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Geographical Disparities and Contributing Factors Linked to Cesarean Section Deliveries in Bangladesh: Bangladesh Demographic and Health Survey 2017-2018 analysis

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Abstract

Cesarean sections are growing at an alarming pace around the world. In Bangladesh, unnecessary cesarean deliveries are frequent and responsible for both short-term and long-term health complications of mothers as well as babies. The focus of this research aimed to identify geographical variations as well as risk factors associated with cesarean section in Bangladesh. The most recent Bangladesh Demographic and Health Survey (BDHS) data was used in this study. A total of 5,195 ever-married women who gave birth within the three years preceding the survey were analyzed. The outcome variable was cesarean section delivery (yes, no), and the explanatory variables were factors at the individual and community levels. Getic Ord general G statistics was used to identify the hot spot and cold spot of a cesarean section in Bangladesh. A multilevel logistic regression model was utilized to assess the sociodemographic factors associated with cesarean section deliveries in Bangladesh. The prevalence of cesarean section deliveries in Bangladesh was about 33.0%. The hot spots with high-level cesarean section delivery were mainly located in Dhaka, Khulna, Rajshahi, Sylhet, and rangpur divisions. The cold spots, areas with low levels of delivery through CS, were located mainly in Mymensingh, Barisal, and Chattogram divisions. The result showed that women's aged 20-24 years (OR = 1.23, 95% CI = 0.89-1.69), Partners higher education (OR = 1.13, 95% CI = 0.69-1.86), women whose husband are service worker (OR=1.56, 95% CI=0.59-4.07), Age at first birth >=25 (OR=2.28, 95% CI= 1.35-3.87), Mothers' BMI status Overweight/obese (OR=1.86, 95% CI=1.28-2.67), exposure to mass media (OR=1.51, 95% CI=1.16-1.97), ANC care obtained from government facility (OR=2.21, 95% CI=1.05-4.67), delivery facility from private sector (OR=8.67, 95% CI=6.71-11.19), women living in the Dhaka division (OR = 1.42, 95% CI = 0.87-2.32), women living in the Khulna division (OR =1.35 , 95% CI =0.82-2.22), and women living in the Sylhet division (OR =1.29 , 95% CI =0.77-2.16) and women who lived in rural area (OR =1.08, 95% CI =0.83-1.39) were significantly more to deliver by cesarean section. Therefore, attention on woman's age, education, partner's marital status, schooling, wealth index, exposure in the media, and the crucial role of necessary medical personnel, including midwives in particular, having access to publicly funded hospitals may be able to help politicians develop efficient plans and regulations that would help Bangladesh avoid having unnecessary cesarean sections.

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Background of the Study

The greatest invention of the modern age is the cesarean birth; due to this, the deaths of mother and child are decreasing day by day. Bangladesh has achieved remarkable success in improving maternal and child health. Childbirth is a natural process for women. Every woman tastes it after marriage. Giving birth is a natural process that is very painful for women. Women take cesarean sections when normal delivery is not possible.

A cesarean section, also known as a C-section or cesarean delivery, is a surgical procedure that requires cutting abdomen incisions on the mother for delivery of the baby [1]. This method of delivery is typically used when a vaginal birth is not possible or is deemed risky for the mother or the baby. Some common reasons for a C-section include a previous C-section, a breech presentation, fetal distress, a large baby, multiple pregnancies, or maternal health conditions. The procedure is usually performed under regional or general anesthesia and requires a longer recovery time than a vaginal birth.

Cesarean sections are an efficient surgical method to remove complications associated with delivery for women, both in advanced and developing nations [2]. Emergency cesarean surgeries may greatly decrease maternal and neonatal mortality and morbidity when they need to happen for mothers' healthcare needs [3].

Overall, 22% of births in private facilities and 37% of births overall were delivered in informal health care facilities in 2014. Of these, a staggering 61% and 77% of conceptions ended in CS, respectively. Recently, it has been observed that many mothers in Bangladesh have CS deliveries without complications at all [4].

The prevalence of cesarean sections is rising globally. Significant maternal and perinatal morbidity and mortality are caused by it. Over the past ten years, the rate of cesarean sections has risen substantially in South Asian nations, notably Bangladesh. The cesarean occurrence rate in Bangladesh increased from 2.6 percent in 2001 to 12.2 percent in 2010 [5]. The rising incidence of CS is the result of numerous reasons, other than medical besides medicine. BMI along with age rises in mothers as well as modifications to obstetric procedures and technology, are all medical variables. The mother's request for CS, the incorrect oversight of deliveries, and the physician-induced need for CS are examples of reasons that are not medical [5].

Approximately 810 women died worldwide every day due to pregnancy and childbirth in 2017 [6]. However, as time passed, CS use increased in all wealth quintiles, though primarily higher among women in the middle to richest wealth quintile, with more than seventy-eight percent of the total CS use. The poorest and poorer groups, which represent about a third of the total population with a very high fertility rate, utilized just 22 percent of the total CS in Bangladesh [7].

The rate of cesarean section (C-section) is quite high (83%) in private care facilities, where two-thirds of all institutional deliveries take place. Despite there being far fewer government facilities than essential ones, the C-section rate there is still quite low (35%) [8].

The World Health Organization (WHO) recommended that the acceptable range for cesarean deliveries should be between 10% and 15% and ought not to be lower than five percent with Bangladeshi women, the rate of Cesarean Sections (CS) was 67.4%. Age of the women, financial status, use of prenatal care (ANC), delivery at a medical institution, and division were all found to be strongly linked with CS, based on multilevel analysis. COVID-19 and its impacts are taking a toll on the health of women and newborns as mothers continue to face disruptions in prenatal care and delivery. In 2020, the global a total of 152 deaths of moms to earn each one million live births. via 2030, this trajectory anticipates 133 deaths per one million live births, meaning it's almost twice the SDG target. [9].

The World Health Organization (WHO) 2010 report states that Brazil had the highest CS rate (45.7%) and that Pakistan and India likely had the lowest rate (7-8%) [10]. Both planned and crisis cesarean sections can be undertaken based on how urgent or the date for the operation is. As labor starts with a scheduled or optional C-section, in contrast, a cesarean section in an emergency is a surgery done before or after labor out of concern for the mom or baby [11].

The CS ranks have been below 10 percent in fifty-two nations across the last three centuries, from ten percent to fifteen percent in 14 nations, and exceeding fifteen percent in sixty-nine nations across the globe. Each of them mother and the unborn child can be spared by CS. CS births are nevertheless detrimental to the health and wellness of mothers and their offspring [12].

The safe motherhood and child survival campaigns' primary goal is to boost competent attendance at birth for delivery care, which is critical for both maternal and perinatal health [13]. Likely wise, it's vital that moms give birth in an appropriate location with access to life-saving tools and clean, proper conditions, which can help lower the risk of complications that could result in the mother's death or the illness of the child [14]. In reality, from 2015 to 2019, the aggregate CS rate was 51.8%. However, it was relatively high (77.8%) among women who were 40 years of age or older (2020).

The improper use of this kind of delivery has led to important hazards for the mother and fetus, although c-section surgeries have become a life-threatening technique. The perils of unimportant surgical delivery might be rendered apparent to women and their relatives. Pregnancies with the right sensitization. [15].

The majority of cesarean sections are unnecessary, making this one of the toughest issues to solve not only in developing countries but also in developed nations. Cesarean sections are increasing at an alarming rate around the world. In Bangladesh, unnecessary cesarean deliveries are common and are liable for both mothers' short- and long-term problems with health and children [16].

There are an estimated 18.5 million Cesarean Births (CS) performed each year in the world, with roughly one-third of those being deemed "unnecessary" because they took place without medical advice. Despite studies showing that developing countries are also seeing a spike in unnecessary CS, developed countries still contribute to the majority of this trend. This trend puts a strain on the available but rare healthcare resources, puts family's welfare at risk, and creates an impediment to reasonable access to healthcare [17]. 73.85% of those surveyed with CS on public medicals confessed at times to viewing media. The proportion of seldom TV viewers attending private medicals was 82.10%. Women under the age of twenty were typically treated for cesarean births at healthcare facilities (69.72%)

and in private clinics (65.36%) [18].

Recent study showed that Bangladesh's rising rate of CS. This survey was carried out cross-sectionally to determine the factors, and a bivariate logistic regression analysis was carried out. The study revealed several crucial elements that have a big impact on the rising prevalence of cesarean births. The results of this research will assist decision-makers in creating the best initiatives to efficiently and effectively tackle this situation. The rate of CS in Bangladesh could be reduced by implementing some special programs to raise societal awareness and values about the protection of both mother and child [19].

Another study shows that, the prevalence and results in have been investigated. of the use of Cesarean Sections (CS) in the dichotomy of 'public' and 'private' health facilities in West Bengal, India. In this research, women in West Bengal, India, are examined for their socioeconomic status regarding vaginal birth, postpartum issues, and care. The results of the analysis with multiple variables reveal an important positive association involving a greater number of cesarean deliveries and the level of schooling, BMI, and financial circumstances of the mom. The author concluded that needless birth is a priority in optimal parenthood and the welfare of parents and kids [20].

"A Comparative Investigation on Giving Birth in Bangladesh's economy: Cesarean and Regular Delivery." The aim of this investigation is to examine the success rates of cesarean delivery and births that are natural to identify what has more impact on Bangladesh. Finding that family income and C-section deliveries have a positive linear interaction; therefore, people with bigger incoming tend to have more C-sections. Finally, the authors noted that a decrease in the rate of cesarean births as a result of moving and normal deliveries are advised for the generations that follow **[21]**.

"Associated elements and their relation to cesarean births within married women in the nation of Bangladesh: evaluation of the nation of Bangladesh demographic and healthcare survey the fact has been studied. The authors addressed the factors that could be taken into account for decreasing the rate of shipment of cesarean birth in Bangladesh in the determination **[2].**

Research objectives

To recognize the risk aspects involved in sections of cesarean delivery by using a multilevel logistic regression model when data are clustered.

To identify the hot spot and cold spot of a cesarean section in Bangladesh using Getic Ord general G statistics.

Materials and Methods

The 2017-18 Bangladesh Demographic and Health Survey (BDHS) was implemented under the authority of the National Institute of Population Research and Training (NIPORT), Medical Education and Family Welfare Divisions, Ministry of health and family welfare. Mitra and associates, a private research agency, was engaged to collect data from October 2017 to march 2018. The funding for the 2017-18 (BDHS) was provided by the United States Agency for International Development (USAID)/ Bangladesh. The information was obtained from the DHS program website with permission (https://dhsprogram.com/data/available-datasets.cfm). This survey was performed using a two-stage stratified sampling procedure. In the first phase of this investigation, 675 enumeration areas were chosen at random. In the second stage, 30 households were selected at random from each enumeration area. Finally, 672 enumeration areas were selected in this investigation after the removal of three areas due to flooding. A total of 20,127 ever-married women aged 15-49 was interviewed in this survey. For this study's analysis, 5195 women were used as the study sample the relationship between demographic factors and determinants of the cesarean section will be examined using inferential statistics such as chi-square tests and multi-level logistic regression. Statistical tools like SPSS or STATA will be used to analyze the data.

Explanations for CS stated by the mother

Convenience and avoiding labor pain were two factors that could have led to As opposed to possible CS (CS not necessary by wellness motives), the remaining arguments are due to medical conditions that require performing CS, such as mal presentation, premature baby, cord prolapse, failure to progress in labor, a history of Pre type 2 diabetes, earlier cesarean sections, several deliveries, and a lesser burden on the infant's body, water breaking or drying up, There may be further problems and reasons. The following table-1 summarizes the explanations for deciding on CS by the primary decision-makers, such as a doctor or her mother. The vast majority of the moment (63.07%), physicians created the final call concerning CS Percentage of most recent births that are alive in three of the years prior the poll had been carried out by C-section by reasons for C-section, Bangladesh DHS 2017-18 Previous cesarean sections (28.21%) consisted the greatest justifications stated by females (23.37%), then other complications (23.37%). Failure to progress in labor (12.02%), convenience (9.35%), avoiding labor pain (8.01%), and mal presentation (7.18%). On the other hand, the major cause of other complications was 36.85%, followed by previous cesarean section (15.15%), mal presentation (14.27%), failure to progress in labor (11.44%), and others (9.38%) **(Table 1).**

Table 1: Decision-justifications for electing a cesarean birth based on mothers.

Justifications	mom's side	medical side	Total
	% (n)	% (n)	% (n)
The term convenience	9.35(56)	1.37(14)	4.32(70)
Avoid labor pain	8.01(48)	1.27(13)	3.76(61)
Mal presentation	7.18(43)	14.27(146)	11.65(189)
Premature baby	0.17(1)	0.39(4)	0.31(5)
Cord prolapsed	0.67(4)	0.39(4)	0.49(80)
Failure to progress in labor	12.02(72)	11.44 (117)	11.65(189)
Multiple births	0.50(3)	0.68(7)	0.62(10)
Pre-eclampsia	0.67(4)	1.08(11)	0.92(15)
Diabetes	0.00 (0)	0.59 (6)	0.37(6)
Previous cesarean section	28.21(169)	15.15 (155)	19.98(324)
Less pressure on baby's body	1.34 (8)	3.23 (33)	2.53(41)
water broke/dried up	2.00(12)	3.91(40)	3.21(52)
Other complications	23.37(140)	36.85(377)	31.87(517)
Others	6.51(39)	9.38(96)	8.32(135)
Total	36.93(599)	63.07(1,023)	100.00(1,622)

Table 2: Multilevel logistic regression analysis of individuals and community-level factors associated with Cesarean Section Delivery in Bangladesh (N=5195).

Variables	Null model	Model-1	Model-2	Full model OR (95% CI)
	OR (95%CI)	(Individual level factors)	(Community l evel factors)	
		OR (95% CI)	OR 95%CI)	
Mothers' age				
15-19		1		1
20-24		0.86(0.69-1.06)		1.23(0.89-1.69)
25-29		0.65(0.52-0.83)		0.99(0.70-1.39)
30-49		0.76(.59- 0.98)		1.22(0.84-1.79)
Mothers' schooling				
No schooling		1		1
primary school		0.92(0.66-1.29)		0.51(0.28-.91)
Secondary		1.52(1.09- 2.11)		0.67(0.38-1.21)
Higher		2.35(1.57-3.50)		0.80(0.41-1.55)
The husband's schooling				
No schooling		1		1
Primary school		1.03(0.80- 1.32)		0.76(0.50-1.14)
Secondary		1.40(1.08- 1.81)		0.99(0.65-1.51)
Higher		2.04(1.45- 2.82)		1.13(0.69-1.86)
Religion				
Muslim		1		1
Non - Muslim		1.15(0.88- 1.51)		0.94(0.66-1.35)
Husband occupation				
Unemployed		1		1
Professional/technical/ managerial		1.05(0.48-2.29)		1.25(0.47-3.33)
Sales		0.89(0.41-1.10)		1.22(0.47-3.13)
Agricultural		0.81(0.371.75)		1.32(0.50-3.49)
Services		1.07(0.93-2.30)		1.56(0.59-4.07)
Skilled and unskilled		0.81(0.38-1.74)		1.17(0.46-2.97)
Age at first birth				
<18		1		1
18-20		1.14(.97-1.35)		1.03(0.79-1.3)
21-24		1.61(1.29-2.02)		1.38(0.98-1.93)
>=25		2.95(2.08-4.20)		2.28(1.35-3.87)
Wealth Index				
Poor		1		1
Middle		1.25(1.02- 1.54)		0.99(0.71-1.37)
Rich		1.82(1.49-2.21)		0.99(0.72-1.37)
Mothers' BMI status				
Underweight		1		1
Normal		1.15(0.93-1.42)		1.22(0.89-1.67)
Overweight/obese		2.14(1.68-2.73)		1.86(1.28-2.67)
Media expose				
No		1		1
Yes		1.77(1.49-2.11)		1.51(1.16-1.97)
ANC care obtained				
Home/Others			1	1
Government facility			2.41(1.15-5.03)	2.21(1.05-4.67)
Private facility			1.10(.99-4.04)	1.49(0.73-3.06)
Place of delivery				
Government sector			1	1
Private sector			9.42(7.3512.07)	8.67(6.71-11.19)
Division				
Barisal			1	1
Chattogram			0.68(0.43- 1.08)	0.60(0.37-0.97)
Dhaka			1.58(0.99-2.53)	1.42(0.87-2.32)
Khulna			1.42(0.87-2.31)	1.35(0.8202.22)
Mymensingh			1.29(0.77-2.14)	1.22(0.73-2.04)
Rajshahi			1.20(0.74-1.97)	1.19(0.72-1.96)
Rangpur			0.76(0.47-1.24)	0.69(0.42-1.14)
Sylhet			1.25(0.76-2.04)	1.29(0.77-2.16)
Residency				
Urban			1	1
Rural			0.86(0.68-1.08)	1.08(0.83-1.39)

The result is submitted using a multilevel logistic regression model of individuals and community-level factors associated with cesarean section delivery in Bangladesh (Table 2).

Individual-level factors: The complete model that investigated what determinants at the individual and community levels influence the consumption of cesarean section birth services in Bangladesh were next offered (**Table 2)**. In the full model, we found that significant variations in cesarean section increased by 23% (OR: 1.23, 95% CI: 0.89-1.69) for mothers 20-24 and also increased by 22% (OR: 1.22, 95% CI: 0.84-1.79) for mothers ages 30-49, but cesarean section decreased by 1% (OR: 0.99, 95% CI: 0.70-1.39). Mother's age ranges from 25 to 29 compared to the reference ages.

Mothers' education level we found the likelihood of cesarean section delivery declined by 49% at the primary level, 33% at the secondary level, and 20% at the higher educational level compared to the mother's no education. Husband education level: we also found that cesarean sections also declined in primary and secondary levels, but in higher educational levels, there was a significant association with the husband's higher education level. Mothers whose husbands were more educated had a greater likelihood of getting CS 13% done (OR: 1.13, 95% CI: 0.69-1.86). Cesarean section delivery was 6% lower (PR: 0.94, OR 95% CI: 0.66-1.35) among Muslim women than non-Muslim women. When compared to a woman's husband whose work was unemployed, a woman's husband's formal job was protectively linked to delivery through CS. Cesarean section delivery increased by 56% (OR: 1.56; 95% CI**:** 0.59-4.07). Similarly, cesarean section delivery is 2.28 times higher (OR 2.28, 95% CI**:** 1.35-3.87) in women's first birth age >=25 than in women's ages <18.

Women with lower and lower family income quintiles experienced a reduced probability of giving birth via with women cesarean birth with higher household wealth quintiles. Contrarily,

women in the richer quintile had a greater possibility that they would give birth via CS Model 1, but in the full model, there was a 1% decrease compared to the reference (OR: 0.99, **95% CI:** 0.71-1.37). Connection to digital platforms by moms improves the chances of deploying cesarean section delivery. On the contrary, the chances of shipment through CS were stronger for women. In the overweight/obese category (OR: 1.86, 95% CI: 1.28-2.67) compared to underweight mothers' BMI status.

Community level factors

We found the influence that variables have at the healthcare facility layer on cesarean section shipment were different across the types of antenatal care obtained. For every unit increase in scores of managements of the nearest health facility, likelihoods of cesarean section delivery among women increased approximately 2.21 times (95% CI, 1.05-4.67) and 1.49 times (95% CI, 0.73-4.67) in government health facilities and private health facilities, respectively. Similar to this, the OR of delivery through CS among women increases up to 8.67 times (95% CI, 6.71-11.19) for every unit increase in the place of shipment in the private health center, with the highest effect for the private sector compared to the government sector.

The region of interest additionally demonstrated a significant connection with cesarean section shipment. Upon controlling for every additional element, we calculated the chance of applying cesarean section Dhaka, Khulna, Rajshahi, and Sylhet had a higher rate of the delivery, while Mymensingh, Rangpur, and Chittagong. Women living rural regions had a greater probability of delivering birth cesarean sections compared to women who reside in urban communities (OR: 1.08; 95% CI: 0.83-1.39).

Measure of variation

In the null model (Model-0), there were substantial variations in CS across clusters (variance = 0.95; 95% CI: 0.76-1.0). Without relation to the vacant model of medical facility their delivery, overall Intra-Class (ICC) relationship is 0.22%. Besides, the PCV in the full model (Model-III) revealed that 65.26% of the variability in CS Individual and community-level interpretations characteristics. Even after taking into consideration each factor in the performance model, the variations in clusters remained statistically noteworthy (**Table 3**).

Table 3: Measure of variation for CS in Bangladesh, BDHS 2017-2018.

Measure of variation	Null	Model- 1	Model -2	Model -3 or Full model
Variance	0.95(0.76-1.10)	0.36(0.34-0.53)	0.39(0.20-0.76)	0.34(0.15-0.74)
Log likelihood	3137.153	-2696.9707	2696.970	-1217.72
ICC	0.22	0.10	0.10	0.09
AIC	6278.3	5443.84	2584.511	2507.452
BIC	6291.41	5607.369	2659.693	2715.693
PCV	-	63.157	58.947	65.263

OR: Odds Ratio; CI: Confidence Internal; ICC: Intraclass Coefficient of Correlation; (ICC); PCV: Proportionate Volatility Shift; AIC: Akaike Information Criteria.

Utilizing Global Moran's, I statistic: We conducted an analysis to identify regions characterized by relatively high and low prevalence of Cesarean delivery, which refer to as "hot spots" and "cold spots", respectively. T is statistical measure allowed us to assess the spatial clustering of cesarean section delivery rate. To computed the Global Moran's I statistic, we first calculated the mean and variance for the dependent variable, namely cesarean delivery prevalence. Then, we determine the deviation of each feature value from the mean by corresponding subtraction. Subsequently, we multiplied the deviation of all Neighboring features together, resulting in a cross-product ranging from +1 to -1. Deviations for all Neighboring feature were then multiplied together to create a cross-product that ranging from +1 to -1. In the context of Moran's I, a value of +1 indicates strong positive spatial clustering, meaning high values tend high numbers are next to other high values, whilst lower ones are nearest to other values that are low. Conversely, a value of -1 suggests repulsion, where high values repel other high values and tend to be near low values. Effective cross-product amounts balance while the other way around is true. Moran's I tend to approach 0 [22].

Spatial autocorrelation report of cesarean section delivery in Bangladesh

Global Moran's I statistic spatial autocorrelation was used for estimating the regional pattern of acute cesarean section delivery in Bangladesh. The spatial distribution of cesarean section varied across regions in Bangladesh. Results of the Global Moran's I value (0.26, p< 0.00) indicates a significant positive autocorrelation and Z- score 9.90 (Figure 1).

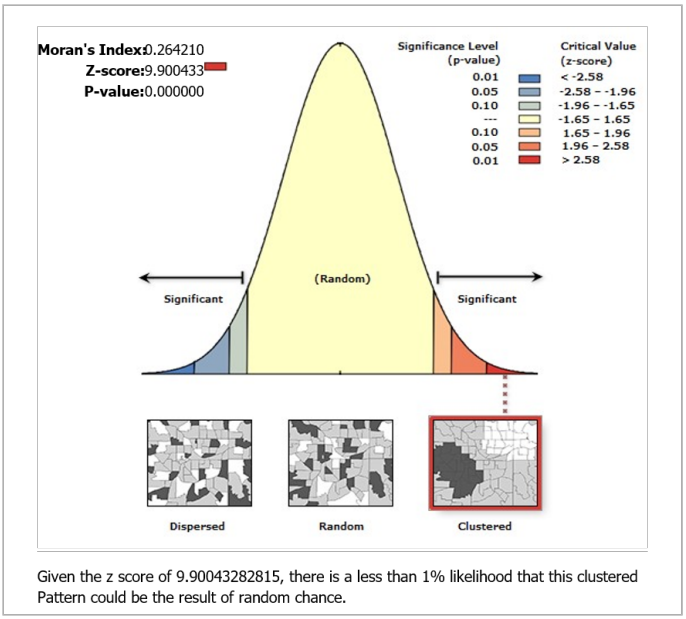

Figure 1: Spatial Autocorrelation Report of Cesarean Section delivery in Bangladesh. Evidence from the Bangladesh Demographic and Health Survey 2017-2018.

Hot spot and cold-spots of caesarean section deliveries in Bangladesh.

The hot spots with high-level cesarean section delivery were mainly located in Dhaka, Khulna, Rajshahi, Sylhet, and rangpur divisions **(Figure 2).** The cold spots, areas with low levels of delivery through CS, were located mainly in Mymensingh, Barisal, and Chattogram divisions.

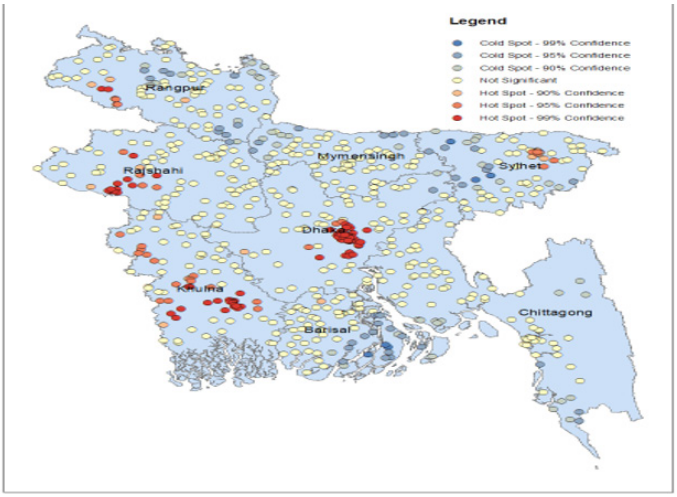

Figure 2: Hot spot and cold-spots of caesarean section deliveries in Bangladesh.

Summary and Discussion

The purpose of the inquiry was to spatial variations and risk factors associated with cesarean section delivery based on the recent nationally representative statistical methods from the 2017-18 Bangladesh Demographics and Heath Surveys. In relation to our research, an additional 32.61% of Bangladeshi women underwent CS, with substantial regional variations. The hot spots with high-level cesarean section delivery were mainly located in Dhaka, Khulna, Rajshahi, Sylhet, and rangpur divisions. In contrast, cold spots were located in parts of in Mymensingh, Barisal, and Chattogram divisions.

Studies that took place in Bangladeshi using information collected in 2016 or earlier indicated a nationwide share of CS delivery (24%) that was less than our observed rate (32.61%). These rates, though, above the proposed Delivery of CS rate (5-15%) [10].

The cesarean section delivery rate in Bangladesh was only 2.37% in 2000, though it is now higher than in neighboring countries like India (14%), Pakistan (14%), and Nepal (4%), and in more advanced countries consisting of England (9%), Sweden (8.6%), and Norway (17.1%) [23].

The women were questioned based on their different socioeconomic and demographic backgrounds. This study found that in Bangladesh, the age of the mother's pregnancy had a significant relationship with the requirement for an emergency cesarean delivery. Older women were more likely to have cesarean deliveries than young women. Women who are young face pregnancy-related complications and are not able to deliver a baby easily. Women under 18 years old are more responsible for preterm labor than older women. Young women often suffer from urinary tract infections, which can lead to preterm birth, while older women suffer from severe complications of pregnancy such as gestational diabetes, placenta previa, postpartum hemorrhage, pulmonary embolism, and preeclampsia, which are responsible for caesarean delivery [24].

One of the most important factors in selecting a cesarean section was the level of education of the woman. Compared to uneducated women, enlightened women were far more inclined to give birth via cesarean section. Another look generated the same finding [25]. Educated women have sufficient knowledge about pregnancy-related complications and can detect their problems easily.

The educational background of the partner had a high correlation with cesarean delivery. In contrast to women who married men who had no education, those with educated husbands were more likely to give birth via a cesarean section. A similar finding was identified in another study. A husband's education is correlated with employment and aids him to land an improved position, which helps improve family income [26].

As opposed to women who belonged to the most impoverished wealth index, women who referred to the richest wealth index were far more likely to deliver by cesarean section. The better economic condition of the family may be responsible for cesarean delivery because this type of family is able to pay the cost of cesarean delivery and has knowledge of obstetric complications. This finding was similar to another investigation. Women who come from the richest wealth index lead comfortable lives and enjoy better facilities to survive.

Non-Muslim women have a lower possibility of utilizing cesarean section offering services in comparison with Muslim women. Significant predictors of a cesarean section were found to be the location and region.

Based on our research, women who given birth in an intimate setting had a greater probability of requiring a cesarean section delivered in public facilities than those who, consistent with the historical trend in Bangladesh. In 2001-2003, nearly half of the absorption in business settings in Bangladesh were done by cesarean birth. The fining was similar to another investigation [27]. The most important factor determining cesarean birth deliveries in Bangladesh was delivery in a private medical facility. Due to their main concentration on profit, health care organizations want to defend themselves against unexpected delivery risks.

In Bangladesh, cesarean section delivery is available in all three types of delivery facilities: Governmental, private, and nongovernmental, with a uniform guideline to perform cesarean section 8. 67 times more women choose private facilities than government facilities. We found that CS delivery was higher in urban settings, especially for private health facilities, which is identical to other studies [28].

Women's exposure to mass media was identified as an influential factor in cesarean section delivery. Women who were granted knowledge of media outlets had a higher chance of having a C-section than women who were not exposed to mass media.

Bangladesh has eight administrative areas; among these areas, women living in Dhaka, Chittagong, and Khulna divisions were more likely to have cesarean deliveries than in other divisions. Women from the Sylhet and Rangpur divisions had lower chances of having cesarean deliveries than women from the Barisal and Mymensingh divisions.

According to the multilevel logistic regression analysis, qualities contain place of living and education level monthly family income, age at marriage, respondents' ages, divisions, husbands'

ages, levels of education, and employment status, as well as knowledge of pregnancy and family planning and government initiatives, are highly significant. Woman's age, residence, division, income quartile, Age at marriage, Education qualification, Husband's education, post-natal care, Pregnancy health and FP husband aware, Pregnancy health and FP you aware, Women's decision-making power, antenatal care number, pregnancy health, and FP husband awareness You are aware that cesarean section delivery was found to be very significant while doing logistic regression.

Conclusion

In Bangladesh, cesarean problems continue to be a serious public health concern, especially for women who live in rural regions and have less education and money. To lower maternal and newborn morbidity and death rates in Bangladesh, women must be informed of pregnancy difficulties and have access to healthcare services. Nonetheless, the study found that there were significant variations in women's levels of awareness across a wide range of factors, including age, location, education, income quartile, and marital status.

Being diagnosed with a cesarean section lacking a medical necessity is an obstacle for the public's health in countries with low incomes. like Bangladesh, given that it is on the rise and results in long-term and short-term illness risks for new mothers and their babies. Compared to vaginal delivery, which is preferred in Bangladesh, unnecessary cesarean sections do not reduce mortality among mothers and children or morbidity; rather, they raise it.

Data availability

The dataset is publicly available in the Demographic and Health Survey assortment (https://dhsprogram.com/data/available-datasets.cfm)

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Author contributions

MSI and MJB conceptualized the study. MSI performed the data analysis and wrote the initial manuscript draft. MMR and MJB critically reviewed and edited the study. Finally, all authors approved the manuscript.

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Competing Interests

The authors have declared that they have no competing interests.

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