# Magnitude of cesarean section and its associated factors among mothers who gave birth in public hospitals in East Wollega Zone, Oromia, Ethiopia

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## Abstract

**Background** Globally, there has been an explosive rise in the cesarean section rate that exceeds the World Health Organization rate of 10–15% and in the past fifteen years the rates was doubled in some countries including Ethiopia. Therefore, it is essential to recognize the current magnitude and the factors that contribute to increasing cesarean section rates beyond the World Health Organization recommendations and specifically in the study areas.

**Objective** This study aimed to assess the magnitude of cesarean sections and its associated factors among mothers who gave birth in public hospitals in East Wollega Zone, Oromia Ethiopia 2022.

**Methods** A Facility-based cross-sectional study design supplemented by the qualitative study was conducted among 403 mothers, and an in-depth interview was held with purposefully selected 18 post-cesarean section mothers who gave birth at public hospitals. The study subject for quantitative data was selected by a systematic random sampling method. Face-to-face interviews and a chart review checklist were used for data collection. Data were entered into EPI Data Version 3.1 and analyzed by SPSS version 25 for quantitative data and thematic analysis for qualitative data. Bivariate and multivariable logistic regression was used to assess the association between dependent and independent variables. Variables that were statistically significant at bivariate logistic regression with a *p*-value < 0.25 were entered into the multivariable logistic regression. Statistical significance was declared at a p-value less than 0.005

**Result** The finding of this study revealed that the magnitude of the cesarean section was 31.5% (95% CI: 27.4%-36.5%). Factors such as living in an urban area (AOR = 2.87, 95%CI (1.63,5.05)), a mother who attained college and above (AOR = 3.48, 95% CI (1.72, 7.06)), being a referred mother (AO R = 2.27, 95% CI (1.31, 3.94)), being induced labor (AOR = 4.83, 95% CI (1.93,12.06)) and lack of antenatal care follow up (AOR=7.84, 95% CI (4.26, 14.44)) were significantly associated with an increased likelihood of cesarean section.

**Conclusion** and Recommendation

The study indicates a high cesarean section rate that exceeds the World Health Organization recommendation 10-15%. Therefore, improving antenatal care, referral systems, and labor induction management needs concern to mitigate unnecessary cesarean deliveries.

**Keywords** Magnitude, Cesarean section, Associated factors, Nekemte, Ethiopia

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## Background

A cesarean section is a surgical procedure in which one or more babies are delivered via laparotomy and then hysterectomy after 28 weeks of gestation [1, 2]. It is a life-saving surgical procedure used to preserve the lives of mothers and neonates if spontaneous vaginal delivery is not feasible [3]. It is a measure of use and access to a common obstetric intervention that prevents maternal and newborn fatalities as well as complications like obstetric fistulas. A cesarean section is used as an emergency obstetric care indicator as a percentage of all deliveries [4]. Despite the absence of scientific evidence on an ideal range, the World Health Organization (WHO) has recommended that cesarean sections, as a percentage of all births, be no less than 5% and no more than 15% since 1985. Extremely low or extremely high cesarean section rates are linked to significantly higher rates of morbidity and mortality [5–7].

Globally, there has been an explosive rise in the rate of cesarean section. The rate has doubled in the past 15 years from 21% to reach up to 40% in some countries [8]. Out of 6.2 million unnecessary caesareans done each year; half occur in developed countries like Brazil and China [9–11]. Another study in the United States revealed that approximately 1.3 million women undergo a cesarean section every year [12]. A study conducted in Pakistan implies that among 30.2% of cesarean sections performed more than half were elective cesarean sections [13]. The current demographic and health survey (DHS) in 34 Sub-Saharan African (SSA) countries indicates that the cesarean section prevalence rate was the highest in some African countries 64.2%,60.3%, and 33.3% in Rwanda, Namibia, and Comoros respectively [14].

In Ethiopia; the magnitude of the cesarean section was alarming. As in Southwest Ethiopia 32.5% [15], Northern Ethiopia 30.9% [16], Debre Tabor comprehensive specialized hospital 39.1% [17], Addis Ababa 38.3% [18], Amhara 41.5% [19], and in the Oromia region 33.1% [20]. The overall pooled prevalence of cesarean section rates in Ethiopia was 29.55% [21]. Previous studies in Ethiopia indicates that out of a total of 39.1% of cesarean sections performed, more than half (54.06%) were performed for emergency reasons [17]. The prevalence of cesarean section rates across different areas of the regions of the world including Ethiopia does not meet the World Health Organization (WHO) recommendation rates of 10- 15% [22].

A cesarean section is indicated for a variety of reasons, including medical, obstetric, or both [23]. The rise in cesarean deliveries has been attributed to a wide range of medical and nonmedical factors [9]. The contributing factors to the cesarean section are complex and include advanced maternal age, income, residence, and maternal requests for nonmedical reasons [9]. The rise in maternal requests or preferences for cesarean sections, particularly in urban areas, private facilities, and among the more wealthy populations, is concerning [24].

Despite this, there are conflicting feelings about cesarean sections, with the majority of women and their husbands preferring vaginal deliveries; however, more women are willing to have a cesarean section [25]. The rising rate of cesarean sections also has immediate consequences for facilities and countries in terms of volume and cost, as well as how it affects a woman's future childbearing [26]. And also, the finding implies that cesarean section procedures ended up with low AP GAR scores, perinatal asphyxia, neonatal sepsis, meconium aspiration syndrome, early neonatal death, stillbirth, prematurity, allergy, and asthma [15, 21]. Maternal complications like febrile morbidity, surgical site infection, maternal mortality, severe anemia, and postpartum hemorrhage were the most common following a cesarean section [27].

In the absence of global effective interventions to revert the trend, regions like Southern Asia and sub-Saharan Africa will face a complex scenario with morbidity and mortality associated with the unmet need, the unsafe provision of cesarean sections, and the concomitant overuse of the surgical procedure, which adds avoidable morbidity and mortality [28].

To tackle all the problems related to cesarean sections, some strategies or approaches are implemented globally to maintain the cesarean sections rate per World Health Organization or increase physiological labor and birth, like labor companionship, midwife-led continuity of care, midwife-led units, antenatal education and training, implementation of evidence-based guidelines at the point of care, and use of a cesarean section delivery checklist to improve the service and reduce the length of hospital stay [11, 29].

Similarly, Ethiopia also focuses on attempts such as vaginal birth after cesarean section (VBAC), instrumental delivery, decreasing elective cesarean sections, working on prevention of Cephalo-pelvic disproportion (CPD), and focused anti-natal care (FANC) to keep as a World Health Organization recommendation [30, 31]. However, the magnitude of cesarean sections continues to rise globally, including Ethiopia. Therefore, it is essential to recognize the current magnitude and factors that contribute to an increase in cesarean section rates beyond the WHO recommendation rate.

## Methods

### Study area

The East Wollega Zone is located in the Oromia Regional State in the western part of Ethiopia. The capital city of the zone is Nekemte, which is 331 kilometers from Addis Ababa city. It has 17woreda and 5 hospitals, including Wollega University referral hospitals, Nekemte Specialized Comprehensive Hospital, Gida Ayana General Hospital, Arjo Primary Hospital, and Sire Primary Hospital. The zone also has 65 health centers and 326 health posts.

### Study period

Study was conducted from January 25 to February 25/2022.

### Study design

A Facility-based cross-sectional study design supplemented by the qualitative study was conducted.

### Source population

All women who gave birth in Public Hospitals of the East Wollega Zone

### Study population

All selected women who gave birth in Public Hospitals during the study period

### Eligibility criteria

All delivered women admitted to the postnatal ward in the selected hospital during the study period were included. Those mothers who were admitted to the postnatal ward who had a laparotomy for an extra-uterine pregnancy and also had a record chart that lacked the required information were excluded from the study.

### Sample size determination for quantitative data

For the objective one, the sample size was estimated using a single population proportion formula by considering $P = 39.1\%$, which was taken from Debre Tabor comprehensive specialized hospital in the Amhara region of Ethiopia [16]**.** The study considered a marginal error of 5%, a non-response rate of 10%, and a 95% confidence interval. It was calculated using the sample size calculation formula as indicated below.

$$n = \frac{(Z\partial/2)^2 . P\,(1-P)}{d^2}$$

Where n = sample size

Z is the standard normal distribution curve value for the 95% confidence level (1.96).

P = proportion of the previous study,

D = marginal error of 5%.

$$=> \ n = \frac{(1.96/2)^2 * 39.1(1-39.1)}{(0.05)^2} = \frac{3.84 * 39.1(0.61)}{0.0025} = 366$$

After adding 10% non-response rate = 403

For objective 2, the sample size was calculated with Epi Info 7 software using the double population proportion formula with the following assumptions: a 95% confidence interval, a 5% margin of error, a power of 80%, a proportion of exposed to the unexposed ratio of 1, and a 10% non-response rate. Therefore, by using a proportion of significant associated factors with cesarean section delivery rates such as urban residence, previous cesarean section, and weight ≥4000 g [14, 16, 19]. The sample size of each variable was below in table.

After comparing the determined sample size for the three variables the largest sample size for the second objective will be 190. Finally, after comparing the estimated sample sizes from both objectives 1 and 2, the largest sample size was selected as the final sample size, which were 403 after adding a 10% non-response rate

### Sample size determination for qualitative data

In-depth interviews were done with purposively selected post-cesarean section mothers in the postnatal or maternity ward of the selected hospital until the idea was saturated.

### Measureable variables

*Dependent variables*

Cesarean section delivery

*Independent variables*

Socio-demographic characteristics: age, residence, level of education and income.

Obstetric characteristics: (gravidity, parity, ANC follow-up and gestational age).

Clinical indication: mal-presentation, antepartum hemorrhage (APH), previous cesarean section or surgery on the uterus, bad obstetric history, intrauterine growth retardation (IUGR), gestational diabetes, failed induction of labor, post-term pregnancy prelabour rupture of membrane (PROM), declines a trial of labor after cesarean section (TOLAC), Cephalo-pelvic disproportion (CPD), fetal distress, obstructed labor, cord prolapse, elective repeat cesarean section (ERCS). Fourth, the mother's preference; fear of childbirth, safety concerns related to health risk perceptions, negative previous birth

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experiences, positive beliefs toward cesarean birth, and access to biased information.

### *Operational definition and definition of terms*

Cesarean section magnitude: is the proportion of unnecessary cesarean sections performed in a hospital to the total number of live births in a research area [21]

Maternal preference: is the mother's choice or willingness to go under cesarean section depending on different factors

Maternal perception: it indicates mother's feelings and how they accept cesarean section delivery

Elective cesarean section: It is an operation that is done at a prearranged time during pregnancy to ensure the best quality of obstetrics, anesthesia, neonatal resuscitation, and nursing services [32].

Emergency cesarean section: an operation that was done immediately, unplanned, or unscheduled termination of pregnancy via cesarean section for the ultimate purpose of saving the life of both the parturient and her offspring [32].

Vaginal delivery: is includes spontaneous, instrumental, and also vaginal delivery after cesarean section delivery (VBAC)

### Data Collection Tools, procedure and quality assurance

Data were collected by using face-to-face interviewees to administer a structured questionnaire for quantitative data and semi-structured open-ended questionnaires for qualitative data, which were adapted independently by reviewing different literature and previous similar studies [15, 17, 20, 33]. Seven B.Sc. midwives from the health center were assigned as data collectors and 2 senior health officers (HO) as supervisors were assigned. The one-day Training for the data collectors was given on the purposes of the study, how to interview and handle data, principles, and ethical considerations of the data collection process for one day. The pretest was conducted on 5% (20 mothers) at Shambu General Hospital. Accordingly, a possible amendment to the questionnaire was made. During data collection, the questionnaires were reviewed for completeness, accuracy, and consistency by the supervisor and principal investigator.

### Data management and analysis

For the quantitative data, the collected data were re-checked for completeness before data entry. Then the data were entered into EPI Data Version 3.1 and exported to SPSS Version 25 for further analysis. Then the data was cleaned and checked for missing values and outliers before data analysis. Any errors were corrected by referring to the original data using the code number of the questionnaires.

Bivariate and multivariable analyses were done using a binary logistic regression model to identify factors associated with cesarean section delivery. The variables that were a *P*- value < 0.25 in the bivariate analysis were a candidate for the multivariable analysis. The statistical significance of multivariable binary logistic regression was declared at a *P*-value < 0.05. Those statistically significant variables in the bivariate logistic regression model were tested for multi-collinearity using the variation inflation factor (VIF) to check Violations of the regression model assumption (Tolerance = 0.929, VIF=1.077). Model goodness-of-fit was tested by the HosmerLem show goodness of the fittest (*P*-value =0.602). The backward stepwise (likelihood ratio) method was used and the adjusted odds ratio together with their corresponding 95% confidence interval was computed and interpreted accordingly. Finally, the results were presented in the form of, frequency, narration, tables, and charts or figures based on the characteristics of the analyzed data. For qualitative data, the data were sorted out thematically by clustering material with similar content to the idea. Then, the thematic analysis was done for qualitative data and the result was triangulated and presented with narration (Table 1).

## Results

### Socio-demographic characteristics of study participants

A total of 403 respondents were included in the study, giving a response rate of 100%. Of the total mothers, 150 (37.2%) were between the ages of 21–25 years. The mean age of study participants was 24.63±5.05SD. More than half 219 (54.3%) of the respondents were rural residents. The majority 393 (97.5%) of the participants were married. About 271 (67.2%) of the respondents were protestant by religion. Majority (94.0%) of the respondents were Oromo by ethnicity. (Table 2)

### Obstetrics and Gynecologic Characteristics of Mothers

Out of 403 (51.4%) were multigravida followed by Prim gravid 140 (34.7%). About 25 (6.25%) had a history of stillbirth, while 28 (6.9%) had a history of abortion. Only 53 (13.2%) of the respondents were grand

**Table 1** Sample size determination for associated factors of cesarean section

| Variables | P1 (%) | P2 (%) | Expose to Unexposed Ratio | AOR | Total Sample size |
|---|---|---|---|---|---|
| Urban residence | 51 | 25 | 1:1 | 3 | 110 |
| Previous C/S | 65 | 35 | 1:1 | 3.4 | 190 |
| Fetal weight >4000gm | 32.1 | 67.9 | 1:1 | 0.2 | 62 |

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**Table 2** Socio-demographic characteristics of study participants (*n*=403)

| Variable name | Category | Frequency | Percent |
|---|---|---|---|
| Age | 16-20 | 126 | 31.3 |
|  | 21-25 | 150 | 37.2 |
|  | 26-30 | 75 | 18.6 |
|  | >30 | 52 | 12.9 |
| Place of residence | Urban | 184 | 45.7 |
|  | Rural | 219 | 54.3 |
| Marital status of mothers | Single | 3 | 0.7 |
|  | Married | 400 | 99.3 |
| The religion of the mothers | Orthodox | 95 | 23.6 |
|  | Muslim | 36 | 8.9 |
|  | Protestant | 271 | 67.2 |
|  | Other* | 1 | 0.3 |
| Ethnicity of the mothers | Oromo | 379 | 94.0 |
|  | Amhara | 21 | 5.2 |
|  | Gurage | 3 | 0.7 |
| The educational level of the mothers | Cannot read and write | 83 | 20.6 |
|  | Primary school(1-8) | 61 | 15.1 |
|  | Secondary school(9-12) | 98 | 24.3 |
|  | College and above | 161 | 40.0 |
| Occupational status of the mothers | Housewife | 216 | 53.6 |
|  | Merchant | 42 | 10.4 |
|  | Student | 54 | 13.4 |
|  | Government employee | 80 | 19.9 |
|  | Other** | 11 | 2.7 |
| Spouse's level of education | Cannot read and write | 35 | 8.7 |
|  | Primary school(1-8) | 106 | 26.3 |
|  | Secondary school(9-12) | 82 | 20.3 |
|  | College and above | 180 | 44.7 |
| Spouses level of education | Cannot read and write | 35 | 8.7 |
|  | Primary school(1-8) | 106 | 26.3 |
|  | Secondary school(9-12) | 82 | 20.3 |
|  | College and above | 180 | 44.7 |
| Spouses of occupation | Private | 97 | 24.1 |
|  | Farmer | 111 | 27.5 |
|  | Merchant | 114 | 28.3 |
|  | Government | 66 | 16.4 |
|  | Other** | 15 | 3.7 |
| Income | <1000 | 89 | 22.1 |
|  | 1001-2000 | 83 | 20.6 |
|  | 2001-3000 | 53 | 13.2 |
|  | >3000 | 178 | 44.2 |

* Wakeffataa, Catholic ** NGO, student, daily labor

multipara by parity. Out of 403 (18.4%) of them had a history of previous cesarean sections. Three hundred-seven (76.2%) of the respondents had antenatal care follow-up for their current pregnancy. Out of 307 (43.2%) of the respondents had three or more antenatal care visits. (Table 3)
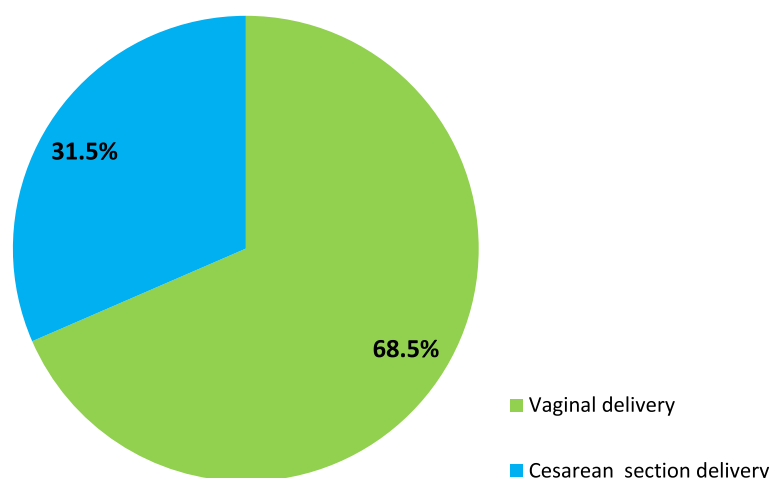
**The Magnitude of Cesarean Section Delivery**

In this study, magnitude of cesarean section was 127 (31.5%), 95% CI: (27.4%, 36.5%). Out of this, mothers who had a cesarean section due to emergency cases were 107 (26.6%) while elective cesarean section constituted 20 (5%) (Figure 1).

**Table 3** Obstetrics characteristics of study participants (*n*=403)

| Variables | Category | Frequency | Percent |
|---|---|---|---|
| Gravidity (*n*=403) | Primigravida | 115 | 28.5 |
| | Multigravida | 219 | 54.3 |
| | grand multigravida | 69 | 17.1 |
| Stillbirth (*n*=403) | Yes | 22 | 5.5 |
| | No | 381 | 94.5 |
| Number of stillbirths (*n*=22) | One time | 20 | 5.5 |
| | Two and above | 3 | |
| Abortion (*n*=403) | Yes | 35 | 8.7 |
| | No | 368 | 91.3 |
| Number of abortion (*n*=28) | One time | 27 | 6.7 |
| | Two and above times | 8 | 2.0 |
| Parity (*n*=403) | Nulliparous | 125 | 31 |
| | Primipara | 78 | 19.4 |
| | Multipara | 174 | 43.2 |
| | Grand multipara | 26 | 6.5 |
| Previous Modes of delivery | Vaginal delivery | 329 | 81.6 |
| | Cesarean section | 74 | 18.4 |
| ANC (*n*=403) | Yes | 307 | 76.2 |
| | No | 96 | 23.8 |
| Number of ANC visits (*n*=307) | At least one | 30 | 7.5 |
| | Two times | 104 | 25.8 |
| | Three and above | 173 | 42.9 |
| How was come to this facility (*n*=403) | Referred | 162 | 40.2 |
| | Non referred | 241 | 59.8 |
| Place of referral (*n*=162) | Health center | 90 | 22.3 |
| | Private health facility | 35 | 8.7 |
| | public hospitals | 26 | 6.5 |
| | Other *** | 11 | |

*** Directly from home, health post



**Fig 1** Magnitude of cesarean section among mothers who gave birth in the public hospital of East Wollega Zone

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### Maternal Preference for Cesarean section

Out of 127 (31.5%) of the study participants those who undergo a cesarean section, 91 (22.6%) of them preferred to give birth by cesarean section depending on factors like, perceiving it as a safe procedure for them and their baby 72 (17.9%), fear of labor pain 19 (4.7%). This is supported by qualitative findings. *A 26-year-old mother said, "I perceived that that cesarean section delivery was best for me because I didn't feel any pain, the time of delivery was short, and I and my babies were fine; thanks to God, she laughs".* Those due to loss of a baby in previous birth (2.5%), a complication of labor in previous vaginal birth (7.7%), and about 41 (10.2%) were preference of the cesarean section delivery.

### Current Clinical Indication of Cesarean Section to the study participants

In this study, the major indication for cesarean section was non-reassurance fetal heartbeat (NRFHB) (30.6%), which was followed by previous cesarean section 29 (22.8%) and malpresentation 19 (15%) (Figure 2).

### Associated Factors of Cesarean Section Delivery

In bivariate analysis, variables with a *P*-value < 0.25 were candidates to the multivariable regression model. These variables were socio-demographic factors such as the mother's age, residence, and educational status, as well as obstetric and gynecologic factors such as gravidity, parity, and antenatal care follow-up, and referral linkage, history of stillbirth, history of abortion, the

onset of labor and previous history of cesarean section (Table 4).

After adjusting for other variables' effects in the multivariable analysis, urban residence, level of education, being induced for labor, mothers with no history of antenatal care follow-up, and previous cesarean sections were significantly associated with cesarean section delivery.

The odds of having a cesarean section were 3.11 times higher among mothers who lived in urban areas as compared to mothers who lived in rural areas (AOR = 3.11, 95 % CI (2.87(1.63,5.05)).

The mothers who attained a college and above were 3.48 times more likely to have a cesarean section than those who couldn't read or write (AOR = 3.48, 95% CI (1.72, 7.06)). This finding is also supported by qualitative findings. A 24-year-old mother said, *"I'm a college teacher, and I've understood previously that having a cesarean section is the best option for me because it is painless and shortened delivery time. Actually, I haven't experienced any pain and the delivery time so quickly; now, both my child and I are OK, thanks to Almighty God, and she laughs!"*

The referral status of mothers was significantly associated with cesarean section delivery. Mothers who were referred were 2.27 times more likely to cesarean section delivery than non-referred mothers (AO R=2.27, 95% CI (1.31, 3.94))

The finding of this study revealed that, there was a significant association between the onset of labor and cesarean section delivery. Mothers with induction of
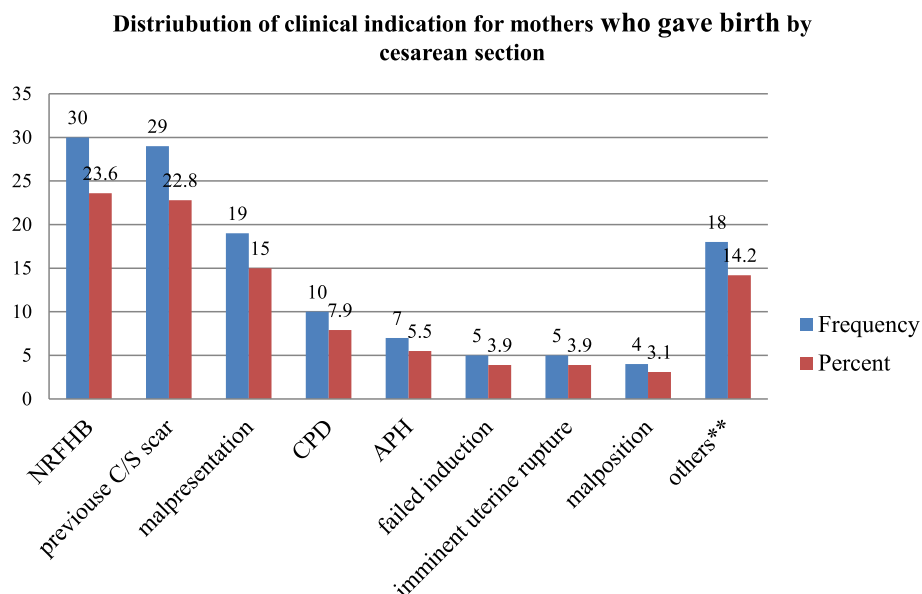


**Fig 2** Indication of cesarean section among mothers who gave birth in public hospitals of East Wollega Zone. **Declined TOLAC, prolonged labor, post-term pregnancy, twin pregnancy, severe preeclampsia

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**Table 4** Factors associated with cesarean section delivery in bivariate analysis among women who gave birth in public hospitals of East Wollega Zone, Oromia, Ethiopia

| Variables | Category | Mode of delivery | | COR (95% CI) | P. value |
|---|---|---|---|---|---|
| | | Cesarean sections N (%) | Vaginal delivery N (%) | | |
| Place of residence | Urban | 82(44.6) | 102(55.4) | 3.11(2.01,4.82) | .000 |
| | Rural | 45(20.5) | 174(79.5) | 1 | |
| Age of the mothers | 16-20 | 61(48.4) | 65(51.6) | 3.75(1.11,11.86) | .024 |
| | 21-25 | 43 (28.7) | 107(71.3) | 1.61(0.51,5.08) | .419 |
| | 26-30 | 7(9.3) | 68(90.7) | 0.41(0.11,1.58) | .196 |
| | 31-35 | 12(37.5) | 20(62.5) | 2.40(0.65, 8.88) | .013 |
| | >35 | 4(20.0) | 16(80.0) | 1 | |
| Educational status | Cannot read and write | 18(21.7) | 65(78.3) | 1 | |
| | Primary school(1-8) | 8(13.1) | 53(86.9) | 0.55(0.22,1.35) | .190 |
| | Secondary school(9-12) | 12(12.2) | 86(87.8) | 0.50(0.23,1.12) | .092 |
| | College and above | 89(55.3) | 72(44.7) | 4.46(2.43, 8.20) | .000 |
| History of stillbirth | Yes | 18(72.0) | 7(28.0) | 0.16(0.06, 0.39) | .000 |
| | No | 109(28.8) | 269(71.2) | 1 | |
| history of previous abortion | Yes | 14(50.0) | 14(50.0) | 2.32(1.07, 5.0) | 0.033 |
| | No | 113(30.1) | 262(69.9) | 1 | |
| Previous mode of delivery | Cesarean section | 45(39.2) | 29(60.8) | 1.52(0.90, 2.56) | 0.117 |
| | Vaginal delivery | 98(29.8) | 231(70.2) | 1 | |
| Referral status | Non referred | 74(54.3) | 88(54.3) | 1 | .000 |
| | Referred | 53(22.0) | 188(78.3) | 2.98(1.93,4.60) | |
| Onset of labor | Induced | 22(61.1) | 14(38.9) | 3.92(1.93,7.95) | .000 |
| | Spontaneously | 105(28.6) | 262(71.4) | 1 | |
| Antenatal care follow- up | Yes | 70(72.9) | 26(27.1) | 1 | |
| | No | 57(18.6) | 250(81.4) | 11.81(6.92, 20.15) | .000 |
| Gravidity | Primigravida | 55(42.9) | 60(57.1) | 3.30(1.67,6.51) | .001 |
| | Multigravida | 57(28.5) | 162(71.5) | 1.27(0.66,2.42) | .474 |
| | Grand multigravida | 15(14.3) | 54(85.7) | 1 | |
| Parity | Nullipara | 59(47.2) | 66(52.81) | 1 | |
| | Primipara | 17(21.8) | 61(78.2) | 2.98(1.12, 7.92) | 0.029 |
| | Multipara | 45(25.9) | 129(74.1) | 0.93(0.32, 2.68) | 0.892 |
| | Grand multipara | 6(23.1) | 20(76.9) | 1.16(0.44 3.08) | 0.761 |

labor were 4.83 times more likely undergo cesarean section delivery than those mothers with spontaneous labor (AOR=4.83, 95% CI (1.93, 12.06)). In this study, antenatal care follow-up has a significant association with cesarean section delivery. The mothers who have no history of antenatal care follow-up were 7.84 times more likely to undergo cesarean section delivery than those who had antenatal care follow-up (AOR = 7.84, 95% CI (4.26, 14.44)). (Table5).

## Discussion

The finding of this study revealed that the magnitude of cesarean section was 127 (31.5 %) with 95% CI: (27.4%, 36.5%) which exceeds the WHO's recommended rate of 15% [22]. This finding is in line with studies conducted in Pakistan (30.20% [34], Jordan 29.1% [35], in African countries (Comoros and Ethiopia) 33.3% and 30.1% [14] respectively, and Aira Hospital 33.1% [20]. But it is higher than studies conducted globally (21.1%) [8], in USA 25.3% [14], in the Southern Nation Nationalities and People's Region 24.7% [36], in the Gurage Zone 21% [37]. The possible justification for the discrepancy is might be due to variation in the sample size and study design. For instance, the study conducted at Butajira General Hospital conducted on 250 participants using retrospective cross-sectional methods which are different from the current study [37]. But it is lower than the findings from Chinese cities: 37.3% [38], Debra Tabor's comprehensive specialized hospital 39.1% [17], Bahir Dar city 41.8% [19] and Addis Ababa hospital 38.3% [39]. The disparity

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**Table 5** Factors associated with cesarean section delivery in multivariable logistic regression

| Category | Mode of delivery | | COR(95%CI) | AOR (95% CI ) | P. value |
|---|---|---|---|---|---|
| | Cesarean sections N (%) | Vaginal deli very N (%) | | | |
| Place of residence | | | | | |
| Urban | 82(44.6) | 102(55.4) | 3.11(2.01,4.82) | 2.87(1.63,5.05) | 0.000* |
| Rural | 45(20.5) | 174(79.5) | 1 | 1 | |
| Educational status of the mother | | | | | |
| Cannot read and write | 18(21.7) | 65(78.3) | 1 | 1 | |
| Primary school(1-8) | 8(13.1) | 53(86.9) | 0.55(0.22,1.35) | 0.49(0.17,1.38) | 0.175 |
| Secondary school(9-12) | 12(12.2) | 86(87.8) | 0.50(0.23,1.12) | 0.50(0.20,1.25) | 0.136 |
| College and above | 89(55.3) | 72(44.7) | 4.46(2.43, 8.20) | 3.48(1.72, 7.06) | 0.001**️** |
| Referral status of mothers | | | | | |
| Non referred | 74(54.3) | 88(54.3) | 1 | 1 | |
| Referred | 53(22.0) | 188(78.3) | 2.98(1.93,4.60) | 2.27(1.31, 3.94) | 0.004* |
| How labor was started | | | | | |
| Induced | 22(61.1) | 14(38.9) | 3.92(1.93,7.95) | 4.83(1.93,12.06) | |
| Spontaneously | 105(28.6) | 262(71.4) | 1 | 1 | 0.001* |
| Antenatal care follow up | | | | | |
| Yes | 70(72.9) | 26(27.1) | 1 | 1 | |
| No | 57(18.6) | 250(81.4) | 11.81(6.92, 20.15) | 7.84(4.26,14.44) | 0.000* |

* Statistically significant at *P*-value <0.05

is might be due to differences in the sample size and the study areas.

In this study, Mothers living in urban areas were 3.11 times more likely than rural mothers to have a cesarean section. This finding was consistent with a study conducted in southwest Ethiopia [15] and northern Ethiopia [16]. The possible justification is might be due to that mothers in an urban area could be able to get more information and understanding about the delivery modes than those in a rural area. But, it is inconsistent with a study conducted at Butajira General Hospital in Gurage Zone, SNNPR, Ethiopia, which found that rural mothers were 2.5 times more likely to have a cesarean section [37].

The findings of this study also revealed that a cesarean section was significantly associated with mother's educational level. Women those who attained college and above were 2.81 times more likely to have had a cesarean section than those who have no formal education. This finding is in line with studies conducted in Indonesia [24], Tanzania and Kenya [40] and Bahir Dar city [19]. The possible justification is might be due to those women who attained higher education could be able to get more information and understanding about the delivery modes than those who have had no formal education.

The referral status of the mother was significantly associated with a cesarean section delivery. Mothers who were referred from other health facilities were 2.4 times more likely to have a cesarean section than those who

were not referred. This was comparable with the study conducted in the Amhara region [41]. This might be due to the fact that the majority of referred mothers from other health facilities had obstetric complications that necessitated surgery.

The finding of this study revealed that antenatal care (ANC) follow-up had a significantly associated with cesarean section delivery. Mothers who did not have an antenatal care follow-up to the current pregnancy were 7.16 times more likely to have a cesarean section delivery than those who had at least one antenatal care follow-up. This finding is inconsistence with the study conducted in Bangladesh [42]. This disparity might be due to the differences in the study design and geographical difference.

The finding of this study also indicated that how the labor was started had a significantly associated with cesarean section delivery. Mothers who went into labor after induction and augmentation had a 5.47 times higher chance of having a cesarean section than mothers who went into labor naturally or spontaneously. This finding is consistent with the study conducted in Northern Ethiopia [43]. The possible justification is might be due to Unexpected CPD during induction can cause obstructed labor and uterine hyper stimulation, both of which can contribute to non-reassurance of fetal heart rate (NRFHR) and an imminent uterine rupture that leads to an emergency cesarean section [44].

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## Conclusion and Recommendation

The study found that the overall magnitude of cesarean sections was high when compared to the World Health Organization Recommendations. Mothers who lived in the urban area, educational level, mothers who were referred, mothers who were induced for labor, and mothers who had no history of antenatal care follow-up were significantly associated with cesarean section delivery. Therefore, highlighting the need for improving antenatal care, referral systems, and labor induction management are concern to mitigate unnecessary cesarean deliveries.

## Strength and Limitations of the study

Since the study is a cross-sectional, direct cause and effect between dependent and independent variables may not be demonstrated. Pre-test were conducted and data were collected from primary data sources.

## Abbreviations

| | |
|---|---|
| ANC | Ante-Natal Care |
| NICU | Neonatal Intensive Care Unit |
| NRFHRP | No reassurance Fetal Heart Rate pattern |
| VBAC | Vaginal Birth after Cesarean Section |
| WHO | World Health Organization |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12905-024-03518-w.

> Supplementary Material 1.

## Declarations

### Ethics approval and consent to participation

The work described in this study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and we confirm that the manuscript was in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals. The ethical approval was granted by the ethical review committee of Wollega University (WU|RD|496|2014), and the East Wollega Zonal Health Office issued a permission letter to all Public hospitals in East Wollega Zone. Individuals provided written informed consent and all study participants were informed about the study's purpose through voluntary participation. Participants were assured that their decision not to participate would not impact the service they received. Moreover, personal identifiers like name and phone number were not used on the data collection questionnaire to maintain their privacy.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

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## Publisher's Note