

# Outcome of Labor Induction and it's Associated Factor among Laboring Women at Dilchora Referral Hospital, Dire Dawa, Eastern Ethiopia

Abel Shiferaw (✉ [shifrawabel@gmail.com](mailto:shifrawabel@gmail.com))

DireDawa regional health bureau

Tesfaye Assebe

Haramaya university

Melake Demena

Hararmaya university

Abeselom Assefa

Saint Paul's hospital millennium medical college

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## Research Article

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# Abstract

**Background:** Induction of labor has a great role to prevent neonatal and maternal mortality and morbidity. Despite its role Induction sometimes fails with a potential risk of increasing maternal and neonatal mortality and morbidity. In Dire Dawa, there was no study done on outcomes of labor inductions. Therefore, this study is planned to fill this gap by studying the outcome of labor induction and associated factors among women who had delivered at Dilchora referral hospital in Dire Dawa, East Ethiopia.

**Objective:** To determine the outcome of labor induction and associated factors among women who had delivered at Dilchora referral hospital Dire Dawa East Ethiopia, May 15 to June 1, 2020.

**Methods:** Hospital-based retrospective cross-sectional study (July 8, 2014 up to July 08, 2019) was employed by using a pre-tested structured questionnaire to collect data from a sample of 444 charts using a systematic random sampling method by trained data collectors. First, bi-variate analysis was done to select variables for multivariate analysis and those variables with p-value 0.25 or less interred into multivariate analysis. In multivariable analysis, those variables with p-value <0.05 are considered as significantly associated. The model adequacy was checked by using the Hosmer and Lemeshow goodness of fit test.

**Result:** The result of the study reveled Post-Term mother [(AOR: 0.49 (0.25-0.98).The mother whose labor is induced by misoprostol [(AOR: 2.5 (1.08-5.94] the mother whose labor is induced by both (oxytocin and misoprostol) [(AOR: 0.33 (0.13-0.86)] and non-reassuring fetal heart rate pattern [(AOR: 0.10(0.03-0.30)] were significantly associated with success of induction.

**Conclusion:** The prevalence rate of success of labor induction was found (83.6%). And the most common indications for labor inductions were PROM and Post term. Furthermore, the study described that the most common method of induction in Dilchora referral Hospital is iv oxytocin and the minister of health should develop national evidence-based clinical practice guidelines for labour of induction and enforce its implementation.

## Introduction

### 1.1 Background

Induction of labor refers to the iatrogenic stimulation of uterine contractions before the onset of spontaneous labor to accomplish vaginal delivery(Cunningham et al., 2010). It is usually performed by administering oxytocin or prostaglandins to the pregnant woman, or by artificially rupturing the amniotic membranes(World health organization, 2018). and it indicated only when the risk of continuing the pregnancy to the mother and/or fetus exceeds the risk associated with the induced labor and birth (SOGC, 2008).

Induction of Labor is not risk-free, and many women find it uncomfortable. The incidence of inducing labor over the past several decades has continued to rise. In developed countries, the proportion of infants delivered at term following induction of labor can be as high as one in four births. In low- and middle-income countries the rates are generally lower, but in some low-income countries, they can be as high as those observed in high-income countries. (World Health Organization, 2018).

Induction of labor can be elective or emergency. Elective induction is usually done with prior planning by the health provider and the mother when continuing the pregnancy beyond certain weeks has a risk for the mother or the fetus, like in case of Pre labor rupture membrane, Diabetic Mellitus, moderate hypertension, postdate pregnancy. Emergency induction done when there is an emergency maternal and fetal condition that necessitates induction of labor immediately such as; prolonged PROM, severe preeclampsia, eclampsia Intra-uterine fetal death, intrauterine infection, severe oligohydramnios (Acharya, Devkota, Bhattarai, & Acharya, 2017; Cunningham et al., 2010)

Indications for induction of labor must be specific and unambiguous. The indications must be to save the life of the fetus and mother due to continuing risky pregnancy eg:- severe preeclampsia and eclampsia, pre-mature rupture of membrane, post-term pregnancy (Ayuba, Abhulimen, & Ekine, 2012). Induction sometimes fails with a potential risk of an increasing rate of Caesarean Section (C/S), excessive uterine activity, abnormal fetal heart rate pattern, maternal water intoxication, delivery of preterm infant due to incorrect estimation of dates, rarely uterine rupture, and possible cord prolapse (Sujata, Chanania, & Hansa, 2017)

## 1.2 Statement of the problem

Labor is a natural process by which uterine contraction results in cervical change. Whether spontaneous or induced the hope is that to achieve spontaneous vaginal delivery and reduce caesarian section and instrumental delivery but in some circumstance, the condition will go to caesarian section and instrumental delivery (Morris et al., 2017)

An increased rate of induction of labor for post-term pregnancies over 15 years was associated with decreased stillbirth rates in Canada (Vogel, Gülmezoglu, Hofmeyr, & Temmerman, 2014). For a long period many health care providers have recommended the use of induction of labor in circumstances in which the benefit of continuing a pregnancy must be outweighed than the potential maternal and fetal risk associated with the procedure and waiting for the onset of spontaneous labor. These circumstances generally include gestational age of 41 completed weeks or more, pre-labor rupture of amniotic membranes, hypertensive disorders, maternal medical complications, fetal death, fetal growth restriction, chorioamnionitis, multiple pregnancies, vaginal bleeding, and other complications. Following this condition, many neonates and mothers die in each hour throughout the world to prevent maternal and neonatal death WHO design and implement a strategy in the area of improving and availing comprehensive emergency obstetric services. One of the strategies is the induction of labor (World Health Organization, 2018)

Access to induction of labor can reduce complications which are happened due to continuing pregnancy has a risk to the fetus and mother. However, the use of induction of labor without medical need can put women at risk of short-term and long-term health problems(SOGC, 2008). The WHO advises that induction of labor be done when medically necessary, but does not recommend a specific rate for countries to achieve at the population level(World health organization, 2018).

The neonatal and maternal mortality rate of Ethiopia is 28/1,000 live births and 401/100,000 mothers respectively. (CSA., 2019). The main direct causes of maternal death in Ethiopia are obstetric complications such as hemorrhage 29.9%, obstructed labor/ruptured uterus 22.34%,pregnancy-induced hypertension 16.9%, puerperal sepsis 14.68%(Mekonnen & Gebremariam, 2018).

In Dire Dawa, there were un area with a high rate of maternal mortality and morbidity MMR calculated for the two periods (2013–2015) was 511 and 505 per 100,000 live births during baseline and trial periods, respectively (Tseyon, 2015). Those maternal mortality is due to poor access to comprehensive emergency obstetric care. Knowing labor outcome and associated factors following induction is crucial. In the investigator knowledge there is no study conduct in Dilchora referral hospital. Therefore, this study aimed to determine the outcomes of induction of labor and factors associated with induction of labor at Dilchora referral hospital.

## **1.3 Significant of the study**

For health professionals and community: Identifying magnitude and factors associated with labor induction outcomes will emphasize improvements in access to qualified care for laboring women that are necessary for a reduction in maternal life-threatening conditions. Since the labor induction outcomes, exploring and analyzing the severity of factors that provides important information for laboring women as well as for health care providers in setting priorities for in-depth assessments and health care improvements in maternal health. Furthermore, studies on labor induction outcomes related events in the study area are crucial to further understanding associated issues and to provide an evidence-based platform for appropriate interventions.

For government and other stakeholders: Since the study will explain factors associated with labor induction outcomes, study results will serve as an input for the health bureaus, health offices/departments, local NGOs and other stakeholders working in Dire Dawa city administration in planning and implementation of preventive and intervention strategies to improve maternal and neonatal health.

Moreover, the study can also be used as a baseline framework for researchers for further studies that will be conducted in similar setups

## **1.4 OBJECTIVES**

### **1.4.1 General objective**

To assess the outcome and associated factors of induction of labor among women who had delivered from July 08, 2014, to July 08, 2019, at Dilchora referral Hospital from May 15 up to June 1, 2020

#### 1.4.2 Specific objectives

To determine labor induction outcome.

To identify factors associated with outcome of labor induction.

## Material And Methods

### 3.1 The Study setting and period

Dire Dawa is one of two chartered cities in Ethiopia located in the eastern part approximately 515kms from Addis Ababa. The town is surrounded by predominantly rural Woreda as which produce, khat, and vegetables which are used as a principal cash crop for producers and consumption goods to the people in Dire Dawa and east Hararge region.

The city have 17 government-owned health centers, and Dilchora and Sabian hospital which is they used as a referral hospital owned and run by the Government. The total population of Dire Dawa city is 342,827; 171,930 are men and 170,897 women 232,854 or 67.5% of the population are urban inhabitants. The hospital especially Dilchora gives a referral service for different parts of the Oromiya and Somalia region. Delivery ward is one of the areas in which mothers get the service which is given by 4 Obstetricians. 1 general practitioner, 1 Head nurse 22 midwives. According to data from the hospitals labor ward registration book more than 400 inductions has been conducted in the 2018. The average monthly delivery service on Dilchora referral hospital in 2018 G.C is about 325. So far, there have not been any properly documented studies to show induction of labor, its associated factor and labor outcome. (CSA., 2007)

The study was carried out From May 15 up to June 1, 2020.in Dilchora referral hospital

### 3.2 Study design

Hospital-based cross-sectional study was used.

### 3.3 Population

#### 3.3.1 Source population

All women who had induction of labor and gave birth after 28 weeks of gestation in Dilchora referral hospital from July 08, 2014 – July 08, 2019.

#### 3.3.2 Study population

All women who had induction and gave birth after 28 weeks of gestation in the Dilchora referral Hospital from July 08, 2014 – July 08, 2019

## 3.4 inclusion and exclusion criteria

### 3.4.1 Inclusion Criteria

All registered women who delivered through induction of labor after period of viability (28 weeks) at Dilchora referral hospital

### 3.4.2 Exclusion criteria

All registered women without full document

## 3.5 Determination of sampling size

For first objective: The sample “size of outcome variable” for induction of labor is calculated using single population proportion formula considering the following assumptions: the level of confidence of 95%, margin of error 4%, proportion of success of labor induction from previous study to be 78%,(Girma & Wolde, 2016)

$$n = \frac{z^2 p(1-p)}{e^2}$$

Z = 1.96

P = 78%

e = margin of error 4%

Where, n is the sample size, Z2 tabulated value from standard normal distribution with the desired confidence level (95%), e is the desired level of precision; P is the estimated proportion (0.786).

$$n = \frac{(1.96)^2 \times (0.786)(1-0.786)}{(0.04)^2} = 404$$

(0.04)<sup>2</sup>

By adding 10% of the non-response rate the final sample size will be 404 + 40 = 444.

For the second objective-sample size was determined by considering different factor associated with success of labor induction using Epi- info version 7-sample size and power calculation for unmatched cohort and cross-sectional studies used to calculate the sample size .The assumptions taken two sided confidence interval of 95%, the power of study (1-β) of 80%.

Table 1

-Sample size calculation by considering different factor that associated with success of labor induction

Variable	percentage of outcome in unexposed group	percentage of outcome in exposed group	Sample size	Sample Size + 10% non-response rate	Reference
Gestational age	47%	69%	179	197	(Abdulkadir et al., 2017)
Mother Bishop	30%	66%	84	92	(Abdulkadir et al., 2017)
Weight of new born	47%	69%	180	198	(Abdulkadir et al., 2017)

To get representative sample on induction of labor outcome in the study period, the largest sample size from single population proportion formula is taken; which is 444.

## 3.6 Sampling procedure and sampling technique

A systematic random sampling procedure was used to choose the study participants using delivery registration book from July 08, 2014 – July 08, 2019

By using the formula  $k = N/n = 1334/444 = 3.0045 \sim 3$

Where:  $k$  = length of interval from the first selected sample to the next to be selected in registration book,  $N$  = total population,  $n$  = sample size. So, the sample was picked every three charts from registration book. When there was missing chart for the selected sample, we picked the next. Lottery method was used to select the first sample from the first three

## 3.7 Data collection methods

### 3.7.1 Data collection instrument

Data was collected by using a structured data-collecting checklist that was prepared and developed from previous studies. Pretest of the questionnaire was done to 5% of the sample size to validate and customize the tool.

### 3.7.2 Data Collectors

Two midwifery professional, who are not working in the study sites was recruited as a Data collector and one integrated emergency obstetric surgeon as supervisors. Data collector was oriented to the data collection format by supervisor and principal investigator on daily basis. P.I and supervisor was review all collected data and take corrective measures.

### 3.7.3 Data collection procedure

Those midwives Who would be trained as data collector was collect the data on the data collection tool and procedures under the supervision of one integrated emergency surgeon and the principal investigator For their completeness, accuracy and consistency. The data collector was start data collection after reviewing mothers chart for legibility. Those mother medical chart not fulfill the inclusion criteria will be replaced by next legible mother medical chart Based on the information obtained from the hospital delivery registration log books, and medical record a total of 444 patients card filled .

## **3.8 Study Variables**

### **3.8.1 Dependent variables- outcome of labor induction**

3.8.2 Independent variables- maternal socio demography factor (Age, residence) Obstetric factors (gravida, para, ANC follow up, Gestational age, bishop score) method of labor induction, an indication of labor induction (Post term, PROM, PIH)

## **3.9 Operational definitions**

Failed induction:- Failed induction is failure to initiate good uterine contraction. It is diagnosed if adequate uterine contractions are not achieved after 6 to 8 hours of induction (Federal Ministry of Health, 2010)

Outcome Of Labor Induction:-Proportion Of Success/Failure Of Induced Labor.

Success of labor induction:- if a woman delivered vaginally or by an instrument after induction with any of the methods.(Organization(WHO). 2011)

unsuccess of labor induction:- if a woman delivered by C/S due to any indication for cs after starting of induction. (Organization(WHO). 2011)

Bishop score: A group of measurements made at internal examination, used to determine whether the cervix is favorable or not. The score is based on the station of presenting part, dilation, effacement (or length), position and consistency of the cervix. A score of 8 or more generally indicates that the cervix is ripe.(World health organization, 2018)

## **3.10 Data quality assurance**

To keep the quality of data, detail trainings given for data collectors. day to day activities during data collection; supervised and evaluated errors was corrected by the investigator before the following day activity. The checklist was pre- tested by taking 5 percent of the sample size in the same Hospital and necessary modification in the checklist was made based on the nature of gaps identified.

## **3.11 Data processing and analysis**

The collected data was checked for its completeness, entered using epi-data 3.1 version and exported to SPSS-22 database program for analysis. Frequency distributions of both dependent and independent variables was done and presented by table and texts. To determine associated factors for induction and its outcome, logistic regressions was used. First bi-variate analysis was done to select variables for multivariate analysis and those variables with p-value 0.25 or less was interred into multivariate analysis. In multivariable analysis, those variables with p-value < 0.05 will be considered as significantly associated. The model adequacy was checked by using Hosmer and Lemeshow goodness of fit test.

## **3.12 Ethical considerations**

Institutional ethical clearance was first sought from the Institutional Health Research Ethics Review Committee (IHRERC) at Haramaya University, College of Health and Medical Sciences. Next, permission letter was taken from Dire Dawa City administration Health Bureaus and health facility officials. Before the start of data collection informed, voluntary, written and signed consent will be taken from facility head and confidentiality will be maintained and assured.

## **3.13 Plan for dissemination of findings**

The study will be presented to Haramaya university community as part of MPH thesis; and it will be disseminated to, Regional health bureau to the targeted health facility and to NGOs working on this area. Further attempt will be made to publish it on international scientific journals. Finally the data was described and presented using tables and charts.

## **Result**

### **4:1 Socio-demographic and obstetric Characteristics of the study participant**

Documents of 444 labor induced were reviewed during the study period. The Chart retrieval rate was 100%. From the total participants 341(76.8%) were in the age group of 20–34 years with a mean ( $\pm$  SD) of 27 ( $\pm$  5) years. The minimum and maximum age of mother in years was 16 and 39. Of the total participants 258 (58.1%) live in rural.

Three hundred fifty five (80%) of the women were multi para while 89(20%) were null-para. The study also revealed that 387(87.2%) of the participants had ANC follow up during pregnancy and the rest 57(12.8%) had no ANC follow up. 326 (73.4%) of the mother were gestational age of 37–41 weeks followed by gestational of > 42 weeks 71(16%).

Before induction time 289(65.1%) of the women had bishop score 5–8, and the membrane was ruptured in 184 (41.4%) mother. The study also shows that from the total 444 fetuses, 423(95.3) of them had regular fetal heartbeat pattern during induction and 21 (4.7%) had developed none reassuring fetal-heart beat pattern (NRFHRP)after induction.(Table 2)

Table 2  
 Socio demographic and obstetric Characteristics of Women  
 Who Had undergone induction of labor and Gave Birth In  
 Dilchora Referral Hospital From July 08, 2014 – July 08, 2019

Variable	Frequency (n)	Percentage (%)
Age	55	12.4
<20	341	76.8
20–34	48	10.8
≥ 35		
Residence	186	41.9
Urban	258	58.1
Rural		
Parity	89	20
Null-para	355	80
Multi-para		
ANC follow up	387	87.2
Yes	57	12.8
No		
Gestational Age	47	10.6
Less than 36 week	326	73.4
37–41 week	71	16.0
≥ 42 week		
Membrane status	260	58.6
Intact	184	41.4
Ruptured		
Bishop score	122	27.5
less than/equal to 4	289	65.1
5–8	33	7.4
greater than/equal to 9		

Variable	Frequency (n)	Percentage (%)
NRFHR	21	4.7
yes	423	95.3
No		

NRFHR:- non reassuring fetal heart rate.

## 4.2 Induction of labor

### 4.2.1 Reason and methods for induction of labor

The three most indications for inducing labor were PROM taking the highest frequency of 179(40.3%) followed by pregnancy-induced hypertension-160(36%) and post-term pregnancy 71(16). The methods of induction were either IV oxytocin infusion 212(47.7%), 169(38.1%) misoprostol and 63(14.2%) both.(Table 3)

Table 3

Reason And Methods for Induction of Labor in Women Who had undergone induction of labor and Gave Birth in Dilchora Referral Hospital from July 08, 2014 – July 08, 2019

Variable	Frequency(n)	Percentage (%)	
<b>Reason for induction</b>			
Yes	71	16	
<b>Post term(n = 444)</b>	No	373	84
<b>Prom(n = 444)</b>	Yes	179	40
<b>IUFD(n = 444)</b>	No	265	60
<b>Congenital anomaly(n = 444)</b>	Yes	33	7
	No	411	93
	Yes	21	5
	No	423	95
<b>Method of induction</b>			
Iv oxytocin	212	47.7	
Misoprostol	169	38.1	
Combined	63	14.2	

PROM– Premature rupture of membrane. IUFD – Intra uterine fetal death

## 4.3 Outcome of Labor Induction

Of the 444 women undergoing induction, 73(16.4%) were delivered by caesarean section while 371 {83.6% (95% CI: 80–87)}achieved vaginal delivery. In this study The main aim of induction was to achieve vaginal delivery, all women delivered by caesarean section were considered unsuccessful in labor induction.(Fig. 2)

### **4.3.1 Indication for caesarean section**

The main reason for caesarean section was failed induction 28(38%) followed by fetal distress 19(26%) and cephalo-pelvic disproportion 14(19%), malposition and prolonged labor 4(5%) & 8(11) respectively. (Fig. 3)

## **4.4 Associated factors for labor induction outcome**

### **4.4.1. Associated factors for labor induction outcome during bivariate binary logistic regression.**

In bivariate analysis, the following factors Related to labor induction outcome:-resident, post-term, bishop score, method of induction, non-reassuring fetal heart rate pattern, para significant association with success of induction of labor.

The Mother from rural area had 2.29[COR =, 95% CI: 1.37–3.81] times more likely to have succeeded in labor induction than those in urban areas. The odds of success of labor induction were 61%[COR=,95% CI: 0.39(1.44–4.67)]less likely in post-term pregnancy than their counter parts. Moreover, those women with Bishop scores of 5–8 and  $\geq 9$  at admission were 2.5[(COR=,95% CI: (1.47–4.26))] times and 1.99[(COR=,95% CI: (0.71–5.60))] times more likely induction to be successful compared to those women with  $\leq 4$  Bishop Score at admission.

Mothers whose labor is induced using misoprostol were two times[(COR=,95% CI: (1.04–4.06)] more likely to succeed than oxytocin. In contrast the mother whose labor was induced using both (oxytocin and misoprostol) was 80 %[( COR: 0.20(0.1–0.37))] less likely to be successful than oxytocin. The odd of success of labor induction was 91%[(COR:0.081 (0.03–0.20))] less likely in mother with non-reassuring fetal heart rate patterns than their counterparts.

Multi-para women were 2.7 [(COR: (1.81–35.80))] times more likely to have a success of labor induction than null-para women. The induction of labor in mothers whose babies weight  $> 2500\text{gm}$  were 59% [(COR: (0.16–1.07)] less likely to be successful than those with  $\leq 2500\text{gm}$ . .(Table 4)

Table 4

Bivariate Binary Logistic Regression Of Associated Factors For Labor Induction Outcome In Women Delivered In Dilchora Referral Hospital From July 08, 2014 – July 08, 2019

Variable	Outcome of Induction		COR(95%,CI)	P-value
	success	Un success		
Age				
< 20	47 (85.5%)	8 (14.5%)	1.17(0.41–3.41)	0.767
20–34	284 (83.3%)	57 (16.7%)	0.99(0.44–2.24)	0.993
≥ 35	40 (83.3%)	8 (16.7%)	1	
Residential Address				
Rural	228 (88%)	30 (12%)	2.29(1.37–3.81)	0.002*
Urban	143 (77%)	43 (23%)	1.00	
Post-term				
Yes	50 (70%)	21 (30%)	0.39(0.21–0.69)	0.001*
No	321 (86%)	52 (14%)	1.00	
Bishop score				
5–8	253 (88%)	36 (12%)	2.50(1.47–4.26)	0.001*
> 9	28 (85%)	5 (15%)	1.99(0.71–5.60)	0.192
< 4	90 (74%)	32 (26%)	1.00	
Method of induction				
Misoprostol	156(92%)	13 (8%)	2.05(1.04–4.06)	0.038*
Combined	34 (54%)	29 (46%)	0.20(0.14–0.37)	0.001*
Oxytocin	181(85%)	31 (15%)	1.00	
NRFHRP				
Yes	7 (33%)	14 (67%)	0.08(0.03–0.21)	0.001*
No	364 (86%)	59 (14%)	1.00	
Para				
Multi Para	308(86.6)	47(13.4%)	2.7(1.56–4.89)	0.001*
Null Para	63(70.8)	26(29.2%)	1.00	
New born weight				

Variable	Outcome of Induction		COR(95%,CI)	P-value
	success	Un success		
> 2500gm	315 (82%)	68 (18%)	0.41(0.16–1.07)	0.069*
≤ 2500gm	56 (92%)	5 (8%)	1.00	

\*- statistically significant at P-value < 0.25

IUFD-intrauterine fetal death,

NRFHRP-Non reassuring fetal heart rate pattern

## 4.4.2. Associated factors for labor induction outcome during multivariate binary logistic regression.

In multivariate analysis, being post-term, the induction method and having non-reassuring fetal heart rate pattern have retained their significant association with successful induction. Post-Term mother were 51% [(AOR: 0.49 (0.25–0.98)] less likely induction to be successful compared to those women with term pregenacy.

The mother whose labor is induced by misoprostol where 2.5[(AOR: (1.08–5.94)] times more likely to succeed in labor induction than those induced by oxytocin. In contrast the mother whose labor is induced by both (oxytocin and misoprostol) was 67% [(AOR: (0.13–0.86)] less likely to be successful than that labor is induced by oxytocin. The odd of success of labor induction is 90% [(AOR: 0.10(0.03–0.30)] less likely in with non-reassuring fetal heart rate pattern than those of regular fetal heart rate pattern during labor.(Table 5)

Table 5  
Multivariate Binary Logistic Regression Of Associated  
Factors For Labor Induction Outcome In Women  
Delivered In Dilchora Referral Hospital From July 08,  
2014 – July 08, 2019

Variable	AOR(95%,CI)	P-value
Residential Address		
Rural	1.68(0.91–3.10)	0.095
Urban	1.00	
post term		
Yes	0.49(0.25–0.98)	0.044**
No	1.00	
Bishop score		
5–8	2.07(0.90–4.76)	0.086
≥ 9	1.53(0.40–5.82)	0.533
≤ 4	1.00	
Method of induction		
Oxytocin	1.00	
Misoprostol	2.53 (1.08–5.94)	0.033**
Combined	0.33(0.13–0.86)	0.022**
NRFHP		
Yes	0.10(0.03–0.30)	0.001**
No	1.00	
Para		
Multi Para	1.7 (0.94–3.47)	0.73
Null Para	1.00	
New born weight		
> 2500gm	0.39(0.13–1.15)	0.088
≤ 2500gm	1.00	

\*\* - statistically significant at P-Value ≤ 0.05

IUFD-intrauterine fetal death

## Discussion

From 444 card reviewed in this study 73(16.4%) of them delivered by caesarean section while 371 achieved vaginal delivery making the prevalence rate of success induction (83.6%) with (95% CI: 80% – 87%). Post-term, Method of induction, non-reassuring fetal heart rate pattern had a statistically significant Rate of success of induction in St. Luke Catholic Hospital (58%) and public hospitals of Mekelle town (76%).(Abdulkadir et al., 2017; Garang Dakjur, Angesom Kebede, & Araya Abrha Medhanyie, 2020) This could be because of the difference in quality of induction care provided by the hospitals, skilled professionals and different induction method practice in those setup. (Abdulkadir et al., 2017).

Related to the factors associated with the success of induction the study shows that induction of labour occurred mostly in multi Para mother 80% compared to 20% in null-para mothers. Even if it does not show the significant of association in multivariate analysis, multi parous mother have two times more likely to have a success of labor induction than null-para women. similar finding reported in the study done in Public Hospital in Ethiopia and Dessie Referral Hospital: Northeast Ethiopia (Dilnessa et al., 2019; Rade et al., 2018). increased parity had a favorable bearing on the outcome of induction. Also, labour will proloned in primipara women because cervix was not tested for labour. (Dilnessa et al., 2019).

This study's common indication for labor induction was PROM (40.0%) followed by post term (16%).This is in line with the study done in public hospitals of Mekelle town PROM (41% )followed by post term (19%) (Garang Lueth, 2020).Contrasting to this the most common indication for labor Induction in Latin America was elective induction (30%) (Guerra et al., 2009). This difference is because of the two countries socio-economic conditions and PROM was more common in low socioeconomic societies due to wide spread nutrition and infection conditions that would facilitate the condition (Guerra et al., 2009).

The study shows that post-term mothers were fifty one percent less likely induction to be successful than those women with term. A similar result was found in the previous study done in Wolliso St. Luke, Catholic Hospital and The Aga Khan University Hospital, Pakistan shows term mother had three and two time more likely to succeed in labor induction than post term mother.(Abdulkadir et al., 2017; Khan et al., 2012) This may be related to when the mothers became post term(Gestational age > 42 week) there would be respectively big fetus (macrosomia) or decreased placental insufficiency potentially causing fetopelvic disproportion and non-reassurance fetal heart beats, for induction of labor to fail (Abdulkadir et al., 2017).

In this study the most common method of induction was iv infusion of oxytocin (47.7) followed by misoprostol (38.1) This is in line with other study done in Tigray region, Ethiopia 51% of induction of labour done by oxytocin infusion followed by misoprostol 49% .other Study conducted in Egypt shows 65.5% of the women received misoprostol while 34.4% received intravenous oxytocin infusion as a method of labor induction (Abraha, 2020;Abdel Hafiz, 2014 ). Other study done in Latin America where oxytocin IV infusion was used in about 90% of all labor inductions (Guerra et al., 2009). The choice

whether to induce with oxytocin or misoprostol was more on their dependent on the favorability of the woman's cervix and misoprostol availability and protocol used within the unit.(Bekru & Yirdaw, 2018)

The mother whose labor is induced by misoprostol where 2.5 times more likely to succeed in labor induction than those induced by oxytocin. ) This is in line with other study done by Coronation Hospital and Universiv of the Witwatersrand, South Africa When compared with oxytocin,misoprostol was more effective for labour induction. The relative risk of failure to achieve vaginal delivery was 0.48 (95% CI 0.35 to 0.66) (Alfirevic, 2006)

The mother whose labor is induced by both (oxytocin and misoprostol) was 67% less likely to be successful than that labor is induced by oxytocin. .(Alfirevic, 2006)

The study also revealed that the presence of non-reassuring fetal heart beat pattern was significantly associated with the success of labor induction. The success of labor induction is ninety percent less likely in with non-reassuring fetal heart rate pattern than those of having regular fetal heart rate pattern. This is consistence with a study done in Wolaita Sodo, South Ethiopia. The success of labor induction is sixty four percent less likely in with non-reassuring fetal heart rate pattern than those of having regular fetal heart rate pattern (Bekru & Yirdaw, 2018). Other study conducted in Wolliso St. Luke, Catholic Hospital, South West Shewa, Oromia revealed that Cases who had not fetal heart beat abnormality were five time more likely to be success during induction of labor in contrast with those with abnormality. (Abdulkadir et al., 2017) This could be due to the presence of fetal distress cause non reassuring fetal heart beat pattern and this sign is alarming to take immediate action in order to save the life newborn(Acharya et al., 2017).

## **Limitation Of The Study**

Since it was a retrospective study it only depends on available data's Details of socio demographic and obstetric Characteristics variables such as educational level, and quality of obstetric services not addressed due to lack of documentation.

The study was done in only single hospital so the result may not describe the induction data of county.

## **Conclusion And Recommendations**

### **6.1. CONCLUSION**

The prevalence rate of success labor induction was found (83.6%). And the most common indications for labor inductions were PROM and Post term. Furthermore, the study described that the most common method of induction in Dilchora referral Hospital is IV oxytocin infusion. Variables which increased the likelihood of success of labor induction were post term, method of induction and non-reassuring fetal heart rate.

### **6.2. RECOMMENDATION**

Based on the finding of this study, the following recommendation are made:-

- the minister of health should develop national evidence-based clinical practice guidelines for labour of induction and enforce its implementation
- The hospital could develop clear induction protocol and it should be started and implemented. In addition, it should have a follow-up and evaluation method for induction service. Before starting of induction, the health care providers also should consider that induction of labour has a high risk of failure. Therefore, they must make sure that the possible benefit of induction outweighs the risk of induction.
- Further prospective studies should be made with large sample size to investigate Outcome of Labor Induction and Associated Factor by researchers.

## Declarations

Competing interests: The author declares no competing interests.

## Abbreviations

ANC	Antenatal Care
APGAR	Appearance, Pulse, Grace, Activity, Reflex
ARM	Artificial Rupture of the Membranes
CEMOC	Comprehensive Emergency Obstetric Care
CS	Caesarean Section
DM	diabetic mellitus
FHR	Fetal Heart Rate
GA	Gestational Age
ICU	Intensive Care Unit
IOL	Induction of Labor
IUFD	Intrauterine Fetal Death
IV	Intravenous
NICU	Neonatal Intensive Care Unit
NRFHRP	Non-Reassuring Fetal Heart Rate pattern

PGE2	Prostaglandin E2
PIH	pregnancy induced hypertension
PROM	premature rupture of membrane
RCOG	Royal College of Obstetricians and Gynecologists
WHO	World Health Organization

## References

Abdulkadir, Dejene, A., Geremew, M., & Dechasa, B. (2017). Induction of labor prevalence and associated factors for its outcome at Wolliso St. Luke. *Catholic Hospital, South West Shewa, Oromia. Intern Med*, 7(255), 2.

Acharya, T., Devkota, R., Bhattarai, B., & Acharya, R. (2017). Outcome of misoprostol and oxytocin in induction of labour. *SAGE open medicine*, 5, 2050312117700809.

Al-Shaikh, G., Wahabi, H., Fayed, A., Esmail, S., Al-Malki, G., & Al-Esmail, I. (2012). Factors associated with successful induction of labor. *Saudi Med J*, 33(3), 298-303.

Ayuba, I., Abhulimen, O., & Ekine, A. (2012). Safety of Induction of Labour in the Niger Delta Region. *Greener J Med Sci*, 2(6), 173-178.

Bekru, E. T., & Yirdaw, B. E. (2018). Success of labour induction institution based cross-sectional study Wolaita Sodo, South Ethiopia. *International Journal of Nursing and Midwifery*.

CSA., C. s. a. (2007). *Summary and Statistical report of the 2007 population and housing census*.

CSA., C. s. a. (2019). Ethiopia Mini Demographic and Health Survey.

Cunningham, F., Leveno, K., Bloom, S., Hauth, J., Rouse, D., & Spong, c. (2010). Williams Obstetrics 23rd edition *JAMA*, 304(4), 474-475.

Dilnessa, T., Temesgen, K., & Workie, A. (2019). The Proportion of Failed Induction of Labour and Associated Factors among Women Undergoing Induction of Labour in Dessie Referral Hospital: Northeast Ethiopia a Cross-sectional Study. *Asian Journal of Pregnancy and Childbirth*, 1-13.

Federal Ministry of Health. (2010). Management protocol on selected obstetrics topics

Garang Dakjur, Angesom Kebede, & Araya Abrha Medhanyie. (2020). Prevalence, outcomes and associated factors of labor induction among women delivered at public hospitals of MEKELLE. *BMC pregnancy and childbirth*.

- Girma, W., TseaduFitsum, & Wolde, M. (2016). Outcome of Induction and Associated Factors among Term and Post-Term Mothers Managed at Jimma University Specialized Hospital: A Two Years' Retrospective Analysis. *Ethiopian journal of health sciences*, 26(2), 123-132.
- Guerra, G., Cecatti, J., Souza, J., Faúndes, A., Morais, S., Gülmezoglu, A., . . . Carroli, G. (2009). Factors and outcomes associated with the induction of labour in Latin America. *BJOG: An International Journal of Obstetrics & Gynaecology*, 116(13), 1762-1772.
- Khan, N. B., Ahmed, I., Malik, A., & Sheikh, L. (2012). Factors associated with failed induction of labour in a secondary care hospital. *Journal of the Pakistan Medical Association: JPMA*, 62(1), 6.
- Mekonnen, W., & Gebremariam, A. (2018). Causes of maternal death in Ethiopia between 1990 and 2016: systematic review with meta-analysis. *Ethiopian Journal of Health Development*, 32(4).
- mohamed S, abdelhafeez M, & A, m. (2013). the distance from maternal perineum to fetal head as apredictive of successful induction of labour *SEMANTIC SCHOLAR*.
- Morris, J. L., Winikoff, B., Dabash, R., Weeks, A., Faundes, A., Gemzell-Danielsson, K., . . . Ho, P. C. (2017). FIGO's updated recommendations for misoprostol used alone in gynecology and obstetrics.
- Organization(WHO)., W. H. (2011). *WHO recommendations for induction of labour*. World Health Organization.
- Pravati, T., Tapasi, P., Prasanna, B., & Susanta-kumar, M. (2016). prevalence and predictor of faild induction *international jornal of pharmaceutical sciences review and research*.
- Rade, B., Mitku, Y., Weldemicheal, A., Zenebe, Z., & Desalegn, A. (2018). Induction of Labor and Its Determinant Factors: Retrospective Cross-Sectional Study from a Public Hospital in Ethiopia. *J Preg Child Health*, 5(388), 2.
- SOGC. (2008). guid line for Induction of Labour. *National Collabourating Centre for Women's and Children's Health. National Institute for Health and Clinical Excellence*.
- Sujata, P., Chanania, K., & Hansa, J. (2017). Comparative Study between Elective Induction of Labour and Spontaneous Labour. *Advances in Bioresearch*, 8(2).
- Sujata., Chanania, K., & Hansa, J. (2017). Comparative Study between Elective Induction of Labour and Spontaneous Labour. *Advances in Bioresearch*, 8(2).
- Tandu-Umba, B., Tshibangu, R. L., & Muela, A. M. (2013). Maternal and perinatal outcomes of induction of labor at term in the university clinics of Kinshasa, DR Congo. *Open Journal of Obstetrics and Gynecology*, 3(01), 154.

Tseyon, T. (2015). Assessment of maternal death and factors affecting maternal death surveillance and response system in Dire Dawa, Ethiopia. (2), 8-9.

Vogel, J., Gülmezoglu, A., Hofmeyr, G., & Temmerman, M. (2014). Global perspectives on elective induction of labor. *Clinical obstetrics and gynecology*, 57(2), 331-342.

World health organization. (2018). *WHO recommendations: induction of labour at or beyond term*. World Health Organization.

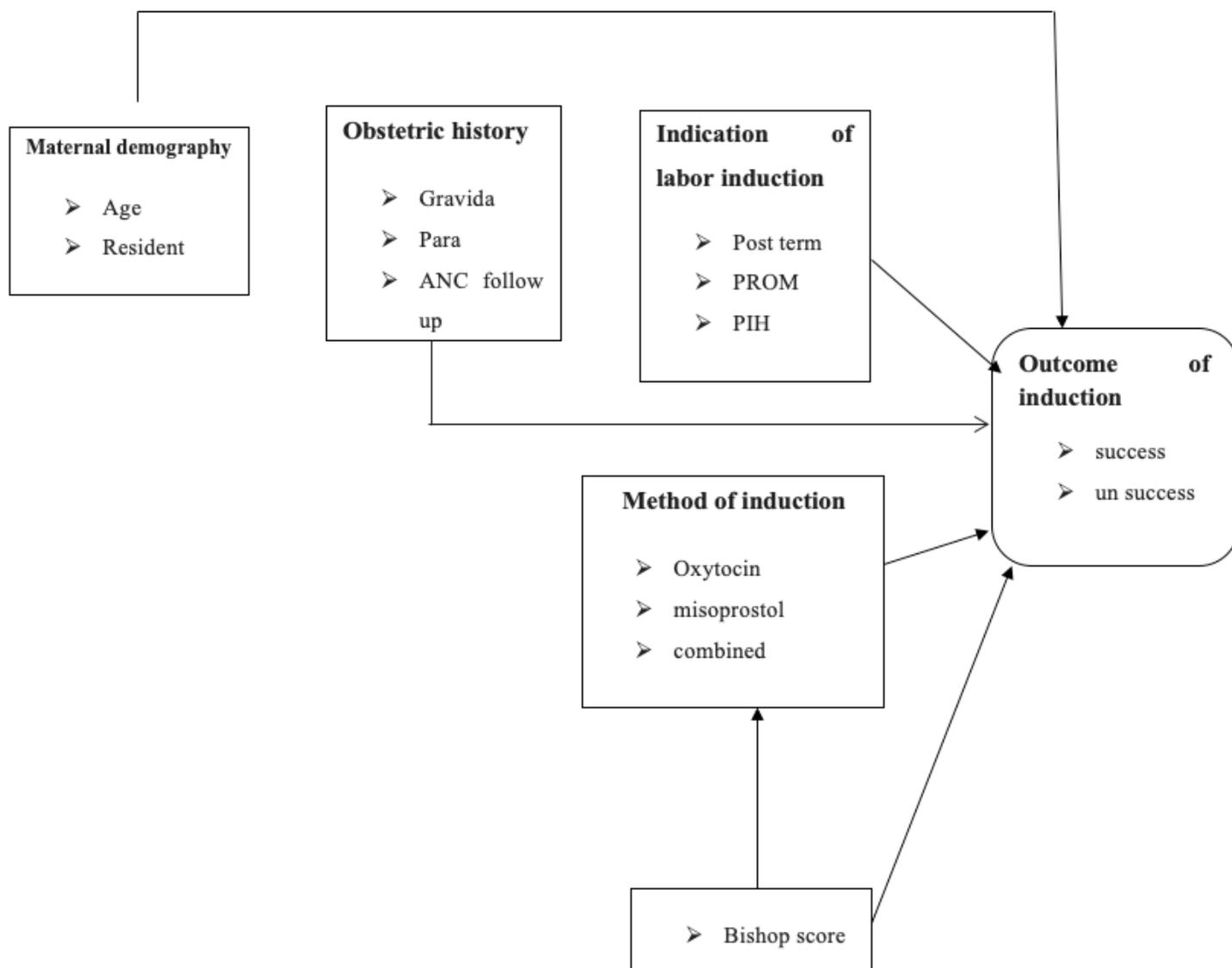
Garang Dakjur, Angesom Kebede, & Araya Abrha Medhanyie. (2020). Prevalence, outcomes and associated factors of labor induction among women delivered at public hospitals of MEKELLE. *BMC pregnancy and childbirth*.

Teklehaymanot H, Wondwossen W, & K., G. (2019). Failure of labor induction in Tigray region, Ethiopia: a retrospective record review study.

Alfirevic, Z. and A. Weeks (2006). Oral misoprostol for induction of labour. Cochrane Database of Systematic Reviews, John Wiley & Sons, Ltd.

## Figures

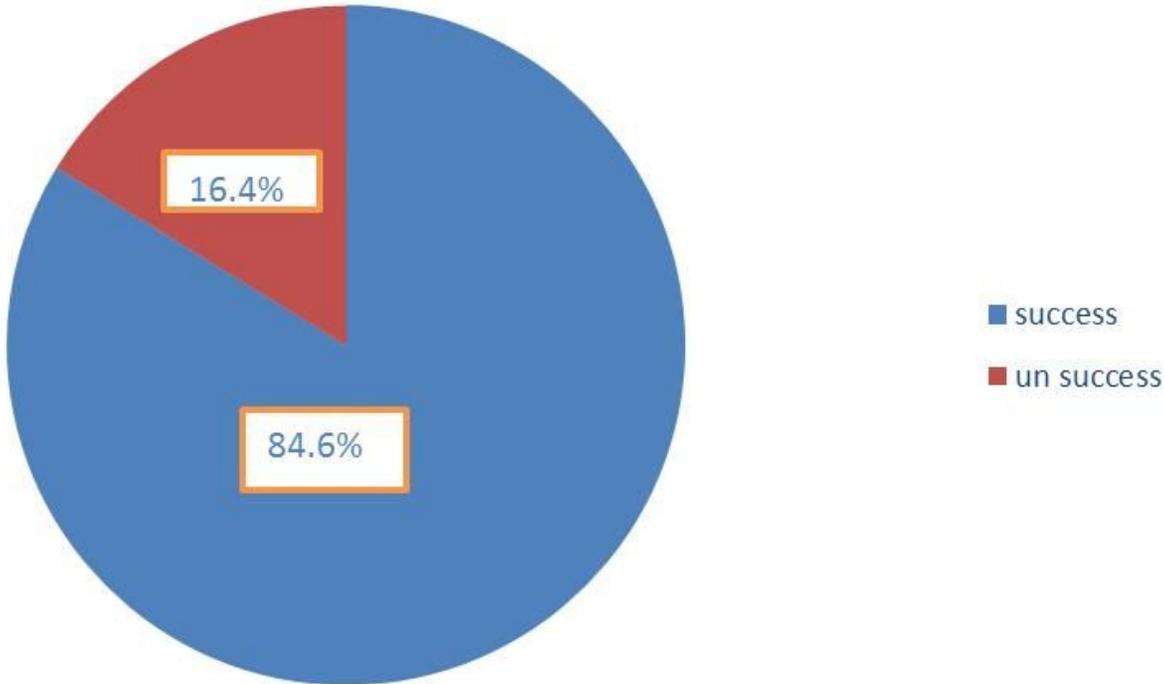
### 2.3 Conceptual framework



**Figure 1**

Based on various literature review Conceptual framework of outcome of induction of labor and associated factor are developed.

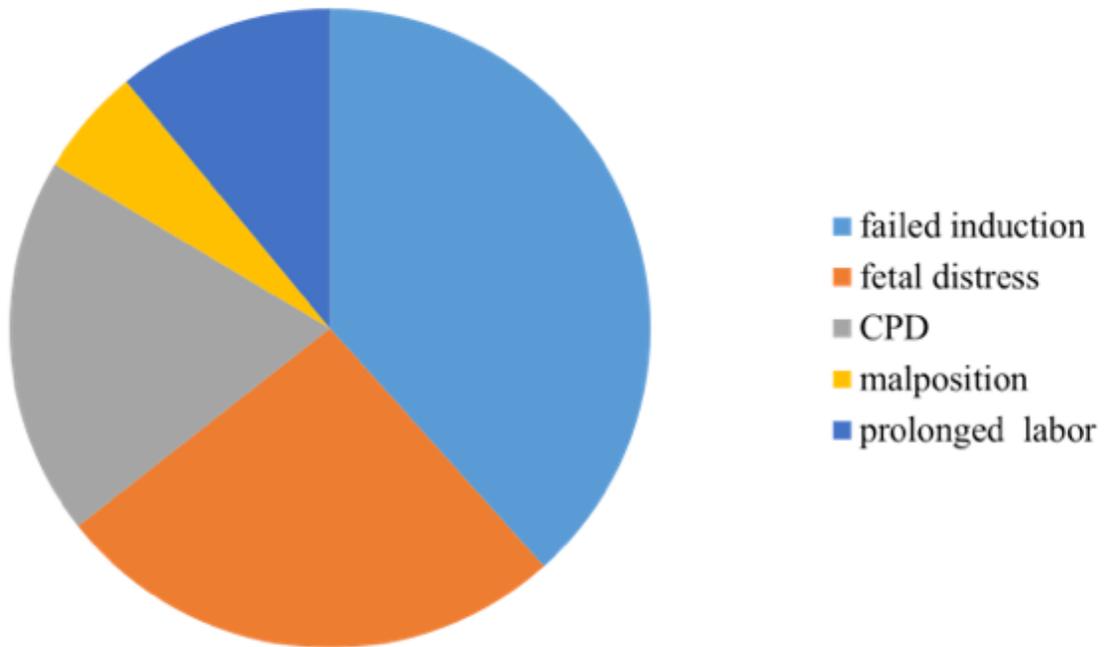
# outcome of labor induction



**Figure 2**

Outcome Of Labor Induction among Women Who Had undergone induction of labor and Gave Birth In Dilchora Referral Hospital From July 08, 2014 – July 08, 2019

### Indication for CS



**Figure 3**

Indication for CS among Women Who had undergone induction of labor and Gave Birth in Dilchora Referral Hospital from July 08, 2014 – July 08, 2019

## Supplementary Files

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