

## Prevalence of Cesarean Section and Associated Factors in University of Gondar Comprehensive Referral Hospital, North West Ethiopia, 2019

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### ABSTRACT

**Objective:** cesarean section is the delivery of the fetus, placenta, and membranes through an incision on the abdominal and uterine walls after the fetus has reached viability. The World Health Organization (WHO) suggests the Cesarean Section (CS) rate between 5%-15%. Evidence suggested that the rate of CS is high in developing countries including Ethiopia. So the aim of this study was to assess the prevalence and associated factors of cesarean section in the University of Gondar comprehensive referral hospital, North West Ethiopia, 2019

The overall prevalence of cesarean section in Gondar university hospital was 29.7%. The most common indications of CS were Non-Reassurance Fetal Heart Rate Pattern (NRFHP) (17.8%) which was followed by previous CS scar (15.9%) and severe preeclampsia (12.1%). Factors such as maternal educational status (AOR 2.89, CI (1.278-6.56), gravidity (AOR 3.259 CI (1.484-7.160), Ante Natal Care (ANC) follow up (AOR 0.248, CI (0.083-0.739) and number of ANC follow up (AOR 5.17 CI (1.48-18.03) were associated with CS.

**Keywords:** Prevalence; Caesarean section; University of Gondar Referral Hospital; Laboring mothers; Ethiopia

### INTRODUCTION

Cesarean Section (CS) is the delivery of the fetus, placenta, and membranes through an incision made on the mothers abdominal and uterine walls after 28th weeks of gestation. CS is the most common surgical procedure during pregnancy and labor to save both the life of the mother and the newborn [1,2]. Despite its advantage, CS is associated with adverse maternal and neonatal outcomes including long term sequels, with appropriate clinical indication significantly saves the life of the mother and the newborn as well. In contrast, CS performed without any medical indication increases the trend without giving any advantage for the patients. Increased CS rate has an important negative implication for health coverage nationally and internationally [3-8].

Cesarean section performed with aseptic technique, appropriate anesthesia, the applicability of lower transverse uterine segment cesarean section, safe and rapid availability of blood products collectively decreases the morbidity and mortality associated with cesarean section. The rate of cesarean section is twice higher in private than in public hospitals.

The global Cesarean Section Rate (CSR) is 18.6% ranging between 6.0% to 27.2% in developing and developed world respectively, Latin American and Caribbean accounts the highest proportion of cesarean section rate (40.5%) and the lowest rate is in Africa (7.3%), particularly in western Africa (3%).

The major obstetrical indication for cesarean section is obstructed labor, previous CS scar, non-reassuring fetal heart pattern, malpresentation, malposition, antepartum hemorrhage and failed induction, cesarean section rate more than the WHO threshold (15%) cause morbidity and mortality than giving any advantage, so routine use of antibiotics for all women undergoing CS decreases the morbidities associated with CS.

According to the WHO 2010 report, the minimum CS rate to have a good maternal outcome is 5%. However, for better neonatal health outcome the range should be between 5%-10%

Studies conducted in three Asian countries the prevalence of CS in Bangladesh was 73%, 30% in Nepal and 18% in India. A study also that was done in Brazil was 29.9 % and 86.2% in public and private health sectors respectively. Another study in Asia revealed that the proportion of cesarean section in India 21.6%, in Pakistan 21.40% and China 54.5% [9-14]. The study conducted in the Arab region showed that Egypt having the highest CS rate (26.2%) but lowest in Mauritania 5.3%. Another study conducted in 34 Sub-Saharan Africa (SSA) countries showed that the rate of cesarean section is ranged from 3% in Burkina Faso to 15.6% in Ghana. The highest rate showed in Rwanda, Namibia, and Ethiopia which is 64.2%, 60.3% and 30.1% respectively. The lowest rate was shown in Congo which is 2.3%. Another study conducted in South Africa, Johannesburg CS rate was 39.4% [15-17].

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Studies in Ethiopia that was conducted in private and government hospitals in Harar town the overall prevalence of CS was 34.3%. A hospital-based cross-sectional study done at Chiro Zonal Hospital, West Harergae rate of cesarean delivery was 18.2% [18]. A cross-sectional retrospective study that was conducted in Attat Hospital; Gurage zone Southern Nations and Nationalities of People Republics (SNNPR), Ethiopia, showed that the rate of CS was 27.6% [9]. Similarly, the study that was done in Oromia suggested that prevalence of CS was 29.4%. A hospital-based retrospective cross-sectional study carried at Jimma University specialized hospital the overall prevalence of C/S was 28.1% [19,20]. According to the study conducted at Adigrat hospital, northern Ethiopia using a retrospective study design, the institutional cesarean delivery rate was 14.23% [21,22]. The study that was done in the west Tigray zone, the rate of CS was 13.2%. According to the study conducted in Addis Ababa on cesarean delivery practices in teaching public and nongovernment/private Maternal and Child Health (MCH) hospitals, the CSR 31.1% in public hospitals and 48.3% in private hospitals [23-25]. Similar Studies conducted in northwest Ethiopia the prevalence of CS was 11% in Finoteselam hospital and 25.4% in felegehiwot hospital.

Study finding in India showed that Previous Lower Segment Cesarean Sections (LSCS) was the leading indication to the CS rate (29.96%) followed by the arrest of labor (13.94%), Cephalic Public Disproportions (CPD) (11.84%) and fetal distress (10.97%) [26]. A study conducted in Pakistan showed that the most common indication of cesarean section was the previous cesarean section scar (22.76%) followed by failed progress of labor (18.29%) [12]. Another study conducted in Iran showed that repeated cesarean section (52.9%), elective CS (on maternal request) (7.5%) was the most common indication.

Similar Study conducted in Nigeria the common indication for CS was CPD (40% followed by preeclampsia (18%) and previous CS (11.8%) [27,28]. Another study that was conducted in Tanzania showed that prolonged/obstructed labor (30%) of all indication [29,30]. Similarly study in Zambia suggested that fetal distress (14.9%) and prolonged labor (10%) was the commonest indication for CS.

Even though the cesarean section is important and lifesaving intervention for mothers and babies when vaginal delivery is contraindicated, it has a negative health impact on mother and baby and also put the mother on risk for future pregnancy. Therefore in order to decrease this negative health impact, the cesarean section rate should be in recommendation range. So identifying the prevalence and associated factor of the cesarean section would help our hospital and the country, in general, to set plan and strategies' to make cesarean section delivery rate within 5%-15% as WHO-recommended and to reduce maternal and fetal complication during delivery [22].

## METHODOLOGY

### Study design and setting

An institution-based retrospective cross-sectional quantitative study has been conducted in the University of Gondar comprehensive referral hospital from March 1st to May 30th, 2019. University of Gondar comprehensive hospital is one of the oldest institutions in Ethiopia and producing the number of professionals and also giving huge service for the community since 1954.

### Study participants and sampling method

All laboring mothers admitting to the University of Gondar Referral Hospital were study population. The sample size was determined by

using single population proportion formula based on the findings conducted in Bahirdar Felege Hiwot Referral Hospital which is 25.4%, 4% precision, 95% confidence level, 10% none response rate. With this assumptions sample of 323 laboring mothers were involved in the study.

### Data collection procedure and data quality control

The structured questionnaire prepared in English was translated to Amharic which is the local language by language experts and translated back to English by other language experts to check its consistency. Amharic version questionnaire was used to collect data. Three BSc holder midwives with minimum two-year work experience were selected randomly and one other midwifery holder was selected for supervision. The pre-test was done on 16 (5% of sample size) on poly health center found in Gondar town. Based on the finding grammatical sequences of questions were arranged on questionnaires. Training and orientation were given to the selected data collectors and supervisor for one day. The Principal Investigator and Supervisor confirmed on the daily base the collected data for the completeness, accuracy, and clarity with data collectors, and the necessary correction was made before the next data collection day started. Finally, data cleaning; data entry, coding and crosschecking was done before data analysis [15].

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### Data quality assurance and analysis

Data were entered to EPI info version 7 and imported to SPSS version 20 for analysis. Exploratory and statistical data analysis was done and results were presented using tables. Bivariate logistic regression was first fitted to identify potential confounding factors and variables with a p-value less than 0.2 were entered to multivariable logistic regression models using backward selection method to identify associated factors with knowledge of students on liberalized low of safe abortion. Adjusted odds ratio with 95% confidence interval and p-value <0.05 were used to show statistical significance with the outcome variable.

## RESULTS

A total of 323 study participants were included in this study with a response rate of 100%. The mean age of the study participants was 28.34 years (SD= ± 6.1). And more than half (52%) of the study participant was in the age group of 25-34 years. Majority of the participants (94%) were orthodox Christian followers. Nearly 97% of the women were Amhara in ethnicity. And also, the majority of participants 298 (92.3%) were married. It was also noted that 178 women (55.1%) lived in the urban area. As to the educational status of respondents, 95(29.4%) were grade 9-12. The occupation of the respondents 203 (63.8%) were housewives (Table 1).

**Table 1:** Sociodemographic, obstetric characteristics and indications of cesarean section among women who gave birth in university of Gondar comprehensive referral hospital, North West Ethiopia, 2019(n=323).

Variable	Frequency	Percentage (%)
<b>Age n=323</b>		
15-19	16	5
20-24	71	22
25-34	170	52.6
>35	66	20.4
<b>Religion n=323</b>		
Orthodox	248	76.7
Muslim	57	17.6
Protestant	18	5.7
<b>Ethnicity z n=323</b>		
Amhara	315	97.5
Tigray	7	2.2
Oromo	1	0.3
<b>Marital status n=323</b>		
Married	298	92.3
divorced	11	3.4
single	6	1.9
widowed	8	2.4
<b>Residential area n=323</b>		
Urban	178	55.1
Rural	145	44.9
<b>Maternal occupational status n=323</b>		
House wife	206	63.8
Governmental employ	59	18.3
Farmer	25	7.7
Private employ	9	2.8
Merchant	20	6.2
Student	4	1.2
<b>Educational status n=323</b>		
Unable to read and write	86	26.6
Abel to read and write	77	23.8
Grade 1-8	65	20.2
Grade9-12, diploma and above	95	29.4
<b>Gravid n=323</b>		
One	101	31.3
Two-four	181	56
Grand multi (>5)	41	12.7
<b>Parity n=323</b>		
One	134	41.5
Two	76	23.5
Three	59	18.3
Four and above	54	16.7
<b>ANC follow up n=32</b>		
No	43	13.3
Yes	280	86.7
<b>Number of ANC follow up n=280</b>		
One	43	13.3
Two	17	5.3
Three	47	14.6
Four	156	48.3
Five times and above	30	9.5
<b>Gestational age n=323</b>		
28-36	39	12.1
37-42	250	77.4
>42	34	10.5
Vaginal delivery	227	70.3
Cesarean section	96	29.7
<b>Type of cesarean section n=96</b>		
Emergency	65	67.7
Elective	31	32.3
<b>Number of CS delivery n=96</b>		
Primary	77	80.3
Repeated	19	19.7
<b>How many CS did she have n=19</b>		
Two	16	84.2

Three and more	3	15.8
Prom prolonged	8	7.5
Obstructed labor	4	3.8
Fetal distress	19	17.8
Abnormal presentation	9	8.4
Previous cs scar	17	15.9
Failure to progress	1	0.9
APH/AP/PP	3	2.8
Failed induction	7	6.5
Sever preeclampsia	13	12.1
Post date	1	0.9
Cord prolapsed	2	1.9
Multiple pregnancy	4	3.7
Maternal request	1	0.9
CPD	6	5.9
Macrosomia	2	1.9
Oligohydramnios	3	2.8
Pathological solid fibroid	1	0.9
Uterine rupture	2	1.9
Kidney disease	1	0.9
Contracted pelvis	1	0.9

### Obstetric characteristics

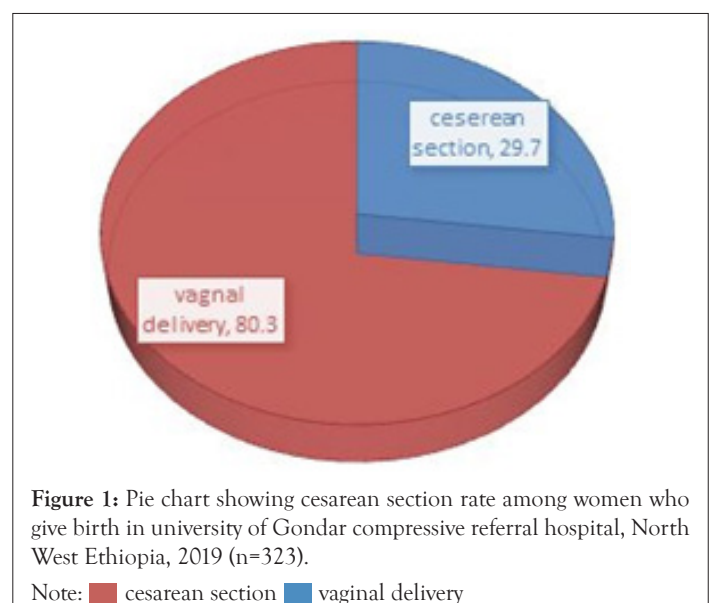
Among the participants 181 (56%) of the women ever had the pregnancy of 2.4. And nearly 41% of the participants gave birth after the seventh month one time. It was also noted that 86.7% of respondent have ANC follow up. Of the total participant's majority (86.7%) of them have at least one ANC follow up, of these 48.3% women receives four ANC visit. More than 77% of the cesarean section were performed between the gestational ages of 37-42 week (Table 1).

### Indication of cesarean section

Of the total CS performed, the top five indications were NRFHP (17.8%), previous CS scar (15.9%), severe preeclampsia (12.1%), abnormal fetal presentation (8.4%), and failed induction (6.5%) (Table 1).

### The proportion of cesarean section

The proportion of cesarean section rate was 29.7% (CI: 24.2, 36.2). From these more than 67% of women have an emergency cesarean section and around 80.2% of women have a primary cesarean section (Figure 1).



**Figure 1:** Pie chart showing cesarean section rate among women who give birth in university of Gondar comprehensive referral hospital, North West Ethiopia, 2019 (n=323).

Note: ■ cesarean section ■ vaginal delivery

### Factors associated with cesarean section

Bivariable and multivariable logistic regression was fitted to identify factors associated with cesarean section. On bivariable logistic regression, the religion of the women, educational status, maternal occupation, gravidity, parity, ANC follow up and number of ANC follow up had an association with cesarean section. The result of multivariable logistic regression showed that educational status of the mother, gravidity; parity, ANC follow up and the number of ANC visit were significantly associated with cesarean section. The odds having a cesarean section for those mothers who are grade 1-8 is 2.9 times compared with their counterpart (AOR, 2.897, CI: 1.278, 6.564). Those women who got pregnant two-four times are 3.26 times more likely to have a cesarean section rate compared with those who got pregnant five or more times (AOR=3.26, CI: 1.48, 7.16). Those mothers who hadn't ANC follow up in their last pregnancy were 75.2% less likely to cesarean section compared with their counterpart (AOR=0.248, CI 0.083-0.739).

Among respondents, those mothers who had ANC follow up of three times were 5.17 times more likely to have a cesarean section compared with those mothers who have one ANC visit (AOR=5.17, CI 1.48-18.00). Similarly, those women who had ANC visit of four were 4.49 times more likely to have cesareans section compared with mothers who had one ANC visit (AOR=4.49, CI 1.47-13.66) (Table 2).

### DISCUSSION

This study was aimed to assess the proportion and associated factors of cesarean section among mother who gave birth in the last three months in Gondar university comprehensive referral hospital. This study found that the overall proportion of cesarean section is 29.7% (95% CI: 24.2%-36.2%) and also 67.7 % of the cesarean section was emergency and 80.2% were primary cesarean section. This result is in line with a study conducted in Brazil and the Gurage zone which was 29.9% and 27.6% respectively. Also, the study relatively comparable with studies conducted in Oromia (29.4%), Jimma (28.1%), felegehiwot hospital (25.4%). However, this finding is considerably high compared with research conducted in chiro zone hospital west Harergae, adigrat, and Tigray region which was 18.2%, 14.2%, and 13.2% respectively [3,23]. This disparity might be due to the time gap, variation in sample size, increased awareness of mothers on ANC follow up and early identification of complications and increased opted cesarean section. Besides, this finding is significantly high compared with a study conducted in Finoteselam hospital (11%). This gross variation might be due to the time gap, variation in sample size, the difference in awareness and preference for CS also.

The major indication for cesarean section in the study was NRFHR 17.8% and previous cesarean section 15.9%. This study was similar to the study conduct in Iran, chiro zona hospital, west Harergae, Addis

**Table 2:** Factors associated with caesarean section delivery in bivariable and multivariable logistic regression among women who gave birth in university of Gondar comprehensive referral hospital North West Ethiopia, 2019 (n=323).

Variable	Caesarean section		COR(95% CI)	AOR(95% CI)
	Yes%	No%		
<b>Religion</b>				
Orthodox	80(32.3)	168(67.7)	0.420(0.118,1.492)	0.361(0.91,1.430)
Muslim	13(22.8)	44(77.2)	0.677(0.169,2.705)	0.443(0.98,2.009)
Protestant	3(16.7)	15(83.3)	1	1
<b>Occupation status</b>				
House wife	64(31.1)	142(68.9)	1	1
Farmer	13(22.0)	46(78.0)	1.595(0.806,3.156)	2.918(1.122,7.587)
Government employ	9(36.0)	16(64)	0.801(0.336,1.909)	0.882(0.339,2.292)
Privet employs	1(11.1)	8(88.9)	3.606(0.442,29.435)	4.055(0.439,37.414)
Merchant	8(40.0)	12(60)	0.676(0.264,1.734)	0.440(0.114,1.349)
Student	1(25.0)	3(75)	1.352(0.138,13.250)	3.180(0.260,38.847)
<b>Educational status</b>				
Unable to read	34(39.5)	52(60.5)	1	1
Abel to read	19(24.7)	58(75.3)	1.996(1.017,3.919)	2.459(1.165,5.192)
Grad 1-8	12(18.5)	53(81.5)	2.888(1.349,6.183)	2.897(1.278,6.56)*
Grad 9 and above	31(32.6)	64(67.4)	1.350(0.734,2.482)	1.678(0.820,3.437)
<b>Gravidity</b>				
One	38(37.6)	63(62.4)	1.432(0.687,2.983)	1.429(0.620,3.296)
Two-four	39(21.5)	142(78.5)	3.145(1.548,6.388)	3.259(1.484,7.160)*
Grand multi	19(46.3)	22(53.7)	1	1
<b>Parity</b>				
One	43(32.1)	91(67.9)	1.347(0.699,2.596)	1.071(0.236,4.857)
Two	20(26.3)	56(73.7)	1.782(0.884,3.766)	0.734(0.218,2.473)
Three	12(20.3)	47(29.7)	2.492(1.079,5.758)	0.975(0.290,3.275)
Four and above	21(38.9)	33(61.1)	1	1
<b>ANC follow up</b>				
Yes	87(31.1)	193(68.9)	1	1
No	9(20.9)	34(79.1)	0.587(0.270,1.277)	0.248(0.083,0.739)*
<b>Number of ANC follow up</b>				
One	4(9.3)	39(90.7)	1	1
Two	5(29.4)	12(70.6)	3.306(1.184,9.229)	2.405(0.607,9.522)
Three	10(21.3)	37(28.7)	2.844(0.752,10.758)	5.167(1.481,18.03)*
Four	54(34.0)	105(66.0)	4.375(1.320,14.504)	4.485(1.422,13.66)*
Five times and above	14(46.7)	16(53.3)	3.237(1.190,8.811)	1.755(0.767,4.017)

Note: \* = p-value ≤ 0.05

Ababa nongovernmental MCH hospital. However, this finding was different from the study conducted in Tigray that the most frequent indication was CPD (23.5%) and ant partum hemorrhage (15.6%) and also from study conducted in Nigeria the leading indication for cesarean were CPD (40% followed by preeclampsia (18%). This difference might be due to the decreased trial of vaginal birth after CS and time not given for conservative management of fetal distress. As this study demonstrated that the odds of having CS among women who got pregnant two-four times were 3.26 times more likely to have CS compared with their counterpart (AOR=3.26, CI:1.48,7.16). This result is in accordance with a study done in Brazil [10].

This study also demonstrates that those mothers who had ANC follow up of three times were 5.17 times more likely to have cesarean section compared with those mothers who have one ANC visit (AOR=5.17, CI 1.48-18.00). These findings were similar to the study conducted in Addis Ababa (AOR=1.8, CI 1.01-3.29) [20]. This might be that when women have more ANC visit were more risk is going to be identified than those who do not have more ANC visit.

## CONCLUSION

Based on this finding it was concluded that the overall CS prevalence in the University of Gondar was 29.7%. It is above 15% recommended by WHO for developing countries. CS rates higher than 15% are not associated with a reduction in maternal and newborn mortality rates. Therefore to reduce the high prevalence of CS, each case should be evaluated to determine the possibility for vaginal delivery. As a result, this study confirms that even though the cesarean section is the most commonly performed surgical procedures to day, it is not without risks. The result of this study agrees with the other authors that the proper diagnosis of maternal and fetal indications and also the use of prophylactic antibiotics helps to reduce the morbidity associated with CS. In multivariate logistic regression factor identified to be significantly associated with CS are educational states, gravidity, ANC follow up and number of ANC follow up. The leading indication of C/S was NRFHRP and previous c/s scare.

## LIMITATION OF THE STUDY

Referral case might overestimate the true magnitude of CS rate

## DECLARATION

### Ethical approval and consent

Ethical clearance letter was obtained From the Ethical Review Committee of the School of Midwifery, under the delegation of the Institution Review board (IRB) of the University of Gondar. Permission letters were also obtained from the University of Gondar referral hospital administrative office. Informed written consent was obtained from respondents after a clear explanation of the purpose of the study. Confidentiality and anonymity were maintained.

## CONSENT FOR PUBLICATION

Not applicable

## AVAILABILITY OF DATA AND MATERIALS

Data will be available upon responsible request from the corresponding author using "sabayneh7@gmail.com"

## COMPETING INTERESTS

The authors declared no potential competing interest with respect to the research, authorship, and publication of this article.

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## AUTHOR'S CONTRIBUTIONS

AAS has contributed from the beginning of the research idea to proposal writing, data collection process, analysis and interpretation of finding and preparation of the manuscript.

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