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# Non-medical Factors Affecting the Decision of Caesarean: A Study through Path Analysis

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**ABSTRACT:** When life-threatening conditions occur during pregnancy or childbirth, Caesarean section (CS) is among the most important procedures for protecting the lives of mothers and babies [1]. Non-medical causes have been proposed as primary contributors to excessive CS [2]. Over the last few decades, global CS concentrations have gradually increased [3]. Aside from the potential for negative health consequences, unnecessary CS places a significant financial burden on individuals, families, and society as a whole. The expenditure of post-pregnancy clinical consideration and cross as a result of prolonged CS is projected to be around US$ 2.32 billion globally. The expenditure of post-pregnancy clinical consideration and cross as a result of prolonged CS is projected to be around US$ 2.32 billion globally. We looked at variables like education, occupation, wealth index, respondent's media exposure, and child alive in this project, all of which have a major causal association with our dependent variable CS delivery. Based on the BDHS 2017-18 data, we used path analysis to look at the cultural and racial factors that influence the choice of CS in Bangladesh. For this, we used the SPSS AMOS program. Aside from binary logistic analysis, multivariate analysis was performed. Furthermore, correlation was used to identify the variables that had the greatest impact on the choice of CS.

**KEYWORDS:** Binary logistic Regression, Correlation, Path analysis, SPSS Amos.

## A. INTRODUCTION

### *i) Background of the study*

Caesarean Section (CS) can be an existence operation both for mother and the fetus [4], as well as a way to avoid bad obstetric outcomes. Several studies, mainly from high- and intermediate countries, investigated the factors that affect the use of CS, but the results were mixed [5-7]. In a recent longitudinal study conducted in the USA, prior CS was found to be the strongest predictor of CS activity [8]. A scientific review of 17 studies showed that parental choice was the best predictor of CS[9].The rising trend of C-sections in Bangladesh could point to the importance of social factors in the decision.

### *ii) Objectives of the study*

The following is the study's objective:

1. Determine the major socio-demographic factors that influenced CS's decision in 2017-2018.
2. Determine whether the indicators in the path model have any potential causal relationships.

### *iii) Limitations of the study*

The study's limitations are listed below:

1. It's possible that removing a significant volume of missing data resulted in the loss of useful information.
2. One of the most significant roadblocks to the project's completion was the lack of citations relevant to this approach.
3. Project execution was rushed due to time constraints, which could have jeopardized the project's credibility.

### *B. i) Literature Review*

This chapter will examine the literature on the general relationship between CS decision and non-medical factors that influence it. The literature review will briefly cover the previous analysis that has been conducted by other researchers prior to the evaluation of

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current research knowledge about the relationship of the variables. Around the world, CS is said to prevent 1.6 million parental and 65 million maternal mortality per year. Before further analysis is completed, WHO estimates that 515 percent is a reasonable level approximation [11].In 2014, CS was used to deliver about 18 percent of the world's births [12]. The maximum percentage of CS was found in African Countries (32%), while the lowest rate was found in Africa (7%) [12]. According to a new analysis of data gathered from 43 Asian and African countries' demographic and health surveys, urban rich women have better rate of CS than rural poor women [9]. There is no solid statement of whether some social and economic groups are observing comparative upward or range of waste in their use of CS, or whether these trends are influenced by factors such as location [13]. As a result, a comprehensive analysis of the comparative speed of change in the proliferation of CS in Bangladesh, as well as the factors influencing this change, is needed. Bangladesh has made significant progress in terms of maternal and child welfare. Prenatal care is now given to the majority of Bangladeshi women (79%) and postnatal care is provided to 36% [15]. In 2014, 37% of births took place in unofficial medical facilities, including 22% in private clinics, with 61 percent and 77 percent of deliveries resulting in CS, simultaneously [15, 16]. The rising rate of CS may be influenced by a variety of factors, including Bangladesh's greater incidence of teenage pregnancy (35%), the frequency of late gestation (5%), changing educational and cultural status of mothers, and the continuing dual metabolic pressure (professional and non-conditions of around and under nutrition) [14, 17].

***ii) Data Source***

The data came from the Bangladesh Demographic and Health Survey (BDHS), which was conducted in 2017-2018 and was nationally representative. Since 1984, the DHS has aided over 300 surveys in over 90 countries with technical assistance. The DHS program is renowned for collecting and distributing accurate, official statistics on fertility, access to contraception, maternal and newborn health, ethnicity, HIV/AIDS, tuberculosis, and health. The US Agency for International Development funds the DHS program (USAID). The DHS has many advantages, including higher response times, regional reach, increased respondent training, structured data gathering procedures across countries, and standardized data throughout period, allowing cross-sectional and longitudinal comparisons across populations. The DHS data aid epidemiological research aimed at tracking incidence, patterns, and disparities.

***Introduction of Variables***

| Variable | Variable type | Categories |
|---|---|---|
| Delivery by C-section | Endogenous Variable | 0=No<br>1=Yes |
| Education of respondent | Exogenous Variable | 0 indicates that no education has been obtained |
| | | 1=1st class<br>2=Secondary<br>3 =more. |
| Residence address | Exogenous Variable | 1=Urban<br>2=Rural |
| Newspaper reading frequency | Exogenous Variable | 0=absolutely not<br>1=Once a week or less<br>2=Once a week at the very least<br>3=Nearly every day |
| Radio listening frequency | Exogenous Variable | 0=absolutely not<br>1=Once a week or less<br>2=Once a week at the very least<br>3=Nearly every day |

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| | | |
|---|---|---|
| Frequency of television viewing | Exogenous Variable | 0=absolutely not<br>1=Once a week or less<br>2=Once a week at the very least<br>3=Nearly every day |
| Child alive | Exogenous Variable | 0=No 1=yes |
| Occupation: respondent | Exogenous Variable | 0=Not working<br>1=Land owner<br>2=Menial service<br>3=Business holder<br>4=Unemployed<br>5=Retired |
| Occupation: husband | Exogenous Variable | 0=Not working<br>1=Land owner<br>2=Menial service<br>3=Business holder<br>4=Unemployed |
| | | 5=Retired |
| Wealth index | Exogenous Variable | 0=Poor<br>1=Middle class<br>2=Rich |

### *C. METHODOLOGY*

#### *i) Introduction*

Our goal was to find the most likely response to the question: Is there a causal relationship between the decision to do CS and other social variables based on the respondent's instructive status? We found approximately 5000 cases for our investigation to eliminate missing attributes and cases that were not valid.

#### *ii) Research Design*

To select family units, BDHS used a two-stage specified cluster analysis. The definition was completed by the home's metropolitan/country location. In the first step, the likelihood relative to estimate was used to select Principal Sample Elements (PSUs). Following that, family units were chosen from single PSUs in remote regions using efficient examining.

#### *iii. Statistical analysis*

#### *iii(a) Correlation:*

The correlation coefficient, which literally means "affiliation," is a statistical measure of how closely two variables affect one another. A correlation coefficient may indicate a positive relationship, a negative relationship, or even no relationship at all.

A two-variable relationship with a positive relation is one in which both variables share the same characteristics. As a consequence, when one variable increases while the other decreases, or when one variable decrease while the other decreases. A negative correlation is a relationship in which one variable causes the other to shift.

A correlation of 0 occurs when two factors have no association.

The “Pearson Product-Moment Correlation Coefficient” is the most widely used correlation metric. The computation formula in mathematics Pearson's r is defined as

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{\{n(\sum x^2)-(\sum x)^2\}\{n(\sum y^2)-(\sum y)^2\}}}$$

#### *iii(b )Binary Logistic Regression*

Easy linear regression is extended to binary logistic regression. If the variable is categorical or binary, we can't use straightforward linear regression.

When the outcome variable is binary, binary logistic regression is a method for predicting the relationship between predictors (our response variable) and an expected variable (the outcome variable) (e.g., sex [male vs. female], response [yes, no] and so on).

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***iii(c)Path analysis***

In path analysis, path coefficients are adjusted r2 coefficients in a form of linear regression equations, typically represented Pij, where the first precept denotes the dependent variable and the next substring denotes the factor whose direct change in the dependent variable is evaluated. Pij, on either side, are path coefficients that show how j affects variable I directly. The percentage of the dependent variable's margin of error that the explanatory variables is directly responsible for is called a path coefficient [14].In other words, Pij = j/i, where j and I are the standard deviations of the dependent and independent variables. I calculate path coefficients, (ii) calculate specific, indirect, and contingent correlations, and (iii) predict inferred correlations using the path approximation equations.

Path analysis has a few main components: path diagram, exogenous variables, endogenous variables, mediator variables, path coefficients, and path model. We'll go through these concepts using an example of three variables: A, B, and C. The example is as follows:

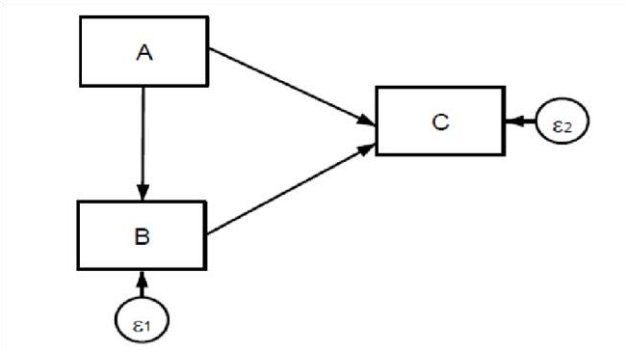


***Figure:*** *Path Diagram*

We can see that there is one exogenous variable, A, and two endogenous variables, B and C, in the above route diagram, with B serving as a mediator variable.To solve for direct effects in path models, each endogenous variable is regressed on all the variables that have direct paths leading to it. (P. Liears) As a result, the path models for the above diagram are as follows: PCA + PCB +e = C

PBA +e = B

The path coefficients between the variables were the subject of this analysis.

***D. Result & Analysis:***

***i)Bivariate Analysis***

We try to explain the relationship between our variables in this section, as well as look for a significant relationship between them. To arrive at our decision, we looked at the p value and the chi-square value.

***Cross table***

| | | Delivery by caesarean section | |
|---|---|---|---|
| | | No | Yes |
| Age classes of five years | 15 to 19 | 633 | 258 |
| | | 18.3% | 15.4% |
| | 20 to 24 | 1210 | 617 |
| | | 35.0% | 36.7% |
| | 25 to 29 | 903 | 433 |
| | | 26.1% | 25.8% |
| | 30 to 34 | 508 | 268 |

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| | | | |
|---|---|---|---|
| | 35 to 39 | 14.7% | 16.0% |
| | | 162 | 87 |
| | | 4.7% | 5.2% |
| | 40 to 44 | 33 | 15 |
| | | 1.0% | 0.9% |
| | 45 to 49 | 6 | 2 |
| | | 0.2% | 0.1% |
| Residence address | Town | 1002 | 742 |
| | | 57.5% | 42.5% |
| | Rustic | 2453 | 938 |
| | | 72.3% | 27.7% |
| Reading a newspaper or magazine on a regular basis | Absolutely not | 3217 | 1356 |
| | | 70.3% | 29.7% |
| | Once a week or less | 181 | 206 |
| | | 46.8% | 53.2% |
| | Once a week at the very least | 57 | 118 |
| | | 32.6% | 67.4% |
| | Nearly everyday | 0 | 0 |
| | | 0.0% | 0.0% |
| Listening to the radio on a regular basis | Absolutely not | 3319 | 1524 |
| | | 68.5% | 31.5% |
| | Once a week or less | 82 | 101 |
| | | 44.8% | 55.2% |
| | Once a week at the very least | 54 | 55 |
| | | 49.5% | 50.5% |
| | Nearly everyday | 0 | 0 |
| | | 0.0% | 0.0% |
| Frequency of television viewing | Absolutely not | 1628 | 366 |
| | | 81.6% | 18.4% |
| | Once a week or less | 313 | 139 |
| | | 69.2% | 30.8% |
| | Once a week at the very least | 1514 | 1175 |
| | | 56.3% | 43.7% |
| | Nearly everyday | 0 | |
| | | 0.0% | 0.0% |
| education of respondent | no education | 281 | 50 |
| | | 84.9% | 15.1% |
| | 1st class | 1184 | 252 |
| | | 82.5% | 17.5% |
| | secondary | 1635 | 821 |
| | | 66.6% | 33.4% |

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| | | | |
|---|---|---|---|
| | more | 355 | 557 |
| | | 38.9% | 61.1% |
| wealth index | poor | 1799 | 375 |
| | | 82.8% | 17.2% |
| | middle class | 642 | 287 |
| | | 69.1% | 30.9% |
| | rich | 1014 | 1018 |
| | | 49.9% | 50.1% |
| respondent's occupation | not working | 1950 | 1168 |
| | | 62.5% | 37.5% |
| | land owner | 0 | 0 |
| | | 0.0% | 0.0% |
| | menial service | 1392 | 402 |
| | | 77.6% | 22.4% |
| | business holder | 113 | 110 |
| | | 50.7% | 49.3% |
| | unemployed | 0 | 0 |
| | | 0.0% | 0.0% |
| | retired | 0 | 0 |
| | | 0.0% | 0.0% |

**** At the 0.05 and 0.01 level of significance, all chi-square values are considered to be important.**

***Cross-tabulation of CS with different socio-demographic variables.***

***Interpretation***

We can see from the table that a significant number of CS are performed in urban areas (42.5 percent). Rural regions, on the other hand, account for 27.7% of the population.

People have been exposed to the media (newspapers, radio, and television) at least once per week are more interested in making CS decisions. Furthermore, people with higher educational qualifications are more interested in CS (61.1 percent).

Similarly, rich people do the most CS out of the three financial groups (poor, middle, and wealthy) (50.1 percent).

Moreover, among the other occupation groups of the respondent, company owners perform the highest percentage of CS (49.3%).

***Correlation Analysis:***

We attempted to investigate the relationship between the variables of interest in this section of the study. Which you can see in the table below.

| | Delivery by caesarean section | Type of place of residence | Frequency of reading newspaper | Frequency of listening Radio | Frequency of watching Tv | Child alive | Education of respondent | Wealth index | Husband's occupation | Respondent's occupation |
|---|---|---|---|---|---|---|---|---|---|---|
| Delivery by caesarean section | 1 | | | | | | | | | |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of place of residence | -.150** | 1 | | | | | | | | |
| Frequency of reading newspaper | .191** | -.161** | 1 | | | | | | | |
| Frequency of listening Radio | .098 ** | -.057** | .219** | 1 | | | | | | |
| Frequency of watching Tv | .255** | -.221** | .175** | .102** | 1 | | | | | |
| Child alive | .056** | .004 | .008 | .020 | .018 | 1 | | | | |
| Education of respondent | .303** | -.096** | .352** | .157** | .265** | .036* | 1 | | | |
| Wealth index | .316** | -.390** | .256** | .104** | .478** | .020 | .379** | 1 | | |
| Husband's occupation | .285** | -.149** | .330** | .147** | .228** | .032* | .544** | .382** | 1 | |
| Respondent's occupation | -.102** | .093** | .029** | -.002 | -.099* | -.008 | -.054** | -.193** | -.094** | 1 |

***At the 0.01 level, correlation is important. *At the 0.05 level, correlation is significant.***

***Correlation Coefficient Matrix among the Variables***

We can see that wealth has a moderate positive correlation with CS decision (.316), indicating that wealth and CS decision are related. All variables, with the exception of the respondent's occupation and home, behaved similarly. These variables have a negative association with CS judgment, with a coefficient of -.150 for place of residence and -.120 for respondent's occupation.

***ii)Binary logistic regression***

For certain demographic variables, we use multivariate analysis to perform binary logistic regression. All variables have a huge impact on CS's decision.

| | B | S.E. | Wald | df | Sig. | Exp(B) | Lower 95% CI | Upper 95% CI |
|---|---|---|---|---|---|---|---|---|
| age(20-24) | -.538 | .845 | .405 | 1 | .024 | .584 | .111 | 3.062 |
| age(35-39) | -.199 | .854 | .054 | 1 | .016 | .819 | .154 | 4.368 |
| residence(urban) | .176 | .072 | 5.894 | 1 | .015 | 1.192 | 1.034 | 1.373 |
| education(1st class) | -.667 | .179 | 86.732 | 1 | .000 | .189 | .133 | .268 |
| education(secondary) | -.496 | .106 | 200.944 | 1 | .000 | .224 | .182 | .275 |
| education(more) | -.809 | .086 | 88.677 | 1 | .000 | .446 | .377 | .527 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| wealth(middle class) | .501 | .090 | 30.763 | 1 | .000 | .606 | .508 | .723 |
| Respondent occupation (landowner) | -.401 | .156 | .005 | 1 | .044 | .989 | .728 | 1.344 |
| Respondent occupation (menial-service) | -.011 | .164 | 5.996 | 1 | .014 | .070 | .486 | .923 |

****Reference category is delivery by CS (yes).**

**Interpretation**

The observed Intercept values and Odds Ratios [Exp(B)] given in the tables above will be used to draw our conclusions. It's worth noting here that an Odds Ratio >1 means that as the number of variables increases, the probability of the result dropping into the comparison category increases. An Odds Ratio of one, on the other hand, means that the outcome variable is more likely to be in the reference group than the comparison group. The sign of the intercept values indicates whether the quantity of the underlying variable of concern should be increased or decreased.

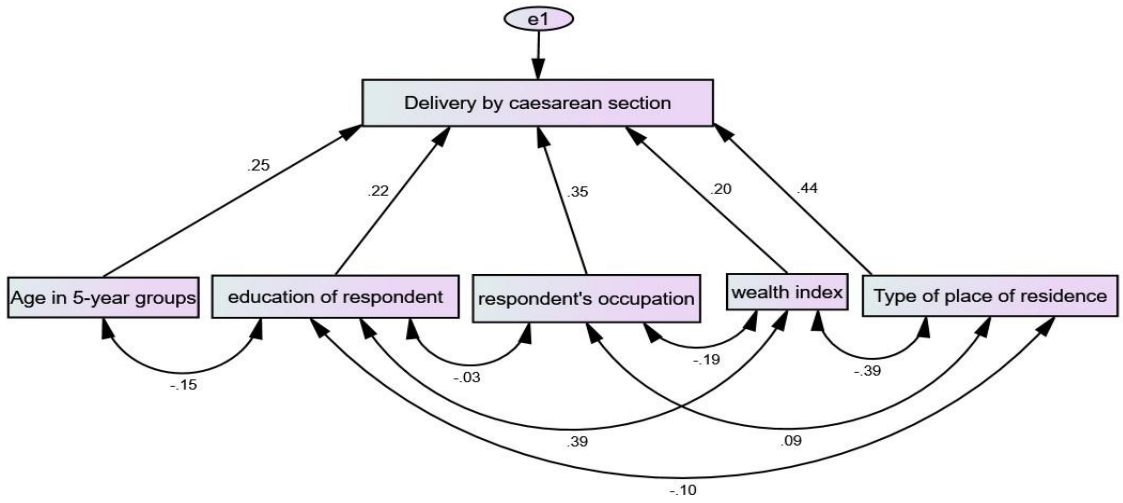
**iii) Path Analysis**

To create a path analytical model, the data was subjected to SEM using AMOS version 23 (Analysis of Moment Structures) in SPSS. The model's fit was assessed using a number of Comparative Fit Indexes. The following indices indicate a satisfactory model fit:

- Chi-square/df (to test for model discrepancy) ≥2
- **GFI** (Goodness of Fit Index): a number between 0 and 1, with a higher value suggesting a better match
- **AGFI** (Adjusted Goodness of Fit Index) > 0.9
- **CFI, NFI:** The range is Zero to one, with a higher value indicating a better fit.
- **RMSE**A (Root Mean Square Error Approximation Index) < 0.08

The independent variables were evaluated by their standardized path coefficients (), which reflect their predictive strength to CS decision, after the model fit was accepted.

Our path diagram is given below



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: Path model

**Degrees of independence computation**

The number of different sample periods is as follows: 21
The following are the number of different parameters that must be estimated: 18
Degrees of liberty (21 - 18): 3

**The ultimate outcome (Default model)**

The bare minimum was met.
Chi-square analysis = 151.444
Degrees of liberty = 3
Level of Probability = .067

**CMIN**

| Model | NPAR | CMIN | DF | P | CMIN/D |
|---|---|---|---|---|---|
| Default model | 18 | 151.444 | 3 | .000 | 50.481 |
| Model that is saturated | 21 | .000 | 0 | | |
| Model of self-reliance | 6 | 2950.79 | 15 | .000 | 196.720 |

**RMSEA**

| Model | RMSEA |
|---|---|
| Model by default | .098 |
| Model of self-reliance | .195 |

**GFI**

| Model | RMR | GFI | AGFI |
|---|---|---|---|
| Model by default | .041 | .990 | .933 |
| Model that is saturated | .000 | 1.00 | |
| Model of self-reliance | .104 | .829 | .760 |

**Baseline Comparisons**

| Model | NFI Delta1 | CFI |
|---|---|---|
| Model by default | .949 | .949 |
| Model that is saturated | .000 | 1.000 |
| Model of self-reliance | .000 | .000 |

**Regression Weights of path model:**

| | Estimation that is not standardized | S.E. | P | Estimate that has been standardized (beta) |
|---|---|---|---|---|
| Delivery_caesarean ←age | .11 | .005 | *** | .25 |
| Delivery_caesarean←education | .130 | .008 | *** | .226 |
| Delivery_caesarean←occupation | .15 | .006 | *** | .35 |
| Delivery_caesarean←wealth | .104 | .008 | *** | .201 |
| Delivery_caesarean←residence | .30 | -.0014 | .002 | .443 |

Regression weights of different paths in the path diagram

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***E. Discussion***

The basic model was found to be ill-fitting, so it was modified until a compact model with a satisfactory fit was found. The most plausible model is shown in figure 5.

All of the independent variables in this study have a direct impact on the route model, according to the findings. As a result, all of the independent variables discovered to precisely predict the delivery decision by CS.

Age, schooling, income, occupation, and place of residence were all important positive predictors, as were occupation and CS distribution.

The complete association with occupation and CS with statistically relevant associations are shown in the route diagram (0.35). The effects of age, schooling, and income on CS decisions are moderate (0.25, 0.22, and 0.20respectively). The impact of residence on CS decision is moderately high, with a coefficient of 0.44.

Since the other variables (media exposer, child alive, husband's occupation) did not provide a suitable fit for the final model, they were removed from the path model.

The coefficients in the output path diagram demonstrate that the predictor variables and the criterion variable have significant causal effects.

Since there is no negative path coefficient in the model, the pathways' directions are positive, indicating that there is no inverse relationship between the variables. The output path diagram showed that all of the causal variables were moving in a positive direction. No path was omitted because all of the path coefficients in the output path diagram are greater than 0.05, meaning that all paths are significant

***F. Conclusion***

We discovered that the respondent's age, schooling, and wealth have a major causal relationship with the CS decision. Furthermore, it was discovered that more CS deliveries were made in urban areas. Furthermore, people who own a company have a higher proportion of CS. People are more likely to pursue CS as their education and media exposure improve. In this survey, it was also discovered that nearly a third of the respondents (33%) did not complete the survey.

The majority of the citizens are also found to be from a low socioeconomic background. The middle class accounts for the smallest proportion of the population. Almost half of those polled had completed high school (47.83 percent)

***G. Recommendation***

This research also lacks information on cultural and psychological influences.

Regrettably, the Bangladesh Demographic and Health Survey data does not provide the above data. The discovery also highlights the need for further studies to identify cultural and psychological factors that influence CS decisions.

Bangladesh Demographic and Health Survey2017-18. National Institute of Population Research and Training. Medical Education and Family Welfare Division. Ministry of Health and Family Welfare, Dhaka, Bangladesh.

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