MAGNITUDE OF CESAREAN SECTION DELIVERY AND ITS ASSOCIATED FACTORS AMONG MOTHERS WHO GAVE BIRTH AT PUBLIC HOSPITALS IN NORTH WOLLO ZONE, NORTHERN ETHIOPIA

MSc THESIS

MELESE AYALEW ABATE (BSc)

MAY 2019

HARAMAYA UNIVERSITY, HARAR, ETHIOPIA

Magnitude of Cesarean Section Delivery and its Associated Factors among Mothers Who Gave Birth at Public Hospitals in North Wollo Zone, Northern Ethiopia

A Thesis Submitted to the School of Nursing and Midwifery,

Post Graduate Program Directorate

Haramaya University

In Partial Fulfilment of the Requirements for the Degree of

Master of Science in Maternity and Neonatal Nursing

MELESE AYALEW ABATE (BSc)

MAY 2019

HARAMAYA UNIVERSITY, HARAR, ETHIOPIA

APPROVAL SHEET

HARAMAYA UNIVERSITY

POST GRADUATE PROGRAM DIRECTORATE

I hereby certify that I have read and evaluate this Thesis entitled "Magnitude of Cesarean Section Delivery and Its Associated Factors among Mothers Who Gave Birth at Public Hospitals in North Wollo Zone, Northern Ethiopia" prepared under my guidance by Melese Ayalew Abate. I recommend that it be submitted as fulfilling the thesis requirement.

Bizatu Mengistie (PhD, Associate Professor)	_____	_____
Major Advisor	Signature	Date
Merga Dheressa (PhD, Assistance Professor)	_____	_____
Co-Advisor	Signature	Date

As a member of the Board of Examiners of the MSc Thesis Open Defense Examination, I certify that I have read and evaluated the Thesis prepared by Melese Ayalew Abate and examined the candidate. I recommend that the thesis be accepted as fulfilling the Thesis requirement for the degree of Master of Science in Maternity and Neonatal Nursing.

_____	_____	_____
Chairperson	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

Final approval and acceptance of the Thesis is contingent upon the submission of its final copy to the Council of Graduate Studies (CGS) through the candidate's department or school graduate committee (DGC or SGC).

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this Thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this Thesis. Any scholarly matter that is included in the Thesis has been given recognition through citation.

This Thesis is submitted in partial fulfillment of the requirements for a master degree at the Haramaya University. The Thesis is deposited in the Haramaya University Library and is made available to borrowers under the rules of the Library. I solemnly declare that this Thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma of certificate.

Brief quotations from this Thesis may be made without special permission provided that accurate and complete acknowledgement of the source is made. Requests for permission for extended quotations from or reproduction of this Thesis in whole or in part may be granted by the Head of the School or Department when in his or her judgment the proposed use of the material is in the interest of scholarship. In all other instances, however, permission must be obtained from the author of the Thesis.

Name: **Melese Ayalew Abate** Signature: _____ Date: _____

School/Department: Nursing and Midwifery

BIOGRAPHICAL SKETCH

My name is Melese Ayalew Abate. I was born in 1989 at Jarsa, Gubalafto Woreda, North Wollo Zone, and Northern Ethiopia. I completed my elementary education at Wolldia Primary School, melestegna from 2004-2006 and secondary education at Woldia Secondary and Preparatory School from 2007-2010. I joined to Hawassa University in 2012 for tertiary education. After four years of education in BSc Midwifery at Hawassa University I graduated in BSc Midiwifery in 2016. Then, I joined in HFSUH, Midwifery Department. After two year of work experience I joined to Haramaya University for the second degree education in Maternity and Neonatal Nursing in 2018.

ACKNOWLEDGMENTS

First of all I am grateful to the almighty God and his mother Virgin St. Mary for giving me good health and helping me during the preparation of this MSc thesis.

Secondly, I would like to express my gratefulness to School of Graduate Studies, College of Health and Medical Sciences, Haramaya University, School of Nursing and Midwifery for giving this chance to do this thesis.

Thirdly, I would like to extend my deepest appreciation and thanks to my advisors Dr. Bizatu Mengiste and Dr. Merga Dheresa for their unreserved and constructive comments and guidance throughout the work starting from proposal development up to the end

Finally, I would like to express my appreciation to Haramaya University, College of Health and Medical Science librarian and internet center coordinator for their support and assistance in getting important materials to develop this research thesis and I would like to acknowledge my families for their material and moral support; and my appreciation extend, to every person who has come into my life and inspired, and touched me through their presence.

Lastly, my appreciation also goes to my data collectors, supervisors and study participants; without them the research would not be done.

TABLE OF CONTENTS

LIST OF TABLES

Tables Page

LIST OF FIGURES

Figures Pages

ACRONYMS AND ABBREVIATIONS

ANC	Antenatal Care Clinic
AOR	Adjusted Odd Ratio
APH	Ante Partum Hemorrhage
NRFHBP	Non Reassuring Fetal Heart Beat Pattern
GA	Gestational Age
CS	Cesarean Section
ECS	Emergency Cesarean Section
CPD	Cephalic Pelvic Disproportion
VBAC	Vaginal Birth After Cesarean Section
HIV/AIDS	Human immune virus/acquired immune deficiency syndrome
ROM	Rupture of membrane
EDHS	Ethiopian Demographic and Health Survey
ETB	Ethiopian Birr
FDRE	Federal Democratic Republic of Ethiopia
FMOH	Federal Ministry of Health
HIMS	Health Management and Information System
HU	Haramaya University
IHRERC	Institutional Health Research Ethics Review Committee
OR	Odd Ratio
PNC	Post Natal Care
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
WHO	World Health Organizations

ABSTRACT

Background: Cesarean section is one of the most common surgeries around the world performed whenever abnormal conditions complicate labor and vaginal delivery, threatening the life or health of the mother or the baby. Although Cesarean Section is a safe operation, when it is performed without medical need it puts mothers and their babies at risk of short- and long-term health problems. However, the factors are not persistent and there is limited information concerning the levels of cesarean section delivery and its associated factors in public hospitals. Therefore, this study was aimed to assess the magnitude of cesarean section and associated factors in hospitals of North Wollo Zone, Northern Ethiopia.

Objective: To assess the magnitude of cesarean section delivery and its associated factors of cesarean section delivery among mothers who gave birth in public hospitals of North Wollo Zone, Northern Ethiopia from March 1 up to 30 /2019.

Method: An institution based cross sectional study design was employed to gather information on magnitude and associated factors of cesarean section delivery among 433 mothers who gave birth in public hospitals of North Wollo Zone, Northern Ethiopia from March up to 30, 2019. Systematic random sampling method was be used to select study partcipants. Structured questionnaire was used to collect data. The collected data was entered into Epi data version 4.2.0.0 and then exported into SPSS window version 24 for analysis. Bivariate and multivariate analysis was carried out to identify independent predictors of cesarean section

Result: The Magnitude of caesarean section was 30.9% (95% CI, 26.8-35.3). Being urban resident (AOR=4.04, 95%CI: 2.19-7.45), Malpresentation (AOR=2.56, 95%CI: 1.29-5.05), previous cesarean section (AOR=9.11, 95%CI: 3.77-22.01) and ante partum hemorrhage (AOR=8.65, 95%CI: 3.82-19.56) were statistically and positively associated with cesarean section delivery.

Conclusion and Recommendation: The magnitude of cesarean section among mothers who gave birth at north Wollo zone public hospitals was high. Residence, ate partum hemorrhage, previous cesarean section and Malpresentation were significantly associated with cesarean section. Therefore, hospitals should give a great emphasis in reducing magnitude of caesareans sections.

Key words: cesarean section, public hospitals, North Wollo Zone.

1. INTRODUCTION

1.1. Background

Cesarean delivery is an operative technique by which a fetus, placenta, and membranes are delivered through an abdominal and uterine incision. it is also called cesarean section, performed whenever abnormal conditions complicate labor and vaginal delivery, threatening the life or health of the mother or the baby (Gibbons et al., 2010). Cesarean section is one of the most common surgeries around the world (Feng et al., 2014) and it is classified into elective, necessary, and emergency caesarian section. Elective cesarean section is based on the maternal request without medical reasons, according to the signs of labor, and is performed within the allotted time. Emergency cesarean section is performed at the time of any immediate threat to the health of the mother or the fetus (Stjernholm et al., 2010).

The main indications for cesarean delivery are previous cesarean delivery, Cephalic pelvic disproportion, fetal distress, pregnancy-induced hypertension, failed induction, ante partum hemorrhage, obstructed labor, breech presentation, multiple gestation, Chorioamnionitis (Gayathry et al., 2017). Although Cesarean Section is a safe operation, when it is performed without medical need it puts mothers and their babies at risk of short- and long-term health problems. Most complications of Cesarean Section, however, come from the cause which leads to Cesarean Section. Factors that make some women more likely to have complications include: obesity, large infant size, prolonged labor, multiple pregnancy, and premature labor. In the absence of a clear medical indication, the excess risk associated with the operation itself must be considered. Short- and long-term maternal and infant problems associated with elective caesarean section are higher than those associated with vaginal birth (Gilliam, 2006; MacDorman et al., 2008).

World Health organization (WHO) has recommended that the cesarean-section rate should lie between 5% and 15% to have an optimal impact since no additional benefit for the newborns or for the mothers is obtained beyond this level (Betrán *et al*., 2007). In the United States, magnitude CS delivery 29.1%, of all births and in the United Kingdom it was about 20%, Brazil has one of the highest rates of cesarean sections in the world, which reached a high peak of 36.4%. This is higher than the rate that expected by the WHO (Fay Menacker *et al*., 2006)

1.2. Statement of the problem

Worldwide, Cesarean section delivery is the most frequent abdominal surgery performed among pregnant women. It is estimated that about 20 million cesarean section deliveries occur each year. The number of women having babies born by cesarean section is rapidly growing in a continuous way in both the developed and developing countries (Betrán et al., 2007; Luz et al., 2010). In a study conducted in 137 countries worldwide, Cesarean sections prevalence in 54 countries was reported less than 10% and in 69 countries more than 15% (Luz et al., 2010). It is the most common major surgical procedure performed in sub-Saharan Africa countries (Berhan and Abdela, 2004).

The rate of cesarean section in different countries varies between urban and rural areas, different socio-economic groups, and among people with a different rate of access to different public and private services (Strom, 2013). A study conducted between 2002 and 2012 showed that the rate of cesarean section increased from 18.2% in 2002 to 30.3% in 2012 with the most common reason for cesarean section being the absence of a clear indication (Al Rifai, 2014).

According to American College of Obstetricians and Gynecologist (ACOG) report, cesarean birth significantly increased a woman's risk of a pregnancy-related fatality (35.9 deaths per 100,000 deliveries with a live-birth outcome) compared to a woman who delivered vaginally (9.2 deaths per 100,000) (ACOG, 2013). The risk and safety of cesarean section differ from place to place in respect to structural development of health system. Although cesarean section is now safer than it has never been, it can never be entirely safe and therefore, is not an alternate to vaginal delivery (Ijaiya and Aboyeji, 2001).

The majority of cesarean section deliveries are performed for a condition that might pose a threat to both the mother and her fetus if vaginal delivery occurred (Gabbe, 2002). In many developed countries, women are not allowed to vaginal birth after cesarean section (VBAC) and must re-sign to a repeat cesarean section with each successive pregnancy, them to greater risks with each procedure and subsequent pregnancy. Aside from the increased delivery costs, future pregnancies are more likely to be complicated because of a primary cesarean section (ACOG, 2013)

A number of recent studies have documented an increased incidence of placenta Previa and accreta with repeated uterine scars. The percentage of hysterectomy that occurred in a setting of a previous cesarean delivery increased from 27% to 57%. The placenta accreta as an indication of hysterectomy increased from 5.4% to 46.5% (E. Keag Oonagh et al., 2018; Howard, 2011). The main purpose of performing Cesarean section is to reduce the incidence of maternal and neonatal mortality during childbirth in dangerous situations (Majid, Mohammadrezaet al. 2014). When compared with vaginal delivery, cesarean delivery is associated with a reduced rate of urinary incontinence, fecal incontinence, pelvic pain and pelvic organ prolapse in the mother (E. Keag Oonagh et al., 2018).

In Africa, cesarean sections are still performed in unfavorable conditions for saving the mother and fetus. It has been shown that the risks of surgical complication are greater with emergency compared with elective cesarean section (Neuman et al., 2014). Maternal morbidity and mortality associated with cesarean section delivery is five to ten times greater than that associated with vaginal delivery (Shearer, 2011) So, if the rate of cesarean section which is higher the recommended of WHO it will have negative effect on both maternal and fetus health worldwide. In most of countries in sub Saharan Africa there are surgical services available in referral facilities, but the resources are limited, quality of care is heterogeneous, and distance to the facility is frequently a real barrier for people living in rural regions and maternal morbidity and mortality remain very high (Thaddeus and Maine, 2014).

In Ethiopia, the national population based cesarean delivery rate of is 0.6% with variation between the regions from 0.2% to 9% and the overall institutional level was 18%, which varied between 46% in the private for- profit sector and 15% in the public sector (Fesseha et al., 2011) and thus, the magnitude of maternal complication is expected to be high. However, according to the 2016 Ethiopian demographic and health survey (EDHS) the regional variations of cesarean section delivery rate range from 0.4% in Somali to 21.4% in Addis Ababa (CSA and ICF., 2016).

A few studies conducted in Addis Ababa cesarean section rate ranged from15% to 31.1% in public hospitals (Gebremedhin, 2014; Aman et al., 2014). Another study conducted in Addis Ababa (1995 to 2010) showed a significant increase with a 2.6 fold increase in 2011 compared to the figure in 2000 (Gebremedhin, 2014).

When looking at the rate of cesarean section delivery in the northern part of the country including the Ethiopian afar region, Benishangul Gumuz region, Tigray region and Amhara region it was 0.7%, 1.0% and 2.0%, 2.3% respectively (CSA and ICF., 2016).

Findings from previous studies indicated medical and nonmedical factors that are likely to be associated with increasing in magnitude of cesarean section across the world including premature rupture of amniotic membrane, cephalic-pelvic disproportion, multiple pregnancy, maternal preference, birth weight, parity, antenatal care use and previous cesarean section, maternal income, maternal educational status, induction of labor, and hypertension (RifaiaRami, 2014; Jaspinder et al., 2013; Gebremedhin, 2014; Mendoza S et al., 2010). However, given only a few studies conducted in assessing the magnitude of CS in Ethiopia (Gebremedhin, 2014; Fesseha et al., 2011; Aman Hassen et al., 2014). There is limited information concerning the magnitude of cesarean section in public hospitals and the associated factors. Therefore, this study is aimed to assess the magnitude of cesarean section in hospitals and associated factors in northern Ethiopia.

1.3. **Significance of the Study**

The findings of this study primarily used for local policy makers for planning appropriate policies, strategies directed towards improving the rate of cesarean section delivery and serve as the basis for enhancing the training of the health providers in delivering better health services against this rapidly increasing problem. The findings of this study also use for Woldia town Health Office, North Wollo Zone Health Department, stakeholders from government and nongovernmental organizations (NGOs), health care providers, particularly midwives, public health officers and nurses, clients and who work in delivery room, to determine maternal complications during and after cesarean section and associated factors as the knowledge of the study results will help to increase awareness among health care professionals for the prevention of this problem in hospitals by providing important information for decision making on service provision and utilization.

In addition, the findings of this study can also serve as a basic framework and baseline information for other studies with a similar interest in the future.

1.4. Objectives

1.4.1. General Objective

To assess the magnitude of cesarean section delivery and its associated factors of cesarean section delivery among mothers who give birth in hospitals of North Wollo Zone, Northern Ethiopia March 1 –30 /2019.

1.4.2. Specific Objectives

To assess the magnitude of cesarean section delivery

To identify factors associated with cesarean section delivery

2. LITERATURE REVIEW

2.1. Magnitude of Cesarean Section

The following review of existing literatures covered a range of topics related to cesarean section delivery, including factors that associated with cesarean section delivery. The literature were collected by using search terms like cesarean section delivery, associated factors of cesarean section delivery in Ethiopia, Africa and worldwide by using search engines like Google scholars, PubMed, BMC, full pdf search, Hinari, and SCI-HUB.

An institutional based cross-sectional study conducted to assess factors associated with cesarean delivery in public and private hospitals in a city of northeastern Brazil (April 2004-March 2005) among 1,344 post-partum women showed that the prevalence of surgical deliveries was 43.5 % (585/1,344) (Vieira G. O et al., 2015). A community based cross-sectional study conducted in India for 3 months (March 2016-May 2016) among 100, in Bangladesh (November 20, 2017) among 2549, in Nalgonda (January 2017 to February 2017) among 118 post-partum women showed that the rate of cesarean section in this study was 62%, 35%, and 55.9% respectively (Balmur Sarala Kumari and Visweswara., 2017; Begum T et al., 2017b; Maktha Vijay et al., 2016).

An institutional based cross-sectional study conducted in Nepal from 2013 to 2015 years among 2627 total deliveries cesarean section was performed in 1084 (41.26%). An institutional based cross-sectional study conducted in Sub-Saharan Africa (August 1, 2010, to January 31, 2011) among 1276 women showed that the rate of Cesarean section was 6.2% (Chu k et al., 2012). An institutional based cross-sectional retrospective study was conducted in Attat Hospital, Garage Zone, Ethiopia from January 2011 – December 2013 GC to assess the prevalence and Outcome of Caesarean Section delivery among 5,611 post-partum women showed that 1,547 were by cesarean section delivery, the rate of cesarean section delivery was 27.6% (Moges Ayano et al., 2015). Another institutional based cross-sectional study conducted in Tigray, Ethiopia (September 2015 to February 2016) among 425 post-partum women showed that the rate of cesarean section was 24.2% (Haftu, 2017).

Institution-based cross-sectional study was conducted at Mizan Aman General Hospital Southwest Ethiopia (September 11, 2012 to March 9, 2013) among 342 (21.1%) and at Yirgalem General Hospital, Southern Nation Nationalities Peoples Region (July 8/2013 to July 7/2015) among a total of 4519 deliveries in this Hospital, out of which 1219 (26.9%) women delivered by cesarean section respectively (Gutema Hordofa and Ashenafi, 2014; TesfayeT et al., 2017). Another cross-sectional study was conducted in Harar town, eastern Ethiopia (February 1 to March 30, 2013) among 465 delivered mothers showed that the overall prevalence of cesarean section delivery in Hospitals is 34% (Tsega Fikirte et al., 2015). A cross-sectional study was conducted at Felegehiwot Referral Hospital, Amhara region, Northwest Ethiopia (July 1, 2012, to June 31, 2013) among 2967 eligible mothers showed that the prevalence of cesarean section delivery was 723 (25.3 %) (Abebe Fantu et al., 2016).

A cross-sectional survey was conducted in Addis Ababa, Ethiopia (December 2013 and January 2014) to explore the patterns of cesarean-section delivery among 835 women who delivered at healthcare facilities, 19.2% of them gave birth by cesarean section (Bayou et al., 2016).

2.2. Factors Associated with Cesarean Section Delivery

2.2.1. Socio-demographic Factors

A population-based cross-sectional study conducted in Bangladesh showed that women with higher secondary and above education were two times (AOR: 2.06 95% CI: 1.24–3.25) more likely to deliver by Cesarean section than women with no education (Begum T et al., 2017a). In Jordan, a study conducted between 2002 and 2012 showed that cesarean section rate was significantly higher among women who delivered in public hospitals (42.5%) compared to women who delivered in public hospitals (25.2%) (Am et al., 2017). A study conducted by Ethiopia Demographic and Health Survey(EDHS) showed that the percentage of cesarean section delivery among the lowest wealth quintile was 0.6 % compared to 8.1 % among the highest wealth quintile(CSA and ICF., 2016).

Institution-based cross-sectional study was conducted on mothers delivering in Southwest, Ethiopia (September 11, 2012, to March 9, 2013) among 342 post-partum women showed that Mothers whose age is between 20-24, 25-34, 35 and above are 3.2, 3.6, 10 times more likely to undergo Cesarean section as compared with those age between 15-19 years respectively with (AOR: 3.2, 95% CI: 1.03, 10, AOR: 3.6, 95% CI: 1.15, 11.6, AOR: 10, 95% CI: 1.06, 93.01,)

(Gutema Hordofa and Ashenafi, 2014). Another cross-sectional study was conducted in northwest Ethiopia (July 1, 2012 to June 31, 2013) among mothers showed that the age category of 15–19 had 37 % lower (AOR= 0.63, 95 % CI: 0.43, 0.93) probability of cesarean section delivery compared to age category of 20–34 years) (Abebe Fantu et al., 2016). A cross-sectional survey was conducted in Addis Ababa, Ethiopia (December 2013 and January 2014) among 835 women who delivered at healthcare facilities showed that age, educational status and type of residence had significant associations with cesarean section delivery as Compared with young mothers ages 15–24 years, older mothers aged 30–49 years had greater odds of cesarean section delivery (OR = 2.56). Women with education at the secondary level and above and non-slum residents were 3.10 and 1.80 times more likely to have CS delivery compared with those who had no formal education and are slum residents, respectively (Bayou et al., 2016).

Another cross-sectional study conducted at Felegehiwot Northwest Ethiopia (July 1, 2012, to June 31, 2013) among women showed that the residence, maternal age, and presence of risk factors significant associations with cesarean section delivery. Likewise, the odds of undergoing cesarean section was 1.67 (AOR= 1.67, 95 % CI: 1.39, 19.9) and 2.31 (AOR = 2.31, 95 % CI: 1.74, 3.07) times higher among women from rural and having history of risk factors, respectively (Abebe Fantu et al., 2016).An Institutional based cross-sectional study was conducted in the Gurage zone, SNNPR, Ethiopia (January 2011 – December 2013 GC) among 5,611delivered women showed that 236 (84%) the patients were between 20-35 years, 260 (79%) of the women were from rural as compared to their counter parts (Moges Ayano et al., 2015).

2.2.2. Obstetrics factors

A population-based cross-sectional study conducted among Bangladesh Women with three or more birth order were 68% less likely to deliver by Cesarean section delivery (OR: 0.32 95% CI: 0.23–0.44) than women with 1st birth order. An institutional cross sectional study was conducted in Pakistan (January-March 2014) revealed that the main indications for elective caesarean section were post caesarean pregnancy and CPD while fetal distress and failure of progression of labour were the chief indications for emergency caesareans (Hafeez M et al., 2014). Another community based cross sectional study was conducted in India from (March 2016-May 2016) revealed that type of delivery, higher birth order and associated health problems during delivery were significantly associated with caesarean section delivery (Maktha Vijay et al., 2016).

Another cross-sectional study conducted in Addis Ababa year of 2011 GC showed that the contributions of the unknown date and post-term pregnancy were significantly associated with cesarean section delivery in governmental hospitals 142 (29.6%) and 54 (11.3%) respectively (Aman Hassen et al., 2014).

A cross-sectional study conducted in Harar Ethiopia (February 1 to March 30, 2013) among mothers showed that birth weight of more than 4000 g (AOR=3.58, 95% CI (1.11, 11.55)), previous Cesarean Section delivery (AOR=50.00, 95% CI (17.76, 144.00) were significantly associated with cesarean section delivery (Tsega Fikirte et al., 2015).

Institutional based cross-sectional study conducted in Gurage zone, SNNPR, Ethiopia (January 2011 – December 2013 GC) among 5,611 post-partum women showed that mothers who had cesarean section were categorized according to parity are 87 (31%) of the mothers were primiparous, 179 (63.7%) were between Para one and Para four and 15 (5.3%) were grand multipara,193 (68.7%) of the mothers had primary cesarean section while 88 (31.3%) had repeat cesarean section delivery as compared to their counter parts (Moges Ayano et al., 2015).

An Institution-based cross-sectional study conducted in Northwest Ethiopia (July 1, 2012, to June 31, 2013) among mothers showed that the odds of experiencing cesarean section were almost ten times (AOR= 9.80, 95 % CI: 7.16, 13.42) higher if women had abnormal presentations. Similarly a women having history of previous cesarean section and fetal weight of 4000gm and more were almost four times (AOR= 3.93, 95 % CI: 2.39, 6.44) and 13.68 (AOR= 13.68, 95 % CI: 7.87, 23.78) times more likely to give birth by cesarean section (Abebe Fantu et al., 2016).

A cross-sectional survey conducted in Addis Ababa, Ethiopia (December 2013 and January 2014) among 835 women showed that mothers who had a history of a high-risk pregnancy is positively associated with Cesarean Section delivery (OR = 67). Women who received overall adequate ANC were more likely to have CS delivery compared to those with inadequate ANC (OR = 1.83). Mother's pregnancy intention, health insurance coverage, and place of ANC visit did not show consistent significant association to cesarean section delivery (Bayou et al., 2016).

Institution-based cross-sectional study was conducted on mothers delivering at MizaAman General Hospital (September 11, 2012, to March 9, 2013) showed that Cesarean section delivery is 63% less likely among mothers whose gestational age at labor is greater than thirty-eight weeks as compared with those who gestational age at labor is less than thirty-eight (AOR: 0.37,

95% CI: 0.15, 0.9) and One hundred ten (32.3%) of them had ANC follow up for their current pregnancy, while the remaining (67.7%) are do not have ANC follow up. Of those who have ANC follow up the majorities (75.5%) are less than four times (Gutema Hordofa and Ashenafi, 2014).

Another study conducted in Adiss Abeba from 1st February to 30th May 2017 showed that with increasing parity, the frequency of ECS deliveries decreases it was 58.8% in primiparous, 36.4% in multiparous and only 4.8% of the grand multiparous deliveries. This finding demonstrated a statistically significant association between low parity and ECS sealed further the strong relationship between low parity and emergency CS when they reported that increasing number of deliveries was associated with a decrease in risk for both elective and emergency Cesarean Section delivery (Bizuneh and Ayana, 2017).

2.2.3. Medical illness-related factors

A cross-sectional study conducted from Bangladesh, India and Nepal (2005 - 2011) to assess the Prevalence and determinants of cesarean section delivery showed that having a serious health complication during pregnancy and delivery was associated with caesarean delivery in all locations except rural Bangladesh, where they observed a negative association (AOR 0.87, 95% CI 0.76 to 1.00). Another study conducted in Brazil to assess. the factors associated with caesarean section delivery in the year 2013 which showed that the presence of hypertension (OR=2.10, CI=1.31-3.37), diabetes (OR=4.32; CI=1.63-11.50) during pregnancy (OR=4 03; CI=1.35-12.02) increase the chances of caesarean section in the public health care system (Oliveira et al., 2016).

Another study conducted in Banglandish indicated that the uptake of cesarean section delivery was significantly higher among women who reported various complications during delivery (Anwa I et al., 2008). An Institutional cross sectional study conducted in East African Referral Hospital from 2005-2010 showed that known HIV seropositivity have remained constant in their contribution to Cesarean section delivery. Pre-eclampsia/eclampsia showed a statistically significant increasing trend as an indication for cesarean section delivery, with percentages in 2005 of 6.6% and 10.5% in 2010 (an estimated per year increase of 0.7% (Worjoloh et al., 2012).

A community based cross sectional study conducted in India (March 2016-May 2016) to assess the Prevalence and factors associated with caesarean section delivery showed that about 15% of

women had an associated health problem during pregnancy. Common health problems noticed were eclampsia, diabetes, hypertension (Maktha Vijay et al., 2016).

Institution based cross-sectional study was conducted at Yirgalem General Hospital (8/2013 to July 7/2015) showed that the leading medical diseases were hypertension, 39(8.3%), HIV/AIDS, 15(3.2%) and diabetes mellitus, 15(3.2). Four Hindered Seven mothers (86.8%) delivered by emergency cesarean section (TesfayeTsigereda et al., 2017).Institution based cross sectional study was conducted in Northwest Ethiopia (July 1, 2012 to June 31, 2013) the presence of risk factor showed significant association with cesarean section. Likewise, the odds of undergoing cesarean section was 2.31 (AOR = 2.31, 95 % CI: 1.74, 3.07) times higher among women from having a history of risk factors (Abebe Fantu et al., 2016).

Majority of the previous studies were retrospective document review in which mother's medical record was not fully documented. In previous study, duration of labor, the time interval between decision for cesarean section delivery and start of operation were not determined. Therefore, the above limitations will be addressed by using different data sources with similar contexts during data collection period since prospective study will be undertaken as a result primary data will be obtained from the mothers which would have helped exploring other factors such as previous obstetric history, literacy and educational status

2.3. Conceptual Framework

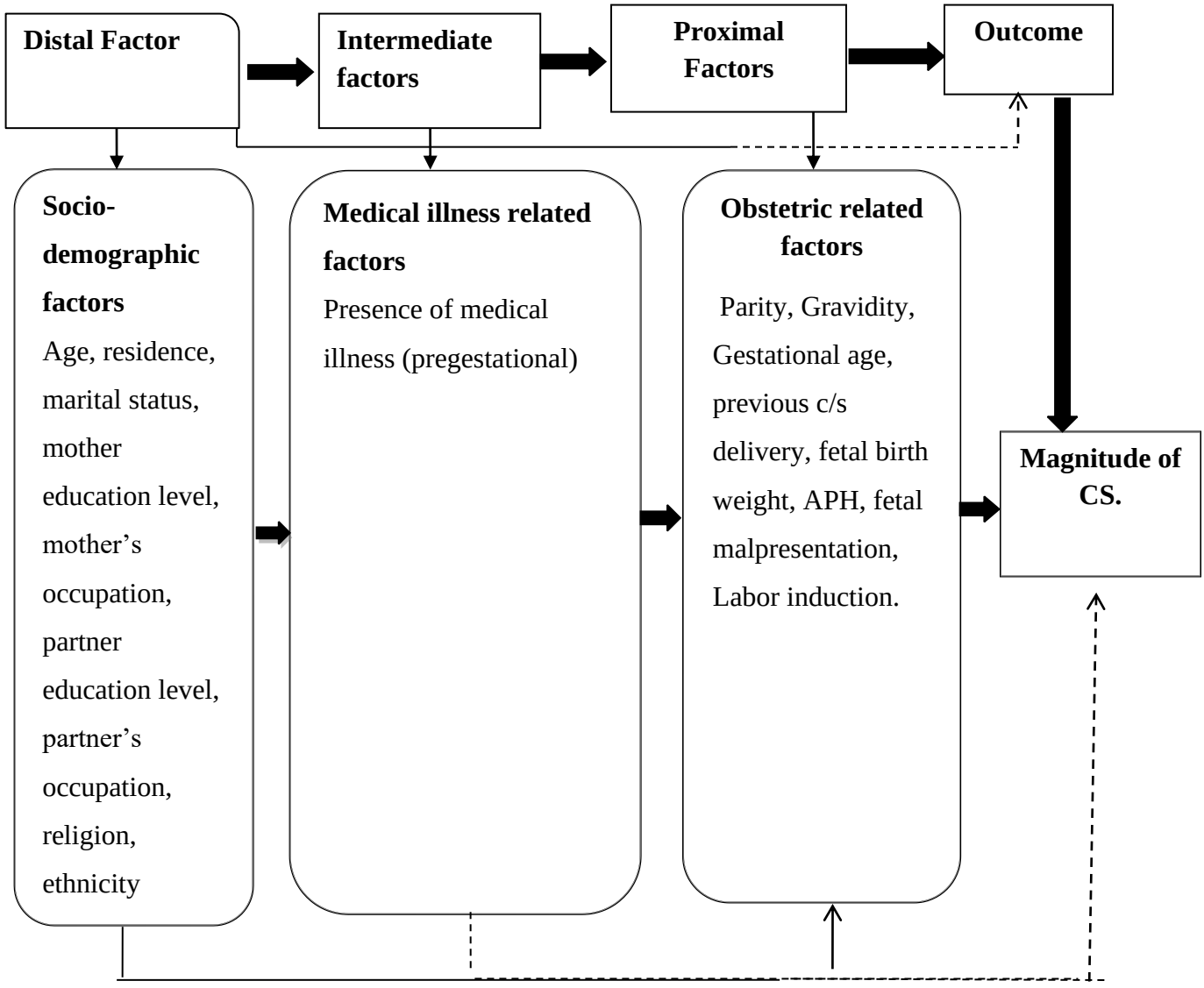

Figure 1: Conceptual framework of factors associated with the magnitude of cesarean section delivery among mothers who give birth in public hospital Of North Wollo Zone, Northern, Ethiopia (Fateema, 2016; Abebe Fantu et al., 2016; Tesfaye Tsigereda et al., 2017l).

3. METHOD AND MATERIALS

3.1. Study Area and Period

This study was conducted in the hospitals of North Wollo Zone, which is one of 11 zones of the Amhara Region of northern Ethiopia. North Wollo Zone, it borders on the south by South Wollo, on the west by South Gondar, on the north by Wag Himra, on the northeast by Tigray Region, and on the east by Afar Region. Its towns include Lalibela (known for its rock-cut churches) and Woldia (also spelled Woldia). North Wollo Zone is located at about 521Km from Addis Ababa, the capital city of Ethiopia, 358 Km southeast from Bahirdar city of Amhara Regional State. It has an area of 12,172.50 square kilometers (source: world encyclopedia, North Wollo Zone - Wikipedia). Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA and ICF., 2016) the total population of North Wollo Zone is 1,500,303, an increase of 19.04% over the 1994 census, of whom 752,895 are men and 747,408 women respectively.

Regarding health services, there are six hospitals, sixty-five health centers and two hundred seventy-five health posts providing services to the community according to North Wollo Zone health office. Annual report from North Wollo Zone Health office in 2018 indicated that the health coverage of institutional delivery was 68% and delivery service was 79% (Woldia town administration health office 2018).

The study was conducted from March 1 to 30 2019 in North Wollo Zone in selected Public hospitals, Northern Ethiopia.

3.1.1. Study Design

Cross-sectional study was used to assess the magnitude of cesarean section delivery and its associated factors in government hospitals in North Wollo zone, Northern Ethiopia.

3.2. Population

3.2.1. Source Population

The source population was all mothers who gave birth at public hospitals of North Wollo Zone, Northern Ethiopia.

3.2.2. Study Population

All mothers who gave birth in the selected hospitals during the actual data collection period.

3.3. Inclusion and Exclusion Criteria

3.3.1. Inclusion Criteria

All mothers who were deliver in the selected hospitals during the study period.

3.3.2. Exclusion Criteria

Women with known mental illness, women who are not able to speak or communicate and critically sick and referred to other institution were excluded from the study.

3.4. Sample size determination and sampling procedure

3.4.1. Sample Size Determination for 1st objective

For the first specific objective (to determine the magnitude of cesarean section delivery among mothers who give birth at public hospitals in North Wollo Zone, Northern Ethiopia) single population proportion formula is used.

The actual sample size was calculated by using a single population proportion formula.

$$n = \frac{(Z_{\alpha/2})^2 p(1-P)}{d^2} = \frac{(1.96)^2 * 0.343(1-0.343)}{(0.05)^2} = 346$$

Where: - n= minimum sample size required for the study

Z= standard normal distribution (Z=1.96) with a confidence interval of 95%

P= prevalence of cesarean section delivery in Harari Ethiopia (p=34.3%) (Fikirte Tsega et al., 2015) d=is a tolerable margin of error (d=0.05)

Sample size determination for the 2nd objective

The sample size for the factors associated with cesarean section delivery was determined by considering three factors like Gravidity, Parity and gestational birth at birth were associated with outcome variable, the confidence interval of 95 %, the margin of error 5% and power of 80% using open Epi info version 7. The final sample sizes for selected factors were shown in Table1

Table 1: Sample Size Determination For A Study On Magnitude And Associated Factors Of Cesarean Section Delivery Among Mothers Who Give Birth In Hospitals Of North Wollo Zone, Northern Ethiopia, 2018/19.

Associated factors (95% CI)	The proportion of cesarean section delivery cases		AOR	Sample size with 10% non-retrieval rate	Reference
	Unexposed (p1)	Exposed (p2)			
Gravidity	14.9% (proportion cesarean section delivery among pregnant woman who had three	37.7% (proportion of cesarean section delivery among pregnant woman who had one	0.75	132+13 =145	(Mendoza S et al., 2010)
Parity	27.4% (proportion of cesarean section delivery among delivered women who had three	41.3% (proportion of cesarean section delivery among delivered women who had one	0.32	394+39 = 433	(Begum T et al., 2017a)
GA at labor	72.3% (proportion of cesarean section delivery among mothers whose gestational age less than thirty-eight weeks	26.9% (proportion of cesarean section delivery among mothers whose gestational age greater than thirty-eight weeks	0.37	44+ 4= 48	(Gutema Hordofa and Ashenafi, 2014)

The sample size for the 1st objective is smaller than that of the 2nd objective. In that case, the final sample size was obtained by adding a non-response rate of 10% to the larger sample size from 2ndobjective which was 394. So, the final sample size for the study was 433.

3.4.2. Sampling Procedure

Public hospitals were selected by Simple random sampling technique (lottery method). Six hospitals were presented in the North Wollo Zone from six hospitals three Public hospitals which were selected by SRS (Woldia General Hospital, Lalibela hospital, kobo hospital) in the North Wollo Zone were included in the study. The proportional allocation was assigned to respective hospitals based on their client flow of women. Finally, study subjects was selected using systematic sampling technique by taking every two clients as interval based on the average daily flow of the clients of women from the respective health facility and include every eligible client coming to the facility until the required sample size was achieved. The total estimated number of delivering mothers attending delivering service in each hospital for a single month was identified prior to allocate proportional sample size. Based on that monthly number of delivered mother in Woldia General Hospital (460), Lalibela hospital (280), and kobo hospital (150) with a total of (890) and sampling with population proportional to size (PPS) was calculated for each institution to give the total sample size by using the following formula.

$$\text{The sample size for each hospital} = \frac{\text{No of respondents from each hospital x final sample size}}{\text{Total number of delivering mother}}$$

For Woldia General Hospital ni = (460/890)*433 = 224 respondents was selected.

For Lalibela hospital ni = (280/890)*433 = 136 respondents was selected.

For Kobo hospital ni = (150/890)*433 = 73 respondents was selected.

With the total number of delivering mother N = 890, the minimum sample size being n = 433, an interval of $k = N/n = 890/433 \approx 2$, was used to select the study participants from each health facility. The first mother was randomly selected from their delivery registration and then every two delivering mothers were selected by systematic random sampling method

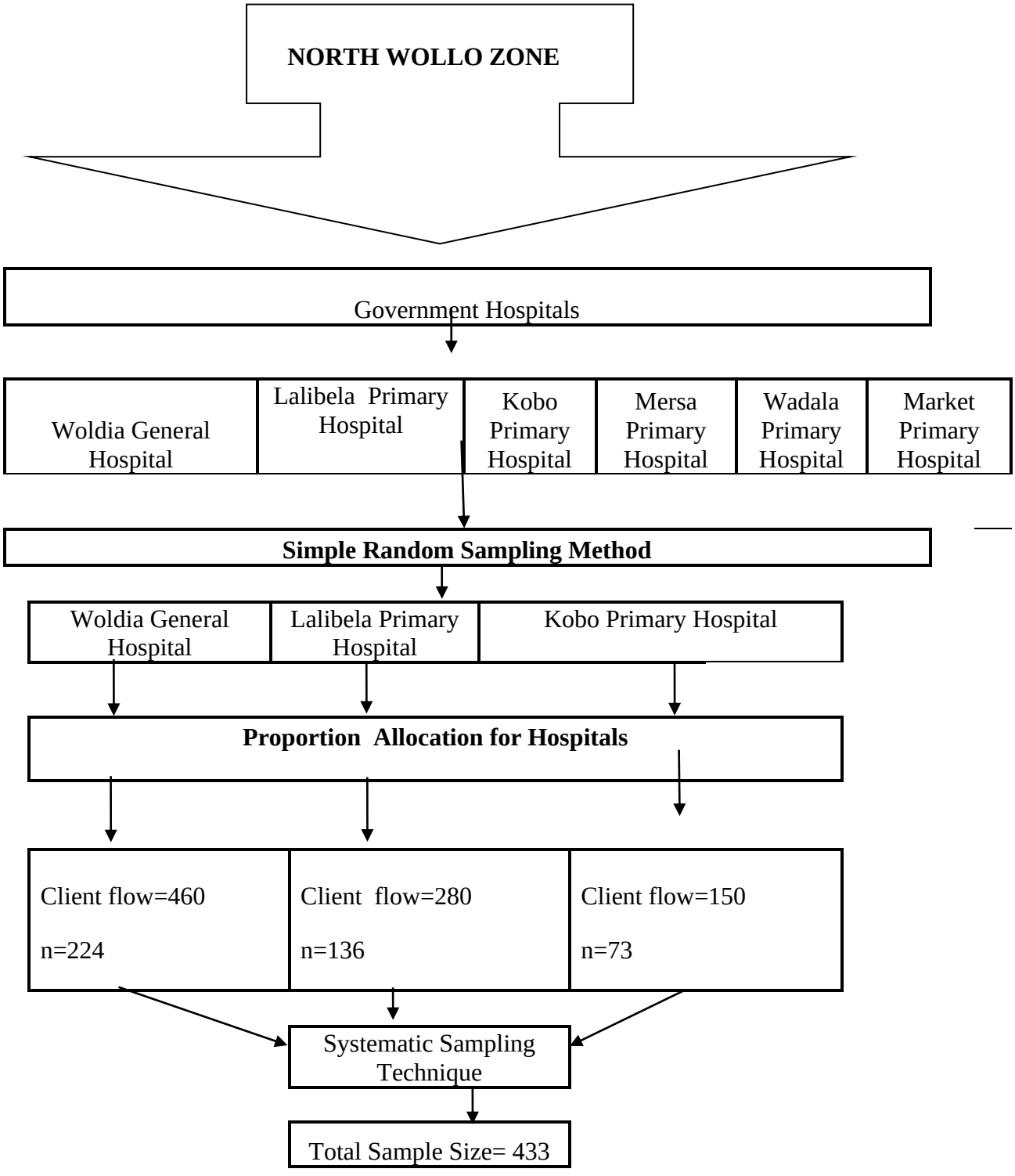

Figure 2: Schematic presentation of sampling procedure for the magnitude of cesarean section delivery and associated factors among mothers who give birth in public hospital of North Wollo Zone, Northern Ethiopia, 2019.

3.5. Data Collection Tool and Procedure

3.5.1. Data Collection Tool

Data was collected using English version structured questionnaire adapted from a study done in Iran, Brazil, Nepal and India India (Begum T et al., 2017a; Maktha Vijay et al., 2016; AZAMI-AGHDASH Saber et al., 2014 ; T Gurung et al., 2016) and further developed by using different peer-reviewed published literatures (Gutema Hordofa and Ashenafi, 2014; Moges Ayano et al., 2015; TesfayeTsigereda et al., 2017; Tsega Fikirte et al., 2015). To include factors associated with cesarean section delivery of mothers. The English language questionnaire was translated into Amharic language (language spoken in the study area) by Amharic language speaker and was translated back to English language by a person who attended Master of Arts in English language Comparison was made on the consistency of the two versions. The questions are both open and close-ended. The questionnaire was address women's socio-demographic factors, obstetrics factors, and maternal medical illness factors.

3.5.2. Data Collectors

Eighteen diploma midwives/nurses and three BSC nurses supervisor who were fluent in Amharic who were not working in the study sites was recruited for data collection. Two days (one day theoretical and one-day practical) training was given on data collection such as on respondent rights, informed consent, and techniques of interview. The supervisors were closely following the data collection process throughout the data collection period with the principal investigator. All field questionnaires were reviewed each night and errors were corrected.

3.6. Data Collection Procedure

The data was collected through face to face interview by using the pretested structured Amharic questionnaire in maternity ward. The interviewers were informing the delivering mother about all details of the research. The women was encouraged to feel free and told that the confidentiality of their responses was assured and no information was shared with third parties, except the investigator. After that, a woman who was willing to participate and signed the informed consent document was interviewed in a quiet and comfortable room after they finished

their delivering service. On-site supervision was carried out during the whole period of data collection on daily basis by the supervisor and principal investigator. At the end of each day questionnaires were reviewed and cross-checked for completeness, accuracy, and consistency by the supervisor and principal investigator and corrective measures was taken.

3.8. Study Variables

3.8.1. Dependent Variable

Cesarean section delivery

3.8.2. Independent Variables

Socio-demographic characteristics: Age, residence, marital status, mother education level, mother's occupation, partner education level, partner's occupation, religion, ethnicity.

Obstetric related factors: parity, gravidity, gestational age, induction of labor, previous C/S of delivery, fetal birth weight, fetal lie, APH fetal malpresentation.

Maternal medical illness

3.9. Operational Definitions

Cesarean section delivery : If the women delivered by a surgical procedure in which incisions are made through a woman's abdomen and uterus to deliver her baby (Gibbons et al., 2010)

Vaginal delivery: if the women delivered by vaginally without any instrumental assistance to deliver her baby (Howard, 2011)

Instrumental delivery: if the women delivered by vaginally with assistance of instrumental to deliver her baby (Mostafa, 2013)

Elective caesarean section: Elective caesarean section when the decision to perform elective cesarean section is planned during ante partum on the basis of an obstetrical or medical indication (L. McFarlin Barbara et al., 2004).

Emergency caesarean section: It is a procedure which is performed after the labor had started and immediate action is required to prevent the deaths of mother, infant (Berhan Y and Abdela A, 2004).

3.10. Data Quality Control

Translation of instrument was made from the English language to local Amharic language and back to the English language by different experts who are familiar on the flew of the area and blind to the original version of the questionnaire (English version) in order to facilitate reliable responses to underline questions and keep the original meaning of the instrument. Two days training was given for data collectors and supervisors by principal investigator about techniques of data collection and was briefed on each question in the data collection tool. After the training, pre-test in 5% of the sample size was conducted to ensure the validity of the tool. Corrections were done before the actual data collection. Principal investigator and supervisors were checked on the spot and review all the questionnaires to ensure completeness and consistency of the information collected and immediate action was taken accordingly. To minimize bias, interviews were conducted in an area with adequate confidentiality and privacy. Simple frequencies and cross tabulation was done for missing values and outliers and crosschecked with hard copies of the collected data.

3.11. Data processing and Analysis

The data was coded, cleaned, edited and entered into Epi data version 4.2.0.0 to minimize logical errors and design skipping patterns. Then, the data was exported to SPSS window version 24 for analysis. Descriptive analysis was done by computing proportions and summary statistics. Simple frequencies, summary measures, tables, and figures were used to present the data. Bivariate analysis, crude odds ratio with 95% CI, was used to see the association between each independent variable and the outcome variable by using binary logistic regression. All variables with $P \leq 0.25$ in the bivariate analysis was included in the final model of multi variate analysis in order to control all possible confounders and the variables were selected by entering method. Multi-collinearity was checked to see the linear correlation among the independent variables by using standard error. Model fitness was checked using the Hosmer-Lemeshow goodness test. Adjusted odds ratio with 95% CI and level of significance at $P<0.05$ was estimated to identify the predictors associated with cesarean section delivery.

3.12. Ethical Considerations

Ethical clearance was obtained from College of Health and Medical Sciences, Haramaya University, Institutional Health Research Ethics Review Committee (IHRERC). A formal letter for permission and support was written to the Zonal Health Department of North Wollo from Haramaya University and finally to selected public hospitals. Permission was also secured from the respective hospital administrators. All the study participants were informed about the purpose of the study, as well as their right to refuse. Informed voluntary written and signed consent was obtained from all study participants prior to distribution of the questionnaire. The respondents were also be told that the information obtained from them was treated with complete confidentiality and do not cause any harm to them.

RESULTS

4.1. Socio-Demographic Characteristics

In this study, a total of 433 study participants were involved, making a response rate of 100%. The mean age of study participants was 27.27 years with standard deviation of 5.18. Majority, 370(85.5%) of the participants were found within the age group of 20-30 years. Nearly, 412(95.2%) of the study participants were Amhara by ethnicity, 313(72.3%) were Orthodox by religion and 417(96.3%) were married by marital status. Concerning educational status and occupation of mothers around 116(27.5%) of the respondents attended College level education, 190(45%) were housewives. Out of the total sample respondents more than three-fifth, 291 (67.2%) were from urban while the rest 142(32.8%) were from rural. Regarding to family size, 370(85.5%) of sample respondents had 1-5 family size **(Table 2).**

Table 2: Socio-Demographic and Health Facility Characteristics of Women Who Gave Birth at Public Hospitals in North Wollo Zone, Northern Ethiopia, 2019

Variables	Mode of delivery		Frequency (Percentage)
	Vaginal delivery Number (%)	C/S delivery Number (%)	
Age			
<20	28(9.4)	3(2.2)	31(7.2)
20-30	212(70.9)	81(60.4)	293(67.7)
≥30	59(19.7)	50(37.3)	109(25.2)
Marital status			
Married	287(68.8)	130(31.2)	417(96.3)
Others*	4(25)	12(75)	16(3.7)
Religion			
Orthodox	219(70.0)	94(30.0)	313(72.3)
Muslim	76(66.7%)	38(33.3)	114(26.3)
Others**	4(66.7%)	2(33.3)	6(1.4)
Ethnicity			
Amhara	283(68.7)	129(31.3)	412(95.2)
Oromo	7(70.0)	3(30.0)	10(2.3)
Other***	9(81.8)	2(19.2)	11(2.5)
Mothers educational level			
No formal education	111(37.1)	55(41.0)	166(38.3)
Primary education	45(15.1)	29(21.6)	74(17.1)

Secondary and above	143(47.8)	50(37.3)	193(44.6)
Mothers occupation			
House wife	179(70.2)	76(29.8)	225(58.9)
Gov't employee	58(71.6)	23(28.4)	81(18.7)
Private employee	17(53.1)	15(46.9)	32(7.4)
Student	23(92.0)	2(8.0)	25(5.8)
Self-employee	14(56.0)	11(44.0)	25(5.8)
Other****	8(53.3)	7(46.7))	15(3.4)
Husband educational level			
No formal education	103(34.4)	61(45.5)	164(37.9)
Primary education(Grade 1-8)	30(10.0)	13(9.7)	43(9.9)
Secondary and above	166(55.5)	60(44.8)	226(52.2)
Husbands occupation			
Gov't employee	78(27.1%)	31(24.0%)	109(26.1%)
Private employee	61(21.2%)	26(20.2%)	87(20.9%)
Farmer	83(28.8%)	44(34.1%)	127(30.5%)
Self-employee	39(13.5%)	23(17.8%)	62(14.9%)
Other	27(9.4%)	5(3.9%)	32(7.6%)
Family size			
1-5	268(72.4)	102(27.6)	370(85.5)
≥ 6	31(49.2)	32(50.8)	63(14.5)
Residence			
Urban	188(62.9)	103(76.9)	291(67.2)
Rural	111(37.1)	21(23.1)	142(32.8)
Waiting time			
≤ 8hrs	125(41.8%)	18(11.4%)	143(32.5%)
> 8hrs	173(58.2%)	117(88.6%)	290(67.5%)

4.2. Obstetric Related Factors

Regarding gravidity and parity, from total respondents, nearly three-fifth 248(57.3%) of mothers were multigravida and 263(60.7%) were multiparous. Concerning gestational age, 349(80.6%) mothers delivered within 37-42 weeks. Of the total respondents, the majority 384(88.7%) mothers didn't had medical illness ***(Table 3)***

Table 3: Obstetric and Medical illness related factors of women who gave birth at public hospital in North Wollo zone, Northern Ethiopia, 2019

Variable	**Mode of delivery**		**Total Frequency (%)**
	Vaginal Delivery Number (%)	C/S Delivery Number (%)	
Gravidity			
Primigravida	125(41.8%)	34(25.4%)	159(36.7%)
Multigravida	161(53.8%)	87(64.9%)	248(57.3%)
Grand multigravida	13(4.3%)	13(9.7%)	26(6.0%)
Number of deliveries			
0	133(44.5%)	37(27.6%)	170(39.3%)
I-IV	134(44.8%)	65(48.5%)	199(46.0%)
>=V	32(10.7%)	32(23.9%)	64(14.8%)
Inter pregnancy interval			
0-2 years	269(90.0)	123(91.8)	392(90.5)
> = 3 years	30(10.0)	11(8.2)	41(9.5)
Gestational age			
<37	21(67.7%)	10(32.3%)	31(7.2%)
37-42	248(70.7%)	103(29.3%)	349(80.6%)
>42	2(18.2%)	9(81.8%)	11(2.5%)
Unknown	28(70.0%)	12(30.0%)	38(8.8%)
History of C-section			
Yes	10(3.3%)	28(20.9%)	38(%)
No	289(96.7%)	106(79.1%)	395(91.2%)
Fetus presentation			
Cephalic	277(73.4%)	100(26.6%)	377(86.8%)
Brow	6(70.0%)	3(30.0%)	9(2.3%)
Face	6/100.0	0(0.0%)	6(1.4%)
Breech	10(25.6%)	29(74.4%)	39(9.0%)
Other	0(0.0%)	2(100.0%)	2(0.5%)

Birth weight			
<2.5kg	12(4.0)	9(6.7)	21(4.8)
2.5-3.99kg	282(94.3)	103(76.9)	385(88.9)
>= 4kg	5(1.7)	22(16.4)	27(6.2)
History of stillbirth			
Yes	18(37.5%)	30(62.5%)	44(10.2%)
No	281(73.0%)	104(27.0%)	363(83.8%)
Fetal Heart Beat			
<120	15(5.0%)	23(17.2%)	38(8.8%)
120 -130	56(18.7%)	14(10.4%)	70(16.2%)
131-140	154(51.5%)	64(47.8%)	218(50.3%)
141-150	62(20.7%)	23(17.2%)	85(19.6%)
≥151	12(4.0%)	10(7.5%)	22(5.1%)
Number of baby			
Single	294(69.2%)	131(30.8%)	
Twin	4(57.1%)	3(42.9%)	
Fetal lie			
Longitudinal	298(69.5%)	131(30.8%)	429(99.1%)
Oblique	1(50.0%)	1(50.0%)	2(0.5%)
Transverse	0(0.0%)	2(100.0%)	2(0.5%)
Duration of membrane ruptured			
<4	101(80.2%)	25(19.8%)	124(28.6%)
4-12	125(71.4%)	50(28.6%)	175(40.4%)
>12	10(62.5%)	6(37.5%)	16(3.7%)
Intact	63(54.8%)	52(45. %)2	115(26.5%)
Reason for admission			
Induction	7(58.3%)	5(41.7%)	12(2.8%)
Early onset of labor	65(76.5%)	20(23.5%)	83(19.2%)
Active labor	176(89.5)	20(10.2%)	194(44.8%)
Rupture of membrane	26(76.5%)	8(23.5%)	29(6.7%)
Bleeding	11(32.5%)	23(67.6%)	30(6.9%)
Others	14(19.4%)	58(80.6%)	67(15.5%)
Malpresentation			
Yes	26(44.6%)	31(44.6%)	57(12.9%)
No	273(72.7%)	103(27.3%)	376(87.1%)
Antepartum hemorrhage			0.000
Yes	12(31.6%)	26(68.4%)	
No	287(72.7%)	108(12.3%)	391(90.3%)
Labor induction			0.494
Yes	43(72.9%)	16(27.1%)	58(13.4%0
No	256(68.4%)	118(31.6%)	367(84.8%)
Medical illness			0.001
Yes	24(49.0%)	25(51.0%)	49(11.3%)

No	275(71.6%)	109(28.4%)	384(88.7%)
Type of medical illness			
Hypertension	4(18.2%)	8(30.8%)	12(25.0%)
HIV/AIDS	7(31.8%)	5(19.5%)	12(25.0%)
Diabetes mellitus	4(18.2%)	8(30.8%)	12(25.0%)
Others	7(31.8%)	5(19.2%)	12(25.0%)

4.3. Magnitude of Caesarean Delivery

In this study from a total of 433 deliveries, 30.9% (95% CI: 26.8, 35.3) delivered through caesarean section.

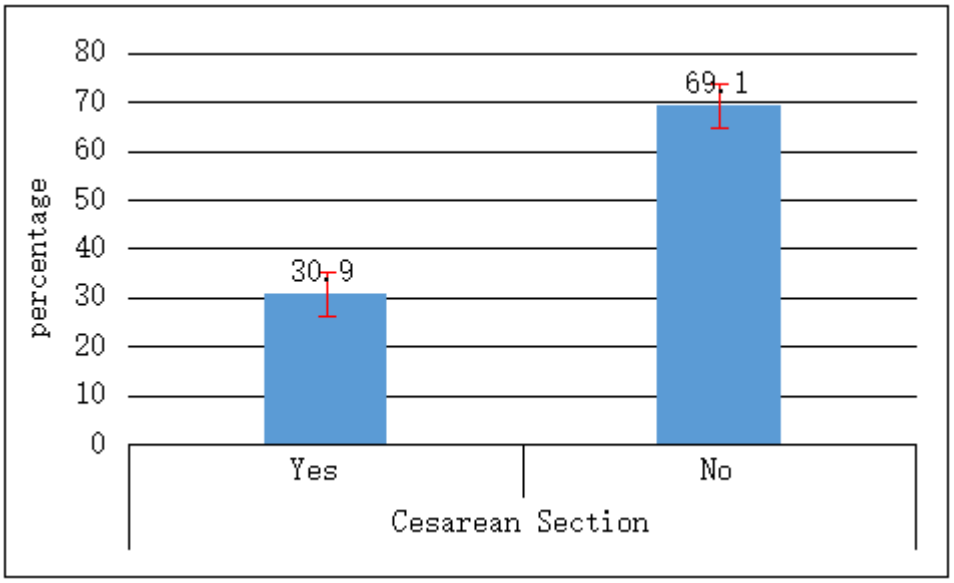

Figure 3: Mode of Delivery among Mothers Who Gave Birth (N=433) At Public Hospital in North Wollo Zone, Northern Ethiopia, 2019

Regarding indication for C/S NRFHP, previous C/S, APH followed by failed induction and CPD accounts for 32(22.2%), 28(19.4%), 17(11.8%), 10(6.9%) and 7(4.9%) respectively (Fig 4).

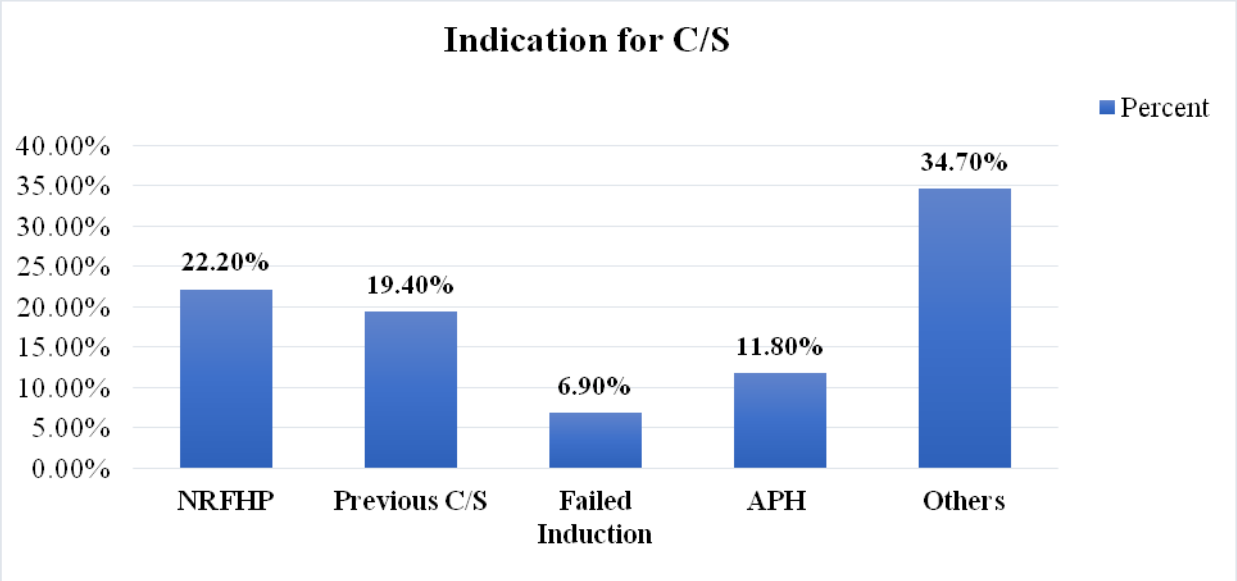

Figure 4: Indication for Cesarean section among Mothers Who Gave Birth at Public Hospital in North Wollo Zone, Northern Ethiopia, 2019

In Fig 4 the x-axis represents indication of cesarean section and the y-axis represents rate of cesarean section

4.4. Factors Associated with Caesarean Section Delivery

In the bivariate analysis nineteen variables were analyzed for checking of model fitness and then to entered in the multi-variable analysis (Table4).

Table 4: Bivariate Analysis For Factors Associated With Cesarean Section Delivery Among Mothers Who Gave Birth At Public Hospitals In North Wollo Zone, Northern Ethiopia, 2019 (N=433).

Variables	Cesarean Section		COR(95%CI)	p-value
	YES (%)	NO (%)		
Age				
<20	3(9.7)	28(90.3)	1	
20-30	81(27.6)	212(72.4)	3.57(1.05,12.05)	0.041**
>30	50(45.9)	59(54.1)	7.90(2.26,27.57)	0.001**
Marital status				
Married	130(31.25)	287(68.8%)	1	
0thers*	4(25%)	12(75%)	0.72(0.23,2.32	0.72
Religion				
Orthodox	94(30.00%)	219(70.00%)	1	
Muslim	38(33.0%)	76(66.70%)	1.16(0.74,1.84)	0.514
Others**	2(33.30%)	4(66.70%)	1.16(0.21,6.47)	0.861
Ethnicity				
Amhara	129(31.30%)	283(68.70%)	1	
Oromo	3(30.00%)	7(70.00%)	0.94(0.10,2.29)	0.930
Others***	2(19.2)	9(81.80%)	0.48(0.24.3.69)	0.362
Mothers educational level				
No formal education	61(45.5)	103(34.4)	1	
Primary education (Grade 1-8)	13(9.7)	30(10.0)	1.30(0.74-2.29)	0.36
Secondary and above	60(44.8)	166(55.5)	1.71(0.85-2.31)	0. 38
Mothers occupation				
House wife	76(29.80%)	179(70.20%)	1	

Gov't employee	23(28.40%)	58(71.60%)	0.93(0.54,1.62)	0.81
Private employee	15(46.90%)	17(53.10%)	2.08(0.99,4.38)	0.251
Student	2(8.00%)	23(92.00%)	0.21(0.078, 1.73)	0.256
Self-employee	11(44.00%)	14(56.00%)	1.85(0.58,6.62)	0.281
Others	7(46.70%)	8(53.30%)	2.06(0.85-5.15)	0.380
Husband educational level				
No formal education	61(45.5)	103(34.4)	1	
Primary education(Grade 1-8)	13(9.7)	30(10.0)	0.73(0.36-1.51)	0.39
Secondary and above	60(44.8)	166(55.5)	0.61(0.39-0.94)	0.025
College and above	45(29.40%)	108(70.60%)	0.68(0.38,1.21)	0.289
Husbands occupation				
Gov't employee	32(28.60%)	80(71.40%)	1	0.42
Private employee	26(28.90%)	64(71.10%)	1.02(0.55,1.88)	0.963
Farmer	45(334.40%)	86(65.60%)	1.31(0.76,2.25)	0.324
Self-employee	25(38.50%)	40(61.50%)	1.56(0.76-2.26)	0.33
Others	31(51.67%)	29(48.33%)	2.67(0.82,2.98)	0.267
Residence				
Urban	103(35.40%)	188(64.60%)	1.96(1.23, 3.12)	0.005**
Rural	31(21.80%)	111(78.20%)	1	
Gravidity				
Primigravida	34(21.40%)	125(78.60%)	0.27(0.11,0.64)	0.003**
Multigravida	87(35.10%)	161(64.90%)	0.54(0.24,1.21)	0.137**
Grand multigravida	13(50.00%)	13(50.00%)	1	
Number of deliveries				
0	37(27.6%)	133(44.5%)	0.28(0.15-1.51)	0.00**
I-IV	65(48.5%)	134(44.8%)	0.49(0.27-0.86)	0.013**
>=V	32(23.9%)	32(10.7%)	1	
Inter-delivery interval				
0-2 years	123(31.40%)	269(68.60%)	1.25(0.61,2.57)	0.550
>2 years	11(26.80%)	30(73.20%)	1.00	
Gestational age				
<37	10(32.3%)	21(67.7%)	1.00	
37-42	103(29.3%)	248(70.7%)	0.87(0.40,1.92)	0.734
>42	9(81.8%)	2(18.20%)	9.45(0.91,25.23)	0.260
Unknown	12(30.0%)	28(70.0%)	0.90(0.33,2.48)	0.838
History of C-section				
Yes	28(73.70%)	10(26.30%)	0.13(0.06,0.28)	0.000**
No	106(26.80%)	289(73.20%)	1	
Birth weight				

<2.5kg	9(6.7)	12(4.0)	1	
2.5-3.99kg	103(76.9)	282(94.3)	0. 94 (0.19-1.19)	0.83
>= 4kg	22(16.4)	5(1.7)	9.87(1.59-21.53)	0.270
Malpresentation				
Yes	31(44.6%)	25(44.6%)	3.29(1.85-5.85)	0.001**
No	103(27.3%)	274(72.7%)	1	
Antepartum hemorrhage				
Yes	26(68.4%)	12(31.6%)	5.76(2.80-11.81)	0.000**
No	108(12.3%)	287(72.7%)	1	
Labor induction				
Yes	16(27.1%)	43(72.9%)	0.81(0.44,1.49)	0.494
No	118(31.6%)	256(68.4%)	1.00	
Medical illness				
Yes	25(51.0%)	24(49.0%)	2.63(1.43-4.80)	0.0001**
No	109(28.4%)	275(71.6%)	1	

Keys: ****** -p-value less than 0.25 and included in final model

Multivariable analysis was conducted to control confounding variables and identifies independent predictors of caesarean section. From the total variables included in the model, residence, APH, medical illness, previous cesarean section and malpresentation were significantly associated with Cesarean section.

Mothers who came from urban resident were 4.04 times more likely to have cesarean section than those who came from urban resident (AOR=4.04, 95%CI: 2.19-7.45). The odds of cesarean section were 2.5 times higher among mothers with malprsenetation compared those mothers without malpresentation (AOR=2.56, 95%CI: 1.29-5.05). Mothers who had history of previous cesarean section were nine times more likely to have cesarean section than those who hadn't history of previous C/S. (AOR=9.11, 95%CI: 3.77-22.01). Mothers who had APH were 8.65 times more likely to have cesarean section than those who hadn't APH (AOR=8.65, 95%CI: 3.82-19.56) **(Table 5).**

Table 5: multi-variable analysis for factors associated with cesarean section delivery among mothers who gave birth at public Hospitals in North Wollo Zone, Northern Ethiopia, 2019 (n=433).

Variables	Cesarean Section		COR (95%CI)	AOR (95%CI)
	Yes (%)	No (%)		
Mother age				
<20 Years	3(9.7)	28(90.3)	1	1
20-30 Years	81(27.6)	212(72.4)	3.57(1.05,12.05)	2.47(0.68-8.98)
≥ 30 Years	50(45.9)	59(54.1)	7.90(2.26,27.57)	3.34(0.83-13.48)
Residence				
Urban	103(35.40%)	188(64.60%)	1.96(1.23, 3.12)	**4.04(2.19-7.45)***
Rural	31(21.80%)	111(78.20%)	1	1
Gravidity				
Primigravida	34(21.40%)	125(78.60%)	0.27(0.11,0.64)	0.56(0.0.08-3.65)
Multigravida	87(35.10%)	161(64.90%)	0.54(0.24,1.21)	1.17(0.35-3.82)
Grand multigravida	13(50.00%)	13(50.00%)	1	1
Parity				
0	37(21.80%)	133(78.20%)	0.27(0.15,0.51)	0.88(0.16-4.66)
1-4	65(32.70 %%)	134(67.30%) %)	0.49(0.27,0.86)	0.56(0.23-1.40)
≥ 5	32(50.00%)	32(32.00%)	1	1
APH				
Yes	26(68.4%)	12(31.6%)	5.76(2.80-11.81)	**8.65(3.82-19.56)***
No	108(12.3%)	287(72.7%)	1	1
Medical Illness				
Yes	25(51.0%)	24(49.0%)	2.63(1.43-4.80)	1.84(0.90-3.75)
No	109(28.4%)	275(71.6%)	1	1
Previous C/S				
Yes	28(73.70%)	10(26.30%)	0.13(0.06,0.28)	**9.11(3.77-22.01)***
No	106(26.80%)	289(73.20%)	1	1
Malpresentation				
Yes	31(55.40%)	25(44.6%)	3.29(1.85-5.85)	**2.56(1.29-5.05)****
No	103(27.3%)	274(72.7%)	1	1

Significant at: *P<0.001, **P=0.007, 1 = reference.

5. DISCUSSION

This institutional based cross sectional study tried to identify the magnitude of caesarean section and associated factors among mothers who gave birth at North Wollo Zone public hospitals. Accordingly the study shows that the prevalence of caesarean section was 30.9% (95% CI, 26.8-35.3). The result showed that the rates of cesarean section in the study are is higher than that of WHO recommended prevalence cesarean. This level indicates no additional benefits of the mothers and newborns are obtained since the rate of cesarean section is beyond the recommended level. . From the total variables included in the model, residence, APH, medical illness, previous cesarean section and malpresentation were significantly associated with Cesarean section.

The prevalence of cesarean section section in this study is in line with the results of studies conducted in Bangladesh (35%) (Begum T et al., 2017b), Attat Hospital, Gurage Zone, Ethiopia (27.6%) (Moges Ayano et al., 2015), Yirgalem General Hospital, SNNPE (26.9%) (Tesfaye T et al., 2017) and Harar town, eastern Ethiopia (34%) (Tsega Fikirte et al., 2015).

The finding was higher than the study conducted in Sub-Saharan Africa (6.2%) (Chu k et al., 2012), Mizan Aman General Hospital Southwest Ethiopia (21.1%) (Gutema Hordofa and Ashenafi, 2014), Tigray, Ethiopia (24.2%) (Haftu, 2017), Addis Ababa, Ethiopia (19.2%) (Bayou et al., 2016) and Felege Hiwot Referral Hospital, Amhara region, Northwest Ethiopia (25.3 %) (Abebe Fantu et al., 2016). This difference may be due to the fact that the data was collected from north Wollo zone public hospitals which perform caesarean section in the zone and no private institution performing caesarean section which increase referral to the hospital. On the other hand the North Wollo zone public hospitals also serve for neighbor afar and Tigray region other than its catchment which increases referral for caesarean delivery. But it was lower than the study conducted from Brazil (43.5%) (Vieira G. O et al., 2015), India (62%) (Balmur Sarala Kumari and Visweswara. 2017) and in Nalgonda (55.9%) (Maktha Vijay et al., 2016). This might be due to the difference in geographic location, educational status and economic status of study participants and difference in sample size of the study.

Mothers who came from urban resident were four times more likely to have cesarean section than those who came from urban resident. This is in line with the study conducted in Addis

Ababa Ethiopia (Bayou et al., 2016), Felege Hiwot Referral Hospital, Amhara region, Northwest Ethiopia (Abebe F et al., 2016) and Attat Hospital, Gurage Zone, Ethiopia (27.6%) (Moges A et al., 2015). This might be due to women who came from urban residents were more likely educated and aware about severity of labor pain and they prefer CS delivery.

The likelihood of cesarean section with Malpresentation were 2.5 times more likely than mothers without Malpresentation which is in consistent with the result obtained from Felege Hiwot Referral Hospital, Amhara region, Northwest Ethiopia (Abebe F et al., 2016). This might be due to the fact that mothers with Malpresentation were unable to give SVD due to change in the normal presentation of the fetus with the normal course of labor which resulted in delivery via cesarean section.

Mothers who had history of previous cesarean section were nine times more likely to have cesarean section than those who hadn't history of previous C/S which is in consistent with studies conducted in Pakistan (Hafeez M et al., 2014) and Harar town, eastern Ethiopia (34%) (Tsega F et al., 2015). This might be due to the fact that mother who had history of previous cesarean section delivery understand that they haven't chance to give birth via SVD due to fear of uterine rupture and women with other obstetrics and medical complications are indicated for cesarean section.

Mothers who had APH were more likely to have cesarean section than those who hadn't APH. The probable reason could be due to the fact that women presented with APH mostly major placenta praevia as a result the health care providers decide to have cesarean section delivery to prevent maternal and fetal complications.

6. LIMITATION OF THE STUDY

6.1. Limitation of the Study

- ✓ The study did not address about the views and practices of health care providers related to CS delivery

7. CONCLUSION AND RECOMENDATIONS

7.1. Conclusions

The magnitude of cesarean section among mothers who gave birth at north Wollo zone public hospitals was 30.9%. It is high compared to the WHO recommended optimum upper limit of 15% prevalence rate of C/S. Residence, APH, Previous C/S and Malpresentation were significantly associated with cesarean section.

7.2. Recommendations

Recommendations were forwarded for responsible body based on study finding as follows:

Health care providers

- ✓ Educate and give a clear picture regarding the risks and benefits of caesarean section

Hospitals

- ✓ Interventions on prevention of unnecessary primary cesarean section to avoid repeat cesarean section, advocating vaginal delivery for a woman who had previous cesarean section if medically appropriate.
- ✓ Health education for pregnant mothers on the risk of unnecessary cesarean section during antenatal care visits will also be important in gaining clients rational decision on the mode of delivery.
- ✓ The CS rate should be maintained within the optimum range by introducing medical audit of labor management in public health facilities.
- ✓ It is necessary to obtain CTG on every fetal assessment if resource is available.
- ✓ It is recommended that trial of vaginal birth after caesarean section (VBAC) should be encouraged in appropriate cases.

Researchers

- ✓ The other researchers do further investigation to assess the views, attitudes and practices of health care providers related to CS delivery

8. REFERENCES

Abebe Fantu , Gebeyehu Abebaw, Kidane Ashebir , et al. (2016) Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: a retrospective record review. *Reprod Health* 13: 6.

ACOG. (2013) American College of Obstetricians and Gynecologists Profile of Ob-Gyn Practice.

Al Rifai R. (2014) Rising cesarean deliveries among apparently low-risk mothers at university teaching hospitals in Jordan: analysis of population survey data, 2002–2012. *Global Health: Science and Practice* 2: 195-209.

Am B, Sa AD, Ys K, et al. (2017) Cesarean Section: Incidence, Causes, Associated Factors and Outcomes: A National Prospective Study from Jordan. *Gynecology & Obstetrics Case report* 03.

Aman H, Negash S and Yusuf L. (2014) Cesarean delivery practices in teaching public and non-government/private MCH hospitals, Addis Ababa. *Ethiopian Journal of Health Development* 28: 22-28.

Aman Hassen , Negash S and Yusuf L (2014) Cesarean delivery practices in teaching public and nongovernment/private MCH hospitals, Addis Ababa. *Ethiop. J. Health Dev.;():]* 28: 22-28.

Anwa I, Sami M , AkhtarN, et al. (2008) Inequity in maternal health-care services. *Bulletin of the World Health Organization* 86

AZAMI-AGHDASH Saber, GHOJAZADEH Morteza, DEHDILANI Nima, et al. (2014) Prevalence and Causes of Cesarean Section in Iran: Systematic Review and Meta-Analysis. *Iranian J Publ Health*. 43, : 545-555.

Balmur Sarala Kumari and Visweswara. RG. (2017) Study on factors influencing caesarean section delivery in urban field practice area of Kamineni Institute of Medical Sciences, Narketpally, Nalgonda, India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* 6: 3129.

Bayou YT, Mashalla YJ and Thupayagale-Tshweneagae G. (2016) Patterns of caesarean-section delivery in Addis Ababa, Ethiopia. *Afr J Prim Health Care Fam Med* 8: e1-6.

Begum T, Rahman A, Nababan H, et al. (2017a) Indications and determinants of caesarean section delivery: Evidence from a population-based study in Matlab, Bangladesh. *PLoS One* 12: e0188074.

Begum T, Rahman A, Nababan H, et al. (2017b) Indications and determinants of caesarean section delivery: Evidence from a population-based study in Matlab, Bangladesh. *PLoS One* 12: e0188074.

Berhan Y and Abdela A. (2004) Emergency obstetric performance with emphasis on operative delivery outcome: Does it reflect the quality of care? *Ethiop.J.Health Dev* 18.

Berhan Y and Abdela A. (2004) Emergency obstetric performance with emphasis on operative delivery outcome: Does it reflect the quality of care? *Ethiop. J. Health Deve 2004 18 (2): 96* 106.

Betrán AP, Merialdi M, Lauer JA, et al. (2007) Rates of caesarean section: analysis of global, regional and national estimates. *Paediatric and perinatal epidemiology* 21: 98-113.

Bizuneh A and Ayana G. (2017) Indications and Outcomes of Emergency Caesarean Section at St Paul's HospitalMedical College, Addis Ababa, Ethiopia 2

Chu k, Cortier H, Maldonado F, et al. (2012) Cesarean section rates and indications in sub-Saharan Africa: a multi-country study from Medecins sans Frontieres. *PLoS One* 7: e44484.

CSA and ICF. (2016) *Central Statistical Agency (CSA) [Ethiopia] and ICF.. Ethopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF*. Available at: https://dhsprogram.com/pubs/pdf/FR328/FR328.pdf.

E. Keag Oonagh, E. Norman Jane and Sarah JS. (2018) Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. *PLOS Medicine* 15: e1002494.

Fateema RK. (2016) FACTORS AFFECTING THE INCREASED RATES OF CAESAREAN SECTION

Feng XL, Wang Y, An L, et al. (2014) Cesarean section in the People's Republic of China: current perspectives. *International journal of women's health* 6: 59.

Fesseha N, Getachew A, Hiluf M, et al. (2011) A national review of cesarean delivery in Ethiopia. *Int J Gynaecol Obstet* 115: 106-111.

Gabbe S. (2002) Pocket companion to obstetrics: Normal and problem pregnancies.

Gayathry D, Guthi VR, Bele S, et al. (2017) A study of maternal morbidity associated with caesarean delivery in tertiary care hospital. *International Journal Of Community Medicine And Public Health* 4: 1542.

Gebremedhin S. (2014) Trend and socio-demographic differentials of Caesarean section rate in Addis Ababa, Ethiopia: analysis based on Ethiopia demographic and health surveys data. *Reproductive health* 11: 14.

Gibbons L, Belizán JM, Lauer JA, et al. (2010) The global numbers and costs of additionally needed and unnecessary caesarean sections performed per year: overuse as a barrier to universal coverage. *World Health Report* 30: 1-31.

Gilliam M. (2006) Cesarean delivery on request: reproductive consequences. *Seminars in Perinatology*. Elsevier, 257-260.

Gutema Hordofa and Ashenafi S. (2014) Caesarean Section and Associated Factors at Mizan Aman General Hospital Southwest Ethiopia. *Journal of Gynecology and Obstetrics* 2: 37.

Gutema Hordofa and Ashenafi S. (2014) Caesarean Section and Associated Factors at Mizan Aman General Hospital Southwest Ethiopia. *Journal of Gynecology and Obstetrics* 2: 37.

Hafeez M, Yasin A, Badar N, et al. (2014) Prevalence and Indications of Caesarean Section in a Teaching Hospital. *JIMSA January* 27.

Haftu A. (2017) Assessment of Magnitude and Associated Factors of Adverse Birth Outcomes among Deliveries at Suhul Hospital Shire, Tigray, Ethiopia From September, 2015 to February, 2016. *Biomedical Journal of Scientific & Technical Research* 1.

Howard B. (2011) The Rising Cesarean Delivery Rate in America. *Obstetrics & Gynecology* 118.

Ijaiya M and Aboyeji P. (2001) Caesarean Delivery: The trend over a Ten-year period at Ilorin, Nigeria. *Nigerian Journal of Surgical Research* 3: 11-18.

Jaspinder K, Sargun S and Kawaljit K. (2013) Current trend of caesarean sections and vaginal births. *Advances in Applied Science Research* 4: 196-202.

Koblinsky M, Chowdhury M, Moran Allisyn, et al. (2012) Maternal Morbidity and Disability and Their Consequences: Neglected Agenda in Maternal Health. *J HEALTH POPUL NUTR* 30.

L. McFarlin Barbara , CNM, MS, et al. (2004) Elective cesarean birth: issues and ethics of an informed decision. *J Midwifery Womens Health* 49: 421-429.

Luz G, Belizán José M., Jeremy A Lauer, et al. (2010) The Global Numbers and Costs of Additionally Needed and Unnecessary Caesarean Sections Performed per Year: Overuse as a Barrier to Universal Coverage. *World Health Report* 30.

MacDorman MF, Declercq E, Menacker F, et al. (2008) Neonatal mortality for primary cesarean and vaginal births to low‐risk women: Application of an "intention‐to‐treat" model. *Birth* 35: 3-8.

Maktha Vijay, Ghatam Anjaneyulu, Padamata Harika, et al. (2016) Prevalence and factors associated with caesarean section: a community based cross sectional study in rural parts of Rangareddy district, Telangana, India. *International Journal Of Community Medicine And Public Health*: 2054-2057.

Mendoza S, Almeida C, Silva PRd, et al. (2010) Risk factors for cesarean section by category of health service. *Rev Saúde Pública* 44: 80-89.

Moges Ayano, Beyene WA and Geremew MA. (2015) Prevalence and Outcome of Caesarean Section in Attat Hospital, Gurage Zone, SNNPR, Ethiopia. *iMedPub Journals* 7.

Mostafa SMK. (2013) Preference for Institutional Delivery and Caesarean Sections in Bangladesh. *J HEALTH POPUL NUTR* 31: 96-109

Neuman M, Alcock G, Azad K, et al. (2014) Prevalence and determinants of caesarean section in private and public health facilities in underserved South Asian communities: cross-sectional analysis of data from Bangladesh, India and Nepal. *BMJ Open* 4: e005982.

Oliveira RR, Melo EC, Novaes ES, et al. (2016) Factors associated to Caesarean delivery in public and private health care systems. *Rev Esc Enferm USP* 50: 733-740.

RifaiaRami A. (2014) Rising cesarean deliveries among apparently low-risk mothers at university teaching hospitals in Jordan. *Science and Practice* 2

Shearer EL. (2011) Cesarean section: medical benefits and costs. *Social science & medicine* 37: 1223-1231.

Stjernholm YV, Petersson K and Eneroth E. (2010) Changed indications for cesarean sections. *Acta obstetricia et gynecologica Scandinavica* 89: 49-53.

Strom S. (2013) Rates, Trends and Determinants of Cesarean Section Deliveries in El Salvador: 1998 to 2008.

T Gurung , G Gurung, R Shrestha, et al. (2016) Prevalence and Outcome of Cesarean Section at Gandaki Medical College Teaching Hospital and Research Centre, Pokhara, Nepal. *J-GMC-N* 09

TesfayeT , Hailu D, Mekonnen N , et al. (2017) Magnitude of Maternal Complication and Associated Factors among Mothers Undergone Cesarean Section at Yirgalem General Hospital, SNNPR, Ethiopia. *International Journal of Health Sciences and Research* 7.

TesfayeTsigereda , Hailu Dejene , Mekonnen Niguse , et al. (2017) Magnitude of Maternal Complication and Associated Factors among Mothers Undergone Cesarean Section at Yirgalem General Hospital, SNNPR, Ethiopia. *International Journal of Health Sciences and Research* 7.

Thaddeus S and Maine D. (2014) Too far to walk: maternal mortality in context. *Social science & medicine* 38: 1091-1110.

Tsega Fikirte, Mengistie Bezatu, DessieYadeta, et al. (2015) Prevalence of Cesarean Section in Urban Health Facilities and Associated Factors in Eastern Ethiopia: Hospital Based Cross Sectional Study. *Journal of Pregnancy and Child Health* 02.

Vieira G. O, Fernandes L. G, de Oliveira N. F, et al. (2015) Factors associated with cesarean delivery in public and private hospitals in a city of northeastern Brazil: a cross-sectional study. *BMC Pregnancy Childbirth* 15: 132.

Worjoloh A, Manongi R, Oneko O, et al. (2012) Trends in cesarean section rates at a large East African referral hospital from 2005-2010. *Open Journal of Obstetrics and Gynecology* 02: 255-261.

9. ANNEXES

9.1. Information Sheet and Informed Voluntary Consent Form for Head of Public Health Facilities

My name is (_____). I am working as a data collector for the study being conducted in this community by Melese Ayalew (BScM) who is studying for his Master‘s degree in Maternity and Neonatal Nursing at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your institution being selected as the study setting.

1. **The Study/Project Title**:

Magnitude and association factors of cesarean section delivery among mothers give birth at public hospitals in North wollo zone, Northern Ethiopia, 2018/19.

2. **Purpose/aim of the study:**

The findings of this study will be used as evidence and input for hospitals to plan on maternal health activities, intervention programs, expand and implement training programs to improve the magnitude and association factors of cesarean section delivery service in the study area. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a master’s degree program in Maternity and Neonatal Nursing for the principal investigator based on the findings from Public Hospitals, North Wollo zone.

3. **Procedure and Duration:**

I will be interviewing mothers who gave birth and will attend in your hospital using a questionnaire to provide me with pertinent data that is helpful for the study. There are 45 questions to answer where I will fill the questionnaire by interviewing the mother. The interview will take about 30 minutes.

4. **Risks and Benefits:**

The risk of being participating in this is very minimal. But few minutes from mothers time. There would not be any direct payment for being participating in the study. But, the findings from this research will reveal important information for the institutions and health planners.

5. **Confidentiality**:

The information that we will be provided will be kept confidential. There will be no information that will identify the participants in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

5. **Rights:**

Participation in this study is fully voluntary. The participants have the right to declare to participate or not to participate in this study. You have the right to permit or not for this study. If you decide to permit the study, you have the right to terminate the study at any time if you consider something related to the study is wrong.

6. **Contact Address:**

If there are any questions or enquires any time about the study or procedures, please contact in this address.

Principal investigator: Melese Ayalew, Cell Phone: +251-921-523-545/+251-929-397-133 E-mail: Melesea76@gmail.com, Contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O. Box 235, Harar)

7. **Declaration of Informed Voluntary Consent**

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to answer any question that they do not want. I am also informed that the health center/Hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the health center/hospital's premises. Therefore, I declare my voluntary consent on behalf of (_____) management to allow this study to be conducted in the Health center/Hospital with my initials (Signature) as indicated below.

Name and Signature of head of the Hospital: _____Date _____

Name and Signature of Data Collector: _____Date _____

Thank you for your cooperation!!!

9.2. English Version Participant Information Sheet and Voluntary Consent Form

My name is (_____). I am working as a data collector for the study being conducted in this community by Melese Ayalew (BScM) who is studying for his Master‘s degree in Maternity and Neonatal Nursing at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

1. **The Study/Project Title:**

Magnitude and association factors of cesarean section delivery among mothers give birth at public hospitals in North Wollo Zone, Northern Ethiopia, 2018.

2. **Purpose/aim of the study:**

The findings of this study will be used as evidence and input for hospitals to plan on maternal health activities, intervention programs, expand and implement training programs to improve the magnitude and association factors of cesarean section delivery service in the study area. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a master’s degree program in Maternity and Neonatal Nursing for the principal investigator based on the findings from Public Hospitals, North wollo zone.

3. **Procedure and Duration:**

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study. There are 45 questions to answer where I will fill the questionnaire by interviewing you. The interview will take about 35 minutes, so I kindly request you to spare me this time for the interview.

4. **Risks and Benefits:**

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

5. **Confidentiality**:

The information that we will be provided will be kept confidentially. There will be no information that will identify the participant in particular. The findings of the study will be general for the study community and will not reflect anything particularly of the individual person. The questioner will be coded to exclude showing names. No reference in oral or written reports that could link participant to research.

6. **Rights:**

Participant for the study is fully voluntary. You have the right to declare or not for this study. If you decide to participate in the study, you have the right to terminate the study at any time if you consider something related to the study is wrong

7. **Contact Address:**

If there are any questions or enquires any time about the study or procedures, please contact please contact and speak to (Principal investigator: Melese Ayalew, Cell Phone: +251-921-523-545/+251-929-397-133 E-mail: Melesea76@gmail.com, Contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O. Box 235, Harar).

8. **Declaration of Informed Voluntary Consent**:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent for to participate in this study with my initials (Signature) as indicated below.

Name and Signature of Participant: _____Date _____

Name and Signature of Data Collector: _____Date _____

9.3. Amharic Version Participant Information Sheet and Voluntary Consent Form

የጥናቱ ተሳታፊዎች መረጃ መስጫና ፈቃደኝነት መጠየቂያ ቅፅ (በአማርኛ)

የተሳታፊች መረጃ

እንደምን አሉ! ስሜ----------እባላለሁ።በሐረማያ ዩኒቨርሲቲ፤ሐረር ጤና እና ህክምና ሳይንስ ኮሌጅ የሁለተኛ ዲግሪውን የሚያጠናው አቶ መለሰ አያሌዉ ለሚያደርገዉ ምርምር በመረጃ ሰብሳቢነት እሰራለሁ።ስለሆነም ስለጥናቱ የተወሰነ ማብራሪያ ተሰጥቶዎት የጥናቱተ ሳታፊ ይሆኑ ዘንድ ትኩረትዎን ሰጥተዉ በጥሞና እንዲከታተሉ በትህትና እጠይቃለሁ።

1. **የጥናቱ ርዕስ**

በሰሜን ወሎ ዞን ዉስጥ በሚገኙ ጤና ተቋማት በወላድ እናቶች የሚሰራዉ የቀዶ ህከምና ሰራ በትክክል ለመሰራቱና በትክክል ላለመሰራቱ አመላካች የሆኑ ነገሮችን መለየት ፤ሰሜን ኢትዮጵያ ይሰኛል።

2. **የጥናቱ አላማ**

ከጥናቱ የሚገኘው ውጤት በዞኑ ውስጥ ለሚገኙ ጤና ተቋማትና ጤና ባለሙያዎች፣ሌሎች ለሚመለከታቸዉ ባለድርሻ አካላትና ድርጅቶች ለችግሩ ትኩረት እንዲሰጡና መፍትሄ እንዲያፈላልጉ የበኩሉን ይወጣል ተብሎ ይታሰባል።መሰረታዊ አላማዉ የሁለተኛ ዲግሪዉን በእናቶች እና ጨቅላ ህጻናት እንክብካቤ ትምህርት ለሚማረዉ ተማሪ መለሰ ኤያሌዉ የመመረቂያ ጥናታዊ ጽሁፍ ለማዘጋጀት ነው::

3. **የመጠይቁ አካሄድ እና የሚፈጀዉ ጊዜ**

ለጥናቱ አስፈላጊውን መረጃ ለማግኘት መጠይቅ በመጠቀም ቃለ-መጠይቅ አደርግልዎታለሁ።መጠይቁ 35 ጥያቄዎችን የያዘ ሲሆን እርስዎን በመጠየቅ ይሞላል።መጠይቁ በአማካኝ 30 ደቂቃ ይወስዳል። ስለሆነም ይቺን ጊዜ ካለዎት ጊዜ ቀንሰዉ ለመጠይቁ ይፈቅዱልኝ ዘንድ በትህትና እጠይቅዎታለዉ።

4. **የጥናቱ ጥቅም እና ጉዳት**

ይህ ጥናት ከጊዜዎ ላይ35 ደቂቃ ከመውሰድ ውጭ በእርስዎም ሆነ በልጅዎ ላይ ጉዳት አያመጣም ።በዚህ ጥናት በመሳተፍዎ በቀጥታ የሚያገኙት ክፍያ የለም። ነገር ግን የዚህ ጥናት ውጤት ለከተማዉ ጤና ጽ/ቤትና እቅድ አውጭ የመንግስት አካላት ጠቃሚ መረጃ ሊሰጥ ይችላል።

5. **ሚስጢራዊነት**

የሚሰጡን መረጃ ሚስጥራዊነት የሚጠበቅ ሲሆን እንደግለሰብ ተለይቶ የሚወሰድ መረጃ የለም። የጥናቱ ውጤት የህብረተሰቡን አጠቃላይ ሁኔታ እንጂ የአንድን ግለሰብ ምንም ነገር አያንጸባርቅም። የተሳታፉዎችን ስም ላለማሳየት ለመጠይቆቻችን የራሳችንን ቁጥር ሰጥተናቸዋል። የጥናቱ ተሳታፉዎችን ከምርምሩ ጋር በማጣቀስ የሚሰጥ የቃልም ይሁን የጹሁፍ ሪፖርት የለም።

6. **በጥናቱ ያለዎት መብት**

በዚህ ጥናት ውስጥ መሳተፍ ሙሉ በሙሉ በፈቃደኝነት ላይ የተመሰረተ ሲሆን በጥናቱ ለመሳተፍም ሆነ ላለመሳተፍ የመወሰን መብት አለዎት። በፈለጉት ጊዜ ከጥናቱ መውጣት ይችላሉ።ይህን በማድረግዎም ማግኘት የሚገባዎትን ጥቅም አያስቀርብዎትም። በጥናቱ ወይንም በመረጃ አሰባሰቡ ዙሪያ ጥያቄ ወይም ያልተብራራ ነገር ካለ በሚከተለው አድራሻ ያግኙን (ዋና አጥኚ መለሰ አያሌዉ ኢሜል: melesea76@gmail.com፤ ስልክ ቁጥር፡+251921 5235453/929397133፤የተቋም ምርምር ስነ ምግባርና ክትትል ኮሚቴ ስልክ: 0254662011ወይምፖ.ሳ.ቁ 235 ሀረር)

7. **ከላይ በቀረበዉ የግንዛቤ ማስጨበጫ መሰረት የጥናቱ ተሳታፊ ለመሆን የሙሉ ፈቃደኝነት ማረጋገጫ**

የተሳታፊዎችን መረጃ ወረቀት አንብቤዋለሁ/ተነብቦልኛል። የጥናቱን አላማ፣ ክንዋኔ ፣ጥቅምና ጉዳት ፣ ሚስጥራዊነት ፣ መብት እናለማንኛውም ጥያቄ የተሰጠውን የመገኛ አድራሻ በደንብ ተረድቼዋለሁ።ግልፅ ያልሆነ ጥያቄ ካለኝ እንድጠይቅ እድል ተሰጥቶኛል።በፈለግሁት ጊዜ ከጥናቱ መውጣት እንደምችል እንዲሁም መመለስ የማልፈልገውን ጥያቄ መመለስ እንደሌለብኝ ተነግሮኛል። ሰለዚህ በዚህ ጥናት ለመሳተፍ ያለኝን ፈቃደኝነት ከዚህ ቀጥሎ በፊርማዬ አረጋግጣለሁ።

የተሳታፊ ስም እና ፊርማ _____ ቀን _____

የመረጃ ሰብሳቢ ስም እና ፊርማ _____ ቀን _____

ስለ ትብብርዎ ከልብ እናመሰግናለን፡:

9.4. English Version Questionnaire

HARAMAYA UNIVERSITY

POST GRADUATE STUDY PROGRAM

Dear Respondents

This questionnaire is prepared to assess the magnitude of cesarean section delivery and factors associated with cesarean section delivery among delivering women attending Labor and Delivery at public hospitals in North Wollo zone, Northern Ethiopia, 2018/19.

The assessment is made for the partial fulfillment of MSc Degree in Maternity and Neonatal Nursing. The questionnaire contains both closed and open ended questions and will be interviewed. You are therefore kindly requested to provide genuine response to the questions. The information you provide is confidential and is used only for the purpose of this study. If you have any question, don't hesitate to ask the data collector. Your cooperation and participation until the completion of the interview is very necessary for the successful completion of the assessment.

Thank you in advance for your cooperation!!!

Interview Record for Quantitative Data

Questionnaire ID: ---------- Type of health institution _____

Name of health institution_____ serial number_____

Date of interview in Ethiopian Calendar (dd/mm/yy) _____/_____/_____

Interviewer's Name_____ code_____ signature_____

Supervisor's Name _____code_____ signature_____

Result of interview: 1. Completed ◯ 2. Partially completed ◯

S. No	Questions	Response	Skip
	Part I: Socio- Demographic Characteristics		
101	How old are you? (Age in years)	/_____/ in complete year	
102	What is your current marital status?	1. Married	

		2. Divorced 3. Widowed 4. Single	
103	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others (specify)……	
104	What is your Ethnicity?	1. Amhara 2. Oromo 3. Tigray 4. Others (specify)……..	
105	What is your highest educational level you completed?	1. Can't read and write 2. Can read and write 3. Primary (grade 1-8th) 4. Secondary (grade 9-12th) 5. College and above	
106	What is your current occupation?	1. House wife 2. Government employee 3. Private employee 4. Daily laborer 5. Farmer 6. Student 7. Self-employee 8. Others (specify)…….	
107	What is your husband's level of educational status when you are married?	1. Can't read and write 2. Can read and write 3. Primary (grade 1-8th)	

		4. Secondary (grade 9-12th) 5. College and above	
108	What is your husband's occupation if you are married?	1. Gov't employee 2. Private employee 3. Daily laborer 4. Farmer 5. Student 6. Self-employee 7. Other specify--------	
109	How many people are living in the household (family size of the house hold)?	Enter No…….	
110	What is your place of residence?	1. Urban 2. Rural	
111	How long it takes you to this hospital from your home? (**in minutes**)	Enter No……	
112	What is your waiting time in the hospital? (in minutes)	Enter No……	
Part II Obstetric Factors			
201	What is your gravidity? (Number of pregnancy including the present)	Enter No……	
202	What is your parity? (Number of births)	Enter No……	
203	What is your child birth interval in years from your previous child if you delivered by cesarean section?	Enter No …….	
204	How many weeks is the pregnancy during this visit?	Enter No……	
205	Did you have APH during Labor?	1. Yes	**If "No" skips to**

	(Please take from chart)	2. No	**Q No 207**
206	What was the reason for admission during this visit?(Please take from chart)	1. Induction 2. Early onset of labor 3. Active labor 4. ROM 5. Bleeding Other (describe) ___	
207	If your answer for Question No 205 is yes, which one of the following is/are identified by ultrasound during labor?	1. placenta preveia 2. abruptio placenta 3 vasa preveia 4 uterine rupture 5 Other (specify)……	
208	Did you have previous obstetric history of still birth?(Please take from card)	1 yes 2 no	
209	Haw was the time of Membrane status? (Please take from card)	No ……..	
210	Did you have Labor induction?(Please take from card)	1. Yes 2. No	If "No" skip to Q No 211
211	If your answer for Question No 209 is yes, multiple answers allowed (Please take from card)	1. AROM 2. Pitocin 3, Prostaglandin 4. Other (specify)……	
212	What was the mode of delivery during this visit? (Please take from card)	1. Vaginal 2. C/S 3. Vacuum 4. Forceps	
213	Why do obtain you induction labor? (Please take from card)	1. Postdate pregnancy 2. In adequate Uterine contraction	

		3. ROM 4. Other (specify)……	
214	Which one of the following is/are the indications of Emergency cesarean section delivery? (Multiple answers allowed) (Please take from card)	1. NRFHP 2. Previous c/s 3. Failed induction 4. Multiple pregnancies 5. Fetal Malpresentation 6. APH 7. Other (specify)……..	
215	Was the fetal presentation Abnormal during labor? (Please take from card)	1 Yes 2. No	If "No" skip to Q No216
216	How was the Fetal weight? (Please take from card)	Enter No……	
217	Did you have Previous Cesarean section delivery?	1. Yes 2. No	
218	What was the presentation during labor? (Please take from card)	1. Cephalic 2. Brow 3. Face 4. Breech 5. Other (specify)……	
219	What was the day GA at labor? (Please take from card)	Enter No……..	
220	How was Fetal Heart Beat during labor? (Please take from card)	Enter No……	
221	Including this delivery how many children do you have?	Enter No……..	
222	What was the Fetal lie during pregnancy? (Please take from card)	1. Longitudinal 2. Oblique 3. Transverse	

		4. Not stated 5. Other (specify)	
223	What was your Delivery type? (Please take from card)	1. Vaginal 2. CS	
224	Which one of the following is/are the indications of elective cesarean section delivery? (Multiple answers allowed) (Please take from card)	1. Previous caesarean section 2. CPD 3. caesarean section on demand 4. postdated 5. transverse lie 6. Other (specify)……	
	Part III Medical illness		
301	Do you have any medical illness during pregnancy?(Please take from card)	1. Yes 2. No	If "No" skips to Q No 302
302	If your answer for Question No 301 is yes, which one of the following is/are medical illness during pregnancy? (multiple answers allowed)(Please take from card)	1. Hypertension 2. HIV/AIDS 3. Diabetes mellitus 4. Cardiac disease 5. Other (specify)……	

9.5. Amharic Version Questionnaire

ሐረማያ ዩኒቨርሲቲ የድህረ ምረቃ ፕሮግራም ውድ ተሳታፊዎችችን

ይህ መጠይቅ የተዘጋጀው በሰሜን ወሎ ዞን ዉስጥ በሚገኙ ሆስፒታል በወላድ እናቶች የሚሰራዉ የቀዶህክምና ብዛት እና ቀዶ ህክምናዉ እንድሰራ አመላካች የሆኑ ነገሮችን መለየት ፤ሰሜን ኢትዮጵያ ይሰኛል።.

ይህ ጥናት በዋናነት ለማስተርስ ዲግሪ መመረቂያ የማሟያ ጥናታዊ ጽሁፍ ለማዘጋጀት ነው:: ለጥናቱ አስፈላጊውን መረጃ ለማግኘት መጠይቁ የያዛቸውን ጥያቄዎች በመጠቀም የእርስዎ ትብብርና ተሳትፎ እሰከመጨረሻው ድረስ መቀጠል ለመረጃው መሰብሰብ በጣም አስፈላጊነውም ቃለ-መጠይቅ አደርግልዎታለሁ:: ትክክለኛ የሆነ መልስ እንዲሰጡኝ እጠይቅዎታለሁ::

ስለትብብርዎ ከልብ እናመሰግናለን::

የቃለ ምልልሱ መረጃዎች መጠየቂያና መመዝገቢያ ቅፅ

የመጠይቁ ኮድ/መለያ _____ የጤና ተቋሙ ዓይነት _____

የጤና ተቋሙ ስም_____ የቅድመወሊድ እንክብካቤ መለያ ቁጥር _____

መጠይቁ የተካሄደበት ቀን (እ.ኢ.አ) _____/_____/_____

የጠያቂው ስም_____ መለያ_____ ፊርማ_____

የተቆጣጣሪው ስም_____ መለያ_____ ፊርማ_____

መጠይቁ: 1. የተሟላ ◯ 2. ያልተሟላ ◯

የጥያቄ ኮድ	ጥያቄዎች	የመልስምርጫዎች	እለፍ
	ክፍል አንድ፡የማህበራዊ እና የአኗኗር መረጃ		
101	እድሜዎት ስንት ነዉ?	_____ዓመት	
102	የጋብቻ ሁኔታ?	1. ያገባች 2. የፈታች 3. ባለቤቷ የሞተባት 4. ያላገባች	
103	ሃይማኖትዎ ምንድን ነው?	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላካለይገለፅ----------	
104	ብሔርዎ?	1. አማራ 2. ኦሮሞ 3. ትግራይ 4. ሌላ ካለ ይገለፅ……	
105	የእርስዎ የትምህርት ደረጃ?	1. ማንበብና መፃፍ የማትችል 2. ማንበብና መፃፍ የምትችል 3. የመጀመሪያ ደረጃ (ከ1ኛ-8ኛ ክፍል) 4. ሁለተኛ ደረጃ (ከ9ኛ-12ኛደረጃ) 5. ኮሌጅ እና ከዚያ በላይ	
106	በአሁኑ ሰአት እየሰሩ ያሉት ስራ ምንድን ነዉ?	1. የቤት እመቤት 2. የመንግስት ሰራተኛ 3. የግል መስሪያ ቤት 4. የቀንስራ 5. አርሶአደር 6. ተማሪ 7. የግልስራ 8. ሌላካለይገለፅ……	
107	ያገቡ ከሆነ የባለቤትዎ የትምህርት ደረጃ?	1. ማንበብና መፃፍ የማይችል 2. ማንበብና መፃፍ የሚችል 3. የመጀመሪያ ደረጃ (ከ1ኛ-8ኛክፍል) 4. ሁለተኛ ደረጃ (ከ9ኛ-12ኛደረጃ) 5. ኮሌጅ እና ከዚያ በላይ	
108	ያገቡ ከሆነ የባለቤትዎ ስራ ምንድንነው?	1. የመንግስት ሰራተኛ 2. የግልመስሪያ ቤት	

		3. የቀን ስራ 4. አርሶ አደር 5. ተማሪ 6. የግልስራ 7. ሌላ ካለይ ገለፅ……	
109	በቤት ዉስጥ ስንት ሆናችሁ ትኖራላችሁ?	ቁጥሩን አሰገባ/ቢ……	
110	የሚኖሩበት ቦታ ከተማ ነዉ ገጠር?	1. ከተማ 2. ገጠር	
111	ከሆስፒታል እሰከ ቤት ምን ያህል ጊዜ ይወስዳል?	ቁጥሩን አስገባ/ቢ……..	
112	ከዚህ ሆስፒታል ለምን ያህል ጊዜ ቆይተሻል?	ቁጥሩን አስገባ/ቢ……..	
ክፍል ሁለት፡የእርግዝና ሁኔታ			
201	አሁን ያረገዙት ለስንተኛ ጊዜ ነዉ? (እባክዎት ከካርዱ ይዉሰዱ)	ቁጥሩንአስገባ/ቢ……..	
202	ስንት ልጅ ወልደዋል? (እባዎት ከካርዱ ይዉሰዱ)	ቁጥሩን አስገባ/ቢ……	
203	ከዚህ በፊት የወለዱ ከሆነ ከወለዱት ልጅና አሁን በተረገዘው እርግዝና መካከል ያለው የእድሜ ልዩነት በዓመት ስንት ነው?	……	
204	ፅንሱ ባሁኑ ሰዓት ስንት ሳምንቱ ነዉ? (እባዎት ከካርዱ ይዉሰዱ)	ቁጥሩን አስገባ/ቢ…	
205	በምጥ ስአት የደምመፍሰስ ችግር ገጥሞወት ነበር?	1. አዎ 2. የለም	ቁጥር 207 ን እለፍ
206	በዚህ ጉብኝተወ የመጡበት ምክኒያት ምን ነበር?	1. የምጥ መርፌ ለመዉሰድ 2. ምጡ በደንብ ስለጀመረ 3. የንቨርት ዉሃ ስለፈሰሰ 4. ደም ስለነበር 5. ሌሎች ይጠቀሱ	
207	መልሰዎ ለተራ ቁጥር 205 ጥያቄ አዎ ከሆነ ብዙ አማራጮች አሉ የትገኞቹ ናቸው? (እባዎት ከካርዱ ይዉሰዱ)	1. የንግደ ልጅ ከልጁ ፊት ለፊት ሁኖ ደም ሲፈስ 2. የንግደ ልጅ ከልጁ በስተኋላ ሁኖ ደም ሲፈስ 3. ከልጁ እትብት የደም መፍሰስ ሲኖር 4. በማህጸን መቀደድ ምክኒያት የሚፈስ ደም ሲኖር	

		5. ሌሎች ካሉ ይጠቀሱ	
208	ከአሁን በፊት እንደተወለደ የሞተ ልጅ ነበር?	1.አዎ 2.የለም	
209	እንቨርት ዉሃዉ ከፈሰሰ ምንያ ህል ጊዜ ነበር?	ቁጥር አስገባ/ቢ ……	ተራቁጥር 213 ን እለፍ
210	የምጥ መርፌ ወስደዉ ነበር?	1. አዎ 2. የለም	
211	መልሰዎ ለቁጥር 210 ጥያቄ አዎ ከሆነ ብዙ አማራጮች አሉ	1. ሰዉ ሰራሽ የንሽርት ዉሃ መፍሰስ 2. በደም ስር የሚሰጠጥ መዳህኒት 3. በማህጸን በር አካባቢ የሚሰጥ መዳህኒት 4. ሌሎች ይጠቀሱ	
212	በዚህ ጉብኝት የወለዱበት መንገድ ምንድን ነዉ?	1. አምቡ መዉለድ 2. በቀዶ ህክምና 3. እናትየዋ እየገፋች ልጁን ጎትቶ የሚያወጣ መሳሪያ በመጠቀም 4. እናትየዋ ሳትገፋ ልጁን ጎትቶ የሚያወጣ መሳሪያ በመጠቀም	
213	የምጥ መርፌ ለምን ነበር የተወሰደዉ?	1. የእርግዝና ጊዜ ስላለፈ 2. በቂ የማህጸን ቁርጠት አለመኖር 3. የእንሽርት ዉሃ መፍሰስ 4. ሌሎች ይጠቀሱ	
214	ድንገተኛ ቀዶ ህክምና ለመስራት ከሚከተሉት አመልካች የሆኑት የትኞቹና ቸዉ?	1. የልጁ የልብ ምት ትክክል አለመሆን 2. ከአሁን በፊትበ ቀዶ ህክምና መዉለድ 3. የምጥ መርፌ አለመሳካት 4. ብዙ እርግዝና መኖር 5. ትክክለኛ ያልሆነ የልጅ አመጣጥ 6. በምጥ ወቅት የደም መፍሰስ 7. ሌሎች ይጠቀሱ	ተራቁጥር 216 ን እለፍ
215	በምጥ ወቅት ትክክለኛ ያልሆነ አመጣጥ ነበር?	1. አዎ 2. የለም	
216	የልጁ ክብደት ስንት ነበር?	ቁትር አስገባ.....	
217	ከዚህበፊትበቀዶህክምናወልደሽነበር	1. አዎ 2. የለም	
218	በምጥ ወቅት የልጁ አመጣጥ በምን ነበር?	1. በጭንቅላቱ 2. በግንባሩ 3. በፊቱ	

		4. በመቀመጫዉ 5. ሌሎችይጠቀሱ	
219	በምጥ ወቅት እርግዝናዉ ስንትነበር?	ቁጥር አስገባ/ቢ ……	
220	በምጥ ወቅት የልጁ የልብ ምት እንደት ነበር	ቁጥር አስገባ/ቢ ……..	
221	ይህን ጨምሮ ምን ያህል ልጆች አሉ?	ቁጥር አስገባ/ቢ ……..	
222	በእርግዝና ወቅት የልጁ አቀማመጥ እንደትነበር?	1. ቀጥታ 2. በጎን 3. ቀጥታ ወይም ጎን ያልሆነ 4. ሌሎችይጠቀሱ	
223	በወሊድ ጊዜ በምን አይነት መንገድ ወለድሽ?	1. በምጥ 2. በቀዶህክምና	
224	ጊዜ ሰጥቶ ቀዶ ህክምና ለመስራት ከሚከተሉት ነገሮች የትገኞቹ ናቸዉ	1. ከዚህ በፊት ቀዶ ህክምና መኖር 2. የእናት እና የልጅ ሰዉነት አለመመጣጠን 3. የገንዘብ መኖር 4. የእርግዝና ጊዜ ማለፍ 5. ትክክለገኛ ያልሆነ የልጅ አቀማመጥ 6. ሌሎች ይጠቀሱ	
ክፍል ሦስት የበሽታዎች ሁኔታ			
301	በእርግዝና ወቅት ሌሎች በሽታዎች ነበሩ?	1. አዎ 2. የሉም	ተራቁጥር 302
302	መልሰዎ ለተራ ቁጥር 301 አዎ ከሆነ ከሚከተሉት የትገኞቹ ናቸዉ?	1. የደምግፊት 2. የኤድስ 3. የስኳር 4. የልብ 5. ሌሎችይጠቀሱ	

ለነበረን ቆይታ አመሰግናለሁ።