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Title: Identifying factors associated with caesarian section without medical indication among women in Bangladesh.

Abstract:

Background: Particularly in a developing nation like Bangladesh, CS delivery has a substantial impact on mother and newborn health. However, the current trend of undergoing C-sections has surged due to convenience to women without any medical indication. Besides, fear, anxiety, and labor pain also play a crucial role in choosing cesarean delivery over natural birth. The aim of this study is to explore the factors associated with cesarean sections occurring without medical reason using two nationally representative surveys.

Method: This is a cross-sectional study conducted by using secondary data from Bangladesh Demographic and Health Survey (BDHS) 2017-18 & 2014. BDHS is a nationally representative data that covers all up-to-date information about fertility and fertility preferences; childhood mortality levels and causes of death; awareness, approval, and use of family planning methods; maternal and child health, including breastfeeding practices and nutritional status; newborn care; women's empowerment; selected noncommunicable diseases (NCDS); and availability and accessibility of health and family planning services at the community level.

Result: A total number of 2579 married Bangladeshi women who had C-sections three years preceding the surveys were considered in this study. The prevalence of CS delivery without medical indications among Bangladeshi women was 14%. The logistic regression model showed that the education of the respondent, BMI, number of children, and place of delivery were the most important predictors among Bangladeshi mothers. Most of these women were 20-30 years old, living in urban areas, Dhaka division, Muslim, educated up to secondary school, housewives, and having normal BMI. Besides, the majority of them had 1-2 children, aged at first birth between 10-19 years, took four ANC, and delivered in private facilities.

Conclusion: In the present study, important socio-demographic factors associated with CS delivery without indications in Bangladesh were identified. Consequently, these factors can be considered for reducing the rate of unnecessary CS delivery in Bangladesh.

Keywords: C-section without medical indications, unnecessary CS delivery, Bangladeshi women.

Background:

A significant and empowering human event is childbirth. Women's birth stories frequently mention sentiments of empowerment, joy, and accomplishment, especially after a vaginal birth without any medical interventions. (1) The term, "Caesarean Section" refers to a surgical procedure where a baby is delivered from the mother's womb through an incision on the abdominal wall and uterus. It is one of the most performed surgeries in obstetric practice. There are certain medical indications where a c-section is a life-saving procedure when a significant risk of adverse outcome for the mother or baby is present if the operation is not performed at a given time. (2) The percentage of births by cesarean section is an indicator of access to and utilization of care during childbirth. It is

estimated that between 5% and 10% of all births in a population will involve a complication that requires an intervention such as a cesarean section. (3) There are two types of cesarean section performed: elective and emergency c-section. An elective c-section is performed before the onset of labor pain. It is usually decided by health care practitioners during antenatal checkups considering various indications. Another type is emergency c-section, where the surgery is performed on an emergency basis to save the mother or the baby. Indications for cesarean section include malpresentation (e.g., breech presentation, transverse lie), difficult labor or dystocia, premature baby, antepartum hemorrhage, prolonged or obstructed labor, cephalopelvic disproportion, cord prolapse, oligohydramnios, maternal diseases such as cardiovascular disease, hypertension or pre-eclampsia, gestational diabetes mellites and previous history of c-section. Besides, there are other indications where an emergency c-section is done such as premature rupture of membrane, decreased fetal movement, fetal distress, and multiple pregnancies where fetuses are not in a cephalic position. Over the years performing a c-section has not been confined to these medical indications. The fear of labor pains and simultaneous concern about the baby being born is more and more commonly leading to women choosing to deliver by cesarean section. (4,5)

The optimal rate for cesarean sections has been considered between 10% and 15% by the international medical community, since 1985. Moreover, there is no evidence that cesarean deliveries are beneficial for mothers or babies who do not need the procedure. (6) However, this recommended rate has exceeded in both developed and developing countries. Additionally, the number of c-sections has been rising as a result of a number of ambiguous non-medical indications such as failure to labor progress and presumed fetal compromise.(7) Particularly the maternal request plays a vital role in increasing c-sections without medical indication.(8) It has been argued that psychological trauma from the past or present may have influenced the percentage of women who requested cesarean sections for no discernible medical cause.(9) One study showed that among 169 countries that include 98·4% of the world's births, 29.7 million births occurred through c-section in 2015, which was approximately double the number of births in 2000. (10) Another study in 2008 showed, about 3.18 million additional CS were needed and 6.20 million unnecessary c-sections were performed. The global "excess" CS cost was estimated to amount to approximately USD 2.32 billion, while the global "needed" CS was approximately USD 432 million. (11) The impression of cesarean sections as a typically safe treatment, despite their higher costs, has undoubtedly supported their liberalization in clinical practice. (12)

Similar to any surgery, cesarean sections are associated with short and long-term risks which can extend many years beyond the current delivery and affect the health of the woman, her child, and future pregnancies. (6)Severe maternal morbidity and mortality including death, hysterectomy, blood transfusion, and admission to intensive care double the risk with elective c-sections, and up to five times the risk of postpartum infection, when compared with women, delivered vaginally. (13) Besides, cesarean delivery on maternal request or without indication increases the risk of bleeding, infections, and breastfeeding complications for the newborn. (8)Moreover, with elective c-section neonatal respiratory complications, neurological disorders (e.g., autism spectrum disorders (14), schizophrenia (15)), and immune-related diseases, such as asthma (16,17), skin atopy (18), juvenile arthritis, coeliac disease (19), type 1 diabetes (T1D) (20)or obesity rise

compared to spontaneous vaginal delivery suggested by epidemiological studies. (21–27) Recently, studies have revealed that the incidence of respiratory morbidity [transient tachypnea neonatal (TTN), respiratory distress syndrome (RDS), or persistence pulmonary hypertension (PPH)] was 10% in neonates born by elective CS (ECS) at 37 weeks as compared to 2.8% among neonates born vaginally. (28)No need to mention that unnecessary c-sections play a vital role in increasing these complications more frequently. As the sustained, unprecedented rise in cesarean sections has become a major public health concern, the WHO published guidelines to provide evidence-based recommendations on non-clinical interventions specifically designed to reduce cesarean delivery. These interventions include health education for women attending antenatal care, implementation of evidence-based clinical practice guidelines combined with structured, mandatory second opinion for cesarean section indication, collaborative midwifery-obstetrician model of care, and financial strategies for health care professionals or health care organizations. (29)

Recent ecological studies also found substantial associations between cesarean delivery and increased neonatal mortality, particularly in low and middle-income countries. (30) Many South Asian countries have experienced significant increases in cesarean section rates over the past decade. (31) The maternal mortality ratio (MMR) in 2015 was 176 per 100,000 live births, which needs to reduce by 70 per 100,000 live births by 2030 to meet the SDG-3 target. (32)Bangladesh is providing maternal and child health services from the root level to higher levels through a wide range of networks. The female field workers visit pregnant women regularly at the household level and motivate them to visit service providers for antenatal check-ups at the community clinic (CC) or the union-level Health and Family Welfare Centre (UH&FWC). Around 6,000 population are covered by a CC, and UH&FWC covers, on average, a population of 25,000. The Upazila-level hospital known as Upazila Health Complex (UHC) (1 hospital for about 250,000 to 300,000 population), provides basic emergency obstetric care (EmOc) services and refers clients with complications to the district-level hospital where comprehensive EmOc services are provided. (33)From the district hospitals, complicated cases are referred to the Medical College Hospitals. Moreover, the Ministry of Health and Family Welfare of the Government of Bangladesh implemented the Maternal Health Voucher Scheme to enhance institutional deliveries and delivery by skilled birth attendants. (34) However, utilization of these services is still not satisfactory, despite the availability and incentives. One of the major reasons behind this scenario is delays in recognizing a case of obstetric emergency and the decision to seek treatment. Two-fifths of women fail to decide whether to go for treatment within six hours of acknowledging the complications. Even after the decision of going to the facilities, it takes more than one hour for one in five women. (35)Furthermore, delays in actually receiving treatment at the facility, and the cost of treatment is another burden for many people in Bangladesh. Inadequate obstetric and neonatal care provided by health facilities also plays a vital role. Non-functional referral systems, poor quality of services, and lack of skilled healthcare providers are also evident at both the facility and community levels. (36)A qualitative study involving experienced obstetric complications in Matlab in 2008–2009 found that about 70% of women who had undergone c-sections had spent nearly or more than 15000BDT (US$217) on the procedure, which was approximately one-third of gross domestic product per capita at the time. (37)The lack of association between c-sections and complicated obstetric cases comes with the high financial incentives given to service providers for performing

cesarean sections and the demand of junior physicians to 'practice' their surgical skills, further indicates that obstetric surgery is being utilized for purposes other than those of clinical necessity. (31)

According to Bangladesh's demographic health survey, institutional birth increased by 12% from 2014 to 2017-18 (37 to 49%); however, home delivery declined by 8% (62 to 50%). Among these institutional deliveries, 33% occurred by c-section in 2017 which was 23% in 2014. (38)A most recent study revealed that private facilities have a significant role in increasing the rate. These private facilities are usually profit driven and do not have properly trained providers or facilities to take unexpected delivery risks. (39)On the other hand, despite having all the evidence-based protocols and necessary training, service providers are reluctant to follow those. Not every woman with a history of a previous c-section needs to go for another one; however, in practice it is different. Besides, pressure from relatives of affluent patients influences the providers to opt for cesarean delivery. (40) Moreover, about 57.7% of cesarean deliveries were decided before labor pains began, which is indicative of surging c-sections without medical reasons. A report by Save the children stated that in 2018, 70% of all c-sections occurred unnecessarily in Bangladesh, which is responsible for $483 million in expenditure in a year. (41) A number of studies explored the determinants of cesarean section in Bangladesh, particularly mothers' age, education, place of residence, wealth index, age at marriage, age at first birth, parity, birth order, antenatal visit, husband occupation, delivery in the private sector, religion, the geographical region found significant. (42–46) However, limited studies on unnecessary or c-sections without medical indication conducted so far. The aim of this study is to find out the proportion of women who prefer c-sections without any medical indication along with the reasons. Furthermore, this study will illustrate the associated factors of these unnecessary c-sections.

Methodology

Design and study population

In the present study, secondary data were used which was collected by Bangladesh Demographic and Health Survey (BDHS-2014 & 2017-18). BDHS is a nationally representative data that cover all up-to-date information about fertility and fertility preferences; childhood mortality levels and causes of death; awareness, approval, and use of family planning methods; maternal and child health, including breastfeeding practices and nutritional status; newborn care; women's empowerment; selected noncommunicable diseases (NCDS); and availability and accessibility of health and family planning services at the community level. BDHS 2014 was conducted from June 2014 to November 2014, & BDHS 2017-18 from October 2017 to March 2018. The BDHS-2014 & 2017-18 used a two-stage stratified cluster sampling method based on enumeration areas (EAs) and households. All information about the sampling technique, survey design, survey instruments, measuring system, quality control, ethical approval, and subject consent for the 2014 & 2017-18 BDHS has been described elsewhere. The survey of BDHS 2014 collected information from 17886 & BDHS 2017-18 interviewed 20,100 ever-married women 15–49 years old. From the two

surveys, 2579 women who preferred C-sections without any clear medical indication were considered a sample in this study. There were 13 reasons documented for a C-section. Among those, convenience and avoiding labor pain were considered as dependent variables.

Selected variables

The primary outcome variable in the present study was a dichotomous variable, CS delivery without any medical indication, (i) Yes or (ii) No. This variable was measured by a question to participants, "*Was there any medical reason behind your cesarean section*?" The secondary outcome variable was to find out the socio-demographic factors associated with cesarean delivery without medical indications. Apart from the variables that were indicated in the previous studies, some new variables have been considered in this study. Variable Division contains eight geographical regions (Dhaka, Chittagong/ Chattogram, Barisal, Khulna, Rajshahi, Rangpur, Sylhet). The age of mothers was categorized into three categories: 10 to 19 years, 20 to 30 years, and greater than 30 years. Similarly, mothers' age at first birth was also divided into three categories:10 to 19 years, 20 to 30 years, and above 30 years. Place of residence contains two categories: urban and rural areas. Variable wealth index was calculated by principal component analysis based on the assets possessed by the households and categorized as poor, middle class, and rich. The religion of the respondents was categorized into Muslim and rest of the other religion titled as non-Muslim. Education was divided into four groups: pre-primary or none, primary, secondary, higher secondary, or above. The occupation was grouped into four categories: those who are not involved in any work as a housewife, service holders who do any job, business, and others. Moreover, the occupation of husbands was categorized into professional or managerial jobs, skilled workers, business, and others. The Body Mass Index (BMI) of the mothers was categorized into four categories: Underweight (< 18.5 kg/m2), Normal (BMI 18.5 kg/m2 to less than or equal to 25 kg/m2), Overweight (25 kg/m2 to less than 30 kg/m2), and Obese (30 kg/m2 or above). The number of living children was grouped into two categories: one or two and more than two children. Moreover, the number of ANC visits was divided into three groups: no visits, one to three visits, and four or more visits. Lastly, the place of delivery was categorized into five groups: government medical colleges, other govt. hospitals, private medical college hospitals, private clinics, and NGO hospitals.

Statistical Analysis

The BDHS 2014 & 2017-18 data set was cleaned (i.e., removing missing cases, coding, recoding variables, etc.) before formal data analysis. Descriptive statistics were run to calculate the number and frequency of each variable. Firstly, the frequency and percentage of variables of all C-sections were calculated. Then, the frequency and percentage of variables of C-sections without medical indications were demonstrated. bivariate logistic analysis (χ2-test) was performed to determine significant associations between C-sections without medical indications and selected socio-demographic factors. These associated variables were considered independent variables. The frequency of the timing of C-sections without medical indications was calculated and plotted in a bar chart. Finally, the frequency of the decision makers of C-sections without medical indications was calculated and depicted in the pie charts. Statistical significance was accepted at $p < 0.1$ and analyses were carried out using R software.

Result:

In the present study, 2579 married Bangladeshi women aged between 15 and 49 who went through cesarean section were considered a sample. Among them, 444 participants (14%) chose c-sections without medical indication. The reasons for undertaking c-sections without medical indications are convenience and avoiding labor pain. Of them, 261 (9.46%) for convenience and the rest 183(6.63%) to avoid labor pain. Most participants were between 20 and 30 years (77.3%) and very few were above 30 (6.5%). Among all divisions, the Dhaka division contained the majority of participants which is 594(21.5%). The second highest is the Khulna division, where 426(15.4%) women were delivered by c-section. Surprisingly most of the participants were from rural areas (53.2%). About half of them (50.8%) were educated up to secondary school and the majority were housewives (73.9%). The highest number of participants belong to the higher class or affluent society. Mostly whose BMI was normal chose to deliver by c-section. Besides, those who have one or two living children preferred cesarean delivery. Most of the participants took antenatal care by visiting four or more times (57.2%). The majority of c-section deliveries took place at private hospitals, whereas private clinics were responsible for 76% of cesarean sections.

Prevalence of cesarean delivery without medical indications

Among the women who chose cesarean delivery without medical indications were mostly aged between 20-30 years (78.9%), followed by 10-19 years (15.8%) and above 30 years (5.4%). Division-wise 25% from the Dhaka division, 18% from the Khulna division, and 11.5% from the Rajshahi division. Half of the women were from urban, half from rural areas, and mostly Muslim (88.5%). Likewise, in C-section, the majority of the participants were educated up to secondary school (49.5%), followed by higher secondary or above (38.3%). A large group of respondents was housewives (41.7%). On the contrary, the profession of the husband of most participants was skilled workers (49.5%), followed by businessmen (28.4%) and professional job holders (20.5%). Moreover, most of them were from higher class society (70.9%). Same as to the c-section, the BMI of most of the participants without medical indication was normal (51.6%) and the second highest was overweight (26.9%). Those who became first-time mothers during their adolescence were slightly higher in preferring C-sections without medical indications (49%), compared to 20-30 years (48.7%). Besides, as with the cesarean delivery, the majority of the participants took four or more antenatal care (59.5%), followed by one to three visits (38.7%) and no visits (1.8%). Most of these unnecessary C-sections took place in private clinics (79.7%).

Table 1: Sociodemographic characteristics of study participants

Variables	**C/S** **(n=2759) (%)**	**CS without medical indication** **N= 444 (14%)**
Age		
10-19	448(16.2%)	70(15.8%)
20-30	2132(77.3%)	350(78.9%)
>30	179(6.5%)	24(5.4%)
Division		
Dhaka	594(21.5%)	112(25.4%)
Chittagong	408(14.8%)	50(11.3%)
Barisal	251(9.1%)	37(8.33%)
Khulna	426(15.4%)	80(18.0%)
Mymensingh	170(6.2%)	32(8.04%)
Rajshahi	353(12.8%)	51(11.5%)
Rangpur	284(10.3%)	38(8.6%)
Sylhet	273(9.9%)	39(8.78%)
Type of residence		
Urban	1291(46.8%)	223(50.2%)
Rural	1468(53.2%)	221(49.8%)
Religion		
Muslim	2493(90.4%)	393(88.5%)
Non-Muslim	266(9.6%)	51(11.5%)
Educational Status		
Pre-primary or none	94(3.41%)	8(1.8%)
Primary	403(14.6%	45(10.1%)
Secondary	1401(50.8%)	220(49.5%)

Higher Secondary or higher	861(31.2%)	170(38.3%)
Occupation		
Housewife	2039(73.9%)	185(41.7%)
Service	173(6.3%)	35((7.9%)
Business	32(1.16%)	7(1.35%)
Others	515(18.7%)	71(16%)
Husband's occupation		
Professional job	400(31.4%)	91(20.5%)
Business	754(27.3%)	126(28.4%)
Skilled work	1527(55.3%)	220(49.5%)
Others	78(2.8%)	7(1.6%)
Household wealth status		
Poor	523(19.0%)	71(15.9%)
Middle	455(16.5%)	58(13.1%)
Rich	1781(64.6%)	315(70.9%)
Body Mass Index (BMI)		
Underweight	321(11.6%)	46(10.4%)
Normal	1473(53.4%)	229(51.6%)
Overweight	710(25.7%)	119(26.9%)
Obese	207(7.5%)	41(9.2%)
Age at first birth		
10-19	1514(54.9%)	217(49%)
20-30	1195(43.3%)	216(48.7%)
31-39	50(1.8%)	11(2.5%)
Number of living children		
1-2	2352(85.2%)	399(89.9%)
More than 2	407(14.8%)	45(10.1%)

Number of ANC visits		
No visit	58(2.10%)	8(1.8%)
1-3 visits	1123(40.7%)	172(38.7%)
4 or more visits	1578(57.2%)	264(59.5%)
Place of delivery		
Govt. Medical College Hospitals	109(3.95%)	7(1.6%)
Other Govt. hospitals	376(13.6%)	60(13.5%)
Private Medical College Hospitals	48(1.7%)	9(2.02%)
Private clinics	2098(76.0%)	354(79.7%)
NGO hospitals	128(4.6%)	14(3.15%)
Reasons for cesarean section without medical indications		
Convenience	261(9.46%)	
Avoid Labor Pain	183(6.63%)	

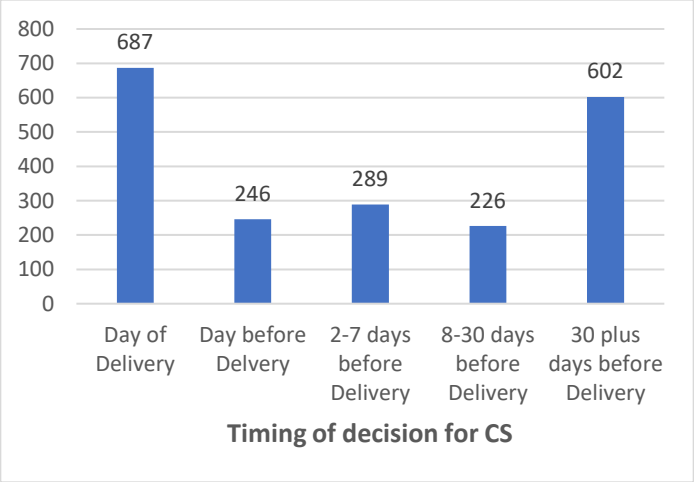
Socio-demographic factors associated with cesarean sections without medical indications

In the bivariate logistic regression model, when the effects of all covariates were controlled statistically, the probability of using C-section delivery without medical indications increased with higher education of women, decreasing the number of living children, and delivered in private hospitals and other government hospitals. Women with higher secondary and above education were two times (OR: 2.2 & 95% CI: 0.03-1.67) more likely to deliver by C-section without any medical indication than women with no education. Moreover, women with one or two children are more likely to choose a C-section without any medical indication than those with more than two living children (OR: 1.4 & 95% CI: 0.72-0.007). Also, those who delivered in other government hospitals (such as UHC, MCWC) and private hospitals are nearly three times more likely to prefer C-sections without medical indications compared to government medical colleges.

Table 2: Factors associated with c-sections without medical indications

Variables	Odds Ratio	95% CI		p-value
Age		**Upper**	**Lower**	
10-19	Ref			
20-30	0.804	0.17	-0.59	0.26
Above 30	0.705	0.29	-1.03	0.29
Division				
Dhaka	0.95	0.48	-0.57	0.83
Chittagong	0.74	0.29	-0.89	0.31
Barisal	Ref			
Khulna	0.98	0.56	-0.57	0.95
Mymensingh	1.39	0.92	-0.26	0.27
Rajshahi	0.97	0.56	-0.59	0.92
Rangpur	0.82	0.41	-0.81	0.51
Sylhet	0.79	0.42	-0.89	0.48
Type of residence				
Urban	Ref			
Rural	0.96	1.67	-0.27	0.73
Religion				
Muslim	Ref			
Non-Muslim	1.14	0.47	-0.22	0.507
Educational Status				
Pre-primary or none	Ref			
Primary	1.4	1.26	-0.44	0.42
Secondary	1.9	1.52	-0.09	0.11
Higher Secondary or higher	2.2	1.67	0.03	0.06*
Occupation				
Housewife	Ref			
Business	1.17	1.07	-0.95	0.75
Service	0.98	0.49	-0.56	0.96
Others	0.88	0.20	-0.46	0.45
Husband's occupation				

Service	0.72/1.37	0.96	-1.42	0.64
Business	0.66	0.86	-1.46	0.47
Skilled work	Ref			
Others		0.72	-1.57	0.33
Household wealth status				
Poor	Ref			
Middle	0.86	0.25	-0.54	0.48
Rich	1.11	0.45	-0.20	0.49
Body Mass Index (BMI)				
Underweight	0.842	0.29	-0.68	0.49
Normal	Ref			
Overweight	1.2	0.46	-0.18	0.39
Obese	1.6	0.91	-0.04	0.06*
Age at first birth				
10-19	0.88	0.12	-0.35	0.30
20-30	Ref			
Above 30	1.07	0.78	-0.72	0.84
Number of living children				
1-2	1.41	0.72	0.007	0.04*
More than 2	Ref			
Number of ANC visits				
No visit	0.69	0.73	-1.81	0.57
<4 visit	Ref			
More than 4 visits	0.95	0.23	-0.340	0.69
Place of delivery				
Medical College Hospitals	Ref			
Other Govt. Hospitals	3.3	2.22	0.36	0.009*
Private Medical College Hospitals	3.4	2.39	0.08	0.036*
Private Clinics	2.8	2.0	0.26	0.017*
NGO Hospitals	1.5	1.56	-0.70	0.473



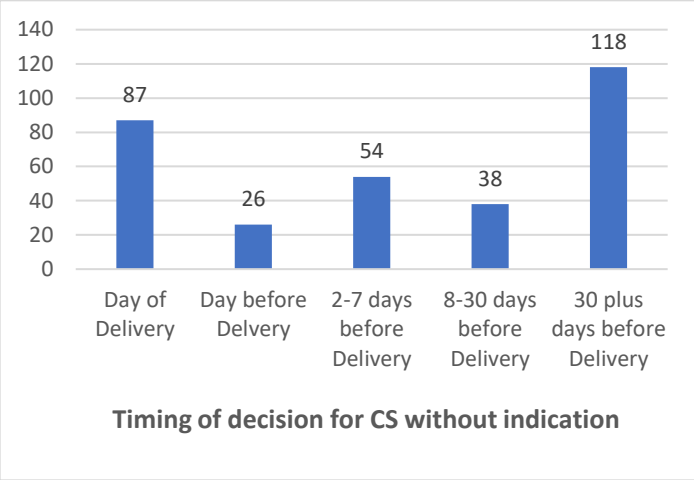
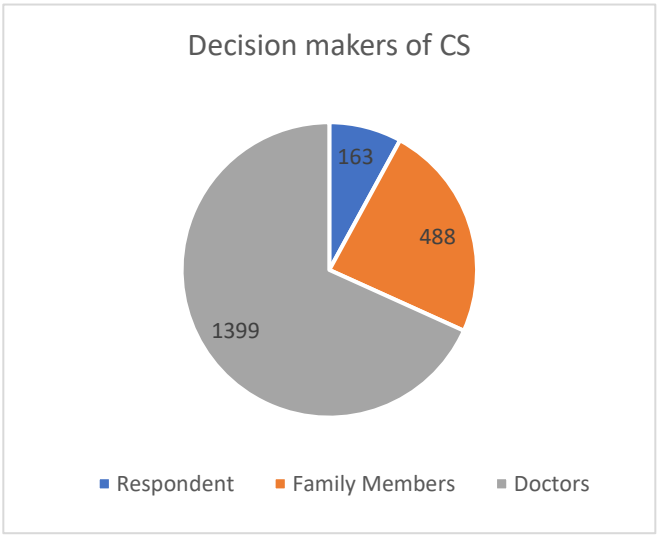


Fig_1: Timing of Decision for CS

Timing and decision makers for cesarean section

The highest number of decisions for C-sections were taken on the day of delivery (33.5%), followed by 30 plus days, 2-7 days of delivery, the day before delivery, and 8-30 days of delivery. On the other hand, for C-sections without medical indications, the highest number of deliveries was decided 30 or more days before the delivery (36.5%), followed by the day of delivery (26.9%), 2-7 days of delivery (16.7%), 8-30 days of delivery (11.8%), and the day before delivery (8.04%). The decision came from doctors in the case of overall C-sections (68.3%). On the contrary, members of the family decided to go for a C-section without medical indications in most cases (43%). In both cases, the least number of decisions came from respondents.



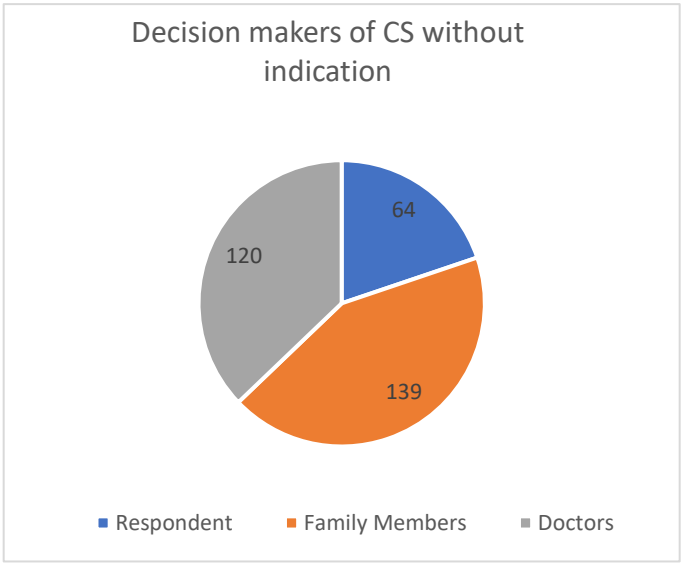


Fig_2: Decision Maker for CS

Discussion:

This study aimed to determine the risk factors for CS delivery without medical indications in Bangladesh by using nationally representative data. From BDHS 2014, the C-section rate was found 23%, and in 2017-18 it increased by 33%. Both of the rates are significantly higher than the WHO recommended rate. (47) According to a global survey, China (46.2%) has the highest prevalence of CS delivery. (48)While the other nations' percentages ranged from 42.0% to 1.62% (Angola) (Paraguay). (49,50) In Latin America and the Caribbean region, the highest rate of CS delivery was (32%), while the African region stated that the lowest rate of CS delivery was (7%). (51) Besides, this method of delivery rate was substantially higher in Brazil (45.9%) and lowest in Chad (0.4%), and in our two neighboring countries (India and Pakistan) was around 7%. (51) Cultural, educational, and economic disparities between regions may be the cause of variations in the delivery rate of CS in different parts of the world. (52)

Several studies from low- and middle-income countries suggest the proportion of CS performed without a clearly reported medical indication might be higher. A study suggested that 38% of the 303 cesarean sections performed in Tanzania were based on "unclear" or "unsuitable" grounds, and 25% of them were based on "inappropriate" indications. (53)Many studies on CS delivery had been done with different populations, and they reported that some socio-demographic and anthropometric factors were related to CS delivery. (54–57) A number of studies identified that the type of residence, education of women and their husbands, current working status, age at first birth, number of children, household's wealth index, child's birth weight, and categories of BMI were most important predictors for CS delivery among Bangladeshi married women at the reproductive age.

Previous studies found age above 30 years has a higher possibility of CS compared to young women. (52) (39) However, age has no significant role in C-sections without medical indications. It is also noted that adolescent mothers chose CS without any medical indications, which is very alarming. This finding suggests that teenage mothers are not physiologically or emotionally mature enough to give birth and decide to go for a CS. Further studies need to be performed in order to support this statement. Moreover, women from urban areas are twice as likely to undergo CS delivery as rural women as demonstrated by earlier studies. The possible explanation could be that educated and wealthy women have greater confidence and capability to take action regarding their own health. One explanation for this could be that educated and rich women are more self-assured and capable of making decisions about their own health. (52) (58) Besides, the majority of medical facilities are found in urban areas. Also, during their pregnancies, metropolitan moms can easily receive the necessary nursing care from various private or public facilities. (59) Although no association of C-sections without medical indications and place of residency was found in this study. Furthermore, women belonging to affluent families are more likely to choose CS compared to the middle class or poor. (39)Mothers from higher-income households typically have more

amenities and conveniences, thus they may be more concerned about the pain of vaginal delivery and opt for a CS delivery because of this. (59) Yet this study did not find any significance in terms of CS without medical indications. Further studies might clarify this finding.

It was observed that higher educated women are two times more likely to CS without any medical indications. An explanation might be that these women usually belong to wealthy families and therefore, try to avoid labor pain in vaginal delivery and prefer C-sections. Also, with higher education, women are becoming more career focused, and as a result, they are delaying their first pregnancy which enhances the risk of obstetric complications. Consequently, women are preferring CS even if there might not be any clear medical reason. In addition, obese women are more likely to go for a CS without a clear indication. Various studies also found that being overweight is a risk factor for C-sections. Besides, the proportion of overweight or obese women had been rising with increasing educational qualifications and wealth index. Moreover, birth orders of more than two are significantly associated with unnecessary cesarean sections. Mothers' increased anxiety about labor pain and bleeding during their first delivery may be the cause. Moreover, the first delivery has more complications than the second and subsequent deliveries, (60), and that might intimidate mothers to choose CS delivery without medical reasons. In Bangladesh, delivery in a private health facility had the biggest impact on the rising CS rate. Due to their primary focus on profit, private healthcare facilities strive to save themselves against unforeseen delivery hazards. (61) Also, other government hospitals such as upazila health complexes and maternal and child health care centers also play a vital role in increasing CS without medical reasons. According to a Brazilian study, obstetric risk factors did not correspond with the prevalence of C-section deliveries, especially in private sector institutions. (62) Clinical audit and feedback are anticipated to play a crucial role in this situation, assisting health professionals in examining and changing their practices to align with clinical guidelines for safe delivery practices. (63) One meta-analysis of Canadian researchers found that the rate of cesarean sections dropped by 13% after the implementation of clinical audit and feedback and that the reduction rose to 27% with a multimodal intervention that included second opinions and positive culture change. (64) These strategies might be implemented in Bangladesh in order to reduce unnecessary C-section trends. Furthermore, the situation might be improved by providing suitable facilities in government health facilities and ensuring that everyone has access to them. (39)

From the comparison of the timing of decision for C-sections, the majority of these deliveries were previously decided even before thirty or more days. This is a concerning factor that those who choose CS for convenience and to avoid labor pain, are determined not to initiate or induce labor pain. This finding points out the quality of ANC service in Bangladesh. If a service provider would explain the risks and complications of the unnecessary CS, it might change the scenario. Also, this arises questions about evidence-based delivery care. In fact, nowadays there are facilities for painless vaginal deliveries. Inadequate adherence to current procedures underscores the need for more transparent delivery of instructions, for instance through professional organizations. This entails reorienting medical professionals to the most recent standards of evidence-based obstetric care. The WHO and FIGO recommendations for delivery after a previous CS are now followed by Bangladesh, and both organizations oppose repeat CS unless there is a strong medical reason to do so. (40) Moreover, decision-makers were mostly the members of the families. A study also

revealed that patients' relatives frequently attempt to influence clinicians' decisions and request a CS even when there is no medical cause, even when rules and protocols are accessible and followed. According to providers, there are a number of reasons why families might select CS over vaginal birth, including fear of losing the mother or the infant. Relatives frequently threaten to take the patient to another (typically private) institution if the practitioner doesn't do a CS, which puts a lot of pressure on the provider. (40) Consequently, unnecessary C-sections are rising rapidly.

Limitations:

The study was based on the most recent BDHS-2017-18 & 2014 data with nationally representative large sample size. Regardless of the above strengths, the study has many limitations. Since the data was collected from a cross-sectional study, a cause-effect relationship could not be observed. Also, the study analysis was based on retrospective data, and therefore, the results might be potentially biased. Another limitation is the inability to incorporate all potential independent variables. For example, besides the selected socio-demographic factors which have been included in this analysis, a host of other programmatic factors, such as accessibility, quality, costs of delivery services, and women's role in the decision-making process are also likely to influence the delivery practices of women. Also, the outcomes of the CS without medical reasons could not be demonstrated due to a lack of relevant data. Since BDHS did not collect the information from the medical records of patients, it was not possible to investigate the doctor's medical grounds to operate for cesarean delivery without medical indications.

Conclusions:

The prevalence of CS delivery among married women of reproductive age in Bangladesh is high, and it has increased during the last 20 years. The percentage of cesarean birth in Bangladesh is well above the World Health Organization's recommendation of the ideal rate for caesarean delivery. This study finds obese, highly educated women, with lower birth order have more tendency to go for CS deliveries. Also, private hospitals and government hospitals at district levels are playing a significant role in accelerating this rate. Therefore, proper birth planning should be encouraged for highly educated women. Pre-conception counseling could play a vital role for those women who are overweight or obese, so that weight can be controlled before conception. In addition, hospitals in the private sector should be regulated to follow recommended guidelines. Regular follow-up of their performance statistics could be a way to reduce these unnecessary C-sections. Besides, some intervention programs could be carried out to raise public awareness of the harmful consequences of unnecessary CS delivery. Further studies needed to be done to find out the maternal and perinatal outcomes of these C-sections, which are carried out without any medical reason. In conclusion, cesarean sections should be done when there is a clear advantage expected, a benefit that might make up for the greater costs and added risks in the context of the particular setting where the surgery is being performed.

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