

MONASH University

Women's Autonomy and Reproductive Health in Bangladesh

Submitted by

Sumaiya Abedin

(BSc Honours, MSc and MPhil, University of Rajshahi)

A thesis submitted for the degree of *Doctor of Philosophy* at

Monash University in 2017

School of Social Sciences

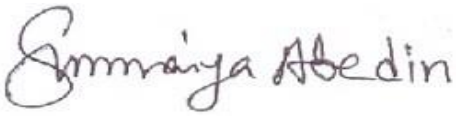
Copyright notice

© The author (*2017*).

I certify that I have made all reasonable efforts to secure copyright permissions for third-party content included in this thesis and have not knowingly added copyright content to my work without the owner's permission.

DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature: … 

Print Name: Sumaiya Abedin

Date: 25 January 2017

ABSTRACT

A high level of maternal, infant and neonatal mortality occurs in Bangladesh. Certain childbearing practices lead to a pattern of high-risk fertility as well as making Bangladeshi women more vulnerable to childbearing risks and adverse birth outcomes. Women in Bangladesh remain considerably subordinate to men in almost all aspects of their lives, from education and work opportunities to healthcare utilisation. The 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 aims to investigate the low status of women in relation to the significant amount of adverse reproductive health outcomes in Bangladesh, examining their autonomy and reproductive health in a single framework.

This thesis examines the nature of the associations between women's autonomy and reproductive health as measured through high-risk fertility, high-risk pregnancy and adverse perinatal outcomes. In particular, the principal aim is to measure the influences of women's autonomy in decision-making, physical mobility and economic matters on their reproductive health and outcomes. Furthermore, it also investigates whether the level of autonomy and reproductive health experiences differ across Bangladesh at local community and district levels.

The present study adopts a quantitative approach and uses data from the Bangladesh Demographic and Health Survey (BDHS 2011). A multilevel approach is applied to investigate the influences of autonomy on the reproductive health of women and their variations in different locations across Bangladesh. Multilevel logistic regression models (MLRM) of categorical response variables, and a causal mediation model (CMM) are used as statistical tools to analyse the relevant data for each outcome variable: high-risk fertility, high-risk pregnancy and perinatal mortality.

The analysis reveals that in Bangladesh, women have low levels of autonomy in economic matters. Nearly 90% of women do not have control of their own economic

resources, either their husband or other family member decides how to spend their earnings. Among the three dimensions of autonomy, decision-making autonomy of women is found to be the strongest factor influencing high-risk fertility and maternal healthcare utilisation. Although, the level of autonomy is found to be significantly associated with high-risk childbearing practices, it does not have any significant effects on high-risk pregnancy and perinatal death. Rather, the influence of autonomy on birth outcomes was transmitted through the pathways of maternal age, parity, birth interval and use of antenatal care services. It was also found that maternal healthcare utilisation mediates the relationship between autonomy and high-risk fertility, high-risk pregnancy and perinatal outcomes. Women's level of education and place of residence were found to be strong inhibiting factors influencing these relationships. Lastly, it is found that both the level of autonomy and reproductive health aspects vary significantly across Bangladesh.

ACKNOWLEDGEMENTS

I would like to begin by thanking my main supervisor, Dharma Arunachalam, whose academic guidance, constant encouragement and vision were indispensable in completing this thesis.

I wish to extend my sincere gratitude to my associate supervisors, Alan Petersen and Sara Niner, for their generous support, encouragement and suggestions throughout the entire course of my PhD candidature. Without their help this thesis would have never been completed.

I also wish to thank Brett Hough for proof-reading my thesis in accordance with the Australian Standards for Editing Practice, Standards D and E.

I am grateful to Monash University for awarding me an International Postgraduate Research Scholarship and an Australian Postgraduate Award. My sincere thanks go to the staff and students at the School of Social Sciences, whose kindness provided a very enjoyable study environment. Many thanks to Sue Stevenson for administrative support and suggestions.

My immeasurable thanks goes to my beloved parents and my husband. My achievements today would not have been possible without their unconditional love, encouragement and manifold support during the entire course of my study. Also, I am grateful and thankful to my dearest little son for his sacrifice. Finally, I would like to thank my friends, relatives and all well-wishers for their continuous encouragement during this journey.

TABLE OF CONTENTS

ABSTRACT ..... **III**

ACKNOWLEDGEMENTS ..... **V**

LIST OF FIGURES ..... **VIII**

LIST OF MAPS ..... **VIII**

LIST OF TABLES ..... **VIII**

CHAPTER 1 INTRODUCTION **1**

1.1 RATIONALE, SIGNIFICANCE AND AIMS OF RESEARCH 1
1.2 REPRODUCTIVE HEALTH OF WOMEN 5
1.3 AUTONOMY OF WOMEN: A PARADIGM SHIFT IN REPRODUCTIVE HEALTH RESEARCH 5
1.4 CONCEPTUAL FRAMEWORK 6
1.5 EPIDEMIOLOGY OF ADVERSE REPRODUCTIVE HEALTH OUTCOMES 11
1.6 BANGLADESH AT A GLANCE 14
1.7 THESIS STRUCTURE 19

CHAPTER 2 LITERATURE REVIEW **21**

2.1 INTRODUCTION 21
2.2 THE CONCEPT AND MEANING OF WOMEN'S AUTONOMY 21
2.3 MAJOR FINDINGS OF PREVIOUS STUDIES ON WOMEN'S AUTONOMY 24
2.3.1 Determinants of autonomy *24*
2.3.2 The influence of autonomy *25*
2.4 MAJOR FINDINGS OF REPRODUCTIVE HEALTH RESEARCH 28
2.4.1 Proximate determinants of reproductive health *29*
2.4.2 Childbearing practices, pregnancy health and birth outcome *31*
2.5 CONTRIBUTION TO THE EXISTING LITERATURE 33

CHAPTER 3 DATA AND METHODOLOGY **36**

3.1 INTRODUCTION 36
3.2 THE DATA: TYPE AND SOURCE 36
3.2.1 Sample design *37*
3.2.2 Questionnaire and data collection *38*
3.2.3 Study variables and measurements *39*
3.3 METHODOLOGY 48
3.3.1 Analysis of data: statistical tools *50*
3.4 ETHICAL CONSIDERATIONS 53

CHAPTER 4 PATTERNS OF WOMEN'S AUTONOMY **54**

4.1 INTRODUCTION 54
4.2 STATUS OF WOMEN IN BANGLADESH 55
4.3 STUDY POPULATION, DATA AND METHODS 57
4.3.1 Data and variables *57*
4.3.2 Methods of analysis *58*
4.4 RESULTS AND DISCUSSION 59
4.4.1 Results of statistical analysis *59*
4.4.2 Discussion *64*

CHAPTER 5 ACCESS TO AND UTILISATION OF MATERNAL HEALTHCARE **73**

5.1 INTRODUCTION 73
5.2 CONCEPTUAL FRAMEWORK 74
5.3 AN OVERVIEW OF THE DETERMINANTS OF MATERNAL HEALTHCARE UTILISATION 76
5.4 DATA AND METHODS 79

5.5 RESULTS AND DISCUSSION 80
5.5.1 Results of multilevel analysis 80
5.5.2 Discussion 85

CHAPTER 6 HIGH-RISK FERTILITY BEHAVIOUR 93
6.1 INTRODUCTION 93
6.2 HIGH-RISK AND LOW-RISK FERTILITY 94
6.3 CHILDBEARING PRACTICES AND ROLE OF WOMEN IN BANGLADESH 95
6.4 DATA AND METHODS 97
6.4.1 Study population and variables 97
6.4.2 Methods of analysis 98
6.5 RESULTS AND DISCUSSION 99
6.5.1 Women of high-risk childbearing practices 99
6.5.2 Results of multilevel regression analysis 100
6.5.3 Discussion 104

CHAPTER 7 CHILDBEARING COMPLICATIONS AND HIGH-RISK PREGNANCY 112
7.1 INTRODUCTION 112
7.2 HIGH-RISK PREGNANCY 113
7.3 PREGNANCY HEALTH STATUS AND ASSOCIATED FACTORS 114
7.3.1 The socio-economic factors 114
7.3.2 Maternal factors related to pregnancy and childbirth 115
7.3.3 Healthcare seeking behaviour 116
7.4 DATA AND METHODS 116
7.5 RESULTS AND DISCUSSION 119
7.5.1 Women with pregnancy complications and high-risk pregnancies 119
7.5.2 Determinants of high-risk pregnancy: Multinomial Regression Analysis 120
7.5.3 Discussion 121

CHAPTER 8 RISK FACTORS OF PERINATAL MORTALITY 130
8.1 INTRODUCTION 130
8.2 PERINATAL MORTALITY 131
8.3 BIRTH OUTCOMES FROM A SOCIO-DEMOGRAPHIC PERSPECTIVE 131
8.3.1 Maternal socio-economic factors 132
8.2.2 Childbearing practices 133
8.2.3 Healthcare seeking behaviour of women 134
8.4 CONCEPTUAL FRAMEWORK 135
8.5 STUDY POPULATION, DATA AND METHODS 137
8.5.1 Variables and measurements 137
8.5.2 Methods of analysis 139
8.6 RESULTS AND DISCUSSION 140
8.6.1 Patterns of stillbirths and early neonatal deaths 140
8.6.2 Determinants of perinatal deaths 141
8.6.3 Associations between autonomy and perinatal deaths: Causal Mediation Analysis 142
8.6.4 Discussion 142

CHAPTER 9 CONCLUSION 149
9.1 SUMMARY OF THESIS 149
9.2 RECOMMENDATIONS 153
9.3 LIMITATIONS OF PRESENT STUDY AND FUTURE DIRECTIONS 156

REFERENCES 158

LIST OF FIGURES

FIGURE 1.1: ASSOCIATIONS BETWEEN AUTONOMY AND THE REPRODUCTIVE HEALTH OF WOMEN 10
FIGURE 4.1: LEVELS OF WOMEN'S AUTONOMY 59
FIGURE 5.1: THE RELATIONSHIP BETWEEN AUTONOMY AND MATERNAL HEALTHCARE UTILISATION 75
FIGURE 7.1: HEALTH COMPLICATIONS DURING PREGNANCY (%) 117
FIGURE 8.1: CAUSAL RELATIONSHIP BETWEEN AUTONOMY AND PERINATAL DEATHS 136
FIGURE 8.2: THE RATE OF STILLBIRTH, NEONATAL DEATH AND PERINATAL MORTALITY PER 1,000 LIVE BIRTHS 138

LIST OF MAPS

MAP 1: POLITICAL MAP OF BANGLADESH 14

LIST OF TABLES

TABLE 3.1: VARIABLES OF WOMEN'S AUTONOMY 41
TABLE 3.2: VARIABLES OF WOMEN'S SOCIO-ECONOMIC ATTRIBUTES 44
TABLE 3.3: VARIABLES OF MATERNAL HEALTHCARE UTILISATION 45
TABLE 3.4: VARIABLES OF CHILDBEARING PRACTICES OF WOMEN 46
TABLE 4.1: MEAN VALUES OF AUTONOMY INDICES BY REGION AND PLACE OF RESIDENCE 68
TABLE 4.2: MEAN VALUES OF AUTONOMY INDICES BY ADMINISTRATIVE DISTRICTS 68
TABLE 4.3: DETERMINANTS OF WOMEN'S AUTONOMY – RESULTS OF MMRA (FIXED EFFECTS) 70
TABLE 4.4: RANDOM EFFECT ESTIMATES – RESULTS OF MMRA 71
TABLE 4.5: DETERMINANTS OF OVERALL WOMEN'S AUTONOMY – RESULTS OF MMRA 72
TABLE 5.1: DETERMINANTS OF MATERNAL HEALTHCARE UTILISATION – RESULTS OF MLRA 90
TABLE 5.2: DETERMINANTS OF MATERNAL HEALTHCARE UTILISATION – RESULTS OF MLRA 91
TABLE 6.1: WOMEN OF HIGH-RISK MATERNAL AGES 108
TABLE 6.2: WOMEN OF HIGH-RISK BIRTH INTERVALS AND HIGH-RISK PARITY (%) 108
TABLE 6.3: HIGH-RISK FERTILITY OF WOMEN 108
TABLE 6.4: DETERMINANTS OF HIGH-RISK MATERNAL AGE, PARITY AND BIRTH INTERVAL – RESULTS OF MLRA 109
TABLE 6.5: DETERMINANTS OF HIGH-RISK FERTILITY – RESULTS OF MMRA 110
TABLE 6.6: DETERMINANTS OF HIGH-RISK FERTILITY – RESULTS OF MMRA 111
TABLE 7.1: WOMEN WITH HEALTH COMPLICATIONS DURING PREGNANCY 127
TABLE 7.2: PREVALENCE OF HIGH-RISK PREGNANCIES 127
TABLE 7.3: DETERMINANTS OF HIGH-RISK PREGNANCY – RESULTS OF MLRA 127
TABLE 7.4: DETERMINANTS OF HIGH-RISK PREGNANCY – RESULTS OF MLRA 128
TABLE 8.1: PATTERNS OF STILLBIRTH AND EARLY NEONATAL DEATHS 147
TABLE 8.2: DETERMINANTS OF PERINATAL DEATHS – RESULTS OF BLRA 148
TABLE 8.3: EFFECTS OF AUTONOMY ON PERINATAL DEATHS – RESULTS OF CMA 148

Chapter 1

Introduction

1.1 Rationale, significance and aims of research

This study examines the links between women's autonomy and reproductive health as measured by high-risk fertility, high-risk pregnancy and perinatal outcomes. The primary motivation of this thesis is to contribute to the area of women's reproductive health in Bangladesh by addressing the issues related to the three dimensions of autonomy: decision-making autonomy, autonomy in physical mobility and economic autonomy. The reproductive health status of women can be described by childbearing practices, maternal health conditions (prenatal, antenatal and postnatal health) and birth outcomes (live births, stillbirths and the health status of the newborn). Family planning and the utilisation of maternal healthcare also remain important determinants of reproductive health. Since the International Conference on Population and Development (ICPD) in 1994, empowering women in the developing world has become a primary policy goal with a direct link to reproductive health. Thus, women's autonomy is considered a key pathway to ensuring reproductive rights, universal access to reproductive healthcare services, safe-motherhood and successful health outcomes.

Safe-motherhood has been a major challenge in Bangladesh. The past decade has seen a growing concern with women's health as evidenced by the safe-motherhood initiatives and by the adoption of reproductive health perspectives in addressing family planning, pregnancy health, child survival and women's empowerment issues. In Bangladesh, marriage and children remain universal goals for women (Islam et al. 2004,

1998). Childbearing begins at an early age – just after marriage, and most women have many children over their reproductive span with only short intervals between them. All of these factors make women vulnerable to childbearing risks and adverse birth outcomes (BDHS 2011). Bangladesh has one of the world's highest rates of adolescent motherhood (one in three teenage girls in Bangladesh is a mother) and a high adolescent fertility rate of 83 per 1,000 women. In addition to this, the maternal mortality rate is 170 per 100,000 live births, and about 320,000 women suffer from severe maternal morbidities each year (BDHS 2011). Furthermore, a high level of perinatal, neonatal and infant mortality (about 55, 24.2 and 33 per 1,000 live births respectively) also reflects the poor perinatal health status in Bangladesh (WHO 2014).

In Bangladesh, most women's lives remain centred on their traditional roles and they have limited access to education and the labour markets. This lack of opportunities leads to poor status for women, which also contributes to reduced family well-being and generally poor health outcomes for both mother and newborn. Considering the poor status of women in Bangladesh and the significant amount of adverse health outcomes for both mother and child, it is critically important to develop a comprehensive understanding about the role and rights of women in reproductive health matters. Since an individual's perceptions, interests and behaviours vary according to the socio-cultural context, the social environment influences women's status and health, as well as childbearing and healthcare practices in different ways. Therefore, it is also necessary to assess how the level of women's autonomy and reproductive health vary across different geographical locations in Bangladesh. This study assumes a greater importance for these issues and examines women's autonomy and reproductive health components in a single framework.

The principal aim of this study is to measure the influence of autonomy in decision-making, physical mobility and economic matters on women's reproductive health. The research questions explored in this study are:

- How is autonomy associated with the reproductive health of women? More specifically,
    - How does autonomy influence high-risk fertility, high-risk pregnancies and perinatal mortality?
    - How does autonomy influence maternal healthcare practices? Particularly, if and how maternal healthcare utilisation mediates the relationship between autonomy and reproductive health?
- Is autonomy and the reproductive health of women context dependent? More specifically,
    - How, and to what extent, do women's autonomy and reproductive health components vary across Bangladesh?

To address the overall research aim and to answer the research questions, this study proposes an overall research hypothesis: *Women with higher levels of autonomy have more control over their reproductive health and, therefore, are less likely to experience high-risk fertility, high-risk pregnancy and thus adverse perinatal outcomes*.

The level of education, work status, religion and residential status as well as the socio-economic status of women influence childbearing practices. In addition to this, they are also influenced by utilisation of reproductive healthcare, which largely depends on women's awareness of and access to healthcare services. Therefore, it can be hypothesised that *maternal healthcare utilisation, as well as the socio-economic characteristics of women, influence the association between women's autonomy and high-risk fertility*.

Studies on pregnancy and childbirth mainly focus on the physiological context. However, the associations between autonomy, pregnancy and childbirth are assumed to be influenced by the childbearing practices, healthcare utilisation and socio-economic characteristics of women. Therefore, this study hypothesises that *there is no direct causal relationship between autonomy and high-risk pregnancy as well as perinatal outcomes*; *moreover, maternal healthcare utilisation and childbearing practices mediate their relationship*.

The availability of family planning services, quality healthcare facilities, skilled attendants at birth, emergency treatment of health complications during pregnancy and delivery are required for reducing adverse maternal health outcomes. While most Bangladeshis live in rural areas, medical facilities alone with most skilled healthcare professionals are mainly located in urban areas. Thus, there remains a lack of quality healthcare facilities in rural areas that make rural women vulnerable to poor health outcomes. In addition to this, rural areas in Bangladesh rarely have quality education facilities or employment opportunities compared to urban areas. This also influences women's understanding and attitude towards reproductive health matters. Therefore, this study hypothesises that *both autonomy and reproductive health (the prevalence of high-risk fertility, high-risk pregnancy and perinatal death) of women are likely to vary over different geographic locations across Bangladesh.*

To examine women's autonomy and reproductive health, the present study relies on a national representative sample of 17,842 women who participated in the 2011 Bangladesh Demographic and Health Survey (BDHS). To address the overall research aim and answer the research questions, it is first necessary to discuss the concept of reproductive health and autonomy of women. This discussion is presented in the following sections.

1.2 Reproductive health of women

The International Conference on Population and Development (ICPD) defines reproductive health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and its functions and processes" (United Nations Population Division 1995). Reproductive health, therefore, implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Reproductive health is part of general health, which is a universal concern. But it is of special importance for women of reproductive age, particularly for pregnancy and childbirth, as well as problems that stem from poor maternal health and lead to adverse health outcomes for both mother and newborn.

The most important part of women's reproductive health is maternal health, which refers to the health of women during pregnancy, childbirth and the postpartum period. While motherhood can be a positive and fulfilling experience, for too many women it is associated with suffering, ill health and even death. An investigation of reproductive health problems thus requires an examination of maternal health, including childbearing practices and complications, birth outcomes as well as family planning and antenatal care concerns. Until women have reproductive freedom they cannot significantly improve their reproductive health status, thus raising the issue of 'empowering women' to achieve reproductive health goals.

1.3 Autonomy of women: a paradigm shift in reproductive health research

According to Dyson and Moore (1983), autonomy of women refers to the control that women have over their own lives, that is, the extent to which they have an equal voice in matters affecting themselves and their families, control over material and other resources, access to knowledge and information, the authority to make individual

decisions, freedom to move and the ability to forge equitable power relationships. In the developing world's context, women's demands for autonomy begins with the right to education, to have control over their own lives, including reproductive health matters and improving their status at family and social levels.

The Program of Action of the International Conference on Population and Development (ICPD) in 1994 called for gender equality, the empowerment of women and the comprehensive fulfilment of women's reproductive health and rights. For the first time, there was a clear focus on the need to empower women and the connection between human rights and reproductive health and rights. The reproductive rights of women were introduced first and it was recognized that a woman should have the freedom to decide whether, when and how many children to have. She should also have the right to legal and safe abortion, the right to birth control, as well as access to modern family planning information and methods of choice, and access to quality reproductive and maternal healthcare services (United nations Population Division 1995). In this way, autonomy in decision-making and physical mobility, as well as women's access to and control over economic resources, became a key pathway in achieving an improved reproductive health status.

1.4 Conceptual framework

This study argues that women's level of autonomy (in decision-making, physical mobility and economic matters) influences their childbearing practices, maternal health conditions and birth outcomes. In this study, autonomy of women is hypothesised as a major factor in influencing high-risk fertility, high-risk pregnancy and perinatal mortality. Although there may not be any direct relationships between each of the three components of reproductive health and autonomy levels, there are indirect links

between them. Therefore, the present study assumes the existence of some other factors which influence the relationship between autonomy and reproductive health of women. This study measures women's reproductive health in terms of high-risk fertility, high-risk pregnancy and perinatal outcomes and investigates the indicators of these components of reproductive health. *High-risk fertility* is a level of fertility that refers to certain childbearing practices which describe those women who bear children at very early or very late ages, and/or who bear too many children with short birth intervals and, thus, put themselves and their newborns at increased risk of morbidity or mortality (Population Report 1978). Following the framework consisting of proximate variables of fertility proposed by Davis and Blake (1956), Bongaarts (1978) and Morgan (1996) the two measures of high-risk fertility are determined as being: *maternal age* (the age of the mother when births occur) and *parity* or *children ever born* (the actual number of children ever born to a woman). Additionally, as proposed by Srinivasan (1966), another measure of high-risk fertility is: *birth interval* (the interval between two successive births, which is relatively more sensitive to capturing small changes in fertility levels).

High-risk pregnancy involves major health complications during pregnancy and childbirth that could be life threatening for the mother, for the newborn or for both and may lead to maternal mortality or severe morbidity (Gilbert 2010; Luke & Brown 2007). On the other hand, an uncomplicated pregnancy is generally considered a state of maternal health rather than a disease. Those pregnancies which are full-term (more than 37 weeks of gestation) and do not have any congenital anomalies in the newborn, as well as an absence of severe health complications during pregnancy are considered as uncomplicated pregnancies that can provide sound health to the mother and the newborn (Healthy People, 2010; Gilbert 2010; Enkin et al. 2000). All health complications during pregnancy and childbirth that tend to long-term maternal

morbidity or mortality can be considered as the major determinants of maternal health in reproductive health research.

Perinatal outcome refers to live births, stillbirths, preterm or premature births, as well as early neonatal deaths. Reducing perinatal mortality and poor health outcomes is gaining increased international attention in order to achieve child survival goals. *Perinatal mortality*, which reflects adverse perinatal outcomes (stillbirths and early neonatal deaths), is an important indicator of reproductive health. It is the worst outcome of pregnancy and is measured through the number of foetal deaths in late pregnancy (after 22 completed weeks of gestation or, if the gestational age is unknown, the birth weight is less than 500 grams, as defined by WHO), as well as the death of a newborn within 7 days of life. *Perinatal deaths* are one of the key issues in maternal health, especially for developing countries, and thus represent a major challenge to the healthcare system.

To investigate the links between reproductive health and autonomy, this study examines the three dimensions of autonomy: decision-making, physical mobility and economic autonomy. *Decision-making autonomy* refers to women's role in making household decisions, decisions regarding the timing and number of children, decisions about the use and methods of contraception and decisions about their own and their children's healthcare. *Autonomy in physical mobility* refers to women's freedom of movement, which is the ability of women to go outside the home to visit family and relatives, access healthcare or for other purposes such as employment. And, *economic autonomy* refers to women's control over cash and earnings as well as decisions about spending money for any purposes including their own healthcare.

It is recognized that autonomy has a major impact on childbearing practices (Gipson et al. 2011; Islam et al. 2004, 1998; Amin & Lloyd 2002; Hossain 1998), as well as

women's behaviour towards reproductive healthcare utilisation (Woldemicael & Tenkorang 2010; Mistry et al. 2009; Mumtaz & Salway 2007, 2009; Pillai & Gupta 2006; Bloom et al. 2001; Khan, 1997; Sathar & Kazi 1997). It is also well documented that maternal healthcare initiatives are essential for sound pregnancy health and successful outcomes (Nahar et al. 2012; Haque et al. 2011; Rahman et al. 2011; Sikder et al. 2011). Although the decision to use healthcare services is mostly an individual choice, it can also be considered as a complex behavioural phenomenon that is influenced by a woman's surrounding environment. Moreover, the socio-economic characteristics of women are considered to influence their perception, understanding and attitudes towards any issue, including childbearing practices, family planning and healthcare utilisation (Adhikari 2010; Mumtaz & Salway 2007; Agarwala & Lynch 2006; Dharmalingam & Morgan 2004; Jejeebhoy 2000; Sathar & Mohammad 1984). Therefore, investigation of high-risk fertility, high-risk pregnancy and adverse perinatal outcomes requires an in-depth and comprehensive analysis of all these factors in a single framework.

Figure 1.1 shows the conceptual relationship between autonomy and women's reproductive health that informs this study. Variables of women's autonomy (decision-making, physical mobility and economy matters) are hypothesised to influence the women's reproductive health and outcome in terms of childbearing practices, maternal health conditions and birth outcomes. In this context, *childbearing practices* refer to maternal age, the number of children ever born and intervals between two successive births; *maternal health* status refers to both pregnancy health and delivery conditions; and *perinatal outcome* includes both live births and perinatal deaths (stillbirths and early neonatal deaths). It is further assumed that higher levels of autonomy may increase women's decision-making power regarding the timing and number of children, their independent mobility to go outside the home for healthcare purposes as well as

their ability to use and access their financial resources to seek healthcare. Additionally, individual demographic and socio-economic factors such as education, employment, socio-economic status, religion and place of residence affect women's healthcare-seeking behaviour, which are also assumed to influence the relationship between autonomy and reproductive health outcomes.

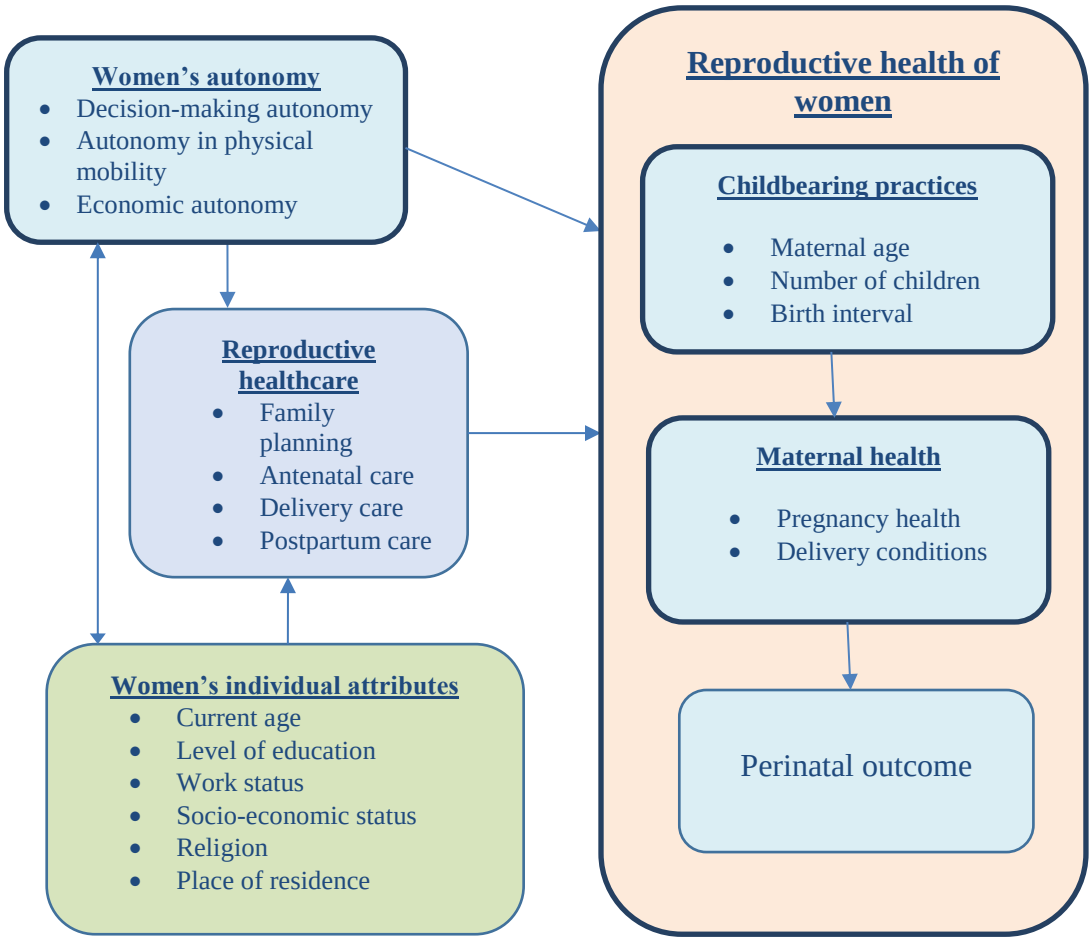


Figure 1.1: Associations between autonomy and the reproductive health of women

In addition to this, women residing in different locations in Bangladesh are assumed to have different perceptions, cultural backgrounds, levels of education and employment facilities, as well as different levels of access to medical facilities. All of these affect their autonomy level, childbearing practices and healthcare utilisation. The present

study assumes that the existing influences of autonomy on high-risk fertility, high-risk pregnancy and birth outcomes vary across Bangladesh. To investigate this phenomenon, a multilevel approach is applied to the entire framework where individuals (Level 1) nested within communities (Level 2) and districts (Level 3).

1.5 Epidemiology of adverse reproductive health outcomes

Childbearing in human population is a universal biological event and varies greatly at individual as well as collective levels. Approximately 350,000 women died from pregnancy-related causes worldwide in 2008 – mostly from developing countries (WHO 2011; UNFPA 2011). Apart from maternal mortality, around 300 million women suffer from severe maternal morbidities each year in developing countries (WHO 2011). The World Health Organization stated that the worldwide major causes of maternal deaths are severe vaginal bleeding during delivery or haemorrhage (25%), infections (13%), unsafe abortions (13%), eclampsia (12%), obstructed labour (8%) and other indirect causes (20%) such as malaria, anaemia, HIV/AIDS and cardiovascular disease, which complicate pregnancy or are aggravated by it (World Health Report 2010). In Bangladesh, about 11,000 to 21,000 women die each year due to these pregnancy-related complications (WHO 2013), and a further 320,000 women suffer from severe maternal morbidities (BDHS 2011).

Besides maternal mortality and morbidity, foetal, neonatal and infant deaths also occur at disproportionately high levels in developing countries. Developing countries account for the vast majority of four million foetal deaths each year (Save the Children 2011). The worldwide stillbirth rate is 18.9 per 1,000 births of which about 76·2% occurred in South Asia and Sub-Saharan Africa. Though the perinatal mortality rate is 53 per 1,000 live births globally, developing countries have a higher perinatal mortality rate of 57 compared to 11 per 1,000 live births in developed countries. At a global level, the

neonatal mortality rate is 36 per 1,000 live births that accounts for more than five million annual neonatal deaths, of which about 98% occur in developing countries (WHO 2011).

The South Asian region is one of the most populous in the world and it bears a disproportionate burden of infant and child mortality (WHO 2011; UNFPA 2010). Among the South Asian countries, Pakistan accounts for the highest neonatal and infant mortality rates with 64 neonatal deaths and 42 infant deaths per 1,000 live births (WHO 2011). India, Bhutan and Nepal also show almost the same rate, whereas Sri Lanka has achieved a much better outcome with an infant mortality rate of 9.7 per 1,000 live births and a neonatal mortality rate of 9.0 per 1,000 live births. Bangladesh accounts for a relatively high level of infant mortality (52 per 1,000 live births), neonatal mortality (27 per 1,000 live births) and perinatal mortality (55 per 1,000 pregnancies) (WHO 2011; BDHS 2011). The relatively high level of stillbirth rate and early neonatal mortality rate (37 and 38 per 1,000 births) reflects the poor perinatal health status in Bangladesh.

Apart from high perinatal, neonatal and maternal mortality rates, low birth weight and preterm births are also very common in developing countries, including Bangladesh. The rates of premature birth and low birth weight in Bangladesh in 2010 were 14 and 220 per 1,000 live births respectively (WHO 2011; BDHS 2011) indicating the poor status of infant health. Poor birth outcomes as well as perinatal, neonatal and maternal mortality have often been used as indicators of reproductive health status and healthcare systems in a country. Ensuring safe pregnancy and healthy perinatal outcomes is necessary if there is going to be further improvements in reproductive health and safe-motherhood practices in Bangladesh.

The state of reproductive health in Bangladesh has been gradually improving since the adoption of the ICPD global policy in 1994. The country has modified its approach to fertility reduction not only through family planning but also through a broad-based reproductive health approach, including reproductive rights and women's empowerment. However, despite improvements in many ways, Bangladeshi women are still vulnerable to adverse reproductive outcomes. Exploring these issues requires an in-depth examination of reproductive health components and the participation of women in reproductive health and related issues.

1.6 Bangladesh at a glance



Map 1: Political Map of Bangladesh

The population

Bangladesh is a South-Asian country with one of the highest population densities in the world: more than 1,161 people per square kilometre (World Bank 2013). According to

the Population Census 2011, the total population of Bangladesh is 142.3 million, of which 71.3 million are males and 71.1 million are females. The current annual population growth rate is 1.34% (BBS 2011). The population of Bangladesh is characterized by a young age structure (about 40% of total population remain under 15 years of age) and relatively high proportion of married women in the reproductive ages with a low female age at marriage.

The country is divided into 7 divisions and 64 districts. Muslims make up almost 90% of the population of Bangladesh, Hindus and other religions account for 9% and 1% respectively (DGHS 2012). The national language of Bangladesh is *Bangla*, which is spoken and understood by all (NIPORT 2007). More than 70% of people still live in rural areas and cannot easily access proper education facilities, employment opportunities and healthcare facilities (World Bank 2013).

Socio-economic context

According to the Human Development Index (HDI) Bangladesh ranked 142 out of 187 countries and territories (UNDP 2015). The HDI value for 2014 was 0.570, which put the country in the medium development category. The Human Poverty Index (HPI), which is a multidimensional measure of poverty, shows that in Bangladesh about 43.3% of total population are living below the income poverty line, while an additional 18.8% live near poverty and about 21% live in severe poverty (UNDP 2015). Agriculture is the single largest producing sector of the Bangladeshi economy, which contributes about 22% to the total GDP and employs about 48% of the labour force (NIPORT 2007; BBS 2008). The manufacturing sector contributes about 17% of total GDP, and is becoming increasingly important as a result of foreign investments.

The adult literacy rate in Bangladesh has increased from 29.2% in 1981 to 57.7% in 2011 (World Bank 2013). Bangladesh has a high average years of schooling per capita for South Asia, nevertheless over 40% of the population have never been to school. Of those that have education almost all have completed primary school and many have progressed to secondary and tertiary school. Primary education is free and compulsory until the age of 10, however, many children drop out of school and work as child labourers to help support the household.

Political context

The present territory of Bangladesh was a part of Pakistan and was known as East Pakistan. It was separated from West Pakistan and emerged on the world map as a sovereign state in 1971, after fighting a nine-month war of liberation. The country is bordered by the Bay of Bengal in the South, Myanmar in the south-east, and India to the east, north and west. Bangladesh is a unitary state and parliamentary democracy. The Liberation War, which led to the creation of the independent state of Bangladesh in 1971, destroyed about a fifth of Bangladesh's economy, and post-war dislocations left the country on a slow growth trajectory for the better part of two decades.

Fertility pattern and childbearing practices

Bangladesh has gone through a critical phase of fertility transition. Fertility rates reported in the Bangladesh Demographic and Health Surveys (BDHS) reflect an extremely steep decline in the age-specific and total fertility rates (TFR) over 20 years of age. Following a significant decline in fertility in the late 1970s and 1980s from 6.3 to 3.4 births per woman, fertility in Bangladesh began to plateau. The total fertility rate then stalled at 3.3 for about ten years during the 1990s (BDHS 1996, 1994; ICDDR,B 2005, 1994; NIPORT 2005, 2001). Both the age-specific fertility rate (ASFR) and TFR in Bangladesh show a decreasing trend over time. The current ASFR shows the fertility

of Bangladeshi women is heavily concentrated in the early years of reproduction, indicating an age pattern of early childbearing, particularly between 20 to 24 years. The trend of ASFRs and TFRs during the last three decades show that although the fertility rate in Bangladesh has markedly fallen, the birthing pattern remains more or less the same and a prolonged reproductive span still persists (BBS 2013; BDHS 2011, 2007, 2004).

A very young age at marriage and early pregnancy is common in Bangladesh. The total fertility rate (TFR) in Bangladesh is 2.8 births per currently married woman. More than 50% of women aged 15 to 19 years who have been married have at least one child, although most have had only one. At ages 20 to 24 years, about 51% of ever-married women have had two or more births and 10% of them had at least four births. Around 55% of women in their early thirties have had four or more children (BDHS 2011), which is indicative of high-risk fertility. The percentage of women who have never given birth is extremely low (less than 3%); indicating that childbearing among Bangladeshi women is nearly universal.

Women's life and status

Bangladesh is a largely patriarchal society in which social and cultural norms sometimes curtail the ability for women to make decisions regarding their own lives. Although women and men are, according to the constitution, equal; in reality, they are not. In general, the role of women has been that of daughter, wife and mother. Their activities in the socio-cultural milieu are primarily domestic in nature and confined to the home. Additionally, for many activities and decisions, women are supervised by their husband or their mother-in-law.

The Gender Inequality Index (GII), which reflects gender-biased inequalities in three dimensions (reproductive health, empowerment and economic activity), ranks

Bangladesh 111 out of 155 countries (UNDP 2015) with a value of 0.503. In Bangladesh, about 30% of women do not have any basic education, about 21% have only a primary education, and about 34.1% of adult women have reached a secondary level of education compared to men (UNDP 2015; Bangladesh Literacy Survey 2013). In addition, while 35% of women have paid employment, one in three do not have any access to their own income, so that either their husband or other family members decide about their earnings. This lack of opportunities leads to poor status for women, which also contributes to reduced family well-being, childbearing risks and generally poor health outcomes for both mother and newborn. Poor levels of education and low status within the home and society thus make Bangladeshi women inferior as well as vulnerable in many spheres of life.

Bangladesh has deeply rooted patriarchal ideals and has relatively low valuation of women. Domestic violence is a pervasive problem and presents a huge threat to the security of girls and women. More than half of ever-married women aged 15 to 49 years reported that they had experienced some form of physical and/or sexual violence from their husbands (NIPORT 2011, World Bank 2007). Additionally, more than one-third of both men and women believe that men are justified in beating their wives in specific circumstances, such as arguing. The practice of dowry, a lower age at marriage and poverty are all associated with women's higher likelihood of experiencing and condoning violence.

The nutritional status of women remains alarming. Almost one-third of women of reproductive age have a body mass index of less than 18.5; this means they are very underweight. Even among the wealthiest quintile of society about 13% of women are underweight (UNICEF 2011; NIPORT 2009). Inadequate intake of food and poor diet are the primary causes of malnutrition. Anaemia is a severe public health problem, which is experienced by 30% of adolescent girls (compared to 26% of adolescent boys)

and almost half of all pregnant women. Rural women and the poor are the worst sufferers. Vitamin A and iron deficiency is also common among women, which particularly affects pregnant and lactating mothers, increasing the chances of maternal mortality.

Healthcare system

Health services are delivered by both the public and non-public sectors. In the public sector, the Ministry of Health and Family Welfare is the main agency providing public health services, including promotive and preventive services. However, the public sector health facilities are poorly equipped with medical devices, instruments and supplies (World Bank 2012). The health system in Bangladesh is thus characterised by a massive shortage of skilled health workers, clustered disproportionately in urban areas while rural facilities are overburdened and insufficiently equipped. Most of the significant health institutions are located in the capital city which shows great centralisation, while health workers are concentrated in urban secondary and tertiary hospitals, although more than 70% of the population lives in rural areas (BHSR 2015). Also, most of the skilled healthcare professionals are mainly concentrated in the urban areas. On the other hand, low skilled/semi-qualified practitioners such as village doctors and community health workers are mainly concentrated in rural areas. There is also a shortage in rural areas of maternal-child healthcare centres, emergency delivery care services and skilled birth attendants.

1.7 Thesis structure

The thesis is organised into nine chapters. *Chapter 1* is the introductory chapter that contains the rationale and significance of the study, as well as the research questions and objectives. *Chapter 2* comprises a summary of the relevant literature, which provides insights regarding women's autonomy and reproductive health including

family planning, maternal health care utilisation, childbearing practices, and childbearing complications and adverse outcomes at the global and the South Asian levels, with particular focus on the Bangladeshi context. Furthermore, an explanation of how this thesis adds to the literature is included here. *Chapter 3* deals with the source and type of data used for this study and the research methods, including study variables, measurement of variables, analysis of data and the statistical tools used for data analysis.

Chapter 4 is the first analytical chapter, which focuses on the patterns of women's autonomy in Bangladesh. The main objective of this chapter is to measure women's autonomy indicators and to identify the influence of women's socio-economic characteristics on the level of autonomy in different locations across Bangladesh. *Chapter 5* examines women's behaviour towards maternal healthcare services as well as investigates the influences of autonomy on the utilisation of those services at different geographic locations across Bangladesh. *Chapter 6* measures the influences of the three autonomy dimensions (decision-making autonomy, autonomy in physical mobility and economic autonomy) on high-risk fertility. In this chapter, high-risk fertility is measured through maternal age, parity and birth intervals. *Chapter 7* measures high-risk pregnancies through several health complications during pregnancy and investigates the associations between autonomy and high-risk pregnancies. *Chapter 8* investigates the risk factors of perinatal deaths by examining the direct and indirect effects of autonomy on perinatal outcomes. The main purpose of the chapter is to establish the links between women's autonomy and perinatal outcomes through pathways with which the autonomy of women influences perinatal deaths in Bangladesh.

Chapter 9 contains the summary of results of the analysis, limitations of the study and conclusion.

Chapter 2

Literature Review

2.1 Introduction

To address the overall research aim of examining the links between women's autonomy and reproductive health, a systematic review of the existing literature was undertaken to gather ideas about outcomes, predictors and methods. Insights have been gained from socio-demographic studies regarding women's autonomy, family planning, maternal healthcare and childbearing practices, and to some extent epidemiological views regarding pregnancy complications and birth outcomes in the global, South Asian and particularly in the Bangladeshi context. This chapter begins by addressing studies on women's autonomy and concerns related to women's access to family planning and healthcare utilisation; second, major findings on reproductive health and the concerns related to childbearing practices and maternal health outcomes; and finally, the views on data and methods employed by previous research on autonomy and reproductive health. This chapter also synthesises the reported findings and observations, discusses the limitations of existing literatures, identifies the factors associated with reproductive health of women in Bangladesh and shows how this research contributes to those studies. The information gathered for this study is discussed in the following sections.

2.2 The concept and meaning of women's autonomy

The concept of autonomy in the literature includes women's autonomy, women's status and women's empowerment. Some researchers use these terms interchangeably. The use of these distinct concepts synonymously, however, leads to confusion and

inconsistent findings. Autonomy of women primarily refers to the decision-making power in multiple domains such as household purchases, healthcare or contraception, as well as physical mobility and economic matters. Several studies examined the relationship between female autonomy and demographic regimes (Cain et al. 1979; Dyson & Moore 1983) where women's status and autonomy were used and analysed almost interchangeably from a socio-economic perspective. For example, Dyson and Moore's study (1983) of the relationship between female autonomy and demographic regimes at the regional and national level in Indian states identified that individual socio-economic and demographic attributes such as education, employment and access to economic resources improve the health of women and their children. Those research works which focus on woman's autonomy as a determinant of woman's health or fertility and mortality mainly describe a high level of autonomy from the distribution of induced exogenous socio-economic variables such as income, education, religion and access to economic resources.

Several studies have also conceptualized and examined associational links between woman's status and autonomy and their health (Mason 1986; McCarthy et al. 1992). Women's status generally describes the relative socio-economic position of women, usually compared to men, but also to the position of women as compared to each other (Brunson et al. 2009; Mason 1986). McCarthy and Maine (1992) view woman's status as the position in society determined by their level of education, occupation and personal wealth and income. Autonomy was also conceptualised as woman's ability to make independent decisions where autonomy was measured by ability to travel on their own and to make use of healthcare services (Mason 1986; Jejeebhoy 2000). However, both status and autonomy of women were derived from economic and cultural institutional factors such as education, religious background and practices, as well as economic conditions and woman's access to those resources.

Jejeebhoy (2000) considers women's 'autonomy' and 'empowerment' as more or less equal terms and defines both in terms of women gaining control of their own lives in family, community and society. Kabeer (1999) also gives an encompassing definition of empowerment as referring to the expansion in women's ability to make strategic life choices in a context where this ability was previously denied to them. Autonomy and empowerment of women thus refers to similar processes that lead women to perceive themselves as able and entitled to make decisions regarding their own lives (Rowlands 1995).

Gender norms have a powerful influence on people's sexual identity, practices and behaviour. Therefore, gender equality and women's status or autonomy, as well as empowerment are considered important determinants of women's reproductive health. In recent decades, particularly after the International Conference on Population and Development (ICPD) and the Fourth World Conference on Women (FWCW) in 1995, women's autonomy issues have become a major force that affects women's health, more specifically reproductive motivations, behaviour and outcomes (United Nations Division for the Advancement of Women 1995). The aim of linking autonomy and women's reproductive health is to improve women's equality in education and economic opportunities with a special focus on improving maternal health, fulfilling reproductive rights and regarding men as equal partners in reproductive health matters by reducing gender inequalities.

The Demographic and Health Surveys (DHS) were one of the first group of surveys to collect empowerment data on nationally representative samples of women across numerous countries. In the DHS, under the *women's status* module, there are questions on the decision-making power women have over their own life and family, their freedom of movement and control over and access to their own or family income. In this way, women's autonomy issues become a major area of investigation with a direct

link to women's reproductive health and a key element in discussions of population health and health policy.

2.3 Major findings of previous studies on women's autonomy

The literature on women's autonomy includes a large number of sociology, anthropology and economic works, as well as demographic studies. Previous studies viewed autonomy both as a dependent and an independent variable depending on the specific study context. In reproductive health research, the autonomy of women is mainly viewed as an intermediate variable in association with other socio-demographic factors.

2.3.1 Determinants of autonomy

Many previous studies (Adhikari 2010; Mumtaz & Salway 2007; Fikree & Pasha 2004; Khan 1999; Cleland et al. 1996; Jejeebhoy 1995; Ganguly et al. 1987; Kabeer 1999; Casterline 1984; Sathar & Mohammad 1984) have identified the socio-economic determinants of autonomy, in the context of autonomy viewed as a dependent variable. Both women's status and autonomy were derived from socio-economic and cultural institutional factors such as education, income and religious beliefs and practices. Education is seen to be one of the most important means of empowering women with the knowledge, skills and self-confidence necessary to participate fully in the development process (ICPD). In this way literacy status and education of women is considered as a pivotal factor to influence their level of autonomy (Ganguly et al. 1987; Kabeer 1985; Casterline 1984; Sathar 1984 & Mohammad 1984). In almost every setting, the education of women was found to be negatively associated with age at marriage and number of children, and positively associated with labour force participation and contraception use. Better-educated women were more likely to have greater control over their own lives and thus could make better decisions for themselves

and their children (Adhikari 2010; Mumtaz & Salway 2007; Moursund et al. 2003; Fikree & Pasha 2004; Cleland et al. 1996; Jejeebhoy 1995).

A woman's employment outside the home is one of most important economic factors that can increase her domestic decision-making power and control over economic resources (Agarwala & Lynch 2006; Jejeebhoy 2000; Malhotra et al. 1999). In the Indian context, it was found that women's income increased their economic independence and thus increased their use of family-planning services (Dharmalingam et al. 1996).

Religious beliefs and practices also play an important role in determining the level of women's autonomy in developing countries. Women's mobility in Pakistan, a Muslim developing country, is closely linked to the Muslim practice of '*purdah*' that restricts women's mobility and their participation in public space (Khan, 1999; Mumtaz & Salway 2007). By restricting their mobility, *purdah* also impacts on the utilisation of family planning and healthcare services (Mumtaz & Salway 2005). The low status of women in Bangladesh is also a result of a rigid family system coupled with strong traditions of *purdah*. According to this tradition, women do not engage in trade, work outside the home or leave the family home other than for traditionally prescribed visits to relatives (Balk 1997; Arthur et al. 1978).

2.3.2 The influence of autonomy

A large number of studies identified the autonomy of women as a significant independent variable which influences women's fertility behaviour and healthcare utilisation, either directly or through other pathways.

Fertility transition

Reproduction is a key feature in women's lives, and fertility is inextricably linked with women's roles in the family and society. In this context, the autonomy of women has been recognized as one of the most important factors affecting individual fertility behaviour and societal fertility transition. Some, for instance, consider fertility decline as a result of women's empowerment as well as fundamental improvements in the status of women within family and society (McDonald 2004; Notestein 1953). In this context, Dyson and Moore (1983) suggested early age at marriage, limited spousal communication and sex preference as the determinants of high fertility, which were also associated with the status of women. Other studies have shown an inverse relationship between women's status and fertility behaviour in the developing world. The findings of these previous studies suggest that autonomy indirectly facilitates fertility regulation through the pathways involving education, employment and the socio-economic status of women (Gipson & Hindin 2009; Bloom et al. 2001; Hindin 2000; Jejeebhoy 1991; Basu 1990; Sathar et al. 1988; Bongaarts 1978).

In the Bangladeshi context, a significant number of studies (Gipson et al. 2011; Islam et al. 2004; Hossain 1998) have found a positive association between autonomy and fertility decline. In particular, studies have highlighted contraception as the primary fertility-reducing factor, which is significantly interlinked with the level of reproductive decision-making autonomy. In some studies, women's autonomy is seen as an intermediate factor influencing women's fertility behaviour through increased female education rate, increased age at marriage and use of family planning. In these cases, women's decision-making autonomy regarding contraception is identified as the most influential factor, which has also played a vital role in lowering fertility rates over the last three decades in Bangladesh (Islam et al. 2004, 1998; Hossain 1998). On the other hand, women's reduced access to economic resources is viewed as resulting in fewer

reproductive rights and contributed to a large number of children (Gipson et al. 2011; Amin & Lloyd 2002).

Family-planning utilisation

Autonomy has also been identified as one of the significant factors in women utilising healthcare services, including maternal healthcare. Evidence from several countries indicates a positive relationship between decision-making autonomy and contraceptive use (Woldemicael & Tenkorang 2010; Saleem & Bobak 2005; De-Silva et al. 2000; Schuler et al. 1997; Morgan & Niraula 1995). Dharmalingam & Morgan (1996) identified a strong influence of women's autonomy on contraception in an Indian context, concluding that women with a higher level of autonomy were more likely to adopt birth control measures than less autonomous women. Another study in Uganda showed that in households in which women had greater influence in decision-making there was the highest level of contraception practices, whereas when a low level of autonomy prevailed in household decision-making, the use of contraception significantly decreased (DeRose et al. 2010). Previous studies have also documented the positive effects of women's access to and control over economic resources on contraceptive use (Osamor et al. 2016; Rahman et al. 2014; Nigatu et al. 2014)

In the Bangladeshi context, past evidence has shown that lower use of contraception was greatly influenced by women's lower level of education and poor socio-economic status, as well as reduced participation in economic matters (Hossain et al. 2007; Kabir et al. 2005; Rob et al. 2004). It is also suggested that women's low level of decision-making autonomy, restricted mobility and financial dependency were significantly associated with the low use of contraception in Bangladesh (Laskar et al. 2006; Saleem & Bobak 2005).

Maternal healthcare utilisation

Studies in developing countries have shown that women's autonomy has significant influences on maternal health outcomes through the pathways of antenatal, delivery and postnatal care. For instance, many studies showed that women's inability to make independent decisions regarding reproductive health matters contributed to less use of antenatal care services which in turn contributed to poor overall reproductive health (Mistry et al. 2009; Pillai & Gupta 2006; Blanc 2003; Bloom et al. 2001).

Another factor highlighted in previous studies is that of women's freedom of movement, which was viewed as directly promoting their health by allowing them to access healthcare services. In particular, freedom of movement is considered to improve maternal health and birth outcomes indirectly through the pathways of increased exposure to information, development of interpersonal skills and greater self-confidence (Woldemicael & Tenkorang 2010; Mumtaz & Salway 2007, 2009; Say & Raine 2007; Khan, 1999; Sathar & Kazi 1997). In the Bangladeshi context, both Haque et al. (2011) and Rahman et al. (2011) suggested the need for women to exercise their rights in terms of decision-making about their healthcare, their freedom of movement to go to medical facilities and the right to spend money for these purposes in order to overcome maternal health complications.

2.4 Major findings of reproductive health research

The literature on the reproductive health of women relates to a large number of physiological and biological factors, as well as demographic and sociological factors. Women's fertility behaviour and childbearing practices, utilisation of healthcare services, pregnancy health and birth outcomes remain the main focus in this area of research. To investigate the research objectives of the present study (high-risk fertility, high-risk pregnancy and adverse perinatal outcomes), the major findings of

reproductive health research, particularly in Bangladesh are summarised and discussed in the following.

2.4.1 Proximate determinants of reproductive health

Several socio-economic and cultural factors are found to be associated with women's reproductive health, including marriage practices (Chakravarty et al. 2005), education (Adhikari 2010; Mumtaz & Salway 2007; Kabeer 1985; Casterline 1984; Sathar & Mohammad 1984), religion (Dharmalingam & Morgan 2004; Jejeebhoy & Sathar 2001; Obermeyer, 1999; Basu 1990) and employment (Agarwala & Lynch 2006; Jejeebhoy 2000).

The age at marriage and the commencement of sexual relations directly influences reproductive health outcomes by determining the age of first birth and the number of children. There is a great deal of evidence that the early age at marriage makes for an early start of childbearing, which also increases the risks of poor reproductive health outcomes (Rob et al. 2004; Jejeebhoy & Sathar 2001; Obermeyer 1999; Basu 1995, 1990). Conversely, delayed marriage or marriage at an older age that correlates with higher levels of educational attainment and employment opportunities for women, contributes to better reproductive health outcomes (Jejeebhoy & Sathar 2001; Basu 1995).

In many societies, once the education and economic opportunities for women increase, traditional gender roles, in relation to reproductive health, also start to change. Women's education and employment have been identified as the major determinants of women's fertility behaviour and reproductive health which also affect autonomy (Islam et al. 2004; Kabir et al. 2003; Menken et al. 2003; Amin & Lloyd 2002; Hossain 1998). Kabir (2003) found that educational attainment was a useful index for women's socio-economic status in Bangladesh that is inversely related to the number of children. In

this context, Sayem & Nury (2011) found that illiterate girls are more likely to marry earlier and to experience teenage pregnancy. Also, they did not have enough knowledge about the danger signs of maternal health problems and were less aware about healthcare initiatives.

Many researchers have established a direct relationship between education, employment and the reproductive health status of women (Senerath & Gunawardena 2009; Parveen 2007; Chattopadhyay et al. 2007; Phillips & Hossain 2003; Hussain & Smith 1999). Better education and access to income are seen to provide better maternal health outcomes through the pathways of fertility behaviour, family planning and healthcare utilisation. For example, Mumtaz & Salway (2007) in examination of women's earning role and control over income in Pakistan found a strong relationship with their access to antenatal care. Another study showed that in Bangladesh there is an increased risk of poor birth outcomes for women with low levels of education, poverty and lower social-economic status (Savitz et al. 2004). The study found that women who lived in poverty and had a low level of education had more than a 15% increased risk of poor and adverse birth outcomes. Furthermore, low education and income along with living in a rural area was found to also increase the risk of maternal health complications and poor outcomes (Nahar et al. 2012; Rahman & Abedin 2010; Rajaram et al. 2009; Silva et al. 2008; Salihu et al. 2005).

Religious belief and practice are considered significant determinants of childbearing practice, contraceptive use, as well as behaviour towards maternal healthcare services in Bangladesh. There is much evidence that religious principles have a direct effect on women's mobility and healthcare decisions in Bangladesh (Sikder et al. 2011, Rob et al. 2004; Khan, 1999; Sathar & Kazi 1997). Chattopadhyay and Goswami (2007) found that as Muslim women in Bangladesh have limited access to education, employment,

family planning and healthcare facilities, they are more likely to have a large number of children and higher risks for poor maternal health outcomes.

2.4.2 Childbearing practices, pregnancy health and birth outcome

Maternal health status and birth outcomes are both considered as dependent on the demographic characteristics of childbearing practices, such as maternal age, the number of children and length of intervals between births, as well as health conditions during pregnancy and delivery. Young and old maternal ages, and a large number of children ever born by women with short birth intervals, are considered as risks for both mother and newborn (Population Council 1975). Maternal age is one of the major indicators in reproductive health research, which indicates that having children at an adolescent age causes severe and life-threatening complications to mothers as well as babies (WHO 2010; Reddy et al. 2006). Early childbearing is found to be associated with poor maternal health status such as anaemia and elevated rates of maternal morbidity and mortality (Sayem & Nury 2011; Singh et al. 2000), as well as an high risk of poor outcomes including stillbirth, miscarriage, low birth weight and prematurity (Bakker et al. 2011; Chen et al. 2007; Reddy et al. 2006).

In Bangladesh it has been found that teenage mothers are more likely than older mothers to experience obstetric complications and are less likely to have prenatal and early antenatal care, and thus experience adverse reproductive outcomes which also cause high maternal death rates (Gausia et al. 2012; Khan et al. 2012; Kim et al. 2012; Ferdous et al. 2012; Nahar et al. 2011; Lumbiganon 2010; Cunnington 2001; Rahman et al. 2002; Singh & Darroch 2000). Ferdous et al. (2012) also found that adolescent mothers were more vulnerable to long-term maternal morbidities.

At the same time, delayed childbearing (age at first delivery more than 34 years) is also considered as problematic for pregnancy outcomes. Older mothers are more likely to experience fertility difficulties, pregnancy loss and postpartum complications (Bakker et al. 2011, Reddy et al. 2006; Jacobsson et al. 2004). Additionally, the incidence of several maternal health complications such as hypertension, gestational diabetes, placental abruption, placenta previa and blood loss increases with older maternal ages (Liou et al. 2010; Muganyizi & Kidanto 2009; Luke & Brown 2007).

Previous studies have also shown that a large number of children with short birth intervals between them contribute to risks for poor maternal health outcomes. In Bangladesh, more than 50% of women had at least two births and about 10% of women had at least four births before reaching 25 years of age, and thus experienced maternal health complications due to the adverse biological effects of high parity and short birth intervals (Nahar et al. 2011; Mamun et al. 2006; Khan et al. 2012; Islam et al. 2006). Previous research identified that grand multiparity women (i.e., women who have had more than five children) were more likely to have caesarean deliveries, placental abruption and pregnancy loss, though they were also less likely to have prolonged labour (Geidam et al. 2011; Shaikh et al. 2011). A recent study in Nigeria (Umoh et al. 2012) showed that the most common risks related to grand multiparity are poor health of surviving children (56.4%), poor health of the mother (44.8%), death at delivery (20.7%) and excessive bleeding (19.7%).

Many studies also suggested women with short birth intervals (less than 24 months or more specifically, 18 months) had increased risks of anaemia and bleeding during pregnancy, as well as stillbirths, neonatal deaths and low birth weight babies (Williams et al. 2008; Conde-Agudelo & Belizán 2000, Conde-Agudelo et al. 2006; Royce 2006; Rutstein 2005; Norton 2005). In Bangladesh, shorter birth intervals were also identified as a risk factor of neonatal death and pregnancy complications such as pre-eclampsia,

anaemia and pregnancy infections (Nahar et al. 2011; DaVanzo et al. 2008; Razzaque et al. 2005).

Most of prior studies have focused on the physiological causes and consequences of childbearing complications and their impact on adverse outcomes (Matsuda et al. 2011; Sikder et al. 2011; Lumbiganon 2010; Khatun & Rahman 2008; Mamun et al. 2006). In the Bangladeshi context, the identified causes of pregnancy complications and adverse outcomes were found to be associated with women's fertility behaviour and use of antenatal care, and to some extent the socio-economic context, including the mother's education, socio-economic status, family income, place of residence and religion (Sikder et al. 2011; Ullah et al. 2009; Razzaque et al. 2005; Koenig et al. 2007). Much earlier, Miller et al. (1992) showed a relationship between early childbearing, high parity and short birth interval, which contributed to the high infant mortality in Bangladesh. However, most of these studies ignored women's autonomy issues and, in particular, women's independent decision-making related to reproductive health matters. Only two studies in Bangladesh (Nahar et al. 2011; Sikder et al. 2011) examined the link between pregnancy complications and women's autonomy through the pathways of healthcare utilisation. Both studies showed a relationship between several obstetric complications and women's decision-making autonomy about their healthcare from skilled professionals.

2.5 Contribution to the existing literature

From the foregoing discussion, it is clear that women's reproductive decision-making autonomy greatly influences fertility behaviour as well as healthcare practices. A significant number of previous studies have focused on the role of women in fertility transition and have investigated the impact of women's autonomy in utilising reproductive healthcare services (Section 2.3.2). Furthermore, many studies have

demonstrated the relationship between maternal socio-demographic characteristics, childbearing risks and birth outcomes (Section 2.4.2). The proximate variables of both autonomy and reproductive health are also identified by previous research (Section 2.3.1 and Section 2.4.1). The present study investigates all these concerns in a comprehensive analytical framework.

Most of the studies on reproductive health using BDHS data have ignored the hierarchical setting (Haque et al. 2011; Rahman et al. 2010; Islam et al. 2004). Very few multilevel analyses have been done in Bangladesh using reproductive health data and these analyses have found significant multilevel effects either at lower levels (clusters, households, blocks) or at the middle level (community) but not at the higher level (such as district). For instance, Amin et al. (1996) found significant variation in the use of contraception at the cluster level, whereas Khan (1997), in his three-level analysis, found significant variation in contraceptive use among lower levels (blocks) but not between higher levels (districts). Kalam and Khan (2002) analysed the 1996-97 BDHS data and found significant variation in family planning at the lower levels (clusters, districts) but not at the higher level (divisions).

In summary, the previous research on reproductive health mainly focused on the socio-economic contexts of family planning, maternal healthcare utilisation and childbearing practices. Some studies also identified the physiological or biological causes and consequences of pregnancy health complications as well as birth outcomes. Most of the studies have described the role of decision-making autonomy in family planning which has contributed to declining fertility rates in Bangladesh, as well as the positive influence of women's autonomy on utilisation of reproductive healthcare services, both family planning and maternal healthcare. The main focus has been on women's role in contraception and healthcare utilisation. However, there is a lack of attention to the role

of women's autonomy in reproductive health, more specifically in pregnancy health status and perinatal outcomes in Bangladesh.

In addition to this, no previous studies have found associations between autonomy and reproductive health indicators in a comprehensive framework, which also captures the variations in the levels of autonomy and reproductive health of women. This study thus explores these issues with a multilevel modelling technique. Therefore, to extend our understanding of the role of women's autonomy in childbearing practices, maternal health and birth outcomes, this study examines reproductive health and autonomy of women in a single framework.

Chapter 3

Data and Methodology

3.1 Introduction

The present study adopts a quantitative approach utilising data from the Bangladesh Demographic and Health Survey (BDHS). This study uses the data on fertility and childbearing practices; utilisation of family planning and maternal healthcare; health status during pregnancy and childbirth; and birth outcomes such as live birth, stillbirth and neonatal death. Furthermore, data on autonomy dimensions (decision-making, physical mobility and economic matters), as well as different socio-economic and demographic characteristics of women are also used. A multilevel modelling technique is employed in order to assess the variations in the components of reproductive health across different geographic units in Bangladesh.

3.2 The Data: Type and Source

This study uses data from the 2011 Bangladesh Demographic and Health Survey (BDHS), which is a part of the worldwide Demographic and Health Surveys Program (MEASURE DHS) designed for Bangladesh. The BDHSs are periodic surveys conducted by the National Institute for Population, Research and Training (NIPORT), which include a large sample of ever-married women of reproductive ages from all over the country. The surveys are implemented through a collaborative effort of NIPORT, Macro International, USA, and Mitra and Associates. Members of the Technical Review Committee (TRC) include experts from government, non-governmental and international organisations as well as researchers and professionals working in the

health nutrition and population sector. The aims of the BDHSs are to serve as a source of population and health data for policymakers, program managers and the research community and to meet the monitoring and evaluation needs of health and family-planning programs. Besides this, a significant amount of academic research has used this data set to investigate demographic, sociological, women's empowerment and maternal health issues. Furthermore, the BDHS is the only survey that covers a large sample of the country's population. The present study uses the data from the BDHS 2011, which is a sample of 17,842 ever-married women aged from 10 to 49 years from 17,141 households all over the country, yielding a response rate of 98%.

3.2.1 Sample design

The BDHS 2011 is a nationally representative survey that covers the entire population residing in private dwelling units. This survey used the sampling frame provided by the list of *census enumeration areas* (EAs) with population and household information. Bangladesh is divided into seven *administrative divisions*: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur and Sylthet. In turn, each division is divided into *zila*s, and each zila into *upazila*s. Rural areas in an upazila are divided into *union parishad*s (UP), and UPs are further divided into *mouza*s. Urban areas in an upazila are divided into *wards*, and wards are subdivided into *mahalla*s. These divisions allow the country as a whole to be easily divided into *rural* and *urban* areas. EAs from the census were used as the *Primary Sampling Units* (PSUs) for the survey, because they could be easily located with correct geographical boundaries and sketch maps are available for each one. An EA, which consists, on average, of about 120 households, is equivalent to a mauza in rural areas and to a mahalla in urban areas.

The BDHS 2011 is based on a two-stage stratified sample of households. In the first stage, 600 EAs were selected with probability proportional to the EA size, with 207

clusters in urban areas and 393 in rural areas. A complete household listing operation was then carried out in all the selected EAs to provide a sampling frame for the second-stage selection of households. In the second stage of sampling, a systematic sample of 30 households, on average, was selected per EA to provide statistically reliable estimates of key demographic and health variables for the country as a whole, and for urban and rural areas separately, and for each of the seven divisions. From a total of 17,964 selected households, 17,511 were found to be occupied. Interviews were successfully completed in 17,141 households. A total of 18,222 ever-married women aged 10-49 were identified in these households, and 17,842 were interviewed. All ever-married women aged 10 to 49 years who slept in the selected households the night before the survey ware eligible for interview.

3.2.2 Questionnaire and data collection

Five types of questionnaires were used for the BDHS 2011: a household questionnaire, a women's questionnaire, a men's questionnaire, a community questionnaire and two verbal autopsy questionnaires to collect data on causes of death among children under the age of five years. The contents of the household and individual questionnaires are based on the MEASURE DHS Model Questionnaires. Since the start of BDHS in 1993, the questionnaire used for the surveys was updated from time to time and the last four BDHS were conducted with almost identical questions. The women's questionnaire provides up-to-date information on fertility behaviour and preferences; knowledge, awareness and use of family planning methods; maternal and child health conditions; breastfeeding practices; nutrition levels; awareness of HIV/AIDS and other sexually transmitted diseases; perinatal, neonatal, infant and childhood mortality; women's autonomy; and the socio-economic characteristics of individual and domestic violence. The household questionnaire provides information on the socio-economic status of the family. Additionally, the most recent BDHS 2011 includes information on a group of

eligible members who were selected to participate in testing of the biomarker component, including blood pressure, anaemia, blood glucose and height and weight measurements.

Furthermore, the BDHS 2011 includes the *Verbal Autopsy Questionnaire* developed by an expert group from the World Health Organization (WHO), consisting of researchers, data users and other stakeholders under the sponsorship of the Health Metrics Network (HMN). Two questionnaires were used to collect information related to the causes of death among young children. The topics covered in the verbal autopsy questionnaire are: maternal history; information on prenatal, labour and delivery care and obstetric complications; mother's health and contextual factors; information on treatment module; age description of deceased child; respondent's account of the illness leading to death; and information on the direct, underlying contributing causes of death. This questionnaire was administered to mothers who reported the death of a child under the age of five in the five-year period prior to the BDHS 2011 survey, or to a caregiver who was knowledgeable about the symptoms and treatment preceding the death.

In the BDHS 2011, data quality checks were conducted continuously in order to improve instruments, to assure trained field personnel, to use concurrent data entry and editing and to provide feedback to interviewers during field administration of the instrument. Fieldwork for the BDHS 2011 was carried out from 8 July to 27 December 2011 by 16 interviewing teams. In addition, they also collected blood samples from respondents. Tabulations were completed within two or three months after fieldwork was completed.

3.2.3 Study variables and measurements

To address the overall research aim, this study uses a set of key variables related to reproductive health status and behaviour of women, women's autonomy and other

personal information of the study population. These variables were extracted from the BDHS 2011 women's questionnaire, household questionnaire and verbal autopsy questionnaire and are divided into six domains that correspond with the reproductive health concerns discussed in Chapter 2.

The first group (Table 3.1) consists of the autonomy variables that comprise the three dimensions of autonomy: decision-making autonomy, autonomy in physical mobility and economic autonomy. *Decision-making autonomy* is an important dimension of overall women's autonomy, which is assessed through questions relating to major household decisions as well as decisions about their own and their children's healthcare, contraception, and the number and timing of births. *Autonomy in physical mobility* or *freedom of movement* is assessed through questions related to the ability of women to visit friends and family and access to healthcare without any restriction. *Economic autonomy* is assessed through the ability to spend money when necessary, including for healthcare purposes. In this context, women who do not have their own income are considered as financially dependent on their husband or family.

Table 3.1: Variables of women's autonomy

Dimension	Variables	Response and category
Decision-making autonomy	Decision about own healthcare	0 = Can't decide by herself, mainly husband or other family member decides 1 = Jointly decides with husband 2 = Decides by herself
	Decision about child's health-care	0 = Can't decide by herself, mainly husband or other family member decides 1 = Jointly decides with husband 2 = Decides by herself
	Decision about household purchases	0 = Can't decide by herself, mainly husband or other family member decides 1 = Jointly decides with husband 2 = Decides by herself
	Decision about contraceptives	0 = Can't decide by herself, mainly husband decides 1 = Jointly decides with husband 2 = Decides by herself
	Decision about the number of children	0 = Can't decide by herself, mainly husband or other family member decides 1 = Jointly decides with husband 2 = Decides by herself
Autonomy in physical mobility	Can go outside home for healthcare	0 = Not at all 1 = Needs someone to accompany her 2 = Yes, can go alone
	Can go to visit family and relatives	0 = Not at all 1 = Needs someone to accompany her 2 = Yes, can go alone
	Can go for shopping	0 = Not at all 1 = Needs someone to accompany her 2 = Yes, can go alone
Economic autonomy	Have control over own income	0 = No, mainly husband decides 1 = Jointly decides with husband 2 = Decides by herself 3 = Doesn't have own income

According to the reply of respondents, a score of 0, 1 and 2 is assigned respectively to each response: respondent can't decide at all; jointly decides with husband or other family member; and respondent can decide alone. The first dimension (women's autonomy in decision-making) comprises of five indicators, so the minimum score is 0 and the maximum score is 10. The second dimension comprises of three indicators and contains a minimum score of 0 and a maximum score of 6. And, the third dimension comprises only one indicator and contains the scores 0, 1, 2 and 3. In this context, it is considered that those women who do not have their own income are dependent on their husband's income and his decisions about it. Therefore, 0 and 3 assigned scores are

combined as 0 score. This dimension thus contains a minimum score of 0 and a maximum score of 3. The responses of each dimension are then expressed as the minimum and maximum values between 0 and 1 in accordance with the construction of the Human Development Index (HDI) developed by the United Nations Development Program (UNDP 2005). Three new variables are developed: *index of decision-making autonomy* (IDMA), *index of autonomy in physical mobility* (IAPM) and *index of economic autonomy* (IEA). As well as following the same technique, an overall autonomy index is developed: *women's autonomy index* (WAI).

The indices are further categorised as 'low level of autonomy' (indicates women with no autonomy at all, either husband or other family member decides about their lives), 'medium level of autonomy' (indicates partial autonomy of women, so that they have the ability of joint decisions with husband or other family members) and 'high level of autonomy' (indicates those autonomous women who have the rights to decide about their lives). Women's autonomy index (WAI) is used by researchers to measure the amount of autonomy of a woman as the proportion of unity. The present study analyses the three dimensions of women's autonomy separately as well as overall women's autonomy index (WAI) to understand the level of autonomy of a woman.

The second group of variables (Table 3.2) contains women's individual attributes that include demographic and socio-economic variables such as current age, level of education, work status, religion, place of residence and socio-economic status. The demographic and socio-economic profile of the respondents is useful for this study to interpret the findings and for understanding the influence of these variables on high-risk fertility, childbearing complications and birth outcomes, as well as on women's autonomy variables. This study uses these variables as proxy variables to influence women's reproductive health through the pathways of autonomy and healthcare utilisation.

Level of education is an important indicator to measure the ability of individuals to achieve desired demographic and health goals. Women's education has been found as one of the most significant predictors of women's reproductive health status as well as autonomy of women (discussed in the literature review). The present study divided the level of women's education into four categories: no education; primary completed; secondary completed and higher education and analyses this variable to understand women's behaviour towards reproductive health issues.

Work status of women is used for the same purposes. It is divided into two categories: working and not working; women who are working are further divided into two categories as to whether they received payment for work or not.

Religion consists of two categories: Muslims and non-Muslims. In Bangladesh, more than 80% of people are Muslim, around 10% are Hindu and only around 4% practice other religions such as Christianity or Buddhism. Religion is identified as a significant predictor to influence women's autonomy, that is, limited access to education and mobility, including family planning and health-care utilisation (discussed in the literature review). In this way, it can be assumed that religious values and practices might influence high-risk fertility, childbearing risks and adverse outcomes through the pathways of women's autonomy and reproductive health care utilisation.

Place of residence in divided into two categories: urban and rural. Women living in urban areas generally have better education and work opportunities and access to health facilities than women in rural areas.

Socio-economic status generally refers to an index of household wealth, which is a household characteristic. BDHS constructs this index using variables that include house-building materials, household income, land property and household luxuries

such as owning a television or radio. This index is then split into three groups: rich (the top quartile), middle and poor (the bottom quartile). The wealth index is a useful predictor because women's autonomy is largely influenced by their socio-economic status, therefore is assumed to influence women's health during pregnancy and childbirth, and thus birth outcomes.

Table 3.2: Variables of women's socio-economic attributes

Variables	Response and category
Current age	0 = < 20 years 1 = 20 to 34 years 2 = 34+ years
Level of education	0 = No education 1 = Primary completed 2 = Secondary completed 3 = Higher
Work status	0 = Not working 1 = Not paid 3 = In paid work
Religion	0 = Non-Muslim 1 = Muslim
Place of residence	0 = Rural 1 = Urban
Wealth Index	0 = Poor 1 = Middle 2 = Rich
Husbands' level of education	0 = No education 1 = Primary completed 2 = Secondary completed 3 = Higher

The third group of variables (Table 3.3) comprises the utilisation of maternal healthcare services. The BDHS provides information on the use of both antenatal and delivery care services by the respondents. The *maternal healthcare* system aims to reduce morbidity and mortality related to pregnancy and childbirth and the healthcare that a woman receives during pregnancy and delivery, as well as before and soon after delivery. BDHS collects information about maternal and child healthcare of those women who had given birth in the five years preceding the survey. For the last live birth in that period, mothers were asked a number of questions about antenatal care (ANC) and delivery care (DC) that are used in this study. These variables are first used as dependent

variables to investigate how they are influenced by autonomy of women and other socio-economic and demographic factors (Chapter 6). Second, these variables are assumed to influence pregnancy complications and birth outcomes. Therefore, they are considered as intermediate or mediating variables that influence the relationship between autonomy and high-risk pregnancy as well as perinatal outcomes (Chapters 7 and 8).

Table 3.3: Variables of maternal healthcare utilisation

Variables	Response and category
Number of antenatal visits	0 = Not at all 1 = 1-3 visits 2 = More than 3 visits
Received treatment from professional healthcare provider for pregnancy complications	0 = No 1 = Yes
Received TT Injection	0 = No 1 = Yes
Place of delivery	0 = Home 1 = In medical facilities

The fourth group of variables (Table 3.4) includes the childbearing practices of women (maternal age, the number of children and interval between two successive births). The BDHS collects information about childbearing practices from those women who have had at least one live birth in the five years preceding the survey.

Maternal age or the age of mother at the child's birth is strongly associated with pregnancy health and outcomes, as well as being a major indicator of reproductive health. The BDHS recorded the age of women for each birth. For analysis in this study, maternal age is categorised as early childbearing (age at birth less than 20 years), on-time childbearing (age at birth between 20 to 34 years) and delayed childbearing (age at birth higher than 34 years).

Birth interval has found to be one of the most significant predictors of maternal health. A short interval of less than 18 months between two successive births has been identified as a risk factor of pregnancy health complications as well as perinatal and infant mortality.

Parity is another factor influencing maternal health and outcomes. Children born to mothers with high birth order with short previous birth intervals (less than 18 months) were identified as an increased risk for adverse reproductive outcomes.

Table 3.4: Variables of childbearing practices of women

Variables	Description	Response and category
Maternal age	The age at which women gave birth	0 = On-time childbearing (20-34 years) 1 = Early childbearing (< 20 years) 2 = Delayed childbearing (34+ years)
Birth interval	The interval between two successive births	0 = 18 months and above 1 = Less than 18 months
Parity	Number of live births	0 = No live birth 1 = 1 live birth 2 = 2-3 live births 3 = 4 and more live births

The fifth group comprises the health complications during pregnancy and childbirth as well as perinatal outcomes. The BDHS 2011 survey used a *Verbal Autopsy Questionnaire* to collect information on *childbearing complications* from 480 women who had a live birth in the five years preceding the survey. Following the WHO question structure, information about health complications during pregnancy, which are considered to contribute risks of morbidity or mortality for mother or newborn, or for both, was collected. These pregnancy health complications include:

Gestational diabetes – is a form of diabetes when a woman without diabetes, develops high blood sugar levels during pregnancy.

High blood pressure during pregnancy – is also known as *gestational hypertension* and is the term used when blood pressure rises above 140/90 mmHg after 20 weeks of

pregnancy. It can contribute to pre-eclampsia or convulsions, which are considered as very serious health problems during pregnancy.

Convulsion – is a result of hypertension, which sometimes contributes to eclampsia i.e., the occurrence of two or more convulsions during pregnancy or at the time of delivery.

Vaginal discharge – sometimes is a sign of pregnancy infection, particularly if it is bad smelling or associated with high fever.

High fever – sometimes indicates the presence of pregnancy infection. However, it also may be in conjunction with the high temperature, sweating, shivering, headache, muscle aches, dehydration and fatigue, which are often experienced during pregnancy.

Blurred vision – occurs when a sufficient amount of blood cannot get to the brain and can change the vision of eyes. This type of complication arises from hormonal change as well as fluid retention during pregnancy.

Puffy face or *swelling* – is a normal part of pregnancy that is caused by additional blood and fluid. Normal swelling is experienced in the hands, face, legs, ankles and feet. However, it could sometimes be a sign of pre-eclampsia, which needs special medical care.

Prolonged labour – is labour that lasts for more than 12 hours according to a woman's experience of labour pain.

Excessive bleeding – during pregnancy, particularly at later stages, can be a sign of serious problems which needs emergency medical attention; while during early stages of pregnancy it is quite common. After delivery, excessive bleeding sometimes turns into postpartum haemorrhage, which is a major cause of maternal mortality.

Perinatal outcome includes the information on stillbirths, live births and preterm or premature births with their health status as well as information on early neonatal deaths. The present study has focused on stillbirths and early neonatal deaths. In the BDHS

2011, this information is available for the five years preceding the survey and is collected with the women's questionnaire.

Stillbirth – is the death of a foetus either in the womb after 22 weeks of pregnancy, or which has less than 500 gram birth weight.

Early neonatal death – is the death of a live born baby within the first seven days of life.

The sixth group includes the outcome or dependent variables examined in this study. These include the three indicators of reproductive health: *high-risk fertility*, *high-risk pregnancy* and *perinatal mortality*. The description of these outcome variables is provided in the relevant chapters (Chapters 6, 7 and 8).

3.3 Methodology

As noted in the introduction to this chapter, the study adopts a quantitative approach including multilevel modelling to investigate the associations between autonomy and reproductive health of women and their variations across different geographic areas (signifying different social contexts) in Bangladesh. Multilevel modelling has received a great deal of attention in the social sciences, especially in demographic and epidemiological research. It is used in statistical analysis to imbricate the clustering of lower-level units to higher-level units. This methodology has the advantage of obtaining information on proportions of total variance in dependent variables arising from each level of analysis, therefore providing relevant knowledge on outcomes.

Multilevel methodology is often applied to hierarchically structured data in socio-demographic and public health research, where the units of one level are clustered within the units of the next higher level (Goldstein & Rasbash 1996). As the BDHS 2011 data set is based on multistage stratified cluster sampling where lower-level

clusters are nested into higher-level clusters it has facilitated the implementation of a multilevel methodology in this study. Islam et al. (2010) used a multilevel technique to explore the determinants of the family planning communication between husband and wife from the 1999-2000 BDHS data. This method was also applied to the 2007 BDHS data set to study the nutritional level of children under the age of five (Islam 2011). Some earlier studies also applied the multilevel technique to measure the effects of variables at different levels such as different population units, social context or geographic units. For example, Goldstein and Rasbash (1996) applied this technique to analyse youth unemployment data in Scotland; Rodriguez and Goldman (1995) applied it to health-care utilisation in Guatemala. Khan (1997) applied this approach to investigate the determinants of contraception use in different locations of Bangladesh by using the Bangladesh Fertility Survey (BFS 1989) data.

It is critical for reproductive health interventions to meet the needs of safe-motherhood initiatives. This is because individual knowledge, understanding and behaviour largely depend on the surrounding environment and thus differ from one social structure to another, owing to variability among various socio-economic and geographical factors such as religion, culture, income, place of residence, education, occupation and access to mass media. This research, therefore, applies a multilevel technique to examine the entire phenomenon for different population units within the country. In the BDHS, the units at lower level are individuals (ever-married women aged 10-49: Level 1) who are nested within units at the next higher level (clusters: Level 2) and these clusters are again nested within units at the next higher level (divisions: Level 3). This clustering sampling scheme introduces multilevel dependency or correlation among the variables that can have implications for model parameter estimates.

3.3.1 Analysis of data: statistical tools

To answer the research questions, this study includes analysis of the relevant data through various statistical tools. Statistical techniques for analysis of data usually depend on the structure and quality of data, as well as the expected outcome. The present study required a critical examination of data on women's background characteristics, autonomy, fertility, pregnancy health status, healthcare practice and birth outcome. The relevant information is described through descriptive statistics and analysed with statistical tools such as scoring technique, multilevel logistic regression modelling and causal mediation modelling.

Descriptive Statistics and Bivariate Associations

Bivariate analysis for associations between variables is assessed using Pearson's Chi-square test for association. Some descriptive statistics such as mean, median or mode are computed to explain the pattern of any specific events.

Scoring Technique

To investigate the effect of the independent variables on a specific outcome, a scoring technique was used. In this context, scores are computed for each independent variable. In this study, a scoring technique is applied to develop autonomy indices as well as to determine high-risk pregnancies from several health complications during pregnancy.

Multilevel Logistic Regression Analysis: Binary and Multinomial

The logistic regression model can be applied to identify the risk factors as well as to predict the probability of success, such as the probability of developing a disease as a function of particular risk factors. This probability serves as an index of risk for a given disease or for not responding to a certain treatment. The logistic regression proposed by Cox (1970) has become the standard method for finding the probabilities

(relationship) between the qualitative outcome variables and a set of explanatory variables.

To examine the effects of autonomy variables on the other outcome variables such as high-risk fertility, high-risk pregnancy or perinatal mortality, the present study uses generalised linear mixed models (GLMM) of categorical response variables, both multilevel binary logistic regression models (MLRM) and multilevel multinomial regression models (MMRM) with random intercept. A three-level logistic regression model is used consisting of Level 1: individuals, Level 2: communities and Level 3: district levels. Intra-class correlation coefficients (ICC) are computed for significant random effects in each model that describes the proportion and variance between each level (Heck et al. 2012). The intra-class correlation coefficients are computed as:

$$\rho = \frac{\sigma^2_{\text{Between}}}{\sigma^2_{\text{Between}} + 3.29\sigma^2_{\text{Within}}}$$

The intra-class correlation coefficient (ICC) explains how much of the overall variation in the response is explained simply or accounted for by clustering. This explains the amount of variations in the levels of autonomy, and the three components of reproductive health (high-risk fertility, high-risk pregnancy and perinatal mortality) at different district, community and individual levels.

Causal Mediation Analysis

Causal mediation modelling is used by many social science methodologists as well as epidemiologists (Baron et al. 1986; MacKinnon 2008; Imai et al. 2009, 2011; Zhang et al. 2009; Tingley et al. 2013, 2014) to measure the causal relationships between independent and dependent variables through some intermediate variables. The goal of this analysis is to decompose the causal effect of a treatment into the indirect effects,

which represents the hypothesised causal mechanism, and the direct effect, which represents all the other mechanisms. The assumed causal ordering can be presented as:

Treatment---->Mediating variable---->Outcome (indirect)

Treatment---->Outcome (direct)

The indirect effect combines two arrows going from the treatment to the outcome through the mediator, whereas the direct effect is represented by a single arrow from the treatment to the outcome variable. Because the direct effects and the indirect effects sum up to the total causal effect, a causal mediation analysis represents a decomposition of the total effect into the direct and indirect (mediation) effects.

The analyses of this study identify the average causal mediation effects (ACME) of women's autonomy on the outcome variable of perinatal deaths through mediating or intermediate variables, as well as the average direct effects (ADE) of autonomy on perinatal deaths, which represent the population averages of the causal mediation and direct effects, respectively. The ATE (average total effect) equals the sum of the ACME and ADE. The goal is to decompose the ATE into the ACME and ADE and then assess the relative importance of the hypothesized mechanism. For the computation of ACME, ADE and ATE the present study employed logistic (binary response) regression models, which follow the procedures established by Tingley et al. (2014). A detailed description about the use of this technique is provided in Chapter 8.

The present study also uses graphic methods, rates, ratios and percentages to capture the structure of data. All analyses of data were performed using *SPSS Version 21*, and the causal mediation analysis was performed using the *mediation package* in *R*.

3.4 Ethical considerations

As the Demographic and Health Survey (DHS) dataset is a secondary source of data, no ethics approval was required from the Monash University Human Research Ethics Committee. However, the Measure DHS questionnaires provide access to datasets under certain terms and conditions. Firstly, once downloaded, the datasets must not be passed on to other researchers without the written consent of Measure DHS. Secondly, all reports and publications based on the requested data must be sent to the Measure DHS Data Archive in a Portable Document Format (pdf) or a printed hard copy. Thirdly, the requested data should only be used for the purpose of the research or study. I registered online and agreed with all terms and conditions regarding the use of the BDHS dataset. On 5 October 2012, MEASURE DHS approved my application and gave access to the BDHS datasets of the previous five surveys, and I was given access to the BDHS 2011 dataset on 1 April 2013.

Chapter 4

Patterns of Women's Autonomy

4.1 Introduction

Women's status in Bangladesh has been ranked among the bottom half of countries in the world on the basis of both Gender Inequality Index and Gender Gap Index (112 out of 187 countries and 69 out of 135 countries respectively) (UNDP 2011). The government of Bangladesh is committed to improving the socio-economic conditions for women and integrating them into the mainstream of its national life. Gender equity, equality and the empowerment of women thus remain top priorities in Bangladesh in terms of improving the social and economic conditions of its people. The nationally representative surveys (such as BDHSs, BBSs) also document and monitor women's status in terms of health, nutrition, education, employment, type of earnings, control over cash and earnings, violence as well as freedom of movement.

Women's autonomy in developing countries, as well as in a patriarchal society like Bangladesh, has been conceptualised as having a number of distinct dimensions. These include power over decision-making, freedom of movement and being financially independent. It is a well-established fact that women in Bangladesh are ascribed a lower status than men and are often secluded in their homes, while men have the sovereign power to control households and society as a whole (Balk 1997). Generally, Bangladeshi women have a limited role in household decision-making, limited access and control over household resources (physical and financial assets), a low level of individual assets, heavy domestic workloads, restricted mobility, and inadequate knowledge and skills that lead to vulnerability (UNDP 2011; World Bank 2009). To

explore these issues related to the autonomy of Bangladeshi women, this chapter examines the associations between women's demographic and socio-economic characteristics and autonomy dimensions. In this study, it is hypothesised that the levels of women's autonomy vary by different geographic units across the country. To identify the amount of variations at different community and district levels in Bangladesh a multilevel approach is adopted.

4.2 Status of women in Bangladesh

In recent decades, particularly since the Beijing Women's Conference in 1995, empowering women in the developing world has become a primary policy goal. Quite apart from being an important goal in its own right, increased female autonomy has been shown to confer other benefits like long-term reduction in fertility, higher child survival rates and allocation of resources in favour of children in the household. It has become clear that female autonomy can be measured through the major demographic and social indicators such as higher age at marriage, lower level of fertility and mortality, reduction in infant and child mortality, higher level of educational attainment as well as ensuring maternal health and reproductive rights.

Bangladesh remains a very traditional society in which social and cultural norms curtail the autonomy of women. Although women and men are by constitution equal in Bangladesh, in reality, they are not (Parveen 2007). The traditional role of women has been that of daughter, wife and mother. Their activities in the socio-cultural milieu of Bangladesh are primarily domestic in nature and confined to the home. Additionally, for many activities and decisions women are supervised by their husband or their mother-in-law. Although a woman gains increasing autonomy with age within her family, this is largely determined by education, and income-earning role (Anderson & Eswaran 2009). Women's inability to make their own decisions create a barrier in the

development of interpersonal skills and greater self-confidence, which also affects their health indirectly and becomes a crucial factor in efforts to improve their reproductive health (Haque et al. 2011; Sikder et al. 2011; Perveen 2007).

Not only women's decision-making autonomy, but also women's freedom of movement improves their health by enabling them to access healthcare facilities. Therefore, freedom of movement outside the home is thought to improve women's health outcomes indirectly via increased exposure to information, development of interpersonal skills and greater self-confidence (Woldemicael & Tengkorang 2010; Say & Raine 2007). In the South Asian context, this is often impeded by women's seclusion and restricted mobility, which acts as a crucial barrier for accessing antenatal services. Research shows that freedom to leave the home and visit healthcare services is positively related to birth control and contraception as well as the use of maternal healthcare services (Hussain & Smith. 1999; Amin et al. 1996; Cleland et al. 1994) Bangladesh has a long tradition of *purdah*, which is the practice of secluding women from the view of men. This tradition sometimes makes it difficult for women to go alone outside their home, even to seek healthcare for themselves or for their children (ICDDR,B 2010).

Education remains one of the most important means of empowering women with the knowledge, skills and self-confidence necessary to participate fully in the development process (ICPD 1994). In almost every setting, it is found that better-educated women were more likely to have greater control over their own lives and thus could make better decisions for themselves and their children (Adhikari 2010; Kabeer 2011; Mumtaz & Salway 2007; Moursund et al. 2003; Fikree & Pasha 2004; Cleland et al. 1996; Castro 1995; Jejeebhoy 1995). In the Bangladeshi setting, Kabir et al. (2003) found educational attainment as a useful index for women's socio-economic status that is also positively related to the autonomy of women.

A woman's work status or employment outside the home is a key economic factor that increases her domestic decision-making power and control over resources (Agarwala & Lynch 2006; Jejeebhoy 2000). It is also found that women's income and control over their income increased their economic autonomy which also has an effect on their access to family planning and antenatal care services (Mumtaz & Salway 2007; Dharmalingam et al. 1996). Many researchers have also identified a direct relationship between education and employment of women and women's autonomy in Bangladesh (Kabeer 2011; Senerath & Gunawardena 2009; Chattopadhyay & Goswami 2007; Parveen 2007; Phellips & Hossain 2003).

Against this background, this chapter investigates the associations between women's autonomy, and socio-economic and demographic factors. This in turn will help to explore the role of autonomy in reproductive health of women.

4.3 Study population, data and methods

4.3.1 Data and variables

To address the research aim of this chapter, two sets of key variables from the BDHS 2011 women's individual and household questionnaires are extracted. The first set comprises the independent or predictor variables that include the background characteristics of the study population: respondents' age, level of education, work status, religion, place of residence, socio-economic status (indicated by wealth index) and husbands' level of education. Details about these variables and their measurements are described in Chapter 3, Section 3.2.

The second set of variables comprises the outcome variables related to the three dimensions of women's autonomy: decision-making autonomy, autonomy in physical mobility and economic autonomy. By using the variables from these three dimensions,

three indices of autonomy are developed: *Index of decision-making autonomy* (IDMA) is measured through the ability of women to make independent decisions about household purchases, contraception, the number and timing of children, and their own and children's healthcare; *Index of autonomy in physical mobility* (IAPM) is measured through the ability of women to go outside their home to visit family and friends, as well as for healthcare or employment purposes; and *Index of economic autonomy* (IEA) is assessed through the ability of women to spend their own earnings. An overall autonomy index: *Women's autonomy index* (WAI) that combines the three distinct indices is also developed. All the indices are categorised as three groups: low level of autonomy, medium level of autonomy and high level of autonomy. A detailed description of the three dimensions of autonomy with their relevant indicators and measurements, as well as the development procedures of each index was provided in Chapter 3, Section 3.2.

4.3.2 Methods of analysis

In this chapter, a multilevel (three-level) multinomial logistic model (MMLM) with random intercept is used to explore the variations in the levels of women's autonomy across Bangladesh. The units at the first level are individuals (Level 1: ever-married women aged 10–49: 17,842) who are nested within units at the next higher level (Level 2: communities: 600) and again nested within units at the next higher level (Level 3: districts: 64). A detailed description of the sampling technique was provided in Chapter 3, Section 3.2.

Four models are fitted to analyse each of the three autonomy dimensions and the overall level of a woman's autonomy. Intra-class correlation coefficients (ICC) are computed for significant random effects in each model that describes the proportion and variance between each level (Heck et al. 2012), that is, the amount of variation between different

district and community levels. In all cases 'low level of autonomy' is used as a reference category and then models are fitted for both 'medium level' and 'high level' of autonomy categories. A detailed description of the method is provided in Chapter 3, Section 3.3. All the models were run by using *SPSS Version 21*.

4.4 Results and discussion

4.4.1 Results of statistical analysis

Women in Bangladesh are found to enjoy least autonomy in economic matters. Only 4.2% of women have access to their own income. A large number of women (89.3%) are less autonomous: either they do not have their own income or they do not have access to their own income. Although only 13.2% of women have independent decision-making autonomy, about 51.1% have the ability to decide jointly with their husbands or other family members about their own lives. Women are found to be more autonomous in terms of independent physical mobility. While some 45.8% of women can go outside their home alone, about 18.8% of women need someone to accompany them. The levels of autonomy for each dimension are shown in Figure 4.1.

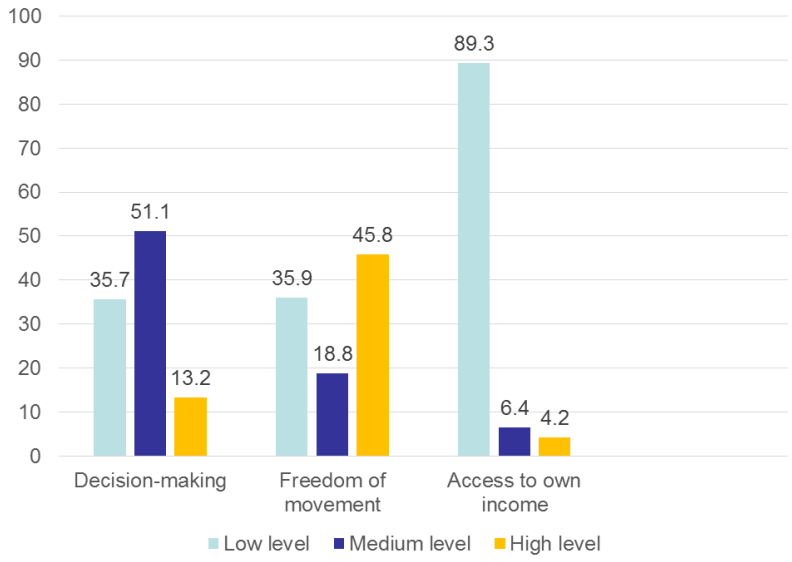


Figure 4.1: Levels of women's autonomy

The mean values for the indices of decision-making autonomy (IDMA), autonomy in physical mobility (IAPM), and economic autonomy (IEA) as well as the overall women's autonomy index (WAI) by region and place of residence are set out in Table 4.1 (presented at the end of chapter). The mean values at district level are shown in Table 4.2.

Table 4.1 shows a very small amount of regional differences in the mean values of the three dimensions of women's autonomy as well as the overall autonomy in Bangladesh. The mean value of overall autonomy is highest in Barisal division (0.34) and lowest in Rajshahi division (0.31). Among the three dimensions of women's autonomy, the lowest mean values are found for women's economic autonomy in all regions. In case of the decision-making index, the highest mean value is also found in Barisal division (0.37) and the lowest value (0.33) is in Shylet division.

Although regional differences in women's autonomy are not substantial, the urban/rural differences are very high for all dimensions of autonomy. The mean value for the overall autonomy index is 0.37 for urban women and 0.30 for rural women. With respect to economic autonomy, urban women have higher autonomy than their rural counterparts (the mean value of 0.11 and 0.06 for urban and rural areas respectively). Table 4.2 shows the administrative district level (64 districts) differences in women's autonomy. The mean values for each index show that the level of women's autonomy varies across Bangladesh at district levels.

To investigate the influence of women's socio-economic and demographic characteristics on women's autonomy, multilevel multinomial logistic regression models were fitted to the data. The multilevel approach employed here also explains the variations in the autonomy levels that accounted for by communities and districts.

The estimated odds of 'medium' and 'high' levels of autonomy versus 'low level of autonomy' are presented in the tables. In the model, seven socio-economic factors (current age, level of education, working status, religion, place of residence, socio-economic status (indicated by wealth index) and husband's education level) are considered as fixed effects, and district-community interactions are included as random effects. The intra-class correlation coefficients are computed which describes the variations in the autonomy levels between different districts as well as different communities in Bangladesh. Details of the method is provided in Chapter 3, Section 3.3. The results of the fitted model are provided in Tables 4.3, 4.4 and 4.5.

Determinants of women's autonomy in decision-making

Table 4.3 shows the fixed effects of demographic and socio-economic variables on women's autonomy. From this table it is observed that women's age, level of education, work status, religion and place of residence have significant effects on the levels of women's autonomy. It is found that older women (more than 34 years of age) were 33% more autonomous than younger women (less than 20 years or 20-34 years of age). The education of women is found as a strong significant determinant of women's decision-making autonomy. Compared to women with no education, women with primary, secondary or higher education were 1.32, 1.40 and 1.41 times more likely to have a high level of autonomy respectively. According to earning status, employed women are found to be only 1.11 times as autonomous as non-earning women. It is also found that women living in urban areas were about 16% and 29% more likely to have medium and high levels of decision-making autonomy respectively compared to their rural counterparts. Muslim women were found to be less (0.62 times) autonomous as non-Muslim women. Women's socio-economic status as well as husband's education level does not show any significant effects on decision-making autonomy.

Determinants of women's autonomy in physical mobility

Table 4.3 shows a significant relationship between freedom of movement, and women's age, education level, work status, religion and place of residence. Age of women is found as a strong determinant of women's autonomy in physical mobility. It is found that women aged more than 34 years were 44% and 56% more autonomous in medium or high levels respectively, as teenager or younger women (20 to 34 years of age). It is also found that, Muslim women were less likely (0.67 times) and those women living in urban areas were more likely (1.38 times) to have high level autonomy in physical mobility compared to non-Muslim and rural women respectively. Additionally, education and the earning status of women were found as strong determinants of autonomy in physical mobility with highly-educated and earning women having 21% and 44% higher levels of autonomy than their non-educated and non-earning counterparts respectively.

Determinants of economic autonomy

Table 4.3 shows significant associations between the levels of economic autonomy and all the fixed effects, except husband's level of education. It is found that older women were more likely (1.50 times of high levels of autonomy) to have access to and control of economic resources than their teenager counterparts. It is also found that women with high levels of education had 46% (medium level) and 42% (high level) higher autonomy than women with no education. Those women who were earning and were living in urban areas were 41% and 23% more autonomous compared to unemployed and rural women respectively. Furthermore, Muslim women were found as 0.87 times less likely to have high level of economic autonomy. Women's socio-economic status showed a significant associations with the levels of economic autonomy. It is found that women with high socio-economic status (rich category) were 1.24 times more autonomous than women with low socio-economic status.

Determinants of the overall autonomy of women

Table 4.5 shows women's age, level of education and place of residence as strong determinants of women's overall autonomy. However, the religious background and work status of women also have significant effects on autonomy. The odds for both medium and high levels of autonomy are found to be higher for older women (1.31 and 1.36 times) than women less than 20 years of age. Also, higher education for women provided 53% higher levels of autonomy compared to women with no education. It is also found that women living in urban areas have higher levels of autonomy (60% more) compared to women living in rural areas. Women's socio-economic status as well as their husband's education level was not found to be significantly associated with women's autonomy.

Variations in the levels of autonomy

The estimates of random effects of autonomy in decision-making, physical mobility and economic matters, and women's overall autonomy are presented in the Table 4.4 and Table 4.5 respectively. From Table 4.4, it is found that each of the three dimensions of autonomy have significant variations at both district and community levels across the country. Women's physical mobility is found to have highest variations at both district and community levels. The intra-class correlation coefficients (ICC) show that about 6.77%% and 7.4% of total variations in medium and high levels of autonomy in physical mobility respectively are accounted for by district level, which are about 5.43% and 5.70% of total variations respectively accounted for by community level across the country. The remaining variation in women's freedom of movement by district and community levels can be accounted for the effects of socio-economic factors.

In terms of women's decision-making autonomy, about 5.27% and 4.44% (in medium level), and 3.77% and 5.78% (in high level) of total variations are accounted for by district and community levels respectively. Also, in terms of economic autonomy, about 4.05% and 3.21% (in medium level), and 3.44% and 3.6% (in high level) of total variations are accounted for by district and community levels respectively (Table 4.4).

Table 4.5 shows that women's overall autonomy is also found to have significant variations at district and community levels across the country. In terms of medium level of autonomy, about 5.92% and 4.69% of total variations are accounted for by district and community levels respectively. Additionally, in terms of high level of autonomy, about 5.68% and 4.91% of total variations are accounted for by district and community levels respectively. The remaining variations in the levels of autonomy can be accounted for by the variations in the different influences of women's socio-economic characteristics across Bangladesh.

4.4.2 Discussion

The findings illustrates that among the three dimensions of women's autonomy, Bangladeshi women are in a worse position on economic matters than on the other two dimensions. This finding is consistent with many studies in Bangladesh (Haque et al. 2013; Ahmed et al. 2010; Bloom et al. 2001; Kabeer 1999). As already noted, a strong patriarchal and conservative environment exists in families, especially in rural areas, that create barriers in women's income-earning opportunities. A large number of women in Bangladesh remain economically dependent on their husbands and cannot fully participate in family economic decision-making matters. Additionally, restrictions on free movement outside the home remain in many Muslim societies like Bangladesh. Female seclusion restricts women's mobility as it is considered inappropriate for

women to go outside their home alone (Mumtaz & Salway 2007; Amin et al. 1997; Chen 1995; Cleland et al. 1994).

Improving their level of education is the single most important way to make women more autonomous in all spheres of society. Many researchers agree that a higher level of education confers women a higher level of autonomy (Adhikari 2010; Kabeer 2011; Mumtaz & Salway 2007; Kabir et al. 2003; Cleland et al. 1996; Castro 1995; Sathar & Kazi 1997; Jejeebhoy 1995), hence illiteracy makes women less autonomous. The present study shows that better educated women have the highest level of autonomy in decision-making and physical movement and that there is a strong relationship between women's decision-making autonomy and working status.

Religion remains an important indicator for women's education and for participation in the labour force, hence it is a strong predictor of women's autonomy (Jejeebhoy & Sathar 2001). Although more than 80% of women in Bangladesh are Muslim, interestingly they remain less autonomous compared to their non-Muslim counterparts in all three dimensions of women's autonomy. The reason for this may lie in the dominance of a conservative Muslim culture that restricts women's education and earning opportunities by limiting their freedom of movement outside the home as well as by maintaining the tradition of *purdah*. Consistent with several studies, it is also found that although older women are economically dependent on their husbands, they have more decision-making power than younger or teenage women (Senerath & Gunawardena 2009; Chattopadhyay & Goswami 2007; Parveen 2007; Hossain 1998). In addition to this, older women enjoy more freedom of mobility to go outside the home than their younger counterparts.

A significant relationship is found between women's place of residence and autonomy level in different dimensions. In almost all cases, it is found that women living in urban

areas enjoy more freedom in decision-making, physical movement and economic matters than their rural counterparts. It is also identified that on all dimensions of women's autonomy, those women who living in urban areas fare better (Table 4.1).

The present study did not find a significant association between socio-economic status and levels of autonomy. This indication could be attributed to the fact that those in poor socio-economic condition have less access to education and work opportunities, as well as family planning and healthcare facilities, and thus hinder women's level of autonomy. Surprisingly, the husband's education level is also found to be an insignificant predictor of women's autonomy. This could be because the perceptions and attitudes of husbands towards the autonomy of their wives remains similar, no matter how educated they are.

The present study found significant amount of variation in women's autonomy that was accounted for by communities and districts across the country. The surrounding environments within which women live play a major conditioning role in women's autonomy through shaping their lives, education, work opportunities and access to economic resources. Access to quality education and employment, as well as women's exposure to the outside world vary according to the services and norms within the local social system, which in turn influence their level of autonomy. An Indian study suggests that women in the southern regions of the subcontinent have more exposure to the outside world, a greater voice in family life and more freedom of movement than do those in the north (Basu, 1990). In Bangladesh, by contrast, the cultural norms are almost uniform all over the country. However, women from rural communities are less likely to receive quality education and have fewer employment opportunities, both of which restrict their earning opportunities and make them economically dependent. Also, women living in small cities have less exposure to the outside world which

influences knowledge and thus restricts their voice in family life which contributes to lower levels of autonomy for them.

From the discussion, it can be concluded that although a large number of women in Bangladesh enjoy autonomy, among the three dimensions of autonomy, women are in the worse position economically compared to decision-making autonomy and freedom of physical movement. It is also the case that women's autonomy varies across Bangladesh at administrative district and community levels. The next four analytical chapters examine the associations between women's autonomy and reproductive health in terms of high-risk fertility, high-risk pregnancy, maternal healthcare utilisation and adverse perinatal outcomes.

Table 4.1: Mean values of autonomy indices by region and place of residence

Region	WAI	IDMA	IAPM	IEA
Barisal	0.34	0.37	0.58	0.07
Chittagong	0.32	0.35	0.54	0.07
Dhaka	0.33	0.35	0.55	0.09
Khulna	0.34	0.37	0.58	0.08
Rajshahi	0.31	0.34	0.51	0.08
Rangpur	0.32	0.36	0.54	0.07
Sylhet	0.31	0.33	0.54	0.05
Place of residence				
Urban	0.3708	0.38	0.62	0.11
Rural	0.3021	0.34	0.51	0.06

WAI: Women's autonomy index, IDMA: Index of decision-making autonomy, IAPM: Index of autonomy in physical mobility, IEA: Index of economic autonomy

Table 4.2: Mean values of autonomy indices by administrative districts

District code	WAI	IDMA	IAPM	IEA
1	0.36	0.31	0.63	0.09
3	0.20	0.11	0.46	-
4	0.33	0.41	0.51	0.07
6	0.36	0.31	0.61	0.09
9	0.31	0.33	0.54	0.03
10	0.32	0.40	0.53	0.08
12	0.30	0.32	0.55	0.03
13	0.33	0.39	0.53	0.07
15	0.38	0.39	0.63	0.10
18	0.35	0.41	0.60	0.05
19	0.31	0.33	0.53	0.06
22	0.22	0.22	0.45	0.06
26	0.39	0.39	0.64	0.13
27	0.36	0.37	0.63	0.08
29	0.29	0.35	0.44	0.07
30	0.31	0.43	0.45	0.05
32	0.28	0.37	0.44	0.04
33	0.33	0.34	0.49	0.14
35	0.37	0.44	0.62	0.05
36	0.28	0.33	0.46	0.07
38	0.39	0.37	0.75	0.06
39	0.31	0.29	0.57	0.07
41	0.36	0.38	0.64	0.07
42	0.36	0.37	0.62	0.10
44	0.34	0.37	0.56	0.10
46	0.38	0.27	0.81	0.07
47	0.36	0.42	0.57	0.09
48	0.31	0.37	0.46	0.09
49	0.31	0.37	0.49	0.06
50	0.32	0.34	0.55	0.08

Table 6 (continued)				
District code	**WAI**	**IDMA**	**IAPM**	**IEA**
51	0.32	0.38	0.52	0.07
52	0.34	0.31	0.65	0.07
54	0.34	0.41	0.52	0.08
55	0.29	0.37	0.46	0.02
56	0.29	0.34	0.51	0.01
57	0.34	0.39	0.56	0.06
58	0.33	0.33	0.58	0.07
59	0.33	0.33	0.61	0.04
61	0.25	0.29	0.42	0.04
64	0.27	0.31	0.43	0.08
65	0.35	0.34	0.71	0.01
66	0.35	0.38	0.52	0.16
68	0.33	0.36	0.61	0.03
69	0.32	0.37	0.51	0.07
70	0.28	0.29	0.45	0.10
72	0.22	0.26	0.37	0.03
73	0.34	0.40	0.55	0.08
75	0.26	0.31	0.42	0.04
76	0.25	0.31	0.37	0.07
77	0.34	0.39	0.56	0.07
78	0.33	0.40	0.51	0.06
79	0.36	0.35	0.66	0.08
81	0.33	0.32	0.61	0.07
82	0.28	0.21	0.57	0.07
84	0.32	0.38	0.57	-
85	0.30	0.32	0.51	0.08
86	0.36	0.42	0.67	-
87	0.29	0.26	0.52	0.08
88	0.32	0.35	0.50	0.11
89	0.26	0.31	0.43	0.02
90	0.29	0.33	0.51	0.03
91	0.32	0.32	0.58	0.05
93	0.35	0.34	0.64	0.06
94	0.34	0.37	0.57	0.08

WAI: Women's autonomy index, IDMA: Index of decision-making autonomy, IAPM: Index of autonomy in physical mobility, IEA: Index of economic autonomy

Table 4.3: Determinants of women's autonomy – Results of MMRA (fixed effects)

Levels of autonomy	Decision-making autonomy		Autonomy in physical mobility		Economic autonomy	
	Medium	**High**	**Medium**	**High**	**Medium**	**High**
Fixed effects	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Current age						
<20 years	-	-	-	-	-	-
20-34 years	1.14*	1.11*	1.22*	1.20*	1.12*	1.09*
34+ years	1.33*	1.33*	1.44*	1.56*	1.40*	1.50*
Level of education						
No education	-	-	-	-	-	-
Primary completed	1.24*	1.32*	1.01*	1.17*	1.17*	1.33*
Secondary completed	1.33*	1.40*	1.24*	1.20*	1.30*	1.39*
Higher education	1.42*	1.41*	1.30*	1.21*	1.46*	1.42*
Work status						
Not working	-	-	-	-	-	-
Not paid	0.90	0.96	1.27	1.37*	0.95	1.13*
Paid work	0.99	1.11*	1.29*	1.44*	1.09*	1.41*
Religion						
Non-Muslim	-	-	-	-	-	-
Muslim	0.60	0.62*	0.66*	0. 67*	0. 86*	0.87*
Place of residence						
Rural	-	-	-	-	-	-
Urban	1.16*	1.29*	1.23*	1.38*	1.13*	1.23*
Socio-economic status						
Wealth index: Poor	-	-	-	-	-	-
Middle	1.07	0.96	1.02	1.02	1.02	1.02*
Rich	1.13	1.00	1.10	1.06	1.16*	1.24*
Husband's education						
No education	-	-	-	-	-	-
Primary completed	0.94	1.04	0.99	1.20	0.95	1.12
Secondary completed	1.24	0.96	1.09	1.08	1.14	1.12
Higher education	0.99	1.03	1.11	1.13	0.41	1.24

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

MMRA: Multilevel Multinomial Regression Analysis; Reference category: Low level of autonomy

Table 4.4: Random effect estimates – Results of MMRA

Random effects	District level		Community level	
	Estimate	ICC	Estimate	ICC
Decision-making autonomy				
Medium	0.18*	0.0527	0.15*	0.0444
High	0.13*	0.0377	0.21*	0.0578
Autonomy in Physical mobility				
Medium	0.24*	0.0677	0.19*	0.0543
High	0.26*	0.0740	0.20*	0.0570
Economic autonomy				
Medium	0.14*	0.0405	0.11*	0.0321
High	0.15*	0.0444	0.12*	0.0360

*All * values are significant at 5% level of significance*
MMRA: Multilevel Multinomial Regression Analysis; Reference category: Low level of autonomy

Table 4.5: Determinants of overall women's autonomy – Results of MMRA

Level of autonomy	Medium level		High level	
Fixed effects	Odds Ratio		Odds Ratio	
Current age				
<20 years	-		-	
20-34 years	1.22*		1.25*	
34+ years	1.31*		1.36*	
Education				
No education	-		-	
Primary completed	1.26*		1.30*	
Secondary completed	1.34*		1.31*	
Higher education	1.41*		1.53*	
Working status				
Not working	-		-	
Not paid	1.08		1.98	
Paid work	1.09*		1.17*	
Religion				
Non-Muslim	-		-	
Muslim	1.03*		0.99*	
Place of residence				
Rural	-		-	
Urban	1.59*		1.60*	
Socio-economic status				
Wealth index: Poor	-		-	
Middle	0.94		1.17	
Rich	1.23		1.22	
Husband's education				
No education	-		-	
Primary completed	0.92		0.99	
Secondary completed	1.21		1.10	
Higher education	0.80		1.01	
Random effects	Estimate	ICC	Estimate	ICC
District level	0.21*	0.0592	0.20*	0.0568
Community level	0.16*	0.0469	0.17*	0.0491

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

MMRA: Multilevel Multinomial Regression Analysis; Reference category: Low level of autonomy

Chapter 5

Access to and Utilisation of Maternal Healthcare

5.1 Introduction

Safe motherhood has been a major public health issue in the developing world. One of the primary objectives of primary healthcare programs in developing countries is to improve child survival through the utilisation of improved maternal-child healthcare services. The World Health Organization (WHO 1994) formulated the *Mother-Baby Package* based on the four principles of safe motherhood: family planning, prenatal care, essential obstetric functions at the first referral level and clean delivery practice. In recent decades, many strategies have been implemented to improve maternal health outcomes around the world. In Bangladesh, the past decade has seen a growing concern with women's health as evidenced by the safe-motherhood initiatives in addressing maternal-child healthcare issues. However, despite various national and international initiatives, more than half a million women from developing countries, including Bangladesh, die each year as a result of complications related to pregnancy and childbirth (UNFPA 2012). Thus, access to and utilisation of maternal healthcare services has been considered a key component to improving pregnancy health and ensuring healthy birth outcomes.

The principal aim of maternal healthcare is early recognition and management of women at risk of complicated pregnancies, which plays a vital role in achieving improved maternal health outcomes. The effectiveness of a maternal healthcare system depends on women's understanding about adverse maternal health outcomes and perceptions of healthcare utilisation. As already noted in Chapter 2, previous research

have argued that the use of maternal healthcare services is affected by demographic, cultural, socio-economic and autonomy factors. The present study contributes to the existing literature by examining the autonomy of women, as well as socio-economic and demographic factors jointly with maternal healthcare utilisation in Bangladesh. It is worth noting that women living in different areas across the country cannot access the same quality of maternal healthcare facilities. At the same time, women's awareness about adverse health outcomes, and thus their healthcare practices, depends on their surrounding environment. Therefore, maternal healthcare utilisation is also assumed to vary across geographic locations in Bangladesh.

The principal aim of this chapter is to examine the relationship between women's autonomy and maternal healthcare utilisation in Bangladesh. The specific objectives are:

- To assess the current status of maternal healthcare utilisation
- To investigate the influences of women's autonomy on antenatal and delivery care utilisation
- To determine the dominant socio-economic and demographic factors influencing the use of maternal healthcare services
- To measure the variations in maternal healthcare utilisation across Bangladesh.

5.2 Conceptual framework

It is recognised that autonomy affects women's behaviour towards antenatal and delivery care utilisation. Although the decision to use maternal healthcare services is mostly an individual choice (Addai 2000; Anderson et al. 1973), it is considered a complex behavioural phenomenon which is also influenced by women's surrounding environment (Chakraborty et al. 2003; Anderson et al. 1973).

Figure 5.1 shows the relationship between autonomy and the utilisation of maternal healthcare that underpins the discussion in this chapter. Women's autonomy (decision-making, physical mobility and economic autonomy) is hypothesised to influence the use of maternal healthcare services. It is assumed that higher levels of autonomy may increase women's decision-making power regarding the use of and access to financial resources to seek healthcare. Individual demographic and reproductive factors such as maternal age, birth order, previous history of pregnancy loss, as well as socio-economic factors such as education, employment, wealth status, religion and place of residence are assumed to affect women's healthcare-seeking behaviour directly and through autonomy indirectly.

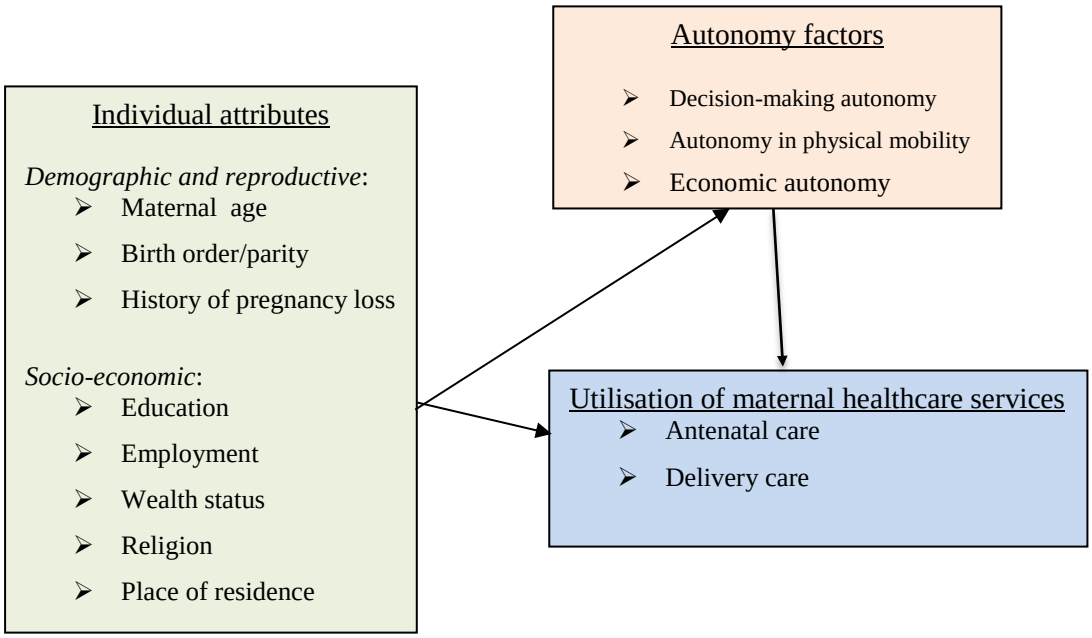


Figure 5.1: The relationship between autonomy and maternal healthcare utilisation

In addition to this, women residing in different locations across Bangladesh are assumed to have different perceptions and medical facilities that affect their utilisation of healthcare services. To investigate this phenomenon, a multilevel approach is applied to the entire framework where individual attributes (Level 1: 17,840 individuals),

followed by community (Level 2: 600 communities) and district (Level 3: 64 districts) levels.

5.3 An overview of the determinants of maternal healthcare utilisation

In reproductive health research, the determinants of maternal healthcare utilisation are investigated by examining the socio-economic, demographic and autonomy variables. Maternal healthcare comprises pregnancy, delivery and postnatal care, which are examined as independent factors influencing pregnancy health and birth outcomes.

Previous studies on maternal healthcare utilisation have focused on the number and timing of antenatal care visits, antenatal and delivery care by skilled health professionals and associated factors. Since the mid-1980s, many studies have been carried out to identify the causes for the under-utilisation of maternal healthcare services in developing countries (Mumtaz & Salway 2005, 2007; Chakraborty et al. 2003; Magadi et al. 2003; Navaneetham & Dharmalingam 2000; Cleland et al. 2006). In this context, most researchers identified socio-economic and demographic indicators such as women's age, birth order, level of education, employment, socio-economic status, religion and place of residence, as well as the level of autonomy, as the determinants of maternal healthcare practices.

It is well recognised that women's age plays an important role in the utilisation of medical services including antenatal and delivery care (Chakraborty et al. 2003). The majority of women in their thirties access antenatal care more frequently than teenagers. Several studies also found a strong association between birth order and use of healthcare services (Chakraborty et al. 2003; Wong et al. 1987). For instance, women were more likely to seek healthcare services for their first birth rather than for subsequent ones.

Evidence from previous studies suggests that maternal education has a positive effect on the use of healthcare services (Chakraborty et al. 2003; Addai 2000; Becker et al. 1993). Education improves women's knowledge and perceptions; educated women are more likely than uneducated women to take advantages of modern medicine and treatments. Women's level of education also reflects a higher standard of living and access to financial and other resources, which have a positive effect on maternal healthcare (Mumtaz & Salway 2005; Bloom et al. 2001). A study in Bangladesh identified that mothers' level of education was a significant determinant of antenatal care and prenatal education played a more important role in the use of routine antenatal care (Nafisa et al. 2011). Abedin et al. (2008) also found women's education was significantly associated with the utilisation of antenatal care received during pregnancy.

In addition to this, women working in paid employment positively affected the use of quality antenatal care services to treat pregnancy complications as well as modern delivery care services. Rahman (2012) found in their Bangladeshi study that women in the higher wealth quintile were more likely to have used a skilled birth attendant compared to women in the lowest wealth quintile. Poor households had lower rates of maternal healthcare utilisation (Gage 2007), while wealthier households were recorded as having higher levels of use of quality healthcare facilities for delivery (Celik et al. 2000). Socio-economic disparities were found as the major cause of variation in antenatal care and delivery care services in Bangladesh (Rahman et al. 2010).

Religious background was found to have a strong influence on the utilisation of maternal health services. Navaneetham & Dharmalingam. (2000) found that in India the use of antenatal care as well as place of delivery varied between religious groups due to differences in their cultural practices and beliefs. In their report, it was observed that Muslim women were less likely to go for antenatal check-up and seek delivery assistance from a male doctor at health facilities than their non-Muslim counterparts.

In developing countries, including Bangladesh, women residing in urban areas live relatively closer to healthcare facilities than their rural counterparts. Women living in urban areas have a different set of cultural values that play an important role in the utilisation of healthcare services (Navaneetham & Dharmalingam 2000). Rahman (2012) similarly found that geographical distance from healthcare services was one of the most important determinants of healthcare utilisation in rural areas in Bangladesh, while Islam (2011) identified that urban/rural differences, level of education and distance of service centre are significantly associated with the total number of antenatal care visits during pregnancy. Rahman et al. (2008) have also explained the significance of urban/rural differentials in receiving antenatal care in Bangladesh.

Although it is well-known that demographic, socio-economic and geographic risk factors affect utilisation of maternal healthcare services, studies in developing countries have also shown the influence of women's autonomy on this (Mistry et al. 2009; Mumtaz & Salway 2007, 2009; Bloom et al. 2001). In Bangladesh, a lack of decision-making power regarding the timing and access to antenatal care services and women's unawareness about maternal morbidity were found as responsible factors for delays in seeking pregnancy care (Nahar et al. 2011; Killeow et al. 2006; Afsana & Rashid 2001; Goodburn et al. 1995).

Women's freedom of movement is also viewed as directly promoting their health by enabling them to access healthcare services. Women's freedom of movement to improves health outcomes indirectly through increased exposure to information, development of interpersonal skills and greater self-confidence (Woldemicael & Tenkorang 2010; Say & Raine 2007). In the South Asian context, restricted mobility has been found to represent a major barrier to women accessing antenatal services making them vulnerable to poor birth outcomes (Mumtaz & Salway 2005, 2007; Bloom

et al, 2001; Khan 1999; Sathar & Kazi 1997). Previous studies in Bangladesh have found a direct effect of women's restricted mobility on healthcare practices (Sikder et al. 2011, Rob et al. 2004; Khan, 1999; Sathar & Kazi 1997). Women's access to and control over economic resources, or more specifically, the right to spend money for antenatal, delivery and postnatal care purposes was also found to have a direct impact on the utilisation of maternal healthcare services (Haque et al. 2012; Rahman et al. 2011).

This study goes beyond what is currently known about the situation in Bangladesh through providing a more comprehensive exploration of the varied outcomes for women across the country by examining not just women's individual socio-economic and demographic characteristics, but the associations between their autonomy and maternal healthcare utilisation.

5.4 Data and methods

To address the overall aim of this chapter a set of key variables were extracted from the BDHS 2011 individual and household questionnaire. The information on the utilisation of maternal healthcare services were obtained from 8,040 (45.6%) women about their most recent births in the five years preceding the survey.

The outcome variables discussed in this chapter consist of the following three maternal healthcare practices: the number of antenatal visits; healthcare seeking behaviour for pregnancy complications; and delivery assisted by medically trained providers. These three outcome variables are analysed as dichotomous variables: a *woman received sufficient antenatal care* (more than three visits – according to the WHO, at least three visits are essential); *a woman looked for professional healthcare for pregnancy complications*; and *her delivery was assisted by trained professionals in medical*

facilities. To analyse these outcome variables, three sets of independent variables are used.

The first group includes the three indices of *women's autonomy*: the index of decision-making autonomy (IDMA), the index of autonomy in physical mobility (IAPM) and the index of economic autonomy (IEA). The values of these variables are categorized as: *low*, *medium* and *high levels of autonomy*. The second group comprises the explanatory variables that include *women's individual attributes*: level of education, work status, place of residence, religion and socio-economic status. The third group comprises women's demographic variables that include *childbearing practices*: maternal age and birth order. A detailed description of these variables and their measurements is provided in Chapter 3, Section 3.2.

The responses obtained from the study population are analysed using descriptive statistics, which include the proportion of respondents that reported use of antenatal and delivery care services. Furthermore, to investigate the influence of autonomy on maternal healthcare utilisation, and to identify the variations in use of maternal healthcare services at district and community levels across Bangladesh, *multilevel logistic regression models* (MLRM) with random intercept are applied. A three-level approach was used for this purpose: Level 1 – individual level (8,040 ever-married women); Level 2 – community level (clusters: 600 primary sampling units); and Level 3 – district level (64 districts).

5.5 Results and discussion

5.5.1 Results of multilevel analysis

To measure the influence of women's autonomy, and socio-economic and demographic variables on maternal healthcare (antenatal and delivery care) utilisation, multilevel

(three level) logistic regression models (MLRM) were fitted. Three binary response multilevel logistic regression models were fitted first and the odds of '*use of maternal healthcare*' versus '*no use*' estimated: number of antenatal visits (Model 1); received healthcare for pregnancy complications (Model 2); and delivery in medical facilities (Model 3). Table 5.1 provides the results of this analysis. In Models 1-3, only autonomy variables were included. Next, socio-economic and demographic variables were added to autonomy variables (Models 4-6). The results of this analysis are presented in Table 5.2.

Table 5.1 shows significant associations between the three indicators of autonomy (fixed effects) and number of antenatal visits (Model 1). It was women with high or medium levels of decision-making autonomy who were about 18% and 13% respectively more likely to have received antenatal care than those with low level of autonomy. In terms of autonomy in physical mobility, it was found that women's freedom of movement contributes to higher use of antenatal care services (about 29% more for women with high level of autonomy compared their less autonomous counterparts). Additionally, economically autonomous women were more likely to have sufficient number of antenatal visits (3 or more) than their less autonomous counterparts (about 41% more).

Table 5.1 also shows significant associations between the three indicators of autonomy and healthcare seeking for pregnancy complications (Model 2). The data indicates that women with higher levels decision-making power were more likely to receive treatments for pregnancy complications than their less autonomous counterparts (about 20% and 16% more with high and medium levels of autonomy respectively). The likelihood of accessing healthcare for pregnancy complications was about 37% and 33% higher for women with high and medium levels of autonomy in physical mobility respectively compared to their less autonomous counterparts. Likewise, the likelihood

of accessing healthcare for pregnancy complications was 32% and 37% higher for women with medium or high levels of economic autonomy respectively than those women with low level of autonomy.

Delivery in medical facilities was also higher among women with high level of decision-making autonomy (29% more compared to women with low level of autonomy). The data shows that economic autonomy of women contributes to 29% higher chances to have births in medical facilities than their less autonomous counterparts. However, autonomy in physical mobility is not found to be significantly associated with place of delivery (Model 3).

The random effects presented in Table 5.1 illustrate significant variations in the three components of maternal healthcare utilisation accounted for by district level in Bangladesh. However, at community level, variation in healthcare seeking for pregnancy complications was not found to be significant. After controlling the autonomy variables (fixed effects), about 6.96% and 6.37% of total variations in the use of antenatal care services was accounted for by district and community levels respectively. The remaining 93% and 93.6% of total variations respectively can be explained by autonomy or other unknown factors (Model 1). At district level, about 7.45% of total variation in the likelihood of accessing healthcare for pregnancy complications was accounted for across the country (Model 2). In terms of delivery place, about 1.91% and 1.26% of total variations were accounted for by district and community levels respectively (Model 3).

The results presented in Table 5.2 shows that socio-economic and demographic variables are more important than autonomy variables in explaining the use of maternal healthcare services. However, when these variables are added with autonomy variables in a single model (Models 4-6), the associations between autonomy and maternal

healthcare utilisation became weaker. Only economic autonomy of women was found to be significantly associated with the three components of maternal healthcare. Both decision-making autonomy and autonomy in physical mobility were found to have significant impacts on the use of antenatal care services only. Furthermore, the influences of socio-economic and demographic variables (specifically, education, place of residence and socio-economic status) were demonstrated to be strongly associated with both antenatal and delivery care utilisation. Table 5.2 shows that each of the three indicators of autonomy had significant influences on a woman receiving sufficient number of visits for antenatal care. However, after adding socio-economic variables, the influences of women's decision-making autonomy, autonomy in physical mobility and economy autonomy on the use of antenatal care reduced about 5%, 6.97% and 7.1% respectively (Model 5).

Table 5.2 reveals that the odds of receiving sufficient antenatal care were higher among women who were more educated, employed, Muslim, residing in urban areas and belonging to the rich socio-economic class (about 56%, 50%, 9%, 34% and 53% higher compared to their non-educated, unemployed, non-Muslim, rural and having poor wealth index counterparts respectively). Furthermore, adolescent and older women were found to be less likely to use antenatal care services than women aged 20 to 34 years (0.799 and 0.628 times less respectively). It was also evident that women were more likely to receive antenatal care in their first pregnancies than those with higher-order pregnancies (Model 4).

Table 5.2 shows that women's level of education, place of residence, socio-economic status and maternal age were significantly associated with the likelihood of accessing healthcare for pregnancy complications. In particular, it was better-educated women, those living in urban areas and those from wealthier socio-economic circumstances who were more likely to receive treatments for pregnancy complications (about 18%, 69%

and 38% more than their illiterate, rural and poor counterparts respectively). Also, it was found that adolescents were more likely (1.23 times) to receive healthcare for any complications during pregnancy than older women (Model 5).

The data revealed that delivery in medical facilities was occurred 59% more for better-educated women than their less-educated counterparts. Also, Muslim women were found to be less likely (0.74 times) to deliver in medical facilities. Women with high socio-economic status and residing in urban areas had 37% and 49% more chances to have births in medical facilities than women with low socio-economic status and residing in rural areas respectively. Furthermore, compared to women aged 20 to 34 years, adolescents were 1.11 times more likely and older women were 0.71 times less likely to deliver in medical facilities. The findings also reveal that in higher order births, women became less likely (0.63 times) to deliver in healthcare facilities (Model 6).

Table 5.2 presents the random effects which indicate that although the variations in each components of maternal healthcare utilisation were found to be significant at district level, at community level it was only significant for the number of visits for antenatal care. Moreover, after adding the socio-economic and demographic variables in the models (Models 4-6), the extent of variations in the three components of maternal healthcare utilisation became less than the previous models containing autonomy variables only (Models 1-3). Only 0.42% and 0.60% of total variations in the use of antenatal care services were accounted for by district and community levels across the country. The remaining variations could be explained by autonomy, socio-economic and demographic or other unknown factors (Model 4). The figures indicate that about 6.24% and 2.78% of total variations in healthcare seeking for pregnancy complications and delivery in medical facilities was accounted for by district level across the country.

5.5.2 Discussion

The focus of this chapter has been to examine the effects of women's autonomy on maternal healthcare utilisation in Bangladesh. Three components of maternal healthcare seeking behaviour have been considered: the number of antenatal visits; healthcare seeking for pregnancy complications; and delivery in medical facilities for the most recent birth. Overall the data reveals that about 55% of women in Bangladesh utilised both antenatal and delivery care services. This proportion is higher than the proportion reported in the 2007 BDHS, which was reported as about 50%.

There is a significant relationship between women's autonomy and maternal healthcare utilisation. Firstly, in the model containing autonomy variables only, statistically significant associations between autonomy variables, antenatal visits, healthcare for pregnancy complications and delivery in medical facilities were found. Women's decision-making autonomy was found as one of the strong determinants of these three components of maternal healthcare use. This finding is consistent with several previous studies that reported a strong association between women's autonomy in decision-making and the use of reproductive healthcare in Bangladesh (Mistry et al. 2009; Mumtaz & Salway 2009; Woldemicael & Tenkorang 2010; Upadhyay & Hindin 2005; Bloom et al. 2001).

Women's independent mobility is the most significant component of women's autonomy that affects the healthcare seeking behaviour of women. As previously noted, the seclusion of women in the home, even for healthcare, is widely prevalent in many Muslim societies including Bangladesh (Sikder et al. 2011; Mumtaz 2007; Rob et al. 2004; Khan, 1999; Sathar & Kazi 1997; Amin et al. 1997; Dharmalingam et al. 1996; Cleland et al. 1994). This practice limits women's knowledge and attitudes toward reproductive healthcare initiatives, as well as their awareness about adverse health

outcomes, which makes them more vulnerable to maternal complications. The data further revealed a significant correlation between economic autonomy and access to antenatal visits, as well as healthcare for pregnancy complications. This may reflect the situation that women with higher autonomy in financial matters are more able to seek healthcare if necessary.

After including the demographic and socio-economic variables, the following picture emerges in respect of the three autonomy indicators: only economic autonomy is found to be strongly associated with each of the three components of maternal healthcare; and the number of women receiving antenatal care is influenced by each of the three indicators of autonomy. Moreover, the analysis indicates that the socio-economic and demographic variables are even more influential than the autonomy indicators in influencing maternal healthcare practices. In particular, women's level of education, place of residence and their socio-economic status are found as the strongest determinants of maternal healthcare utilisation. This highlights that the relationship between autonomy and healthcare use is mediated by socio-economic factors such as level of education, socio-economic status and place of residence.

Many researchers argue that women's higher level of education contributes to the highest level of autonomy in decision-making, while independent mobility confers a higher level of reproductive healthcare utilisation and, thus, the prevention of adverse birth outcomes (Nahar et al. 2012; Jafari et al. 2010; Jansen et al. 2010; Mistry et al. 2009). The data analysis for this chapter found that there is a significant relationship between women's working status and receiving sufficient number of visits for antenatal care and delivering in medical facilities. The reason for this correlation may be that women who are employed are more likely to be exposed to information, knowledge and new attitudes about modern healthcare services which make them more

autonomous in healthcare seeking during pregnancy as well as giving them financial security to spend money on pregnancy care and delivery matters.

A woman's place of residence is found as a strong determinant of maternal healthcare utilisation. For instance, women residing in urban areas are much more likely than rural women to receive antenatal care services and delivery in medical facilities. In the case of Bangladesh, even though more than 70% of the population lives in rural areas, health service provision has an urban bias. In addition to this, the infrastructure for healthcare, education and employment are highly concentrated in urban areas, which make urban women more able to seek healthcare if necessary (Rahman et al. 2010; Silva et al. 2008). By contrast, access to health services for rural women remains a major barrier in antenatal care utilisation as well as delivery assistance from healthcare professionals.

In terms of religion, the analysis is consistent with previous research in finding a significant relationship between religion and the utilisation of antenatal care and delivery in health facilities (Rahman & Abedin 2010; Sathar & Kazi 1997; Basu 1995). Although more than 80% of women in Bangladesh are Muslim, they remain less autonomous compared to their non-Muslim counterparts. This study finds that Muslim women prefer home deliveries rather than delivery in healthcare facilities, which correlates with a number of previous studies that have found religious restrictions create barriers in permitting Muslim women to go to healthcare facilities (Choudhury et al. 2012; Rahman et al. 2011; Mumtaz & Salway 2005; Hussain & Smith 1999). However, according to the present study's data, there was only a slight difference between Muslim and non-Muslim women in utilising maternal healthcare services.

The findings of this chapter further illustrate that women with a high socio-economic status have significantly higher levels of utilisation of maternal healthcare facilities, as many previous studies have found (Rahman et al. 2010; Bloom et al, 2001; Khan 1999).

By contrast those with poor socio-economic status tend to experience poorer living standards and have less access to education as well as healthcare facilities. The costs of travel, service fees and equipment represent significant barriers for poor people to seek healthcare, even if it is necessary.

Another finding indicates that the use of antenatal care services is higher among older women than their younger counterparts, as women in the age range of 20 to 34 were more likely to attend antenatal care than younger women. This may be due to the older women having more knowledge and placing more value on modern healthcare as well as enjoying more freedom of mobility than their younger counterparts. Although older women are likely to be economically dependent on their husbands, they tend to have more decision-making power than younger or teenage women (Senerath & Gunawardena 2009; Parveen 2007; Hussain & Smith 1999). The data also indicated that antenatal care utilisation was higher for first pregnancies and lower for successive ones suggesting that as women became more confident and experienced there was not as much need to use antenatal care. Consequently, high parity equates to less use of antenatal care and to higher home births, particularly among older women.

The final finding to highlight in this chapter is the significant variations in the utilisation of maternal healthcare services across district level. In part this reflects the huge differences between urban and rural healthcare services and between different districts across the country. As most of the quality healthcare centres and qualified medical professionals are located in urban areas and big cities, there is a shortage in rural and small cities across the country. At the same time, as women's education and employment facilities vary across the country, women residing in different areas have different levels of autonomy, which obviously influence their knowledge and understanding about reproductive health initiatives and adverse health outcomes. Consequently, there is uniformity to women's access to and use of maternal healthcare

services throughout Bangladesh. The influences of maternal healthcare components on pregnancy health and birth outcomes, as well as their role as mediating factors in affecting the relationships between autonomy and maternal health outcomes, are described in Chapter 7 and Chapter 8.

Table 5.1: Determinants of maternal healthcare utilisation – Results of MLRA

Fixed effects	Model 1		Model 2		Model 3	
	Odds Ratio		Odds Ratio		Odds Ratio	
Decision-making autonomy						
Low level	-		-		-	
Medium level	1.13*		1.17*		1.21*	
High level	1.18*		1.20*		1.29*	
Autonomy in physical mobility						
Low level	-		-		-	
Medium level	1.26*		1.33*		1.09	
High level	1.29*		1.37*		1.95	
Economic autonomy						
Low level	-		-		-	
Medium level	1.35*		1.32*		1.26*	
High level	1.41*		1.37*		1.29*	
Random effects	Estimate	ICC	Estimate	ICC	Estimate	ICC
District level	0.25*	0.0696	0.26*	0.0745	0.06*	0.0191
Community level	0.22*	.00637	0.19	-	0.04*	0.0126

*All * values are significant at 5% level of significance*
MLRA: Multilevel Logistic Regression Analysis; Reference category: No use of maternal healthcare services
Model 1: Number of antenatal visits; Model 2: Healthcare for pregnancy complications; and Model 3: Delivery in medical facilities

Table 5.2: Determinants of maternal healthcare utilisation – Results of MLRA

Fixed effects	Model 4	Model 5	Model 6
	Odds Ratio	Odds Ratio	Odds Ratio
Autonomy variables			
Decision-making autonomy			
Low level	-	-	-
Medium level	1.12*	1.20	0.98
High level	1.12*	1.19	1.20
Autonomy in physical mobility			
Low level	-	-	-
Medium level	1.13*	1.30	1.32
High level	1.20*	1.27	1.01
Economic autonomy			
Low level	-	-	-
Medium level	1.19*	1.32*	1.19*
High level	1.31*	1.37*	1.22*
Socio-economic variables			
Level of education			
No education	-	-	-
Primary completed	1.21*	1.11*	1.22*
Secondary completed	1.32*	1.10*	1.39*
Higher education	1.56*	1.18*	1.59*
Working status			
Nor working	-	-	-
Not paid	1.09	1.21	0.39
In paid work	1.50*	1.10	1.09*
Religion			
Non-Muslim	-	-	-
Muslim	1.09*	0.11	0.74*
Place of residence			
Rural	-	-	-
Urban	1.34*	1.69*	1.49*
Socio-economic status			
Wealth Index (WI): Poor	-	-	-
Middle	1.39*	1.22*	1.19*
Rich	1.53*	1.38*	1.37*

Table 5.2 (continued)

Fixed effects	Model 4		Model 5		Model 6	
	Odds Ratio		Odds Ratio		Odds Ratio	
Demographic variables						
Maternal age						
On-time (20 to 34 years)	-		-		-	
Early (less than 20 years)	0.79*		1.23*		1.11*	
Delayed (more than 34 years)	0.63*		0.99		0.71*	
Birth order (children ever born)						
1 birth	-		-		-	
2-3 births	0.90*		0.921		0.903*	
4 and more	0.78*		0.659		0.632*	
Random effects	Estimate	ICC	Estimate	ICC	Estimate	ICC
District level	0.01*	0.0042	0.22*	0.0624	0.09*	0.0278
Community level	0.02*	0.0060	0.08	-	0.04	-

*All * values are significant at 5% level of significance*
MLRA: Multilevel Logistic Regression Analysis; Reference category: No use of maternal healthcare services
Model 4: Number of antenatal visits; Model 5: Healthcare for pregnancy complications; and Model 6: Delivery in medical facilities.

Chapter 6

High-Risk Fertility Behaviour

6.1 Introduction

In Bangladesh marriage and childbearing remain universal goals for women. Childbearing begins at an early age, just after marriage, and most Bangladeshi women have many children over their reproductive span with very short intervals between them (Islam et al. 2001). Bangladesh has one of the world's highest rates of adolescent motherhood with one in three teenage girls becoming a mother. All of these factors lead to high fertility, particularly among adolescents, and childbearing risks with poor maternal health outcomes (NIPORT 2015). In addition to this, most women's lives remain centred on their traditional roles of wife and mother, and they also have limited access to healthcare as well as education and labour markets. This lack of opportunities for women contributes to their low status, reduced family well-being and generally poor health for both mother and child.

Childbearing practices and fertility behaviour of women is largely dependent on their surrounding environment. The International Conference on Population and Development (ICPD 1994) recommended that women should have the freedom to decide whether to have children and when and how many to have. In this way, autonomy issues become a major factor for understanding women's fertility behaviour and childbearing practices. Each measure of women's autonomy (decision-making, freedom of movement and economic matters) is assumed to have major impacts on women's fertility behaviour that contributes to high-risk fertility. In addition to this, the availability of family planning and healthcare services, education opportunities and

labour market participation of women vary across Bangladesh. Women's understanding about reproductive health and their participation in maternal healthcare utilisation also vary across the country in terms of different social contexts. Thus women's childbearing practices are also assumed to vary according to their surrounding environment. It is, therefore, important to capture those variations by different locations across Bangladesh.

This chapter examines the extent to which childbearing practices are linked with women's autonomy. It is hypothesised that women with higher levels of autonomy have more control over their fertility behaviour and, therefore, are less likely to experience high-risk fertility. The specific research objectives explored in this chapter are:

- To examine the patterns of high-risk fertility
- To measure the influences of autonomy on high-risk fertility
- To identify the dominant socio-economic factors influencing high-risk fertility
- To investigate how and to what extent high-risk childbearing practices vary across Bangladesh.

6.2 High-risk and low-risk fertility

According to the Alma-Ata declaration, the concept of high-risk fertility refers to a certain childbearing practice which describes those women who bear children at too young or too old an age, who have too many children and/or those who bear children too close together (Population Report 1975). The concept of high-risk fertility is primarily associated with the health risks for both the mother and the foetus. High-risk childbearing behaviour in turn is influenced by the environment in which women live, their status in family and society, and their understanding and attitudes toward reproductive healthcare interventions.

A large number of studies in Bangladesh reveal that adolescent pregnancies caused severe and life-threatening complications to mothers and their babies, as well as high maternal and neonatal death rates (Ferdous et al. 2012; Nahar et al. 2011; Sayem & Nury 2011; Rahman & Abedin 2010). It is also found that childbearing risks go up with an increasing number of children and particularly in high birth orders of four and more. The length of interval between successive births is also found to be associated with childbearing complications and poor birth outcomes. Many studies suggest that birth intervals of three to five years are healthiest for mothers and their babies (Rutstein 2005; Conde-Agudelo & Belizán 2000). Both very short (between 9 to 18 months) and short (less than 18 months) birth intervals may cause life-threatening complications for both mother and newborn (Williams et al. 2008; Royce 2006). In Bangladesh, more than 50% of women have had at least two births and about 10% of women have had at least four births and thus experienced maternal health complications due to the adverse biological effects of high parity and short birth intervals between them (Khan et al. 2012; Nahar et al. 2011; Alam et al. 2008; Mamun et al. 2006; Islam et al. 2006).

6.3 Childbearing practices and role of women in Bangladesh

Childbearing is inextricably linked to the status of women and women's roles within their family and society. Dyson and Moore (1983) suggested that early age at marriage, poor spousal communication and sex preference contributes to high fertility rates, which are also associated with the status of women. Jejeebhoy (1991, 1995) argued, for instance, that women with high levels of autonomy were more likely to be educated, to marry later and to acquire information regarding family planning utilisation, and thus to control their fertility. Several studies also have shown an inverse relationship between fertility behaviour and women's status (Bloom et al. 2001; Hindin 2000; Basu

1990), as well as a positive relationship between autonomy and contraception in lowering fertility rates (Schuler et al. 1997; Morgan & Niraula 1995).

Women's decision-making autonomy regarding contraception was identified as one of the major fertility reducing factors in Bangladesh (BFS 1989; Hossain 1998; Islam et al. 2004). The number and timing of births were influenced by women's reproductive decision-making autonomy as well as knowledge and awareness towards reproductive healthcare initiatives. In Bangladesh, the timing and number of children are beyond many women's own wishes. This leads to women having many children in short birth intervals, which puts them at high-risk of maternal morbidity and mortality (Nahar et al. 2011; Razzaque et al. 2005). In Bangladesh, women's decisions about contraceptive use, pregnancy and the number of children are mainly made by their husbands. Husbands also restrict women's contact with healthcare providers, which in turn limits their knowledge and awareness about reproductive healthcare (Rob et al. 2004).

Much earlier, Bongaarts (1978) described the relationship between women's status and lower fertility through the pathways involving age at marriage, contraceptive use and some other proximate determinants. Women's socio-economic status is likely to influence birth intervals through similar pathways. It has been identified that greater socio-economic status of women increases the likelihood of contraceptive uses and thus increases the interval between successive births (Schuler et al. 1997; Jejeebhoy 1995; Morgan & Niraula 1995). Furthermore, women with high levels of decision-making autonomy tend to delay conception and limit the number of births.

The socio-economic and demographic variables have also been identified in influencing women's reproductive health and their autonomy. A significant number of studies in Bangladesh suggest that female age at marriage, levels of education and employment, the difference in age between a husband and wife, and the husband's education level

effect both women's levels of decision-making autonomy and childbearing practices of women (Islam et al. 2004; Kabir et al. 2003; Menken et al. 2003; Amin & Lloyd 2002; Hossain 1998). Kabir (2003) found educational attainment of women in Bangladesh was a useful indicator of their status that is inversely related to the number of children ever born to them. Furthermore, employment outside the home is found as one of most important economic factors for increasing women's domestic decision-making power and control over their earnings, which in turn improves reproductive healthcare in terms of contraception and healthcare utilisation (Parveen 2007; Agarwala & Lynch 2006; Jejeebhoy 2000). In addition to this, as noted in Chapter 5, religious belief sometimes restricts contraceptive use as well as affecting women's attitudes towards healthcare services, including maternal healthcare (Sathar & Kazi 1997).

In summary, a significant number of previous studies have identified the influences of autonomy and socio-economic factors on childbearing practices in Bangladesh. However, the present study extends this analysis by focusing on high-risk fertility and its relationship with autonomy, which may indicate the extent of aggregated risks of adverse maternal and birth outcomes.

6.4 Data and methods

6.4.1 Study population and variables

The BDHS 2011 contains a sample of 17,842 ever-married women aged 10 to 49 years. However, about 10.2% (1,817) of the total respondents do not have any live births, and are thus excluded from the study of this chapter. The remaining 89.8% (16,025) of women are considered for high-risk maternal age and high-risk parity. Another 20.8% (3,721) of women were excluded because they had only one child and thus were not suitable for birth interval analysis. Therefore, a total of 12,304 (69%) respondents are studied on high-risk fertility.

High-risk fertility is determined by combining three indicators: *maternal age* (the age of mother at birth), *parity* (the number of births) and *birth interval* (the interval between two successive births). The measurement of these variables was described in Chapter 3, Section 3.2. In this chapter, these variables are used to derive the dependent or outcome variables: *high-risk maternal age* (below 20 years and/or above 34 years), *high-risk parity* (more than three births) and *high-risk birth interval* (less than 18 months).

High-risk fertility, the outcome variable of this chapter, is a combination of three variables: high-risk maternal age, high-risk parity and short birth intervals. A combined index of childbearing risk is obtained by cross-classifying births by these three variables. According to this index, a birth may have from zero to four high-risk characteristics: 'no risk', 'single risk', 'double risks' and 'triple risks'. As the women identified with triple risks are a very small number (0.7%), the 'double risks' and 'triple risks' categories are combined into a single category: 'multiple risks'. Therefore, high-risk fertility is analysed with three categories: *no risk*, *single risk*, and *multiple risks*.

To address the overall aim of this chapter, indicators of women's autonomy, socio-economic variables and components of childbearing practices are employed. These variables were extracted from the BDHS 2011 individual and household questionnaires. A detailed description of these variables and their measurements is provided in Chapter 3, Section 3.2.

6.4.2 Methods of analysis

The responses obtained from the study population were analysed using descriptive statistics, which include the percentage of respondents to high-risk maternal age, parity and birth interval, as well as the percentage of respondents to high-risk fertility according to different risk levels (no risk at all, single risk, and multiple risks).

To measure the influences of autonomy on high-risk fertility and to identify the variations in high-risk childbearing practices across Bangladesh, the multilevel generalized linear mixed models (GLMM) of categorical response variables were used. The multilevel approach used in this chapter contains three levels: the *individual* level (12,308 women who had at least one live birth: Level 1); the *community* level (600 primary sampling units from urban and rural areas: Level 2) and the *district* level (64 districts: Level 3). Both binary and multinomial multilevel logistic regression models (MLRM) are used as statistical tools. In the models, *no risk* category has been used as the reference category and models fitted for both *single risk* and *multiple risks* categories. First, multilevel binary logistic models were fitted separately for each of the three components of high-risk fertility: high-risk maternal age (Model 1), high-risk parity (Model 2) and high-risk birth interval (Model 3). Second, a multilevel multinomial logistic model was fitted for high-risk fertility with autonomy variables only. Afterwards the socio-economic variables were included to the model. All the analyses were conducted by using *SPSS Version 21*.

6.5 Results and discussion

6.5.1 Women of high-risk childbearing practices

Table 6.1 and Table 6.2 depict the distribution of women with high-risk and low-risk childbearing according to the key characteristics: maternal age, parity and birth interval. Table 6.1 shows that about 64.8% of women were teenage mothers (19 years or younger at maternal age). On the other hand, in terms of delayed childbearing (maternal age more than 34 years), only 7% of women were in the high-risk category. This table also shows that in terms of maternal age about 65.5% women were in the high-risk category, being either younger than 20 or older than 34. In addition to this, it is also found that some women in the study population had a very long reproductive span, by starting

childbearing at younger than 20 and continuing to have children over the next 15 or more years. However, only 3.2% of women were in this group.

Table 6.2 shows that about 20.2% of women have had high-risk birth intervals of less than 18 months. It is also shown that about 33.2% of women have had at least one high-risk birth interval of less than 18 months. About 9.2% and 1.9% of women have two or three high-risk birth intervals respectively. Very few (0.2%) women have four high-risk birth intervals. In terms of parity, about 15.6% of women were in the high-risk category of four or more children.

Table 6.3 depicts the distribution of women with high-risk childbearing practices classified by maternal age, parity and birth interval. This table shows that 56% of women are in the high-risk category either in terms of maternal age or parity or birth interval. About 21.7% of women are in the multiple-risk category. They are high risk in age at birth and parity, or in age at birth and birth interval, or in parity and birth interval. In addition to this, the women in multiple-risk category may also have all three risks, that is, being at too early or too late maternal ages and having too many children with too short birth intervals.

6.5.2 Results of multilevel regression analysis

To investigate the influence of women's autonomy on high-risk fertility (HRF), multilevel logistic regression models (MLRMs) have been fitted and the odds of single and multiple risks versus no risk are estimated. In this chapter, three-multilevel regression models have been first fitted to analyse each component of high-risk fertility: high-risk maternal age (Model 1), high-risk parity (Model 2) and high-risk birth interval (Model 3). Next, high-risk fertility was examined with women's autonomy only, and then socio-economic variables were included to identify the influential determinants of high-risk fertility. Tables 6.4, 6.5 and 6.6 show the results of these analyses.

Determinants of high-risk maternal age, parity and birth interval

Table 6.4 presents the results of the multilevel logistic regression analysis with random intercept of binary response variables: maternal age, parity and birth interval. Women's decision-making autonomy and autonomy in physical mobility were found to be strongly associated with high-risk maternal age. Women with medium and high levels of decision-making autonomy were 0.84 and 0.64 times respectively less likely to have high-risk maternal ages compared to women with low level of decision-making autonomy. Also, highly autonomous women were 0.79 times less likely in having high-risk maternal ages compared to women with low level of autonomy in physical mobility. Women's autonomy in economic matters was not found to have any significant effect on high-risk maternal age (Model 1).

A woman with higher education was predicted to have 0.75 times less likelihood of experiencing high-risk maternal age (early or delayed childbearing) compared to a woman with no education. The risks were found as about 0.97 and 0.77 times lower for women with primary and secondary education respectively. Compared to non-Muslim women, Muslim women had 42% more chance of having high-risk maternal ages. The maternal age related risks for a woman with a rich wealth index was found to be 0.56 times lower than that for a woman with a poor wealth index. Furthermore, urban women were found to be 0.54 times less likely to experience high-risk maternal ages than rural women.

In Table 6.4, the predicted probabilities in Model 2 show that women's autonomy in decision-making and physical mobility both have significant effects on a large number of children they have. A woman with high level of decision-making autonomy, for instance, is predicted to be 0.67 times less likely to have a large number of children than a woman with a low level of autonomy. Furthermore, those women who are highly

autonomous had 0.62 times less risks than those women who had less autonomy in physical mobility. The predicted probabilities of high-risk parity of women with primary, secondary or higher education were about 0.97, 0.77 and 0.75 times respectively lower than for those woman with no education. Non-working women were found to have more children than their working counterparts (0.69 times less for employed women compared to non-working women). Additionally, Muslim women had 68% increased chances of having high-risk parity compared to non-Muslim women. Furthermore, women living in urban areas had 0.69 times lower chances in having high-risk parity than those women living in rural areas.

In terms of high-risk birth intervals, women's decision-making autonomy, as well as women's education, religion and place of residence have significant effects on high-risk birth intervals (Model 3). Whereas the other fixed effects, including women's autonomy, physical mobility and economic matters, have insignificant effects. Highly autonomous women were found to have 0.83 times decreased risks in having short birth intervals compared to those of low autonomous women; women with high level of education were less likely (0.58 times) to have short birth intervals; Muslim women were found to be 1.08 times more likely; and urban women were 0.76 times less likely to have high-risk birth intervals.

The random effects presented in Table 6.4 shows significant variations in each of the three components of high-risk fertility across district level. However, at community level, only high-risk parity is found to have significant variation. Only 0.49% of total variation in high-risk maternal age is accounted for by district level across Bangladesh. About 6.59% and 4.20% of total variations in high-risk parity (having a large number of children) is accounted for by district and community levels respectively across Bangladesh (Table 6.4, Model 2). Thus the remaining 93.41% or 95.80% of total variations were due to the variations within respondent's autonomy, socio-economic or

unknown factors, which differentially influence high-risk parity. Furthermore, only 0.78% of total variations in high-risk birth intervals is accounted for by district level (Model 3).

Determinants of high-risk fertility

Table 6.5 presents the fixed and random effects on *single* and *multiple risks* compared to the *no risk* of the categorical response variable of high-risk fertility. It is evident that women's autonomy in decision-making and physical mobility have significant effects on high-risk fertility. For instance, a woman with a high level of decision-making autonomy was 0.74 times less likely to have both single and multiple risks respectively compared to a woman with a low level of autonomy. Additionally, in terms of autonomy in physical mobility highly autonomous women were 0.95 and 0.78 times less likely in having single and multiple risks respectively compared to their less autonomous counterparts.

As already noted, the socio-economic characteristics of women influence the relationship between their autonomy and high-risk fertility. Therefore, in terms of the analysis, adding socio-economic variables another single model to investigate the changes in the influences of autonomy variables on high-risk fertility. The results of the analysis are presented in Table 6.6. After addition of the socio-economic variables, only women's decision-making autonomy is found to have significant effects on high-risk fertility. It is found that a high level of decision-making autonomy reduced both the chances of single and multiple risks (about 0.84 and 0.89 times respectively compared to a low level of autonomy). Women's education, religion and place of residence are found as strong determinants of high-risk fertility. Women with high level of education were found to be 0.25 and 0.16 times less likely to have both single and multiple risks respectively (Table 6.6). Furthermore, Muslim women had about 36% (single risk) and

52% (multiple risks) increased risks compared to non-Muslim women. Similarly, compared to those women living in rural areas, the risk is predicted to decrease by 0.90 and 0.89 times for urban women in single and multiple risk categories respectively.

Table 6.5 shows that the variations in the levels of high-risk fertility are found to be significant (for both single and multiple risks categories) across district and community levels. Among the total variations in high-risk fertility, about 2.92% in single risk and 7.05% in multiple risks are accounted for by district level. Also, about 1.44% in single risk and 2.49% in multiple risks are accounted for by community levels across the country. Thus the remaining variations in high-risk fertility at district and community levels can be explained by autonomy or other unknown factors. After adding the socio-economic variables, the findings show that the variation in the high-risk fertility across the country became less. Table 6.6 shows a significant amount of variation in high-risk fertility (both single and multiple risks) across the district level only. There is about 1.61% of total variations in single risk and about 4.53% of total variations in multiple risks that are accounted for by district level across the country. Therefore, the remaining variations in high-risk fertility can be explained by autonomy and women's socio-economic characteristics.

6.5.3 Discussion

This chapter focuses on the influence of women's autonomy on high-risk fertility at the individual, community and district levels across Bangladesh. A large number of earlier studies have identified the determinants of the three components of high-risk fertility, that is, maternal age, children ever born to women and birth intervals. However, the concept of high-risk fertility (the combined effects of high-risk maternal age, a large number of children and short birth intervals) has not been examined so far. The data analysis indicates that a significant amount of early childbearing occurs in Bangladesh.

More than half of Bangladeshi women are found to be at high risk either in terms of early maternal age or high parity or short birth intervals. Some women with high parity (four or more children) had very short intervals (less than 18 months) between all births. This phenomenon indicates a pattern of high-risk fertility that, even now, is still making women vulnerable to adverse maternal and birth outcomes.

Among the three dimensions of women's autonomy, the data indicates that decision-making autonomy and autonomy in physical mobility have significant influence on reducing high-risk fertility, whereas, autonomy in economic matters does not have any significant impact. Many earlier studies have also found that the number and timing of births are greatly influenced by women's decision-making autonomy (Bloom, et al. 2001; Hindin 2000; Basu 1997; Nahar et al. 2011; Razzaque et al. 2005). This women's autonomy component also plays a significant role in reducing the risks related to a shorter birth interval. Therefore, the level of high-risk fertility is also influenced by women's decision-making autonomy. In particular, high levels of decision-making power about having children at a favourable time, thus reduces the prevalence of short birth intervals and having a large number of children as well as high-risk fertility.

Although there are significant effects of women's autonomy on high-risk fertility, individual socio-economic factors are even more influential on reducing high-risk fertility. The findings of this chapter have found factors such as education, working status, religion and place of residence are strong determinants of maternal age, children ever born and short birth intervals (Parveen 2007; Sathar & Kazi 1997; Rahman et al. 2010; Upadhyay & Hindin et al. 2005). Many researchers, for instance, have argued that higher levels of education confer higher levels of autonomy (Adhikari 2010; Mumtaz & Salway 2007; Kabir 2003; Cleland et al. 1996; Castro 1995; Sathar 1996; Jejeebhoy 1995). Illiteracy reduces women's autonomy in family decision-making roles and prevents them being economically independent through earning an income. The

data analysis confirmed education as having the strongest effect on reducing high-risk fertility; less-educated and unemployed women were more likely to give birth at earlier ages compared to educated women who earned their own income; and educated women are more likely to delay childbearing, therefore reducing the chance of having high-risk fertility.

Religion practices continue to influence the fertility behaviour of women (Rahman & Abedin 2010; Sathar & Kazi 1997). Muslim women are found to be more vulnerable to experience high-risk fertility due to their restricted culture. In particular, those who are subject to the tradition of *purdah* and experience fertility-related risks. The conservative Muslim culture which maintains the tradition of *purdah* are likely to have restricted access, if at all, to education and income-earning opportunities. The lack of mobility outside the home results in less decision-making autonomy regarding contraception and the number and timing of births, and therefore, higher risks in childbearing.

A woman's place of residence is another factor which can exacerbate or mitigate maternal health risks such as high-risk maternal age, parity and birth intervals. For instance, women living in urban areas generally enjoy higher levels of decision-making autonomy, more freedom of movement and access to economic resources than their rural counterparts (discussed in Chapter 4). They are, therefore, more aware about reproductive health initiatives, as well as about the risks associated with short birth intervals, high parity or childbearing age. As discussed in the previous chapter, urban based women have more access to family planning and antenatal care services, which reduces their chance in having high-risk fertility.

The data analysed in this chapter further corroborates the existence of variations in high-risk childbearing practices (maternal age, parity and birth interval) across district and community levels. However, through community level, only high-risk parity was

found to have significant variations. In terms of high-risk fertility, significant variations in both single and multiple risks were accounted for at both district and community levels while controlling for autonomy factors only. Single risk (such as adolescent pregnancies or having a large number of children or short birth intervals) seems to have little variation across Bangladesh. However, after adding socio-economic variables into the same model, the findings show an insignificant and decreased amount of variations at community and district levels respectively. This indicates that socio-economic factors are more dominant than autonomy factors in explaining the variability in high-risk fertility across the country.

It can be concluded that although socio-economic factors are more influential than women's autonomy-related factors in decision-making, physical mobility or economic matters, decision-making regarding the number and timing of children is found to be highly significant. Additionally, women's freedom of movement is another strong determinant of high-risk fertility and each of its three components, that is, high-risk maternal age, parity and birth intervals. Although a large number of women enjoy autonomy in decision-making regarding the number and timing of children, high-risk fertility remains high for Bangladeshi women. Their limited access to education and employment restricts them to traditional roles, which contributes to less autonomy overall in decision-making and economic matters. This in turn influences their childbearing practices and thus makes them vulnerable to high-risk fertility and poor maternal outcomes. The following chapters (Chapter 7 and 8) describe the influences high-risk childbearing practices on pregnancy health complications and adverse outcomes.

Table 6.1: Women of high-risk maternal ages

Maternal age <20 years (%)	
Low-risk	35.2 (5639)
High-risk	64.8 (10386)
Maternal age >34 years (%)	
Low-risk	93.0 (14904)
High-risk	7.0 (1121)
Maternal age total high-risk (%)	
Low-risk: 20-34 years (%)	31.4 (5025)
High-risk: <20 or >34 years	65.5 (10493)
High-risk: <20 and >34 years	3.2 (507)
No child (%)	10.2 (1817)

Table 6.2: Women of high-risk birth intervals and high-risk parity (%)

Birth interval		**Parity**	
Low-risk: 18 and more	79.8	Low-risk: < 4 live births	84.4 (13530)
High-risk: < 18 months	20.2	High-risk: 4 and more live births	15.6 (2495)
High-risk birth intervals			
0	55.2		
1	33.2		
2	9.4		
3	1.9		
4	0.2		

Table 6.3: High-risk fertility of women

High-risk fertility	**Percentage of women**
No risk	22.3 (2738)
Single risk	56.0 (6892)
Multiple risk	21.7 (2674)
No live births	10.2 (1817)

Table 6.4: Determinants of high-risk maternal age, parity and birth interval – Results of MLRA

Fixed effects	Model-1		Model-2		Model-3	
	Odds Ratio		Odds Ratio		Odds Ratio	
Intercept	0.28*		0.23*		0.30*	
Decision-making autonomy						
Low level	-		-		-	
Medium level	0.84*		0.76*		0.75*	
High level	0.64*		0.67*		0.83*	
Autonomy in physical mobility						
Low level	-		-		-	
Medium level	0.76*		0.62*		0.88	
High level	0.79*		0.62*		0.98	
Economic autonomy						
Low level	-		-		-	
Medium level	0.91		1.15		1.06	
High level	1.15		1.19		0.87	
Level of education						
No education	-		-		-	
Primary completed	0.97*		0.43*		0.95*	
Secondary completed	0.77*		0.10*		0.87*	
Higher education	0.75*		0.03*		0.58*	
Working status						
Nor working	-		-		-	
Not paid	0.83		1.09		1.85	
In paid work	1.09		0.69*		1.16	
Religion						
Non-Muslim	-		-		-	
Muslim	1.42*		1.68*		1.08*	
Place of residence						
Rural	-		-		-	
Urban	0.54*		0.69*		0.76*	
Socio-economic status						
Wealth Index (WI): Poor	-		-		-	
Middle	0.79*		1.19*		0.89	
Rich	0.56*		1.13*		0.88	
Random effects	Estimate	ICC	Estimate	ICC	Estimate	ICC
District level	0.02*	0.0049	0.23*	0.0659	0.03*	0.0078
Community level	0.02	-	0.08*	0.0420	0.04	-

*All * values are significant at 5% level of significance*
MLRA: Multilevel Logistic Regression Analysis; Reference category: No risk
Model 1: High-risk maternal age; Model 2: High-risk parity; and Model 3: High-risk birth interval

Table 6.5: Determinants of high-risk fertility – Results of MMRA

Fixed effects	**Single risk**		**Multiple risk**	
	Odds Ratio		Odds Ratio	
Intercept	0.87*		0.41*	
Decision-making autonomy				
Low level	-		-	
Medium level	0.79*		0.69*	
High level	0.74*		0.74*	
Autonomy in physical mobility				
Low level	-		-	
Medium level	0.97*		0.89*	
High level	0.95*		0.78*	
Economic autonomy				
Low level	-		-	
Medium level	0.85		1.00	
High level	1.00		0.99	
Random effects	Estimate	ICC	Estimate	ICC
District level	0.10*	0.0292	0.24*	0.0705
Community level	0. 05*	0.0144	0.08*	0.0249

*All * values are significant at 5% level of significance*
MMRA: Multilevel Multinomial Regression Analysis; Reference category: No risk

Table 6.6: Determinants of high-risk fertility – Results of MMRA

Fixed effects	Single risk		Multiple risk	
	Odds Ratio		Odds Ratio	
Intercept	1.05		0.48*	
Decision-making autonomy				
Low level	-		-	
Medium level	0.87*		0.77*	
High level	0.84*		0.89*	
Autonomy in physical mobility				
Low level	-		-	
Medium level	0.93		1.03	
High level	1.14		1.09	
Economic autonomy				
Low level	-		-	
Medium level	0.93		1.12	
High level	1.14		1.01	
Level of education				
No education	-		-	
Primary completed	0.66*		0.50*	
Secondary completed	0.34*		0.19*	
Higher education	0.25*		0.16*	
Working status				
Nor working	-		-	
Not paid	0.75		1.41	
Paid work	0.90		0.78	
Religion				
Non-Muslim	-		-	
Muslim	1.36*		1.52*	
Place of residence				
Rural	-		-	
Urban	0.90*		0.89*	
Socio-economic status				
Wealth Index (WI): Poor	-		-	
Middle	0.92		0.97	
Rich	0.91		0.92	
Random effects	Estimate	ICC	Estimate	ICC
District level	0.05*	0.0161	0.16*	0.0453
Community level	0.02	-	0.05	-

*All * values are significant at 5% level of significance*
MMRA: Multilevel Multinomial Regression Analysis; Reference category: No risk

Chapter 7

Childbearing Complications and High-Risk Pregnancy

7.1 Introduction

The significance of poor or adverse maternal health outcomes leading to maternal and perinatal deaths is recognised as one of the major public health problems in developing countries, including Bangladesh. The common causes of these adverse outcomes are mainly understood as the mothers' physiological health conditions during pregnancy, and the health of the newborn. Although pregnancy and childbirth is a universal part of female physiology and biology, this event is shaped by the surrounding social environment (Davis et al. 1997). Therefore, investigation of pregnancy and childbirth from a socio-demographic viewpoint is one of the major focuses in this research.

Every pregnancy is unique; women may be uncertain about how they will progress through their pregnancy as well as about the outcome. Even early antenatal screening cannot ensure an uncomplicated pregnancy and a healthy outcome. A high-risk pregnancy is considered one where women have any physiological or social concerns that increases the risk of maternal mortality or morbidity, as well as contributes to poor or adverse birth outcome (Gilbert, 2010). The adverse maternal health outcomes, such as maternal and perinatal deaths, premature births or low birthweight babies, are also used as the indicators of reproductive health and the healthcare systems in a country. In this chapter it is argued that, although the pregnancy health status of a woman is concerned with her physiological health, there exists a relationship between women's autonomy in reproductive health matters which influences pregnancy health. This chapter hypothesises that women with higher levels of autonomy have more control

over their reproductive health and, therefore, are less likely to experience high-risk pregnancy. The specific objectives of this chapter are:

- To measure high-risk pregnancies by examining the prevalence of several pregnancy complications
- To investigate the influences of women's autonomy on high-risk pregnancy
- To identify the determinants of high-risk pregnancy by examining childbearing practices, maternal healthcare utilization and socio-economic characteristics of women.

7.2 High-risk pregnancy

According to the Healthy People study (2010), uncomplicated pregnancies are those which are full-term (more than 37 weeks of gestation), do not have any severe health complications (such as hypertension, placenta abruption or previa, excessive bleeding during delivery or postpartum period), as well as no congenital anomalies in the newborn. An uncomplicated pregnancy is generally considered to be a state of health rather than the absence of poor health. Even so, uncomplicated pregnancies are frequently accompanied by minor symptoms of illness (such as nausea and vomiting, tiredness, backache, heartburn, constipation, or leg cramps), which are unpleasant and can cause significant discomfort. However, these do not contribute to any ongoing adverse health effects for mother or newborn (Enkin et al. 2000). However, a pregnancy becomes high-risk when either the mother or the newborn (or both) have a significant risk of morbidity or mortality (Gilbert, 2010). High-risk pregnancy, therefore, refers to those pregnancies in which women experience some health complications that contribute to the risk of adverse outcomes for mother or newborn or for both.

7.3 Pregnancy health status and associated factors

Studies on pregnancy health and childbirth are mainly concerned with physiological contexts, and only to some extent are concerned with women's fertility behaviour, healthcare practices, as well as with their socio-economic background. Maternal health outcomes largely depend on the dynamics of existing events in each social context (Price 2007). Health conditions during pregnancy and any related complications are mainly associated with the mothers' physical health status, which is also associated with their surrounding environment. Therefore, the socio-demographic and healthcare factors are important to understand while studying the causes of pregnancy complications and adverse outcomes.

7.3.1 The socio-economic factors

The socio-economic factors associated with maternal health and outcomes in previous studies have included marriage practice (Chakravarty et al. 2005), education (Adhikari 2010; Mumtaz & Salway 2007; Kabeer 1985; Casterline 1984; Sathar 1984), religion (Dharamalingam & Morgan 2004; Jejeebhoy & Sathar 2001; Obermeyer, 1999; Basu 1990), employment (Agarwala & Lynch 2006; Jejeebhoy 2000) and gender preference for the baby (Arnold et al. 1998). These factors might also have an influence on pregnancy complications.

Women's education and employment are considered to be a pivotal factor in influencing their health and outcome (Ganguly et al. 1987; Kabeer 1985; Casterline 1984; Sathar 1984). Several studies have described the associations between maternal health complications, and women's education, employment and socio-economic status. As highlighted in previous studies, Bangladeshi women with low levels of education, low income and living in rural areas have an increased risk of health complications in pregnancy and poor outcomes (Rahman & Abedin 2010; Silva et al. 2008; Salihu et al.

2005; Savitz et al. 2004). In contrast, Kamal (2012) found that safe-motherhood practices were higher among those women who have higher levels of education, who are non-Muslim and who are undergoing their first pregnancies. The socio-economic status of the mother has also been found to influence with pregnancy health. More specifically, women with a low socio-economic status have increased chances of poor maternal health status (Cunningham et al. 2005). Religion was also identified as a strong factor in influencing maternal health status (Choudhury et al. 2012; Rahman et al. 2011; Mumtaz & Salway 2005; Hussain & Smith 1999).

7.3.2 Maternal factors related to pregnancy and childbirth

The identified risk factors influencing childbearing complications mainly focus on childbearing practices and physiological complications during pregnancy and childbirth. A large number of studies identified the adverse effects of adolescent pregnancies which increased the chance of several health complications during pregnancy and delivery such as anaemia, intrauterine growth restriction, hypertensive complications, gestational diabetes, placental problems, pre-eclampsia, preterm labour and postpartum haemorrhage (Sayem & Nury 2011; Liou et al. 2010; Muganyizi & Kidanto 2009; Luke & Brown 2007; Cunningtom et al. 2005; Singh & Darroch 2000). In Bangladesh, most studies arrived at similar conclusion that adolescent pregnancies hold an increased risk of pregnancy and delivery complications (Gausia et al. 2012; Khan et al. 2012; Kim et al. 2012; Nahar et al. 2011; Sikder et al. 2011; Lumbiganon 2010).

Women with a large number of children (more than three pregnancies) and with shorter birth intervals of less than 18 months were more vulnerable to have different pregnancy complications in their higher birth orders (Teguete et al. 2012; Geidam et al. 2011; Shaikh et al. 2011). In addition to this, short birth intervals were found to be associated

with pre-eclampsia, pregnancy infections, miscarriage, stillbirth and low birth weight (Khan et al. 2012; Nahar et al. 2011; DeVanzo et al. 2008; Mamun et al. 2006; Royce 2006; Conde-Agudelo et al. 2006; Norton 2005).

7.3.3 Healthcare seeking behaviour

Access to reproductive healthcare services is a key determinant of a healthy pregnancy and birth outcome. A large number of studies from developing countries identified autonomy of women as a significant factor in the utilisation of antenatal care services (Woldemicael & Tenkorang 2010; Mistry et al. 2009; Mumtaz & Salway 2007, 2009; Bloom et al. 2001; Khan 1999; Sathar & Kazi 1997). These studies observed that high levels of autonomy are more likely to lead to high use of maternal healthcare services by increasing women's decision-making ability regarding healthcare practices, freedom to go outside the home for healthcare purposes, as well as access to economic resources to address health problems. A number of studies in Bangladesh (Pervin et al. 2012; Sikder et al. 2011; Khatun & Rahman 2008; Koeing et al. 2007) identified strong associations between maternal healthcare utilisation and pregnancy complications, although these studies focused on each complication separately. It thus appears that high-risk pregnancies have not yet been examined.

7.4 Data and methods

This chapter's analysis is based on data from the verbal autopsy questionnaire of BDHS 2011, which followed the model of WHO *Verbal Autopsy Questionnaire*. Through this questionnaire, the information about several health complications during pregnancy and delivery was collected from 490 ever-married women aged from 10 to 49 years with their most recent pregnancies.

The outcome variable of this chapter refers to *high-risk pregnancy* comprising a number of health complications during pregnancy which are considered to contribute to risks for adverse birth outcomes. The BDHS collected information on 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 and excessive bleeding during labour. A detailed description of these variables is provided in Chapter 3, Section 3.2. Figure 7.1 shows the prevalence of pregnancy complications according to the responses of the study population.

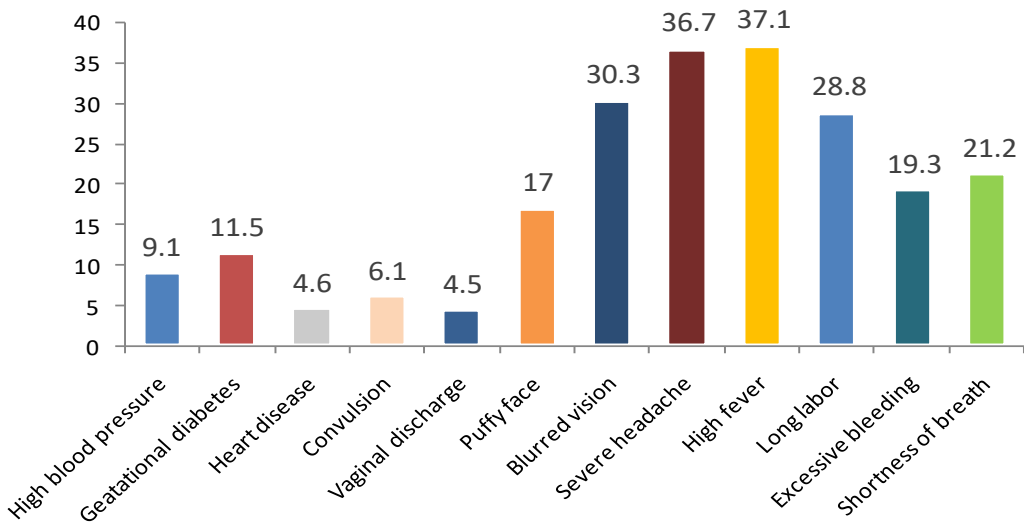


Figure 7.1: Health complications during pregnancy (%)

The information about these health complications during pregnancy was then used to derive the outcome variable: *high-risk pregnancy*. 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 were combined to produce a single measure of pregnancy risk. This overall index of high-risk pregnancy

may take values from zero to three categories: *no risk*, *single risk*, *double risks* and *multiple risks*.

In order to measure the influences of women's autonomy on high-risk pregnancy, a set of key variables were extracted from the BDHS 2011 individual, household and verbal autopsy questionnaires. The variables used to analyse the outcome variable were categorised into four groups. The first group comprises the four autonomy variables: *index of decision-making autonomy* (IDMA), *index of autonomy in physical mobility* (IAPM) and *index of economic autonomy* (IEA), and the overall *women's autonomy index* (WAI). These variables are categorised as: *low*, *medium* and *high levels of autonomy*. The second group comprises the explanatory variables: *level of education*, *work status*, *place of residence*, *religion* and *socio-economic status*. For detailed description of these variables see Chapter 3, Section 3.2.

The third group comprises women's childbearing practices, which are categorised as: *high-risk maternal age* (below 19 years and/or above 34 years), *high-risk parity* (more than three births) and *high-risk birth interval* (less than 18 months). The fourth group refers to the utilisation of maternal healthcare, which were categorised as: *women had sufficient antenatal visits* (at least three visits); *received healthcare for health complications during pregnancy*; and *received TT injection*. A detailed description of these variables is provided in Chapter 5 and also in Chapter 3, Section 3.2.

The responses obtained from the study population were analysed using descriptive statistics, which include the percentage of respondents to different pregnancy complications. Furthermore, to identify the influence of women's autonomy on high-risk pregnancy, this study used Multinomial Logistic Regression Models (MLRM). Although in earlier analytical chapters three-level models (individual-community-district) were applied, in this chapter, the analysis is based on a much small number of

respondents (490 women), so that not all communities (600) and districts (64) have the necessary information. Thus a multinomial logistic regression model has been applied.

7.5 Results and discussion

7.5.1 Women with pregnancy complications and high-risk pregnancies

Women who had a live birth five years preceding the survey experienced several health problems during the pregnancy. The study population was asked whether they had any complications (one or more) as well as which complication they experienced. Table 7.1 represents information of 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 mother and newborn. A large number 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, which is a life-threatening problem for the mother.

Table 7.2 depicts the distribution of women by number of complications: no complication, single complication, and two or more complications. The table shows that about 24.6% of women experienced one of the minor health complications during their most recent pregnancy. About 13.8% of women experienced two complications during pregnancy, so they are in the double-risk category. And, about 38.7% women were found to have experienced more than two health complications during pregnancy, so they are in the multi-risk category.

7.5.2 Determinants of high-risk pregnancy: Multinomial Regression Analysis

To investigate the influences of women's autonomy on high-risk pregnancy (HRP) the multinomial logistic regression models (MLRM) were fitted and the odds of single, double and multiple risks versus no risk were estimated. For this chapter's analysis, two regression models have been applied. First, high-risk pregnancy of women is examined with autonomy variables only, and then socio-economic and intermediate variables are included to the model to identify the dominant determinants of high-risk pregnancy. Tables 7.3 and 7.4 show the results of this analysis.

Table 7.3 represents the effects of autonomy on single risk (category 1), double risks (category 2) and multiple risks (category 3) compared to the no risk (category 0) of the categorical response variable: high-risk pregnancy. The data indicates that women's autonomy in decision-making and control over economic resources do not have any significant effects on high-risk pregnancy. Only women's freedom of movement has a significant effect on high-risk pregnancies, which is about 44% and about 49% more for double and multiple risks respectively compared to the no risk category.

As this study assumes that women's socio-economic characteristics, childbearing practices and use of maternal healthcare influence the relationship between women's autonomy and high-risk pregnancy, another model was fitted by including the overall *women's autonomy index* with childbearing practice, maternal healthcare and socio-economic variables. The results of this analysis are presented in Table 7.4.

Table 7.4 shows no significant relationship between levels of autonomy and high-risk pregnancy. Moreover, it is found that childbearing practices and use of healthcare services have strong significant effects on high-risk pregnancy. The findings of the analysis show that high-risk maternal age has a strong effect on high-risk pregnancies. It is found that, women of high-risk maternal age (both adolescent and older mothers)

have a 48% increased chance of high-risk pregnancies compared to those women who have maternal ages of 19 to 34 years. Women with high-risk parities as well as high-risk birth intervals have about 39% and 47% respectively increased risk for multiple pregnancy complications followed by high-risk pregnancy compared to women with low-risk parities and low-risk birth intervals.

Table 7.4 further reveals strong associations between high-risk pregnancies and maternal healthcare components. It is evident that sufficient numbers of antenatal visits reduce the chance of multiple pregnancy complications (about 0.48 times less compared to no antenatal visits). Additionally, those women who received TT injections during pregnancy had 0.33 times less chance of high-risk pregnancies than women who did not receive TT injections. Access to medical facilities also reduced the prevalence of high-risk pregnancies. Those women who received treatment for health complications during pregnancy had 0.54 times reduced chance in having high-risk pregnancies.

Among the socio-economic factors, education of women is found to be a strong significant determinant of high-risk pregnancy. Table 7.4 shows that higher levels of education reduced the chance of high-risk pregnancy. Women with higher levels of education were 0.68 times less likely to have multiple pregnancy complications than non-educated counterparts. Furthermore, women living in rural areas had an increased chance for high-risk pregnancies compared to their urban counterparts (women living in urban areas had 0.64 times less chances). Women's employment, socio-economic status and religious practices were not found to have any significant effects on high-risk pregnancies.

7.5.3 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, with healthy outcomes for both the mother and baby. On the other hand, major problems during pregnancy include high blood pressure, eclampsia, convulsion, gestational diabetes, excessive bleeding or pregnancy infections. When women have an aggregated chance of these complications, it is termed as high-risk pregnancy, which can contribute to poor or adverse outcomes for mother or baby or both, requiring special medical attention. However, the concept of high-risk pregnancy has not yet been examined in the literature.

The data indicates that a significant proportion of women in Bangladesh have experienced childbearing 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 chapter further illustrates that of the three dimensions of women's autonomy, only freedom of mobility has a significant influence on high-risk pregnancy. While earlier studies have found that freedom to go outside the home for healthcare purposes have resulted in better maternal outcomes (Mumtaz & Salway 2005, 2007; Nahar et al. 2011; Razzaque et al. 2005). Women's independent mobility also plays a significant role to gather necessary information about pregnancy health, complications and remedy measures. In addition to this, the freedom to go outside the home for employment purposes also contributes to more control over their lives and increased their decision-making power about having children at a favourable time. At the same time, 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 woman's autonomy in respect of physical mobility could be associated with sound pregnancy health.

The present study does not find any significant effects of women's overall autonomy on high-risk pregnancy. Moreover, childbearing practices and the use of antenatal care services appeared to have stronger significant 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 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 (Ferdous et al. 2012; Nahar et al. 2011; Cunnington 2001; Singh & Darroch 2000; Gausia et al. 2012; Khan et al. 2012; Kim et al. 2012; Lumbiganon et al. 2010).

Previous research also showed that the grand multiparous (more than four children) women were more likely to have caesarean deliveries, placental abruption, precipitate labour, preterm births and stillbirths (Geidam et al. 2011; Shaikh et al. 2011). The present study found that women with low-risk parity (less than four children) have lower risk of multiple and life-threatening complications. Generally, 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. In addition to this, maternal health complications could occur due to the adverse biological effects of

high parity and short birth intervals (Teguete et al. 2012; Nahar et al. 2011; Mamun et al. 2006; Khan et al. 2012; Islam et al. 2006).

The data analysis for this chapter also found a corresponding relationship between short birth intervals of less than 18 months and high-risk pregnancies, which is similar to the previous studies that investigated the adverse effects of short birth intervals on maternal health complications (Nahar et al. 2011; DeVanzo et al. 2008; Razzaque et al. 2005; Rutstein 2005; Miller 1991). Women with very short birth intervals are more likely to have several pregnancy complications such as third-trimester bleeding, anaemia, gestational diabetics and high-blood pressure, as well as an increased risk of poor outcomes such as premature and low birthweight babies.

A significant relationship between high-risk pregnancies and maternal healthcare utilisation is evident from the data. About 24.6% of women reported at least one complication during pregnancy and 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 (Chapter 5). 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.

Several studies identified education, work status, socio-economic status, place of residence and religion as strong determinants of maternal age, children ever born as well as birth intervals (Parveen 2007; Sathar et al. 1997; Rahman & Abedin 2010; Upadhy et al. Al. 2005). Furthermore, previous research described the impact of these factors on women's autonomy as well as maternal healthcare utilization (Adhikari 2010; Mumtaz & Salway 2007; Kabir et al. 2003; Cleland et al. 1996; Sathar 1996; Jejeebhoy 1995). The data analysis has found that women's education is a strong

predictor of high-risk pregnancy, as better education makes women more autonomous and more aware, and thereby contributes to better health outcomes for them and their children.

In addition to this, women's residential status is found to be a strong predictor of high-risk pregnancy. Women who live in rural areas have fewer opportunities for education and work, usually have poor socio-economic status, have their mobility reduced by traditional religious beliefs, and therefore have less autonomy. Additionally, the traditional culture of male-dominant decision-making in the household, less reproductive decision-making right for women, desire for a male child, restricted mobility for women, as well as women's fear of midwives (particularly male) touching their bodies are all issues in Bangladesh, particularly in rural areas. At the same time women living in rural areas have difficulty accessing quality medical services (including skilled doctors, nurses, birth attendants, as well as emergency services to overcome pregnancy complications) compared to urban areas. These conditions highlight the difference between urban and rural areas in Bangladesh, which make rural women more likely to experience adverse birth outcomes and life-threatening complications during pregnancy.

The main focus of this chapter was to investigate the nature of the associations between women's autonomy and high-risk pregnancy. Although the data analysis does not show any significant relationship between the two, there are significant associations between high-risk pregnancy, and childbearing practices and use of maternal healthcare services are identified. Also, women's socio-economic attributes, particularly levels of education and place of residence have major impacts on high-risk pregnancy. In Chapters 5 and 6, it was established that women's autonomy influences the use of maternal healthcare services as well as has major impacts on childbearing practices in terms of reproductive decision-making concerning the timing and number of children.

Therefore, it can be concluded that both childbearing and healthcare practices of women mediate the relationship between autonomy and the severity of pregnancy complications followed by high-risk pregnancy. Also, women's level of education and place of residence have mediating effects in determining the relationship between autonomy and high-risk pregnancy.

Table 7.1: 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

Table 7.2: Prevalence of high-risk pregnancies

High-risk fertility	Percentage of women
No complication	23.0
Single complication	24.6
Two complications	13.8
More than two (multiple) complications	38.7

Table 7.3: Determinants of high-risk pregnancy – Results of MLRA

Variables	Single risk	Double risk	Multiple risks
	Odds Ratio	Odds Ratio	Odds Ratio
Decision-making autonomy			
Low level	-	-	-
Medium level	0.64	0.92	0.68
High level	1.24	2.17	1.27
Autonomy in physical mobility			
Low level	-	-	-
Medium level	2.74	2.06	1.97*
High level	1.92	1.44*	1.49*
Economic Autonomy			
Low level	-	-	-
Medium level	0.65	1.31	0.37
High level	1.24	0.71	0.43

*All * values are significant at 5% level of significance*
MLRA: Multinomial Logistic Regression Analysis; Reference category: No-risk

Table 7.4: Determinants of high-risk pregnancy – Results of MLRA

Variables	Single risk	Double risks	Multiple risks
	Odds Ratio	Odds Ratio	Odds Ratio
Autonomy of women			
Low level	-	-	-
Medium level	1.64	2.85	2.38
High level	3.30	3.46	7.49
Socio-economic factors			
Level of education			
No education	-	-	-
Primary completed	0.77*	0.69*	0.79*
Secondary completed	0.75*	0.75*	0.75*
Higher education	0.67*	0.59*	0.68
Working status			
Not working	-	-	-
In paid work	0.31*	0.55	0.07
Religion			
Non-Muslim	-	-	-
Muslim	1.74	0.64*	4.94
Socio-economic status			
Wealth Index (WI): Poor	-	-	-
Middle	1.27	2.38	1.47
Rich	0.44*	1.06	0.10
Residential status			
Rural	-	-	-
Urban	0.30*	0.11*	0.64*
Childbearing practices			
Maternal age			
Low-risk (19 to 34 years)	-	-	-
High-risk (less than 20 years or more than 34 years)	1.34*	1.66*	1.48*
Parity			
Low-risk (1-3 births)	-	-	-
High-risk (more than 3 births)	0.89	1.15*	1.39*
Birth interval			
Low-risk (more than 18 months)	-	-	-
High-risk (less than 18 months)	1.27*	1.26*	1.47*

Table 7.4 (continued)			
Variables	**Single risk**	**Double risks**	**Multiple risks**
	Odds Ratio	Odds Ratio	Odds Ratio
<u>Healthcare seeking behaviour</u>			
Antenatal visits			
No ANC	-	-	-
Had sufficient ANC (at least 3 times)	0.67*	0.70*	0.48*
TT Injections			
No	-	-	-
Yes	0.79*	0.69*	0.33*
Treatment for pregnancy complications			
No	-	-	-
Yes	0.91*	0.34	0.54*

*All * values are significant at 5% level of significance*
MLRA: Multinomial Logistic Regression Analysis; Reference category: No-risk

Chapter 8

Risk Factors of Perinatal Mortality

8.1 Introduction

The significance of perinatal deaths, particularly in developing countries including Bangladesh, is recognised as a major public health problem. Adverse perinatal outcomes refers to stillbirths, neonatal deaths and premature births. Bangladesh accounts for a relatively high level of perinatal mortality (about 55 per 1,000 live births), as well as high rates of stillbirths and early neonatal deaths (about 37 and 38 per 1,000 births, respectively), all of which reflect the poor perinatal health status in Bangladesh (WHO 2013).

The causes of adverse birth outcomes are largely concerned with the mother's health during pregnancy and the health status of the newborn. Although most research on pregnancy and childbirth is focused on physiological concerns, there are some studies which have examined the demographic, social and cultural factors associated with birth outcomes. Investigations into the inherent causes of adverse birth outcomes in specific social contexts also focus on women's childbearing practices and their utilisation of maternal healthcare, which can ensure sound pregnancy health outcome. The present study extends this research by focusing on the importance of women's autonomy in reducing adverse birth outcomes.

Logically, there is no direct relationship between autonomy and birth outcomes. However, it could be hypothesised that this relationship is determined and influenced by several individual maternal factors such as childbearing practices, pregnancy health conditions and use of maternal healthcare services. This chapter provides an

examination of perinatal deaths from a socio-demographic viewpoint by examining all these aspects of reproductive health. The principal aim is to investigate the nature of the associations between women's autonomy and perinatal deaths in Bangladesh. The specific objectives are:

- To investigate the patterns of stillbirths and early neonatal deaths
- To examine the effects of childbearing practices and maternal healthcare utilisation on perinatal deaths
- To measure the influences of women's autonomy on perinatal deaths through different indirect pathways

8.2 Perinatal mortality

The term *perinatal mortality* refers to both stillbirths and death of infants who die shortly after birth. In the late 1940s, physicians and other researchers had become increasingly aware of the relatively large number of deaths occurring in the period immediately before and after delivery. At that point, the concept of the *perinatal period* was developed. This period starts after 22 completed weeks of gestation and ends seven days after birth. The WHO defines perinatal death as a combination of stillbirths and early neonatal deaths. *Stillbirth* refers to the foetal death in late pregnancy, after 22 completed weeks of gestation and/or if the birth weight is less than 500 grams. *Early neonatal death* relates to the death of live born infants in the first seven days of life. Therefore, *perinatal mortality* is defined as the number of stillbirths and deaths of the newborn during the first week of life per 1,000 live births.

8.3 Birth outcomes from a socio-demographic perspective

A vast majority of studies on pregnancy health and outcomes have focused on individual maternal risk factors. The common causes of poor or adverse pregnancy

outcomes are mainly related to the health status of mother during pregnancy and delivery. The conditions responsible for the majority of neonatal deaths occur from the circumstances established before delivery or from the stresses introduced by the birth process (Tomashek et al. 2004). However, a number of demographic, socio-economic and cultural factors are also considered to have an indirect influence on these adverse birth outcomes. Most of the previous research mainly identified the indirect causes of poor or adverse birth outcomes which are associated with women's socio-economic and behavioural characteristics. On the other hand, the direct causes mainly focused on the physiological risk factors of a pregnant woman and high-risk childbearing practices. The identified key maternal factors associated with perinatal deaths are discussed in the following section.

8.3.1 Maternal socio-economic factors

A large number of studies described the associations between birth outcomes and women's socio-economic characteristics such as education, employment, religious practices and socio-economic status. Education and employment of women were considered as pivotal factors to influence their reproductive healthcare practices (Kabeer 1985; Casterline 1984; Sathar & Mohammad 1984). It is found that better-educated women were more likely to have greater control over their own lives and thus could make better decisions for themselves in reproductive health matters (Adhikari 2010; Mumtaz & Salway 2007; Fikree & Pasha 2004; Cleland et al. 1996; Jejeebhoy 1995). This is also demonstrated in their higher levels of utilisation of maternal healthcare services (Sayem & Nury 2011). Higher levels of education for women is also found to be strongly associated with improved perinatal and neonatal survival (Jafari et al. 2010; Jansen et al. 2010).

An increased risk of perinatal mortality, preterm birth and low birthweight has been found to be associated with mother's low level of education, poverty and lower social-economic status (Jafari et al. 2010; Jansen et al. 2010; Savitz et al. 2004). Furthermore, in the context of developing countries, stillbirth rates are higher for those mothers who are illiterate, poverty stricken and living in rural areas (Nahar et al. 2012; Rajaram et al. 2009). Some studies have also explored the significance of women's education, employment and socio-economic status on infant morbidity and mortality in Bangladesh (Ferdous et al. 2012; Gausia et al. 2012; Baqui et al. 2011; Azad et al. 2010; Hong 2006; Hong & Ruiz-Beltran 2007; Bari et al. 2002).

In addition, religious belief and practices have been also identified as a strong determinant of childbearing practice, contraceptive use as well as behaviour towards maternal healthcare services in developing countries (Rahman & Abedin 2010; Sathar & Kazi 1997). Religious restrictions towards contraception and women's independent mobility raised the problems of adolescent fertility in developing countries, which also increased the risk of poor birth outcomes (Choudhury et al. 2012; Rahman et al. 2011; Mumtaz & Salway 2005; Rob et al. 2004; Jejeebhoy & Sathar 2001; Hussain & Smith 1999). Although all these studies have identified the influences of socio-economic and autonomy factors on pregnancy and childbirth, the present study argues that logically those factors cannot have any direct effect on birth outcomes. Therefore, it is hypothesised that the influences of those factors on birth outcomes are transmitted through the pathways of childbearing practices as well as the healthcare practices of women.

8.2.2 Childbearing practices

The identified risk factors of adverse birth outcomes have been found to be associated with physiological complications during pregnancy and childbirth and certain

childbearing practices of women. Many studies at the global level conclude that adolescence pregnancies are more likely to result in both stillbirths and early neonatal deaths (Bakker et al. 2011; Liou et al. 2010; Muganyizi et al. 2009; Chen et al. 2007; Reddy et al. 2006; Andersen & Eswaran 2000). It has been also found that women with large number of children (more than three pregnancies) had poor outcomes in their higher birth orders (Teguete et al. 2012; Geidam et al. 2011; Shaikh et al. 2011). Additionally, short intervals between births have been found to be associated with an increased risk of stillbirth, neonatal death and low birthweight (Williams et al. 2008; Royce 2006; Conde-Agudelo et al. 2006; Norton 2005). In the Bangladeshi context, a large number of studies have identified maternal age, high parity or short birth intervals as the direct causes contributing to risks of perinatal deaths or poor birth outcomes (Gausia et al. 2012; Khan et al. 2012; Kim et al. 2012; Nahar et al. 2011; Lumbiganon 2010; DeVanzo et al. 2008; Mamun et al. 2006; Razzaque et al. 2005).

8.2.3 Healthcare seeking behaviour of women

Access to family planning and antenatal care services is considered as a key component to improving pregnancy health and ensuring a healthy birth outcome. The ability of women to make independent decisions on the use of reproductive healthcare services can ensure better maternal and child health outcomes. Studies on developing countries revealed that women's decision-making ability regarding their own healthcare, access to financial resources for healthcare purposes, as well as independent mobility to medical facilities contributed to a higher use of antenatal and safe delivery care services that provided better birth outcomes (Woldemicael & Tenkorang 2010; Mumtaz & Salway 2007, 2009; Say & Raine 2007; Bloom et al. 2001).

In Bangladesh, a number of studies have examined the association between maternal healthcare utilisation and pregnancy outcomes (Pervin et al. 2012; Khatun & Rahman

2008; Koeing et al. 2007). It was found that women's unawareness about maternal morbidity and lack of decision-making power regarding the timing and access to antenatal care services were responsible for delays in pregnancy care seeking which resulted in adverse outcomes (Nahar et al. 2011; Killeow et al. 2006; Afsana & Rashid 2001; Goodburn et al. 1995). A recent study identified that delay in seeking emergency healthcare for pregnancy complications remained one of the major causes of stillbirths and newborn health complications (Bapat et al. 2012). Bari et al. (2002) found that perinatal mortality is higher for those women who delivered in rural healthcare facilities in Bangladesh, since the rural health centres are of poor quality and are not equipped to handle complicated deliveries.

It is apparent that most previous research has focused on the physiological health complications, along with certain childbearing and maternal healthcare practices as the direct measures of birth outcomes. While examining the associations between women's autonomy and perinatal mortality, most of the previous studies have overlooked their links and the pathways through which autonomy of women indirectly influences birth outcomes. Therefore, an exploration of these relationships is undertaken here.

8.4 Conceptual framework

Previous research on the determinants of perinatal or neonatal deaths have concentrated on the environmental, social and behavioural factors that may influence the likelihood of death. The analytical framework adopted for this study is based on the hypothesis that there is no direct relationship between autonomy and perinatal deaths. The causal relationship is determined or influenced by the intermediate or mediating factors: childbearing practices and maternal healthcare utilisation, which refers to the maternal behavioural factors.

Past research has identified that autonomy of women has significant impacts on both childbearing practices (Gipson et al. 2011; Islam et al. 2004, 1998; Amin & Lloyd 2002; Hossain 1998); and maternal healthcare utilisation (Woldemicael & Tenkorang 2010; Mistry et al. 2009; Mumtaz & Salway 2007, 2009; Pillai & Gupta 2006; Bloom et al. 2001; Khan, 1999; Sathar & Kazi 1997). Additionally, it is found that maternal demographic characteristics (maternal age, parity and birth interval), as well as use of maternal healthcare services are significantly associated with birth outcomes (Bakker et al. 2011; Nahar et al. 2011; Liou et al. 2010; Muganyizi & Kidanto 2009; Killeow et al. 2006; Afsana & Rashid 2001). The investigation of the associations between autonomy and perinatal deaths therefore requires an in-depth and comprehensive analysis of all these factors in a single framework.

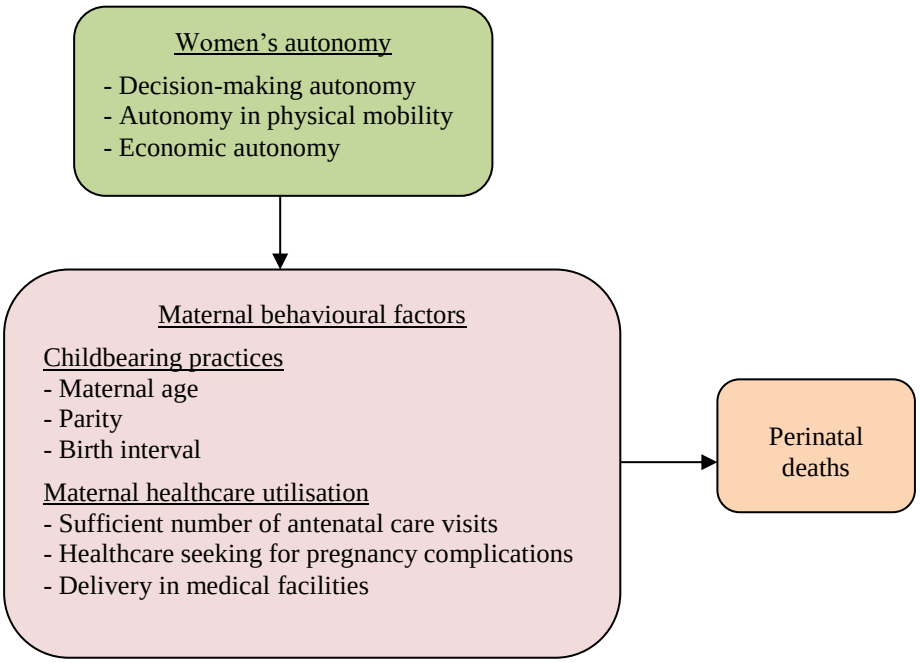


Figure 8.1: Causal relationship between autonomy and perinatal deaths

As shown in Figure 8.1, the three components of women's autonomy (decision-making, physical mobility and economic) affect women's childbearing practices as well as

maternal healthcare utilisation. Maternal age, parity and birth interval, and maternal healthcare components in turn have direct impacts on perinatal deaths. Therefore, it is assumed that autonomy can only have an indirect effect on birth outcomes, and their relationship is assumed to be mediated by those factors that directly influence birth outcomes. Consequently, there is a causal mediation effect in the relationship between autonomy and perinatal deaths.

8.5 Study population, data and methods

8.5.1 Variables and measurements

In this chapter, the data analysis is based on stillbirths and early neonatal deaths obtained from 8,040 women for their most recent births in the five years preceding the survey. The outcome variable *perinatal deaths* comprises two perinatal outcomes: stillbirth and early neonatal death. *Stillbirths* refer to the number of foetal deaths that occurred after 22 completed weeks of gestation. *Early neonatal deaths* refer to the number of neonatal deaths that occurred in the first seven days of life. In this study, both stillbirth and early neonatal deaths are used as dichotomous variables: *a woman either experienced a stillbirth or an early neonatal death* (*yes* or *no*). A new variable was developed by combining these two variables: *perinatal deaths*, which is also categorized as *yes* or *no* categories. Figure 8.2 shows the prevalence of stillbirths, neonatal deaths and perinatal mortality per 1,000 live births in the study population.

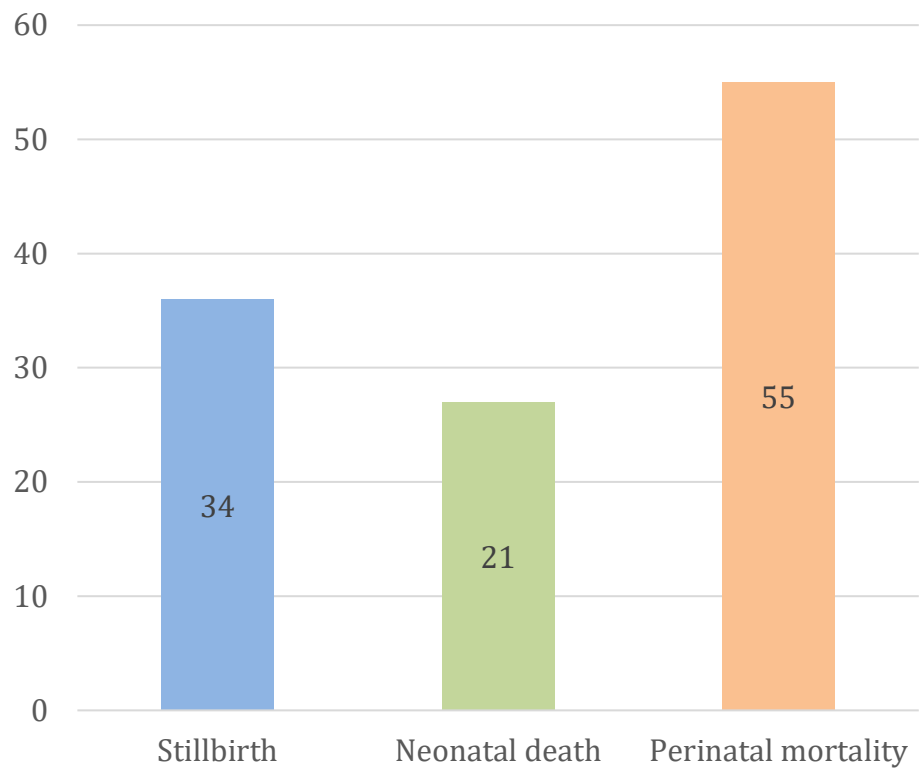


Figure 8.2: The rate of stillbirth, neonatal death and perinatal mortality per 1,000 live births

To analyse to outcome variable a set of key variables were extracted from the BDHS 2011 individual and household questionnaires. The first set comprises the four autonomy variables: *index of decision-making autonomy* (IDMA), *index of autonomy in physical mobility* (IAPM), *index of economic autonomy* (IEA), and the overall *women's autonomy index* (WAI). These variables are categorized as: *low*, *medium* and *high levels of autonomy*. The second set comprises women's individual attributes: *level of education*, *work status*, *place of residence*, *religion* and *socio-economic status*. The measurement of these variables is described in Chapter 3, Section 3.2.

The third set comprises two groups of variables which are assumed to mediate the relationship between autonomy and perinatal deaths: childbearing practice and maternal healthcare utilisation. *Childbearing practice* includes maternal age (the age of

mother at birth), parity (the number of births) and birth interval (the interval between two successive births). The measurement of these variables is described in Chapter 3, Section 3.2. These variables are categorized as: *high-risk maternal age* (below 19 years and/or above 34 years), *high-risk parity* (more than three births) and *high-risk birth interval* (less than 18 months). *Maternal healthcare utilisation* refers to the dichotomous variables categorized as: *women had sufficient antenatal visits* (at least three visits); *received healthcare for health complications during pregnancy*; and *delivery assisted by medical professionals*. A detailed description of these variables is provided in Chapter 3, Section 3.2.

8.5.2 Methods of analysis

The responses obtained from the study population were analysed using descriptive statistics which include the rate of stillbirth and early neonatal death per 1,000 live births by different background characteristics of respondents. To examine the effects of childbearing practices and use of maternal healthcare services on perinatal deaths, binary logistic regression analysis (BLRA) was applied.

In earlier analytical chapters multilevel models (individual-community-district) were applied to investigate the variations of the influences of autonomy on healthcare use and high-risk fertility of women. However, in this chapter's data analysis, application of multilevel modelling was not possible because the occurrence of stillbirths or early neonatal deaths was not even across all sampling units (600 communities) and the number of perinatal deaths was not large. Therefore, rather than multilevel modelling, a causal mediation model has been applied in this chapter.

As discussed, it is hypothesised that there is no direct relationship between women's autonomy and perinatal deaths. Autonomy rather influences birth outcomes through what is referred to as intermediate or mediating factors. Thus, causal mediation analysis

is conducted to measure the indirect/causal relationships between autonomy and perinatal deaths through the mediating factors. The goal of this analysis is to disaggregate the causal effect of a treatment (women's autonomy) into the indirect effects which represent the hypothesised causal mechanism (see Chapter 3, Section 3.3 for description of this model). The *mediation package* in *R* was used for the analysis of data.

8.6 Results and discussion

8.6.1 Patterns of stillbirths and early neonatal deaths

Table 8.1 (at the end of this chapter) shows the distribution of stillbirths and early neonatal deaths per 1,000 live births by maternal socio-economic and autonomy factors. Illiterate mothers experienced a higher rate of stillbirths and early neonatal deaths than educated mothers. According to Table 8.1, the rate of stillbirth and early neonatal death for illiterate mothers are 24 and 19 per 1,000 live births respectively. However, these rates are much lower for those women who have completed secondary education or who received higher education. From Table 8.1, it was also found that among those women who are working outside the home, the rate of stillbirth and early neonatal death are about 16 and 13 per 1,000 live births respectively. These rates are higher for those women who are not engaged in paid employment.

Table 8.1 further shows higher rates of stillbirth and early neonatal death for those women with lower socio-economic status than for those women with comparatively high socio-economic status (about 29 and 9 stillbirths per 1,000 live births respectively; and about 13 and 10 per early neonatal deaths per 1,000 live births respectively). Additionally, rural mothers experienced a higher rate of stillbirths than urban mothers (about 24 and 11 per 1,000 live births respectively), and they had a higher rate of neonatal deaths (about 17 and 12 per 1,000 live births respectively).

The autonomy of women was found to have a major impact on perinatal deaths. Women with higher levels of autonomy had lower rates of both stillbirth and early neonatal deaths. Table 8.1 shows that women with higher decision-making autonomy had about 17 stillbirths and 18 early neonatal deaths per 1,000 live births, whereas women with lower levels of autonomy had about 27 stillbirths and 22 early neonatal deaths per 1,000 live births. Similar results are found for the higher levels of autonomy in physical mobility and in economic matters.

8.6.2 Determinants of perinatal deaths

To investigate the influences of childbearing practices and use of maternal healthcare services on perinatal death, binary logistic regression models (BLRM) were fitted. The odds of having experienced perinatal deaths versus no perinatal death were estimated. The results are presented in Table 8.2.

Table 8.2 shows that maternal age, birth interval, number of antenatal visits and delivery assistance by medical professionals have significant effects on perinatal deaths. For instance, adolescent and older (more than 34 years of age) women had about 4% more risks of having perinatal deaths than mothers of 20 to 34 years. Also, short birth intervals of less than 18 months contributed about 39% more risks compared to long birth intervals. Furthermore, women who had sufficient antenatal visits were less likely (0.87 times) to experience perinatal deaths. Deliveries assisted by medical professionals were found to have 0.93 times less risks of perinatal deaths. Interestingly, birth order did not have significant association with perinatal deaths.

The results of data analysis in this section describes how childbearing practices and the use of maternal healthcare services affects perinatal deaths. The following section describes the causal mediating effects of the maternal factors. In other words, it analyses

how the influence of women's autonomy on the likelihood of experiences perinatal deaths is mediated by these factors.

8.6.3 Associations between autonomy and perinatal deaths: Causal Mediation Analysis

The results of causal mediation analysis are presented in Table 8.3. It is clear that the average direct effects between autonomy and perinatal death are insignificant, which supports the hypothesis stated at the beginning of the chapter. The findings indicate that maternal age, parity and birth interval are significant mediators that inhibit the relationship between autonomy and perinatal deaths. On average, the rate of mediation of maternal age inhibits the relationship between autonomy and perinatal death by -0.000046. Among the components of maternal healthcare, antenatal care visit is found to be a significant mediator. The same description could be made for the other mediating variables from Table 8.3. Furthermore, the average proportion mediated indicates the percentage (last row in Table 8.3) by which the total effect of an exogenous variable on an outcome variable is transmitted through all mediating variables. The results shows that only about 1.2% of total effect of autonomy on perinatal deaths is transmitted through maternal age, and about 59.7% and 25.6% is transmitted through parity and birth interval, respectively. The proportion of mediation through antenatal care visits is about 9.96%. Therefore, it can be concluded that parity and birth interval are strong mediating factors inhibiting the relationship between autonomy and perinatal deaths.

8.6.4 Discussion

The principal aim of this chapter is to investigate the associations between autonomy and perinatal deaths in Bangladesh. Past studies on adverse birth outcomes have mostly focused on individual level determinants (as discussed in Section 8.3). However, while

a variety of determinants have consistently been found to be significant, collectively they do not explain all of the variation evident in adverse birth outcomes. The causal mediation analysis used in this study, which has not been employed in past research, helps to understand the indirect influences of autonomy on perinatal deaths. The findings confirm that the experience of perinatal deaths is associated with a number of maternal demographic and socio-economic characteristics. In particular, the influences of childbearing practices and maternal healthcare utilisation on perinatal deaths are strong and significant. More importantly, the analysis shows the relationship between autonomy and perinatal deaths by a number of mediating factors; birth interval being the strongest.

The findings of this chapter indicate that a significant proportion of women in Bangladesh experience perinatal deaths. Women with low levels of autonomy remain more vulnerable to having stillbirths and early neonatal deaths than autonomous women. In many earlier studies, it was found that the chance of a better birth outcome increases when women have reproductive decision-making rights (Mumtaz & Salway 2005, 2007; Nahar et al. 2011; Razzaque et al. 2005). In addition to this, freedom of movement and economic autonomy play a significant role in the utilisation of family planning and healthcare services as well as access to and use of resources to remedy pregnancy complications. These together contribute to better maternal and child health outcomes.

Individual socio-economic and demographic factors, as well as healthcare seeking behaviour, have significant effects on perinatal deaths. A large number of previous research identified women's education, employment, socio-economic status, religion and residential status as strong determinants of maternal health outcomes (Parveen 2007; Sathar et al. 1997; Rahman & Abedin 2010; Upadhyay & Hindin 2005). The findings of this chapter reveal that, in Bangladesh, a significant number of perinatal

deaths occurred to those mothers who are less educated, unemployed and are from poor families. Illiteracy makes women less autonomous in both family and in decision-making roles, prevents them from earning an income and being economically independent. These factors influence women's childbearing practices and thus contribute to high-risk fertility as well as creating a barrier in utilising maternal healthcare services.

The results also show that both stillbirth and early neonatal death rates are higher for rural women than for urban women. Women living in urban areas have better education and employment opportunities, have comparatively higher socio-economic status, and therefore, enjoy higher levels of autonomy than their rural counterparts. Additionally, women residing in urban areas also have better healthcare facilities, including skilled doctors, nurses, birth attendants, emergency services and have easy access to these services. Therefore, they have greater chances of experiencing sound pregnancy health, emergency remedy for any pregnancy complications, and therefore, a healthy birth outcome.

Although the identified risk factors of adverse birth outcomes mainly focused on physiological complications during pregnancy and childbirth, many studies also found an association between birth outcomes and childbearing practices as well as healthcare seeking behaviour of women (Mumtaz & Salway 2007, 2009; Sayem & Nury 2011; Liou et al. 2010; Muganyizi & Kidanto 2009; Luke & Brown 2007; Singh et al. 2000). Previous studies found that adolescent mothers were more likely to have stillbirths and early neonatal deaths (Gausia et al. 2012; Khan et al. 2012; Bakker et al. 2011; Nahar et al. 2011; Cunnington 2001; Chen et al. 2007; Reddy et al. 2006). The present chapter's data analysis reveals high-risk maternal age (less than 19 years) as a significant factor of perinatal deaths. The reason for this might be that as adolescence mothers are more likely than older mothers to be unemployed and less educated, they

do not have enough awareness and experience regarding the danger signs of complications, and therefore, are less likely to have early prenatal, antenatal and postnatal care. All these factors contribute to complications during pregnancy and can result in adverse birth outcomes.

In addition to this, previous research shows that women with a large number of children (more than three pregnancies) as well as short birth intervals had higher perinatal morality rates and low birthweight babies in their higher birth orders (Williams et al. 2008; Royce 2006; Conde-Agudelo et al. 2006; Norton 2005; Teguete et al. 2012; Geidam et al. 2011; Shaikh et al. 2011; Bai et al. 2002). This chapter's analysis finds a corresponding relationship between short birth intervals of less than 18 months and perinatal deaths. As women with very short birth intervals are more likely to have several pregnancy complications they have an increased risk of stillbirths or perinatal deaths.

A causal mediation model was applied to examine the direct and indirect relationships between autonomy of women and perinatal deaths. The results of the causal mediation analysis indicate that no direct significant relationship exists between autonomy and perinatal deaths, which support the hypothesis of this chapter. In this chapter, it was further hypothesised that childbearing practices and use of maternal healthcare services mediate the relationship between autonomy and perinatal deaths. It was shown that autonomy influences the use of maternal healthcare services (Chapter 5) and the timing and number of children (Chapter 6). The influences of childbearing practices and antenatal care utilisation on perinatal deaths were identified in this chapter. The analysis of the present chapter found significant indirect relationships between autonomy and perinatal deaths transmitted through maternal age, birth interval, parity and antenatal care use.

The data analysis presented in Chapters 4 to 7 consistently shows that women with low levels of autonomy are more likely to face poor reproductive health outcomes which can affect perinatal deaths through women's fertility behaviour, healthcare utilisation and pregnancy health status. In Bangladesh, more than half of all women are in high-risk categories in terms of either maternal age or high parity or short birth intervals. Additionally, more than half of Bangladeshi women's healthcare decisions are made without their participation. By contrast, women with higher levels of autonomy are more likely to obtain better healthcare and thus experience better birth outcomes. In addition to this, women's income and control over their earnings contributes to independent decision-making power about having children at a favourable time, thus reducing the adverse effects of short birth intervals by ensuring healthy birth outcomes. In this way, autonomy of women indirectly affects the occurrence of perinatal death, and the combined effects of autonomy on childbearing practices and use of antenatal care services thus mediates its effects on perinatal mortality.

Table 8.1: Patterns of stillbirth and early neonatal deaths

Characteristics of women	Stillbirth (per 1,000 live births)	Early neonatal death (per 1,000 live births)
Socio-economic factors		
Education		
No education	24	19
Primary completed	23	15
Secondary completed	18	11
Higher	10	10
Working status		
Not working	21	22
Working	16	13
Socio-economic status		
Poor	29	13
Medium	17	14
High	09	10
Religion		
Non-Muslim	25	13
Muslim	19	14
Place of residence		
Rural	24	17
Urban	11	12
Autonomy factors		
Decision-making autonomy		
Low	27	22
Medium	16	10
High	17	18
Autonomy in physical mobility		
Low	22	20
Medium	17	13
High	19	06
Economic autonomy		
Low	24	19
Medium	20	17
High	10	13

Table 8.2: Determinants of perinatal deaths – Results of BLRA

Variables	Odds Ratios
Childbearing practices	
Maternal age	
Low-risk (20-34 years)	-
High-risk (<20 and/or > 34 years)	1.04*
Parity	
Low-risk (1-3 births)	-
High-risk (4 and above births)	0.92
Birth interval	
Low-risk (>18 months)	-
High-risk (<18 months)	1.39*
Maternal healthcare utilisation	
ANC visits	
Not sufficient (0-2 visits)	-
Sufficient (at least 3 visits)	0.87*
Healthcare for pregnancy complications	
No	-
Yes	1.20
Delivery assisted in medical facilities	
No	-
Yes	0.93*

*All * values are significant at 5% level of significance*
BLRA: Binary Logistic Regression Analysis; Reference category: No perinatal death

Table 8.3: Effects of autonomy on perinatal deaths – Results of CMA

Effects	Intermediate / Mediating factors					
	Childbearing practices			Use of maternal healthcare services		
	Maternal age	Parity	Birth interval	ANC visits	Healthcare for pregnancy complications	Delivery assistance
ACME (control)	0.000174*	-0.000533*	-0.000578*	-0.000097	0.000116	-0.000115
ACME (Treated)	-0.000265*	-0.000436*	-0.000460*	-0.000084	0.000925*	-0.000097
ADE (control)	-0.007590	-0.007070	-0.007140	-0.007360	-0.007700	-0.007610
ADE (Treated)	-0.007600	-0.006970	-0.007020	-0.007360	-0.007720	-0.007610
Total effect	-0.007600	-0.007500*	-0.007600*	-0.007360	-0.007610	-0.007620*
ACME	-0.000046*	-0.000485*	-0.000519*	-0.000092	0.000104*	-0.000106
ADE	-0.007600	-0.007020	-0.007080	-0.007360	-0.007710	-0.007610
Ave. Prop. mediated	0.012*	0. 597*	0.256*	-0.0996*	0.013*	0.050

*All * values are significant at 5% level of significance*
CMA: Causal mediation analysis; Exogenous variable: Overall autonomy index; Dependent variable: Perinatal death; ACME: Average causal mediation effect; ADE: Average direct effect

Chapter 9

Conclusion

9.1 Summary of thesis

The principal aim of this dissertation has been to examine the association between women's autonomy and reproductive health of women in Bangladesh. More specifically, to measure the extent and nature of the influence of three dimensions of women's autonomy (decision-making autonomy, autonomy in physical mobility and economic autonomy) on reproductive health (high-risk fertility, high-risk pregnancy and perinatal mortality) across the country. The salient features of women's life in Bangladesh generally shows a poor status for them within family and society. They have limited access to education and employment opportunities, as well as low autonomy in matters regarding their own lives, from financial matters to healthcare utilisation and childbearing practices. All these factors influence their understanding and experiences of their own and their children's health.

The present study, therefore, assumes greater importance as it relates to women's autonomy, and reproductive health and birth outcomes. This study has argued that *women with high levels of autonomy have more control over their reproductive health and, therefore, are less likely to experience high-risk fertility, high-risk pregnancies and thus adverse birth outcomes*. Two major research questions have been addressed to examine the main aim of the thesis. First, how the autonomy of women is associated with reproductive health; and second, whether women's autonomy and reproductive health experiences varies at different locations across Bangladesh. The analytical chapters addressed the three aspects of reproductive health: high-risk fertility, high-risk

pregnancy and perinatal mortality. The empirical investigation relied on the most recent round of Bangladesh Demographic and Health Survey 2011 that was available.

The analyses found that Bangladeshi women have very little autonomy in economic decision-making matters. More than half of all women have no employment, so that they are completely dependent on their husbands' earning. Additionally, more than 60% of employed women have no independent decision-making ability regarding how to spend their earnings. Marriage and pregnancy at a young age, combined with low levels of education acts to restrict women's earning opportunities outside the home. At the same time, a lack of understanding and awareness, as well as less exposure to social activities and access to healthcare services contribute to overall poor health. The data indicates that in the exercise of autonomy and the utilisation of maternal healthcare services, rural women remain more vulnerable and more disadvantaged than urban women. There are significant variations in the levels of autonomy of women are found across Bangladesh in terms of different social contexts.

The present study reveals a pattern of high-risk childbearing practices is prevalent in Bangladesh. More than 21% of women are in the multiple-risk category and about 56% are in the single risk category. More than 50% of women have high-risk maternal age or a larger number of children or short birth intervals. Levels of women's autonomy were found to have significant inhibiting effects on high-risk maternal age, parity or birth intervals, thus on high-risk fertility.

Childbearing complications are also widely prevalent among Bangladeshi women. More than 37% of women suffer from multiple health complications during pregnancy. The analysis on high-risk pregnancies, has not found any direct significant relationship between autonomy and high-risk pregnancies, which supports the hypothesis of this study. However, high-risk childbearing practices, particularly adolescent childbearing

and short birth intervals, as well as lack of utilisation of maternal healthcare services were found to be strongly associated with high-risk pregnancies. Women's autonomy thus indirectly influences high-risk pregnancies through childbearing practices as well as utilisation of maternal healthcare services.

This study also has attempted to investigate the associations between autonomy and birth outcomes, more specifically, perinatal mortality. Autonomy of women, childbearing practices and the use of maternal healthcare services have been examined in a single causal mediation analysis framework. The analysis shows that there is no direct relationship between autonomy and perinatal outcomes. However, the data indicates that high-risk childbearing practices (such as adolescent motherhood, a large number of children and short birth intervals), as well as some components of maternal healthcare utilisation (such as a sufficient number of antenatal visits and delivery in medical facilities) mediate the influence of autonomy on perinatal outcomes. More specifically, high-risk childbearing practices have significant enhancing effects while maternal healthcare components have significant inhibiting effects of perinatal deaths. This indicates that each of the three components of high-risk fertility increases the risk of perinatal deaths. On the other hand, higher uses of maternal healthcare services, particularly sufficient number of visits for antenatal care reduces this risk.

Among the socio-economic characteristics of women, education is strongly associated with high-risk fertility, high-risk pregnancy and perinatal deaths. Better educated women are less likely to experience these events compared to less educated women. Women's place of residence represents a strong determinant of each of the three aspects of reproductive health. Women living in rural areas are generally less autonomous, as well as more vulnerable to having poor reproductive health status and outcomes. Religious background is another strong determinant of high-risk childbearing practices and maternal outcomes. Additionally, women's employment and socio-economic status

also have significant effects on autonomy as well as high-risk childbearing practices. However, the extent of influence is not the same for all socio-economic factors. Women's education and place of residence, in particular, are the strongest determinants of high-risk fertility, high-risk pregnancy and perinatal mortality. Interestingly, socio-economic factors, particularly women's education and residential status, rather than women's autonomy have stronger association with the reproductive health of women.

The second research question of this dissertation was addressed by employing a multilevel modelling technique. It was assumed that both the levels of autonomy and reproductive health status of women as measured through high-risk fertility, high-risk pregnancy and perinatal mortality vary across Bangladesh. To address this issue, a three-level model was used where individuals were, at the first level (17,840 women), nested within communities (600 primary sampling units) at second level, which were nested within districts (64 administrative units) at third level. As women living in different locations or communities are likely to enjoy different levels of autonomy, they are exposed to different levels of high-risk fertility, high-risk pregnancies and adverse birth outcomes. Women's places of residence influence their education and employment opportunities. Secondly, the surrounding environment may influence their understanding, values and attitude towards childbearing practices and maternal health matters. Finally, their location may differently affect access to and use of healthcare and other resources related to reproductive and child health. Education and employment opportunities, quality medical facilities (including antenatal care and emergency delivery services) and skilled medical professionals are mainly located in urban areas, thus making rural women more vulnerable to poor health outcomes. However, as the place of residence is associated with both autonomy and the reproductive health of women, women's residential location also influences the relationship between autonomy and reproductive health. The present study found significant variations in

women's autonomy as well as in high-risk childbearing practices and maternal healthcare utilisation by different locations across the country, which supports the hypothesis of this study.

From the preceding discussion of the major findings of this thesis on autonomy and reproductive health among Bangladeshi women, the following recommendations has been developed which, if implemented, could contribute to an improvement in overall reproductive health and birth outcomes In Bangladesh.

9.2 Recommendations

The present study has a clear message: increasing the level of women's autonomy helps to improve their reproductive health status. Higher levels of autonomy play a significant role in reducing high-risk childbearing practices and improving the level of maternal healthcare utilisation. Therefore, to increase the levels of women's autonomy will help to reduce high-risk fertility, high-risk pregnancy and thus will ensure healthy birth outcomes for Bangladeshi women.

Recommendation 1: Improve women's status in Bangladesh

First, to improve women's reproductive health and outcome, it is important to improve the status of women in Bangladesh. Women should have the right to choose the timing and number of children. Therefore, special measures will be needed to ensure reproductive rights for women. It is necessary for women to understand these rights and, together as a social movement, assert these rights both publicly and privately. It is necessary to design well-defined policies and interventions across the country, including programs to educate both men and women that will directly or indirectly raise the status of women. Raising the status of women also requires a determination to

change power hierarchies between women and men within social, cultural, political and religious institutions

Recommendation 2: Reducing high-risk childbearing practices

Second, it is important to reduce high-risk childbearing practices in Bangladesh. Reduction of high-risk childbearing practices requires an increase in the age at first birth, a limit on the number of children and an extension of the intervals between births. Traditionally, Bangladeshi couples want to have their first child as soon as possible after marriage. Later age at first conception naturally shortens the reproductive period of a woman, which will consequently reduce the number of children she has. Increasing the age that young women are allowed to legally marry would be a policy option.

In this context, adolescents need special care. Therefore, the existing health management system needs to be strengthened to create awareness among young mothers about the adverse effects of early reproduction and big families. Since young mothers are much more vulnerable to health complications during pregnancy and delivery, as well as experiencing adverse birth outcomes, there is a clear need to priorities provision of antenatal programs for them.

Recommendation 3: Improving the utilisation of reproductive healthcare services

Third, an improvement in the utilisation of reproductive healthcare services should be a priority initiatives to improve maternal and child health outcomes. Bangladesh has already achieved effective family planning interventions, however, women's awareness of and access to the other components of maternal healthcare services should be of special concern. It is necessary to ensure that women have at least three antenatal visits from medically trained providers. At the same time, it is necessary to encourage women, as well as their husbands and other family members, to give birth in medical facilities. At present, about 80% of births in Bangladesh still occur at home.

Recommendation 4: Health education for families

Fourth, women as well as their husbands should have adequate knowledge about the danger signs of pregnancy complications and about the health condition of a newborn. In developed countries, special education during pregnancy (about pregnancy complications, emergency remedies and the health of the newborn) have contributed to better health outcomes for both mother and baby. In Bangladesh, such an initiative would contribute to healthier pregnancies and outcomes. Additionally, the survival of children could contribute to less desire for more children, which can reduce high-risk childbearing practices by limiting the number of pregnancies as well as short birth intervals. Newborn survival could be achieved by extensive launching of immunisation, health and nutritional programs, and parents should have adequate knowledge about those initiatives.

Recommendation 5: Education of women

Finally, the education of women was found to be strongly associated with both autonomy and reproductive health. Therefore, increasing girls' education facilities and creating employment opportunities would be the best policy option to raise the status of women as well as to achieve reproductive health goals. For reducing early childbearing, it is necessary to raise the age at first marriage by improving female education and employment opportunities. More vocational training facilities should be arranged and secondary schools for girls should be established in all parts of the country. This will motivate girls to continue secondary education rather than dropping out. These initiatives will result in delaying marriage and first births. At the same time, education can help women take better care of themselves and their children, which can reduce both maternal and neonatal mortality. Poverty alleviation programs should be a policy option regarding these issues.

In addition to this, there are huge differences between rural and urban areas in education, employment as well as healthcare facilities. It is, therefore, necessary to provide education and employment facilities for young women across the country, particularly in rural areas. It is further necessary to ensure the availability of maternal healthcare centres in rural and remote areas to provide quality antenatal and delivery care services, as well as to provide emergency services that reduce pregnancy and delivery complications. These initiatives will result in successful pregnancy outcomes and also will reduce newborn deaths, which are significant in rural areas. Furthermore, the aim should be to increase deliveries in medical facilities instead of at home and to ensure the presence of skilled medical professionals.

9.3 Limitations of present study and future directions

The present study is a secondary analysis based on the data from a country representative national survey – the Bangladesh Demographic and Health Survey (BDHS 2011), a sample of 17,842 women aged 10 to 49 years. To address the research questions and the principal aim, relevant information was extracted from individual, household and verbal autopsy questionnaires, and this permits quantitative analysis only. However, reproductive health, childbearing practices and autonomy of women are largely concerned with individual understanding, attitudes and participation. It is, therefore, important to investigate women's own perceptions and experiences with regards to these issues. Therefore, in addition to quantitative analysis, a qualitative study could provide more meaningful conclusions in these issues. This is one of the limitations of this present study.

Most research on pregnancy health and childbirth is mainly concerned with physiological issues. The present study examined this issue from a socio-demographic perspective by using information collected through the BDHS. However, it will be more

meaningful if information had been collected from a hospital database or directly from those women who were admitted in the maternity wards. However, because of time limitations, this was not possible. Furthermore, the study on adverse birth outcomes should include information about miscarriages, stillbirths, premature births, low birth weight and neonatal deaths. However, the BDHS does not provide an acceptable method of collecting data about miscarriages, premature births or low birth weight babies. Additionally, information on the health complications during pregnancy and childbirth were self-reported, not scientifically collected. This information would become acceptable for analysis if it was collected from hospital records or from interviewing women admitted in maternity wards. Moreover, examination of this aspect could be a further extension of this study.

This thesis described the associations between autonomy of women and reproductive health by examining childbearing practices, healthcare utilisation, pregnancy health condition and perinatal outcomes in a single framework. In the context of poor or adverse reproductive health outcomes, the present study provided a clear idea about what is happening in Bangladesh and why it is happening. This could be extended in future research with a more comprehensive substantive approach involving multi-methods, data from different sources, and inter-disciplinary perspectives in the Bangladeshi context.

References

Abedin, S., Khan, M.A.R. and Abedin, S. (2010). On Some Dominant Factors Affecting the Age Pattern of Fertility in Bangladesh, *Demography India*, **39** (1):

Adhikari, R. (2010). "Demographic, socio-economic, and cultural factors affecting fertility differentials in Nepal". *BMC Pregnancy and Childbirth*; **10**(1): 19.

Afsana, K. and S. F. Rashid (2001). "The challenges of meeting rural Bangladeshi women's needs in delivery care". *Reproductive Health Matters*; **9**(18): 79-89.

Agarwala, R. and S. M. Lynch (2006). "Refining the measurement of women's autonomy: An international application of a multi-dimensional construct". *Social Forces*; **84**(4): 2077-2098.

Ahmed, S., Creanga, AA, Gillespie DG, and Tsui AO. (2010). "Economic status, education and empowerment: implications for maternal health service utilization in developing countries". *PloS one*; **5**(6): e11190.

Amin, S. Diamond, I., Steele, F. and Rashid, SF (1996). "Contraception and Religious practice in Bangladesh". Popline Org.

Amin, S. and C. B. Lloyd (2002). "Women's lives and rapid fertility decline: Some lessons from Bangladesh and Egypt". *Population Research and Policy Review*; **21**(4): 275-317.

Anderson, S. and M. Eswaran (2009). "What determines female autonomy? Evidence from Bangladesh". *Journal of Development Economics*; **90**(2): 179-191.

Arnold F, MK Choe and TK Roy (1998). "Son preference, the family-building process and child mortality in India". *Population studies*, Taylor & Francis

Azad, K., Barnett, S., Banerjee, B., Shaha S., Khan, K. (2010). "Effect of scaling up women's groups on birth outcomes in three rural districts in Bangladesh: a cluster-randomised controlled trial". *The Lancet*; **375**(9721): 1193-1202.

Bangladesh Demographic and Health Survey (2011). National Institute of Population, Research and Training (NIPORT), Mitra and Associates & Macro Internationals

Bangladesh Fertility Survey (1989). National Institute of Population, Research and Training (NIPORT), Mitra and Associates & Macro Internationals

Bakker, R., Steegers, EAP., and Biharie, AA. (2011). "Explaining differences in birth outcomes in relation to maternal age: the Generation R Study". *BJOG: An International Journal of Obstetrics & Gynaecology*; **118**(4): 500-509.

Balk, D. (1997). "Defying gender norms in rural Bangladesh: A social demographic analysis". *Population Studies*.

Baqui, A. H., Choi, Y., and Williams, EK. (2011). "Levels, timing, and etiology of stillbirths in Sylhet district of Bangladesh". *BMC Pregnancy and Childbirth*; **11**(1): 25.

Baron RM and Kenny DA (1986). "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations". *Journal of Personality and Social Psychology*, **51(6)**, 1173-1182.

Bari, W., Chowdhury, RI., and Islam, MA. (2002). "The differentials and determinants of perinatal mortality in rural Bangladesh". *European Journal of Contraception and Reproductive Healthcare*; **7**(4): 216-222.

Basu, A. M. (1990). "Cultural influences on health care use: two regional groups in India". *Studies in Family Planning*; **21**(5): 275-286.

Basu, A. M. (1997). "The 'politicization' of fertility to achieve non-demographic objectives". *Population Studies*; **51**(1): 5-18.

Blanc, A. K. (2003). "The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence". *Studies in Family Planning*; **32**(3): 189-213.

Bloom, S. S., Wypij, D., and Das Gupta, M. (2001). "Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city". *Demography*; **38**(1): 67-78.

Bongaarts, J. (1978). "A framework for analyzing the proximate determinants of fertility". *Population and Development Review*; 105-132.

Brunson, E. K., Shell Duncan, B. (2009). "Women's autonomy and its relationship to children's nutrition among the Rendille of Northern Kenya". *American Journal of Human Biology*; **21**(1): 55-64.

Chakraborty, N., Islam, MA., and Chowdhury, RI. (2003). "Determinants of the use of maternal health services in rural Bangladesh". *Health Promotion International*; **18**(4): 327-337.

Chattopadhyay, A. and B. Goswami (2007). "Status of women in two Bengals: evidence from large scale surveys". *Journal of Biosocial Science*; **39**(2): 276.

Chen, X. K., Wen, SW., Fleming, N., and Demissie, K. (2007). "Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study". *International Journal of Epidemiology*; **36**(2): 368-373.

Choudhury, N., Moran, AC. (2012). "Beliefs and practices during pregnancy and childbirth in urban slums of Dhaka, Bangladesh". *BMC Public Health*; **12**(1): 791.

Cleland, J., S Bernstein, A Ezeh, A Faundes, A Glasier. (2006). "Family planning: the unfinished agenda". *The Lancet*; **368**(9549): 1810-1827.

Conde-Agudelo, A. and J. M. Belizán (2000). "Maternal morbidity and mortality associated with interpregnancy interval: cross sectional study". *BMJ*; **321**(7271): 1255-1259.

Conde-Agudelo, A. (2006). "Birth spacing and risk of adverse perinatal outcomes". *JAMA: the Journal of the American Medical Association*; **295**(15): 1809-1823.

Cox, D.R. (1970). "*The Analysis of Binary Data*", London: Methuen

Cunnington, A. J. (2001). "What's so bad about teenage pregnancy?" *Journal of Family Planning and Reproductive Health Care*; **27**(1): 36-41.

DaVanzo, J., L Hale, A Razzaque, M Rahman. (2008). "The effects of pregnancy spacing on infant and child mortality in Matlab, Bangladesh: How they vary by the type of pregnancy outcome that began the interval". *Population Studies*; **62**(2): 131-154.

Davis, K. and J. Blake (1956). "Social structure and fertility: An analytic framework". *Economic Development and Cultural Change*; 211-235.

DGHS (2012). "*Health Bulletin 2012*". Directorate General of health Service, Ministry of Health and Family Welfare, Bangladesh.

Davis-Floyed and C Sargent (1997). "*Childbirth and Authoritative Knowledge: Cross cultural perspectives*". Oxford University Press, Oxford.

De Silva, S., CA Fisher, A Premawardhena. (2000). "Thalassaemia in Sri Lanka: implications for the future health burden of Asian populations". *The Lancet*; **355**(9206): 786-791.

DeRose LE, and AC Ezeh (2010). Decision-making patterns and contraceptive use: evidence from Uganda". *Population Research and Policy Review*. Springer

Dharmalingam, A. and S. P. Morgan (2004). "Pervasive Muslim-Hindu Fertility Differences in India". *Demography*; **41**(3): 529-545.

Dyson, T. and M. Moore (1983). "On kinship structure, female autonomy, and demographic behaviour in India". *Population and Development Review*; 35-60.

Enkin, M. (2000). *A Guide to Effective Care in Pregnancy and Childbirth*; Oxford University Press, Oxford.

Ferdous, J., A Ahmed, SK Dasgupta, M Jahan. (2012). "Occurrence and Determinants of Postpartum Maternal Morbidities and Disabilities among Women in Matlab, Bangladesh". *Journal of Health, Population, and Nutrition*; **30**(2): 143.

Fikree, F. F. and O. Pasha (2004). "Role of gender in health disparity: the South Asian context". *BMJ: British Medical Journal*; **328**(7443): 823.

Gausia, K., D Ryder, M Ali, C Fisher, A Moran. (2012). "Obstetric complications and psychological well-being: experiences of Bangladeshi women during pregnancy and childbirth". *Journal of Health, Population, and Nutrition*; **30**(2): 172.

Geidam, A., BM Audu, Z Oummatel. (2011). "Pregnancy outcome among grand multiparous women at the University of Maiduguri Teaching Hospital: A case control study". *Journal of Obstetrics & Gynaecology*; **31**(5): 404-408.

Gilbert, E. S. (2010). *Manual of High Risk Pregnancy and Delivery*; Mosby.

Gipson, J. D. and M. J. Hindin (2009). "The effect of husbands' and wives' fertility preferences on the likelihood of a subsequent pregnancy, Bangladesh 1998–2003". *Population Studies*; **63**(2): 135-146.

Gipson, J. D., MB Hossain, MA Koenig. (2011). "Measurement of and Trends in Unintended Birth in Bangladesh, 1983-2000". *Journal of Health, Population, and Nutrition*; **29**(4): 400.

Goldstein, H. and J. Rasbash (1996). "Improved approximations for multilevel models with binary responses". *Journal of the Royal Statistical Society. Series A (Statistics in Society)*; 505-513.

Goodburn, E. A., R Gazi, M Chowdhury. (1995). "Beliefs and practices regarding delivery and postpartum maternal morbidity in rural Bangladesh". *Studies in Family Planning*; 22-32.

Haque, M. M., TM Islam, MI Tareque. (2011). "Women Empowerment or Autonomy: A Comparative View in Bangladesh Context". *Bangladesh Sociological Society*; **8**(2): 17.

Haque, S. E., M Rahman, MG Mostofa, MS Zahan. (2011). "Reproductive health care utilization among young mothers in Bangladesh: does autonomy matter?" *Women's Health Issues*.

Healthy People (2010). Final Review, National Centre for Health Statistics; *U.S.* Department of Health and human Services.

Hindin, M. J. (2000). "Women's autonomy, women's status and fertility-related behavior in Zimbabwe". *Population Research and Policy Review*; **19**(3): 255-282.

Hong, R. (2006). "Effect of multiple birth on infant mortality in Bangladesh". *Journal of Pediatrics and Child Health*; **42**(10): 630-635.

Hong, R. and M. Ruiz-Beltran (2007). "Impact of prenatal care on infant survival in Bangladesh". *Maternal and Child Health Journal*; **11**(2): 199-206.

Hossain, M. B., JF Phillips. (2007). "The effect of women's status on infant and child mortality in four rural areas of Bangladesh". *Journal of Biosocial Science*; **39**(3): 355.

Hossain, S. Z. (1998). "Decision making, use of contraception and fertility in Bangladesh: A path analysis". *International Journal of Sociology and Social Policy*; **18**(7/8): 27-55.

Hussain, T. M. and J. F. Smith (1999). "Women's physical mobility in rural Bangladesh: The role of socio-economic and community factors". *Contemporary South Asia*; **8**(2): 177-186.

ICDDR,B (2010). Annual Report. International Centre for Diarrhoeal Diseases Research, Bangladesh

Islam, M., RI Chowdhury, N Chakraborty. (2004). "Factors associated with delivery complications in rural Bangladesh". *European Journal of Contraception and Reproductive Healthcare*; **9**(4): 203-213.

Islam, M. A. (2011). "Consistency in Reporting Contraception among Couples in Bangladesh". *Asia-Pacific Population*; **26**(1): 79.

Islam, M. A., RI Chowdhury, HH Akhter. (2006). "Complications during pregnancy, delivery, and postnatal stages and place of delivery in rural Bangladesh". *Health Care for Women International*; **27**(9): 807-821.

Islam, M. A., SS Padmadas, PWF Smith. (2010). "Family planning communication between husbands and wives in Bangladesh: a multilevel analysis". *Genus*; **66**(1).

Islam, M. M., Islam, MA. (2004). "Fertility transition in Bangladesh: understanding the role of the proximate determinants". *Journal of Biosocial Science*; **36**(3): 351-370.

Islam, M. Al Mamun, and R Bairagi (1998). "Fertility and its proximate determinants in Bangladesh: evidence from the 1993/94 Demographic and Health Survey". *Asia-Pacific population journal*.

Imai K, Keele L, Tingley D, Yamamoto T (2011). "Unpacking the Black Box: Learning about Causal Mechanisms from Experimental and Observational Studies". *American Political Science Review*, **105(4)**, 765-789.

Imai K, Keele L, Tingley D, Yamamoto T (2010). "Causal Mediation Analysis Using R". In HD Vinod (ed.), *Advances in Social Science Research Using R, Lecture Notes in Statistics*, pp. 129-154. Springer-Verlag, New York.

Jacobsson, B., L Ladfors, I Milsom. (2004). "Advanced maternal age and adverse perinatal outcome". *Obstetrics & Gynecology*; **104**(4): 727-733.

Jafari, F., H Eftekhar, A Pourreza, J Mousavi. (2010). "Socio-economic and medical determinants of low birth weight in Iran: 20 years after establishment of a primary healthcare network". *Public Health*; **124**(3): 153-158.

Jansen, P. W., H Tiemeier, FC Verhulst. (2010). "Employment status and the risk of pregnancy complications: the Generation R Study". *Occupational and Environmental Medicine*; **67**(6): 387-394.

Jejeebhoy, S. J. (1991). "Women's status and fertility: Successive cross-sectional evidence from Tamil Nadu, India, 1970-80". *Studies in Family Planning*; **22**(4): 217-230.

Jejeebhoy, S. J. (1995). Women's education, autonomy, and reproductive behavior: Experience from developing countries; Clarendon Press Oxford.

Jejeebhoy, S. J. (2000). "Women's autonomy in rural India: Its dimensions, determinants, and the influence of context". *Women's Empowerment and Demographic Processes: Moving beyond Cairo*; **1**.

Jejeebhoy, S. J. and Z. A. Sathar (2001). "Women's autonomy in India and Pakistan: the influence of religion and region". *Population and Development Review*; **27**(4): 687-712.

Kabeer, N. (1999). "Resources, agency, achievements: Reflections on the measurement of women's empowerment". *Development and Change*; **30**(3): 435-464.

Kabeer, N. (2011). "Between affiliation and autonomy: navigating pathways of women's empowerment and gender justice in rural Bangladesh". *Development and Change*; **42**(2): 499-528.

Kabir, A., R Jahan, SMK Alam. (2003). "The Effect of Education on Fertility in Bangladesh". *International Quarterly of Community Health Education*; **22**(3): 199-214.

Kabir, A., QIU Ibrahim. (2005). "Relationships between factors affecting contraception and fertility in Bangladesh". *International Quarterly of Community Health Education*; **24**(1): 45-53.

Kalam EMN and Khan HTA (2002). "*Modelling Contraceptive Prevalence in Bangladesh: A Hierarchical Approach*", Populationasia.org.

Kamal, S. M. M. (2012). “Safe Motherhood Practices Among Women of Urban Slums in Bangladesh”. *Health Care for Women International*; **33**(8): 719-738.

Khan, A. (1999). “Mobility of women and access to health and family planning services in Pakistan”. *Reproductive Health Matters*, Elsevier.

Khan, H. (1997). “A hierarchical model of contraceptive use in urban and rural Bangladesh”. *Contraception*; **55**(2): 91-96.

Khan, R., LS Blum, M Sultana, S Bilkis. (2012). “An Examination of Women Experiencing Obstetric Complications Requiring Emergency Care: Perceptions and Sociocultural Consequences of Caesarean Sections in Bangladesh”. *Journal of Health, Population, and Nutrition*; **30**(2): 159.

Khatun, S. and M. Rahman (2008). “Socio-economic determinants of low birth weight in Bangladesh: A multivariate approach”. *Bangladesh Medical Research Council Bulletin*; **34**(3): 81-86.

Killewo, J., I Anwar, I Bashir, M Yunus. (2006). “Perceived delay in healthcare-seeking for episodes of serious illness and its implications for safe motherhood interventions in rural Bangladesh”. *Journal of Health, Population, and Nutrition*; **24**(4): 403.

Kim, J. M., A Labrique, KP West, M Rashid. (2012). “Maternal morbidity in early pregnancy in rural northern Bangladesh”. *International Journal of Gynecology & Obstetrics*.

Koenig, M. A., K Jamil, PK Streatfield, T Saha. (2007). “Maternal health and care-seeking behavior in Bangladesh: findings from a national survey”. *International Family Planning Perspectives*; 75-82.

Laskar, M., MH Mahbub, K Yokoyama. (2006). “Factors associated with contraceptive practices of married women in Bangladesh with respect to their employment status”. *European Journal of Contraception and Reproductive Healthcare*; **11**(3): 220-227.

Liou, J. D., L Ladfors, I Milsom. (2010). “Advanced maternal age and adverse perinatal outcomes in an Asian population”. *European Journal of Obstetrics & Gynecology and Reproductive Biology*; **148**(1): 21-26.

Luke, B. and M. B. Brown (2007). “Elevated risks of pregnancy complications and adverse outcomes with increasing maternal age”. *Human Reproduction*; **22**(5): 1264-1272.

Lumbiganon, P., M Laopaiboon, AM Gülmezoglu. (2010). “Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007–08”. *The Lancet*; **375(**9713): 490-499.

Magadi, M. A., EM Zulu, M Brockerhoff. (2003). “The inequality of maternal health care in urban sub-Saharan Africa in the 1990s”. *Population Studies*; **57**(3): 347-366.

McCarthy J, and D Maine (1992). “A framework for analyzing the determinants of maternal mortality”. *Studies in Family Planning*, JSTOR

Mamun, A. A., SS Padmadas. (2006). “Maternal health during pregnancy and perinatal mortality in Bangladesh: evidence from a large-scale community-based clinical trial”. *Pediatric and Perinatal Epidemiology*; **20**(6): 482-490.

Mason, K. O. (1986). *The status of women: Conceptual and methodological issues in demographic studies*. Sociological Forum, Springer.

Matsuda, Y., K Hayashi, A Shiozak. (2011). “Comparison of risk factors for placental abruption and placenta previa: Case-cohort study”. *Journal of Obstetrics and Gynecology Research*; **37**(6): 538-546.

McDonald, P. (2004). “Gender equity in theories of fertility transition”. *Population and Development Review*; **26**(3): 427-439.

Menken, J., L Duffy, R Kuhn. (2003). “Childbearing and women’s survival: new evidence from rural Bangladesh”. *Population and Development Review*; **29**(3): 405-426.

MacKinnon D (2008). “*Introduction to Statistical Mediation Analysis*”. Routledge, New York.

Miller, J. E. (1991). “Birth intervals and perinatal health: an investigation of three hypotheses”. *Family Planning Perspectives*; 62-70.

Miller, J. E., J Trussell, AR Pebley, B Vaughan. (1992). “Birth spacing and child mortality in Bangladesh and the Philippines”. *Demography*; **29**(2): 305-318.

Mistry, R., and O Galal, M Lu. (2009). “Women’s autonomy and pregnancy care in rural India: A contextual analysis”. *Social Science and Medicine*; **69**(6): 926-933.

Morgan, S. P. (1996). “Characteristic features of modern American fertility”. *Population and Development Review*; **22**: 19-63.

Morgan, S. P. and B. B. Niraula (1995). “Gender inequality and fertility in two Nepali villages”. *Population and Development Review*; 541-561.

Muganyizi, P. S. and H. L. Kidanto (2009). “Impact of change in maternal age composition on the incidence of Caesarean section and low birth weight: analysis of delivery records at a tertiary hospital in Tanzania, 1999–2005.” *BMC Pregnancy and Childbirth*; **9**(1): 30.

Mumtaz, Z. and S. Salway (2005). “‘I never go anywhere’: extricating the links between women’s mobility and uptake of reproductive health services in Pakistan”. *Social Science & Medicine*; **60**(8): 1751-1765.

Mumtaz, Z. and S. Salway (2007). “Gender, pregnancy and the uptake of antenatal care services in Pakistan”. *Sociology of Health & Illness*; **29**(1): 1-26.

Mumtaz, Z. and S. Salway (2009). “Understanding gendered influences on women’s reproductive health in Pakistan: Moving beyond the autonomy paradigm”. *Social Science & Medicine*; **68**(7): 1349-1356.

Nahar, S., M Banu, HE Nasreen. (2011). “Women-focused development intervention reduces delays in accessing emergency obstetric care in urban slums in Bangladesh: a cross-sectional study”. *BMC Pregnancy and Childbirth*; **11**(1): 11.

Nahar, S., A Rahman, HE Nasreen. (2012). “Factors Influencing Stillbirth in Bangladesh: A Case–Control Study”. *Pediatric and Perinatal Epidemiology*.

Navaneetham, K. and A. Dharmalingam (2000). *Utilization of maternal health care services in south India*; Centre for Development Studies.

Norton, M. (2005). “New evidence on birth spacing: promising findings for improving newborn, infant, child, and maternal health”. *International Journal of Gynecology & Obstetrics*; **89**: S1-S6.

Notestein, F. W. (1953). *Economic Problems of Population Change*; Oxford University Press.

Obermeyer, C. M. (1999). "The cultural context of reproductive health: implications for monitoring the Cairo agenda". *International Family Planning Perspectives*; 50-55.

Parveen, S. (2007). "Gender awareness of rural women in Bangladesh". *Journal of International Women's Studies*; **9**(1): 253-269.

Pervin, J., A Moran, M Rahman. (2012). "Association of antenatal care with facility delivery and perinatal survival–a population-based study in Bangladesh". *BMC Pregnancy and Childbirth*; **12**(1): 111.

Phillips, J. F. and M. B. Hossain (2003). "The impact of household delivery of family planning services on women's status in Bangladesh". *International Family Planning Perspectives*; 138-145.

Pillai, V. K. and R. Gupta (2006). "Cross-national analysis of a model of reproductive health in developing countries". *Social Science Research*; **35**(1): 210-227.

Population Report (1978). The International Conference on Primary Healthcare convened in Alma-Ata, organized by WHO and UNICEF.

Price NL and K Hawkins (2007). "A conceptual framework for the social analysis of reproductive health". *Journal of Health, Population and Nutrition*, JSTOR

Rahman, M. (2012). "Women's Autonomy and Unintended Pregnancy among Currently Pregnant Women in Bangladesh". *Maternal and Child Health Journal*; 1-9.

Rahman, M., HH Akhter. (2002). "Obstetric deaths in Bangladesh, 1996–1997". *International Journal of Gynecology & Obstetrics*; **77**(2): 161-169.

Rahman, M., A Islam, M Islam. (2010). "Rural-urban differentials of knowledge and practice of contraception in Bangladesh". *Journal of Population and Social Studies*; **18**(2): 87-110.

Rahman, M. H., WH Mosley, S Ahmed. (2008). "Does service accessibility reduce socioeconomic differentials in maternity care seeking? Evidence from rural Bangladesh". *Journal of Biosocial Science*; **40**(01): 19-33.

Rahman, M. M. and S. Abedin (2010). “Factors affecting neonatal mortality in Bangladesh”. *Journal of Health Management*; **12**(2): 137-152.

Rahman, M. M., SE Haque. (2011). “Factors affecting the utilisation of postpartum care among young mothers in Bangladesh”. *Health & Social Care in the Community*; **19**(2): 138-147.

Rajaram, S., LK Zottarelli. (2009). “An assessment of fetal loss among currently married women in India”. *Journal of Biosocial Science*; **41**(3): 309.

Razzaque, A., J Da Vanzo, M Rahman. (2005). “Pregnancy spacing and maternal morbidity in Matlab, Bangladesh”. *International Journal of Gynecology & Obstetrics*; **89**: S41-S49.

Reddy, U. M., CW Ko, M Willinger. (2006). “Maternal age and the risk of stillbirth throughout pregnancy in the United States”. *American Journal of Obstetrics and Gynecology*; **195**(3): 764-770.

Rob, U., N Piet-Pelon. (2004). “When family planning services fail: Experience from Bangladesh”. International Quarterly of Community Health Education; **23**(2): 151-167.

Rodriguez, G. and N. Goldman (1995). “An assessment of estimation procedures for multilevel models with binary responses”. *Journal of the Royal Statistical Society. Series A (Statistics in Society)*; 73-89.

Royce, R. A. (2006). “Birth spacing—the long and short of it”. *JAMA: The Journal of the American Medical Association*; **295**(15): 1837-1838.

Rutstein, S. O. (2005). “Effects of preceding birth intervals on neonatal, infant and under-five years’ mortality and nutritional status in developing countries: evidence from the demographic and health surveys”. *International Journal of Gynecology and Obstetrics*; **89**(1): 7.

Saleem, S. and M. Bobak (2005). “Women’s autonomy, education and contraception use in Pakistan: a national study”. *Reproductive Health*; **2**(1): 8.

Salihu, H. M., B Bekan, MH Aliyu, DJ Rouse. (2005). “Perinatal mortality associated with abruptio placenta in singletons and multiples”. *American Journal of Obstetrics and Gynecology*; **193**(1): 198-203.

Sathar, Z. A. and I. Mohammad (1984). “Reproductive Behaviour in Pakistan: Insights from the Population, Labour Force, and Migration Survey 1979-80”. *The Pakistan Development Review*; **23**(2/3): 207-223.

Sathar, Z. A, N Crook, C Callum and S Kazi (1988). “Women’s status and fertility change in Pakistan”. *The Pakistan Development Review*; JSTOR.

Sathar, Z. A. and S. Kazi (1997). “Women’s autonomy, livelihood and fertility: a study of rural Punjab”.

Savitz, D. A., JS Kaufman, N Dole, AM Siega-Riz. (2004). “Poverty, education, race, and pregnancy outcome”. *Ethnicity & Disease*; **14**(3): 322-329.

Say, L. and R. Raine (2007). “A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context”. *Bulletin of the World Health Organization*; **85**(10): 812-819.

Sayem, A. and A. T. Nury (2011). “Factors associated with teenage marital pregnancy among Bangladeshi women”. *Reproductive Health*; **8**(1): 16.

Schuler SR, SM Hashemi, and AP Riley (1997). The influence of women's changing roles and status in Bangladesh's fertility transition: evidence from a study of credit programs and contraceptive use. *World Development*, Elsevier

Senarath, U. and N. S. Gunawardena (2009). “Women’s autonomy in decision making for health care in south Asia”. *Asia-Pacific Journal of Public Health*; **21**(2): 137-143.

Shaikh, K., SS Premji, MS Rose. (2011). “The association between parity, infant gender, higher level of paternal education and preterm birth in Pakistan: a cohort study”. *BMC Pregnancy and Childbirth*; **11**(1): 88.

Sikder, S. S., AB Labrique, B Ullah. (2011). “Accounts of severe acute obstetric complications in Rural Bangladesh”. *BMC Pregnancy and Childbirth*; **11**(1): 76.

Silva, L., M Coolman, EAP Steegers. (2008). “Maternal educational level and risk of gestational hypertension: the Generation R Study”. *Journal of Human Hypertension*; **22**(7): 483-492.

Singh, S. and J. E. Darroch (2000). “Adolescent pregnancy and childbearing: levels and trends in developed countries”. *Family Planning Perspectives*; 14-23.

Srinivasan, K. (1966). “An application of a probability model to the study of interlive birth intervals”. *The Indian Journal of Statistics*; Series B: 175-182.

Teguete, I., et al. (2012). “Maternal and neonatal outcomes of grand multiparas over two decades in Mali”. *Acta Obstetrics and gynecology Scandinavia*; **91**(5): 580-586.

Tingley, Dustin, Teppei Yamamoto, Kentaro Hirose, Luke Keele and Kosuke Imai (2014). Mediation: R Package for Causal Mediation Analysis. Journal of Statistical Software, vol. **59(5): 1-38**

Tingley D, Yamamoto T, Hirose K, Keele L, Imai K (2013). Mediation: R Package for Causal Mediation Analysis. R package version 4.4.2,

Tomashek KM, M Kotelchuck and W Barfield (2008). “Effect of late-preterm birth and maternal medical conditions on newborn morbidity risk” *Pediatrics*, Am Acad Pediatrics

Ullah, A., A Barman, J Haque. (2009). “Birthweight and early neonatal health: Bangladesh perspective”. *Pediatric and Perinatal Epidemiology*; **23**(6): 542-547.

UNFPA Annual Report (2011). “*State of World Population*”. United Nations Population Fund.

UNDP (2015). “*Human Development Report*”. United Nations Development program.

United Nations Population Division (1995). Population and Development: Programme of Action adopted at the International Conference on Population and Development (ICPD), Cairo, 5-13 September 1994 (New York, United Nations).

United Nations Division for the Advancement of Women (1995). Beijing Declaration and Platform for Action of the Fourth World Conference on Women (FWCW), Beijing, 15 September 1995.

Upadhyay, U. D. and M. J. Hindin (2005). “Do higher status and more autonomous women have longer birth intervals?: Results from Cebu, Philippines”. *Social Science & Medicine*; **60**(11): 2641-2655.

Williams, E. K., MB Hossain, RK Sharma. (2008). “Birth interval and risk of stillbirth or neonatal death: findings from rural north India”. *Journal of Tropical Pediatrics*; **54**(5): 321-327.

Woldemicael, G. and E. Y. Tenkorang (2010). “Women’s autonomy and maternal health-seeking behavior in Ethiopia”. *Maternal and Child Health Journal*; **14**(6): 988-998.

World Bank (2013). “*World Development Annual Report*”. World Bank

World Health Organization [WHO] (2014). *World Health Statistics*; World Health Organization.

World Health Organization [WHO] (2011). *Global Status Report on Non-Communicable Diseases 2010*; World Health Organization.

World Health Organization [WHO] (2010). *Maternal Mortality in 2005*; World Health Organization.

World Health Organization [WHO] (2004). *The World Health Report*; World Health Organization.

Zhang Z, Zyphur MJ and Preacher KJ (2009). “Testing Multilevel Mediation Using Hierarchical Linear Models”. *Organizational Research Methods*, **12(4)**, 695-719.