Chapter One
Introduction

1.1. Background

Reduction of maternal mortality is on the agenda of several national and international health programs and forms a part of the United Nations Millennium Development Goals (MDGs) established in 2000 (WHO, UNICEF and UNFPA 2004, p. 2). There are eight Millennium Development Goals (MDGs) for the year 2015, which consist of goals to (i) halve extreme poverty, (ii) achieve universal primary education, (iii) promote gender equality and empower women, (iv) reduce child mortality, (v) improve maternal health, (vi) combat HIV/AIDS, malaria and other diseases, (vii) ensure environmental sustainability and (viii) develop a global partnership for development (UNDP 2000). The goal of reducing maternal mortality or improving maternal health is commonly known as MDG Five.

The Program of Action of the International Conference on Population and Development of 1994 (ICPD,1994), held in Cairo also affirmed a target to reduce maternal mortality in the context of family planning and reproductive health services to meet the family planning needs for all by the year 2015 (ICPD Program of Action 1994, paragraphs 8.21 and 7.16). As a signatory to all such programs, the Government of Bangladesh has formulated its own policies and programs to improve reproductive health and family planning

services in the frameworks of the MDGs and ICPD 1994 Program of Action (Directorate General of Family Planning, 1998).

However, maternal mortality is still high in Bangladesh. More than half of the pregnant women do not have access to necessary health care and 20 percent of all deaths of women aged 15 to 49 years are caused by complications of pregnancy and childbirth. Mothers aged 15 to 19 years (i.e. adolescent women) have a 30-50 percent higher mortality than mothers of other age groups (People's Forum on MDG 2005, p. 25). A third of the adolescents aged 15-19 have already begun childbearing (NIPORT et. al. 2005, p. 61). Most of the child bearing in Bangladesh appears to be completed by age 40, as the percentage of women becoming pregnant after age 40 is only 0.3 (NIPORT et. al. 2005, p. 54). There is a fair degree of births at short intervals as revealed by the fact that the percentage of births within 24 months of a previous birth is 16.3[1]. More than one in three births to teenage mothers aged 15-19 occur after a "too short" interval or less than 24 months (NIPORT et. al. 2005, p. 57). The percentage of high-risk pregnancies is 53.2. These high-risk[2] pregnancies are more likely to experience adverse pregnancy outcomes and maternal deaths than other women. Although the use of contraceptives by women of

[1] Research indicates that maternal health is jeopardized when a woman's births are too close together, i.e., when the interval between births is less than 24 months and that children born too soon after a previous birth are also at an increased risk of poor heath and dying (NIPORT et. al. 2003, pp. 97-98).

[2] The high-risk groups usually include very young mothers, very old mothers, women having first pregnancies, and women with high parities, i.e., more than 4 births (Winikoff and Sullivan 1987, p. 129).

reproductive ages (15-49 years) has increased from 8% in 1975 to 58% in 2004, it is rather low among women aged 10-19 (Table 1.1).

Table.1.1. Current use of contraception* by women by age, Bangladesh 2004

Age of women	Currently using (any method)	Not currently using
10-14	29.1	70.9
15-19	42.2	57.8
20-24	52.9	47.1
25-29	61.3	38.7
30-34	68.6	31.4
35-39	72.1	27.9
40-44	64.7	35.3
45-49	47.3	52.7
Total	58.1	41.9

Source: The BDHS 2004, p. 66

*current use of contraception is measured by the percentage of currently married women who are currently using a method of contraception.

Studies conducted by NIPORT et. al. (2005, p. xxi) also report a gap in the continuation of the use of contraceptives by method as well differences in contraceptive by urban and rural areas, level of education and socio-economic status of women and their families. Findings of the Bangladesh Demographic and Health Survey conducted in 2004 show that 16 percent of the births in Bangladesh were mistimed and 14 percent not wanted at all, constituting a total of 30 percent unplanned births in the country (NIPORT et. al. 2005, p. xix). Most of these unwanted pregnancies result in abortion, most of which carry high risks of death. In Bangladesh, the general abortion rate was 5% in

2001. During the 1970s and 1990s in Matlab *thana*[3] , 15 percent of the maternal deaths were attributed to abortion (NIPORT et. al. 2003, p. 95). It is found that approximately 90 percent of deaths from abortions and 20 percent of all maternal deaths could be averted through fair access to contraception, effective use of contraception and by having only wanted pregnancies (WHO 2006, pp.6-9).

1.2. The health and family planning programs in Bangladesh

Since independence in 1971, the family planning programs in Bangladesh have evolved through different phases. In the late 1970s the government initiated a Traditional Birth Attendant (TBA) training program with the goal of having one trained TBA in each village. However, the program failed to deliver the expected result (WHO 2005, p. 12). In 1975, the government adopted a broad-based, multisectoral family planning program which was integrated in the first official policy document in 1976 (NIPORT et. al. 2003, p. 2). This program promoted the integration of maternal and child health and family planning (MCH-FP) activities, training of Family Welfare Assistants (FWAs) for community based family planning motivation and distribution work and accelerated a training program for family welfare visitors (FWVs). In the mid-1970s a social marketing program to promote the sale of contraceptives was also initiated. In 1998 the government formulated the

[3] Matlab *thana* is a sub-division of the Dhaka division. It is a completely rural and riverine area, 45 km south east of Dhaka, the capital of Bangladesh. Most people live by subsistence farming. Total fertility rate is 6 per women, literacy rate of 30% (Fauveau et. al. 1990, p. 103).

Health and Population Sector Strategy (HPSS)[4] program to incorporate health in the population program, which was then developed into the Health and Population Sector Program (HPSP) (NIPORT et. al. 2004, p. 3). In the early 1990s, the Emergency Obstetric Care (EOC) program was implemented through the Maternal and Child Welfare Centers (MCWC). The Maternal Health Strategy of 2001 evolved a rights-based approach[5] to maternal health with safe motherhood as its main theme (NIPORT et. al. 2003, p. 3). In 2003 the Ministry of Health and Family welfare, with the support of WHO and UNFPA, and assistance from the Obstetrical and Gynecological Society of Bangladesh (OGSB), formulated a six-month pilot program to develop community based, Skilled Birth Attendant (SBA) program. In 2003-2006 the government launched the Health, Nutrition and Population Sector Program (HNPSP 2004-2006) to meet the challenges outlined in the ICPD and MDGs (WHO 2005, p.12).

Recently, the government has adopted the Bangladesh Population Policy with the objectives of improving the status of family planning and maternal and child health. It aims to increase the use of family planning methods among eligible couples through raising awareness of family planning; ensure

[4] The HPSS, which laid the foundation for the fifth five-year plan (1998-2003) defined an 'Essential Service Package', the components of which are reproductive health care, child health care, communicable disease control, limited curative care and behavior change communication (BCC) (Hague et.al. 2002, S49).

[5] In the rights based approach to development practices, principles and values derived for human rights are incorporated into policy and program and implementation (Freedman, Waldman, Pinho, Wirth, Chowdhury and Rosenfield 2005, p. 33).

adequate availability and access of reproductive health services, especially family planning services to all, including information, counseling and services for adolescents; improving maternal health with emphasis on reduction on maternal mortality; reducing reproductive tract and sexually transmitted infections (RTI/STIs) and preventing the spread of HIV/AIDS (NIPORT et. al. 2005, p. 3).

1.3. The Millennium Development Goals for Bangladesh

Considering the priority contextual issues in maternal health in Bangladesh, such as high fertility, very young age at marriage and child birth, high levels of malnutrition and the prevalence of violence against women, the Government of Bangladesh has set itself six targets and goals to achieve the goal of improving maternal health within the framework of the global MDGs (see Table 1.2).

Table 1.2. Targets and indicators of MDG Five in Bangladesh

Global goal	Global target	Indicators for monitoring progress towards global MDGs	Bangladesh targets	Indicators for monitoring progress towards Bangladesh MDGs
Improving maternal health	Reducing maternal mortality ratio (MMR) by three quarters between 1990 and 2015	Maternal mortality ratio	Reduce MMR from 570 per 100,000 live births in 1990 to 143 by 2015	MMR (deaths per 100,000 live births
		Proportion of births attended by skilled health personnel	Increase the proportion of births attended by skilled health personnel to 50% by 2010	Proportion of births attended by skilled health personnel
			Reduce total fertility rate (TFR) to 2.2 by 2010	Total fertility rate
			Reduce maternal malnutrition to less than 20% by 2015	Proportion of mothers who are malnourished
			Increase by 2 years the median age of girls at first marriage	Legally stipulated age at girls' first marriage
			Eliminate violence against women	Proportion of maternal deaths caused by violence

Source: GOB and UN 2005, p. ii

In the context of high fertility alone, which is associated with births at early ages, at short birth intervals and at high parities of women, it can be argued

that a substantial reduction in the total fertility rate would help in lowering maternal mortality in Bangladesh. Considering the near universality of marriage in Bangladesh, family planning becomes an obvious choice of intervention to reduce fertility in the country.

Bangladesh has shown some progress towards achieving some of the targets listed in Table 1.2 to improve maternal health and family planning services. The maternal mortality ratio has declined from 410 to 320 maternal deaths per 100,000 live births between 1998 and 2002. During the same period, life expectancy at birth for females has risen from 58 to 6o years (Germain and Kidwell 2005, p. 90). The total fertility rate (TFR) for women aged 15-49 estimated to be 3.0[6] in 1990, a decline of 52% from 6.3 in 1971-1975. But the TFR had plateaued at around 3.3 in the 1990s. Contraceptive prevalence rate has increased from 53.8% to 58.1% between 2001 to 2004, and the unmet need[7] for contraception has decreased from 15.3% in 2000 to 11.3% in 2004 (BDHS 2004).

However, it is claimed that the current family planning program is not sufficient to meet the needs of women (Hardee et. al.1999, p. s3). The levels of adolescent fertility and unwanted pregnancy have remained unchanged and the unsafe abortion rate is still high (Germain and Kidwell 2005, p. 9). A large proportion of women still get married before they attain the minimum legal

[6] means on average per women would have 3.0 children in her life time

[7] Want to use contraceptives but not using

age at marriage. Thus, Bangladesh has not progressed towards the MDGs at the expected rate.

1.4. The research question

It is usually found that maternal mortality is high among the disadvantaged groups (Loudon, 2007; p. 243; Marston & Cleland 2004; Dey, 1998; Winikoff, 1988). Age at birth, birth spacing, parity, and access to and availability of health care services are important factors for reducing maternal mortality. It has been documented in various surveys (e.g. Royston & Armstrong 1989; Herz & Measham 1987; Obuekwe & Marchie n.d.; Fortney, 1987 and Chen et. al. 1974) that family planning reduces deaths of women from maternal causes by reducing the incidence of pregnancy particularly that of high-risk pregnancies. Therefore, this study is aimed to examine the importance of family planning in reducing maternal mortality in Bangladesh. It will involve an examination of the trends of maternal mortality in Bangladesh, trends of using family planning in the country.

1.5. Research objectives

1.5.1. General objective.

The general objective of this study is to examine the role and potentiality of family planning in reducing maternal deaths and thereby helping achieve the goal of improving maternal health in Bangladesh.

1.5.2. Specific objectives.

In order to fulfill the general objective of this study, several specific objectives are addressed as follows:

1) To observe the levels and trends of maternal mortality in Bangladesh.
2) To observe the levels and trends of fertility in Bangladesh.
3) To observe the levels and trends of contraceptive use in Bangladesh.
4) To examine the affect of family planning on the risk factors of maternal mortality and antenatal care (ANC).
5) And finally make recommendations for appropriate policies for family planning use.

1.6. Rationale of the study

The circumstances described above depict a dismal situation about the life of mothers who do not want to be pregnant any more. Many of these mothers, as reported, are faced with serious health hazards and risk of death. As various reports describe, maternal death is an issue that needs to be addressed from every angle. It is necessary to know about the current condition of maternal mortality in the country and its way out. It would help design policies and programs by the policy makers.

It is claimed that family planning is an essential element of the efforts to improve maternal health. Bangladesh has made little progress to improve maternal health. However, progress has not occurred at the expected rate. So, it is the time not to think what we have achieved rather to think what more we

should do. Yet, despite the fact that a huge body of research exists on maternal mortality, markedly few studies have been conducted focusing the issue of reducing maternal mortality through family planning. This research, therefore, intended to investigate the significance of family planning to improve maternal health and reducing maternal deaths as well.

1.7. Research framework and organization of the thesis

The thesis is divided into six chapters. The first chapter contains an introduction, background of the problem, research question and objectives, rationale of the study. Discussion of data and methodology of the study are addressed in the second chapter. The third chapter focuses on literature review and levels and trends of maternal mortality in Bangladesh including the conceptual framework for the study. Using data sets of the Bangladesh Demographic and Health Survey 2004 and the Bangladesh Maternal Health and Maternal Mortality Survey 2001, chapter four analyses the relationships between the risk factors and family planning through bivariate analysis. Chapter Five provides multivariate analysis of the risk factors of maternal mortality and maternal health indicator. And finally, Chapter Six summarizes the findings of the study and provides the, conclusion and policy recommendations.

CHAPTER TWO

METHODOLOGY OF THE STUDY

2.1. Data sources

The study is based mainly on analysis of data from two major surveys conducted in Bangladesh: the Bangladesh Demographic and Health Survey of 2004 or BDHS 2004 (NIPORT et. al. 2005) and the Bangladesh Maternal Health and Maternal Mortality Survey of 2001 or BMMS 2001 (NIPORT et. al. 2003). The main advantage of using these data sets is that, in both of them, data have been collected from nationally representative samples of women of reproductive ages and presented in terms of socio-economic background and specific age groups of women. These data sets are appropriate for identifying the levels and trends of fertility and mortality of women of reproductive ages in Bangladesh, and relate them to various socio-economic and demographic characteristics of the women. Such analyses are parts of the objectives of this study.

2.1.1. Bangladesh Demographic and Health Survey 2004 (BDHS 2004)

Data from the Bangladesh Demographic and Health Survey 2004 (NIPORT et. al. 2005) have been used for examining the levels and trends of fertility and contraceptive prevalence in Bangladesh. The BDHS 2004 was conducted under the authority of National Institute of Population, Research and Training (NIPORT) of the Ministry of Health and Family Welfare and was designed to

collect data on fertility, family planning, and maternal and child health from a nationally representative sample of ever married women of reproductive ages, along with data on these women's socio-economic and demographic characteristics. The survey was intended to serve as a source of information on fertility and family planning for policy makers, program managers in health and family planning, and researchers. The survey sample covered the populations of both urban and rural areas. The BDHS 2004 sample was a stratified, multistage, systematic sample covering 361 primary sampling units (PSUs), of which 122 were in urban areas and 239 in rural areas. The data were collected by trained field workers from 1 January to 25 May 2004 by using four types of questionnaires: Household Questionnaire, Women's Questionnaire, Men's Questionnaire and Community Questionnaire. A total of 10,811 households were visited, from which 11,440 women (or 98.6 percent of the total number of available women) were interviewed (NIPORT et. al. 2005, pp. 5-8). The non-response rate is only 1.4 for this survey that is lower than those for previous surveys. The BDHS 2004 survey data are accessible in different forms, e.g., household recode, couple's recode, children recode and individual recode. For the present study the Statistical Package for Social Sciences (SPSS) system of individual recode has been used.

2.1.2. Bangladesh Maternal Health Services and Maternal Mortality Survey 2001 (BMMS 2001)

To examine the trends and causes of maternal mortality in Bangladesh the present study has used data from the Bangladesh Maternal Health and

Maternal Mortality Survey 2001 (NIPORT et. al. 2003). This data set provides comprehensive information about of maternal mortality in Bangladesh, including its trends. This survey is intended to provide data on maternal health and maternal mortality for policy makers, program managers and researchers. Similar to the BDHS 2004, the BMMS 2001 was conducted under the authority of the NIPORT and Ministry of Health and Family Welfare. Technical support on questionnaire design, data collection and data analysis was provided by the John Hopkins University, Baltimore, USA, and the International Centre for Diarrhoeal Disease Research, Bangladesh (*ICDDR*, B) and Macro International, Calverton, Maryland as part of the ORC- Measure *DHS*+ program (NIPORT et. al. 2003, p. 6).

To obtain an accurate estimate of maternal mortality ratio in Bangladesh at the national level, a stratified national sample of 104,323 households was systematically selected from a total of 1,616 clusters. All ever-married women aged 13-49 were eligible to be interviewed. The coverage of the selected households was 99 percent; the very small gap in coverage was caused due to some dwellings being vacant or the inhabitants having gone away for an extended period at the time of survey. The response rate from the eligible women was 97.2 percent. The principle reason for non-response among the eligible women was that it was not possible to contact most of these women in their homes after repeated attempts. There was a very low refusal rate. Three types of questionnaires were used in the survey: (i) household questionnaires,

(ii) women's questionnaires and (iii) verbal autopsies to collect information on the symptoms and causes of death of those women who died between the ages of 13 and 49 (i.e., basically to elicit information about maternal deaths) (NIPORT et. al. 2003, pp. 7-9).

2.2. Data quality

The BDHS 2004 data provide the most recent and detailed record of the basic indicators of social progress including demographic trends, and the current health and family planning situation of Bangladesh. The BMMS 2001 data are the latest and most detailed source of maternal mortality date and the general maternal health situation of Bangladesh. In both the surveys, experienced and well trained interviewers were used to ensure good quality of data. Prior to data collection, the interviewers were given further extensive training, both in class rooms and in the field. Quality control teams consisting of trained field supervisors were used to check the data collection in the field. In addition, NIPORT monitored the fieldwork by regularly visiting the teams in the field, and filled-in questionnaires were returned to Dhaka[8] for processing soon after the interviews had been completed. An efficient data processing team worked with microcomputers on double shifts to process the data concurrently. The advantage of concurrent data processing is that the quality control teams were able to advise the field teams of any errors detected during data entry so that timely corrections could be made (NIPORT et. al. 2005, p. 7).

[8] The capital of Bangladesh

2.3. Data Management

The data were made accessible in the SPSS format. It is possible to access the BDHS and BMMS data online with the permission of Measure *DHS*+ (http://www.measuredhs.com/login.cfm). For the present analysis, some variables (such as those continuous variables which were initially not grouped, such as age at marriage, age at birth, parity, desired family size, fertility preference, number of antenatal visits) have been recoded as necessary by using the SPSS software.

2.4. Method of analysis

This study is based upon an original analysis of secondary data (from the two surveys mentioned above) and findings of previous research. Based on the conceptual framework proposed in Chapter 3, the analysis of data for the present study has been done in following two ways:

(1) Descriptive analysis of data from the Bangladesh Demographic and Health Survey (BDHS) 2004 and the Bangladesh Maternal Health Services and Maternal Mortality Survey (BMMS) 2001 in order to observe the trends in maternal mortality ratio, the levels and trends in fertility, and the levels and trends in contraceptive prevalence in Bangladesh. A number of cross tabulations and frequency tables have been generated to discern the relationships of demographic, socio-economic, and household characteristics with maternal mortality, contraceptive prevalence and fertility.

(2) Statistical analysis of the factors influencing the proximate determinants of maternal mortality following the McCarthy and Maine framework (McCarthy, and Maine, 1992) discussed in Chapter 3. Wantedness of pregnancy, age at last child birth, parity and birth interval has been selected as the proximate determinants. The statistical analysis comprises bi-variate analysis and multivariate regression analysis with respect to the risk factors of maternal mortality i.e. wantedness of pregnancy, age at birth, parity and birth interval.

(3)Multivariate analysis of wantedness of pregnancy, age at birth, parity and birth interval in order to examine the different factors of influencing maternal mortality in Bangladesh. The section of the study using multivariate analysis is intended to explain the variations in maternal mortality in terms of these factors. Conceptual frameworks have been drawn for wantedness of pregnancy, age at birth, parity and birth interval along with a conceptual framework for family planning use and maternal mortality. Statistical analysis has been performed using these conceptual frameworks in order to identify the contributing factors of pregnancy related maternal mortality.

2.5 The identification and operationalisation of variables

The variables used in this study are related to maternal mortality in Bangladesh. The details of the variables used in this study are as shown in Table 2.1.

Table 2.1. Indicators, operationalisation and level of measurement of variables

Wantedness of pregnancy

Dependent variable	Independent variable	Indicators	Operational definition
Wantedness of pregnancy		Pregnancy is wanted or unwanted	Whether pregnancy is wanted or unwanted
	Socio-cultural variable	Use of family planning	Whether women ever used any method of contraception or not
		Age at marriage	The age at which women get married

Age at birth

Dependent variable	Independent variable	Indicators	Operational definition
Age at birth		The age at which women give birth	The age at which women give birth
	Socio-economic variables	Education of husband	Years of schooling completed by husband
		Education of wife	The highest level of education completed by a married woman
		Wealth index of the household	The wealth quintile of the household belongs to women
	Number of children	Number of children ever born to a woman	Perceptions of a woman about the ideal number of children

Parity

Dependent variable	Independent variable	Indicators	Operational definition
Parity		Total number of previous births	Total number children ever born to a woman
	Demographic variables	Age at birth of last child	Age at birth of last child
	Socio-economic variables	Education of husband	Years of schooling completed by husband
		Education of wife	The highest level of education completed by a married woman
		Wealth index of the household	The wealth quintile of the household belongs to women
	Number of children	Desired number of children ever born to a woman	Perceptions of a woman about the ideal number of children

Birth interval

Dependent variable	Independent variable	Indicators	Operational definition
Birth interval		Interval between two children	Interval between last two children
	Socio-economic variables	Education of husband	Years of schooling completed by
		Education of wife	The highest level of education completed by a married woman
		Wealth index of the household	The wealth quintile of the household where the woman lives
	Fertility preference	Whether women desire any more children	Whether women desire any more children

Antenatal care

Dependent variable	Independent variable	Indicators	Operational definition
Antenatal care		Whether received antenatal care during pregnancy	Whether received antenatal care during pregnancy
		How many times women visits for antenatal care during pregnancy	How many times women visits for antenatal care during pregnancy

2.6. Conclusion

In conclusion, the methodology of the study has been developed in order to achieve the main objectives of this study; namely to examine the levels and trends of maternal mortality, fertility and contraceptive prevalence in Bangladesh. Moreover, variables which are known to influence the above mentioned trends, such as wantedness of pregnancy, age at child birth, parity and birth interval have been included in the analysis. Besides these, the multidimensionality of maternal health, the need to address the activities for improving maternal health, and the need of family planning in reducing maternal mortality have also been explored.

CHAPTER THREE

REVIEW OF THE LITERATURE AND CONCEPTUAL FRAMEWORK ON FAMILY PLANNING AND MATERNAL MORTALITY

3.1. Literature review

This chapter will review selected studies on maternal mortality and family planning that have been conducted with particular reference to: (1) the conceptual issues related to maternal mortality, (2) levels and trends of maternal mortality and family planning in Bangladesh (3) issues related to family planning in reducing maternal mortality (4) family planning as a strategy for reducing maternal mortality (5) historical and present interventions to avert maternal mortality and to formulate family planning programs.

3.1.1. Conceptual issues related to maternal mortality

The root causes of maternal mortality are complex and can be viewed from different conceptual perspectives. Cook and Fathalla (1996) present a complex concept of maternal mortality, where maternal mortality is considered to be affected by a range of factors starting from a lack of contraception or trained birth attendants to women's unequal status in the society. They show that disparities between the poor and the rich and the government's negligence in providing reproductive health services as a part of public health services account for high maternal mortality in a major way (Cook and Fathalla 1996,

p.117). Maternal mortality is the result of different socio-economic, cultural and demographic factors which enhance the high risks of the "too early, too late, too many and too close" (Cook 1993, p. 76) pregnancies, and unwanted pregnancies followed, in most cases by unsafe abortions[9], and obstetric complications leading to maternal death (Chen et. al. 1974, p.335).

McCarthy and Maine (1992) regard maternal mortality as one of three outcomes of pregnancy and childbirth, the other two possible outcomes being disability and safe child birth. Maternal mortality is the result of complications of pregnancy, and pre-existing health problems that are aggravated by the pregnancy. The outcomes of pregnancy and child birth are influenced by sets of intermediate and distant factors. Intermediate factors comprise health status; reproductive status; health care behavior, access to and use of health services including use of contraceptives and safe abortion procedures. According to the McCarthy-Maine framework, socioeconomic and cultural factors influence maternal death as distant factors. The framework also recognizes unknown or unpredictable factors other than lack of access to health services, or poor health conditions prior to or during pregnancy (McCarthy and Maine, 1992, p. 24-27). McCarthy and Maine recommend widespread use of family planning as an effective preventive measure of maternal deaths, because the pre-

[9] Unsafe abortion is defined as a procedure for terminating an unwanted pregnancy performed by persons either lacking the necessary skills or in an environment lacking the minimal medical standards, or both (WHO, communicating family planning in reproductive health, n. d.).

conditions of maternal deaths are that the woman has to become pregnant, has complications during pregnancy or during delivery (McCarthy and Main, 1992, p. 30).

The Mother-Baby Package of the World Health Organization (WHO, 1994) also considers maternal mortality as the end result of complications of pregnancy and childbirth. This strategy for reducing maternal mortality defines complications of pregnancy as haemorrhage, sepsis, hypertensive disorders of pregnancy, obstructed labor and abortion (WHO n. d., pp. x- xiii). Winikoff (1988) presents a more holistic concept of maternal mortality, according to which maternal mortality is the result of a lifelong and intergenerational experience of poor health and poor health care services. Poor health can be perpetuated from mother to daughter as a result of a complex interplay of social, economic, cultural and biological factors (Winikoff, 1988, p. 197). Cook (1993, p.73) argues that the root causes of maternal deaths or sickness e.g. deficiencies of calcium, vitamin D, or iron sometimes hinder women's lives in infancy or even before their birth.

The prevailing law on age at marriage or its lack of enforcement can be another contributing factor to maternal deaths. If there is no minimum legal age at marriage or if the legal minimum age at marriage is set at a young age, or the law is not enforced, adolescent pregnancies can be common

occurrences. Such pregnancies are associated with high obstetric risks and maternal mortality (Cook, 1993, pp. 73- 74).

Nanda, et. al. (2005) in their recent study present an integrated view on maternal mortality which suggests a pathway to improve maternal health outcomes that depend on a complex interaction of factors at different levels, e.g. government policies and actions, the health system and other sectors, households and communities. In this regard they have reviewed 'promising approaches'[10] undertaken in different countries to reduce maternal mortality under a number of themes, namely government policies and actions, health system and health financing, access to health services, capacity building, quality of care, community involvement, monitoring and advancing progress, and partnership and collaboration (Nanda et.al., 2005, p.18). Winikoff and Sullivan (1987, p.129) suggest an obvious approach to improve the safety of childbearing, which is to concentrate the births in the 'safest' age/parity groups[11] . Chen, Melita, Geshche, Ahmed, Chowdhury and Mosley (1974) using the Matlab Cholera Research Institute data, show in their research that there are two types of pregnancy complications that are associated with

[10] Promising approaches refer to overall programs, specific health practices, research practices, research efforts, complex or discrete interventions, innovations or other strategies to improve maternal health outcomes (Nanda et. al., 2005, p. 2).

[11] The 'safest' age/parity groups refer to age range of 20-40 and parities under arbitrary cut-offs such as 4, 5 or 6 (Winikoff and Sullivan, 1987, p. 129).

maternal deaths: direct[12] and indirect[13]. Besides these, they also define the level of maternity related deaths in relation to selected demographic parameters, e.g. mother's age and her gravidity[14]. According to their study, maternal mortality and age; and maternal mortality and gravidity have a U-shaped pattern in their relationships, indicating that maternal mortality is high in the early and late ages; and at prima-gravida and multi-gravida statuses respectively. Same pattern is observed among maternal mortality and parity as well (Chen et. al., 1974, pp. 334-341). A study by Khan, Jahan and Begum (1986) in Jamalpur district[15] shows similar patterns of correlation between maternal mortality and age and parity. Both studies suggested extensive family planning services to reduce maternal mortality.

The research by Thaddeus and Maine (1994) considered maternal mortality as an instance of generic problem. They focus on the interval between the onset of an obstetric complication and its outcome. With this they present a conceptual framework of three phases of delay that contribute to maternal mortality, namely delay in deciding to seek health care (Phase 1 delay); delay in reaching an adequate health care facility (Phase 2 delay) and delay in receiving adequate care at the facility (Phase 3 delay). These delays in turn are

[12] The direct pregnancy complications include obstetric causes.

[13]The indirect pregnancy complications include malnutrition (anemia).

[14] Gravidity refers to the number of pregnancies.

[15] A district in Dhaka division. Bangladesh is divided into six administrative divisions. Dhaka (the capital city) is one of them.

influenced by different factors. Phase 1 delay is affected by socioeconomic and cultural factors, access to service facilities and the perceived or actual quality of service facilities. Phase 2 delay is affected by accessibility of the services (e.g. distribution of the services, travel time, availability, transportation and costs). Finally, the Phase 3 delay is affected by logistic support of the service system (e.g. lack of supplies and essential equipment, poor staff quality and inadequate management (Thadeus and Maine, 1994, pp. 1093-1105).

The Initiative for Maternal Mortality Programme Assessment (IMMPACT) provides a more integrated approach of addressing maternal mortality which includes the environment, need, health system, market outcomes and health outcomes in its framework (IMMPACT, 2004).

3.2. Levels and trends of maternal mortality, fertility and contraceptive prevalence in Bangladesh

The maternal mortality ratio is expressed as the number of deaths from pregnancy related causes or child birth per 1,000 or 100,000 live births. Strictly speaking, maternal mortality should be measured by the maternal mortality rate, which shows the number of maternal deaths per 1,000 or 100,000 pregnancies, but since it is difficult to ascertain the true number of pregnancies in a population, live births are used instead for calculating maternal mortality and the index is called maternal mortality ratio (MMR). The Bangladesh maternal Mortality Survey of 2001 (BMMS 2001) has

produced data on MMR (NIPORT et. al., 2003). But the Bangladesh Demographic and Health Survey 2004 (BDHS 2004) does not provide information on MMR (NIPORT et. al., 2005). Therefore, the present study uses only the BMMS 2001 for data on MMR. It would be very useful to analyze maternal mortality by cause of death, but data in such detail are not available. However, pregnancy related maternal mortality rate (PRMR)[16] can give a reasonably good estimate of maternal health status in the absence of cause specific maternal health data. Pregnancy related mortality ratio is defined as the ratio of all deaths during pregnancy including maternal deaths, delivery and up to 42 days after birth, irrespective of causes of death expressed per 100,000 live births (NIPORT et. al., 2003, p. 21).

Table 3.1 shows pregnancy-related mortality rates, maternal mortality ratios, total fertility rates (TFR) and contraceptive prevalence rates (CPR) by year. It shows that in Bangladesh the pregnancy-related maternal mortality has declined from 514 per 100,000 live births in1989-1991 to 400 per 100,000 live births in 2001-2003. On the other hand, the maternal mortality ratio has declined from 514 per 100,000 live births in 1989-1991 to 322 per 100,000 live births in 2001-2003 and 320 per 100,000 live births in 2004. TFR has declined over the period 1989-2004 from 4.3 to 3.0. Table 3.1 also shows that the contraceptive prevalence rate has increased from 40 percent to 58 percent

[16] The Tenth Revision of International Classification of Disease (ICD-10) introduced the concept of pregnancy related deaths, which are defined as 'the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of cause of death' (WHO and UN 2000, p. 5).

over the period 1989-2004. Thus the trends in all the indicators shown in Table 3.1 are consistent with each other.

Table 3.1. Trends in maternal mortality, fertility and contraceptive prevalence in Bangladesh, 1989-2004

Year	Pregnancy-related mortality ratio (PMMR)	MMR(per 100,000 live birth)	Contraceptive prevalence (any method) rate	% antenatal visits	TFR
1989-1991	514	514	39.9	-	4.3
1991-1993	-	485	44.6	-	3.4
1994-1996	485	449	49.2	30	3.3
1998-2000	449	380	53.8	35	3.3
2001-2003	400	322	58.1	47.6	3.0
2004	-	320	58.1	55.9	3.0

Source: adapted from BMMS 2001 and BDHS 2004

The mean number of children ever born (Table 3.2) and the age-specific fertility rates (Table 3.2) follow the typical early child bearing pattern of fertility of a moderately high fertility country like Bangladesh and the age-specific pregnancy related mortality and maternal mortality ratios reflect the increasing risk of maternal mortality of women with age due to higher exposure to child bearing with age (Table 3.2).

Table 3.2. Fertility and maternal mortality indices, Bangladesh 2001-2004

Woman's age	Mean number of children ever born (2004)	Age specific fertility rates (2001-2003)	Pregnancy related maternal mortality ratio (PMMR) (2001-2003)	Number of maternal deaths (2001-2003)	Maternal mortality ratio (2001-2003)
(1)	(2)	(3)	(4)	(5)	(6)
15-19	0.4	0.134	326	20.501	169.88
20-24	1.4	0.185	272	29.559	236.58
25-29	2.6	0.149	357	30.820	358.38
30-34	3.4	0.097	519	24.399	516.15
35-39	4.1	0.053	908	10.490	492.48
40-44	4.7	0.020	1,475	12.367	1,945.92
45-49	5.6	0.006	3,933	3.256	2,435.43
Total	2.5	3.222	400	-	322.15

Sources: Column 2 from BDHS 2004; other columns from BMMS 2003

There are differentials in fertility, maternal mortality and contraceptive use according to women's background characteristics. Only the BMMS 2001 presents the most recent maternal mortality related data, while the BDHS 2004 presents the most recent data on fertility and contraceptive use. Table 3.3 shows the differentials in fertility, maternal mortality and contraceptive use by women's background characteristics. As expected, the levels of fertility and maternal mortality are higher in the rural areas than urban areas. Further, maternal mortality follows the expected pattern of generally an inverse relationship with an economic indicator such as wealth quintile – the lower the

wealth, the higher the maternal mortality, with the exception of the wealth middle quintile. There is no information on maternal mortality by education, but it has been found that fertility declines with increasing education and increasing wealth – another expected finding. The association of contraceptive use with wealth is in the expected direction, namely the higher the wealth quintile, the higher the contraceptive use. However, the relationship of contraceptive use with education is a little puzzling in that contraceptive use appears to decline with increasing education for the first three categories of education, but increases at the higher educational level. It may be possible that the lowest educated, and possibly the poorest sections of the women were especially targeted for family planning by NGOs and the government.

Table 3.3. Fertility, maternal mortality and contraceptive prevalence by background characteristics in Bangladesh, 2004

Background characteristics	Total fertility rate	Contraceptive prevalence (any method)	Maternal mortality Ratio (2003)
Residence			
Urban	2.5	62.9	303
Rural	3.2	56.7	326
Education			
No education	3.6	58.8	32.3*
Primary	3.3	56.8	143.1
Secondary	2.7	56.3	87.0
Higher	2.2	62.0	-
Wealth index			
Poorest	4.0	53.6	343
Poorer	3.2	57.6	302
Middle	3.0	57.8	473
Richer	2.3	58.5	268
Richest	2.5	62.5	208
Total	3.0	58.1	

Source:BMMS 2001 and BDHS 2001

*educational level specific MMR recent data is not available, so this study used maternal mortality rate in 1983 (Alauddin, 1986, p. 18).

3.1.3. Issues related to family planning in reducing maternal mortality

The effect of family planning on maternal mortality could be found to be remarkable through perfect coverage and perfect efficacy of contraception among the high-risk groups selected. Winikoff and Sullivan (1987, p.136) state that to avail of and use contraceptives continuously and effectively would depend on reasonable and accessible services, and acceptability of services. In

many societies, it would be unacceptable to avoid or postpone births after marriage by a significant length of time even though such births could be in the high-risk age. In that case it would be unrealistic to advocate the avoidance of first births. But in the case of women aged over 35 with seven children the termination of fertility or avoiding further pregnancies might be acceptable. Trussell and Pebley (1984) suggest that family planning would be unlikely to reduce fertility in societies where pregnancies under age 20 are common, unless the average age at marriage is increased. The effectiveness of contraception is associated with continued use of contraception. Women aged fewer than 20 or between ages 30 and 40 do not continue contraceptive use for long. Such women might have a chance of having unintended pregnancies. In such situations, Winikoff and Sullivan (1987) suggest, health care services including prenatal care, delivery, and abortion services might be better strategies for preventing maternal mortality for those who have accepted family planning as well as for the majority who have not, rather than for avoiding pregnancies altogether.

The impact of family planning on maternal mortality may be large in situations where both fertility and mortality are high and lowering fertility and improving maternity will reduce the number of maternal deaths (Fortney, 1987, p. 112). Data from the Bangladesh Demographic and Health Survey (1996-1997) (NIPORT et. al., 1997) show that if all unplanned pregnancies were avoided, the total fertility rate would have declined by more than one

birth (Itzkowitz, 1998, p. 201). Here fertility preference is also a contributing factor to regulate fertility. If older aged women desire more children then there is a possibility of not using contraception, in consequence there is risk of maternal deaths

Though family planning may prevent pregnancy, a certain number of accidental pregnancies could still occur. This rate might be anywhere from less than 1% percent to more than 50 percent, depending on the use-effectiveness and mix of different contraceptive methods (Winikoff & Sulivan, 1987. p. 137). Preference of method may reflect political or economic decisions made by governments to emphasize certain methods, the limited range of methods offered cost of the method (Family Planning: so that every pregnancy is wanted, n. d).

Family planning use varies by residence and education and there is a strong association between the use of family planning and the number of living children (NIPORT et. al., 2003, p. 102). Men have a great influence on the use of family planning. In Bangladesh, women are required to have their husband's permission before using contraception. Men have a role to play in helping their wives in decision making and seeking health care services (Islam 2005).

A study by Phillips et al. (1982) in Matlab shows that the effectiveness of contraception depends on existing demand for efficient birth planning methods. The findings of the Phillips et. al. study also show that contraceptive

services can change fertility in a poor traditional population suggesting that unmeet need[17] for contraception can be fulfilled by an intensive field program[18] and a user-effective program[19] which would be substantially more effective (Phillips, et al., 1982 pp. 134-138).

According to Bongaarts et. al. (1990, p.305) significant proportions of women in developing countries who wish to limit or space childbearing but do not practice contraception due to lack of access to and quality of family planning services, actual or perceived drawbacks of contraceptive methods, accidental pregnancies because of improper use of the method or method failure and lack of motivation to use contraceotives. They suggest that unwanted childbearing can be reduced by bringing improvements in the quantity and quality of services and by more effective and convenient methods of contraception.

The above review reflects that readily available and effective family planning services can lead to a reduction in fertility, and control of unwanted childbearing, and thereafter help in reducing the chances of maternal death.

The use of family planning can be seen from the supply side and the demand side. Supply side factors include acceptability, feasibility, availability, quality

[17] Women having unmet need for contraception are those who do not want to have further children or who wish to postpone their next birth, but are not using any contraception.

[18] Intensive field program includes making contraceptive readily available to households, attendance to health problems by trained and sympathetic village-based paramedics (Phillips et. al., 1982, p. 137).

[19] A user-oriented program is one with a wide choice of methods, skilled counseling, rigorous follow-up and treatment of side effects, and ancillary health services (Phillips et. al., 1982, p. 138).

and cost of the services. Demand side factors include the socio-cultural and economic status of the community and family, health beliefs and personal characteristics of the users. Geographical figure in both supply side and demand side factors (DeGraff, 1991, pp. 65-81). Andersen (1995, pp.1-3) suggests that different predisposing factors e.g. age, number of previous pregnancies and family size has a U-shaped relationship with the use of health services (pp. 1-3). Finally, Chakraborty et. al. (2003, pp. 329-334) found that women's education has a net effect on maternal health service use.

3.2. Family planning as a strategy for reducing maternal mortality

Any strategy for reducing maternal mortality needs to fulfill two conditions: (i) to make pregnancy and delivery safer once a woman becomes pregnant; (ii) to reduce the number of pregnancies through the use of family planning. On World Health Day, 7 April 2007 world leaders agreed that every woman should have access to a basic package of reproductive health services and voluntary family planning that could reduce 35 percent of maternal deaths (UNFPA 2007).

In order to reduce the conditions of high risk pregnancy, such as women's age under 20 and over 35; women's parity 4+, either the pregnancy should be made less risky by changing the profile of the women who become pregnant or by improving the health care of pregnant women. It is observed from

Chen's data from Bangladesh (Chen, et. al., 1974) that eliminating high-risk births might prevent over one half of all maternal deaths in the country. Combining the most effective family planning and health services means that if there are no births to women under age 15 or over age 35 and over parity 4 and if all other pregnancies received adequate antenatal care, about 90 percent of all maternal deaths could be prevented (Winikoff and Sullivan, 1987, p. 135). But it would be very difficult in many societies to prevent such high-risk pregnancies, as it might be culturally unacceptable to increase the age at marriage, try to avoid or postpone the first birth soon after marriage or change the perceptions about desired large family size prevailing in the society. .

A woman's lifetime risk to maternal deaths can be reduced by lowering her risks to maternal deaths from frequent child births. Herein lies the importance of reducing the total fertility rate (TFR) in reducing maternal mortality and that is why the Millennium Development Goal (UN 2000) for improving maternal health in Bangladesh includes the reduction of the TFR as one of the targets. There are several studies which emphasize the implementation of extensive family planning programs to reduce maternal mortality. Fertility reduction can contribute to maternal mortality reduction in two possible ways; (i) by reducing the likelihood of a woman to fall pregnant and ultimately encounter the risk of pregnancy related death, and (ii) by reducing fertility through family planning programs to reduce high risk and unwanted pregnancies, all of which are associated with the risk of maternal death. Many

and unwanted pregnancies are less likely to receive adequate parental care and unwanted pregnancies are more likely to end in unsafe induced abortions. It has been observed in different studies that a family planning program focused on preventive births could reduce maternal mortality by 30 percent (Chen, et. al., 1974, p. 340).

Various authors have identified different factors influencing fertility in Bangladesh. Such factors include economic and social change, growing aspirations of life (Caldwell and Khuda 2000), women's participation in income generation activities and autonomy (Kabir, Khatun and Ahmed 1993), sex preference and desired family size (Saha and Bairagi 2004), and the availability of large scale family planning program in Bangladesh (Bairagi 2001).

A study conducted in the Middle East found that mothers who married before age 16 were at about double the risk of chronic maternal illness and miscarriage during their childbearing period compared to women married after age 16 (Shawkey and Millat, 2001, p. 30). One of the consequences of this early childbearing is unwantedness of a number of these pregnancies and consequently, the likelihood of induced abortions. Further, in many societies, pregnancies among young unmarried women are not welcomed, carrying a high-risk of abortion and potentiality of high mortality associated with unsafe abortions (Family Planning International, n. d.). Use of family planning

methods can be the only measure to prevent such pregnancies and thus, abortions.

It should be noted that lowering fertility may not necessarily increase the safety of giving births. A substantial component of maternal mortality is the result of poor service and improperly performed abortions[20]. It happens due to lack of available services, both for family planning and for termination of unwanted pregnancies. In the poorest countries, as many as 50 percent of total pregnancies are unplanned and 25 percent are unwanted and complications of unsafe abortion are responsible for a substantial proportion of deaths. The existing demand for family planning services could reduce maternal deaths in developing countries by 20% or more (Costello, et. al., 2004). Family planning is reasonable and accessible, and if used continuously and effectively by high-risk groups could lead to a fall in unintended pregnancies and help avoid these unwanted births.

A recent study by the International Centre for Diarrhoeal Disease Research, Bangladesh (*ICDDR*,B, 2007) recommends that all women should be provided with access to safe means to avoid unwanted pregnancies and unsafe abortions. Better access to high-quality contraceptive services is likely to reduce the number of abortions. It is documented in a study by Ahmed, et. al. (2005, p.203) that in *Matlab* the impact of the intensity of family planning programme and the fulfillment of the small unmet need for family planning on

[20] elimination of unwanted births

the incidence of abortions was much larger than that of non-use of family planning and the non-fulfilment of unmet need. Ahmed et. al. (2005) draw attention to the need to provide high-quality contraceptive services to reduce unwanted pregnancies. In Bangladesh, the abortion rate declined with better access to high-quality family planning services and greater contraceptive use (Family Planning International 2002). The result of such studies help set up notions of relationship between family planning and abortion, and to demonstrate that increased contraception use leads to fewer abortions, a fact which is particularly important in countries where abortion is a serious threat to women's health and survival.

3.3 Historical and present interventions to avert maternal mortality and to formulate family planning programs

'Pregnancy is special: let's make it safe' is the slogan of the World Health Day, 1998. Pregnancy is not a disease but a normal physiological process that women must engage in for the sake of humanity. At the Programme of Action of the International Conference on Population and Development, 1994 (ICPD 1994) delegates agreed that abortion was not to be promoted as a method of family planning in any case, the prevention of unwanted pregnancies must always be given the highest priority and every attempt should be made to eliminate the need for abortion. They also made it important that education and family planning services should be offered promptly (Islam 2005).

The Mother-Baby Package of the World Health Organization (WHO) includes family planning information and services and safe motherhood to ensure safe pregnancy and childbirth. For safe motherhood the package considers the four pillars of health care: (1) family planning- to ensure couples and individuals to have the information and services to plan the timing, number and spacing of pregnancies (2) antenatal care to detect and prevent complications of pregnancy (3) clean/safe delivery to ensure clean and safe delivery (note- clean delivery refers to a delivery that is attended by a health staff in a medical institution or by a trained birth attendant at home observing cleanliness- clean hands, clean surface, clean cutting of the cord), and (4) essential obstetric care (EOC) to ensure essential care for high-risk pregnancies and complications (WHO n. d. p.9-13). The Safe Motherhood Initiative (SMI), in its strategy, has adopted a comprehensive seven step strategy to reduce maternal mortality by incorporating (1) provision of family planning services, (2) improvement in the socio-economic status of the women, (3) provision of safe legal abortion services, (4) provision of pre-natal care, (5) improvement in EOC, (6) training of traditional birth attendants (TBAs) and, (7) education and mobilization of the community (McCarthy and Maine, 1992, p. 30).

The report of the International Conference on Better Health for Women and Children through Family Planning; Recommendations for Action, in Nairobi, Kenya, 1987, shows that poverty, malnutrition, poor education and unplanned childbirth contribute to maternal and child deaths and other complications

accompany them. From the evidence presented, this conference shows that half of the maternal deaths could be prevented by the year 2000 by a balanced program of family planning and improved maternal health care and millions of child deaths could be prevented by well timed and spaced pregnancies (Conference report, 1998, p. 58).

3.4. A conceptual framework linking family planning with the reduction of maternal mortality

Family planning is a logical intervention for reducing maternal mortality, especially when a significant proportion of the maternal deaths are caused by high-risk pregnancies and abortion. However, reducing maternal mortality through family planning is strongly associated with various socio-economic, demographic and cultural factors, including fertility, the incidence of high-risk pregnancies, women's demographic profile and the quality of family planning services. The conceptual framework presented in Figure 3.1 is an attempt to present the relationship of different factors related with family planning and maternal mortality. The setting of strategic responses to these factors has also been addressed in this framework. The arguments of this framework are based on the literature review undertaken in Section 3.1. The arrows connecting the indicators and strategic responses in this framework indicate the causal link among the variables. Although a number of maternal mortality frameworks have been introduced by different authors (e.g. McCarthy and Maine

framework[21], IMMPACT[22] framework and Thaddeus and Maine's Three Delays model[23]), the significance of this specific framework lies in its own particular features. The specialties of this framework are as follows:

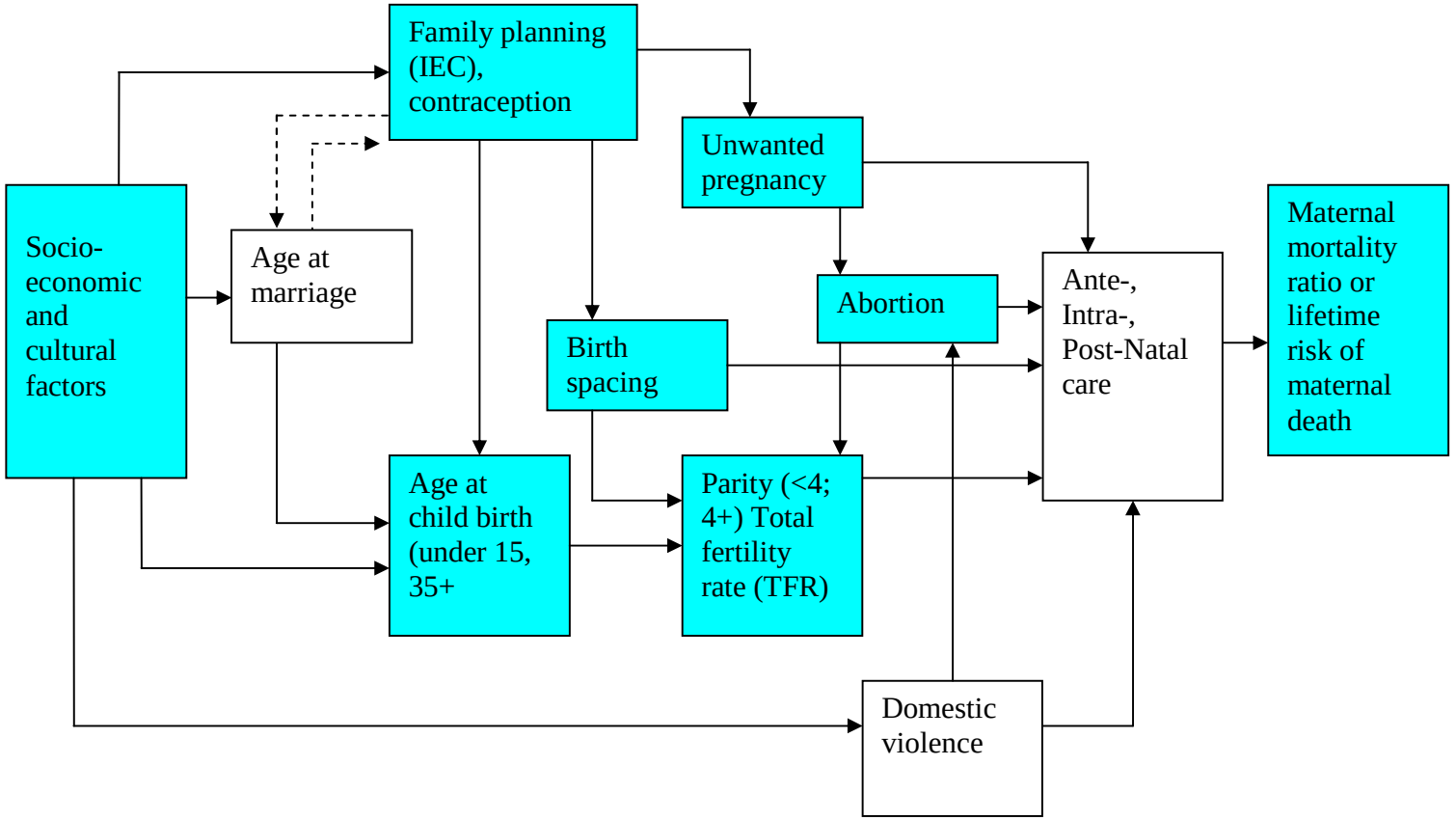
1. This is a framework of maternal mortality which particularly considers the indicators related to family planning in Bangladesh. While some studies have been conducted to analyze the effect of family planning in reducing maternal mortality, no framework including the indicators such as wantedness of pregnancy, age at birth, parity and birth interval given in the proposed framework has yet been developed.
2. Although the previous frameworks were developed in order to address how to reduce maternal mortality, none of them shows explicitly the effect of family planning on the maternal mortality ratio (MMR). Thus, the proposed framework makes an effort to illustrate the relationship among the given components of maternal mortality and MMR.

[21] McCarthy J. and Maine D. 1992.

[22] Initiative for Maternal Mortality Program Assessment (http://www.abdn.ac.uk/immpact/resources/fraework/framediagram.php)

[23] Thaddeus S. and Maine D. 1994.

Figure 3.1. Conceptual framework of family planning and maternal mortality



According to McCarthy and Maine (1992, p. 28) the effects of socioeconomic and cultural factors on maternal mortality operate through a set of intermediate factors comprising TFR, age at marriage and age at birth. Socioeconomic and cultural factors include women's status in the family and community (education, occupation, income, household possession of assets, decision making power and social and legal autonomy), the family's status in the community (family income, land, education of others and occupation of others), and the community's status (aggregate wealth and community resources). Religion and law affect fertility in Bangladesh. Religious beliefs against family planning influence women not using contraception: abortion is illegal and punishable by law, as a result contraception and abortion affect on controlling fertility (McQuillian, 2004, p. 28).

Since the most common indicator of maternal mortality, namely the maternal mortality ratio (MMR) is defined as the number of deaths of women from pregnancy related causes or during the puerperium in a year per 100,000 live births in the same year (WHO, 2001), it is clear that the risk of maternal mortality is directly related to fertility, which is commonly measured by TFR. The lifetime risk of maternal deaths is directly proportional to fertility, as every time a woman becomes pregnant runs the risk of maternal health complications or of maternal death.

According to McCarthy and Maine (1992) any efforts to reduce maternal mortality must (i) reduce the likelihood that a woman will become pregnant; (ii) reduce the likelihood that a pregnant woman will experience a serious complication of pregnancy or childbirth; and (iii) improve the outcomes for women with pregnancy complications.

The other indicators (age at marriage, age at childbirth and parity) play important roles in determining the level of maternal mortality which is affected by socioeconomic and cultural factors. In Bangladesh the median age at marriage is 15 years, although the government has set the legal minimum age at marriage for girls at 18 years (UNFPA, 2003) and on average 22 percent of total births are delivered before reaching the age of 20 years (BDHS 2004, p. 50). This gap between the legally stipulated minimum age at marriage and the observed median age at marriage indicates, among other factors, the inability of law enforcement agencies in enforcing the legal minimum age at marriage in the face of strong socio-cultural tendencies to obey the legal prescription regarding the minimum age at marriage.

Contraceptive use is the highest among women in their thirties and the lowest among women in their teens and in their forties (United Nations, 1987). Thus married women in their teens and their forties have the strongest possibilities of becoming pregnant. In Bangladesh, the maternal mortality ratio among adolescent mothers is 30-50 percent higher than the national ratio. A low age

at marriage potentially prolongs a woman's time in childbearing, thus increasing the risk of maternal mortality. It is evident from the literature review (Section 3.1) that young and old ages at pregnancy bear greater risks of maternal mortality. Unwanted and unintended pregnancy occurs among women who do not use contraception, which in turn may result in abortion (many of which may be unsafe) and in consequence, most women with unwanted pregnancies run the risk of death. Even those who use contraception have a chance of becoming pregnant (unwanted) due to contraceptive failure and they may resort to abortion. Violence against women, causing 13 percent of maternal deaths in Bangladesh (Ahmed et. al., 2004, p. 312) is a matter of grave concern in maternal mortality reduction programmes and activities. Violence, especially forced sexual union can directly cause unwanted pregnancy, thereby leading to (unsafe) abortion.

The strategic response to the relationship of these factors with maternal mortality should be centered on family planning programs. In the proposed framework given in Figure 3.1, family planning comprises information, education and communication (IEC), which informs and educates women about the benefits of family planning programs; and contraception, about which the method of contraception and the continuation of contraceptive use help reduce the likelihood of women's falling pregnant and reducing the number of high-risk and unwanted pregnancies, unsafe abortions and finally of maternal deaths.

3.5. Risk factors of maternal mortality: wantedness of pregnancy, age at child birth, parity and birth interval

It may be concluded from the literature review that maternal mortality is directly affected by factors such as wantedness of pregnancy, age at child birth, parity and birth interval, each of which, in turn is affected by socio-economic, cultural and demographic factors.

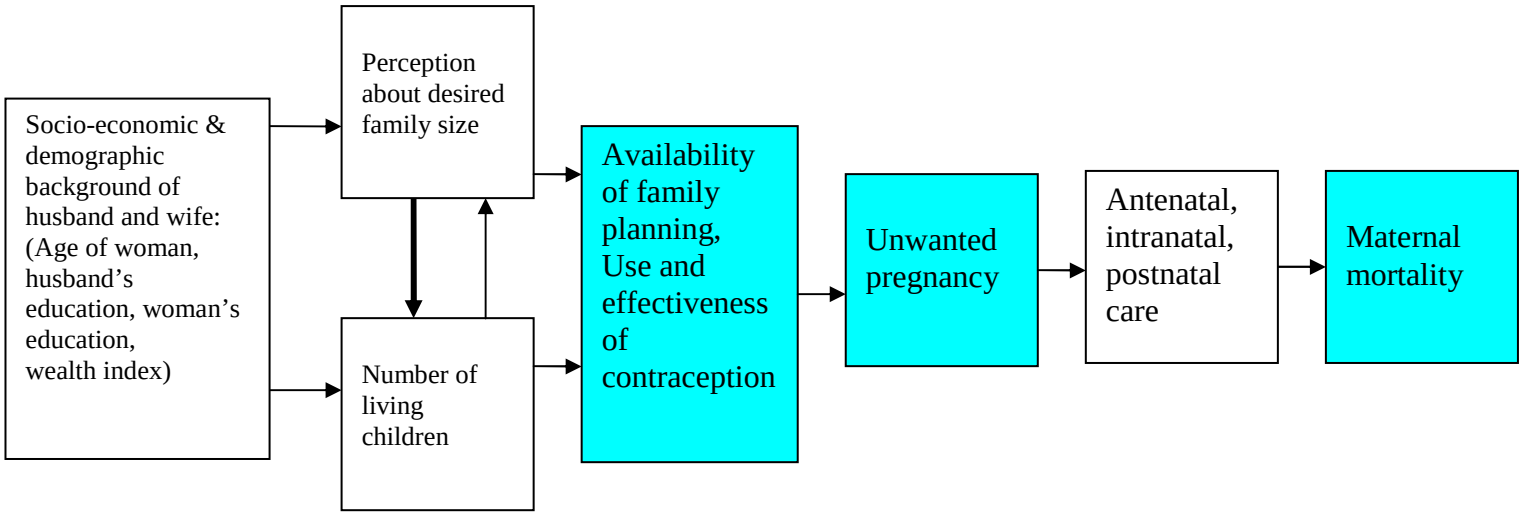
An objective of this research is to identify the factors which affect these four variables, namely wantedness of pregnancy, age at child birth, parity and birth interval in reducing maternal mortality in Bangladesh. As a part of the broader framework for analyzing the factors affecting maternal mortality, a framework for each of these four variables has been proposed which aims to identify the contributing factors to reduce maternal mortality via each variable.

3.5.1. Wantedness of pregnancy

Wantedness of pregnancy appears to be the most important factor associated with maternal mortality. The desire to have a pregnancy is strongly related with socio-economic and demographic backgrounds (including fertility), and the spacing or stopping of a pregnancy is related to the use of family planning services. Among the demographic factors, achieved and desired fertility affects the wantedness of a pregnancy. Achieved fertility incorporates child losses and the number of living children. As the desired family size falls, couples tend to limit the number of any future births according to the number

of children they have already achieved. In such situations, any pregnancy they might have despite the desire not have any more children could be considered as “unwanted”. Further, a pregnancy which has occurred earlier than when the woman wanted it could be considered as mistimed, and therefore also “unwanted” with respect to timing (or birth spacing). Both these types of “unwanted” pregnancies can be prevented by the proper use of family planning. Many women like to terminate such “unwanted” pregnancies by resorting to abortion which, in many situations could be unsafe and lead to maternal death.

Figure 3.2. A framework for analyzing the wantedness of pregnancy in Bangladesh



Woman's age, husband's and woman's education, economic status (represented by wealth index), woman's age have been taken as socio-economic and demographic background factors affecting the wantedness of a pregnancy. Perceptions about family size and the number of living children affect the use of contraception and outcome of contraceptive use, which in turn influences the wantedness of pregnancy.

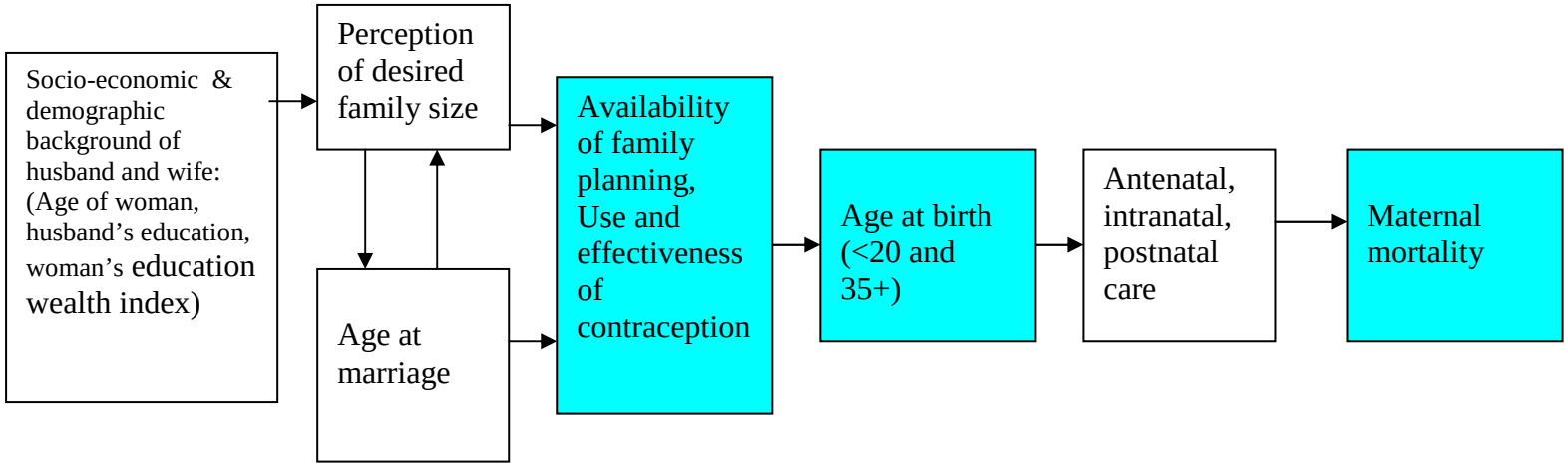
The proportion of women who want no more children increases with age. The BDHS of 2004 reported that in Bangladesh, 12 percent of the women aged 15-19 wanted no more children, compared with 73 percent of women aged 45-49 years who wanted no more children (NIPORT et. al. 2005, p.103). The wantedness of a pregnancy is affected by the number of living children. In Bangladesh 62 percent women with two living children and 90 percent of women with five living children desired to stop childbearing (NIPORT et. al., 2005, p. 102). Among the women who have two living children 64.3 percent of women used contraception and among the women who have more than four living children 62.4 percent used contraception in 2004 (NIPORT et. al. 2005, p.70). Nearly 5 percent of women with two living children wanted no more children and 80.8 percent of women with five living children wanted no more children in 2004 (NIPORT et. al., 2005, p. 101)**.** Among the sources of the family planning service, family planning fieldworkers and satellite clinics are two crucial elements. The family planning fieldworker provides information and education about family planning and contraception to married couples by

visiting their households. The satellite clinics are available in every community where both men and women can get knowledge about family planning and supply of contraceptives (NIPORT et. al., 2005, pp. 84-87).

3.5.2. Age at child birth

It is known from the literature review (see Section 3.1) that age at child birth is strongly related with chances of maternal deaths. Also, the onset of childbearing has a direct effect on fertility. Early initiation into childbearing lengthens the reproductive period and subsequently increases fertility. In Bangladesh age at child birth is strongly associated with socio-economic background of husband and wife (NIPORT et. al., 2005, p. 59).

Figure 3.3. A framework for analyzing the age at birth in Bangladesh



Women's age, husband's education, women's education and wealth index have been taken as socio-economic and demographic variables influencing age at child birth. Desired family size and previous pregnancy outcomes affect the use of contraception and outcomes of contraception, which in turn influence the age at child birth.

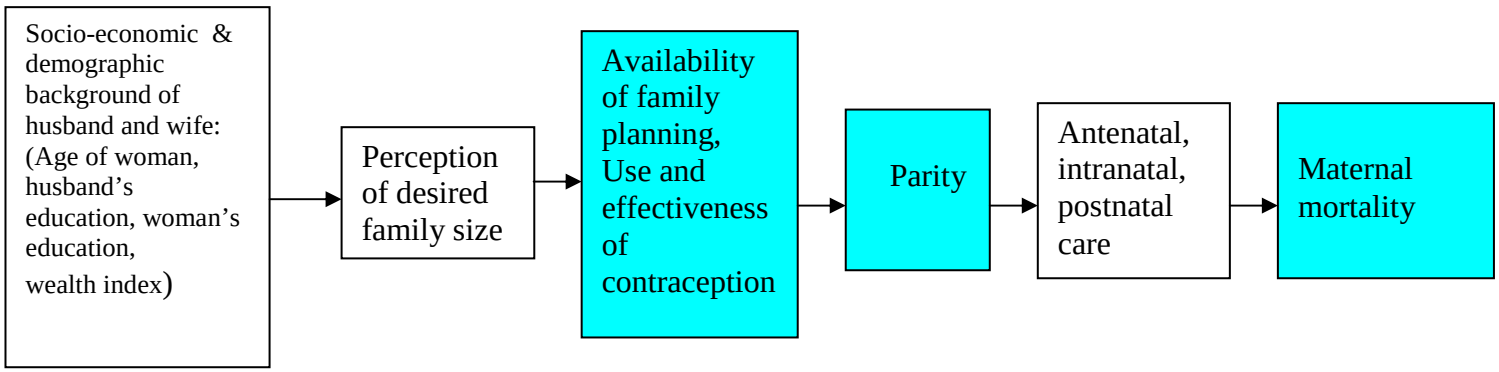
Perceptions about desired family size influences the timings of first and the last childbearing. A larger desired family size influences women to start childbearing early and continue childbearing until late in the reproductive age. In Bangladesh the mean ideal number of children is 2.2 for women aged under 20 and 2.3 for women aged 35-39. Among women aged under 20, 55 percent have already become a mother, and among these women only 35.6 percent use contraception (NIPORT et. al., 2005, p. 61).

In terms of family planning use, the status of contraception and effectiveness of contraception have been taken into account in this framework. The role of family planning in preventing a pregnancy is well recognized. Therefore, changing the perception about desired family size and changing the age at marriage is not enough for reducing maternal mortality, rather such changes need to be followed by use of family planning, which can change the age at child birth and in turn reduce maternal mortality.

3.5.3. Parity

High parity births are particularly risky for older women. It is also found in the literature review (Section 3.1) that high parity poses a greater risk of maternal death in Bangladesh. High parity women are more likely to refuse antenatal care and supervised delivery. Older, high parity women are at greater risks of maternal deaths due to biological factors. For example, postpartum haemorrhage is often caused by the failure of the uterus to contract adequately after delivery and close the blood vessels that feed the placenta. Repeated childbearing increases the risk that the uterus will not contract properly (Rinehart et. al., 1984). In Bangladesh socio-economic and cultural background and use of family planning affect parity. This framework (Figure 3.4) shows the relationship between parity and socio-economic and demographic backgrounds.

Figure 3.4. A framework for analyzing the relationship of parity with maternal mortality in Bangladesh



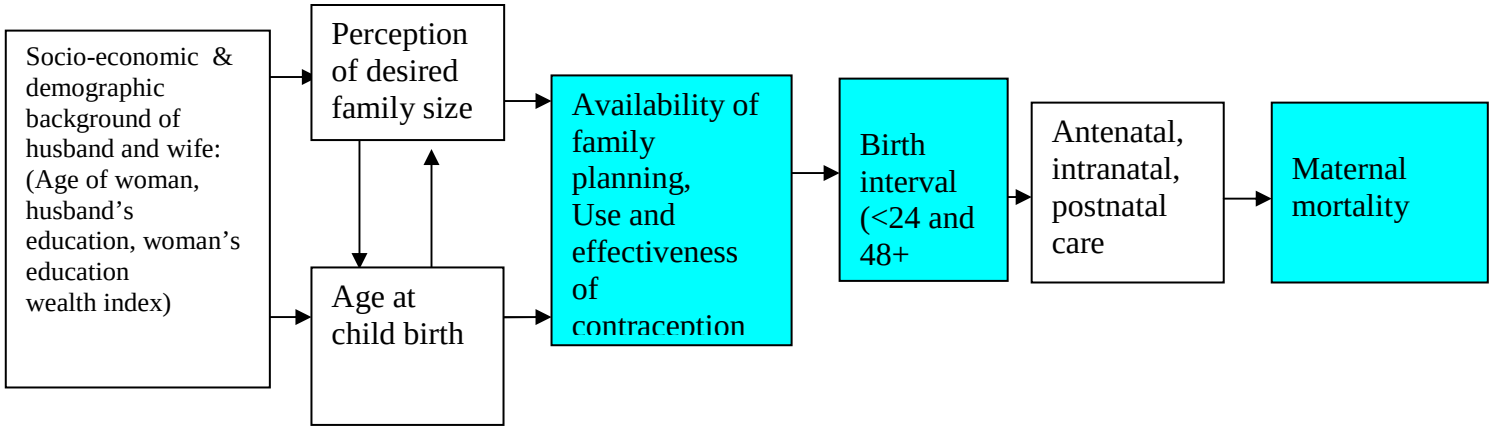
In this framework (Figure 3.4) women's age is considered as a demographic background variable and level of education of husband and wife and wealth quintile are considered as socioeconomic variables. In Bangladesh only 2.5 percent of the women desired only one child; among them 4.7 percent had no children (0 parity) and 0.8 percent had more than 4 parity. On the other hand, 21.3 percent of the women desired 3 children of whom 14 percent had have 0 parity and 27.1 percent had parity more than 4. The percentage of women desiring 4 children was 9.1 of whom only 6.1 percent had 0 parity and 17.6 percent had parity 4+ (NIPORT et. al., 2005, p. 108). Among the women who had parity 0 only 23.4 percent had used contraception and among women of parity 4+, 62.4 percent had used contraception in 2004 (NIPORT et. al., 2005, p. 70).

3.5.4. Birth intervals

Short intervals between births or pregnancies are risk factors of maternal mortality. A study in Latin America shows that both short (less than six months) and long (more than 59 months) interpregnancy intervals[24] are associated with increased risk of adverse maternal outcome (Conde-Agudelo & Belizan, 2000, p. 1257). Intervals between two pregnancies or two births are associated with socioeconomic background, fertility preference or perception about the value of children.

[24] Interpregnancy interval is defined as 'the time elapsed between the women's last delivery and the date of last menstrual period for the index pregnancy (Conde-Agudelo & Belizan, 2000).

Figure 3.5. A framework for analyzing birth intervals in Bangladesh



This proposed conceptual framework (Fig. 3.5) involving birth interval in Bangladesh includes women's age, husband's level of education, women's level of education, and wealth index as socio-economic factors. In Bangladesh women's age affects birth intervals. Among women aged under 20, 14.5 percent had short birth intervals (7-17 months) and among women aged 35+, nearly 52 percent had more than birth intervals of 48 months or more (NIPORT et. al., 2005, p. 58). However, both of these age groups carried high risk of maternal deaths, which are exacerbated by age (young age less than 20 years and older age more than 35 years).

3.6. Conclusion

The issue of maternal mortality is multi-faceted. Therefore, it requires a multidimensional approach to address the problem. The reduction of maternal mortality stipulates a broad range of issues, from socio-demographic and economic factors to formal health service factors. However, numerous maternal deaths are caused due to unsafe abortion following unwanted pregnancies. In this study, the center of attention on maternal mortality reduction is focused on preventing unwanted pregnancies through proper use of family planning. An extensive family planning program has to be accompanied by available, accessible and expectable services and information and effectiveness of the services to ensure safe pregnancy and childbirth.

However, few studies have been done to establish the role and strategic responses of family planning to avert maternal deaths in Bangladesh. Family planning has mainly been seen as a measure to reduce fertility and not as a

strategy for preventing maternal deaths. Therefore, a study on family planning as an intervention for reducing maternal mortality is needed.

Fertility is still relatively high among younger women in Bangladesh, which includes high adolescent fertility. Maternal mortality is high among older women. In Bangladesh there are many women who have an unmet need for family planning. There are numerous barriers to overcome in order to reach these women and provide them with family planning services. Some of these barriers are associated with service quality and service accessibility.

In relation to the conceptual framework it may be noted that the framework suggested in this chapter incorporates only the risk factors of pregnancy and factors influencing these risk factors. Therefore, theoretically it does not cover all aspects of maternal mortality or factors related to it. Rather this framework points to the role that family planning can play in reducing maternal mortality in Bangladesh.

World wide and country-specific strategies to reduce maternal mortality encompass a wide range of programs from small scale community interventions in the context of family planning in reproductive health and formal health programs. Although the Bangladesh government provides extended family planning services with an aim to reducing maternal mortality and improving maternal health (NIPORT et. al., 2005, p. 3), still there are gaps in the family planning services such as unmet need for family planning, and contraceptive failure... These gaps need to be closed so that women in

Bangladesh can enjoy a safe reproductive life with much reduced risks of maternal deaths.

CHAPTER FOUR
ANALYSIS OF THE RISK FACTORS OF MATERNAL MORTALITY IN BANGLADESH

In this chapter bivariate analyses has been carried out to examine the relationship of selected risk factors of maternal mortality in Bangladesh, such as wantedness of pregnancy, age at last child birth, parity and birth interval,

with the use of family planning, and selected demographic and socio-economic factors, as shown in the conceptual framework in Chapter Three.

4.1. Differentials in using family planning in relation to the risk factors of maternal mortality: results of a bivariate analysis

Various socio-economic and demographic factors are associated with the use of family planning. The purpose of this section is to analyze the relationship of the use status of family planning (never used and ever used) with the risk factors of maternal mortality. Only those demographic factors which are also risk factors of maternal mortality, namely age at child birth, birth intervals and parity have been taken into account to examine their association with family planning use. This is one of the objectives of this study.

The total number of respondents is 11,440. However, the total number of cases in the various tables do not match total number of respondents due to missing cases, or because each table is confined to the number respondents relevant for that particular variable. These are noted at the bottom of each table.

The use status of family planning refers here only to whether or not the respondents had ever used any method of contraception. Age at child birth refers to age of the respondent at the birth of her last child.

(a) Use status of contraception and age at last child birth

Table 4.1 shows that most of the women (71.14%) have given birth to their last child between the ages of 20 and 34 regardless of whether they have ever used contraception or not (see the row totals of Table 4.1). However, compared to the

ever users of contraceptives, larger proportions of women who have never used contraception have given birth to their last child in the high risk age groups of less than 20 or over 35 years. More specifically, of the women never using contraception, 24.5% had their last child born at ages 20 or below and 12.25% at ages 35 and above, making a total of 36.75% having had their last child born in the high risk age groups. In comparison, among the women who have ever used contraception, a smaller proportion (27.39%) had their last child born in these high risk age-groups. All, or a large proportion of these births may well have been “unwanted”. Women who have given their last births in their high risk age-groups should be encouraged to use family planning (or use it more effectively, for the ever users) in order to minimize the number of births in these high risk age-groups.

Table 4.1. Percentage of women according to use status of contraception and age at last birth in Bangladesh, 2004

Use status of contraception	Age at last child birth			Total
	<20	20-34	35+	
Never used	24.50	63.25	12.25	100.0 (1502)
Ever used	20.03	72.61	7.36	100.0 (8097)
All women	20.73	71.14	8.13	100.0 (9599)

Source: Computed by the author from the BDHS 2004 data set
Note: Figures in the parentheses in the Totals column show the number of women

(b) Use status of contraception and birth interval

Very short and long birth intervals are associated with increased risks of adverse outcomes for the health of mothers and children. Table 4.2 shows that among the women who have ever used contraception, more than one third (38.8%) have very long birth intervals (48+ months) and only 5.7% have short birth intervals (7-17 months). Another point worth noting in this table is that among the women who have never used contraception 38.8% have their last child within high risk birth intervals of the previous child (30.9% at 48+months and 7.9% at 7-17 months). Many of these children (at least those with birth intervals of 7-17 months) might have been "unwanted", because in Bangladesh births intervals are generally long with the median birth interval being 39 months (NIPORT et. al., 2005, p. 57).

Table 4.2. Percentage of women according to use status of contraception and birth interval in Bangladesh, 2004

Use status of contraception	Birth interval (months)					Total
	7-17	18-	24-	36-	48+	
Never used	7.9	11.4	31.4	18.5	30.9	100.0 (1186)
Ever used	5.7	9.7	25.4	20.4	38.8	100.0 (6807)
All women	6.0	10.0	26.3	20.1	37.6	100.0 (7993)

Source: Computed by the author from the BDHS 2004 data set
Note: Figures in the parentheses in the Totals column show the number of women. Data on birth intervals refer to women who have at least two children ever born.

(c) Use status of contraception and parity

There does not appear to be much difference between the never and ever users of family planning in terms of the proportions of women with high risk parities (Table 4.3). Nearly 30% of women among either the never users or the ever users of contraception have high risk parities of 4 and above. However, compared to the ever users of contraception, a larger proportion of the never users have parities less of than 3. This apparent anomaly may be explained by the possibility that the never users of contraception are younger than the ever users or because of short marital duration or ever users might have started using family planning after achieving parity 3 and over.

Table 4.3. Percentage of women according to use status of contraception and parity in Bangladesh, 2004

Use status of contraception	Parity			Total
	<3	3	4+	
Never used	56.29	12.89	30.83	100.0 (1622)
Ever used	48.11	22.24	29.64	100.0 (8407)
All women	49.44	20.73	29.83	100.0 (10029)

Source: Computed by the author from the BDHS 2004 data set
Note: Figures in the parentheses in the Totals column show the number of women

To sum up, the use of family planning is found to be associated with the risk factors of maternal mortality, notably with age at the birth of the last child and birth interval, and point to the need of emphasizing the use of family planning for better health of mothers.

4.2. Factors influencing the risk factors of maternal mortality: wantedness of the last pregnancy

Among the risk factors of maternal mortality, unwantedness of pregnancy is perhaps the most important factor that leads a large number of women to unsafe abortions, and consequently to death. However, since the present study deals with individual women as units of analysis, the indicator of childbearing used is whether the last pregnancy was wanted or not.

This section presents the results of an analysis on the relationship between wantedness of pregnancy and family planning and the major contributing factors of wantedness of pregnancy that have been found in the bivariate analysis through cross tabulations.

4.2.1. Immediate factors contributing to wantedness of last pregnancy: results of a bivariate analysis

In the conceptual framework given in Figure 3.2 of Chapter 3, it has been hypothesized that unwanted pregnancies may occur because of non-use of or failure of contraception. It would have been better if data were available about contraceptive use just before the last pregnancy to examine whether the unwanted pregnancy has been due to contraceptive failure. But such data are not available, therefore this analysis is based on "ever use of any method of contraception".

(a) Use status of contraception and wantedness of pregnancy

It can be seen from Table 4.4 that most women (68.3%) stated that their last child was "wanted". This is not unexpected, as it may be very difficult for a woman to describe any of her children as "unwanted". However, nearly one-third of all the women had reported that they had either wanted the last born child to be born later, or did not want another child. These two answers comprise 16.4% (wanting later) and 16.5% (not wanting another child). Broken down by contraceptive use, the proportion of women who had never used any contraception but had "wanted" their last child is large (81.3%), as it is to be expected, but even among these women, close to one-fifth (18.7%) had "not wanted" their last child (12.9% not wanting it then and 5.8% not wanting at all). This shows the extent of unmet need for contraception for this group of women. On the other hand, a larger proportion of women having ever used contraception (34.3%) had "not wanted" their last child, and close to two-thirds (65.7%) of these women had "wanted" their last child. The last category of women, i.e., who had ever used contraception and "wanted" their last child to be born then, probably consists of women who had stopped using contraceptives before their last pregnancy or had a contraceptive failure. The

most salient picture to emerge from this table is that overall, nearly a third of the women (31.7%) had not wanted their last child or wanted it later.

Table 4.4. Percentage of women according to use status of contraception and whether their last child was wanted, Bangladesh, 2004

Use status of contraception	Wantedness of the last child				Total
	Wanted then	Unwanted		Total "unwanted"	
		Wanted later	Did not want at all		
Never used	**81.3**	12.9	5.8	**18.7**	100.0 (876)
Ever used	**65.7**	17.1	17.2	**34.3**	100.0 (4490)
All women	**68.3**	16.4	15.3	**31.7**	100.0 (5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses in the Totals column denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

4.2.2. Demographic and socio-economic factors contributing to wantedness of last pregnancy: Results of a bivariate analysis

From the conceptual framework as presented in Chapter 3, some socio-cultural factors have been chosen to examine their association with wantedness of pregnancy in Bangladesh. The demographic factors comprise age at marriage and age of women at last child birth.

(a) Age at child birth and wantedness of the last pregnancy

A strong relationship between age at child birth and wantedness of the last child is shown in Table 4.5. Almost one fourth (23.59%) of the women giving birth to their last child before the age of 20 years wanted to have their last born child later (a small proportion did not want it), but a large majority of these women (76.4%) had said that they had wanted the child then. This implies that most of women wanted to have their children before the age of 20 which is risky for both mother and child.

The percentage of women stating that their last born child was not wanted (i.e., wanted later and not wanted all) increases as age at last child birth increases, with more than half (56.84%) of the of the women having their last child at ages above 35 stating that their last child was unwanted (Table 4.5). Probably these women did not use contraception before their last child or had contraceptive failure.

Table 4.5. Percentage of women according to age at last child birth and whether their last child was wanted, Bangladesh, 2004

Age at last birth	Wantedness of the last child				Total
	Wanted then	Unwanted		Total unwanted	
		Wanted later	Did not want at all		
<20	**76.4**	23.0	0.6	**23.6**	**100.0 (1395)**
20-35	**67.3**	15.2	17.5	**32.7**	**100.0 (3414)**
35+	**43.2**	3.0	53.8	**56.8**	**100.0 (336)**
All women	**68.2**	16.5	15.3	**31.8**	**100.0 (5145)**

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

(b) Age at marriage and wantedness of the last pregnancy

Almost a similar relationship can be found in Table 4.6 which shows that a large proportion of women (67.6%), who got married at an early age (less than 20 years), had wanted their last child. A small proportion of women (32.4%) marrying early had not wanted their last child. More than a fifth (22.6%) of the women marrying at ages between 20 and 34 years had not wanted their last child then or ever. There were only two women who had got married at aged

above 35 years and both of them had wanted their last child when it was born.

These two variables (age at marriage and age at last child birth) have a strong relationship with wantedness of the last child. It indicates that in Bangladesh age at marriage and age at child birth need to be high to delay childbearing or to stop childbearing. Practice of family planning is the obvious tool for delaying child bearing and messages from family planning programs can help increase the age at marriage.

Table 4.6. Percentage of women according to age at marriage and whether their last child was wanted, Bangladesh, 2004

Age at marriage	Wantedness of the last child				Total
		Unwanted			
	Wanted then	Wanted later	Wanted no more	**Total unwanted**	**Total**
<20	**67.6**	16.4	16.0	**32.4**	100.0 (4996)
20-34	**77.4**	15.8	6.8	**22.6**	100.0 (368)
35+	**100.0**	0.0	0.0	**0.0**	100.0 (2)
All women	**68.2**	16.4	15.3	**31.8**	100.0(5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

(c) Fertility preference and wantedness of the last pregnancy

A similar relationship has been found between fertility preference (whether wanted more children) and wantedness of the last child. More than four-fifths (81.81%) of the women wanting another child stated that their last born child was “wanted” (Table 4.7). The percentage of women stating that their last child was unwanted (wanted later and or not wanted at all) increases according to whether the women wanted to have another child or wanted to have no more children (18.18% compared to 41.7%). It is interesting to note that more than three-fourths (78.23%) of the women who were undecided about their future fertility stated that their last child was “wanted”. Overall, more women (68.54%) stated that their last child was “wanted”. However, the large percentage of women (31.45%) who stated that their last child was “not wanted” indicates the need for emphasizing family planning to prevent such “unwanted” births.

Table 4.7. Percentage of women according to fertility preference and whether their last child was wanted, Bangladesh, 2004

Whether wanted more children	Wantedness of the last child		Total
	Wanted	Unwanted	
Have another	81.81	18.18	100.0 (2106)
Have no more	58.29	41.70	100.0 (2887)
Undecided	78.23	21.76	100.0 (170)
All women	68.54	31.45	100.0 (5163)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

(d) Number of children ever born and wantedness of the last pregnancy

A very strong relationship exists between the number of children ever born and wantedness of the last child (see Table 4.8). It can be seen that nearly one half of the women having had more than three children ever born stated that their last born child was “unwanted” births. Overall, a little more than 30% of the last children were unwanted by the women, which further emphasizes the need for family planning..

Table 4.8. Percentage of women according to number of children ever born and whether their last child was wanted, Bangladesh, 2004

Number of children ever born	Wantedness of the last child		Total
	Wanted	Unwanted	
<3	75.6	24.4	100.0 (3842)
3+	49.7	50.3	100.0 (1524)
All women	68.2	31.8	100.0 (5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

(e) Outcome of previous pregnancy and wantedness of the last pregnancy

Table 4.9 shows the distribution of women whose previous to the last pregnancy had not ended in a live birth and the wantedness of their last child. When the premature termination of the previous to last pregnancy was spontaneous (such as through still birth or miscarriage) more than 75% of the women had "wanted" their last child, but when the premature termination of their previous to last pregnancy was deliberate (such as through menstrual regulation or abortion), a much smaller percentage of the women (between 50% and 60%) "wanted" their last child. Overall, among all women whose previous pregnancy termination was premature, 71% had wanted their last child and 30% did not want, but among those women who had resorted to menstrual regulation or abortion to end their previous to last pregnancy, between 40% and 50% had not wanted their last child (Table 4.9). Such a high percentage of unwanted child birth could have been avoided if these women had made proper use of family planning.

Table 4.9. Percentage of women according to the outcomes of the previous to last pregnancy and whether their last child was wanted, Bangladesh, 2004

Previous pregnancy outcomes	Wantedness of the last child		Total
	Wanted	Unwanted	
Stillbirth	77.22	22.78	100.0 (180)
Miscarriage	76.51	23.49	100.0 (298)
Menstrual Regulation	58.33	41.67	100.0 (168)
Abortion	51.06	48.94	100.0 (47)
All women	70.56	29.44	100.0 (693)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women whose previous pregnancy outcome had not ended in a live birth

(f) Education and wantedness of the last pregnancy

Education influences various aspects of human life. However, in the case of Bangladesh, the survey data do not show much influence of education on the wantedness of the last children. The number of women for whom the last child was unwanted is the same for women with no education, primary education or secondary education. Like wife's education husband's education also does not have much influence on the wantedness of the last child (the tables are not shown here, see Appendix, Table A.1 and A.2). This lack of influence of wife's or husband's education on the wantedness of the last child may be due to the influence of other factors such as desired family size, lack of self decision making power or other cultural factors.

(g) Desired family size and wantedness of the last pregnancy

Desired family size is another fertility preference factor that may have influenced the wantedness of the last child birth. As the desired family size increases, the proportion of women with "unwanted" last child birth also increases (Table 4.10). Almost equal percentages of women in each category

of desired family size had wanted their last child later than when it was born, but the main differentiating factor among the three categories of desired family size is whether they "wanted no more" children. For example, among women with a desired family size of less than 2, less than 1% had not wanted more children, but among women with desired family sizes of 2-3 or 4+ children, 40% had stated that they did not want more children. This also shows that numeracy about desired fertility has a strong influence on the wantedness of the last child. Numeracy about children or a clear notion about what one's family size should be brings about a change in mentality that leads to fertility limitation (van de Walle 1992), and therefore to firm opinions about whether the last child was wanted or not. The large percentage of women of higher desired family sizes "not wanting" their last child may indicate unmet need for family planning and or sexual coercion or violence; or perhaps the last child was not of the desired sex.

Table 4.10. Percentage of women according to desired family size and whether their last child was wanted, Bangladesh, 2004

Desired family size	Wantedness of the last child				Total
	Wanted then	Did not want		Total "unwanted"	
		Wanted later	Did not want at all		
<2	81.8	17.4	0.8	18.2	100.0 (4619)
2-3	59.4	15.8	24.8	40.6	100.0 (553)
4+	60.1	16.8	23.1	39.9	100.0 (194)
All women	68.2	16.4	15.4	31.8	100.0 (5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

(h) Wealth index and wantedness of the last pregnancy

Proportionately fewer women belonging to the richer wealth quintiles stated that their last child was unwanted compared to women belonging to the poorer wealth quintiles (Table 4.11). For example, between 28 and 30 percent of women belonging to the richest and the richer wealth quintile thought their last child was unwanted, whereas between 33 and 34 percent of the women belonging to the middle, poorer and the poorest wealth quintiles thought their last child was unwanted. An interesting aspect of Table 4.11 is that while the percentage of women wanting their last child later increases with increasing wealth, the percentage of women wanting no more children declines with increasing wealth. Thus, the patterns of spacing (wanted later) and stopping (wanted no more) with respect to wealth are in contrast with each other. Probably the poorer women already had sufficiently large family sizes and therefore, were more inclined to stop further child bearing, while the richer women were more interested in spacing their children. In either case, the fact that such large proportions of women (between 28 and 34 percent) in the

various wealth quintiles had their last child when they did not really want them indicates that these proportions of women were in need of family planning and their needs had remained unmet.

Table 4.11. Percentage of women according to wealth index and wantedness of the last child, Bangladesh, 2004

Wealth index (Quintile)	Wantedness of the last child				Total
	Wanted then	Did not want		Total "unwanted"	
		Wanted later	Wanted no more		
Poorest	66.1	15.2	18.7	33.9	100.0(1167)
Poorer	66.7	15.2	18.1	33.3	100.0 (1017)
Middle	66.6	17.9	15.5	33.4	100.0 (990)
Richer	70.1	17.0	12.9	29.9	100.0 (989)
Richest	71.5	17.0	11.5	28.5	100.0 (1203)
All women	68.2	16.4	15.4	31.8	100.0 (5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

To sum up, in Bangladesh socio-economic and demographic factors have been found to have an association with wantedness of the last pregnancy. In all cases, and from whichever demographic or socio-economic perspective one looks at it, about a third of the women had stated that their last pregnancy/last child was unwanted, either in terms of timing or in terms of stopping child bearing. As mentioned previously, women with unwanted pregnancies have a propensity to resort to abortion leading to high risks of maternal mortality. These unwanted pregnancies could have been prevented with proper use of family planning, thereby reducing the potential risk of unsafe abortions and maternal mortality.

4.3. Factors associated with age at child birth: results of bivariate analysis

This section is devoted to analyzing the relationship of age at child birth with socio-cultural and economic factors. A discussion of the association of some socio-cultural and economic factors is presented in Chapter Three. In this chapter, the relationship of age at child with the socio-economic and cultural variables discussed in Chapter Three has been analyzed. Here wantedness of pregnancy and level of education for both husband and wife have been selected as socio-cultural factor factors and wealth quintile as an economic factor.

(a) Wantedness of the last child and age at last child birth

A strong relationship between age at child birth and wantedness of pregnancy can be observed in Table 4.12 Overall, one third of the women (31.8%) stated that their last born child was unwanted. The percentage of women stating their last born child to be unwanted increases as the age at child birth increases. Almost one fourth of the women giving birth to most recent child at ages less than 20 had stated their last born child was unwanted, while more than one half of the women giving birth to their most recent child stated that their last child was unwanted. Most of the women with younger age at last child birth might have wanted to have their children later and most of the women with the older age at last child birth might have wanted to stop further child bearing. Apart from wantedness, early age at marriage or other cultural variables might have influenced the women to have children before the age of age 20 years. Age at marriage has a very strong relation with age at last birth (see Appendix, Table A.3). However, early marriage is culturally embedded in Bangladesh society, therefore to help prevent unwanted pregnancies, especially at the younger ages, family planning appears to be the most effective measure

instead of trying to delay marriages.

Table 4.12. Percentage of women according to at age last child birth and wantedness of the last child, Bangladesh, 2004

Age at last child birth	Wantedness of the last child		Total
	Wanted	Unwanted	
<20	76.4	23.6	100.0 (1395)
20-34	67.3	32.7	100.0 (3414)
35+	43.2	56.8	100.0 (336)
All women	68.2	31.8	100.0(5145)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

It has been found through cross tabulations based on the BDHS 2004 data (NIPORT et. al., 2005) that apart from wantedness of pregnancy, other socio-cultural and economic factors such as wife's and husband's education, desired family size and wealth index do not much effect on age at last child birth (the tables are not shown here, see Appendix, Table A.4-A.7).

4.4 Factors contributing to parity: results of a bivariate analysis

This section analyses the relationship between parity and selected variables as discussed in the conceptual framework on parity in Chapter Three. From the conceptual framework some socio-economic factors have been chosen to examine their association with parity in Bangladesh. The demographic factor comprises women's age at last child birth.

It is found from literature review (see Chapter Three) both very low and high parities are associated with high risks of maternal deaths. In Bangladesh,

parity is associated with wantedness of pregnancy. Table 4.13 shows that, similar to the relationship of age at last child birth and wantedness of the last child, the percentage of women stating their last child as unwanted increases as women's parity increases. A large percentage of women of high parities with unwanted pregnancies indicates a lack of family planning services. For high parity women unwanted pregnancies may happen due to not using contraception (see Table 4.3).

Table 4.13. Percentage of women according to parity and wantedness of the last child, Bangladesh, 2004

Parity	Wantedness of the last child		Total
	Wanted	Unwanted	
<3	78.9	21.2	100.0 (3129)
3	60.7	39.3	100.0 (968)
4+	45.2	54.8	100.0 (1196)
All women	68.0	32.0	100.0 (5293)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women
Data refer to women who had a live birth in the last five years preceding the survey

There is also a significant relationship between desired family size and parity, implying that as the desire for large family increases, parity also increases (see Appendix Table A.8), further confirming the theory of numeracy and fertility of van de Walle (1992) referred to earlier.

4.5. Factors contributing to birth intervals: results of a bivariate analysis

(a) Birth interval and wantedness of the last child

Short births intervals comprise another risk factor of maternal mortality. It may be hypothesized that children with very short and very long birth intervals are unwanted. From Table 4.14 it can be seen that the shorter the birth interval, the larger is the percentage of women stating that their last child was

unwanted.

4.14. Percentage of women according to birth interval and wantedness of last child, Bangladesh, 2004

Birth interval (months)	Wantedness of the last child		Total
	Wanted	Unwanted	
7-17	44.9	55.1	100.0 (234)
18-23	48.1	51.9	100.0 (339)
24-35	56.2	43.8	100.0 (914)
35-47	63.5	36.5	100.0 (772)
48+	69.4	30.6	100.0 (1540)
All women	61.6	38.4	100.0 (3799)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

(b) Fertility preference and birth interval

A strong relationship between fertility preference and birth intervals has been found to exist in Bangladesh (Table 4.15). The women who did not want any more children is nearly same for birth interval category 24-35 (31.6) and 48+ (31.2) and it is larger than same category of women who wanted to have another children. It indicates that a large number of women want to stop childbearing and they need family planning to do so.

Table 4.15. Percentage of women according to whether wanted more children and birth intervals, Bangladesh, 2004

Fertility preference	Birth intervals (months)					Total
	7-17	18-23	24-35	36-47	48+	
Have one	8.3	10.4	28.1	22.4	30.7	100.0 (1080)
Undecided	5.6	9.6	24.4	19.6	40.8	100.0 (5416)
No more	6.0	11.0	31.6	20.2	31.2	100.0 (1497)
All women	6.0	10.0	26.3	20.1	37.6	100.0 (7993)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

To sum up, along with other factors, there is a notable relationship between the risk factors of maternal mortality with wantedness of pregnancy and family planning. The majority of the women with birth intervals shorter than 24 months (a high risk pregnancy condition) had borne unwanted children. This warrants a strong promotion of family planning to avoid unwanted pregnancies at a high risk. The results of bivariate analysis show the extreme importance of family planning in reducing unwanted pregnancies therefore maternal deaths. Although age at marriage has also been found it is significantly associated with early age at birth. This suggests that further

importance must be given on increasing the age at marriage. Increased age at first marriage would naturally lead to increased age at first childbirth. It could be easier to change the age of first child birth that change the age of marriage. So, in that case, promotion of contraception can help make the change.

The following chapter (Chapter 5) is devoted to multivariate analyses of wantedness of pregnancy and antenatal care. In the concluding chapter (Chapter Six), the findings of this chapter have been discussed in conjunction with the findings of other studies.

CHAPTER FIVE
MULTIVARIATE REGRESSION ANALYSIS OF SELECTED FACTORS CONTRIBUTING TO MATERNAL MORTALITY

This chapter discusses the results of multivariate analyses of factors influencing (i) wantedness of pregnancy, (ii) receiving antenatal care (ANC) and (iii) the frequency of ANC visits.

Seeking antenatal care and the frequency of ANC visits are recognized as crucial factors in reducing maternal mortality (WHO 2004). Therefore, these have been chosen as indicators of maternal health. Further, there is a relationship between wantedness of pregnancy and seeking antenatal care.

In Chapter Four, the relationship of each socio-demographic variable with each of the risk factors of maternal mortality, namely wantedness of the last pregnancy, parity, age at child birth and birth interval has been discussed. However, these socio-demographic factors do not act alone in influencing the risk factors of maternal mortality; rather they act simultaneously. Therefore, a multivariate approach is needed to study the simultaneous influence of the socio-demographic variables on the risk factors of maternal mortality. Since wantedndess of a pregnancy determines a woman's willingness to seek antenatal care and make the minimum required number of antenatal visits, the

ensuing multivariate analysis is focused on the three crucial variables, mentioned at the beginning of this chapter, as dependent variables. The independent variables selected for the multivariate analysis are those that have been found to exhibit noteworthy relationships the dependent variables. It may be mentioned that antenatal care and the frequency of antenatal care visits have not been included in the bivariate analysis carried out in Chapter 4 because of their obvious link with maternal mortality.

Since each of the three dependent variables can have one of two values, i.e., whether or not each of the three events mentioned above had taken place, a logistic regression analysis is considered to be the most appropriate multivariate analysis, which calculates the odds of each event happening with respect to the selected independent variables. The logistic regression analysis has been carried out using SPSS version 14.0.2. The values of each dependent variable are as follows:

Wantedness of pregnancy: 1 = Wanted; 2 = Unwanted
Antenatal care (ANC): 0 = Received ANC; 1 = Did not receive ANC
Number of ANC visits: 1 = Less than 3; 2 = 3 or more

5.1. Factors influencing wantedness of pregnancy: results of logistic regression analysis

It is reasonable to assume that women of high parities (i.e., parity 4 and above) might consider their last child as “unwanted”. Similarly, women who had achieved their desired family size (even at parities less than 4) might also consider their last child as “unwanted” (or unexpected).

Regarding fertility preference, women who had stated that they wanted one more child would be inclined to consider their last child as “wanted”. But those women who were “undecided” about whether they wanted to have one more child, the probability of their last child being “wanted” or “unwanted” would be equal.

Wantedness of pregnancy is affected by several socio-demographic factors simultaneously. Table 5.1 shows the odds of unwantedness of the last pregnancy (or last child) with respect to the selected variables.

It is found that, compared to the women who gave birth to their last child at ages 35 and above, women who gave birth to their last child at ages less than 20 had greater odds (1.3 times greater) of not wanting their last child, but women who gave birth to their last child at ages between 20 and 34 had smaller odds (0.6 times smaller) of not wanting their last child. It indicates that under age mothers carry at least two risks of maternal death, one on account of their very young age and the other on account of not having wanted their last pregnancy.

Regarding parity, compared to women of parity 4 and above, the odds of unwantedness of the last child for women with parities 3 or less than 3 are much smaller. This is expected in view of the fact that the average desired family size in Bangladesh is 2 (NIPORT et. al., 2005, p. 107).

Compared to birth intervals of 48 months or more, the odds of not wanting the last child are higher for women with birth intervals of less than 48 months. In fact, the odds increase as the length of birth interval decreases, being the highest for birth intervals of 7-17 months. Women of Bangladesh might not like to have children at such short intervals, even at a fairly high level of fertility that prevails in the country.

Compared to women who have ever used contraception, the odds of not wanting the last child are smaller (almost half) for women who have never used contraception. This may be because women who have never used contraception did so because they wanted to have a child.

Compared to women who desired three or more children, the odds of not wanting the last child are much greater for women who desired 3 or fewer children. This is to be expected as women with smaller desired family sizes would consider any child born in excess of their desired family size as unwanted.

Women who were married young (at ages less than 20 years) have greater odds of not wanting the last child compared to women who were married at more mature ages of 20-34 years. In a high fertility country such as Bangladesh, where traditional norms prevail in most of the population women marrying early might also be expected to bear children early. But the women

themselves might not be prepared for early child birth and hence would be more likely to state that the (last) child was not wanted.

Compared to women preferring to have no more children, women preferring to have one more child or being undecided about another child, had much smaller odds of not wanting the last child. The smaller odds of not wanting the last child by those women who, in fact want to have one more child is quite expected. However, the smaller odds of not wanting the last child by the undecided group of women may also be expected because such women, by the very nature of their undecidedness, would not regard the last child as unwanted.

Women who had a spontaneous premature termination of the previous to last pregnancy from stillbirth and miscarriage have about 50 percent smaller odds of not wanting the last pregnancy compared to women who had resorted to abortion. Women who had terminated their previous to last pregnancy by menstrual regulation had almost equal odds of not wanting their last child compared to the reference group (women who had abortion), as menstrual regulation is an induced method of pregnancy termination as is abortion.

In terms of economic status, in comparison to the richest women, the poorer women exhibited smaller odds of not wanting their last child. This is expected as poorer women prefer to have larger families than wealthier women.

The main findings of the above analysis are that young age at child birth (less than 20 years), high parity (4+), short birth intervals (less than 48 months, and in particular less than 35 months) and young age at marriage (less than 20 years) are associated with high odds of having unwanted children, which in turn are high risk factors of maternal mortality. Family planning and related programs can play crucial roles in raising the ages at marriage and child birth, limiting the parity and in lengthening the birth intervals.

Table 5.1. Estimates of the coefficients, odds ratios and 95% confidence intervals obtained from binary logistic regression of socio-demographic factors on wantedness of last child, Bangladesh, 2004.

Variables	β	Odds ratio	95.0% Confidence interval	
			Lower	Upper
Age at last birth (reference: 35+)				
<20	0.321	1.378	0.413	4.604
20-34	-0.479	0.619	0.264	1.451
Parity (reference: 4+)				
<3	-1.775	0.169	0.089	0.323
3+	-0.853	0.426	0.241	0.754
Birth intervals (reference: 48+)				
7-17	1.728	5.631	2.306	13.748
18-23	1.120	3.066	1.112	8.457
24-35	1.058	2.880	1.565	5.297
36-47	0.555	1.743	0.978	3.104
Ever used contraception (reference: ever used)				
Never used	-0.605	0.546	0.248	1.203
Desired family size (reference: 4+)				
<2	0.800	2.226	0.693	7.152
2-3	1.128	3.088	0.874	10.919
Age at marriage(reference: 20-34)*				
<20	0.571	1.771	0.611	5.134
Fertility preference (reference: have no more)				
Have one	-1.499	0.223	0.074	0.676
Undecided	-1.272	0.280	0.102	0.768
Previous pregnancy outcomes (reference: Abortion)				
Stillbirth	-0.691	0.501	0.196	1.284
Miscarriage	-0.805	0.447	0.185	1.079
Menstrual regulation	0.090	1.094	0.440	2.719
Wealth index (reference: richest)				
Poorest	-1.117	0.327	0.161	0.666
Poorer	-0.149	0.861	0.418	1.776
Middle	-0.543	0.581	0.287	1.176
Richer	-0.613	0.542	0.268	1.094
Constant	1.139	3.122		

Source: computed by author from BDHS 2004 data set

* It is found from the data that before the survey among the respondents no marriage has been occurred at age over 35

5.2. Factors influencing the receipt of antenatal care (ANC) and the number of ANC visits: results of logistic regression analysis

The dependent variables in this case are whether women had received antenatal care during their last pregnancy and whether the women had made the required number of antenatal care visits during their last pregnancy (less than 3 or 3 and more).

The probability of receiving antenatal care and the frequency of antenatal care visits are influenced by various socio-economic and demographic variables. If women desire for a certain number of children they might avail of antenatal care for all pregnancies that would give them their desired family size. It is expected to receiving antenatal care if further child is preferred. Antenatal care costs some money so poorer household have less chance to receive antenatal care in comparison to richer household.

a) Factors contributing to receiving antenatal care: results of a multivariate analysis

Table 5.2 shows the results of logistic regression analysis of socio-demographic factors on whether or not the women received antenatal care (ANC) in Bangladesh, 2004.

Compared to women whose last child was unwanted, the odds of not receiving ANC during the last pregnancy were l.6 times higher for women whose last child was wanted (Table 5.2). This is a rather surprising finding given that

women with wanted pregnancies would be more likely to seek antenatal care than women with unwanted pregnancies. In fact, a bi-variate analysis shows that a slightly higher percentage of women with wanted pregnancies did receive antenatal care than women with unwanted pregnancies (Table 5.3). This anomaly needs further investigation. The odds of having received ANC for women with younger ages at child birth (less than 20 years and 20-34 years) was lower than the odds of receiving ANC by women whose age at child birth was 35 years or more. The reason may be that with increasing age at child birth, women may think that they have had enough experience of child birth and therefore do not need ANC.

The odds of having received ANC during the last pregnancy appear to be lower for women with parities of 3 or less than 3 compared to the odds of having received ANC for women with parities 4 and more. Again, the reason may be that with increasing parity, women may think that they have had enough experience of child birth and therefore do not need ANC.

Regarding birth intervals, women with a birth interval of 18-23 months have higher odds of having received ANC during their last pregnancy compared to women with a birth interval of 48 months or more, but the odds of having received ANC during the last pregnancy were almost 4 times less for women with a birth interval of 7-17 months, 1.6 times less for 24-35 months and 2 times less for 36-37 months.

Compared to the women who had ever used contraceptives, women who had never used contraceptives had nearly 2 times more likelihood of not having received ANC during their last pregnancy. Here is a direct link between the use of family planning and the likelihood of receiving ANC.

The odds of having received antenatal care during the last pregnancy are also influenced by the desired family size. Women desiring larger family sizes have higher odds of not having received ANC during their last pregnancy.

With respect to age at marriage, women marrying young (i.e., at ages below 20 years) exhibit higher odds of not having received ANC during their last pregnancy compared to women marrying at age 20-34 years.

In comparison to women who did not want to have any more children, women wanting one more child or those undecided about their desire for additional children exhibit much higher odds of having received ANC during their last pregnancy. This may be because these women have made a conscious choice about their future fertility and therefore were inclined to receive health care during their pregnancy.

Women whose previous to the last pregnancy was terminated involuntarily (i.e., still birth or miscarriage) had higher odds of having received ANC during their last pregnancy compared to women who had terminated their previous to

last pregnancy voluntarily (i.e., through abortion). But a surprising finding is that a voluntary termination of the previous to the last pregnancy by menstrual regulation had much higher odds of having received ANC during their last pregnancy compared to the odds for women who had opted for abortion to terminate their previous to last pregnancy.

In terms of economic status, women in the poorest to the richer wealth quintiles exhibit much higherr odds of not having received ANC during their last pregnancy compared to women in the richer wealth quintile. A reason for this may be that antenatal care is cost related..

Table 5.2. Estimates of the coefficients, odds ratios and 95% confidence intervals obtained from binary logistic regression of socio-demographic factors on the receipt of antenatal care, Bangladesh, 2004

Variables	β	Odds ratio	95.0% Confidence interval	
			Lower	Upper
Wantedness of the last child(reference: unwanted				
Wanted	.475	1.608	.980	2.638
Age last child birth (reference: 35+)				
<20	-.671	.511	.150	1.743
20-34	-.875	.417	.170	1.022
Parity (reference: 4+)				
<3	-.123	.884	.477	1.638
3+	-.129	.879	.493	1.567
Birth_intervals (months) (reference: 48+)				
7-17	1.369	3.930	1.609	9.597
18-23	-.334	.716	.265	1.933
24-35	.478	1.613	.889	2.926
36-47	.735	2.085	1.191	3.648
Age marriage (reference:20-34)*				
<20	.407	1.502	.503	4.481
Desired family size (reference: 4+)				
<2	-.330	.719	.253	2.047
2-3	-.148	.862	.270	2.750
Fertility preference (reference: have no more)				
Have one	-.956	.384	.129	1.146
Undecided	-.403	.669	.247	1.809
Ever used contraception (reference: ever used)				
Never	.661	1.936	.949	3.949
Previous pregnancy outcomes (reference: Abortion)				
Stillbirth	-.091	.913	.365	2.286
Miscarriage	-.313	.731	.308	1.739
Menstrual regulation	-.559	.572	.228	1.436
Wealth index (reference: richest)				
Poorest	2.081	8.013	3.798	16.905
Poorer	2.261	9.591	4.381	20.996
Middle	1.277	3.587	1.686	7.635
Richer	1.154	3.171	1.482	6.785
Constant	-.819	.441		

Source: computed by author from BDHS 2004 data set

* It is found from the data that before the survey among the respondents no marriage has been occurred at age over 35

Table 5.3. Percentage of women by wantedness of the last child and whether of received antenatal care, Bangladesh, 2004

Wantedness of the last child	Antenatal care		Total
	Received some care	Received no care	
Wanted	58.9	41.1	100.0 (3660)
Unwanted	55.3	44.7	100.0 (1075)
All women	57.8 (3100)	42.2 (2265)	100.0 (5365)

Source: Calculated from BDHS 2004 dataset
The parentheses indicate numbers of women

b) Factors contributing to the number of antenatal visits: results of a multivariate analysis

The logistic regression shows considerable differences by various characteristics, in the odds ratios of making the required number of 3 or more ANC visits (Table 5.4).

In Bangladesh, women whose last pregnancy was wanted had lower odds of making 3 or more ANC visits compared to women whose last pregnancy was unwanted. Again, like the odds ratios of receiving ANC, this is a surprising finding and in fact a bi-variate analysis (Table 5.5) shows that a slightly higher percentage of women with wanted children did make 3 or more ANC visits compared to women with unwanted children. This anomaly needs further investigation because generally, women with wanted children would make the recommended number of antenatal visits (3 or more) to ensure a safe pregnancy and delivery. Age at child birth has been found to have a strong influence on the number of ANC visits. Women with younger ages at last

child birth (i.e., ages less than 20 and 20-34 years) had much higher odds of making 3 or more ANC visits compared to women whose age at last child birth was 35 years or more.

Parity does not appear to make much difference in the odds of making 3 or more ANC visits, but birth interval does. Women with birth intervals of less than 48 months exhibit much lower odds of making 3 or more ANC visits compared to women with birth intervals of 48 months or more.

There does not appear to be any difference in the odds of making 3 or more ANC visits with respect to contraceptive use. However, desired family size appears to have a strong influence on the odds of making 3 or more ANC visits. Compared to the women whose desired family size is 3 or more, women with desired family sizes of less than 2 or between 2 and 3 have much higher odds of making 3 or more ANC visits. Age at marriage and fertility preference also exhibit strong influence on the odds of making 3 or more ANC visits. Premature termination of the previous to the last pregnancy is associated with lower odds of making 3 or more ANC visits. In terms of wealth index, a strong association is found with the number ANC visits. Compared to the wealthiest women, all other women exhibit much lower odds of making 3 or more ANC visits. An interesting finding is that the odds of making 3 or more ANC visits is almost the same for all but the richest women.

Table 5.4. Estimates of the coefficients, odds ratios and 95% confidence intervals obtained from binary logistic regression of socio-demographic factors on frequency of antenatal care visits, Bangladesh, 2004

Variables	β	Odds ratio	95.0% Confidence interval	
			Lower	Upper
Wanted last child (reference: unwanted)				
Wanted	-.357	.700	.364	1.344
Age at last child birth (reference: 35+)				
<20	1.103	3.015	.541	16.795
20-34	.419	1.521	.416	5.561
Parity (reference: 4+)				
<3	.041	1.042	.451	2.406
3	-.287	.751	.343	1.644
Birth intervals (reference: 48+)				
7-17	-.612	.542	.133	2.204
18-23	-.482	.617	.196	1.940
24-35	-1.198	.302	.127	.720
36-47	-.682	.506	.239	1.069
Use of contraception(reference: ever used)				
Never used	-.035	.966	.325	2.869
Desired family size (reference: 3+)				
<2	1.331	3.786	.644	22.253
2-3	.924	2.519	.383	16.556
Age at marriage(reference: 20-34)*				
<20	.146	1.157	.341	3.922
Fertility preference (reference: have no more)				
Have one	1.158	3.185	.677	14.980
Undecided	.613	1.846	.466	7.316
Previous pregnancy outcomes (reference: Abortion)				
Stillbirth	-.106	.899	.242	3.338
Miscarriage	-.230	.794	.231	2.729
Menstrual regulation	-.350	.705	.201	2.474
Wealth index (reference: richest)				
Poorest	-1.152	.316	.127	.789
Poorer	-1.706	.182	.065	.503
Middle	-1.535	.215	.093	.501
Richer	-1.454	.234	.108	.506
Constant	-.599	.549		

Source: computed by author from BDHS 2004 data set. * It is found from the data that before the survey among the respondents no marriage has been occurred at age over 35

Table 5.5. Percentage of women by wantedness of the last child and number of antenatal visits, Bangladesh, 2004

Wantedness of the last child	Number of antenatal visits		Total
	Less than 3	3 or more	
Wanted	46.2	53.8	100.0 (2158)
Unwanted	54.0	46.0	100.0 (943)
All women	48.6 (1507)	51.4 (1594)	100.0 (3101)

c Source: computed from DHS 2004 dataset
The parentheses indicate numbers of women

To sum up, wantedness of pregnancy has been found to be associated with all the selected variables, for example, age at birth, parity, desired family size, and fertility preference, use status of contraception and wealth index. On the other hand, the risk factors of pregnancy have a strong association with the probability of receiving antenatal care and with making 3 or more ANC visits.

In conclusion, the multivariate analysis has revealed strong relationships of wantedness of pregnancy, receiving antenatal care and the number of ANC visits with the various socio-economic variables. It is significant to note that wantedness of pregnancy is strongly associated with the factors that can be controlled by family planning. All the risk factors such as age at birth, parity and birth intervals are closely associated with antenatal care - either with receiving antenatal care or with the number of ANC visits. These factors are: young and old ages at child birth; low and high parity; short and long birth

intervals. These factors can be controlled by proper use of family planning, which shows the importance of using family planning to reduce maternal mortality.

CHAPTER SIX

CONCLUSION:
DISCUSSION OF FINDINGS AND RECOMMENDATIONS

6.1. Discussion of major findings of the study

Unwanted pregnancy, early and older age at child birth, high parity and short birth intervals are risk factors of maternal mortality. These are also common characteristics of the demographic and maternal health situation of Bangladesh. Family planning has a strong relationship with these risk factors variables. Pregnancies which carry these risk factors are associated with socio-demographic variables. The wantedness of a pregnancy or child birth adds a further layer to these risk factors. If a pregnancy is wanted, then the mother or her family would take precautionary measures to reduce the effects of the risk factors. If the pregnancy is unwanted, then the precautionary measures would be largely absent which in turn would make the woman vulnerable to maternal deaths. Frequently, unintended or unwanted pregnancies can be prevented by appropriate use of family planning services.

The Bangladesh Demographic and Health Survey of 2004 or BDHS 2004 (NIPORT et. al., 2005) contains detailed information about pregnancies, breastfeeding, family planning practice and antenatal, intra-natal and postnatal care with respect to the last (most recent) child born to the women before the survey. A detailed analysis of the BDHS 2004 data carried out in this thesis reveals that demographic factors, such as age at child birth, birth interval and

parity are highly influenced by family planning use (Chapter Four). For example, a larger percentage of the women who had never used contraception had given birth to their most recent child before age 20 compared to women who had ever used contraception (Table 4.1). Thus, the women who had never used family planning had put themselves at a high risk of pregnancy, probably mostly unintended or unwanted. Probable reasons for their non-use of family planning could include lack of access to family planning services or other socio-cultural reasons preventing women from using family planning. Lack of knowledge about family planning cannot be cited as a reason for not using family planning because knowledge of contraception among Bangladeshi women is universal (NIPORT et. al., 2005, p. 63). In Bangladesh, where marriage is universal and where child birth takes place almost entirely within marriage delaying marriages could be an effective way of reducing the chances of early child birth, but for those women who are already married at an early age, only family planning can help them avoid high risk pregnancies. In this case, on top of knowledge about family planning it is necessary to provide acceptable, available and affordable family planning services to these women.

The conceptual frameworks discussed in this study indicate close associations of age at first and last child birth, birth interval and parity with maternal mortality. Strategies to change the composition of childbearing can be preventive measures to reduce maternal mortality in Bangladesh. It has been

found from a bi-variate analysis carried out in this study that among the women who have short birth intervals of less than 17 months, eight percent had never used contraceptives. Overall, 31 percent of the women had very long birth intervals (Table 4.2). The BDHS 2005 shows that, of the births with short intervals, 50 percent occurred before the mother was 20 years of age (NIPORT et. al., 2005, p. 58). Such women carry a double risk of maternal death, i. e., a risk of early child bearing and a risk of short birth intervals. Evidently, strategies are needed to prevent such high risk pregnancies. For those women who have never used contraception, introduction of family planning might be a good strategy to help them avoid falling pregnant at an early age and avoid short birth intervals, but for those who have used contraception and space their births too long, such as more than 48 months (this could include younger as well older mothers), introducing only family planning might not be enough; rather giving them information about the risks of very long birth intervals is also needed.

Similarly, for women who desire larger families information about family planning should include knowledge about the risks of too many pregnancies, because the theoretical frameworks discussed in Chapter Three indicate that very low and very high parity pregnancies carry high risks of maternal death. It is impossible to avoid the first pregnancy (or the first parity birth) for which antenatal care and services for safe delivery can help to reduce the risks of maternal death. Family planning can help reduce the occurrence of high parity

pregnancies, or increase the spacing between births. However, apart from changing the preferences for large family sizes, family planning is the only preventive measure to avoid high parity births. There are many women who use contraception but also have high parities. The reason for this is that such women may have had desires for large families and started using contraception after achieving their desired family size. In Bangladesh among women aged under 20, 94 percent do not use contraception (not even for spacing) before having the first child, 11 percent of women of all ages use contraception after reaching parity 4 and 20 percent never use contraception (NIPORT et. al., 2005, p. 72). Yong age at marriage also exposes women to a long period of child bearing. Many such women experience high risk pregnancies. Therefore, it is important to introduce programs on contraception to such women at an appropriate age in order to delay or stop childbearing and have a safe pregnancy when desired.

Unwanted pregnancies carry the possibility of unsafe abortion and thus maternal death. Even if there is no abortion, an unwanted pregnancy might not receive enough care for safe childbearing and delivery. Unintended or unwanted pregnancies may occur due to contraceptive failure, spousal violence (or other types of sexual violence) or due to socio-cultural factors (including sex preference where it exists) forcing the woman to become pregnant against her will. If the pregnancy occurs due to contraceptive failure, then it is important to look at the problems of contraception and circumstances

of their use. If an unwanted pregnancy occurs due to spousal violence or socio-cultural factors, then appropriate action needs to be taken. Early age at marriage is one of most important influencing factors of unwanted pregnancy. In Bangladesh, though the legal minimum age of marriage is 18 years, most marriages take place before age 15 (UNFPA 2003) because of the socio-cultural factors. Thus it might be difficult to change the age of marriage overnight, therefore steps to delay pregnancy within marriage should be adopted.

In terms of socio-demographic factors, fertility preference and number of children ever born (often influenced by sex preference) are associated with wantedness of pregnancies. The analysis of data carried out in Chapter Four shows that there were many women, who in spite of not wanting to have any additional children had another child. Unwanted pregnancies also occurred to women who already had more than three children. This indicates a gap in family planning use and an unmet need for family planning. In Bangladesh, the total demand for family planning for limiting childbearing is 50 percent of which all but 5.1 percent is not fulfilled or is unmet need (NIPORT et. al., 2005, p.106). Although the level of unmet need is small, it still demands immediate action to eliminate, otherwise achieving the Millennium Development Goal Five (MDG Five) would be far from being achieved.

Besides fertility preference and number of living children, a previous pregnancy outcome is another influential factor of unwanted pregnancy. Most

of the women who have experienced unsuccessful outcomes from their previous to the last pregnancy would wish have another successful pregnancy unless they do not desire any more children. To help prevent unsuccessful pregnancy outcomes there is a need to provide proper antenatal care, safe delivery and postnatal care. However, if a pregnancy, occurring after a previously unsuccessful pregnancy is an unwanted pregnancy then there is a need to facilitate programs to prevent such unwanted pregnancies and thereby reduce the risks of maternal death.

Though educational is the most influential factor in different aspects of human life, in relation to the wantedness of pregnancy the level of education does not have much influence. The percentage of women stating that their pregnancy is unwanted is the same for most levels of education, except for the highest educational level where the percentage of women with unwanted pregnancies is much smaller (see Appendix Tables A.1 and A.2). Education has a significant influence on fertility. The BDHS 2004 data show that there is a gap between expected fertility rate and current fertility rate according to educational background and as the time spent on education increases, the gap between expected and actual fertility becomes less. For example, in 2004 the total wanted fertility rate was 2.3 and the actual total fertility rate was 3.6 for women with no educational background, a gap of 1.3 children. But the gap is only 0.2 child for higher educated women (NIPORT et. al., 2005, p. 113).The use of family planning and the differentials of unmet need and demand for

family planning vary according to mothers' educational background (NIPORT et. al., 2005, p.106).

Although having no education or having primary or secondary education does not have much influence on wantedness of pregnancy, having higher education does influence the wantedness of pregnancy. Providing more education to women might help change the intention status (wantedness) of a pregnancy but it might not prevent a woman from becoming pregnant. Only family planning can help avoid unwanted pregnancies.

Maternal mortality is influenced by fertility and the level of fertility is associated with desired family size (which may be influenced by desire for a particular sex of the child). In other words, desired family size has an influence on the level of maternal mortality. Theoretically, it might not be possible to reduce the level of fertility of a population to a level below that of ideal family size perceived by the people (Centre for Policy Dialogue 2002, p. 6). Thus for reducing maternal mortality as far as it may be influenced by fertility, it is important to change people's desired family size.

If the total number of children ever born to a woman is higher than her desired family size, it indicates unwanted pregnancy and unmet need for family planning. An analysis of data carried out in this study reveals that in Bangladesh more than one half of the most recent births among women with

more than three children was stated by the women as being unwanted (see Table 4.13).

It is well acknowledged that economic status is one of the most important determinants of human development. In Bangladesh, maternal mortality is influenced by economic status of the household. For example, among the households with the lowest economic status, the maternal mortality ratio (MMR) is 343 per 100,000 live births and among the households with the highest economic status the household MMR is 208 per 100,000 live births (NIPORT et. al., 2003, p. 26). An analysis of data carried out in this study shows that the prevalence of unwanted pregnancies is lower among the richer households than among the poorer households. If family planning (or the lack of it) is considered to be associated with the prevalence of unwanted pregnancies, then this implies that the cost of family planning services is beyond the capacity of women of poorer households or that the type of (low cost) family planning affordable to such women is not effective.

Due to unavailability of data on the use of contraception just before the most recent pregnancy, it was not possible to examine the effect of contraception on the most recent pregnancy. Though wealth does not have much influence on the prevalence of unwanted pregnancy, wealth (or economic status) is a relevant question if unwanted pregnancies are attempted to be prevented

through family planning services that might be unaffordable to the poorer women.

This study found that among the risk factors of maternal complications age at child birth is associated with wantedness of pregnancy. More than half of the unwanted pregnancies were among women aged over 35 years, indicating that these women could have prevented such pregnancies by practicing family planning. However, this does not mean that unwanted pregnancies should be prevented only among women aged 35 years and above. Citing the case of unwanted pregnancies among women aged 35 years and over is just an example; unwanted pregnancies should be prevented at all ages, and for this purpose family planning is needed.

The BMMS 2001 shows that the maternal mortality ratio (MMR) varies according to parity. For example, for women with '0' parity the MMR is 511 per 100,000 live births and for women with parity 3+, the MMR is 342 per 100,000 live births. Unwanted pregnancies at high risk parities carry a double risk of maternal death. More clearly, if an unwanted pregnancy occurs to a low or a high parity woman, it is more likely to face maternal complications or unsafe abortion. It is found from analysis o data in this study that for high parity women the prevalence of unwanted pregnancies is high and for low parity women the prevalence is low.

Unwanted pregnancy is prevalent among women of all categories of birth intervals, but an unwanted pregnancy with short birth intervals carries multiple risks of maternal complications. If the pregnancy is unwanted among women with short birth intervals it indicates an unmet need for family planning or the occurrence of the pregnancy due to violence. It is important to identify whether unwanted pregnancy occurs due to violence or due to lack of family planning practice and take appropriate steps to prevent them. Another factor that has been found to have an important association with birth intervals is fertility preference. Women who do not want any more children but have them indicate an unmet need for family planning.

Antennal care is one of the determinants of maternal morbidity and maternal mortality. Results of a multivariate analysis carried out in this study shows that antenatal care is strongly associated with the risk factors of maternal mortality and unwanted pregnancy. In such cases where an unwanted pregnancy does not receive adequate antenatal care there may be two options to address the situation- either persuade the woman to seek proper antenatal care or prevent such unwanted pregnancies by proper practice of family planning.

Antenatal care is associated with the risk factors of maternal mortality such as age at child birth, parity and birth interval. Women with a very old age at child birth might not give due importance to antenatal care if they already have a

few pregnancies because they might feel that they are experienced enough to seek antenatal care.

Likewise, high parity and long birth intervals also affect the seeking of antenatal care. High parity women might not be enough concerned to seek antenatal care due to their previous child birth experience and pressures to look after a large family.

To sum up, maternal mortality is a multifaceted problem. There are various factors that influence the wantedness of pregnancy and risk factors of maternal mortality. Therefore, a single intervention may not be sufficient to reduce maternal mortality. It is important to promote comprehensive programs to address this problem.

6.2. Policy implications

The findings of the study have some important policy implications, especially in connection with efforts to reducing maternal mortality in Bangladesh.

- Family planning is widely accepted as an intervention to reduce the total fertility rate (TFR). But this will also help reduce the risk of maternal deaths. In this regards, the existing service of family planning should be made more effective and should provide this with easy access to all women.

- Although in Bangladesh family planning services have field workers to provide information on family planning, there is still unmet need for family planning. Step is needed to remove this unmet need.
- Almost all Bangladeshi women have knowledge of family planning and about it effects on preventing pregnancies. It is helpful to inform women about the risk factors of maternal mortality and how as they can take preventive action. It is recommended to campaign this information to all women through the field workers, Maternal and Child Welfare Centres (MCWCs) and *thana* (below sub-district level) health complexes so that women from rural remote areas and from uneducated backgrounds can get this information.
- Most of the risk factors of maternal mortality are associated with unwanted pregnancies. Therefore, it should be made sure that women use family planning properly to prevent unwanted pregnancies.
- It is suggested to facilitate programs to investigate the reasons behind not using family planning and the reasons for existing barrier and problems of family planning.
- Although education and improved economic status are found to be important factors for unwanted pregnancy and risk factors of pregnancy, it would take time to change educational and

economic status. Rather, it might be more feasible to use family planning as an acceptable and affordable strategy to all women.

- Age at marriage is a direct determinant of age at first child birth. Therefore, in order to delay pregnancy the age at marriage should be increased. As mentioned earlier in his chapter, although in the legal minimum age at marriage for girls is 20 years in Bangladesh, most of the marriages happen before this age. Therefore, this study suggests to properly enforcing legal minimum age of marriage.
- Finally, achieving the Millennium Development Goal (MDG) target of reducing maternal mortality and the International Conference on Population and Development (ICPD) target of promoting universal family planning requires the adoption of policies and programs which would adequately address the groups of women most at risk of maternal mortality.

6.3. Limitations of the study and suggested future research

This study is not without limitations. Although it is found that several factors affect maternal mortality, they also affect the status of use of family planning. This study could not analyze those factors in relation to the use of family planning. This study also does not discuss the differentials family planning use and problems with the existing methods of family planning due to the limited scope of this study. This study could not analyze risk-factor specific maternal

mortality due to paucity of data on risk factors specific to maternal deaths. Data on maternal mortality due to violence and data on pregnancy due to violence are not available. Conceptually, risk factors of maternal mortality are also associated with cultural factors but due to lack of data it was not possible to analyse the relationship between the cultural variables and risk factors of maternal mortality and wantedness of pregnancy.

Future research in this respect should be directed towards a deeper examination of the scope of family planning in reducing the risk of pregnancy. Most of the research on family planning in Bangladesh has focused on the role of family planning in reducing fertility. More research is needed to address the issues of family planning and its effect on the risk factors of maternal mortality. There is also a need for identifying the problems behind not using family planning by women who have knowledge of family planning.

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APPENDIX

Table A.1. Percentage of women according to wife's educational level and wantedness of last pregnancy, Bangladesh, 2004

Wife's educational level	Wantedness of the last child		Total
	Wanted	Unwanted	
No education	64.09	35.91	100.0 (1866)
Primary	67.25	32.75	100.0 (1649)
Secondary	71.83	28.17	100.0 (1512)
Higher	79.65	20.35	100.0 (339)
All women	68.23	31.77	100.0 (5366)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.2. Percentage of women according to husband's educational level and wantedness of last pregnancy, Bangladesh, 2004

Husband's educational level	Wantedness of the last child		Total
	Wanted	Unwanted	
No education	65.49	34.51	100.0 (1991)
Primary	67.69	32.31	100.0 (1433)
Secondary	69.81	30.19	100.0 (1335)
Higher	75.17	24.83	100.0 (604)
All women	68.25	31.75	100.0 (5363)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.3. Percentage of women according to age at marriage and age at last birth in Bangladesh, 2004

Age at marriage	Age at last child birth			Total
	<20	20-34	35+	
<20	22.02	69.93	8.05	100.0 (9036)
20-34	0.00	91.07	8.93	100.0 (560)
35+	0.00	0.00	100.0	100.0 (3)
All women	20.73	71.14	8.13	100.0 (9599)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.4. Percentage of women according to wife's level of education and age at last birth in Bangladesh, 2004

Wife's highest educational level	Age at last child birth			Total
	<20	20-34	35+	
No education	12.87	74.70	12.43	100.0 (3861)
Primary	23.50	68.83	7.67	100.0 (2907)
Secondary	32.61	64.60	2.79	100.0 (2294)
Higher	11.55	86.03	2.42	100.0 (537)
All women	20.73	71.14	8.13	100.0 (9599)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.5. Percentage of women according to husband's level of education and age at last birth in Bangladesh, 2004

Husband's educational level	Age at last birth			Total
	<20	20-34	35+	
No education	18.91	70.59	10.50	100.0 (3570)
Primary	23.76	68.05	8.20	100.0 (2416)
Secondary	22.87	70.72	6.41	100.0 (2418)
Higher	15.67	80.03	4.30	100.0 (1187)
All women	20.73	71.15	8.12	100.0 (9591)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.6. Percentage of women according to household wealth index and age at last birth in Bangladesh, 2004

Wealth index	Age at last child birth			Total
	<20	20-34	35+	
Poorest	21.49	68.29	10.22	100.0 (1703)
Poorer	22.10	68.02	9.88	100.0 (1751)
Middle	22.58	68.34	9.09	100.0 (1794)
Richer	19.94	72.67	7.39	100.0 (1921)
Richest	18.48	76.26	5.27	100.0 (2430)
All women	20.73	71.14	8.13	100.0 (9599)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.7. Percentage of women according to desired family size and age at last child birth in Bangladesh, 2004

Ideal number of children	Age at last child birth			Total
	<20	20-34	35+	
<2	22.37	70.86	6.76	100.0 (8264)
2-3	12.14	72.51	15.35	100.0 (964)
3+	6.47	73.85	19.68	100.0 (371)
All women	20.73	71.14	8.13	100.0 (9599)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.8. Percentage of women according to desired family size and parity in Bangladesh, 2004

Ideal number of children	Parity			Total
	<3	3	4+	
1	53.82	20.90	25.28	100.0 (8577)
2-3	23.84	20.95	55.21	100.0 (1036)
3+	22.84	16.59	60.58	100.0 (416)
All women	49.44	20.73	29.83	100.0(10029)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women

Table A.9. Percentage of women according to parity and marital duration in Bangladesh, 2004

Parity	Marital duration (years)							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
<3	23.07	32.84	18.98	11.07	6.60	4.20	3.25	100.0 (49.58)
3	0.19	11.30	26.74	24.15	16.84	11.16	9.62	100.0 (2079)
4+	0.00	1.30	10.43	19.15	23.13	20.79	25.20	100.0 (2992)
All women	11.45	18.97	18.04	16.19	13.65	10.59	11.12	100.0 (10029)

Source: Computed by the author from the BDHS 2004 data set
Note: The parentheses denote the total number of women