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The Rate, Indications and Contributing Factors of Cesarean Delivery in Southern Nation Nationalities and People's Region, Ethiopia

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ABSTRACT

Background & aim: Caesarean delivery is a lifesaving surgical procedure for both the mother and the infant in specific medically indicated circumstances, but unnecessary caesarean delivery can lead to increased medical risks. This research considers the rate, indications and contributing factors of caesarean delivery in the Durame Hospital, Southern Ethiopia.

Methods: This hospital-based, cross-sectional study examined in the period from May 1 through June 1, 2019. Three hundred respondents were enrolled by consecutive sampling, and a structured tool and document review were used for data collection. Data entry and analysis were conducted with EpiData (version 3.1) and SPSS software (version 24). Multivariable logistic regression was employed to determine the contributing factors associated with caesarean delivery at a 95% confidence interval (CI).

Results: The overall rate of caesarean delivery was observed to be 24.7%. Non reassuring fetal heart rate (n=13; 17.06%) and abnormal presentation (n=9; 12.2%) were the two most prevalent indications of cesarean delivery. The factors associated with cesarean delivery were previous cesarean delivery (AOR =7.3, 95 % CI: 2.02-26.65), post-term pregnancy (AOR=3.3, 95% CI: 1.268.67) and maternal age of ≥35 years (AOR=3.3, 95% CI: 1.26-8.67).

Conclusion: The rate of caesarean delivery exceeded the recommended limit of the World Health Organization. To ensure the appropriate use of the procedure, women with a previous caesarean delivery must be meticulously evaluated for the possibility of vaginal delivery, and the hospital must regularly monitor caesarean delivery indications.

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Introduction

Caesarean delivery (CD) is the delivery of a viable foetus through incisions in the abdominal and uterine walls. Globally, CD is one of the most common types of obstetric surgical procedures that are used in cases where vaginal delivery is either not possible or would cause an excessive risk either to the mother or her baby (1–4).

The prevalence of CD around the world has been controversial. The World Health Organization (WHO) recommends that the rate of CD should not exceed 10–15%. Despite this, the rate of CD is considerably higher and varies worldwide. For example, it was 21.1%, 14.3% and 2% in developed, middle-income and emerging countries, correspondingly (5, 6). When the CD rate is remarkably high, it may also indicate a deviation from proven evidence and proper practice. For this reason, the current CD rate has raised concerns in agenda settings that aimed to decrease maternal morbidity and mortality (7, 8).

In Ethiopia, limited studies have been conducted concerning the rates and determinants of caesarean delivery and its associated factors. The findings of these

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investigations have demonstrated that the prevalence of CD was 21.1% in Mizan Aman (9), 25% in Addis Ababa (10), 25.4 % in Felegehiwot (11), 27.6% in Attat (12) and 34.3% in Harar (13).

Studies conducted in different parts of the world reported a complex range of risk factors associated with CD. These findings were not conclusive and have shown variations among populations and ethno-geographical groups. Despite this, the notable, recognised predisposing factors of CD include cephalopelvic disproportion, history of uterine surgery, prior uterine rupture, failed induction of labour, vaginal bleeding, fetal distress, maternal disease (e.g. pregnancy-induced hypertension and diabetes mellitus), cord presentation and prolapse, macrosomia, and abnormal presentation (14–16).

The International Federation of Gynaecology and Obstetrics (FIGO) states that CD should only be performed for medically indicated reasons to improve the health of women and babies. So far, the provision of safe and timely CDs remains a major issue in countries with a higher maternal death rate (17–19).

CD has risks for both mothers and infants. The maternal complications include infections, bleeding, urinary tract problems, extended hospital stays, venous thrombosis and embolisms, abnormal placentation, scar complications, uterine ruptures and adhesions. The infant complications consist of breathing difficulties, respiratory distress, foetal harm, allergic rhinitis, diet allergies, juvenile asthma and childhood onset of Type 1 diabetes (20). Further research on CD is essential to advance the quality of care in hospitals and to ensure better health for women and their children. Consequently, this research is intended to explore the rates, indicators and factors associated with CD.

Materials and Methods

An institution-based cross-sectional study was undertaken within May 1 to June 1, 2019 in Durame Hospital, Southern Ethiopia. This hospital is found at Durame town, which is the capital of Kambata Zone and it serves as referral hospital for all seven woredas of the Zone which has 46638 people. The hospital has four wards (surgical, obstetrics and gynecology, pediatrics and medical) it gives service of antenatal care, family planning, outpatient and inpatient. The total amount of deliveries in the course of the study period was 300. From this number, 74 were given birth by cesarean section. The inclusion criteria were all women who delivered at Durame hospital during the study period. On the other hand, participants who cannot communicate were not incorporated from this survey.

A single population proportion formula was employed to calculate the sample size using a 95% confidence interval, margin error of 5%, and 10% non-response rate, bearing in mind the research carried out in eastern Ethiopia (13) which showed the proportion of CD as 34.3%. Lastly, the sample size was found to be 300 for the current survey using the consecutive sampling method.

Data were collected through structured instrument and document review, which was applied to acquire information that could not be taken by the interview. The questionnaire consisted of four sections; socio-demographic data, obstetric history, indication of CD and maternal and fetal outcome. The tool was prepared after evaluation of various studies (9-13). The validity of the tool was approved by the appropriate application of validity criteria (content validity). Additionally, five qualified midwives (three with diplomas and two with bachelors degrees) were assigned for the collection of data and supervision. To ensure high quality of data; the tool was initially translated to Amharic (the local language) and then translated back to English by experts to check its accuracy. The reliability of the tool was checked by performing a pretest on 5% of the sample size at Shone hospital before the actual study period. After the pretest, understand ability, clearness, and organization of the instrument were checked. Applying the reliability test, 0.82 Cronbach's alpha value was obtained. In addition, two days of training was given for the data collectors and supervisors on the content of the tool, the purpose of the study, and how to collect the data. Also, the supervisors and the investigators closely monitored the data collection process every day in the course of the pretest and the real data collection period. Besides, the filled tool was collected and signed by the supervisor once it was observed for any absent items and

logicality.

EpiData software (version 3.1) and SPSS software (version 24) were used for data entry and analysis respectively. We used descriptive statistics, frequency and proportions to summarize the data. The outcome variable was "mode of delivery" (cesarean delivery=1; vaginal delivery=0). At first, bivariate logistic regression was employed to see the eligible variables for the multiple variable logistic regression. Those variables, which have a $p \leq 0.25$ in the binary logistic regression were moved into multiple variable logistic regression. The multiple variable logistic regression was conducted to decide the associated factors of the outcome variable and to control the possible confounders. The outcomes of the multiple variable regression analysis were presented by AOR at 95% CI (Confidence Interval). The level of statistical significance was determined at p-value <0.05**.**

Results

Socio-demographic and economic characteristics

The mean age of the participants was 38.6 ±1.7 years. Most of the respondents, 297 (99%) were married, 155 (51.7%) were ethnically Kambata, and 169 (56.3%) resided in urban areas. Housewives constituted a total of 209 (69.6%), and 220 (73.3%) were Protestants. Educationally, 127 (42.3%) did not have any formal education. Regarding income, half of the participants, 151 (50.3%) earned a monthly average income of < 73.42 United State Dollar (USD) (Table 1).

Table 1. Socio demographic characteristics of women at Durame Hospital, Southern Ethiopia, 2019(n=300)

Variables	Frequency (%)
Age in years	
<20	23(7.7)
20-34	256(85.3)
≥35	21(7)
Marital status	
Single	3(1)
Married	297(99)
Residency	
Urban	169(56.3)
Rural	131(43.7)
Religion	
Protestant	220(73.3)
Orthodox	55(18.3)
Muslim	14(4.7)
Catholic	11(3.7)
Occupation	
Housewives	209(69.6)
Private employed	77(25.7)
Government employed	14(4.7)
Educational status	
No formal education	127(42.3)
Primary education	105(35)
Secondary education	53(17.7)
College and higher	15 (5)
Average monthly income in USD	
<73.42	151(50.3)
73.42 -146.84	59 (19.7)
>146.84	90 (30)

Obstetric characteristics, maternal and fetal outcome

Out of the 300 participants, 200 (66.7%) were multiparous.

Table 2. Obstetric characteristics, maternal and fetal outcomes at Durame Hospital, Southern Ethiopia, 2019(n=300)

Variables	Frequency (%)
Parity	
<2	75(25)
2-4	200(66.7)
5 and above	25(8.3)
Antenatal care visit in last pregnancy	
Yes	254(84.7)
No	46(15.3)
Gestational age in weeks	
Preterm	74(24.7)
Term	204(68)
Post-term	22(7.3)
Duration of labor in hours	
<12	238(79.3)
12-24	60(20.0)
≥24	2(0.7)
Previous cesarean delivery	
Yes	12(4)
No	288(96)
Maternal outcome	
Alive	298(99.3)
Dead	2(0.7)
Fetal outcome	
Alive	255(85)
Dead	45(15)
Apgar score	
≤7	22(7.3)
>7	278(92.7)
Weight of the baby in kg	
2.5- 4	273(91)
≥4	27(9)

A total of 254 (84.7%) participants had antenatal care (ANC) visit in their last pregnancy. The majority of the participants, 204 (68%), had a gestational age of 37–42 week. For the majority of the participants, 238 (79.3%), the duration of labor was less than 12 hours. Out of 300 newborns, 255 (85%) were born alive. Out of those alive newborns, most of them 278(92.7%) have an Apgar score of >7. The majority of newborns, 273 (91%) weighed between 2.5-4.0 kg. Of the total mothers, only 2 (0.6%) of them were deceased (Table 2).

The rates of cesarean delivery and its indications

After a total of 300 deliveries, 74 women gave birth by caesarean section, which makes the overall rate of CD 24.7%. Of the total CDs, 4 (5.4%) and 70 (94.6%) were elective and emergency CDs, respectively. The three prevailing indicators of CD were non-reassuring foetal heart rate, 13 (17.06%); abnormal presentation, 9 (12.2%); and pregnancy-induced hypertension, 8 (10.8%) (Table 3).

Table 3. Rate and indications of cesarean delivery at Durame Hospital, Southern Ethiopia, 2019(n=300)

Variables	Frequency (%)
Mode of delivery	
Vaginal delivery	226(75.3)
Cesarean delivery	74(24.7)
Types of cesarean delivery	
Emergency	70(94.6)
Elective	4(5.4)
Indications of cesarean delivery	
Non reassuring fetal heart rate	13(17.6)
Abnormal presentation	9(12.2)
Pre-eclampsia/eclampsia	8(10.8)
Failure to progress of labor	7(9.5)
Failed induction	7(9.5)
Obstructed labor	6(8.1)
Pre-labor rupture of membrane	5(6.8)
Vaginal bleeding	4(5.4)
Multiple pregnancy	4(5.4)
Failed instrumental delivery	3(4.1)
Post-term pregnancy	2(2.7)

Factors associated with cesarean delivery

A bivariate logistic regression analysis revealed that the factors contributing to caesarean delivery include a mother's age of ≥35, rural residence, having had a previous caesarean delivery, parity and post-term pregnancy while the multiple variable logistic regression analysis found that a maternal age of ≥35 years, previous caesarean delivery and post-term pregnancy were contributing factors to caesarean delivery. Mothers older than 35 years were 3.2 timesmore likely to undergo caesarean delivery than those aged 15–19 years(AOR =3.2, 95% CI:1.19-8.67). Furthermore, mothers with a previous caesarean delivery were 7.3 times more likely to undergo caesarean delivery than mothers without a previous caesarean delivery (AOR=7.3, 95% CI: 2.02-26.65). Moreover, mothers with post-term pregnancy were 3.3 times more likely to have a caesarean delivery than those with a term pregnancy (AOR = 3.3, 95% CI: 1.26-8.67) (Table 4).

Table 4. Contributing factors of cesarean delivery at Durame Hospital, Southern Ethiopia 2019

Variables	Cesarean delivery		COR (95% CI)	AOR (95% CI)
	No	Yes		
Age group in years				
<15-19 (ref)	13	10	1	1
20-34	202	54	2.9(0.4,6.91)	2.7(0.34,6.84)
≥35	10	11	4.1(1.66,10.19)*	3.2(1.19,8.67)**
Residency				
Urban (ref)	138	31	1	1
Rural	87	44	2.3(1.32,3.83)*	1.7(0.95,2.99)
Gestational age				
Preterm	56	18	1.1(0.59,2.061)	1.05(0.53,2.05)
Term (ref)	158	46	1	1
Post term	11	11	3.4(1.39,8.43)*	3.3(1.26,8.67)**
Previous cesarean delivery				
No (ref)	221	67	1	1
Yes	4	8	6.6(1.92,22.59)*	7.3(2.02, 26.65)**
Number of parity				
<2	157	43	0.8(0.43,.1.5)	0.9(0.47,1.86)
2-4 (ref)	56	19	1	1
5 and above	12	13	3.2(1.24,8.18)*	2.7(0.96,7.48)

** = Significant at p value < 0.05 COR: Crude odds ratio AOR: Adjusted odds ratio

Discussion

In this survey, we explored the rate and contributing factors of caesarean delivery among women who delivered at Durame Hospital. The findings indicate that the overall rate of caesarean delivery was 24.7%, a result that is high according to the WHO classification criteria (7). This rate was also higher than the reported rates of 17.8% and 21.4% in Morocco and Nigeria, respectively (21, 22). This discrepancy may be due to the improved referral system and government attention given to maternal health care services in the study area. By contrast, this figure was lower than the reported rates found in studies conducted in eastern Ethiopia, Italy and Jordan, which were 34.3%, 36% and 29.1%, respectively (13, 23, 24). The difference could be attributed to the study area and to the implementation of diverse interventions within the study period.

A mother's age of ≥35 years was significantly associated with caesarean delivery, which is in line with research carried out in Ethiopia, Jordan and Bangladesh (23, 25, 26). This may be because the advanced age of the mother increases the risk of developing complications, such as placental abruption, placenta previa, pregnancy-induced hypertension, multiple gestation, breech presentation and foetal macrosomia in the pregnancy. Additionally, older mothers are more likely to have had a prior caesarean delivery, which is associated with a high chance of another caesarean delivery.

Post-term pregnancy was significantly associated with caesarean delivery, similar to findings reported in Ethiopia and India (27, 28). This may be because pregnant women with post-term pregnancy are more likely to experience foetal macrosomia, which is associated with a greater risk of requiring a caesarean delivery.

Having a previous caesarean delivery increased the potential for caesarean delivery, consistent with the studies undertaken in eastern Ethiopia and India (13, 28). This could be explained by the fact that mothers with a prior caesarean delivery are more likely to experience uterine rupture, placenta previa and placenta accreta in their subsequent pregnancies.

The statistical methods used in this study constitute proper and effective techniques for determining associations between the outcomes and explanatory variables. Additionally, various approaches were employed to maintain the quality of the data. In spite of these strengths, this research has a limitation. It is a one-centre survey, which restricts the generalisation of the study results to the study setting. Also, this

research did not include health care providers and health facility–related factors.

Conclusion

A maternal age of ≥35 years, having a previous caesarean delivery and post-term pregnancy were contributing factors of caesarean delivery. Careful evaluation of women with a previous caesarean delivery to determine the possibility of vaginal delivery as well as regular monitoring in the hospital of caesarean delivery indications are required to ensure the appropriate use of the procedure. The results of this survey may help the concerned authorities to provide assistance in the study setting. In addition, these findings may provide baseline information for additional investigations in similar areas of survey. A multicentre study should be conducted that incorporates health care providers and health facility delivering services.

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This study was endorsed by the Ethical Review Committee of Wachemo University, College of Medicine and Health Science, and an agreement letter was secured from the authorities of Durame Hospital (RERC/0132/2019 date:16/03/2019). Prior to the interview, the respondents were told that their involvement was voluntary and that they had the right to terminate their participation at any time during the study. They were also told that declining to participate in the survey would not bring any penalty. Printed informed consent was obtained from each participant. The confidentiality of the responses was maintained during the progress of the survey.

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Conflicts of interest

Authors declared no conflicts of interest.

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