

RATE OF CESAREAN DELIVERY AMONG PHYSICIANS PRACTICING IN A TEACHING HOSPITAL IN TIGRAY REGION, NORTHERN ETHIOPIA

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ABSTRACT

INTRODUCTION: The Ethiopian national cesarean section rate is about 5%. Rates of cesarean delivery (CD) vary widely among population segments in Ethiopia suggesting unequal access. Within this context, this study aimed to assess the rate of CD among physicians practicing at Ayder Comprehensive Specialized Hospital (ACSH).

METHODS: This was cross-sectional study. All female physicians who are parous (n = 15) and all male physicians whose spouses are parous (n = 86) were interviewed to evaluate the mode of delivery among them. Indications for CD were also assessed.

RESULTS: The overall CD rate among participants was 81 (44.3%). Thirteen out of 18 (87%) female obstetrician/gynecologists and male obstetrician/gynecologists' spouses delivered via CD. Cesarean delivery for maternal request (CDMR) accounted for 22.6% of primary CDs. Nearly all (95%) potential candidates for Trial of Labor after Cesarean delivery (TOLAC) opted for repeat elective CD. The driving factors for CD were: lack of confidence in the process of intrapartum fetal monitoring, "uncertainty" of outcome of vaginal delivery, fear of labor pain (due to absence of labor analgesia), and managing obstetricians' fear of blame for poor outcome by their colleagues.

CONCLUSION: This study revealed a disparity in CD rates in physician community vs the general Ethiopian population. More revealing are the reasons why they underwent CD. Rate of CD may be decreased by winning the confidence of the parturient mothers through instituting international-standard intrapartum fetal monitoring and labor analgesia protocols.

KEY WORDS: Rate of Cesarean Delivery, Mode of delivery, Indication, Cesarean Delivery for Maternal Request, Physicians

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INTRODUCTION

Cesarean delivery (CD) is the most common lifesaving major surgery performed worldwide¹. Rates continue to rise globally, and CD now accounts for more than 1 in 5 (21%) of all childbirths². Rates range from 9.2% in Africa to 39.3% in the Americas². The World Health Organization (WHO) predicts that a third of all deliveries (29%) will occur via CD in 2030³. On average, rates of sub-Saharan Africa are about 5%, indicating underuse, while the average rate of 42.8% in Latin America and the Caribbean suggests overuse². These rates also reveal existing disparities in access to this lifesaving procedure.

In Ethiopia, rates of CD in urban and rural settings are 24% and 1% respectively⁴. The rates in hospitals in major cities and private for-profit organizations mirror the rates in developed countries. The stark variation in CD rates in low-middle income countries (LMIC) is multifactorial. The poorest subpopulations in Ethiopia may not have access to safe CD due to proximity/distance from hospitals, poverty contributing to challenges with obtaining prenatal care, and poor health literacy contributing to a lack of awareness of the need for medical attention. By contrast, high rates of CD in urban areas denote a degree of relative privilege that includes access to CD, prenatal care, and improved health literacy in the context of healthcare in Ethiopia⁵.

Reasons cited for the global increasing trend in CD rates include higher financial incentives for physicians performing CD, maternal request, and lack of regulations on indications for the procedure [6]. When performed for medically justifiable indications, CD can improve maternal and neonatal outcomes. However, there is no maternal or neonatal benefit when performed without maternal or fetal indication⁷. Moreover, when performed for medically unindicated reasons, the risks may outweigh the benefits. In the absence of maternal or fetal indications, CD can be harmful to both the mother and the baby⁸.

The safety of CD has improved dramatically over time. However, as in any major surgery, it still possesses short- and long-term complications⁹. Short-term complications include re-laparotomy, anesthesia-related morbidities, adjacent organ injuries (bladder, bowel, and vascular), increased risks of thromboembolic complications, an increased hospital stay, and surgical site infections^{7,10}. Long-term maternal complications include a high rate of repeat CDs, adhesion, scar dehiscence, uterine rupture, adherent placentation, and risks of peripartum hysterectomy in subsequent deliveries^{7,11,12}.

One population that arguably has the readiest access to obstetric care and CD and the highest degree of health literacy is physicians. An interesting query that underlies the ethics and equity of obstetric delivery of care might be, "how do physicians give birth?" With knowledge about complications inherent in major surgeries, it may be assumed that physicians would avoid medically unindicated CD. Congruent with this assumption, a study by Johnson et al. revealed that physicians, as compared to their nonphysician counterparts, are more likely to deliver vaginally¹³. So far, some studies have assessed the preferred mode of delivery among medical professionals¹⁴. However, to our knowledge, there is no accessible data that shows the actual mode of delivery among physicians in the sub-Saharan context. This cross-sectional study aims to assess the actual mode of delivery of physicians practicing in a teaching hospital in the Tigray region of Ethiopia.

OBJECTIVE

The objective of this study is to determine the rate of Cesarean delivery (CD) among parous physicians and their partners at Ayder Comprehensive Specialized Hospital (ACSH) in 2018.

METHOD AND MATERIALS

Research Design

A cross-sectional survey was conducted in 2018, wherein 101 eligible participants were recruited and

surveyed. A medium effect size of 0.3 was used to compute statistical power to ensure adequate sample size. Therefore, this sample size yields a power of 85.5%, which is greater than the conventional 80% statistical power for a 95% CI.

Setting

The study was carried out at ACSH in 2018, which is a teaching hospital serving as a referral catchment area for over 8 million people. Fetal monitoring in ACSH features both Pinard Stethoscope intermittent use of electronic fetal monitoring machines to assess fetal heart rate but without the ability to assess fetal heart rate pattern or tracing. Pain management during labor is not provided.

Participants

The participants for this study were parous resident/senior physicians practicing at ACSH.

Ethical Approval and Consent to Participate

Ethical approval was obtained from the Health Research Review Committee of Mekelle University, College of Health Sciences. Informed consent was obtained from the participants for data collection interviews.

Data Collection

A questionnaire was developed from a literature review. It contains variables such as socio-demographic variables, indications for CD, reasons for choosing CD, and the future plan for Trial of Labor after Cesarean (TOLAC) in those who are candidates. It was pretested on senior physicians at Adigrat General Hospital in 2018. Two obstetrics and gynecology residents were trained as data collectors, and data was collected through a structured and previously established questionnaire.

Data Analysis

The data was entered into IBM SPSS statistics data editor version 20. Descriptive statistics such as mean with standard deviation for continuous variables and proportions for categorical variables were used. Frequency tables were produced and analyzed for demographic and clinical variables.

RESULTS

In the present study, 101 physicians practicing at ACSH participated. Majority (n =70, 69.3%) were senior physicians, and the remaining (n=31, 30.7%) were resident physicians (Table 1). The age of the study participants ranged from 26 – 55 years with a mean age of 35 ± 6.3 years. A total of 183 deliveries were registered. Among these, 181 were singleton, and two were twin deliveries. Parity of the study participants ranged from 1 to 5 with mean parity of 1.81 ± 0.9 .

Table 1: - Sociodemographic characteristics of physicians practicing at ACSH, 2018

Variables	Categories	Frequency	Percent
Sex	Males	86	85.1%
	Females	15	14.9%
Marital status	Married	98	97%
	Others	3	3%
Department	Surgery	31	30.7%
	Internal Medicine	27	26.7%
	Obstetrics and Gynecology	18	17.8%
	Pediatrics	14	13.9%
	Radiology	6	5.9%
	Dermatology	4	4.0%
	ENT	1	1.0%
Academic Rank	Resident	31	30.7%
	Senior	70	69.3%
Occupation of Partner	Health professional	70	69.3%
	Not health professional	31	30.7%
Place of Delivery	Governmental institution	179	95.2%
	Private institution	9	4.8%
Parity	1	43	42.6%
	2	39	38.6%
	3	15	14.9%
	4	3	3.0%
	5	1	1.0%

In this study, CD accounted for 44.3% (n=81) of the overall 183 deliveries. Rate of CD during the birth of the first child was 45.5% (n = 46 CD) (Table 2).

Table 2: - Mode of delivery among physicians and/or partner of physicians practicing at ACSH, 2018.

Mode of Delivery ¹		1 st Child	2 nd Child	3 rd Child	4 th Child	5 th Child
Vaginal Delivery	Number	55	30	14	3	0
	Frequency	54.5%	51.7%	73.7%	75%	0
Cesarean Delivery	Number	46	28	5	1	1
	Frequency	45.5%	48.3%	26.3%	25%	100%

¹ Total CD deliveries (n=81), primary CD (n=53) on which (n=28) repeat CDs were done

The most common indications for primary CD were maternal request 12 (22.6%), poor progress of labor 11 (20.6%), and oligohydramnios 10 (19.9%). The most common indications for repeat CD were

maternal desire for repeat CD 19 (67.8%), history of 2 prior CDs 5 (17.9%), and previous myomectomy scar with 1 previous CD scar 2(7.1%) (Table 3).

Table 3: Type and indications for CD among physicians and/or partners of physicians practicing at ACSH, 2018 (n=81)

Type	Frequency	%
Primary Cesarean Delivery		
1. Maternal request for CD	12	22.6%
2. Poor progress of labor	11	20.6%
3. Oligohydramnios	10	19.0%
4. Fetal macrosomia	7	13.2%
5. Nonreassuring fetal heart rate status	6	11.3%
6. Malpresentation	3	5.7%
7. Previous myomectomy scar	2	3.8%
8. Antepartum hemorrhage	1	1.9%
9. Preeclampsia with unfavorable Bishop score	1	1.9%
Total	53	100%
Second Cesarean Delivery		
1. Opted for repeat CD Scar	19	82.6%
2. Failed TOLAC	1	4.4%
3. APH with Previous CD Scar	1	4.4%
4. Previous myomectomy scar + 1 Previous CD Scar	2	8.6%
Total	23	100%
Third Cesarean Delivery	5	100%

Nearly all (95%) candidate for TOLAC opted for repeat elective CD. There were 30 physicians with only 1 previous CD scar at the time of the interview. Among these, 21 (70%) had the intention to try labor on subsequent deliveries 1 parturient was uncertain for the preferred mode of delivery in the subsequent pregnancy.

Among 12 mothers who underwent CD for maternal request 41.7% opted for CD because they do not trust the process of intrapartum fetal

monitoring in the absence of continuous electronic fetal monitoring. A similar number of women opted CD for fear of labor pain. Half (50%) of study participants with oligohydramnios thought vaginal delivery would confer greater peripartum risk than CD in the set up where this study was conducted. Nearly 30% of participants who underwent CD thought their physician was influenced to perform CD because the parturient was a physician (Table 4).

Table 4: Circumstances during primary CD among physicians and/or partners of physicians practicing at ACSH, 2018

Variable	Response	Frequency	%
1. Alternative mode of delivery provided	Yes	36	67.9%
	No	17	32.1%
2. Treating physician influenced into CD	Yes	16	30.2%
	No	30	56.6%
	Uncertain	7	13.2%
3. Relationship with the surgeon	Close friend	16	30.2%
	Colleague	26	49.1%
	No relationship	11	20.8%
4. Mother or partner Requested for CD	Yes	20	37.7%
	No	33	62.3%
5. Reasons for choosing CD (for those who underwent CD for maternal request)	Lack of confidence in vaginal delivery due to lack of electronic intrapartum fetal monitoring	05	41.7%
	Fear of labor pain	05	41.7%
	Vaginal delivery brings more harm to the baby than CD	01	8.3%
	For timed delivery	01	8.3%
6. Reasons for choosing CD (for those who had CD done for oligohydramnios)	Lack of trust in the vaginal delivery owing to lack of electronic intrapartum fetal monitoring	3	30%
	Fear of labor pain	1	10%
	Vaginal delivery brings more harm to the baby than CD	5	50%
	Indicated	1	1%
Complications related to CD	Yes ²	8	15.1%
	No	45	84.9%

² Spinal headache = 3, surgical site pain = 2, high spinal = 1, PPH = 1, and Paralytic ileus = 1

Nearly three- fourths of the study participants believed that the rate of CD among physicians is higher than the general population. Approximately two- third of them thought CD in this group are

performed for maternal request. Nearly 85% of study participants agree that the parturient is biased toward CD because of one or combinations of factors specific to ACSH (Table 5).

Table 5: Attitude of physicians practicing at ACSH towards CD

Variable	Response	Frequency	%
1. CD done on physician parturient	They are mostly done for rational indications	24	23.8
	They are mostly done not for justifiable medical indications	64	63.4
	Uncertain	13	12.9
2. Rate of CD in physicians as compared to the general population	High	73	72.3%
	Same	9	8.9%
	Low	9	8.9%
	Uncertain	10	9.9%
3. Complications of CD as compared to vaginal delivery	Better	21	20.8%
	Neutral	47	46.5%
	Worse	33	32.7%
4. CD for maternal request	Strongly support	13	12.9%
	Support	17	16.8%
	Undecided	6	5.9%
	Do not support	43	42.6%
	Strongly do not support	22	21.8%
5. Reasons for choosing CD over vaginal delivery	Lack of trust in the vaginal delivery owing to lack of electronic intrapartum fetal monitoring	07	6.9%
	Fear of labor pain	07	6.9
	Vaginal delivery brings more harm to the baby than cesarean delivery	10	9.9%
	For timed delivery	02	2.0%
	Combinations of the above factors	59	58.4%
	They are done for indications	16	15.8%

DISCUSSION

In the present study, 45.5% of physicians gave birth to their first child via CD. Similarly, the overall CD rate was 44.3%. This is in stark contrast to the 5.4% national average of the CD rate in Ethiopia¹⁵. The rate is still higher than the overall national institutional CD rate, which is 18%¹⁶. In 2016, the CD rate in ACSH was 33.5% with an average annual increment of 1.7%¹⁷. Rates of CD in urban and rural settings in Ethiopia are 24% and 1%, respectively⁴. Higher CD rates in physicians than the general population contradicts the findings of a study conducted in the US which revealed

physicians get fewer cesarean deliveries than non-physician counterparts¹³. The rate in this study was also higher than the findings of a study in Finland which showed a 15.9% overall CD rate among physicians¹⁸. The discrepancy may be explained by the differences with CD costs in different settings. All maternity services, including CD, are provided for free in Ethiopia. In contrast, mothers pay for CD in both the US and the Finland studies leading parturient physicians to tilt towards vaginal delivery to avoid the high cost incurred as a result of having a CD.

CDMR was the commonest (26.6%) indication for primary CD. Ironically, two-thirds of the study participants in this study do not support Cesarean section to be done for maternal request. Poor progress of labor and oligohydramnios accounted for 20.6% and 19.9% of primary cesarean deliveries. This contradicts a study conducted by Gedefaw et al., which showed cephalopelvic disproportion, non-reassuring fetal heart rate pattern, and obstructed labor to be the commonest indications in Ethiopia¹⁹. This result also contrasts with the commonest indications in another study conducted in ACSH, which depicted non-reassuring fetal heart rate pattern, cephalopelvic disproportion, and repeat cesarean deliveries to be the commonest indications¹⁷. In our study, the CD was not done for classic indications, as maternal request prevails as an indication. This may explain the divergences from the commonest indications as compared to previous reports.

Of all CDs in the present study, CDMR accounted for 14.3%. This rate is lower than the rate of CDMR in China (22.3%)²⁰. However, the rate of CDMR in the current study was significantly higher than other high-income and LMIC studies. Studies in USA and Canada revealed CDMR rates of 3.9% and 2.5%, respectively^{21, 22}. One systematic review of LMIC countries showed a CDMR rate of 2%²³. The difference might be related to the fact that as participants in this study are physicians and as a result have easy access to CD services compared to the general population in other studies.

The reasons for choosing CD in those who underwent CDMR were the absence of electronic fetal monitoring and fear of labor pain. A study in India similarly points out that patients underwent CDMR for reasons of painless labor²⁴. A study by Zhao et al. revealed that lack of confidence in vaginal birth is the single most important factor influencing women for CDMR²⁵.

The practice of offering CDMR is discouraged by several authorities²⁶. CD is a major surgery with multiple complications. There is a lack of evidence that CD brings benefit for low-risk pregnancies.

CD is associated with increased hospital stay and healthcare cost, and complications in subsequent pregnancies such as morbidly adherent placentation, uterine rupture, and hysterectomy^{27, 28}. There is emerging evidence that babies born by CD have different hormonal, physical, bacterial, and medical exposures, and that these exposures can subtly alter neonatal physiology^{27,28}. Thus, it should be reserved only when there is a perceived risk that impedes the life of the mother and/or the baby which can be offset with the application of CD^{29,30}.

Half of the study participants with oligohydramnios thought vaginal delivery brings more harm than CD in the setting where this study was conducted. However, several pieces of evidence show that isolated oligohydramnios is not typically a direct indication for CD^{31,32}. It is noteworthy that adequate intrapartum fetal monitoring may be a contingency upon which the risk of harm from vaginal delivery may arise.

Strengths and Limitations of the Study

This study assessed a rarely addressed research question and can be used as a baseline on which future studies can base to examine reasons for the high prevalence of Cesarean Delivery among physicians. However, it has several limitations. First, it did not have comparative group. Rate of Cesarean delivery among physicians was compared against rates of previous studies in different settings and contexts. Second, the cross-sectional design of the study does not allow for causal inference or the examination of changes over time. Third, the findings may not be generalizable to other settings with different fetal monitoring and pain management practices during labor. Fourth, the data collected were self-reported, which may be subject to recall bias and may not accurately represent the actual practices or behaviors of the participants.

CONCLUSION

This study revealed a disparity in CD rates for physicians Vs general population. More revealing

are the reasons why they underwent CD. Lack of confidence in vaginal delivery due to the absence of electronic fetal monitoring, and fear of labor pain are the main reason why women choose elective CD. Rate of CD may be decreased by winning the confidence of the parturient mothers or their partners through instituting appropriate intrapartum fetal monitoring and labor analgesia protocols. Additionally, obstetricians and gynecologists should be keen to offer scientific information to patients emphasizing on maternal and neonatal risks of medically unjustifiable CDs. The high rate of repeat CD for history of one prior CD and other non-medical indications like maternal request and isolated oligohydramnios prompt the need to monitor appropriateness of these indications. It is important to note that CD is a major surgery with multiple complications and lack of evidence that CD brings benefit for low-risk pregnancies. Thus, it should be reserved only when there is a perceived risk which is an impediment to the life of the mother and/or the baby which can be offset with the application of CD.

DECLARATIONS

Availability of data and materials

The datasets used for this research are all included within the main text.

Abbreviations

1. **ACSH** - Ayder Comprehensive Specialized Hospital
2. **CD** - Cesarean delivery
3. **CDMR** - Cesarean delivery for maternal request
4. **LMIC** - Low- and middle-income countries
5. **TOLAC** - Trial of labor after cesarean delivery

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Authors' Contributions

HT: Conceived research idea, designed the research, supervised, designed questionnaire, analyzed the data, drafted and reviewed the manuscript AY: Co-supervised, designed questionnaire, analyzed data, reviewed the manuscript. SA: Designed the research, designed questionnaire, analyzed data, reviewed the manuscript. MG, EB, HEA, AH, and EA: Participated in data analysis, reviewed the manuscript. All authors have read and approved the manuscript.

Declaration of Conflicting Interests

The authors have declared that no competing interest exists.

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