

# Cesarean Section and Associated Factors at Aira Hospital, Oromia Region, Western Ethiopia: A Retrospective Record Review

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**Abstract:** Introduction: According to the latest data from 150 countries, currently, 18.6% of all births occur by cesarean section, ranging from 6% to 27.2%. It is alarmingly increasing in the last decade with an average annual rate of increase by 4.4%. Objective: To assess the prevalence of the cesarean section and associated factors among mothers who gave a birth from January 01, 2014, to December 31, 2018, at Aira Hospital, west wollega zone, Oromia region, Ethiopia. Methods and materials: Study was conducted from June 1 to July 25, 2019, by retrospective review of complete medical records of mothers who gave birth from January 01, 2014, to December 31, 2018 at Aira general hospital, west wollega zone, Oromia region, Ethiopia. The sample size was determined by using single population proportion and the final sample size was 339. Check list was used for data collection which was adapted and developed by reviewing relevant literatures. The data was analyzed by statistical package for social science version 20. Odd ratio was used for the interpretation of strength of prediction of independent variable to outcome variable, cesarean section. The statistical significance was declared at  $P < 0.05$  with 95% confidence interval. Result: A total of 332 medical records were reviewed. More than half (51.8%) of mother were less than or equal to 24 years with the mean age of 24.23 ( $\pm 5.17$  SD). The prevalence of cesarean section was 33.1% (95%CI 31.3-35.2%). More than two third (85.5%) of mothers had antenatal care follow up and the gestational age at the time of delivery was 37-40 weeks for 90.7% of mothers. Maternal age, gestational age and fetal weight were factors associated with cesarean section. Conclusion: Since the current prevalence of cesarean section surpass the world health organization recommendation threshold vaginal delivery should be encouraged in appropriate cases and the time should be given for conservative management of fetal distress. Maternal age, gestational age and fetal weight were factors associated with cesarean section. We recommend a future researchers to examine the attitude of service providers and their influence on the growing cesarean section delivery rate.

**Keywords:** Cesarean Section, Associated Factors, Retrospective Record Review, Ethiopia

## 1. Introduction

The cesarean section (CS) is a lifesaving surgical procedure to prevent or treat life-threatening maternal or perinatal complications, and the appropriate rate should be associated with the lowest attainable maternal and perinatal

morbidity and mortality [1, 2]. The medically indicative cesarean section is effective in reducing hurdles related to delivery and birth. However, since cesarean birth has risks of surgery and it increases the possibilities of complications in future pregnancies and might harm mothers and babies [3-5].

The complications may be developed intraoperative,

postoperatively and on future pregnancy due to previous the cesarean section. The common adverse sequel of cesarean section includes blood loss, wound infection, uterine rupture, hematoma, cystitis, injury to organ, placenta accreta, anesthesia complications and re-operation [3, 4, 6]. It has also a negative influence on early initiation of breastfeeding [5] and associated with an increase in subsequent risk of asthma and childhood-onset type one diabetes [3].

In 1994, world health organization (WHO) published revised guidelines stating that cesarean birth rates should range between 5 and 15 percent, adding that rates lower than five percent reflect women's lack of access to life-saving care [7]. According to the latest data from 150 countries, currently, 18.6% of all births occur by cesarean section, ranging from 6% to 27.2% and it is alarmingly increasing in the last decade with an average annual rate of increase of 4.4% [8]. The WHO yielded an estimate of CS prevalence by continent; 36% in America, 23% in Europe, 9% in Asia and 4% in Africa [9], while the study report from sub-Saharan African countries indicated 4.1% to 16.8% of cesarean section [10, 11].

The average national cesarean section prevalence in Ethiopia shows an increased trend with a prevalence of 0.7% in 2000 to 1.9% in 2016 [12]. The rate is substantially variable across administrative regions and places of delivery. For instance, Addis Ababa has the highest rate of the cesarean section, 21.4% in 2016 which surpassed the WHO recommendation and the greatest increase since 2000 (7.9%). Conversely, low rate of the cesarean sections were noted in Somali (0.4%), Afar (0.7%), Oromia (0.9%), Southern nation nationalities and peoples of Ethiopia (1.2%), Gambela (1.3%), Tigray (2.0%), Benishangul-Gumuz (2.0%), and Amhara (2.3%) regions of Ethiopia. Cesarean birth in private health facilities increased from 6.7% in 2000 to 23.0% in 2016 while the rate in public health facilities decreased by 7.9% (from 14.4% in 2000 to 6.5% in 2016) [13].

Many factors have been claimed to be attributed for the increment of the cesarean section. While some literature reported socio-demographic factors to contribute for CS were maternal age, higher educational status, richest family and rural residence [14, 15], whereas obstetric factors include, cephalo-pelvic disproportion, obstructed labor, fetal distress, abnormal presentation, multiple pregnancies, multiple parity, fetal microsomia, previous CS, uterine rupture, antepartum hemorrhage, gestational age are factors contribute for cesarean section [10, 13, 14, 16-19]. The place of delivery also another factor associated with it. Mothers who gave birth at private health facilities are more likely to undergo CS than who gave birth at public health facilities [11, 20, 21].

A raise in a rate of CS are not only determined by the maternal factors. However, factors related to the facility include, the capacity of the health system to deliver surgical obstetric care, its financing structure, and human resources profile, have stronger aggregate-level effects on cesarean section rates than does income [22]. However given only few studies are conducted in assessing the rate of the cesarean section in Ethiopia, perhaps in the oromia region [16, 17, 21].

Therefore, this study is aimed to assess the prevalence of cesarean section and associated factors at Aira General Hospital, Oromia region, western Ethiopia.

## 2. Method and Materials

### 2.1. Study Setting and Period

The study was conducted at Aira Hospital which is located in Aira District, West Wollega Zone of Oromia Region, at a distance of 520 km from the capital city, Addis Ababa. Aira hospital is a general Hospital rendering a service to an estimated 300,000 people. The study was conducted from June 1, to July 25, 2019.

### 2.2. Study Design and Population

A retrospective medical record review was conducted among women who gave birth in Aira hospital in the last five years, from January 01, 2014, to December 31, 2018, were included, while the medical record of mothers with incomplete information was excluded.

### 2.3. Sample Size and Sampling Procedure

Sample size was determined using the formula for single population proportion by considering the prevalence of cesarean section 27.6% [18], 95% level of confidence, 5% margin of error and 10% none response rate was added and yielded a final sample size of 339. Systematic random sampling technique was used to select the study participants by using the delivery registration book as sampling frame. The interval "k" was used to select the study participant from the sample frame. Accordingly, the total number of deliveries during the last five year period were 2,737 deliveries. By dividing the total number of deliveries for the final sample size,  $k=8$  ( $2,737/339$ ). So every 8<sup>th</sup> woman from the sampling frame was included.

### 2.4. Data Collection Procedure and Tools

The data was collected by reviewing the medical record of mothers. Two data collectors (BSc nurses) and one supervisor (MSc Nurse) were participated on data collection. The checklist was developed and adapted by reviewing relevant literatures [13, 16-18, 21, 23-25]. Variables included in checklist form were maternal age, residence, gravidity, gestational age at delivery in weeks, ANC follow up, fetal weight, mode of delivery, indication for the cesarean section, fetal outcome, frequency and type of caesarean section.

### 2.5. Data Quality Assurance

In order to maintain quality of the data, training was given for data collectors and supervisors on data collection procedures. Daily follow-up was made by supervisors to ensure the quality of data collection process and feedback was given for data collectors accordingly. Before the commencement of data collection the tool was pretested with

5% of sample size in Gimbi adventist hospital which found 60km away from the study area and possible modifications were made on the tool. Completeness of data were checked daily and coded before the data analysis.

## 2.6. Data Processing and Analyses

Data were entered to Epi info version 3 and statistical packages for social sciences (SPSS) version 20 was used for analysis. Bivariate and multivariable logistic regression analysis was computed. Those variables with P-value of less than or equal to 0.2 were taken to multivariable logistic regression. The independent effect of each variable on the outcome variable was seen with to multivariable logistic regression and it were presented in crude and adjusted odds ratio (OR) with their corresponding 95% confidence intervals. The statistical significance was declared at  $P < 0.05$ .

## 3. Results

### 3.1. Socio Demographic Characteristics

Ninety-eight percent of the sampled medical records of mothers were reviewed. The mean age of the participants was 24.23 ( $\pm 5.17$  SD) with a range of 15-42 years and more than half (51.8%) of mother were less than or equal to 24 years, followed by mothers whose age group 25-34 (43.7%). Concerning their residence more than half (58.7%) were from rural areas (table 1).

**Table 1.** Socio-demographic characteristics of mothers who gave a birth from January 01, 2014, to December 31, 2018, at Aira Hospital, west wollega zone, Oromia Region, Ethiopia. July 2019, n=332.

Characteristics	Frequency	Percentage (%)
Age		
<= 24	172	51.8
25 - 34	145	43.7
>=35	15	4.5
Residence		
Urban	137	41.3
Rural	195	58.7

### 3.2. Prevalence of the Cesarean Section and Obstetric Characteristics of Mothers

The current prevalence of the cesarean section was 33.1% (95%CI 31.3-35.2%). Two hundred (60.2%) of the mothers were multigravidas, while all of the mothers were in the third trimester during their delivery. Less than one-third (29.2%) had previous abortions and only (20.5%) had history of still births in the previous pregnancies. More than two-third (85.5%) of mothers had ANC follow up and the gestational age at the time of delivery was 37-40 weeks for 90.7% of mothers. Fifty-two (15.6%) of mothers had previous history of the cesarean section, among them 61.5% of them had once. Regarding the indication of the cesarean section majority 33.6% were previous history of cesarean section, followed by NRFHR (Table 2).

**Table 2.** The cesarean section and obstetric characteristics of mothers who gave a birth from January 01, 2014, to December 31, 2018, at Aira Hospital, west wollega zone, Oromia Region, Ethiopia. July 2019, n=332.

Obstetric History	Frequency	Percentage (%)
Gravida		
1	91	27.5
2 -4	200	60.2
≥5	41	12.3
Previous still births		
Yes	68	20.5
No	264	79.5
Abortions		
Yes	97	29.2
No	235	70.8
Number of abortions (n=97)		
1	58	59.8
≥2	39	40.2
ANC Follow-up		
Yes	284	85.5
No	48	14.5
Gestational age		
37 - 40 weeks	301	90.7
>40 weeks	31	9.3
Number of previous CS (n=52)		
One	32	61.5
Two	20	38.5
Current CS		
Yes	110	33.1
No	222	66.9
Indications for CS (n=110)		
Obstructed labor	31	28.2
NRFHR	28	25.5
Previous CS	37	33.6
Post Term	14	12.7

### 3.3. Maternal and Newborn Outcome

More than a half (52.7%) of babies' Weight were between 2,500 – 3,999 grams, followed by >4,000g of 39.5%. Among those babies born 99.4% was alive and 48.3% have APGAR score of 4-6 and two of mothers were passed away (Table 3).

**Table 3.** Mothers and newborn outcome among mothers among mothers who gave a birth from January 01, 2014, to December 31, 2018, at Aira Hospital, west wollega zone, Oromia Region, Ethiopia. July 2019, n=332.

Obstetric History	Frequency	Percentage (%)
Fetal Weight		
< 2500G	26	7.8
2500 - 3999g	175	52.7
> 4000g	131	39.5
APGAR score (n=325)		
<3	30	9.2
4-6	157	48.3
>7	138	42.4
Fetal outcome (n=110)		
Alive	325	97.8
Dead	7	2.2
Maternal outcome		
Alive	330	99.4
Dead	2	0.6

**Table 4.** Factors associated with cesarean section among mothers who gave a birth from January 01, 2014 to December 31, 2018 at Aira Hospital, west wollega zone, Oromia Region, Ethiopia. July 2019, n=332.

Characteristics	Cesarean section		COR 95% CI	AOR 95% CI
	Yes n (%)	No n (%)		
Age				
≤ 24	28 (16.3)	144 (83.7)	1	1
25 - 34	74 (51.3)	71 (49.0)	5.36 (3.19, 9.01)	8.29 (3.75, 18.33)*
≥ 35	8 (53.3)	7 (46.7)	5.88 (1.97, 17.52)	5.24 (1.27, 21.61)*
Residence				
Urban	43 (37.7)	71 (62.3)	1	1
Rural	67 (30.7)	151 (69.3)	0.73 (.46, 1.18)	1.09 (0.62, 1.92)
Gravida				
One	21 (23.1)	70 (76.8)	1	1.04 (0.43, 4.51)
Two-four	67 (33.5)	133 (66.5)	1.68 (0.95, 2.97)	0.55 (0.23, 1.32)
Five & above	22 (53.7)	19 (46.3)	3.86 (1.72, 8.45)	1
Gestational age				
37 – 40 weeks	88 (29.2)	213 (70.8)	1	1
≥ 40 weeks	22 (52.9)	9 (47.1)	5.92 (2.62, 13.36)	4.84 (2.00, 11.69)*
Fetal Weight				
< 2500g	12 (46.2)	14 (53.8)	1	1
2500 - 3999g	56 (32.0)	119 (68.0)	0.55 (0.24, 1.26)	1.08 (0.41, 284)
> 4000g	42 (32.1)	89 (67.9)	3.55 (3.23, 3.29)	3.22 (3.00, 3.44)*

\*= significant at  $P < 0.05$ , g=gram, COR=crude odd ratio, AOR, adjusted odd ratio, CI=confidence interval.

#### Factors associated with cesarean section

Age of the mother, gestational age and infant weight were variables significantly associated with caesarean section after adjusting for other variables in multivariate logistic regression. Mothers whose age between 24-25 were eight times more likely to undergone caesarean section as compared to the mothers age of less than 24 years, with (AOR 8.29 95% CI (3.75, 18.33), similarly Mothers whose age was above 35 years were five times more likely to undergone caesarean section as compared to the age less than 24 years with (AOR 5.24 95% CI (1.27, 21.61). Mother whose gestational age was above 40 weeks were 4.8 times more likely to undergo the cesarean section as compared with those whose gestational age was between 37 - 40 week with (AOR 4.84, 95%CI (2.00, 11.69)). Those who gave birth of baby weight > 4000g were 3.22 times likely undergo the cesarean section than the mother gave a birth of a baby weigh less than 200g with (AOR 3.22 95% (3.00, 3.44) (table 4).

## 4. Discussion

This study provides information regarding the cesarean section and factors associated with it. In this study the overall prevalence of caesarean section was 33.13% (95%CI 31.3-35.2%). This figure is lower when compared with the study result from middle and upper income countries like Mexico (57.3%) [15], Iran (52.9%) [19], Brazil (51.6%) [26], but it is comparable with studies conducted, India (32.6%) [27], Taiwan (31.9%) [28], Thailand (31.5%) [29] and Harar, Eastern Ethiopia (34.3%) [21], On the other hand the prevalence of CS in this study was relatively higher compared to previous studies conducted at Mizan Aman General Hospital (21.1%) [17] and Atata Hospital (27.6%) southern Ethiopia [18], whereas the Ethiopian national review of cesarean rate shows 18% [12] and also higher than

the finding of study conducted at St. Joseph Medical Hospital, Tanzania (18%) [30]. But this figure is higher compared to the rate that WHO have recommended which is 15%. This difference might be due to higher rates of CS in urban areas are associated with the availability of health care facilities and advanced obstetric services, high rates of maternal healthcare utilization, amongst others [20].

The major indication for caesarean section in the study was previous history of CS. This study was similar with the study conducted in Albania and Iran [31, 32]. However this finding was different from the study conducted in Felegehiwot referral hospital, Northwest Ethiopia, where the most frequent indication was obstructed labor [13]. This different might be decreased trial of spontaneous vaginal delivery and time not given for conservative management of fetal distress [26].

In this study, maternal age is significantly associated with caesarean section. An increase in the caesarean section rate with age has been reported in the majority of studies assessing this outcome [19]. Mothers in age group of 25-34 and > 35 were 8.29 and 5.24 more likely to undergo the cesarean section respectively as compared with those women less than 24 years old. This finding is in line with the study result obtained from Nigeria, which have reported the maternal age of greater than thirty-five years, have an association with the cesarean section [33]. Other studies conducted at Japan [34] and India [23] also reported similar findings. This may be due to that those older women are more likely to experience pregnancy complication such as diabetes, hypertension and preeclampsia [17, 24].

Another factor associated with the cesarean section were gestational age. Mother whose gestational age is >40 weeks were more likely to undergo the cesarean section than mothers whose gestational age 37- 40 weeks. Similarly the study finding from united states of America also traces the

cesarean delivery increases concurrently with the gestational age [35, 36]. This may explain the high caesarean section deliveries due to postdates pregnancy; the inductions of labor may have failed or as elective CS [37].

The mother who gave birth of baby weight > 4000g were 3.22 times likely undergo cesarean section than the mother gave a birth of a baby weigh less than 200g. This finding is supported by the study conducted in Harari town of Eastern Ethiopia [21], Nigeria [33] and Bergen, Norway [6]. Study finding from china and three American hospitals also pointed that cesarean section rate increased with the average birth weight of singleton live-birth infants [38, 39]. It is suggested that antenatal care should be strengthened and nutritional guidance during pregnancy should be paid more attention.

## 5. Limitations of Study

Since the study was based the secondary data, we were faced a challenge on the completeness and reliability of data. Use of primary data from the participants could help to assess factors including the wealth status, literacy, obesity, attitude and knowledge level concerning the cesarean section. The referral case may overestimate the real magnitude of CS. Therefore the utilization of this information for decision making should consider the limitations of this study.

## 6. Conclusion

The study revealed that the overall prevalence of caesarean section in the study area was 33.3%. It is high when compared to the WHO recommended optimum upper limit of 15% prevalence. The main indication of CS was previous caesarean section. It is recommended that vaginal delivery should be encouraged in appropriate cases and the time should be given for conservative management of fetal distress rather than rushing to operation theatre with a single episode of fetal heart rate abnormality. Such effort should be taken onto consideration to keep the rate of cesarean section up to the WHO recommendation of 15%. The older women should also counseled during Antenatal care to prevent cesarean section. We also recommend a future researchers to examine the attitude of service providers and their influence on the growing cesarean section delivery rate.

## Abbreviations

ANC: Antenatal Care, APGAR: Appearance, Pulse, Grimace, Activity, Respiration, BSc: Bachelor of Science, CS: Cesarean Section, NRFHR: MSc: Masters of science, Non- Reassuring Fetal Heart Beat, WHO: World Health Organization, SD: Standard deviation.

## Ethical Approval

Ethical clearance and study approval was obtained from Haramaya University, college of health and medical science, school of nursing and midwifery. Letter of permission was

obtained from Aira hospital to access the medical records. Confidentiality was maintained by excluding personal identifiers and not sharing the data with third person.

## Data Availability

The datasets used for analysis are available from the corresponding author upon reasonable request.

## Competing Interests

The authors declare that there is no conflict of interest to declare for this study.

## Author's Contribution

KD and GF participated in inception of idea, proposal development, data collection, analysis, and final write up. BT and HA have participated on write up of the manuscript. All authors approved the final manuscript.

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