

# Associations between Maternal Autonomy and High-Risk Pregnancy in Bangladesh: the Mediating Influences of Childbearing Practices and Antenatal Care Uptake

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## Research article

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# Abstract

**Background** A high level of maternal, infant and neonatal mortality occurs in Bangladesh. Certain childbearing practices as well as low use of antenatal care services make Bangladeshi women more vulnerable to experience poor health during pregnancy which contributes adverse birth outcomes. Also, women in Bangladesh remain considerably subordinate to men in almost all aspects of their lives, from education and work opportunities to healthcare utilisation. This lack of opportunities contributes to the low status of women within their family and society, and generally poor health outcomes for both mother and children. This study thus aims to investigate the factors associated with severity of health complications during pregnancy in relation to the low status of women, and the relative role of childbearing practices and antenatal care uptake to influence this relationship.

**Methods** The relevant data from the last Bangladesh Demographic and Health Survey (BDHS) is used in this study. Multinomial logistic regression models (MLRM) of categorical response variables are applied as statistical tools to analyse the relevant data for the outcome variable: high-risk pregnancy.

**Results** In Bangladesh, about 38.7% of women experienced high-risk pregnancies with multiple health complications. Findings of the study firstly found women's decision-making autonomy and freedom of movement significantly associated with high-risk pregnancies. However, the results further reveal that maternal childbearing practices and antenatal care uptake had strong significant effects on high-risk pregnancies. Maternal age, particularly early childbearing of women had about 52% increased risk, and use of antenatal care had about 0.58 times less risk in having high-risk pregnancies.

**Conclusion** Although the maternal decision-making autonomy and freedom of movement had significant effects on high-risk pregnancies, however, their relationships were strongly mediated by both maternal childbearing practices and uses of antenatal care.

## 1. Background

The significance of maternal and perinatal deaths as well as poor birth outcomes is recognised as one of the major public health problems in Bangladesh. The common causes of adverse outcomes are mainly understood as the mothers' physiological health conditions during pregnancy and childbirth. Although pregnancy is a universal part of female physiology and biology, this event is shaped by the surrounding social environment [1]. A pregnancy becomes high-risk when either the mother or the newborn (or both) have a significant risk of morbidity or mortality [2–3]. Studies on pregnancy health and childbirth are mainly concerned with physiological aspects, and only to some extent are concerned with maternal fertility behaviour, healthcare practices, as well as with their socio-economic background. This study extends this knowledge and examines the relationship between maternal autonomy and the severity of pregnancy health complications followed by high-risk pregnancies among Bangladeshi women.

As highlighted in previous studies, women with low levels of education, low income, a low socio-economic status and living in rural areas, also have a low level of autonomy in reproductive health

matters, and thus have an increased risk of poor health status in pregnancy and poor outcomes in Bangladesh [4–9]. The identified risk factors influencing pregnancy complications also focused on childbearing practices that contributed to poor outcomes. A large number of studies identified the adverse effects of adolescent pregnancies which increased the chance of several health complications during pregnancy: anaemia, hypertension or pre-eclampsia, gestational diabetes, placental problems, preterm labour and postpartum haemorrhage (10–14).. In Bangladesh, most studies arrived at similar conclusions: adolescent pregnancies hold an increased risk of pregnancy and delivery complications [15–17].

Also, women with a large number of children (more than three pregnancies) and with shorter birth intervals of less than 18 months were found to be more vulnerable to experience several pregnancy complications: pre-eclampsia, pregnancy infections, miscarriage, stillbirth and low birth weight [16, 18–22]. Additionally, access to reproductive healthcare services remained a key determinant of a sound pregnancy and healthy outcome [17, 23]. In this context, a large number of studies from developing countries including Bangladesh identified autonomy of women as a significant factor in the utilisation of antenatal care services [9, 24–27]. It appears that although the associations between pregnancy health status, and maternal childbearing practices as well utilization of maternal healthcare were recognized so far, however, the associations between maternal autonomy and pregnancy health complications followed by high-risk pregnancies has not yet been examined. This study therefore aims to investigate these associations, and also to examine the relative role of women's childbearing practices, and antenatal care utilization to influence this relationship.

## 2. Data And Methodology

The present study is based on data from the *Verbal Autopsy Questionnaire* of Bangladesh Demographic and Health Survey 2011 (BDHS), which is most recent survey that used the *WHO Verbal Autopsy Questionnaire*. Through this questionnaire, the information about several health complications during pregnancy and delivery was collected from 480 ever-married women aged 10–49 years for their most recent pregnancy in the five years preceding the survey. In the BDHS, the participants were recruited using a two-stage stratified cluster sample of households yielding a response rate of 98%. The data used in this study was obtained from the MEASURE DHS archive. Details of data collection and management procedures are described elsewhere (BDHS 2011).

### *Outcome variable*

The outcome variable in this study refers to *high-risk pregnancy which* comprised a number of health complications during pregnancy: high blood pressure, heart disease, gestational diabetes, convulsion, vaginal bleeding, puffy face, blunted vision, severe headache, high fever, long labour, shortness of breath and excessive bleeding during labour. Each complication was assigned as score of '0' (did not have that complication during pregnancy) or '1' (had that complication during pregnancy). The scores for all complications during pregnancy were combined to produce a single measure of pregnancy risk—the

outcome variable: *high-risk pregnancy*. According to this index, a pregnancy may have from zero to twelve health complications, and thus this overall index of high-risk pregnancy may take values from zero to three categories: *no risk* (no complication), *single risk* (one complication), double risks (two complications) and *multiple-risk* (more than two complications).

#### *Predictor and mediating variables*

The primary predictor variable in this study comprised three autonomy variables: *decision-making autonomy* (assessed through questions relating to decisions about household purchases, about their own healthcare, their children's healthcare, contraception, and the number and timing of births), *autonomy in physical mobility* (assessed through questions related to the ability of women to visit friends and family, and access to healthcare without any restriction), and *economic autonomy* (assessed through the ability to spend money when necessary, including for healthcare purposes). According to the reply of respondents, a score of 0, 1 and 2 is assigned respectively to each response, which is categorised as: no autonomy (respondent can't decide at all, either husband or other family member decides about their lives); partial autonomy (respondent have the ability of joint decisions with husband or other family members); and high autonomy (respondent have the rights to decide about their lives).

In this study, maternal childbearing practices and uptake of antenatal care services were hypothesized to mediate the associations between maternal autonomy and high-risk pregnancy. Childbearing practices included three variables: *maternal age* (Early childbearing: below 19 years, on-time childbearing: 20 to 34 years, and delayed childbearing: above 34 years), *parity* (high-risk: more than three births, and low-risk: up to three births) and *birth interval* (high-risk: less than 18 months, and low-risk: 18 months and more). Antenatal care uptake were categorised as: *women had no antenatal visits*, and *had sufficient antenatal visits* (at least three visits as recommended by the WHO).

#### *Statistical analysis*

The responses obtained from the study population were analysed using descriptive statistics, and scoring technique. Also to investigate the influences of maternal autonomy on high-risk pregnancy multinomial logistic regression models (MLRM) were fitted to the categorical response variable - high-risk pregnancy, and the odds of single, double and multiple-risk versus no risk were estimated. We have fitted two regression models to the data. First, high-risk pregnancy of women is examined with only autonomy variables, and next the variables of maternal childbearing practices and antenatal care were added to the model to identify their role in influencing the relationship between autonomy and high-risk pregnancy.

## **3. Findings Of The Study**

#### *Prevalence of pregnancy complications*

Table-1 represents information about the most recent live births for which mothers experienced any pregnancy complication. This table shows that a large number of women (11.5%) had pregnancy-related

diabetics. About 9.1% and 6.1% women had two major complications (high blood pressure and convulsion, respectively) that are life-threatening for both the mother and newborn. A proportion of women experienced some minor health complication during their pregnancy such as blurred vision (30.3%), severe headache (36.7%), shortness of breath (21.2%) and puffy face (17%). About 28.8% of women had a long labour of more than 12 hours, whereas about 19% women experienced excessive bleeding during labour. Table 1 further depicts that a vast majority of women (about 24.6%) under study experienced at least one complication. About 13.8% of women experienced at least two complications during pregnancy. And, about 38.7% women were found to have experienced more than two health complications during pregnancy (the multi-risk category).

### *High-risk pregnancy and associated factors*

The results presented in Table–2 reveal that both women’s autonomy in decision-making and physical mobility is significantly associated with high-risk pregnancies. Women with high level of decision-making autonomy and autonomy in physical mobility were 0.67 times and 0.59 times respectively less likely to experience multiple pregnancy complications followed by high-risk pregnancies compared to women with no autonomy. Also, women with partial autonomy in decision-making and in physical mobility had 0.78 and 0.67 times respectively less chance of high-risk pregnancies than their counterparts of no autonomy category. However, economic autonomy of women does not have any significant effects on high-risk pregnancy.

As this study assumed that maternal childbearing practices and use of antenatal care mediate the relationship between women’s autonomy and high-risk pregnancy, another model was fitted by adding the variables of childbearing practice and antenatal care with the autonomy variables. The results (Table–3) show no significant relationship between autonomy variables and high-risk pregnancy. Only autonomy in physical mobility found to be significantly associated with multiple pregnancy complications, however, the effects became not noticeable (Model–2, Table–3). Moreover, it is found that childbearing practices and use of antenatal care services had strong significant effects on high-risk pregnancy. The results reveal that maternal age has the strongest effect on high-risk pregnancies. It is found that both adolescent and older mothers had about 52% and 48% respectively increased risks for multiple pregnancy complications followed by high-risk pregnancies compared to those women in on-time childbearing group (20 to 34 years). Women with high-risk birth intervals had about 27% increased risk for multiple pregnancy complications compared to women with low-risk birth intervals. The effects of high-risk parity on pregnancy health complications were significant; however, not noticeable. Table 3 further reveals strong associations between high-risk pregnancies and antenatal care uptake. It is found that sufficient use of antenatal care services also reduced the prevalence of high-risk pregnancies. In this context, sufficient numbers of antenatal visits (at least three visits) reduced the chance of multiple pregnancy complications (about 0.58 times less) compared to no antenatal visits.

## **4. Discussion**

Pregnancy is a complex and long-term biological transition in a woman's life with many associated health complications. Most natural vaginal births have minor complications, such as nausea and vomiting, headache, blurred vision, puffy face or shortness of breath, however, with healthy outcomes for both the mother and baby. On the other hand, major health problems during pregnancy include high blood pressure, convulsion, gestational diabetes, or pregnancy infections. When women have an aggregated chance of these complications, it is termed as high-risk pregnancy, which contributed to poor outcomes for mother or baby or for both, requiring special medical attention. However, the concept of high-risk pregnancy has not received the same level of attention in the literature as childbearing in general. The present study therefore aims to examine high-risk pregnancies of women in Bangladesh from a socio-demographic viewpoint.

The results of this study indicate that a significant proportion of women in Bangladesh have experienced pregnancy health complications, both minor and major. Also, a large number of women experienced two or more complications that were life-threatening. This phenomenon indicates an entrenched pattern of high-risk pregnancies in Bangladesh, making women vulnerable to adverse maternal and birth outcomes. The findings of this study further illustrate that of the three dimensions of women's autonomy, both decision-making autonomy and autonomy in physical mobility had significant influences on high-risk pregnancies. Earlier studies identified some indirect influences of autonomy indicators on pregnancy health status. It is found that freedom to go outside the home for healthcare purposes have resulted in better maternal outcomes [9, 26, 28]. Independence in mobility can enable women to gather relevant information about pregnancy health, complications and remedy measures, thus contributed healthy outcomes. In addition to this, high level of decision-making power about contraception, having children at a favourable time, spacing and number of children, as well as decision about own and child's healthcare also contributed to better pregnancy outcomes. In this context, both decision-making autonomy and women's independent mobility to access maternal healthcare facilities reduces the prevalence of several health complications during pregnancy by ensuring higher levels of antenatal care utilization, which thus decreases the chance of high-risk pregnancy. In this way, a maternal autonomy in respect of decision-making and physical mobility could be associated with sound pregnancy health.

In this study, childbearing practices and the use of antenatal care services appeared to have strong effects on the severity of childbearing complications that are followed by high-risk pregnancies. Adolescent pregnancy is a common phenomenon worldwide, but is more prevalent in developing countries, including Bangladesh. This study found that teenage pregnancies are more likely to result in several life-threatening complications. The reason for this might be that as teenage mothers they are more likely than older mothers to be less educated as well as less autonomous, and lacking in awareness and experience regarding the danger signs of pregnancy complications, so they are less likely to receive early prenatal and antenatal care. At the same time, they are more likely to experience several health complications during pregnancy because of the biological effects of early childbearing. A large number of earlier studies have also focused on this phenomenon [14–16, 29–32]. Previous research also showed that the grand multiparous (more than four children) women were more likely to have caesarean deliveries, preterm births and stillbirths (19, 33). However, in this study the adverse effects of high birth

order appeared to have lower risks compared to high-risk birth interval and adolescent or delayed childbearing.

The present study found that short birth intervals of less than 18 months had significant enhancing effects on high-risk pregnancies, which is similar to the previous studies that investigated the adverse effects of short birth intervals on maternal health complications (20, 28, 35). Women with very short birth intervals are more likely to have anaemia, gestational diabetics and high-blood pressure, as well as an increased risk premature and low birthweight babies. In addition to this, maternal health complications could occur due to the adverse biological effects of high parity and short birth intervals. Generally, in high order births (more than three) women experience multiple and life-threatening complications. Grand multiparous women are older and less likely to have accessed antenatal care, which results in an increased risk of maternal complications and poor neonatal outcomes (16, 18, 34). The results also showed that A significant relationship between high-risk pregnancies and maternal healthcare utilisation is also evident. About 24.6% of women reported just one complication during pregnancy and about 37.7% of women reported multiple health complications. However, only 55% of women had sufficient antenatal visits and only about 23% sought skilled care for different pregnancy complications (BDHS 2011). Women who had sufficient antenatal care visits and who received treatment for health complications were more likely to enjoy sound pregnancy health and reduced chance of high-risk pregnancies.

The main focus of this research is to investigate the associations between women's autonomy and high-risk pregnancy. Among the three indicators of autonomy, both decision-making autonomy and autonomy in physical mobility appeared to have significant effects on high-risk pregnancy (Model-1). However, after adding the indicators of childbearing practices and antenatal care, this study identified maternal age as the strongest determinant of high-risk pregnancy. Also birth intervals and use of antenatal care services remained to have strong effects on high-risk pregnancies (Model-2); and the effects of decision-making autonomy became insignificant. This phenomenon indicates that women's decision-making autonomy influences high-risk pregnancies through maternal age, birth interval as well as uptake of antenatal care. Additionally, the effects of autonomy in physical mobility on high-risk pregnancies have mediated by maternal childbearing practices and uptake of antenatal care. Thus, both childbearing practices and antenatal care uptake of women mediates the associations between maternal autonomy and high-risk pregnancies. To reduce the prevalence of high-risk pregnancies in Bangladesh, attention needs to be given to increase the level of autonomy of women. Also it is important to reduce the high-risk childbearing practices which require an increase in the age at first birth, a limit on the number of children and an extension of the intervals between births. which will also helps to improve their reproductive health status. At the same time it is necessary to ensure potential mothers' access to antenatal care services for a sound pregnancy health, as well as healthy birth outcomes.

## **5. Ethnical Statement**

We obtained permission from the MEASURE DHS to download and analyse the 2011 BDHS data-set for our study purpose. The data were originally collected by the Macro, Calverton, USA. The 2011 BDHS data

collection procedures were approved by the ORC Macro-institutional review board. The protocol of the survey was reviewed and approved by the National Ethics Review Committee of the Bangladesh Ministry of Health and Family Welfare.

## 6. Competing Interests

None of the authors have any competing interests.

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## Tables

Table 1: Women with health complications during pregnancy

Pregnancy complications	Percentage of women	Pregnancy complications	Percentage of women
High blood pressure	9.1	Blurred vision	30.3
Gestational diabetes	11.5	Severe headache	36.7
Heart disease	4.6	High fever	37.1
Convulsion	6.1	Long labour	28.8
Vaginal discharge	4.5	Excessive bleeding	19.3
Puffy face	17.0	Shortness of breath	21.2
<b>Prevalence of high-risk pregnancies</b>			
<b>High-risk pregnancy</b>		<b>Percentage of women</b>	
No complication		23.0	
Single complication		24.6	
Two complications		13.8	
More than two (multiple) complications		38.7	

Table 2: Associations between autonomy and high-risk pregnancy

Variables	Single risk	Double risk	Multiple risks
	Odds Ratios		
<b><u>Decision-making autonomy</u></b>			
No autonomy	-	-	-
Partial autonomy	0.64*	0.72*	0.78*
High autonomy	0.55*	0.77*	0.67*
<b><u>Autonomy in physical mobility</u></b>			
No autonomy	-	-	-
Partial autonomy	0.74*	1.01*	0.67*
High autonomy	0.66*	0.74*	0.59*
<b><u>Economic Autonomy</u></b>			
No autonomy	-	-	-
Partial autonomy	0.65	1.11	0.87
High autonomy	1.17	0.71	0.73

All \* values are significant at 5% level of significance

Model-1: Reference category: No-risk

Table 3: Associations between autonomy and high-risk pregnancy – effects of childbearing practices and antenatal care

Variables	Single risk	Double risk	Multiple risks
	Odds Ratios		
<b><u>Decision-making autonomy</u></b>			
No autonomy	-	-	-
Partial autonomy	0.89	0.87	0.90
High autonomy	0.92	0.97	0.73
<b>- <u>Autonomy in physical mobility</u></b>			
No autonomy	-	-	-
Partial autonomy	0.85	0.92	0.99*
High autonomy	0.82	0.86	0.97*
<b>- <u>Economic autonomy</u></b>			
No autonomy	-	-	-
Partial autonomy	0.69	0.95	0.89
High autonomy	0.91	0.95	0.81
<b>Maternal childbearing practices</b>			
<b><u>Maternal age</u></b>			
On-time childbearing (20-34 years)	-	-	-
Early childbearing (< 20 years)	1.56*	1.48*	1.52*
Delayed childbearing (> 34 years)	1.34*	1.66*	1.48*
<b>- <u>Parity</u></b>			
Low-risk (1-3 births)	-	-	-
High-risk (> 3 births)	1.19*	1.05*	1.08*
<b>- <u>Birth interval</u></b>			
Low-risk (> 18 months)	-	-	-
High-risk (< 18 months)	1.17*	1.09*	1.27*
<b>Antenatal care uptake</b>			
<b><u>Antenatal visits</u></b>			
No sufficient ANC visits	-	-	-
Sufficient ANC visits	0.49*	0.56*	0.58*

All \* values are significant at 5% level of significance

Model-2: Reference category: No-risk