a total of 90 cases and 180 controls, Hypertensive disorders of pregnancy was the most common cause of induction in both case (35%) and control (46.7%) groups. post term pregnancy is the second common cause of induction for cases (27.8%) whereas premature rupture of membranes (31.7%) was for controls. Out of 90 cases and 180 controls 75.6% of controls and 83.3% of cases had an unfavorable bishop score. Most of the women 89.4% and 95.6% of controls and cases respectively were induced by oxytocin. During induction process, cervical ripening was done in 72.8 % of controls and in 81.1% of cases with different techniques, of which majority, 66.7 % and 74.4% was with misoprostol for controls and cases respectively. More than half 65.6% of cases and 57.8% of controls were primigravida. Bishop score, AOR=16.813(1.526-185.226), Gestational age, AOR=15.190 (6.487-35.570) and Duration of labor AOR=15.190 (6.487-35.570) had been shown to be the main predictor of Failed induction.

**Conclusion and recommendation;** The study revealed that BishopScore, Gestational age and Duration of labor had association with failed induction and it recommended to assess the cervical status (using the Bishop score) before induction was commenced and the hospital should have quality assurance programs and induction policies to ensure that inductions are performed in the best possible quality.

**Keywords:** Induction of labor, failed induction of labor, Ethiopia

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## **ABBREVIATIONS**

|        |  |
|--------|--|
| ARM    | Artificial Rupture of the Membranes      |
| BMI    | Body Mass Index                          |
| CS/CD  | Caesarean Section /Caesarean Delivery    |
| CPD    | Cephalo Pelvic Disproportion             |
| HIC    | High Income Countries                    |
| IOL    | Induction of Labor                       |
| ICU    | Intensive Care Unit                      |
| IUFD   | Intrauterine Fetal Death                 |
| LMIC   | Low and middle income countries          |
| MMR    | Maternal Mortality Ratio                 |
| MDG    | Millennium Development Goal              |
| NICU   | Neonatal Intensive Care Unit             |
| NRFHRP | None Reassuring Fetal Heart Rate pattern |
| OVD    | Operative Vaginal Delivery               |
| PROM   | Premature Rupture Of Membrane            |
| SOL    | Spontaneous Onset of Labor               |
| SVD    | Spontaneous Vaginal Delivery             |
| SSA    | Sub-Saharan Africa                       |
| SDG    | Sustainable Development Goal             |
| UK     | United Kingdom                           |
| US     | United State                             |
| WHO    | World Health Organization                |



## **CHAPTER ONE- Introduction**

### **1.1 Background**

Induction of labor refers to techniques for stimulating uterine contractions to accomplish delivery prior to the onset of spontaneous labor (1). Labor is typically induced by using one of the following methods: cervical ripening agents, artificial rupture of membranes, and uterine stimulation with oxytocin (2).

Induction is indicated when the benefits to either mother or fetus outweigh those of pregnancy continuation. The more common indications include preeclampsia\Eclampsia, premature rupture of membrane, chorioamnionites, fetal growth restriction oligohydramnios, non-reassuring fetal status, post term pregnancy, fetal demise, isoimmunisation and medical causes like diabetes mellitus, Renal Disease and chronic pulmonary disease (2).

Elective induction of labor refers to the initiation of labor for convenience in an individual with a term pregnancy who is free of medical or obstetrical indications. The major risks of elective induction of labor at term are thought to be increased rates of cesarean delivery (especially in nulliparous), increased neonatal morbidity, and cost. The risk of cesarean delivery following elective induction, especially for the nulliparous with an unfavorable cervix, was clearly established in the literature with several cohort and case-control studies (5)

Successful labor induction varies widely depending upon several factors: the characteristics of the population being induced (e.g., intact or ruptured membranes, primiparous or multiparous, baseline cervical status), management of the induction, and choice of endpoints (e.g., delivery within 24 hours, delivery within 48 hours, dose/duration of oxytocin, interval from pre induction cervical ripening to delivery versus time from induction to delivery, route of delivery, maternal and neonatal morbidity)(16).

Rates of induction of labor vary from region to region. In the United States of America and the United Kingdom, about 20% of all deliveries are by induction of labor (4,5) while 11.4% was reported in Latin America (3). Rate of induction labor are low in some Africa region evidenced by only 3% of women had an induction of labor in Nigeria hospital (17).

Induction of labor is directly relevant to health related Millennium Development Goals (MDGs). It has potentials for preventing material complication and improving pregnancy outcomes. Beyond 41 weeks of gestation, the number of routine induction of labor needed to prevent one fetal or neonatal death decreases constantly (20). An increases rate of induction of labor for post term pregnancies over 15 years period was associated with decreased still birth rate in Canada (18).

## 1.2. Statement of problem

Since the discovery of the uterine effects of oxytocin in 1906 and prostaglandin F<sub>2</sub> in 1964, pharmacological induction of labor (either alone or in combination with mechanical methods) has steadily become more widespread. Labor induction is not without risk to both mother and fetus and should only be used “in circumstances in which the risks of waiting for the onset of spontaneous labor are judged by clinicians to be greater than the risks with shortening the duration of pregnancy.” By this standard, the use of labor induction is appropriate for several obstetric and medical indications (6).

Rate of caesarean section is steadily increasing despite the risk associated with caesarean delivery. Most of the studies have found that there is a 2 fold increased risk for caesarean delivery with induction of labor compared to spontaneous labor. Rate of Induction of labor has doubled in the past decade from 10 to 20%. In some institutions, the rate of IOL is as high as 40%. Some of the increase in this rate is related to a rise in the number of medically and obstetrically indicated inductions, however, it appears that marginally indicated and elective inductions account for a large proportion of IOL. One of the other contributing factors for increasing rate of IOL is the concern of the patients and healthcare providers about the possible risk of foetal demise at term or post term with the expectant management (12).

Quality improvement programs have been shown to reduce the number of elective inductions and unplanned CS. Several studies have shown a significant reduction in the number of elective inductions after the implementation of an induction committee. The role of the committee was to review each request and enforce the use of proper indications for induction. Institutional factors may play a role in the CS rate of induced labors. In the group of low-risk women induced at term, the low induction centers had a lower overall CS rate than the higher induction centers (15).

A policy of planned induction was found to lower the risk of perinatal death (stillbirth and neonatal death) by about two-thirds compared to a policy of expectant management. The absolute risk of perinatal death was less than 3 per 1,000 births in both the expectantly managed group and

the induced group. The overall strength of evidence for offering IOL for women over 41 weeks of gestation in order to lower the risk of Cesarean birth is high (26).

Care provider use of appropriate or inappropriate indications for induction has an impact on resources for performing induction and on the overall CS rate. Lydon-Rochelle et al. reviewed the records of 4541 induced pregnancies and found that 15% of inductions were either not clinically indicated or not documented. Le Ray et al. measured an increase in CS rate when care providers violated guidelines for inductions by inducing labor before 38 weeks or with a Bishop score < 5 without an indication (15).

Higher rates of induction of labor may also contribute to lowering caesarean section rates without increasing other adverse pregnancy outcome. Minimizing caesarean section rates without increasing other adverse pregnancy outcomes is a priority consideration in low income countries where available resources need to be judiciously utilized (23).

During induction of labor, the woman has restricted mobility and the procedure itself can cause discomfort to her. To avoid potential risks associated with the procedure, the woman and her baby need to be monitored closely. This can strain the limited health-care resources in under-resourced settings. In addition, the intervention affects the natural process of pregnancy and labor and may be associated with increased risks of complications, especially bleeding, caesarean section, uterine hyper stimulation and rupture and other adverse out comes (22)

Despite the fact that IOL plays a vital role in reduction of maternal mortality, the failed rate of induction and factors that contributes to it is not well studied in the study area. Therefore this study will help to fill this gap by identifying factors related to health indications for labor induction, methods of induction, demographic factors and obstetric history.

## **CHAPTER TWO-Literature review**

### **2.1 Prevalence of induction of labor**

Induction of labor is one of the medical procedures that are increasingly being practiced around the world (3). In the United States, rate of induction of labor more than doubled between the years 1980 and 2001 (4). According to WHO, up to 25% of all deliveries at term involve induction of labor in developed countries, but generally lower in developing countries. However, in some settings in developing countries induction of labor is as high as those observed in developed countries (5).

Rates of induction and their indications varied widely between regions and countries. According to a study of Global Perspectives on Elective Induction of Labor, IOL account for 23.4% of deliveries in the United State, 22.1% of deliveries in England, and 25.4% of deliveries in Australia. The 2008 European Perinatal Health Report (2004 data) showed wide ranges in national induction rates among European countries, ranging from <9% (Baltic countries and the Czech Republic) to over 30% in Malta (37.9%) and Northern Ireland (30.7%) (6).

Evidence on the methods of induction from low and middle income countries confirms that prostaglandins and particularly misoprostol are not in widespread use. Oxytocin alone was the single most frequently used induction method (65.9%) in elective labor inductions in 8 Latin American countries, whereas misoprostol alone was used in only 8.9% (6).

In Africa (average 4.4%), induction rates ranged from 1.4% in Niger to 6.8% in Algeria. Asian rates were generally higher (average 12.1%), ranging from 2.5% in Cambodia to 35.5% in Sri Lanka. Japan, the highest income country, had an induction rate of 19.0%. Induction without medical indication accounted for less than 2% of deliveries in all countries, except for Sri Lanka (27.8%), Japan (8.5%), India (3.6%) and Thailand (3.5%). In Africa, PROM (27.3%) was the most common indication; while in Asia 47.2% were elective. There were 448 women (166 in Africa and 282 in Asia) who had fetal distress as their only medical indication. Amongst elective inductions in Africa and Asia, 36.0% and 32.1% were at <39 weeks gestation (7).

oxytocin alone or oxytocin in combination with a non-drug method (sweeping of membranes, artificial rupture of membranes, mechanical methods or nipple stimulation) were the most common in Africa (45.9% and 20.2%) and Asia (31.5% and 28.2%). In Sri Lanka, induction was very common (35.5%) and the most popular methods were oxytocin plus a non-drug method (48.1%) and non-drug methods alone (24.2%). The use of misoprostol or another prostaglandin (either alone or in combination with other methods) averaged 15% of inductions across Africa and Asia. Induction success (inductions resulting in a vaginal birth) was 83.4% in Africa and 81.6% in Asia. The most successful method was oxytocin only in Africa (86.1%) and oxytocin, misoprostol/other prostaglandin and a non-drug method in Asia (86.3%). Kenya, Uganda, China, Nepal, the Philippines, Thailand and Viet Nam had relatively lower success rates across all induction methods (7).

According to a research done in Addis Ababa in army referral hospital, the mean gestational age was  $39.55 \pm 2.49$  weeks (range: 30 – 44 weeks). Of the included 347 women, 167(48.1%) undergone induction of labor for premature rupture of membranes (PROM), 122 (35.2%) for post-date, while 42(12.1%) for medical disorders with pregnancy. Out of the 294 women who had recorded information on bishop score 256 (73.8%) of them had a modified bishop score of greater than or equal to 6. Regarding method of induction, all of the women had been reported as received intravenous Pitocin infusion. Out of the total 307 (88.5%) of the women liquor was recorded as foul smelling and 15(4.3%) women's diastolic blood pressure was of greater than 90(9).

## **2.2. Determinants of failed induction of labor**

On a WHO Global survey Results At each gestation between 37 and 41 completed weeks, elective induction of labor was associated with a decreased odds of perinatal mortality compared with expectant management (at 40 weeks' gestation 0.08% (37/44 764) in the induction of labor group versus 0.18% (627/350 643) in the expectant management group; adjusted odds ratio 0.39, 99% confidence interval 0.24 to 0.63), without a reduction in the odds of spontaneous vertex delivery (at 40 weeks' gestation 79.9% (35 775/44 778) in the induction of labor group versus 73.7% (258 665/350 791) in the expectant management group; adjusted odds ratio 1.26, 1.22 to



1.31). Admission to a neonatal unit was, however, increased in association with elective induction of labor at all gestations before 41 weeks (at 40 weeks' gestation 8.0% (3605/44 778) in the induction of labor group compared with 7.3% (25 572/350 791) in the expectant management group; adjusted odds ratio 1.14, 1.09 to 1.20) (11).

A significant association between Bishop Score and failed induction was also noted. Rate of induction failure was 1.9 times higher in women with Bishop score of 5 or less (84%) versus (18%) in women with favorable cervix. This Pakistan study also proves a relationship between ruptured membranes and failed induction. According to study from Pakistan women having a cesarean section were 1.3 times more likely to have ruptured membranes than their counterparts.

further noted that women with failed induction were 2.9 times more at odds of having prolonged latent phase and 1.4 times more likely to have prolonged second stage. No association was noted between of failed induction and booking status of patient and level of responsible physician (12)

In other case control study done in Netherland on: Can failure of induction of labor in multiparous women be predicted?, it was noted that the risk of cesarean delivery was significantly associated with low maternal height, a history of preterm delivery, and the amount of dilatation at the start of induction of labor (13).

A study done at France on women who underwent membrane sweeping was significantly less likely to require formal induction of labor (RR 0.51, 95% CI 0.37 to 0.71; three RCTs, 226 women). And also there were no significant differences in caesarean birth rate (RR 0.98, 95% CI 0.49 to 1.95; three RCTs, 200 women), instrumental vaginal birth rate (RR 0.87, 95% CI 0.33 to 2.24; two RCTs, 135 women), 5 minute Apgar score < 7 (RR 0.97, 95% CI 0.06 to 4.85; one RCT, 65 women) or neonatal ICU admissions (RR 0.97, 95% CI 0.15 to 6.47; one RCT, 65 women) maternal and/or prenatal mortality between membrane sweeping and did not (14). Out of the 11,077 cases of induced labor, 1,847 (17%) were elective, representing 5% of deliveries among women with low-risk pregnancies.

Administration of oxytocin was the most common method used for elective induction (66%), and led to vaginal delivery in 88% of cases; cesarean section was required in 12% of electively induced deliveries.(27)

Study done on factors associated with failed induction of labor in a secondary care hospital, in Pakistan women undergoing caesarean section were significantly more likely to have gestational age more than 40 weeks (47.7%) than women having vaginal delivery (36.7%) after IOL. It was also observed that women having failure of induction were 2.5 times more at odds of having macrocosmic babies (3.8%) than patients with successful inductions (1.5%). Study done in Pakistan reported that failed induction rate was 4.6 times higher in nulliparous patients compared to their multiparous counterparts (12).

Study done in Africa and Asia shows Labor induction with a medical indication was associated with a consistent increase in adjusted odds of Apgar score <7 at 5 minutes, low birth weight, ICU admission and fresh stillbirth in both regions. It was also associated with increased adjusted odds of perineal laceration in Africa (AOR 2.17, 95% CI 1.27–3.73) and breastfeeding not commencing in the 24 hours after delivery in Asia (AOR 1.45, 95% CI 1.10–1.91). In Africa, the adjusted odds of caesarean section (AOR 0.61, 95% CI 0.42–0.88) and postpartum hospital stay over 7 days (AOR 0.68 95% CI 0.47–0.98) were decreased and the adjusted odds of hysterectomy in Asian countries (AOR 0.97, 95% CI 0.94–1.00) showed a borderline decrease. Induction without medical indication was associated with an increase in the adjusted odds of NICU admission in Africa (AOR 1.51 95% CI 1.01–2.27) and ICU admission in Asia (AOR 1.74 95% CI 1.11–2.74) and a decrease in the adjusted odds of low birth weight in Asia (AOR 0.77, 95% CI 0.66–0.88). We conducted a sensitivity analysis, excluding those women who had fetal distress as the only medical indication for labor induction, however crude and adjusted odds ratios did not alter in magnitude, direction or significance.(7)

Study done in Congo showed that Indications for induction were: preeclampsia (52=54.1%), premature rupture of membranes (34=29.5%) post term (17=14.6%), gestational diabetes (5=4.3%), stillbirth(5=4.3%), polyhydramnios(3=2.6%) and cardiopathy(1=0.8%). Methods of induction at the first attempt included: oxytocin (86 = 74.7%), vaginal misoprostol (20 = 17.3%), transcervical Foley catheter balloon (14 = 12.1%), and Amniotomy (1=0.8%). Vaginal delivery occurred in 78 (66.9%) women and cesarean section in 34 (29.6%). The majority of cesarean sections were performed at the primary induction, most of them (29/34 = 85.3%) in women with bad Bishop Score. Of 78 vaginally delivered 66/115 cases (67.8%) had a good Bishop score. It was observed mostly after use of oxytocin, but cesarean section was more frequent with Foley

catheter (6/14 = 42.9%) than with misoprostol(6/25=24%) and oxytocin infusion (22/88 = 25%).As of indications of cesarean section, the leading cause was fetal distress (13/34= 38.2%), followed by failure of induction in preeclampsia women (9/34 =26.5%) and fetopelvic disproportion (6/34 = 17.6%).Of 34 cesarean sections fetal distress was encountered in 8cases with oxytocin (23.5%), 3 with misoprostol (8.8%),3 with Foley catheter (8.8%), and 2 (5.8%) with amniotomy. Apgar score <7at the first minute occurred in29/115(25.2%) children. Failure of induction was more likely to occur in association with high maternal weight (OR 6.8; CI1.2 - 39.7), and somewhat birth weight (OR 2.1 but CI containing 1)(8)

According to a research done in Addis Ababa in army referral hospital women with age of less than 24 years were 2 times [AOR=2.437 (1.126, 5.275)] higher than those who were age of 25 and above to experience successful induction. And again the likely hood of successful induction was approximately 2.6 times more prevalent among those women's with Apgar score of greater than 7 [AOR=2.61(1.40, 4.86)] . According to a research done in Addis Ababa in army referral hospital The result of this study also showed significant association of women's bishop score in which women with bishop score greater than 5 were about 7 times more likely to have successful induction when compared to those with less than or equal to 5 [AOR=7.51(2.44, 23.07)]. On the other hand the success of induction was 0.36 times lower among women with fetal heart rate record of non-reassuring [AOR= 0.36(0.13 -0.98)](9).

According to study done in Jimma University Specialized Hospital Outcome of induction with oxytocin: Of the 280women, 154(55%) had spontaneous vertex delivery, 96(34.2%) underwent cesarean section and 30(10.7%) had instrumental delivery. Induction was successful in 184(65.7%) of the study subjects, while 60(21.4%) of the mothers experienced failed induction. Nineteen (6.8%) neonates were low birth weight (< 2500 gram) and248 (88.6%) had normal birth weight(2500-3999gram)(10)

A study done by Osmundson and colleagues (2010) found no differences in Cesarean delivery (20.8% vs. 20.1%, p=0.16) or operative vaginal delivery (OVD) (17.2% vs. 23.9%, p=0.36) among nulliparous with a favorable cervix. Among nulliparous women with an unfavorable cervix, Osmundson and colleagues (2011) found increased rates of both Cesarean delivery and OVD, but in this statistically underpowered study these differences were not statistically significant (Cesarean: 43.1% vs. 34.3%, p=0.16, and OVD: 17.2% vs. 23.9%, p=0.16) (15)

On a research done at Stanford university by combining different studies ; there was a decreased risk of cesarean delivery among the multiparous women when compared to the nulliparous women (OR 0.27; 95 percent CI 0.16-0.45), a higher rate of cesarean delivery was observed in women with a lower Bishop score compared to women with more favorable cervix as represented by higher Bishop scores, increasing gestational age was associated with increased rates of cesarean delivery in the setting of induction of labor(21).

A research done at Saudi indicated that nulliparity increased the risk of failed IOL. Moreover, a birth weight of 4 kg or more, and gestation age of less than 37 weeks both increased the odds for CS. However the maternal age and Bishop Score were not predictive of the outcome of IOL in this study. The strain exerted by the operative delivery on the infants of the mother who delivered by CS compared to those delivered vaginally in this cohort is reflected on the lower APGAR score (24).

A Research done at Sudan showed that there is significant association between induction of delivery and the following maternal variables: age, level of education, parity and frequency of antenatal care visits (*P* values respectively .027, .02, .003, .012). With regards to neonatal outcome, the study revealed significant association between type of delivery and low Apgar score (*P*= 0.001) with more babies in the spontaneous vaginal delivery group having low Apgar score.(25)

Based on the literature review induction of labor can be affected by maternal demographic factors, Indication for IOL and Obstetric history and obstetrics characteristics.

### 2.3. Conceptual frame work

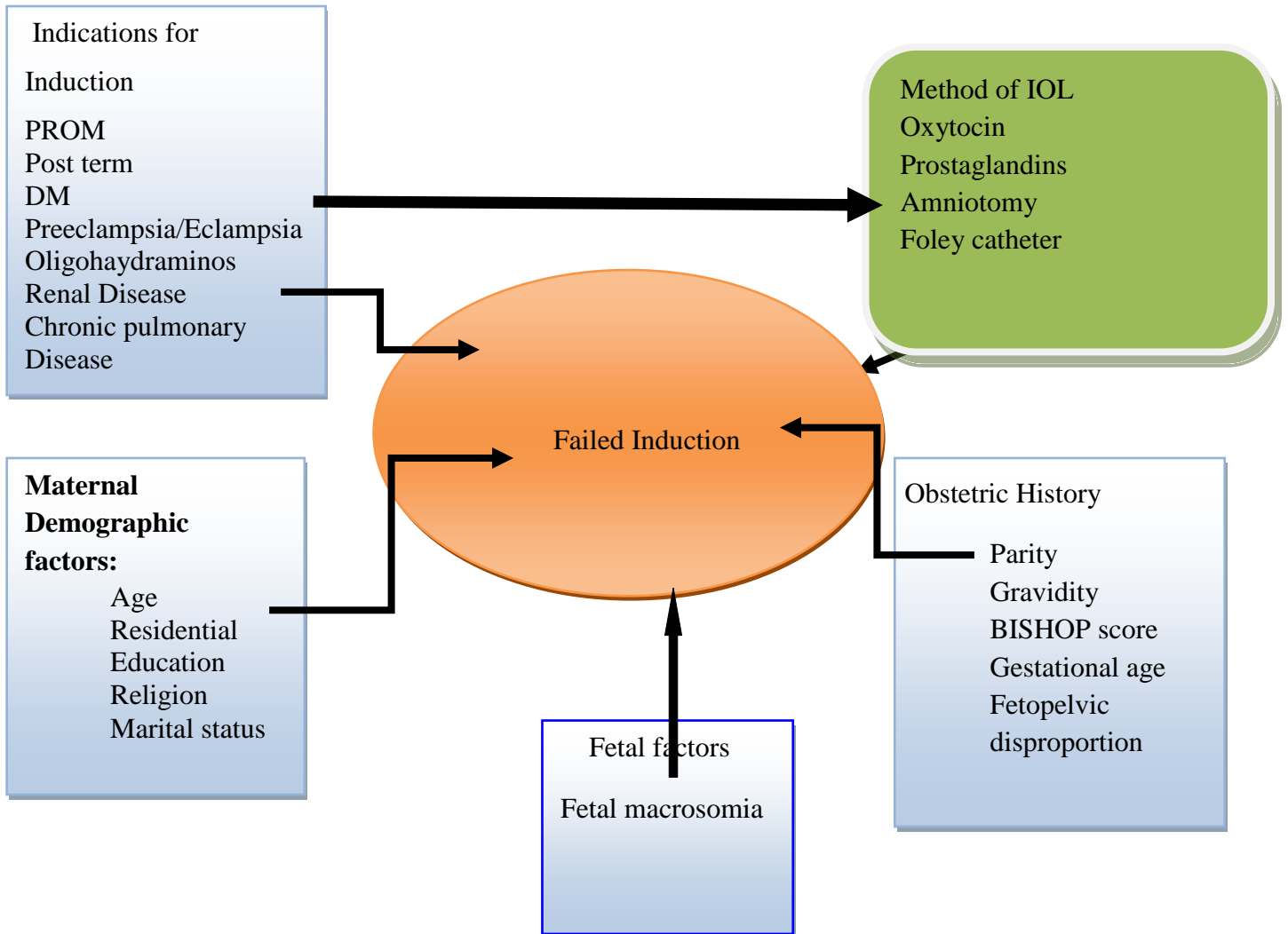


Figure 1: Conceptual frame work of determinants of failed induction at Mettu Karl Hospital, 2018

## **2.4 Significance of study**

The induction of labor may increase the likelihood of neonatal complications or result in unnecessary cesarean section. These risks may be necessary to assume in complicated pregnancies, in which prolongation of gestation presents further risk to the mother or fetus. In the study area, according to the hospital annual report there were no formal studies done toward labor inductions. Therefore this study was aimed at providing information on determinants of failed inductions of labor in Mettu Karl Hospital which helps to reduce the rate of maternal mortality and morbidity resulting from complications related with pregnancies that need emergency terminations of pregnancy. As a result information on this issue will help the hospital staff to know the protocol, trends, common indications and Determinants of failed induction as well as the administrative bodies to prioritize their resource distribution on the most common priority areas and it will benefit for Oromia regional Health bureau and low level health institute in Oromia region to be employed as a base line data to monitor determinant factors of failed IOL.

## **CHAPTER THREE-OBJECTIVES**

### **3.1. General objective**

To Identify Determinants of Failed induction of labor among Induced pregnant mothers at Mettu Karl referral Hospital from January 1/2018 to July 30/2018

### **3.2. Specific objectives**

To Assess outcome of induction of labor among Induced pregnant mothers at Mettu Karl referral Hospital.

To Identify Determinants of failed induction of labour among Induced pregnant mothers at Mettu Karl referral Hospital.

## **CHAPTER FOUR: Method and Materials**

### **4.1. Study area and period**

The study was conducted in Mettu Karl referral hospital from December 1, 2018 to August 30, 2018. Mettu Karl referral Hospital is found at the centre of Mettu Town, capital city of Illu-Ababora Zone, at 600 Km to the South West of Addis Ababa. It is the only hospital in the town established by Swedish Missionaries and RasTeferi in 1932 E.C. currently it is providing full health care services for the population of Illu-Ababora zone and its surroundings estimated to be 1.6 million people. The total number of staff of the hospital is 316 including 170 Professional workers and 146 supportive staffs. There is a total of 214 beds in the surgical, medical, gynaecology-obstetrics, and paediatrics wards of the hospital. Of which 42 beds were found in the gynaecology/obstetrics ward. Currently, the ward is run by 2 gynaecologists, one IESO and 17 midwives.

### **4.2. Study Design**

Institutional based Case Control Study was conducted to describe the Determinants of induction of labor.

### **4.3. Population**

#### ***4.3.1 Source Population***

All pregnant women who had induction of labor of the index pregnancy in the study area during the study period in Mettu Karl hospital

#### ***4.3.2 Study population***

All pregnant women who was induced and give birth after 28 weeks of gestation in Mettu Karl hospital during the study period and who fulfills the inclusion criteria

**Case:** All pregnant women who had failed induction in Mettu Karl hospital during the study period.

**Control:** All pregnant women who had successful induction in Mettu Karl hospital during the study period.

### **4.4. Inclusion and exclusion criteria**

#### ***4.4.1 Inclusion criteria***

All women who had induction of labor at gestational age of 28 weeks and above.



#### 4.4.2 Exclusion criteria

All women with IUFD before induction of labor.

### 4.5. Sample size determination and sampling technique:

#### 4.5.1 Sample size

Sample size was calculated by Kelsey formula using Epi Info Version 7.0.8.3 software, considering one variable assumed to bring difference in the two groups. So that sample size calculation was based on the following assumptions: Two-sided confidence level (CI)=95%, Power=80%, Ratio of cases to controls =1:2, and from a similar study conducted in Jimma University Specialized Hospital, Jimma, Ethiopia; primi gravidity will be taken as main predictor of the outcome. In this study the percent of cases exposed (proportion of failed induction) was 21.4% with Odds ratio (OR) of 2.3 [10]. Thus, the total sample size was 270 (90 Cases and 180 Controls).

| Variable       | CI  | POWER | <i>Proportion of cases exposed</i> | Proportion of controls exposed | Case sample size | Control sample size | Total sample size |
|----------------|-----|-------|------------------------------------|--------------------------------|------------------|---------------------|-------------------|
| prim gravidity | 95% | 80%   | 21.4%                              | 78.6%                          | 90               | 180                 | 270               |

#### 4.5.2 Sampling technique

Based on the sample size calculated above, a total of 270 induced mothers; 90 cases (failed induction) and 180 controls (successful induction) were taken by using consecutive sampling method. For every mother who failed the induction two mothers who had successful induction were taken consecutively during the study period till the sample size fulfilled

### 4.6 Study Variables

#### 4.6.1 Dependent variables

The dependent variable of this study is failed induction of labor

#### 4.6.2 Independent variables

- Maternal demographic factors (age, Residential, Ethnicity, occupation, religion and Educational status)
- Methods of induction used (Amniotomy, oxytocin, Misoprostol and Foley catheter)
- Indication for IOL (PROM, DM, post term, oligohydraminous, pre-eclampsia/eclampsia) and Obstetric history and obstetric characteristics (parity, Gravidity, Gestational age, BISHOP score, Apgar score and fetal weight) taken as independent variable

#### **4.7. Data Collection Method and Instrument**

An interviewer administered structured questionnaire was adopted from different related literatures like researches done in Addis Ababa army hospital and in Jimma hospital on similar topic, which is prepared by English language and the necessary adjustment was made to fit the local condition. The main contents of the questionnaire are socio-demographic characteristics, obstetric history and characteristics of the index pregnancy. Data collectors were selected from BSC nurses and Diploma midwifery working in health institutions and was oriented to the data collection format.

#### **4.8. Data Quality Assurance**

The quality of data was controlled before the starting time of data collection. Before data collection, a two days orientation was given for data collectors and supervisors on the objective and relevance of the study, how to gather the appropriate information, procedures of data collection techniques and the whole contents of the questionnaire. Then, collected data was cleaned, checked and cross checked for their completeness and consistency by the data collectors during the collection period. To maintain the quality of the study, experienced data collectors were selected, data cleaning and editing, strict supervision of data collectors and comments on the problems was made by the supervisors. The questionnaire was pre-tested before study period in 5% of the study population in Bedele primary hospital and necessary modification on the questionnaire was made based on the nature of gaps identified.

#### **4.9. Data Analysis**

The collected data was checked for its completeness and entered using Epidata version-3.1 and exported to SPSS- version 21 for analysis after edition. Frequency distributions and mean with standard Deviation was used for description of independent variables and the association between independent and dependent variables was tested using chi square. To identify determinants of failed induction, multivariate logistic regression was done. A 95 % confidence interval and 5% level of precision was utilized to declare presence of association between dependent and independent variables in the final model. Finally, the data was presented by using tables and charts.

#### **4.10. Ethical consideration**

Letter of ethical clearance was obtained from Institutional Review Board (IRB) of Jimma University and from the coordinator of integrated emergency obstetrics/Gynecology and surgery and letter of permission was obtained from Mettu Karl Hospital. The participants were informed about the objectives of the study and informed consent was obtained before data collection. The participants have also the right to stop responding to the questions at the beginning or during the interview period. Additionally confidentiality and anonymity of the recorded information was kept.

#### **4.11. Dissemination plan**

The result of the study will be submitted to Jimma University College of medical science post graduate research coordinating program and Gynecology/Obstetric department, Mettu zonal health office and referral hospital. Attempts will also be made to publish the paper on peer reviewed journal.

#### **4.12. Operational definitions**

**Induction of labor:** initiation of uterine contractions prior to its spontaneous onset after 28weeks of gestation.

**Induction agent:** A substance used to initiate labor.

**Case, A pregnant** woman who failed to achieve a regular uterine contractions and cervical change for 8 hours after induction of labor was commenced

**Control, A pregnant** woman who succeed to achieve a regular uterine contractions and cervical change for 8 hours after induction of labor was commenced

**Failed induction of labor,** Failure to achieve regular uterine contractions and cervical change for 8 hours after induction of labor was commenced.

**Success of induction of labor,** Success to achieve a regular uterine contractions and cervical change for 8 hours after induction of labor was commenced.

**Apgar score;** a scoring system based on five criteria (heart rate, respiration, color, muscle tone and response to stimulation). A score of 0, 1 or 2 is awarded for each criterion, with a total score out of ten. The score is assessed at 1 and 5 minutes after birth.

**Bishop score;** A scoring system to assess cervical status based on the station of presenting part, dilation, effacement (or length), position and consistency of the cervix. A score of 8 or more indicates that the cervix is favorable.

**Parity;** The number of times a woman has given viable birth. A woman who has given birth a particular number of times is referred to as Para 1, Para 2, etc.

**Premature/Pre-labor rupture of membranes;** is rupture of membranes (ROM) at least one hour before the onset of labor (regular uterine contractions).

**Macrosomia;** is defined as fetal weight exceeding 4000 grams

**Gestational age;** the duration of pregnancy to be expressed in terms of completed weeks. Most reliable clinical parameter of gestational age assessment is an accurate LMP. In some cases, LMP may be inaccurate or unknown. In such a situation, ultrasonography in first trimester of pregnancy will be used to estimate the gestational age.

**Aminiotomy;** an artificial rupture of membrane in order to induce labor.

## CHAPTER FIVE: RESULT

### 5.1 Socio-Demographic Characteristics

A total of 270 Induced women with 100% response rate participated in the study at Mettu Karl hospital from December 1 to August 30, 2018. From those induced mothers 90 were cases who had failed induction and 180 were controls who succeeded the induction. The average age of participants was 26 years for both cases (SD 3) and controls (SD 4). Majorities of the women were Orthodox Christian (38.9% cases and 33.9% controls). Nearly all of the study participants were married (93.3% and 92.2% for cases and controls respectively). Of the participants 53.3% of cases and 51.7% of controls live in Rural and regarding educational status 31.1% of cases and 39.4% controls were illiterate and 26.6% of cases and 23.8% of controls were from grade 1 to 8. (table-1).

| Variables         |                   | Induction Outcome |      |         |      |
|-------------------|-------------------|-------------------|------|---------|------|
|                   |                   | Failed Induction  |      | Success |      |
| Religion          | Orthodox          | 35                | 38.9 | 61      | 33.9 |
|                   | Muslim            | 24                | 26.7 | 57      | 31.7 |
|                   | Protestant        | 30                | 33.3 | 61      | 33.9 |
|                   | Other             | 1                 | 1.1  | 1       | 0.6  |
| Ethnicity         | Oromo             | 63                | 70.0 | 122     | 67.8 |
|                   | Tigre             | 5                 | 5.6  | 7       | 3.9  |
|                   | Amhara            | 17                | 18.9 | 34      | 18.9 |
|                   | Other*            | 5                 | 5.5  | 17      | 9.4  |
| Marital Status    | Single            | 1                 | 1.1  | 5       | 2.8  |
|                   | Married           | 84                | 93.3 | 166     | 92.2 |
|                   | Divorced          | 0                 | 0.0  | 3       | 1.7  |
|                   | Widowed           | 5                 | 5.6  | 6       | 3.3  |
| Educational Level | Illiterates       | 20                | 22.2 | 44      | 24.4 |
|                   | Grade 1-8         | 24                | 26.7 | 44      | 24.4 |
|                   | Grade 9-12        | 23                | 25.6 | 46      | 25.6 |
|                   | Diploma And Above | 23                | 25.6 | 46      | 25.6 |
| Residence         | Urban             | 60                | 67.7 | 114     | 63.3 |
|                   | Rural             | 30                | 33.3 | 66      | 36.7 |
| Occupation        | Housewife         | 28                | 31.1 | 72      | 40.0 |
|                   | Government Worker | 41                | 45.6 | 64      | 35.6 |
|                   | Merchant          | 20                | 22.2 | 40      | 22.2 |
|                   | Other**           | 1                 | 1.1  | 4       | 2.2  |

\*Southern nation's nationality

\*\* Student

Table 1: Socio-Demographic Characteristic in Mettu Karl hospital, 2018.

## 5.2 Obstetrical History

Hypertensive disorders of pregnancy was the most common cause of induction in both case(35%) and control (46.7%) groups. post term pregnancy is the second common cause of induction for cases (27.8%) whereas premature rupture of membranes (31.7%) was for controls. Out of 90 cases and 180 controls 75.6% of controls and 83.3% of cases had an unfavorable bishop score. Regarding method of induction; Most of the women 89.4% and 95.6% of controls and cases respectively were induced by oxytocin. During induction process, cervical ripening was done in 72.8 % of controls and in 81.1% of cases with different techniques, of which majority, 66.7 % and 74.4% was with misoprostol for controls and cases respectively. More than half 65.6% of cases and 57.8% of controls were primigravidas. Concerning gestational age, majority of the women 70% of cases and 61.1% of controls were post term pregnancy followed by term and preterm pregnancy.

## 5.3 Outcome of induction of labor

Out of the total induced labor 66.6% delivered vaginally after 8 hours of induction and they were considered to be control Groups. Those who delivered by instrument also included in control groups whereas 33.3% were cases who have Failed Induction of labor.

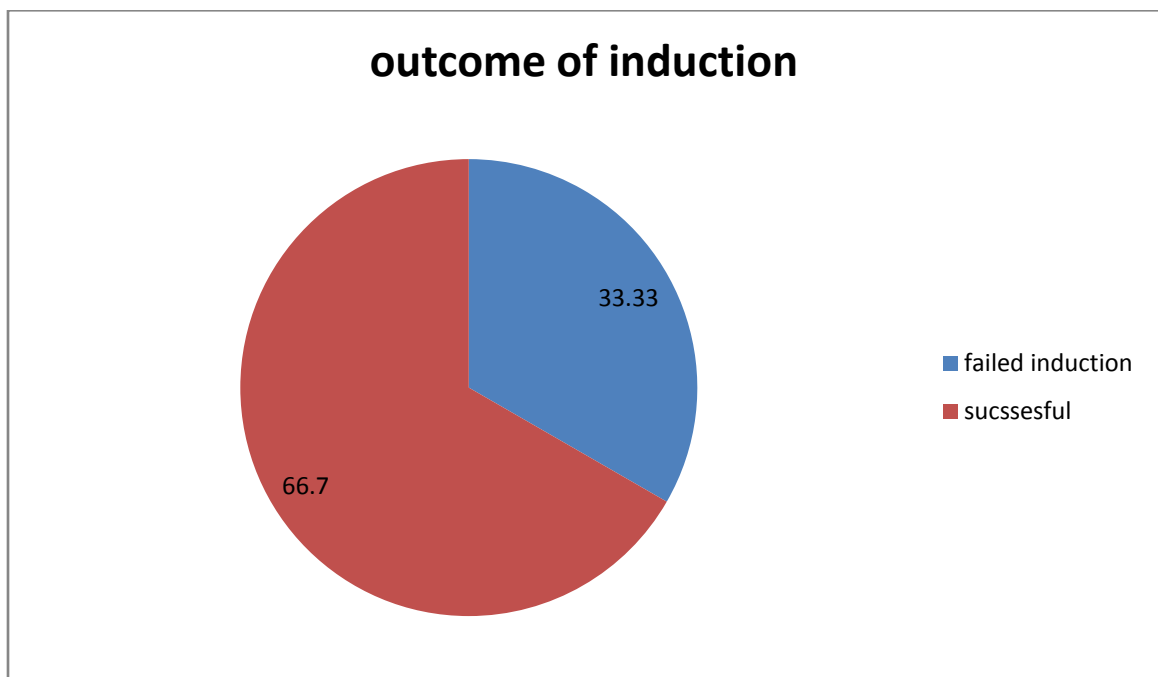


Figure 2: The outcome of induction among induced mothers at Mettu Karl Hospital, 2018.

Regarding fetal outcome from control Group 93.3% and from the cases 98.9% of newborn were born alive .Majority of neonate 78.3% and 88.9% had Apgar score of above 7 in the first minute and 90.6% and 98.9% in the fifth minute for the control and case groups respectively. Most of the new born 72.8% controls and 72.2% cases weighs were between 2500-4000gm.

| Variables                                | Category    | Induction |       |         |       |
|--|-------------|-----------|-------|---------|-------|
|  |             | Failure   |       | Success |       |
| <b>Newborn Status</b>                    | Alive       | 89        | 98.9% | 168     | 93.3% |
|  | Still Birth | 1         | 1.1%  | 12      | 6.7%  |
| <b>APGAR score 1<sup>st</sup> minute</b> | <7          | 10        | 11.1% | 39      | 21.7% |
|  | >=7         | 80        | 88.9% | 141     | 78.3% |
| <b>APGAR score 5<sup>th</sup> minute</b> | <7          | 1         | 1.1%  | 17      | 9.4%  |
|  | >7          | 89        | 98.9% | 163     | 90.6% |
| <b>Weight of the Newborn</b>             | <2.5        | 6         | 6.7%  | 25      | 13.9% |
|  | 2.5-4       | 65        | 72.2% | 131     | 72.8% |
|  | >4          | 19        | 21.1% | 24      | 13.3% |

*Table 2, Fetal outcome for controls and cases among induced mothers at Mettu Karl Hospital, 2018*

#### **5.4 Factors associated with Outcome of Induction of Labor**

The associations of failed induction of labor to different socio-geographic variables on bivariate analysis showed that only Age had statistical association with failed induction. The other socio demographic variables; Religion, Ethnicity, Marital Status, residency and educational level had no statistical association with failed induction.

| Variables         |                   | Outcome of Induction |      |         |      | COR     |
|-------------------|-------------------|----------------------|------|---------|------|---------|
|                   |                   | Failed Induction     |      | Success |      | P value |
|                   |                   | N                    | %    | N       | %    |         |
| Age               | Mean(SD)          | 26(3)                |      | 26(4)   |      | .222*   |
| Religion          | Orthodox          | 35                   | 38.9 | 61      | 33.9 | .574    |
|                   | Muslim            | 24                   | 26.7 | 57      | 31.7 | .421    |
|                   | Protestant        | 30                   | 33.3 | 61      | 33.9 | .492    |
|                   | Other             | 1                    | 1.1  | 1       | 0.6  | 1       |
| Ethnicity         | Oromo             | 63                   | 70.0 | 122     | 67.8 | .290    |
|                   | Tigre             | 5                    | 5.6  | 7       | 3.9  | .253    |
|                   | Amhara            | 17                   | 18.9 | 34      | 18.9 | .368    |
|                   | Other**           | 5                    | 5.5  | 17      | 9.4  | 1       |
| Marital Status    | Single            | 1                    | 1.1  | 5       | 2.8  | .254    |
|                   | Married           | 84                   | 93.3 | 166     | 92.2 | .421    |
|                   | Divorced          | 0                    | 0.0  | 3       | 1.7  | .999    |
|                   | Widowed           | 5                    | 5.6  | 6       | 3.3  | 1       |
| Educational Level | Illiterates       | 20                   | 22.2 | 44      | 24.4 | .797    |
|                   | Grade 1-8         | 24                   | 26.7 | 44      | 24.4 | .809    |
|                   | Grade 9-12        | 23                   | 25.6 | 46      | 25.6 | 1.000   |
|                   | Diploma And Above | 23                   | 25.6 | 46      | 25.6 | 1       |
| Residence         | Urban             | 60                   | 67.7 | 114     | 63.3 | .590    |
|                   | Rural             | 30                   | 33.3 | 66      | 36.7 | 1       |
| Occupation        | Housewife         | 28                   | 31.1 | 72      | 40.0 | .698    |
|                   | Government Worker | 41                   | 45.6 | 64      | 35.6 | .407    |
|                   | Merchant          | 20                   | 22.2 | 40      | 22.2 | .547    |
|                   | Other**           | 1                    | 1.1  | 4       | 2.2  | 1       |

\* Southernnationsnationality, \*\*student

Table 3: The relationship between outcome of induction and socio-geographic variables in Mettu Karl hospital, 2018.

The impact of obstetrical characteristics to the outcomes of induced labor was investigated using bivariate logistic regression analysis. In bivariate logistic regression analysis test; Gestational age, Bishop Score, mothers who had done cervical ripening, mothers induced by oxytocin, cervical ripening by misoprostol, gravidity, First and 5th minute APGAR score less than seven, Duration of Labor and Weight of the Newborn showed significant association to failed induction with having P-value of <0.25. Therefore they were candidate variables for multivariate logistic regression analysis (table 3).



| Variables                          |                            | Outcome of Induction |       |         |       | COR          |
|------------------------------------|----------------------------|----------------------|-------|---------|-------|--------------|
|                                    |                            | Failed Induction     |       | Success |       | P value      |
|                                    |                            | N                    | %     | N       | %     |              |
| Type of Induction Commenced        | Emergency                  | 62                   | 68.9  | 125     | 69.4  | .926         |
|                                    | Planned                    | 28                   | 31.1  | 55      | 30.6  | 1            |
| Indication for Induction           | Post Term Pregnancy        | 25                   | 27.8  | 53      | 29.4  | .896         |
|                                    | Prom                       | 20                   | 22.2  | 57      | 31.7  | .786         |
|                                    | HPN Disorders Of Pregnancy | 42                   | 46.7  | 63      | 35.0  | .538         |
|                                    | Other                      | 3                    | 3.3   | 7       | 3.9   | 1            |
| Gestational Age in Week            | <37                        | 4                    | 4.4   | 27      | 15.0  | <b>.031*</b> |
|                                    | 37-42                      | 63                   | 70.0  | 110     | 61.1  | .821         |
|                                    | >42                        | 23                   | 25.6  | 43      | 23.9  | 1            |
| Chorioamnionites Present           | Yes                        | 3                    | 3.3   | 6       | 3.3   | 1.000        |
|                                    | No                         | 87                   | 96.7  | 174     | 96.7  | 1            |
| Bishop Score                       | Unfavorable                | 75                   | 83.3  | 136     | 75.6  | <b>.018*</b> |
|                                    | Intermediate               | 14                   | 15.6% | 23      | 12.8% | <b>.018*</b> |
|                                    | Favorable                  | 1                    | 1.1%  | 21      | 11.7% | 1            |
| Cervical Ripening                  | Yes                        | 73                   | 81.1% | 131     | 72.8% | <b>.135*</b> |
|                                    | No                         | 17                   | 18.9% | 49      | 27.2% | 1            |
| Which Method Used for Ripening     | Not applicable             | 17                   | 18.9% | 49      | 27.2% | -            |
|                                    | Misopristol                | 67                   | 74.4% | 120     | 66.7% | .965         |
|                                    | Foley catheter             | 6                    | 6.7%  | 11      | 6.1%  | 1            |
| Total Misoprostol used             | Not Used                   | 20                   | 22.2  | 54      | 30.0% | -            |
|                                    | 50ug                       | 62                   | 68.9  | 104     | 57.8% | .469         |
|                                    | >=100                      | 8                    | 8.9%  | 22      | 12.2% | 1            |
| Method Of Induction Used           | Amniotomy                  | 1                    | 1.1%  | 7       | 3.9%  | .654         |
|                                    | IV Pitocin Infusion        | 86                   | 95.6% | 161     | 89.4% | <b>.249*</b> |
|                                    | Misopristol                | 3                    | 3.3%  | 12      | 6.7%  | 1            |
| Gravidity                          | Primigravida               | 59                   | 65.6% | 104     | 57.8% | <b>.219*</b> |
|                                    | Multigravida               | 31                   | 34.4% | 76      | 42.2% | 1            |
| Duration of labor                  | <=8                        | 43                   | 47.8% | 21      | 11.7% | <b>.000*</b> |
|                                    | >8                         | 47                   | 52.2% | 159     | 88.3% | 1            |
| Newborn Status                     | Alive                      | 89                   | 98.9% | 168     | 93.3% | <b>.078*</b> |
|                                    | Still Birth                | 1                    | 1.1%  | 12      | 6.7%  | 1            |
| APGAR score 1 <sup>st</sup> minute | <7                         | 10                   | 11.1% | 39      | 21.7% | <b>.037*</b> |
|                                    | >=7                        | 80                   | 88.9% | 141     | 78.3% | 1            |
| APGAR score 5 <sup>th</sup> minute | <7                         | 1                    | 1.1%  | 17      | 9.4%  | <b>.032*</b> |
|                                    | >7                         | 89                   | 98.9% | 163     | 90.6% | 1            |
| Weight of the Newborn              | <2.5                       | 6                    | 6.7%  | 25      | 13.9% | <b>.030*</b> |
|                                    | 2.5-4                      | 65                   | 72.2% | 131     | 72.8% | <b>.173*</b> |
|                                    | >4                         | 19                   | 21.1% | 24      | 13.3% | 1            |

Table 4 Bivariate logistics analysis for factors associated with Failed Induction of labor in Mettu Karl hospital, 2018.

On multivariate analysis Gestational Age, Bishop Score and Duration of Labor had significant association. Women who had Gestational Age between 37 and 42 are 6.892 times more likely to have failed induction than those had Gestational Age less than 37 weeks AOR 6.892(1.348-35.248). Women who had Unfavorable bishop score were about 16.8 times more likely to have Failed induction as compared to having favorable bishop score AOR=16.813(1.526-185.226). On the other hand, the likelihood of failed induction was 15.1 times higher in women whose duration of labor was less than 8 hrs as compared to others with AOR=15.190(6.487-35.570).(Table 5).

| Variables                          |                     | Induction Outcome |       |                  |       | COR     | AOR                     |
|------------------------------------|---------------------|-------------------|-------|------------------|-------|---------|-------------------------|
|                                    |                     | Success           |       | Failed Induction |       | P value | OR(CI)                  |
|                                    |                     | N                 | %     | N                | %     |         |                         |
| Age                                | Mean(SD)            | 26(4)             |       | 26(3)            |       | .222    | 0.942(0.859-1.033)      |
| Gestational Age in Week            | <37                 | 27                | 15.0  | 4                | 4.4   | .031    | 1                       |
|                                    | 37-42               | 110               | 61.1  | 63               | 70.0  | .821    | 6.892(1.348-35.248)*    |
|                                    | >42                 | 43                | 23.9  | 23               | 25.6  | 1       | 4.590(0.848-24.835)     |
| Bishop Score                       | Unfavorable         | 136               | 75.6  | 75               | 83.3  | .018    | 16.813(1.526-185.226)*  |
|                                    | Intermediate        | 23                | 12.8% | 14               | 15.6% | .018    | 24.781 (2.335-263.047)* |
|                                    | Favorable           | 21                | 11.7% | 1                | 1.1%  | 1       | 1                       |
| Cervical Ripening                  | Yes                 | 131               | 72.8% | 73               | 81.1% | .135    | 1.771 (0.603-5.205)     |
|                                    | No                  | 49                | 27.2% | 17               | 18.9% | 1       | 1                       |
| Method Of Induction Used           | Amniotomy           | 7                 | 3.9%  | 1                | 1.1%  | .654    | 1.014(0.064-16.126)     |
|                                    | IV Pitocin Infusion | 161               | 89.4% | 86               | 95.6% | .249    | 5.721(0.997-32.829)     |
|                                    | Misopristol         | 12                | 6.7%  | 3                | 3.3%  | 1       | 1                       |
| Gravidity                          | Primigravida        | 104               | 57.8% | 59               | 65.6% | .219    | 1.471(0.768-2.817)      |
|                                    | Multigravida        | 76                | 42.2% | 31               | 34.4% | 1       | 1                       |
| Duration of labor                  | <=8                 | 21                | 11.7% | 43               | 47.8% | .000    | 15.190 (6.487-35.570)*  |
|                                    | >8                  | 159               | 88.3% | 47               | 52.2% | 1       | 1                       |
| Newborn Status                     | Alive               | 168               | 93.3% | 89               | 98.9% | .078    | 0.252(0.011-5.673)      |
|                                    | Still Birth         | 12                | 6.7%  | 1                | 1.1%  | 1       | 1                       |
| APGAR score 1 <sup>st</sup> minute | <7                  | 39                | 21.7% | 10               | 11.1% | .037    | 0.664(0.216-2.040)      |
|                                    | >=7                 | 141               | 78.3% | 80               | 88.9% | 1       | 1                       |
| APGAR score 5 <sup>th</sup> minute | <7                  | 17                | 9.4%  | 1                | 1.1%  | .032    | 0.082 (0.004-1.860)     |
|                                    | >7                  | 163               | 90.6% | 89               | 98.9% | 1       | 1                       |
| Weight of the Newborn              | <2.5                | 25                | 13.9% | 6                | 6.7%  | .030    | 0.561(0.110-2.858)      |
|                                    | 2.5-4               | 131               | 72.8% | 65               | 72.2% | .173    | 0.540(0.235-1.241)      |
|                                    | >4                  | 24                | 13.3% | 19               | 21.1% | 1       | 1                       |

\*Significantly associated variables

#### Hosmer and Lemeshow Test

| Step | Chi-square | df | Sig. |
|------|------------|----|------|
| 1    | 6.976      | 8  | .539 |

Table 5: Multivariate analysis for factors associated with outcomes of induced labor in MettuKarl hospital, 2018.

## CHAPTER SIX- DISCUSSION

According to this study For a total of 90 cases and 180 controls, Hypertensive disorders of pregnancy was the most common cause of induction in both case (35%) and control (46.7%) groups. post term pregnancy is the second common cause of induction for cases (27.8%) whereas premature rupture of membranes (31.7%) was for controls which was nearly same to a Study done in Congo which showed that Indications for induction were: preeclampsia (54.1%), premature rupture of membranes (29.5%) and post term (14.6%).(25)

In this study, on multivariate analysis women who had unfavorable bishop score were about 16.8 times more likely to have failed induction AOR=16.813(1.526-185.226); this is similar with a study done in and Jimma University Specialized Hospital in which those women who had unfavorable Bishop Score at admission were 5.3 times more likely to have failed induction as compared to those women with favorable Bishop score (AOR= 5.275, 95 % CI).(20) A significant association between Bishop Score and failed induction was also noted in a study done Pakistan were Rate of induction failure was 1.9 times higher in women with Bishop score of 5 or less (84%) versus (18%) in women with favorable cervix.(12) conversely a research done at Saudi indicated that Bishop Score were not predictive of the outcome of IOL (24).

On a research done at Stanford university by combining different studies a higher rate of cesarean delivery was observed in women with a lower Bishop score compared to women with more favorable cervix as represented by higher Bishop scores, increasing gestational age was associated with increased rates of cesarean delivery in the setting of induction of labor which is similar to this study showing those women with gestational age between 37 and 42 weeks are more likely to have cesarean delivery than those less than 37 weeks(21).

In this study 10.3% neonates were low birth weight (< 2500 gram) 72.5% had normal birth weight (2500-3999gram) which had nearly similar result in a study done at Jimma University Specialized Hospital; Nineteen (6.8%) neonates were low birth weight (< 2500 gram) and 88.6% had normal birthweight (2500-3999gram)(10).

In this study most of the women 92.5% were induced by intravenous Pitocin infusion followed by vaginal misoprostol (6.7%) and transcervical Foley catheter balloon (3.7%). Vaginal delivery occurred in 66.9% women and cesarean section in 33.3%. Which is similar to the study in Congo which showed oxytocin (74.7%), vaginal misoprostol (17.3%), transcervical Foley catheter balloon (12.1%) and Vaginal delivery occurred in 66.9% women and cesarean section in 29.6%. The majority of cesarean sections were performed at the primary induction, most of them (85.3%) in women with bad Bishop Score(25).

in Africa 86.1% with only oxytocin and in Asia 86.3% by oxytocin, (7).In Latin America Oxytocin was the single most frequently used induction method 65.9%, whereas misoprostol was used to induce only 8.9% of the deliveries (27).

According to this study 33.3% were delivered by Cesarean section (C/S) which is nearly similar to a study done in Jimma teaching hospital 34.2% (10) and in Congo 29.6% (8)



## **CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION**

### **Conclusion**

- The most common indication of induction in this study was hypertensive disorder of pregnancy for both cases and control groups followed by post term pregnancy.
- Intravenous Pitocin infusion was main method of induction in both case and control groups.
- Bishop score, Gestational age and Duration of labor are the main predictors of failed induction in this study.

### **Recommendation**

- It recommends that Health care providers should assess the cervical status (using the Bishop score) before induction to decrease the cesarean section rate done for an indication of failed induction and the hospital should have quality assurance programs and induction policies to ensure that inductions are performed in the best possible quality.
- Further research should be conducted in multi-center study to provide national data for evaluating and monitoring this important intervention

## **Limitation and strength of the study**

### **Limitation of the study**

1. The study was conducted in small population in MettuKarl hospital which might not be representative of whole population.
2. Personal bias may not have been completely eliminated but proper training may minimize it.
3. Sampling technique was restricted by period which was only Ten month.

### **Strength**

1. The study was conducted by using primary data that was prospective study.
2. The data collected by oriented midwives and IESO students

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## APPENDICES

### ANNEX- I CONSENT

**Jimma University Department of Integrated Emergency Surgery and Obstetrics (IESO)**

*Questionnaire prepared to study the Determinants of failed induction of labor at Mettu Karl Referral Hospital, Oromia regional state, Ethiopia.*

#### **Consent**

My name is Nuhamin Daniel, a final year IESO student in Master's program at Jimma University. The purpose of this study is to identify determinants of failed induction of labor at mettukarl hospital which can be used to design appropriate intervention so as to address the problem related with failed induction. Therefore, your honest and genuine participation by responding to the questions prepared is highly appreciated and helpful to attain the objective of the study.

Your name will not be written on this form and no individual response will be reported to anybody. Hence, your answers are completely confidential. You don't have to answer any question that you don't want to answer and you may refuse to answer all of the questions.

Please, if you cooperate by responding to the questions it means that you have your own contribution to the success of this study.

Would you willing to answer?

If **yes**, proceed to the next page.

If **No**, please stop here.

## **ANNEX 2- QUESTIONNAIRE/TOOLS FOR DATA COLLECTION**

**Jimma University, Department of Integrated Emergency Surgery and Obstetrics.  
Questioners prepared to collect variables to study Determinants of failed induction of labor  
at Mettu Karl hospital, Ethiopia 2010 E.C.**

Card no -----code no-----date data collection-----

### **Part 1 Maternal Socio-Demographic and baseline health information**

1. Age: \_\_\_\_\_(In Year)
2. Religion: 1/ Orthodox 2/Muslim 3/Protestant 4/ Others (specify)\_\_\_\_\_
3. Ethnicity: 1/ Oromo 2/ Tigre 3/Amhara 4/ other (specify) -----
4. Marital status; 1/ Never married 2 /Married  
3/ Divorced 4/ Widowed 5/ Others (Specify)-----
5. Educational level 1/illiterate 2/Grade 1-8  
3/ Grade 9-12 4/ Diploma and above 5/others (specify) -----
6. Residential Address: 1/ Urban 2/ Rural
- 7.Occupation:1/housewife,2/governmentalworker,3/merchant 4/ other specify-----

### **Part 2 (Induction of labor)**

8. Type of induction commenced: 1/ emergency 2/ planned
9. Indication(s) for Induction, circle where applicable 1/Post term 2/PROM  
3/Hypertensive disorder of pregnancy (HDP) 4/ Diabetes5/ IUGR 6/other specify--

10. Gestation age in weeks \_\_\_\_\_
11. If the indication of induction is PROM, She has chorioamnionitis? 1/ Yes 2 / No
12. Bishop's score: 1/ unfavorable 2/ intermediate 3/favorable
13. If the answer of Q No 12 is No 1 or 2 does ripening the cervix? 1/ yes 2/ no
14. If Q No 13 is yes, which method? 1/ misoprostol 2/ Foley catheter  
3/ cervical stripping 4/ other specify-----
15. Method of induction used 1/Amniotomy  
2/Intravenous Pitocin infusion 3/prostaglandin methods (misoprostol)
16. If misoprostol is used, total amount of misoprostol given; 1/ 50ug 2/ 100ug  
3/150ug 4/ 200ug 5/ >200ug
17. Gravidity; 1/ primigravida 2/ multigravida

**Part -3 Outcome and complication**

18. Duration of labor \_\_\_\_\_
19. Mode of delivery 1/Vaginal delivery 2/ Instrumental delivery 3/Caesarean section
20. If the answer of Q No19 is choice3; indication for c/s is  
1/ failed induction 2/ NRFHB pattern 3 / CPD 4/ other specify-----
21. Newborn Status at birth 1/ Alive 2/ still birth
22. If child alive, the Apgar score at 1st min: \_\_\_\_\_ and at 5<sup>th</sup> min \_\_\_\_\_
23. Weight of the baby; \_\_\_\_\_

DECLARATION

I, the undersigned, declared that the thesis is my original work, and hasn't been presented for a degree in any other university and that all sources of material used for this thesis have been duly acknowledged.

Declared by, candidate

Name: Nuhamin Daniel

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

This thesis has been declared for final submission with my internal examiner and advisers

Approval as university,

Name of internal examiner-----

Signature-----

Date-----

Confirmed by, advisers

1. Dr. DejeneAsefa (MD, Assistant professor and consultant in obstetrics and gynecology.

Signature-----

Date-----

- 4 AyantuKebede (Bsc , MPH).

Signature -----

Date -----