



Determinants of Caesarean Deliveries in Bangladesh: A Multilevel Analysis of a Nationwide Population-Based Survey

Research Article

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ABSTRACT

Caesarean section, a frequently conducted surgical procedure in obstetrics, is instrumental in safeguarding the well-being of both mothers and infants by addressing complications related to pregnancy and childbirth. While it significantly contributes to reducing maternal and infant mortality rates, its overuse can pose serious health risks. The prevalence of caesarean deliveries has surged globally, including in Bangladesh. This rise in caesarean deliveries has prompted this research to investigate the prevalence and various associated factors in the country. To achieve the study objectives, data were extracted from the Bangladesh Demographic and Health Survey (BDHS) conducted from 2017 to 2018. After preprocessing the data, a total of 4,884 women were included in the study. Frequency analysis was conducted to illustrate the distribution of sociodemographic characteristics among Bangladeshi women. Chi-square tests were performed to assess their association with caesarean delivery. Furthermore, multi-level logistic regression analysis was employed to identify the variables that have a significant impact on the likelihood of caesarean delivery. The study revealed that in Bangladesh, the prevalence of caesarean section deliveries was approximately 33.1%, with the majority of these occurring in the Dhaka division, accounting for approximately 25.3%. Women aged 20 or older were 1.62 times more likely to opt for a C-section during childbirth (OR 1.62, [1.38-1.89]) compared to those under 20. Overweight or obese women had twice the likelihood of delivering via C-section. Higher socioeconomic status also increased the

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probability of choosing a caesarean delivery. Women who had exposure to any form of media were 57% more likely to opt for a caesarean delivery (OR 1.57 [1.31-1.87]), while not working women had a 48% higher likelihood of having a C-section. Additionally, the study found that the use of caesarean delivery was positively associated with the husband's education level, the number of children previously born, and the number of antenatal care visits. The study revealed that the rate of C-sections in Bangladesh surpasses WHO recommendations significantly. It also identified various factors driving this trend, including women's education levels, socioeconomic status, media exposure, female obesity, age at first childbirth, and husband's education. These insights may serve as a foundation for developing strategies to regulate the caesarean delivery rate. Urgent policy directives are essential within Bangladesh's healthcare system, coupled with vigilant monitoring of clinical indications for C-sections, to mitigate the adverse effects of unnecessary procedures.

Key Words: *Caesarean delivery, BDHS, Multilevel logistic regression, Maternal health.*

1. Introduction

A caesarean section, often referred to as C-section or caesarean birth, is a surgical procedure involving an incision into the mother's abdomen and uterus for delivery, typically recommended when labor progress is hindered by maternal or fetal factors. (American College of Obstetricians and Gynecologists, 2019; Cunningham et al., 2014). The first recorded caesarean took place in 1020 AD, marking the beginning of a significant evolution in the procedure's techniques (Berghella et al., 2005). However, the escalating global prevalence of caesarean section presents substantial public health concerns, necessitating focused consideration of potential maternal and perinatal risks, cost implications, and disparities in access (Belizán et al., 2007; Torloni et al., 2011).

The World Health Organization (WHO) recommends that the population-level rate of caesarean section deliveries should ideally be within the range of 10–15%. However, a recent study conducted (Betran et al., 2021) revealed that the global rate of Caesarean delivery was approximately 21%, surpassing the WHO's recommended optimal rate. The rate of C-sections varies significantly by country, ranging from just 0.6% in South Sudan to 58.9% in the Dominican Republic (Boatin et al., 2018). In the United States,

caesarean delivery has become the most common surgery, with over 1 million women undergoing the procedure annually, representing a rise from 5% in 1970 to 31.9% in 2016. (Sung & Mahdy, 2023; American College of Obstetricians and Gynecologists, 2019). Brazil has one of the highest rates globally, with approximately 56% of deliveries being via C-section, as found in a recent study (Knobel et al., 2020). In contrast, sub-Saharan Africa 5.0% (Betran et al., 2021), India with 17.2% (Bhartia et al., 2020) and Pakistan with 19.6% (Amjad et al., 2020), exhibited notably lower rates. In the case of Bangladesh, the rate of Caesarean sections has increased significantly, surging over eight-fold from 2.7% in 2001 to 24.3% in 2014 (Aminu et al., 2014; Rahman et al., 2018), with further increases reported up to 35.41% in 2019 according to the Multiple Indicator Cluster Surveys (MICS) (Hasan et al., 2020).

While Caesarean sections are crucial surgical procedures that can mitigate risks during childbirth, the increasing prevalence of caesarean deliveries presents a potential threat to both infant and maternal health, as highlighted in (Ahmmed et al., 2021). In contrast to natural vaginal delivery, opting for a caesarean section raises the mother's mortality risk by eightfold, while also heightening the chances of encountering complications such as infections and excessive bleeding.

Moreover, caesarean section is linked to heightened probabilities of infant mortality, premature birth, respiratory complications, and iatrogenic injuries (Shirzad et al., 2019). Furthermore, undergoing a caesarean section during the first pregnancy may heighten the risk of adverse outcomes in subsequent pregnancies, as women with a history of caesarean section are susceptible to complications such as hysterectomy, placenta accreta, placenta previa, and premature birth (Perveen, 2011).

Now-a-days, caesarean sections are becoming more common in Bangladesh for no clear medical reason (Khan et al., 2022). Numerous studies have observed that various demographic factors can influence the decision to have a caesarean delivery for no reason. For instance, mothers' and paternal education, place of residence, religion, wealth index, mothers' age, mass media exposure, age at first birth, parity, BMI, antenatal visit, geographical region was associated with caesarean section delivery in Bangladesh (Hasan et al., 2019; Ahmmed et al., 2021; Rahman et al., 2018). Considering that caesarean section deliveries are not appropriate for all circumstances and their uncontrolled usage is on the rise in Bangladesh, it is essential to ensure accurate diagnosis and judicious use of this procedure.

Several studies have employed fixed-effect models, including binary logistic regression, conditional logistic regression, and multivariate statistical analyses, to identify the factors influencing caesarean deliveries in Bangladesh (Begum et al., 2017 ; Rahman et al., 2018; Karim et al., 2020). A few studies in Asia and Africa considered both individual and community-level factors (Azene et al., 2019; Amini et al., 2018).

The BDHS 2017/18 study utilized a two-stage stratified cluster sampling method, resulting in a dataset with a hierarchical structure and a cluster effect. Given this hierarchical nature, employing a multilevel regression model is suitable to address

the variation introduced by clusters in the analysis. Therefore, to properly account for the cluster effect, a multilevel binary logistic regression model was employed to investigate the association between the outcome and explanatory variables, treating clusters (EAs) as level-2 factor. This approach allowed for a comprehensive examination of the factors associated with caesarean delivery in Bangladesh, taking into consideration both demographic and socio-economic variables. In addition to identifying factors associated with caesarean delivery, this study also assessed the prevalence of C-section deliveries among women aged 15 to 49 in Bangladesh.

2. Materials and Methods

2.1 Data source

This study utilized data sourced from the eighth iteration of the Bangladesh Demographic and Health Survey (BDHS), conducted through the DHS program [25]. The BDHS survey, spanning from October 2017 to March 2018, is a nationwide, cross-sectional study aimed at providing a comprehensive snapshot of the population's characteristics during that period. Prior to conducting the survey, ethical approval was obtained from the National Institute of Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare, Bangladesh. Administrative offices granted permission, and verbal consent was obtained from each participant before data collection.

2.2 Sample design and Sample size

The survey relies on a sampling method that involves two stages of stratification among households. Bangladesh is divided into eight administrative divisions, and each of these divisions is subsequently subdivided into zilas (districts) and upazilas (townships). At the urban level, an upazila is segmented into union parishads and mouzas. Conversely, at the rural level, it is divided into

wards and mohallas, which are subdivisions of the wards. During the initial stage, a total of 675 enumeration areas were chosen, comprising 250 in urban regions and 425 in rural regions. The selection process was conducted proportionally to the size of each enumeration area (EA), ensuring that areas with larger populations had a greater likelihood of being included in the sample. In the second stage of sampling, a systematic sample of an average of 30 households per EA was selected to provide statistically reliable estimates of key demographic and health variables for the country as a whole, for urban and rural areas separately, and for each of the eight divisions (National Institute of Population Research and Training et al., 2020). Out of the total 20,160 households selected for the survey, interviews were successfully conducted in 19,457 households. Information about 20,127 ever-married women aged 15–49 years old was gathered during the survey process (National Institute of Population Research and Training et al., 2020). Among them, 5331 women (having at least one birth in three years preceding the survey) provided the information about the mode of delivery. Some missing values and unusual data points have been detected in the considered covariates and thereafter eliminated, and a total of 4,884 women with complete information have been considered for this current study.

2.3 Dependent variable

The dependent variable in the study was the type of delivery for the most recent birth within three years before the survey, categorized dichotomously. Responses were initially divided into two groups: "No" for individuals who did not undergo a caesarean section and "Yes" for those who did have a caesarean section.

2.4 Independent variables

The study incorporated a diverse array of socioeconomic, demographic, and household

variables, inspired by prior research that underscored their relevance. Both individual and household factors were considered as explanatory variables, with an emphasis on capturing the comprehensive spectrum of influences.

The individual explanatory variables used in this study were considered empirically (Ajayi et al., 2023; Begum et al., 2017; Khan et al., 2017; Rahman et al., 2018) and they were: age at first birth, women's education, husband's education, current working status, Body Mass Index, current age, 4+ ANC visits, health care decision, child ever born and exposure to mass media.

Similar to the individual explanatory variables, the household factors examined in this study were identified empirically (Ajayi et al., 2023; Azene et al., 2019; Ahmed et al., 2023). These factors comprised: wealth index, religion, place of residence, and administrative division.

2.5 Statistical analysis

For this study, the data sourced from the BDHS 2017-18 underwent cleaning, coding, and analysis procedures. These tasks were carried out using statistical software, specifically SPSS version 25 (IBM Corporation, Armonk, NY, USA). Additionally, in certain instances, Microsoft Excel was utilized for the recoding of variables. Descriptive analysis like frequency distribution (percentages) was employed in this study to obtain a broad comprehension of the sample's traits and attributes. The chi-square test of independence was used to assess how chosen covariates and caesarean delivery interacted. Variables that were noted to be significantly associated with caesarean delivery would be used as independent variables and further analyzed using the multilevel logistic models.

The multilevel logistic regression model serves as a robust statistical method for mitigating the cluster effect and uncovering associations between the dependent variable (category) and the independent variables. This employed multilevel binary logistic

regression model contained components from both the individual and household levels. Individual and household level determinants of the respondents were nested within the community (clusters). We calculated the odds ratios, P values, and 95% confidence intervals for each factor's impact on caesarean delivery. Intra cluster Correlation (ICC) was used to express random effects to assess the fitness of the model. The model was constructed by considering the binary response variable Y_{ij} , which represents "Caesarean Delivery" (1 if i^{th} community's j^{th} woman receive caesarean delivery services and 0 otherwise) (Goldstein, 1987; Austin & Merlo, 2017). The two-level random intercept binary logistic regression model, which accounts for women at level 1 and communities (clusters) at level 2, can be expressed as follows:

$$\begin{aligned} \text{logit}(\pi_{ij}) &= \log\left(\frac{\pi_{ij}}{1 - \pi_{ij}}\right) \\ &= \beta_0 + \sum_{k=1}^m \beta_k x_{ijk} + b_{0i}, \end{aligned}$$

where $\pi_{ij} = Pr(Y_{ij} = 1)$ is the probability that the i^{th} ($i = 1, \dots, d$) community's j^{th} ($j = 1, \dots, n_i$) woman takes caesarean delivery services, X_{ijk} is the values of k^{th} explanatory variables for i^{th} community's j^{th} woman, β_k is a k^{th} regression coefficients to be estimated, and β_0 is a intercept of the fixed effect part and b_{0i} is the random intercept with iid normal $N(0, \sigma_b^2)$.

The Intraclass Correlation Coefficient (ICC) in a two-level random intercept logistic regression model was calculated using the following formula:

$$ICC = \frac{\sigma_b^2}{\sigma_b^2 + \frac{\pi^2}{3}},$$

Where σ_b^2 is the variance of the random intercept (b_{0i}) and π is approximately equal to 3.142. This formula quantifies the proportion of the total variance in the outcome (caesarean delivery) that is

attributed to the differences between communities (clusters) at level 2. The ICC ranges from 0 to 1, where 0 indicates no clustering (all variation is within communities), and 1 indicates complete clustering (all variation is between communities).

3. Results

Table 1 provides insights into the sociodemographic traits of women in Bangladesh. The data indicates that approximately 70% of the mothers delivered their children during their teenage years, specifically when they were under the age of 20. When it comes to education, the largest proportion of women had completed secondary-level education, followed by those with primary-level education, and then those with higher-level education. Only a small 6.2% of women had not received any formal education. Additionally, the majority of women's husbands had received primary and secondary level education, with each category accounting for approximately one-third of the population. The ANC (Antenatal Care) visits were nearly evenly distributed between the categories of 4 or more and less than 4, with 47.3% for the former and 52.7% for the latter. Furthermore, **Table 1** demonstrates that the proportion of the variable was higher among women who were Muslim (91.8%), Not working (62.8%), residing in rural region (73.5%), have normal BMI (62.1%), and were exposed to mass media (65.7%). About two out five women were poor (41.3%) and almost the same proportion were rich (39.5%). Precisely 49.8% of the women had given birth to either 2 or 3 children. Nearly two third of the women fall within the age range of 21 to 34 (68.9%). The caesarean delivery rate, at 33.1%, corresponds to 1616 out of a total of 4,884 women.

Table 1: Distribution of Bangladeshi women's sociodemographic characteristics

Variables	Frequency (n=4884)	Percentage
Age at first birth		
<20 years	3448	70.6
≥ 20 years	1436	29.4
Women education		
No education	304	6.2
Primary	1351	27.7
Secondary	2398	49.1
Higher	831	17.0
Husband education		
No education	671	13.7
Primary	1657	33.9
Secondary	1667	34.1
Higher	889	18.2
Current Working Status		
Yes	1815	37.2
No	3069	62.8
Body Mass Index		
Underweight	743	15.2
Normal	3035	62.1
Overweight	1106	22.6
Current Age		
≤ 20	1234	25.3
21-34	3365	68.9
35+	285	5.8
4+ ANC visit		
Yes	2309	47.3
No	2575	52.7
Decision making		
Self or Joint	3547	72.6
Others	1337	27.4
Child ever born		
1	1849	37.9
2-3	2433	49.8
4+	601	12.3
Mass media access		
Not exposed	1677	34.3
Exposed	3207	65.7
Wealth status		
Poor	2015	41.3
Middle	940	19.2
Rich	1929	39.5
Religion		
Muslim	4484	91.8
Non-Muslim	400	8.2
Residence		
Urban	1293	26.5
Rural	3591	73.5
Division		
Barisal	279	5.7
Chittagong	1021	20.9
Dhaka	1234	25.3
Khulna	447	9.1
Mymensingh	423	8.7
Rajshahi	577	11.8
Rangpur	527	10.8
Sylhet	376	7.7
Caesarean delivery		
Yes	1616	33.1
No	3268	66.9

Table 2 illustrates the associations between

sociodemographic factors and the use of a caesarean section during childbirth. In this analysis, all of the covariates, with the exception of decision-making and the respondent's current age, displayed significant correlations with caesarean delivery. Only significant variables were included in the multi-level model. The proportion of women who opted for c-section delivery was observed to be notably higher among the following demographic categories: older women (aged 20 years or older), with a rate of approximately 49.1%; Overweight women, making up 50.8%; women with higher levels of education, at around 59.9%; husbands with higher levels of education, at 60.1%; women from wealthier backgrounds, accounting for approximately 50.0%; those with exposure to media, comprising 41.4%; women who attended more than four antenatal care (ANC) visits, at approximately 46.7%; and individuals hailing from Khulna division, at 43.2%.

Table 2: Association between Bangladeshi women's socioeconomic characteristics and caesarean delivery

Variables	Caesarean delivery		χ^2 value (P-value)
	Yes (%)	No (%)	
Age at first birth			
<20 years	26.4	73.6	235.404
≥ 20 years	49.1	50.9	(0.000)
Women education			
No education	16.8	83.2	446.347 (0.000)
Primary	18.0	82.0	
Secondary	34.4	65.6	
Higher	59.9	40.1	
Husband education			
No education	17.3	82.7	457.417 (0.000)
Primary	22.5	77.5	
Secondary	35.6	64.4	
Higher	60.1	39.9	

Current Working Status			
No	37.9	62.1	85.671
Yes	25.0	75.0	(0.000)
Body Mass Index			
Underweight	22.9	77.1	213.159 (0.000)
Normal	29.1	70.9	
Overweight	50.8	49.2	
Current Age			
≤ 20	30.9	69.1	3.988 (0.136)
21-34	34.0	66.0	
35+	32.3	67.7	
4+ ANC visit			
Yes	46.7	53.3	367.828
No	20.9	79.1	(0.000)
Decision making			
Self or Joint	33.7	66.3	2.387
Others	31.4	68.6	(0.122)
Child ever born			
1	41.2	58.8	158.900 (0.000)
2-3	31.8	68.2	
4+	13.6	86.4	
Mass media access			
Not exposed	17.3	82.7	288.831
Exposed	41.4	58.6	(0.000)
Wealth Status			
Poor	17.6	82.4	468.465 (0.000)
Middle	31.5	68.5	
Rich	50.0	50.0	
Religion			
Muslim	32.5	67.5	7.473
Non-Muslim	39.3	60.8	(0.006)
Residence			
Urban	44.3	55.7	99.358
Rural	29.1	70.9	(0.000)

Division			
Dhaka	42.9	57.1	
Barisal	25.1	74.9	
Chittagong	26.5	73.5	
Khulna	43.2	56.8	136.486
Mymensingh	26.2	73.8	(0.000)
Rajshahi	36.0	64.0	
Rangpur	27.9	72.1	
Sylhet	23.1	76.9	

Table 3 presents the factors influencing caesarean delivery among women in Bangladesh. The adjusted effect of the country on C-section delivery was estimated in the Model. Women aged 20 and older were nearly 1.62 times more likely to use caesarean delivery during childbirth (OR 1.62, [1.38, 1.89]) compared to younger women (under the age of 20). The educational level of a woman's husband played a significant role in the choice of a caesarean delivery. Women with husbands who had a higher education had 1.86 times more the chance of giving birth via C-section. (OR 1.86, [1.35, 2.55]). The socio-economic status of women had significant effects on the use of caesarean delivery. Wealthy women had a 1.75 -fold higher likelihood of it than economically disadvantaged women. Overweight women had double the likelihood of delivering via C-section, with an odds ratio of 2.02. (OR 2.02, [1.58, 2.59]). This almost same likelihood (2.10) was also found for an increase in ANC visits (OR 2.10, [1.81 -2.44]).

Delivery via C-section was significantly impacted by the mass media. Access to mass media increased a woman's likelihood of choosing caesarean delivery by 57% compared to her counterpart (OR 1.57, [1.31- 1.87]). In this study, no significant association was found between caesarean delivery and factors such as women education, religion, and residence. A reduced likelihood of selecting a C-section delivery was observed among working women, and a similar trend was noted in mothers

with more children. Out of the seven divisions, Chittagong and Sylhet were found to be statistically significant.

Table 3: Multilevel logistic regression analysis of individual- and community-level factors associated with caesarean delivery services among women in Bangladesh.

Variables	Adjusted Odds Ratio (95% CI)	p-value
Age at first birth		
<20 years	Ref.	
≥ 20 years	1.62 (1.38, 1.89)	0.00
Women education		
No education	Ref.	
Primary	0.78 (0.54, 1.13)	0.18
Secondary	1.09 (0.76, 1.57)	0.65
Higher	1.42 (0.94, 2.14)	0.09
Husband education		
No education	Ref.	
Primary	1.04 (0.80, 1.36)	0.77
Secondary	1.22 (0.93, 1.60)	0.16
Higher	1.86 (1.35, 2.55)	0.00
Current Working Status		
Yes	Ref.	
No	1.48 (1.26, 1.74)	0.00
Body Mass Index		
Underweight	Ref.	
Normal	1.15 (0.93, 1.43)	0.19
Overweight	2.02 (1.58, 2.59)	0.00
4+ ANC visit		
No	Ref.	
Yes	2.10 (1.81, 2.44)	0.00

Child ever born		
1	Ref.	
2-3	0.80 (0.69, 0.94)	0.01
4+	0.49 (0.37, 0.66)	0.00
Mass media access		
Not exposed	Ref.	
Exposed	1.57 (1.31, 1.87)	0.00
Wealth status		
Poor	Ref.	
Middle	1.23 (0.99, 1.52)	0.06
Rich	1.75 (1.42, 2.16)	0.00
Religion		
Muslim	Ref.	
Non-Muslim	1.01 (0.76, 1.33)	0.97
Residence		
Urban	Ref.	
Rural	1.04 (0.83, 1.30)	0.74
Division		
Dhaka	Ref.	
Barishal	0.69 (0.46, 1.02)	0.06
Chittagong	0.55 (0.41, 0.72)	0.00
Khulna	1.22 (0.89, 1.67)	0.22
Mymensingh	0.73 (0.52, 1.05)	0.09
Rajshahi	1.06 (0.78, 1.45)	0.70
Rangpur	0.74 (0.52, 1.07)	0.11
Sylhet	0.68 (0.47, 0.98)	0.04
Random-effect variance		
Community	0.315	0.00
ICC Value	0.09	

The study found significant community variations. The estimated intra-cluster correlation coefficient

(ICC) for the model is 0.09, indicating that around 9% of the variation remained among community levels. Therefore, using multilevel modeling with these data is justified.

4. Discussions

This study had a primary aim of examining the occurrence of caesarean deliveries in Bangladesh and identifying the significant factors influencing this. To accomplish this goal, nationally representative survey data were employed. The study revealed that the prevalence of C-section deliveries in Bangladesh was approximately 33%, with a majority of these occurring in the Dhaka division (25.3%) and the Chittagong division (20.9%). Despite the World Health Organization setting a recommended ideal rate of 10 to 15% for C-section deliveries since 1985 (World Health Organization, 2015), the proportion in this study was significantly higher than that recommended range.

In this study, individual factors were identified as crucial contributors to the prevalence of C-section deliveries. Specifically, factors such as the age at first birth, the employment status of women, the educational qualifications of women's partners, family economic status, exposure to media, the number of antenatal care visits, mass media exposure, the number of children ever born, and BMI were found to play significant roles in this regard.

The study found that mothers aged 20 or older have a higher likelihood of having a C-section delivery compared to younger mothers. This aligns with a recent trend where mothers are increasingly starting their pregnancies at later stages of life (Ghosh, 2010). Research indicates that pregnancy at older ages entails various biological changes, such as mal-position and an increased vulnerability to conditions like hypertension, eclampsia, and diabetes (Ecker et al., 2001). The interplay between maternal preferences and these inherent risks may

contribute to an increased likelihood of older mothers opting for caesarean delivery (Ecker et al., 2001).

Consistent with a prior study (Khan et al., 2017) utilizing 10 years of BDHS data, our research findings indicate that women with only one child were more inclined to undergo caesarean sections compared to those who had two or more children.

The educational qualification of husbands emerged as a significant predictor in this study, indicating that husbands with higher education levels are more inclined to opt for C-section delivery compared to those with lower levels of education. Similar prevalence of husband education was also observed in several other findings (Ahmmed et al., 2021; Faruk et al., 2023; Rahman et al., 2018).

Interestingly, women who were employed or working were found to be less inclined to utilize institutional delivery and C-sections compared to those who were not employed. It's possible that working women face time constraints that limit their chances of receiving antenatal care or due to their knowledge of the drawbacks associated with caesarean section (Furuta & Salway, 2006; Safari-Moradabadi et al., 2018).

Wealth status was identified as another significant determinant impacting C-section deliveries in Bangladesh. The study's findings revealed that women from affluent families were more inclined to opt for C-sections compared to those from low-income families. This trend could be attributed to the economic stability that enables affluent families to cover the expenses related to surgery. Additionally, wealthy women may have greater access to private healthcare facilities, which could contribute to higher C-section rates in these settings (Ahmed et al., 2023). This is also supported by previous studies that have consistently reported a higher tendency for caesarean section deliveries among women with more prosperous family backgrounds as opposed to those from lower-

income families (Amini et al., 2018; Azene et al., 2019). Existing literature indicates that the lower rate of C-sections in poorer families may be attributed to their inability to afford this life-saving procedure, often leading them to opt for home births instead [Nababan et al., 2017; McCall et al., 2021].

As for access to mass media, it is widely recognized that maternal health, attitudes, and beliefs can be influenced by various communication channels and media outlets. For example, women who had no access to media had a lower likelihood of undergoing a caesarean delivery compared to those who were exposed to media. Additionally, media campaigns have been shown to effectively reduce the incidence of unnecessary C-sections [Torloni et al., 2020].

As anticipated, our findings indicate a comparatively elevated likelihood of undergoing a Caesarean delivery among women who were overweight or obese. Our discovery aligns with previous studies carried out in both developed and developing countries (Darmasseelane et al., 2014; Djelantik et al., 2012; Gaillard et al., 2014). The exact reasons behind the higher rate of C-sections among overweight or obese women are not entirely clear. Nevertheless, previous research suggests that this might be associated with heightened complications in maternal soft tissue, the occurrence of fetal macrosomia during the intrapartum period, and a majority of these deliveries taking place during the first stage of labor due to indications of dystocia and fetal distress (Darmasseelane et al., 2014; Brown et al., 2010).

Antenatal care is an important tool to prevent complications and decrease the incidence of maternal and antenatal morbidity and mortality. A statistically significant correlation was found with lower antenatal visits and c-section, which was in line with another study conducted in Brazil (Fabbro

et al., 2022). This study shows that women with lower number of ANC visit (<4) had lower chance of delivery by caesarean operation.

The study encountered a significant limitation in its reliance on BDHS (Bangladesh Demographic and Health Survey) data, mainly because of the often restricted sample sizes that are accessible at the national level.

5. Conclusion

A significant proportion of married women of reproductive age in Bangladesh undergo caesarean section deliveries, surpassing the World Health Organization's recommended ideal rate. The study underscores that multiple factors contribute to the heightened likelihood of caesarean sections, including elevated levels of women's education, favorable socio-economic conditions, exposure to media, obesity among women, age at first childbirth, and the educational background of husbands. To address this situation, the study recommends that health authorities in Bangladesh implement targeted intervention programs aimed at raising awareness about the adverse effects of caesarean section deliveries. Specifically, these programs should focus on older women with higher education levels and those residing in affluent households. Mass media can play a pivotal role in enhancing public awareness, and policymakers are urged to consider initiatives that regularly emphasize the negative impacts of c-sections through various programs. Furthermore, the research indicates a strong association between the high utilization of C-sections during delivery and women's Antenatal Care (ANC) visits. Consequently, in the formulation of health policies and strategies, the government of Bangladesh should prioritize training ANC providers. This training should emphasize the encouragement of pregnant women to opt for natural delivery, contributing to a reduction in the prevalence of caesarean sections.

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Ethical Consideration

The study used BDHS data, which is publicly accessible and administered by the Ministry of Health and Family Welfare of the Bangladesh Government. Throughout the BDHS, strict adherence to the protocols outlined by the World Health Organization (WHO) was maintained. Additionally, prior to the commencement of the survey, written consent was obtained from all participants.

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