

PRELIMINARY REPORT

BANGLADESH
MATERNAL HEALTH SERVICES AND
MATERNAL MORTALITY
SURVEY 2001



National Institute of Population
Research and Training
Ministry of Health and Family Welfare



MEASURE/DHS+
ORC MACRO

Preliminary Report

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National Institute of Population Research and Training
Dhaka, Bangladesh

ORC Macro
Calverton, Maryland, USA

Technical assistance from
Johns Hopkins University, USA
ICDDR,B: Centre for Health and Population Research

Financial assistance from
U.S. Agency for International Development (USAID)/Bangladesh

March 2002

The 2001 Bangladesh Maternal Health Services and Maternal Mortality Survey (BMMS) is part of the worldwide MEASURE *DHS*+ program. Additional information about the BMMS may be obtained from the National Institute of Population Research and Training (NIPORT), Azimpur, Dhaka-1205, Bangladesh (Telephone: 862-5251; Fax: 861-3362). Information about the MEASURE *DHS*+ program may be obtained from ORC Macro, Suite 300, 11785 Beltsville Drive, Calverton, MD 20705, U.S.A. (Telephone: 301-572-0200; Fax: 301-572-0999).

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CONTENTS

Foreword	v
I. INTRODUCTION	1
1.1 Background	1
1.2 Survey Implementation	1
1.2.1 Sample Design.....	1
1.2.2 Questionnaires	2
1.2.3 Training and Fieldwork	3
1.2.4 Data Processing	3
1.3 Coverage of the Sample.....	3
1.4 Characteristics of Households and Respondents	4
1.4.1 Household Age and Sex Composition.....	4
1.4.2 Background Characteristics of the Respondents	5
II. MATERNAL CARE	7
2.1 Antenatal Care.....	7
2.1.1 Number and Timing of Antenatal Visits	9
2.1.2 Quality of Antenatal Care.....	9
2.2 Delivery Care	12
2.2.1 Decisions about Delivery Assistance	12
2.2.2 Place of Delivery	12
2.2.3 Assistance During Delivery.....	12
2.2.4 Medical Procedures Performed During Delivery	16
2.3 Physical Checkup after Delivery	17
2.4 Consistency of Maternal Service Use.....	20
III. MATERNAL HEALTH COMPLICATIONS AND CARE SEEKING BEHAVIOR.....	23
3.1 Knowledge of Life-threatening Conditions	23
3.2 Complications During Pregnancy, Delivery, or After Delivery	23
3.3 Time Taken to Recognize Complications	25
3.4 Time Delay Between Recognizing Complications and Deciding to Seek Treatment.....	25
3.5 Care Seeking by Type of Complications.....	27
3.6 Type of Assistance Sought	28
3.7 Travel Time to Facility.....	31

3.8	Waiting time in Facility.....	31
3.9	Number of Facilities Where Treatment Sought.....	32
3.10	Cost of Treatment for Complications	32
IV.	MATERNAL MORTALITY	35
4.1	Post-Childhood Mortality Estimates	36
4.2	Maternal Mortality.....	39
4.2.1	Direct Estimates from Deaths of Sisters.....	39
4.2.2	Estimates of Maternal Mortality from Household Deaths and Time of Death Definition.....	39
4.2.3	Estimates of Maternal Mortality from Household Deaths and Verbal Autopsy Definition	41
4.2.4	Proportions of Female Deaths of Reproductive Age due to Maternal Causes	42
4.3	Comparison of Estimates and Preliminary Conclusions	42
	REFERENCES	45
	APPENDIX	
	Members of the Technical Review Committee and the Technical Task Force.....	46

Foreword

The 2001 Bangladesh Maternal Health Services and Maternal Mortality Survey (BMMS) is the first national survey conducted in Bangladesh. The BMMS is intended to serve a source of maternal health and maternal death data for policy makers and the research community. The survey was implemented under the authority of NIPORT in collaboration with ORC Macro, USA. The Johns Hopkins University, USA and ICDDR,B provided technical assistance. Mitra and Associates and ACPR, two Bangladeshi private research firms, collected the survey data. The financial support for the survey was made by the United States Agency for International Development (USAID)/Dhaka. Preparations for the 2001 BMMS started in early 2000 and the fieldwork was carried out between January and June 2001.

This report presents preliminary results of the 2001 BMMS. It includes information on maternal care, maternal health complications and care seeking behavior, and maternal mortality ratios. More detailed results will be presented in the final report, which will be published by December 2002.

The information collected in the BMMS will be instrumental in identifying strategic directions for national Health and Family Planning Program in Bangladesh. The collected information are crucial indicators in evaluating policies and programs and in designing program strategies for the future. The survey will hopefully contribute to an increased global commitment to improving the lives of mothers and children worldwide.

I am deeply indebted and grateful to all those who contributed to the successful completion of the 2001 BMMS and to their efforts in releasing the preliminary results in such a timely fashion - the Technical Task Force members, representatives on the Technical Review Committee, field staff, the data processing team, and of course, the survey respondents.

(Ahmed Al-Sabir Ph.D)
Director General (In-charge)

I. INTRODUCTION

1.1 Background

The Bangladesh Maternal Health Services and Maternal Mortality Survey (BMMS) is intended to serve as a source of maternal health and maternal death data for policymakers and the research community. In general, the objectives of the BMMS are to:

- Collect data at the national level, which will facilitate an assessment of the level of maternal mortality in Bangladesh;
- Identify specific causes of maternal and non-maternal deaths to adult women;
- Collect data on women's perception of and experience with antenatal, maternity and emergency obstetrical care;
- Measure indicators of utilization of maternal health services in Bangladesh.

The 2001 BMMS was conducted under the authority of the National Institute of Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare in collaboration with ORC Macro, USA. The survey was implemented by Associates for Community and Population Research (ACPR) and Mitra and Associates, two Bangladeshi research firms located in Dhaka. These two field organizations had primary responsibility for implementing the following tasks for the 2001 BMMS: translating, and pre-testing the questionnaires, hiring and training the field staff, implementing and supervising the data collection, and entering and processing the data. The Johns Hopkins University (JHU) in the U.S. and ICDDR,B provided assistance in the questionnaire design and data analysis. ORC Macro of Calverton, Maryland provided technical assistance to the project as part of its international MEASURE *DHS+* program, while financial assistance was provided by the U.S. Agency for International Development (USAID)/Bangladesh.

1.2 Survey Implementation

1.2.1 Sample Design

Administratively, Bangladesh is divided into six divisions. Each division is divided into *zilas*, and then *upazilas*. Each urban area in the *upazila* is divided into *wards*, and into *mohallas* within the ward; each rural area in the *upazila* is divided into *union parishadas* and into *mouzas* within the union.

Smaller subdivisions called enumeration areas (EAs) were created for the 1991 census based on the number of dwellings units. However, experience with the 1999-2000 Bangladesh Demographic and Health Survey (BDHS) showed that EA maps and sketch maps were not easily accessible. For these reasons, EAs were not considered suitable as primary sampling units (PSUs) for the 2001 BMMS survey. However, the entire basic census information is available in published reports, from the division level down to the *mouza* level, but not at the EA level. Consequently, it was decided to make use of the published census reports and to use wards and unions as the primary sampling units. The second stage for the urban areas involved selecting two *mohallas* in each *ward*, while in the rural areas, two *mouzas* were selected in each selected *union* (with a few exceptions that only one *mouza* or one *mohalla* per *union* or per *ward* respectively). The third stage involves selecting household. In summary, in each division, the list of wards constituted the initial sample frame for the urban areas, and, similarly, the list of unions for the rural area.

The field organizations (ACPR and Mitra and Associates) conducted a household listing operation in all the sample points from November 2000 to April 2001. To obtain a maternal mortality rate at the national level (as well as to achieve other objectives of the survey) a stratified national sample of 104,323 households was systematically selected from a total of 1,616 clusters from 808 primary sampling units (674 rural, 134 urban). A systematic sample of households was selected from each cluster, with an average “take” of 65 households.

All ever-married women age 13-49 were eligible to be interviewed. It was expected that the sample would yield interviews with more than 100,000 ever-married women.

1.2.2 Questionnaires

Three types of questionnaires were used for the BMMS: a Household Questionnaire, a Women's Questionnaire for ever-married women age 13-49, and a Verbal Autopsy Questionnaire for deaths of females age 13-49.

The Household Questionnaire consists of a schedule for listing all household members. For each listed person, the survey collected basic information such as age, sex, marital status and education. Information was also collected about the type of housing, source of water, electricity, etc. The Household Questionnaire also asked about any deaths occurring to household members in the three years preceding the survey. The information on the age, sex, and marital status of household members was used to identify eligible respondents for the Women’s Questionnaire. The information about female adult deaths identified deaths for which the Verbal Autopsy Questionnaire was to be used.

The Women's Questionnaire was administered to all ever-married women age 13-49 who were listed in the Household Questionnaire. These women were asked questions on the following topics:

- Background characteristics (age, education, religion, etc.),
- Reproductive history,
- Use of family planning methods,
- Information about siblings (to calculate the maternal mortality rate),
- Knowledge of maternal complications,
- Antenatal, delivery, and postnatal care,
- Experience with and treatment of complications during pregnancy, delivery and after delivery,
- Health-seeking behavior.

The Verbal Autopsy Questionnaire was used to collect information on causes of deaths for all female adult (age 13-49) deaths in the household in the three years preceding the survey. The questionnaire was both structured (precoded questionnaire) and non-structured in nature (open-ended questionnaire) and answered by the most knowledgeable member in the household.

During the design of these questionnaires, input was sought from a variety of organizations that are expected to use the resulting data. ORC Macro designed the questionnaire with assistance from NIPORT, JHU, ICDDR,B, and USAID. After preparation of definitive questionnaires in English, questionnaires were translated into Bengali. Back translations into English were done by people other than the initial translators with the goal of verifying the accuracy of the translations.

1.2.3 Training and Fieldwork

The BMMS questionnaires were pre-tested in November 2000. Pretest teams from both ACPR and Mitra and Associates were trained jointly at NIPORT. After training, the teams conducted interviews in various locations in the field under the observation of staff from the two field organizations and members of the Technical Task Force (TTF). Before the pretest, the verbal autopsy methodology was validated in a field trial in Matlab, Bangladesh during October-November 2000. ACPR was responsible for recruiting a field trial team and conducting fieldwork with assistance from ICDDR,B to pretest the methodology in a sample of households with a disproportionate number of maternal deaths as registered in the Demographic Surveillance System. Based on observations in the field and suggestions made by the pretest and field trial teams, the TTF made revisions in the wording and translations of the questionnaires.

In December 2000, candidates for field staff positions for the main survey were recruited. Recruitment criteria included educational attainment, maturity, experience with other surveys, a firm commitment to spend one month in training and at least five months in the field. Training for the main survey was conducted at two different sites by each field organization from December 3 to January 7, 2001. Initially, training consisted of lectures on how to complete the questionnaires, with mock interviews between participants to gain practice in asking questions. Towards the end of the training course, the participants spent several days in practice interviewing in various places close to Dhaka. Trainees whose performance was considered superior were selected as supervisors and field editors.

Fieldwork for the BMMS was carried out by 50 interviewing teams (23 teams from ACPR and 27 teams from Mitra and Associates) in five phases. Each team consisted of a male supervisor, a female field editor, and four female interviewers. During fieldwork, emphasis was placed on the quality of data. ACPR and Mitra and Associates also fielded quality control teams to check on the fieldwork. Feedback was given to teams after each phase to improve on the quality of data collection. In addition staff from USAID, NIPORT and ORC Macro monitored the fieldwork by visiting teams in the field. Fieldwork started on 9 January 2001 and was completed in the second week of June 2001.

1.2.4 Data Processing

All questionnaires for the BMMS were returned to Dhaka for data processing at ACPR and Mitra and Associates. Data entry personnel were trained in Dhaka in February 2001 by ORC Macro data processing personnel. The processing operation consisted of office editing, coding of open-ended questions, data entry, and resolving inconsistencies found by the computer edit programs. The data were processed on microcomputers working in double shifts and carried out by data entry operators and supervised by the data entry supervisors. During all stages of data entry and processing, the ISSA (Integrated System for Survey Analysis) package program developed by MEASURE *DHS+* was used. Data processing commenced in mid-February 2001 and was completed by the end of August 2001.

1.3 Coverage of the Sample

Table 1.1 shows response rates for the survey. A total of 104,323 households were selected for the sample, of which 100,379 households were occupied. Of the occupied households, 99 percent were successfully interviewed. In these households, 106,789 women were identified as eligible for the individual interview (i.e., ever-married and age 13-49) and interviews were completed for 103,796 or 97 percent of them. The principal reason for non-response among eligible women was the failure to find them at home despite repeated visits to the household. The refusal rate was low.

Result	Residence		
	Urban	Rural	Total
Household interviews			
Households selected	17,294	87,029	104,323
Households occupied	16,536	83,843	100,379
Households interviewed	16,306	82,896	99,202
Household response rate	98.6	98.9	98.8
Individual interviews			
Eligible women	17,943	88,846	106,789
Eligible women interviewed	17,330	86,466	103,796
Eligible woman response rate	96.6	97.3	97.2

1.4 Characteristics of Households and Respondents

1.4.1 Household Age and Sex Composition

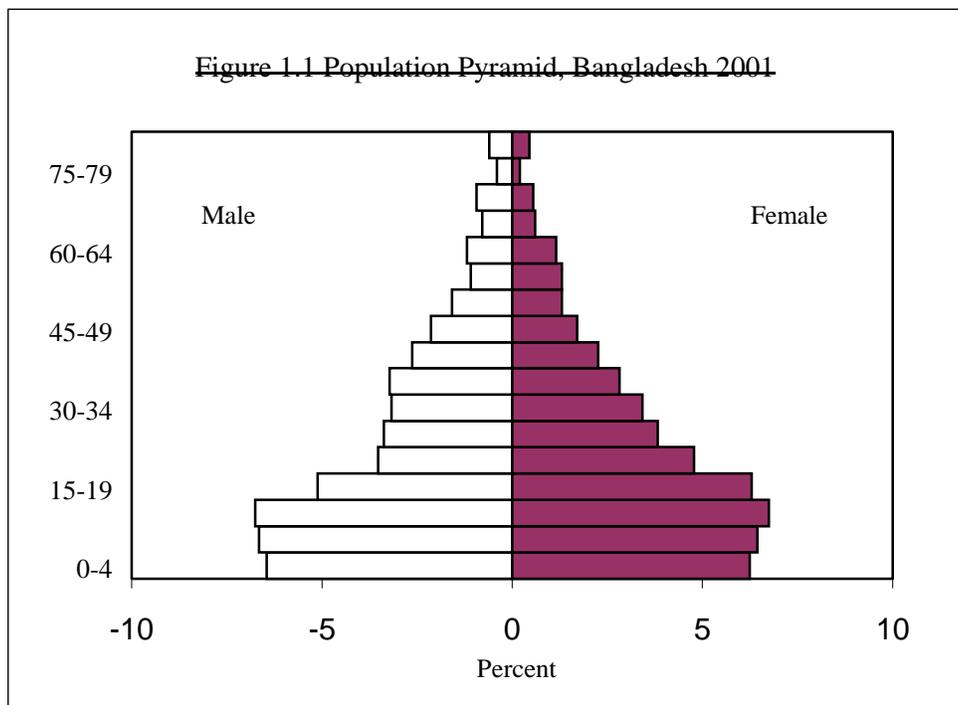
The BMMS Household Questionnaire was used to collect data on the demographic and social characteristics of all usual residents of the sampled household and visitors who had spent the previous night in the household. This approach makes it possible to distinguish between the *de jure* population (those usually resident in the household) and the *de facto* population (those who spent the night before the interview in the household). A household is defined as a person or group of people who live together and share food.

Age group	Urban			Rural			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	11.7	11.6	11.7	13.4	12.6	13.0	13.0	12.4	12.7
5-9	12.0	11.3	11.6	13.7	13.1	13.4	13.4	12.8	13.1
10-14	12.8	13.1	13.0	13.7	13.5	13.6	13.6	13.4	13.5
15-19	10.6	13.3	11.9	10.2	12.3	11.3	10.3	12.5	11.4
20-24	8.1	10.7	9.4	6.9	9.3	8.1	7.1	9.5	8.3
25-29	7.8	8.3	8.0	6.6	7.5	7.1	6.8	7.6	7.2
30-34	7.5	7.5	7.5	6.2	6.7	6.4	6.4	6.8	6.6
35-39	7.1	6.2	6.6	6.3	5.5	5.9	6.5	5.6	6.0
40-44	5.9	4.9	5.4	5.2	4.5	4.8	5.3	4.5	4.9
45-49	4.7	3.4	4.0	4.2	3.3	3.8	4.3	3.4	3.8
50-54	3.4	2.3	2.9	3.2	2.7	2.9	3.2	2.6	2.9
55-59	2.2	2.2	2.2	2.2	2.7	2.5	2.2	2.6	2.4
60-64	2.0	2.0	2.0	2.5	2.4	2.4	2.4	2.3	2.4
65-69	1.3	1.1	1.2	1.6	1.3	1.4	1.6	1.2	1.4
70-74	1.4	1.0	1.2	2.0	1.1	1.5	1.9	1.1	1.5
75-79	0.5	0.4	0.5	0.8	0.4	0.6	0.8	0.4	0.6
80 +	0.9	0.8	0.9	1.3	1.0	1.1	1.2	0.9	1.1
Missing / Don't know	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	46,847	47,464	94,311	202,555	205,516	408,074	249,402	252,979	502,385

Note: Total includes 4 cases with sex not stated.

The distribution of the household population in the BMMS is shown in Table 1.2 by five-year age groups, according to sex and urban-rural residence. The BMMS households constitute a population of 502,385 persons. The population is almost equally divided into females (50 percent) and males (50 percent). Because of relatively high levels of fertility in the past as well as the effects of mortality, there are more persons in the younger age groups than in the older age groups of each sex. Evidence of recent declines in fertility is reflected in the fact that there is a smaller proportion of children under age five than age 5 to 9 (see Figure 1.1). Thirty-nine percent of the population is below 15 years of age and 5 percent is age 65 or older. The proportion below age 15 is relatively higher in rural areas (40 percent) than in urban areas (36 percent).

Overall, the number of women slightly exceeds the number of men. This pattern is especially pronounced at ages 15-34, which may be due in part to migration of young men for work. However, some combination of over reporting of ages of men and/or underreporting of ages of women may account for the excess of men over women at ages 65 and above.



1.4.2 Background Characteristics of the Respondents

The distribution of ever-married women 13-49 interviewed in the 2001 BMMS by selected background characteristics is presented in Table 1.3. The relatively low proportion of women under age 20 (15 percent) is due to the fact that only women who had ever-married were interviewed in the BMMS and many women under age 20 have not yet married. Beginning with the 25-29 cohort, the proportion of women gradually declines with age. Half of ever-married women are under age 30. The age distribution of ever-married women is very similar to that found in the three BDHS surveys (1993-94, 1996-97, and 1999-2000).

Almost 20 percent of women live in urban areas, while about 80 percent live in rural areas. The distribution of ever-married women by division of residence is similar to that in the 1999-2000 BDHS with one-third of respondents living in Dhaka Division, one-fourth living in Rajshahi Division, and 18 percent living in Chittagong Division. Twelve percent of ever-married women live in Khulna Division, 7 percent in Barisal Division, and only 6 percent in Sylhet Division. Almost half (47 percent) of ever-married women have never attended school, while 28 percent have attended primary school only, and one-quarter have some secondary school. A household wealth index¹ was constructed from information about the household's ownership of a number of consumer items ranging from a bench to a television; dwelling characteristics such as flooring materials; source of drinking water; type of toilet facilities used; and other characteristics that are related to wealth status (Gwatkin, Rutstein, Johnson, Pande and Wagsaff, 2000).

Table 1.3 Background characteristics of respondents

Percent distribution of ever-married women age 13-49 by background characteristics, Bangladesh 2000-2001

Background characteristic	Weighted percent	Number of women	
		Weighted	Un-weighted
Age			
13-19	14.5	15,097	15,051
20-24	18.7	19,417	19,396
25-29	17.2	17,840	17,860
30-34	16.1	16,736	16,706
35-39	13.3	13,809	13,816
40-44	10.7	11,083	11,129
45-49	7.9	8,190	8,241
Current marital status			
Currently married	93.4	96,945	96,805
Separated	0.9	937	947
Deserted	0.7	759	785
Divorced	1.2	1,280	1,330
Widowed	3.7	3,875	3,929
Residence			
Urban	19.2	19,896	17,330
Rural	80.8	83,900	86,466
Division			
Barisal	6.6	6,839	10,202
Chittagong	17.6	18,275	18,633
Dhaka	34.5	35,848	27,577
Khulna	11.9	12,307	17,079
Rajshahi	23.6	24,495	19,296
Sylhet	5.8	6,032	11,009
Highest educational level			
No education	46.5	48,243	47,860
Primary incomplete	17.9	18,630	18,999
Primary complete	10.4	10,764	11,236
Secondary+	25.2	26,159	25,701
Household wealth index			
1	20.4	21,186	21,811
2	20.2	20,982	20,946
3	19.7	20,491	20,563
4	19.5	20,257	20,498
5	20.1	20,880	19,978
Total	100.0	103,796	103,796

¹The wealth index scaled from 1 to 5. The highest number in the wealth index indicates wealthiest households and lowest number indicates poorest households.

II. MATERNAL CARE

2.1 Antenatal Care

Proper care during pregnancy and childbirth are important to the health of both the mother and her baby. The major objective of antenatal care is to identify and treat problems during pregnancy such as anemia, pre-eclampsia and infections. It is during an antenatal care visit that screening for complications and advice on a range of issues including place of delivery and referral of mothers with complications occur.

In the BMMS, women who had given birth in the three years preceding the survey were asked a number of questions about maternal and child health care. Interviewers recorded source of antenatal care, the person who provided that care, advice/information received on birth planning and elements of antenatal care received. Table 2.1 shows the percent distribution of births in the three years preceding the survey by source of antenatal care received during pregnancy according to background characteristics. Although interviewers were instructed to record everyone a woman had consulted for care, in the report, only the provider with the highest qualifications is considered if more than one person was seen.

The data indicate that more than half of mothers in Bangladesh do not receive antenatal care. For births that occurred in the three years before the survey, only 48 percent of mothers received antenatal care during pregnancy. Those who do receive care tend to receive it from doctors (24 percent) or nurse, midwives, family welfare visitors, medical assistant, sub-assistant community medical officer (15 percent). About 5 percent of mothers receive antenatal care from health assistant or family welfare assistant. Less than 1 percent of pregnant mothers receive antenatal care from traditional birth attendants (*dai*). The survey results show that there are sharp differences in antenatal care coverage among subgroups in Bangladesh. Antenatal care is much more common for births to younger women and those of lower birth order. The urban-rural differentials in the percentage of births for which the mother had at least one antenatal care visit are quite large. Sixty-three percent of urban births had received antenatal care from a medically trained person, compared with only 41 percent of rural births. The use of antenatal care is strongly associated with level of education and economic status. Mothers with some secondary education are about twice as likely as mothers with no education to receive antenatal care and mothers in the wealthiest households are more than twice as likely to receive antenatal care as mothers in the poorest households.

Table 2.1 Antenatal care

Percent distribution of births in the three years preceding the survey by source of antenatal care during pregnancy, according to background characteristics, Bangladesh 2001

Background characteristic	Antenatal care provider									Total	Number of births
	Doctor	Nurse/ midwife/ paramedic/ FWV/MA/ SACMO	HA/ FWA	Trained birth attendant	Untrained birth attendant	Unqualified medical practitioner	Other	No one	Missing		
Mother's age at birth											
< 20	23.6	17.9	5.2	0.2	0.1	2.2	0.7	50.2	0.1	100.0	12,562
20-34	25.7	15.0	4.2	0.2	0.1	1.9	0.5	52.2	0.1	100.0	24,312
35+	15.8	11.8	4.1	0.1	0.0	2.8	0.6	64.8	0.1	100.0	2,650
Birth order											
1	32.8	18.1	4.5	0.2	0.0	2.0	0.5	41.7	0.1	100.0	11,663
2-3	24.5	16.8	4.5	0.2	0.1	2.0	0.6	51.3	0.1	100.0	16,405
4-5	16.9	13.3	4.7	0.2	0.1	2.1	0.6	62.0	0.1	100.0	7,102
6+	13.2	9.6	4.5	0.1	0.1	2.3	0.5	69.6	0.1	100.0	4,355
Residence											
Urban	42.4	16.7	3.5	0.1	0.1	1.3	0.3	35.6	0.1	100.0	6,826
Rural	20.6	15.5	4.7	0.2	0.1	2.3	0.6	55.9	0.1	100.0	32,699
Division											
Barisal	19.3	10.5	1.8	0.1	0.0	0.9	0.2	67.2	0.0	100.0	2,615
Chittagong	25.7	13.8	1.3	0.3	0.2	0.9	0.0	57.8	0.0	100.0	8,247
Dhaka	26.4	14.2	7.2	0.1	0.1	2.8	1.2	48.0	0.2	100.0	13,531
Khulna	28.5	19.4	6.1	0.1	0.0	2.8	0.5	42.6	0.1	100.0	3,792
Rajshahi	18.2	21.9	2.6	0.1	0.0	1.2	0.0	55.9	0.0	100.0	8,359
Sylhet	27.8	10.8	7.3	0.1	0.1	4.9	1.3	47.4	0.3	100.0	2,980
Mother's education											
No education	12.0	13.8	5.2	0.1	0.0	2.4	0.6	65.8	0.1	100.0	17,668
Primary incomplete	18.7	17.3	5.1	0.1	0.2	2.5	0.7	55.4	0.1	100.0	7,296
Primary complete	25.3	17.2	4.7	0.3	0.1	1.8	0.3	50.2	0.0	100.0	4,220
Secondary+	49.1	17.3	2.9	0.2	0.0	1.5	0.5	28.3	0.1	100.0	10,340
Household wealth index											
1	9.1	13.2	5.6	0.1	0.1	2.7	0.6	68.7	0.1	100.0	9,893
2	13.8	15.6	5.1	0.1	0.1	2.4	0.7	62.0	0.1	100.0	8,670
3	19.8	17.4	4.9	0.2	0.1	2.2	0.5	54.7	0.1	100.0	7,504
4	30.5	18.8	3.9	0.3	0.0	1.9	0.7	43.8	0.1	100.0	6,948
5	60.3	14.4	2.4	0.1	0.0	0.8	0.4	21.5	0.1	100.0	6,509
Total	24.4	15.7	4.5	0.2	0.1	2.1	0.6	52.4	0.1	100.0	39,525

Note: Total includes 49 births for which antenatal care visits are missing. FWV = Family welfare visitor, MA = Medical assistant, SACMO = Sub-assistant community medical officer, HA = Health assistant, FWA = Family welfare assistant.

2.1.1 Number and Timing of Antenatal Visits

Antenatal care is important in monitoring the progress of a pregnancy, identifying complications, and referring mothers for specialized care at an appropriate time for intervention. Information on antenatal care visit and the stage at which pregnant women seek antenatal care is presented in Table 2.2 As mentioned above, for more than half of births, mothers do not obtain any antenatal care. Only 21 percent have three or more visits. For 15 percent of births, women received antenatal care in the first trimester; for one in five births, care was received during the second trimester. Among women who received antenatal care, the median duration of pregnancy at the first visit was 5.4 months.

2.1.2 Quality of Antenatal Care

Complications during pregnancy are an important cause of maternal and child morbidity and mortality. Detecting and monitoring these complications is a crucial component of safe motherhood. To gauge the quality of care received during pregnancy, the BMMS survey included a series of questions on the components of antenatal care. Respondents were asked whether they had received each service during their pregnancies. For births during the three years preceding the survey, Table 2.3 shows the percentage of mothers who received specific antenatal care services according to background characteristics. Among all (live) births for which the mother had at least one antenatal visit, the abdomen was examined and blood pressure was measured for 35 percent of the mothers and about one-third of mothers had their weight or height measured. Mothers of 14 and 18 percent of births had their blood and urine tested during their pregnancy respectively. These antenatal care services are lower for births to older mothers, births of higher order and births in rural areas.

Data on antenatal care in the BMMS are not directly comparable with those from the 1999-2000 BDHS. In the BDHS, questions on antenatal care were asked only for the most recent live birth in the preceding five years, while in the BMMS, data are collected for all births in the preceding three years. Moreover, questions were phrased differently in the two surveys. However, data from both surveys were re-analyzed for last live births in the three years before the survey. Although there has been an increase in the overall antenatal care coverage, the data show almost no differences in antenatal care coverage from doctors, the timing of the first antenatal care visit, and the percentage receiving specific components of antenatal care.

Table 2.2 Number of antenatal care visits and stage of pregnancy

Percent distribution of live births in the three years preceding the survey by number of antenatal care visits, and by the stage of pregnancy at the time of the first visit, according to background characteristics, Bangladesh, 2001

Background characteristic	Number of visits							Number of months pregnant at the time of first visit						Median months pregnant at first visit	Number of births
	0	1	2	3	4+	Don't know/ Missing	Total	No antenatal care	<4	4-6	7+	Don't know/ Missing	Total		
Mother's age at birth															
< 20	50.2	15.4	13.7	9.9	10.8	0.1	100.0	50.2	13.7	23.5	12.5	0.1	100.0	5.5	12,562
20-34	52.2	13.8	11.9	9.2	12.7	0.1	100.0	52.2	15.7	20.6	11.3	0.2	100.0	5.3	24,312
35+	64.8	13.1	8.9	7.5	5.5	0.2	100.0	64.8	10.5	14.3	10.2	0.2	100.0	5.5	2,650
Birth order															
1	41.7	15.0	14.6	11.2	17.4	0.1	100.0	41.7	19.6	25.8	12.8	0.1	100.0	5.3	11,663
2-3	51.3	14.4	12.6	9.5	12.0	0.1	100.0	51.3	14.8	22.0	11.6	0.2	100.0	5.4	16,405
4-5	62.0	13.8	10.0	7.6	6.6	0.1	100.0	62.0	10.7	16.2	10.9	0.2	100.0	5.5	7,102
6+	69.6	12.5	8.2	6.4	3.2	0.2	100.0	69.6	8.0	12.7	9.5	0.2	100.0	5.6	4,355
Residence															
Urban	35.6	12.9	13.2	12.1	26.1	0.1	100.0	35.6	25.8	26.8	11.6	0.2	100.0	5.0	6,826
Rural	55.9	14.5	12.1	8.7	8.6	0.1	100.0	55.9	12.4	19.9	11.6	0.2	100.0	5.5	32,699
Division															
Barisal	67.2	11.6	8.1	5.9	7.1	0.1	100.0	67.2	11.4	14.3	6.9	0.2	100.0	5.2	2,615
Chittagong	57.8	12.3	11.1	8.2	10.6	0.0	100.0	57.8	12.7	18.5	10.9	0.1	100.0	5.4	8,247
Dhaka	48.0	15.8	13.3	9.3	13.4	0.2	100.0	48.0	17.5	22.6	11.7	0.2	100.0	5.3	13,531
Khulna	42.6	15.8	15.4	11.3	14.7	0.2	100.0	42.6	16.1	26.3	14.9	0.2	100.0	5.5	3,792
Rajshahi	55.9	12.9	10.8	10.1	10.2	0.0	100.0	55.9	10.9	20.8	12.3	0.2	100.0	5.6	8,359
Sylhet	47.4	16.5	14.7	10.5	10.4	0.4	100.0	47.4	19.8	21.4	10.9	0.4	100.0	5.1	2,980
Mother's education															
No education	65.8	13.4	9.8	6.8	4.1	0.1	100.0	65.8	8.4	15.7	10.0	0.2	100.0	5.6	17,668
Primary incomplete	55.4	15.5	13.1	8.7	7.2	0.2	100.0	55.4	11.3	20.2	12.8	0.2	100.0	5.6	7,296
Primary complete	50.2	15.6	13.6	9.9	10.5	0.1	100.0	50.2	14.2	23.4	12.2	0.1	100.0	5.4	4,220
Secondary+	28.3	14.3	15.4	13.8	28.0	0.1	100.0	28.3	28.3	30.0	13.3	0.1	100.0	5.0	10,340
Household wealth index															
1	68.7	12.7	8.8	6.3	3.4	0.2	100.0	68.7	7.3	14.7	9.1	0.2	100.0	5.7	98,093
2	62.0	15.0	11.2	7.0	4.7	0.1	100.0	62.0	9.1	17.1	11.7	0.1	100.0	5.7	8,670
3	54.7	15.3	13.4	9.6	7.0	0.1	100.0	54.7	11.3	21.0	12.9	0.1	100.0	5.6	7,504
4	43.8	16.5	15.4	11.4	12.8	0.1	100.0	43.8	16.5	25.7	13.7	0.2	100.0	5.4	6,948
5	21.5	12.0	14.3	14.5	37.5	0.2	100.0	21.5	35.7	31.2	11.5	0.1	100.0	4.5	6,509
Total	52.4	14.3	12.3	9.3	11.6	0.1	100.0	52.4	14.7	21.1	11.6	0.2	100.0	5.4	39,525

Table 2.3 Components of antenatal care

Percentage of births in the three years preceding the survey for which mothers received specific antenatal care services, by background characteristics, Bangladesh 2001

Background characteristic	Percentage receiving antenatal care	Procedures performed during antenatal care							Number of children
		Weighed or height measured	Blood pressure measured	Blood test done	Urine tested	Abdomen examined	Internal pelvic examined	Sonogram	
Mother's age at birth									
< 20	49.8	33.4	35.9	13.5	17.1	37.6	5.3	6.2	12,562
20-34	47.8	31.2	35.8	15.4	18.9	35.9	6.4	9.0	24,312
35+	35.2	19.0	25.0	7.7	9.9	23.1	3.3	4.8	2,650
Birth order									
1	58.3	41.5	44.9	21.2	25.2	46.8	8.4	11.9	11,663
2-3	48.7	32.1	36.0	14.2	18.2	36.3	6.1	8.0	16,405
4-5	38.0	21.6	26.3	8.4	10.8	26.1	3.5	4.2	7,102
6+	30.4	14.7	20.2	5.8	7.4	17.9	2.1	2.5	4,355
Residence									
Urban	64.4	48.5	53.3	27.9	31.9	53.5	12.5	18.3	6,826
Rural	44.1	27.4	31.3	11.5	14.8	31.8	4.5	5.6	32,699
Division									
Barisal	32.8	22.8	25.5	9.8	12.2	25.1	4.4	4.8	2,615
Chittagong	42.2	28.6	33.5	16.3	18.7	34.9	7.4	7.4	8,247
Dhaka	52.0	31.4	36.2	15.3	18.2	36.6	5.7	10.3	13,531
Khulna	57.4	39.7	42.5	14.7	20.1	43.4	6.1	9.1	3,792
Rajshahi	44.1	34.1	34.5	12.3	16.8	35.5	5.5	5.1	8,359
Sylhet	52.5	23.5	35.4	13.3	17.1	32.1	4.5	6.4	2,980
Mother's education									
No education	34.2	19.2	21.8	5.5	7.6	21.6	2.2	1.7	17,668
Primary incomplete	44.6	27.8	31.0	9.3	12.9	31.5	3.9	3.9	7,296
Primary complete	49.8	31.7	36.6	13.4	16.6	37.6	4.7	6.3	4,220
Secondary+	71.6	53.3	60.2	33.3	38.8	61.4	14.0	21.7	10,340
Household wealth index									
1	31.3	17.0	19.0	4.7	6.6	18.7	1.9	0.8	9,893
2	37.9	22.3	25.1	6.2	8.8	25.5	2.4	1.8	8,670
3	45.3	28.4	32.2	9.4	12.9	33.2	3.9	3.7	7,504
4	56.2	36.5	42.0	16.8	21.2	43.0	6.3	8.3	6,948
5	78.5	61.3	69.0	42.6	48.2	69.4	18.2	30.8	6,509
Total	47.6	31.1	35.1	14.3	17.7	35.6	5.9	7.8	39,525

2.2 Delivery Care

2.2.1 Decisions about Delivery Assistance

Respondents who were pregnant at the time of survey were asked whether there was any discussion in the family regarding the intended assistance during delivery. Two-thirds of pregnant women said no decision on delivery assistance had yet been made (Table 2.4). Although discussions were more common among women closer to their delivery date, still more than half of women who were at least seven months pregnant had not discussed who might help them deliver. Delivery assistance by medically trained personnel was intended for only 6 percent of pregnant women. More than one-fifth of the pregnant women intended to have delivery assisted by *dai*. Not surprisingly, intention to have the baby delivered by a medically trained person is higher for urban, educated and wealthy women.

2.2.2 Place of Delivery

Table 2.5 presents the distribution of live births in the three years prior to the survey by place of delivery. Almost all births (91 percent) in Bangladesh occur at home. Use of health facilities for delivery is much more common in urban areas (21 percent of births), among mothers with some secondary education (22 percent), mothers from wealthy households (30 percent), and among mothers who had at least four antenatal visits (37 percent).

2.2.3 Assistance During Delivery

In addition to place of delivery, assistance during delivery is an important variable that influences the delivery outcome and the health of the mother and the infant. This is because the skills of the person attending the delivery determine whether the provider can manage any complication and observe hygienic practices. Table 2.6 shows the percent distribution of live births in the three years preceding the survey by person providing assistance, according to background characteristics. If more than one type of attendant assisted at delivery, only the most qualified person is shown in the table. Three-fourths of births in Bangladesh are assisted by traditional birth attendants i.e., *dais*, with 12 percent being assisted by trained *dais* and 64 percent by untrained *dais*. Twelve percent of births are assisted by medically trained persons, doctors (7 percent), or nurse, midwives, family welfare visitors, sub-assistant community medical officer and medical assistant (5 percent).

Lower order births are more likely than higher births to be assisted by doctors. A child born in an urban area is more likely to have been assisted by medical personnel (doctors, nurses, midwives, or family welfare visitors) than a rural child. Women who have attained secondary education or who are from wealthy households are more likely to be assisted at delivery by a medical professional than women with no education or who are from poorer households.

Table 2.4 Decision regarding assistance during delivery

Percent distribution of currently pregnant women by whether a decision on assistance during delivery was made and type of intended assistant, according to background characteristics, Bangladesh 2001

Background characteristic	Did not discuss assistance during delivery	Intended assistance during delivery:						Total	Number of pregnant women
		Doctor	Nurse/Midwife ¹	Trained TBA ²	Untrained TBA ²	Relative/other ³	Don't know missing		
Age at birth									
< 20	64.6	3.3	1.2	6.0	21.1	3.6	0.1	100.0	2,790
20-34	63.8	5.3	1.8	4.4	21.9	2.8	0.1	100.0	4,417
35+	67.7	1.6	1.5	3.0	23.3	2.9	0.0	100.0	406
Number of live births⁴									
0	73.3	5.3	1.4	3.4	14.0	2.5	0.1	100.0	2,642
1	60.5	7.0	2.1	5.8	21.6	2.9	0.1	100.0	1,894
2-3	59.5	2.9	1.7	5.9	26.1	3.8	0.1	100.0	1,975
4-5	57.6	0.4	1.0	5.1	32.2	3.7	0.0	100.0	728
6+	58.1	0.9	1.1	5.1	31.4	3.4	0.0	100.0	374
Residence									
Urban	57.7	14.0	3.4	4.2	18.6	1.9	0.2	100.0	1,371
Rural	65.7	2.3	1.2	5.0	22.3	3.3	0.1	100.0	6,242
Division									
Barisal	70.2	2.1	1.4	3.4	20.4	2.6	0.0	100.0	462
Chittagong	65.8	3.9	2.0	5.0	21.5	1.8	0.0	100.0	1,601
Dhaka	59.8	6.0	1.7	5.4	23.7	3.3	0.2	100.0	2,623
Khulna	61.4	6.2	1.8	5.3	20.6	4.4	0.3	100.0	741
Rajshahi	71.4	2.9	1.1	4.5	16.6	3.5	0.0	100.0	1,624
Sylhet	59.4	2.2	1.1	3.9	29.7	3.5	0.2	100.0	562
Education									
No education	64.6	0.6	0.6	4.8	25.9	3.5	0.0	100.0	2,833
Primary incomplete	65.0	1.0	0.8	4.2	25.2	3.7	0.1	100.0	1,331
Primary complete	64.0	2.1	1.0	5.8	23.3	3.7	0.1	100.0	892
Secondary+	63.7	11.2	3.3	5.1	14.5	2.1	0.1	100.0	2,557
Household wealth index									
1	68.1	0.4	0.4	4.5	23.1	3.4	0.0	100.0	1,726
2	68.2	0.7	0.6	4.5	22.1	3.8	0.0	100.0	1,570
3	64.6	1.2	1.3	5.8	23.7	3.4	0.0	100.0	1,452
4	65.1	3.1	1.9	5.3	22.0	2.5	0.1	100.0	1,520
5	53.4	18.7	4.2	4.3	16.8	2.2	0.3	100.0	1,345
Duration of pregnancy									
<4 months	76.1	4.4	0.8	3.2	13.7	1.8	0.0	100.0	2,217
4-6 months	66.6	4.7	1.6	4.6	19.6	2.8	0.1	100.0	2,861
7+ months	51.3	4.2	2.2	6.7	31.0	4.5	0.1	100.0	2,534
Total	64.3	4.4	1.6	4.9	21.7	3.1	0.1	100.0	7,613

¹ Includes family welfare visitor

² Traditional birth attendant

³ Includes untrained doctors

⁴ Before current pregnancy

Table 2.5 Place of delivery

Percent distribution of births in the three years preceding the survey by place of delivery, according to background characteristics, Bangladesh 2001

Background characteristic	Place of delivery						Total	Number of births
	At home	Any public health facility	Government hospital/ UHC/MCWC	UHFWC	NGO/private hospital/ clinic	Other		
Mother's age at birth								
< 20	91.9	5.6	5.4	0.2	2.3	0.2	100.0	12,562
20-34	90.5	5.7	5.6	0.1	3.6	0.2	100.0	24,312
35+	94.8	3.6	3.5	0.1	1.4	0.2	100.0	2,650
Birth order								
1	85.0	9.3	9.1	0.2	5.3	0.3	100.0	11,663
2-3	91.9	4.9	4.8	0.1	3.0	0.2	100.0	16,405
4-5	96.2	2.7	2.7	0.1	0.9	0.1	100.0	7,102
6+	97.3	2.1	2.0	0.1	0.5	0.1	100.0	4,355
Residence								
Urban	78.6	11.9	11.8	0.1	9.2	0.3	100.0	6,826
Rural	93.9	4.2	4.0	0.1	1.8	0.2	100.0	32,699
Division								
Barisal	95.2	3.6	3.5	0.1	1.1	0.1	100.0	2,615
Chittagong	92.3	5.5	5.3	0.1	2.2	0.0	100.0	8,247
Dhaka	89.8	5.6	5.5	0.1	4.2	0.4	100.0	13,531
Khulna	87.9	6.6	6.4	0.2	5.1	0.4	100.0	3,792
Rajshahi	91.7	6.1	6.0	0.1	2.1	0.1	100.0	8,359
Sylhet	94.5	3.5	3.4	0.0	1.9	0.2	100.0	2,980
Mother's education								
No education	97.1	2.3	2.2	0.1	0.5	0.1	100.0	17,668
Primary incomplete	94.9	3.7	3.6	0.1	1.2	0.2	100.0	7,296
Primary complete	93.1	5.2	5.2	0.1	1.4	0.2	100.0	4,220
Secondary+	77.9	12.4	12.1	0.3	9.3	0.3	100.0	10,340
Household wealth index								
1	97.7	1.8	1.8	0.0	0.3	0.1	100.0	9,893
2	96.5	2.7	2.7	0.1	0.6	0.2	100.0	8,670
3	95.0	3.8	3.6	0.2	1.1	0.2	100.0	7,504
4	91.4	6.4	6.1	0.2	2.1	0.1	100.0	6,948
5	69.9	15.9	15.8	0.1	13.7	0.4	100.0	6,509
Antenatal care visits								
None	97.9	1.6	1.5	0.0	0.4	0.1	100.0	20,714
1-3	90.8	6.7	6.5	0.2	2.4	0.1	100.0	14,165
4+	62.7	19.5	19.2	0.4	17.0	0.7	100.0	4,596
Total	91.2	5.5	5.4	0.1	3.1	0.2	100.0	39,525

Note: Total includes 49 births for which the number of antenatal care visits was not stated. UHC = Upazila health complex, MCWC = Maternal and child welfare center, UHFWC = Union health and family welfare center

Table 2.6 Assistance during delivery

Percent distribution of births in the three years preceding the survey by type of assistance during delivery, according to background characteristics, Bangladesh 2001

Background characteristic	Assistance during delivery								Total	Number of births
	Doctor	Nurse/ midwife/ FWV/ SACMO/ MA	HA/ FWA	Trained birth attendant	Untrained birth attendant	Untrained medical practitioner	Relative/ other	No one		
Mother's age at birth										
< 20	5.5	5.4	0.2	12.9	64.4	0.5	10.6	0.6	100.0	12,562
20-34	7.3	5.2	0.2	11.7	62.7	0.5	11.0	1.4	100.0	24,312
35+	3.7	3.2	0.0	9.4	69.1	0.5	10.8	3.2	100.0	2,650
Birth order										
1	11.4	7.7	0.3	13.2	58.4	0.5	8.2	0.3	100.0	11,663
2-3	5.8	5.0	0.2	12.4	63.4	0.4	11.5	1.2	100.0	16,405
4-5	2.7	2.8	0.1	11.1	68.0	0.4	12.9	2.0	100.0	7,102
6+	1.9	2.1	0.0	8.2	71.6	0.5	12.4	3.1	100.0	4,355
Residence										
Urban	16.6	10.2	0.2	11.9	53.6	0.2	6.4	0.8	100.0	6,826
Rural	4.4	4.0	0.2	11.9	65.8	0.5	11.8	1.4	100.0	32,699
Division										
Barisal	3.8	4.3	0.3	10.5	70.0	0.2	9.7	1.2	100.0	2,615
Chittagong	6.2	5.2	0.1	12.0	69.0	0.2	6.4	0.9	100.0	8,247
Dhaka	8.0	4.7	0.2	13.2	62.8	0.3	9.7	1.0	100.0	13,531
Khulna	8.4	7.6	0.4	13.0	59.0	1.8	8.9	0.9	100.0	3,792
Rajshahi	4.7	5.5	0.2	11.1	56.7	0.6	18.7	2.4	100.0	8,359
Sylhet	5.2	3.1	0.1	7.9	72.8	0.3	9.8	0.8	100.0	2,980
Mother's education										
No education	1.7	2.3	0.1	10.0	70.6	0.5	12.9	1.9	100.0	17,668
Primary incomplete	3.3	3.8	0.3	11.9	66.8	0.6	12.0	1.2	100.0	7,296
Primary complete	4.9	5.1	0.1	13.0	64.9	0.3	10.7	1.0	100.0	4,220
Secondary+	17.5	10.8	0.3	14.8	49.1	0.5	6.6	0.4	100.0	10,340
Household wealth index										
1	1.2	2.2	0.1	9.6	70.4	0.5	14.1	2.0	100.0	9,893
2	2.0	3.0	0.2	10.5	68.7	0.5	13.2	1.9	100.0	8,670
3	3.2	4.0	0.1	12.7	67.4	0.6	11.0	1.0	100.0	7,504
4	6.2	6.0	0.3	14.7	63.0	0.5	8.6	0.6	100.0	6,948
5	24.6	12.7	0.4	13.5	43.2	0.3	5.0	0.3	100.0	6,509
Antenatal care visits										
None	1.2	1.9	0.1	9.0	72.2	0.5	13.4	1.7	100.0	20,714
1-3	6.4	6.6	0.3	15.4	60.8	0.5	9.0	0.9	100.0	14,165
4+	30.4	14.8	0.3	14.5	34.5	0.3	4.7	0.5	100.0	4,596
Total	6.5	5.1	0.2	11.9	63.7	0.5	10.8	1.3	100.0	39,525

Note: Total includes 49 births for which antenatal care visits are missing. MA = Medical assistant, SACMO = Sub-assistant community medical officer, HA = Health assistant, FWA = Family welfare assistant, FWV = Family welfare visitor

2.2.4 Medical Procedures Performed During Delivery

Two percent of babies born in Bangladesh are delivered with the use of forceps, while 3 percent are delivered by caesarean section (Table 2.7). Less than 1 percent of women receive blood transfusions during delivery while 15 percent of women receive intravenous (IV) fluid during delivery. All four medical procedures are more common among urban births, first births, births to women with some secondary education, and births to women in wealthy households. They are also higher for mothers who have had more antenatal care visits.

Table 2.7 Procedures performed during delivery					
Among births in the three years preceding the survey, the percentage in which specific delivery procedures were performed, by background characteristics, Bangladesh, 2001					
Background characteristic	Delivery procedure				Number of births
	Forceps	Caesarean section	Blood transfusion	Received intravenous fluid	
Mother's age at birth					
< 20	1.8	1.9	0.6	15.9	12,562
20-34	1.7	3.1	0.8	14.4	24,312
35+	0.9	1.3	0.7	9.9	2,650
Birth order					
1	3.4	4.7	1.1	24.4	11,663
2-3	1.2	2.4	0.7	12.4	16,405
4-5	0.8	0.8	0.4	8.3	7,102
6+	0.5	0.6	0.3	7.0	4,355
Residence					
Urban	3.4	7.5	1.5	27.0	6,826
Rural	1.4	1.6	0.6	12.0	32,699
Division					
Barisal	1.0	1.6	0.6	9.6	2,615
Chittagong	1.8	2.2	0.6	15.4	8,247
Dhaka	1.9	3.4	0.8	15.6	13,531
Khulna	2.3	3.6	0.9	19.1	3,792
Rajshahi	1.2	1.8	0.7	13.1	8,359
Sylhet	1.8	1.9	0.7	10.9	2,980
Mother's education					
No education	0.6	0.6	0.4	7.2	17,668
Primary incomplete	0.9	1.1	0.5	10.6	7,296
Primary complete	1.4	1.7	0.6	13.7	4,220
Secondary+	4.4	7.5	1.5	30.4	10,340
Household wealth index					
1	0.5	0.4	0.3	5.8	9,893
2	0.6	0.7	0.4	8.4	8,670
3	1.0	0.9	0.5	11.2	7,504
4	2.1	2.0	0.8	16.6	6,948
5	5.4	11.2	2.1	37.9	6,509
Antenatal care visits					
None	0.5	0.4	0.3	6.7	20,714
1-3	1.9	2.1	0.8	16.9	14,165
4+	6.8	14.0	2.6	43.2	4,596
Total	1.7	2.6	0.7	14.6	39,525

Note: Total includes 49 births for which antenatal care visits is missing.

2.3 Physical Checkup after Delivery

A number of problems women experience surrounding childbirth occur in the postpartum period, the six weeks following delivery. Such problems can be detected and treated through proper follow-up visits for women in the postpartum period. In the BMMS, for each birth in the three years preceding the survey, respondents were asked whether they saw a doctor, nurse, or midwife for a check-up during the two months after the delivery.

Table 2.8 presents data on physical checkup after delivery attendance by background characteristics of the women. In only 16 percent of deliveries, mothers reported that they saw someone for a checkup on their health after their deliveries. Women are slightly more likely to receive physical checkup after delivery for first births than for later births. Mothers with some secondary education were more than twice as likely and women from wealthy household were three times as likely to receive after delivery care than women with no education and women from the poorer households, respectively. There is wide variation across divisions, with only 6-9 percent of women in Barisal, Chittagong, and Rajshahi Divisions reporting a post delivery physical checkup visit, compared with 22-28 percent of women in Dhaka, Khulna, and Sylhet Divisions. Among the mothers who received post delivery physical checkup, two-thirds saw a medically trained person.

Table 2.9 and Figure 2.1 present eight combinations of antenatal care, delivery care, and post delivery physical checkup for the live births in the last three years according to background characteristics. The column headings separate maternity care received from a doctor, nurse, or midwife into eight categories: 1) antenatal care (ANC) only; 2) delivery care (DC) only; 3) post delivery physical checkup (PDC) only; 4) antenatal and delivery care; 5) antenatal and post delivery care; 6) delivery care and post delivery care; 7) all three, and 8) neither antenatal care nor delivery care nor post delivery care from a trained provider.

Background characteristics show essentially the same differences seen separately for the three indicators, that is, births to less educated, and rural women and to women from poorer households are less likely to receive medical care than births to urban, more educated, and women from more affluent households.

Table 2.8 Physical checkup after delivery

Percent distribution of births in the three years preceding the survey by type of post delivery checkup received by the mother, according to background characteristics, Bangladesh, 2001

Background characteristic	Received post delivery care	Post delivery care received from:							Total	Number of births
		Doctor	Nurses/ midwife/ paramedic/ FWV/ SACMO/MA	HA/FWA	Untrained medical practitioner	Other	No one	Missing		
Mother's age at birth										
< 20	15.1	7.7	1.5	0.4	5.0	0.3	84.9	0.1	100.0	12,562
20-34	16.7	9.5	1.5	0.4	4.9	0.3	83.3	0.1	100.0	24,312
35+	15.5	6.7	1.2	0.6	6.4	0.5	84.5	0.0	100.0	2,650
Birth order										
1	19.9	12.7	1.7	0.4	4.5	0.3	80.1	0.1	100.0	11,663
2-3	15.3	8.1	1.4	0.4	4.9	0.4	84.7	0.1	100.0	16,405
4-5	13.0	5.6	1.4	0.3	5.5	0.2	86.9	0.1	100.0	7,102
6+	14.0	5.5	1.1	0.5	6.4	0.3	86.0	0.1	100.0	4,355
Residence										
Urban	23.7	17.8	1.9	0.4	3.1	0.4	76.2	0.1	100.0	6,826
Rural	14.5	6.8	1.4	0.4	5.5	0.3	85.5	0.1	100.0	32,699
Division										
Barisal	6.9	3.8	1.5	0.6	1.0	0.1	93.1	0.0	100.0	2,615
Chittagong	9.0	6.0	1.2	0.3	1.4	0.1	91.0	0.0	100.0	8,247
Dhaka	22.4	12.1	1.5	0.5	7.6	0.5	77.6	0.2	100.0	13,531
Khulna	27.3	13.0	1.4	0.6	11.3	0.9	72.7	0.1	100.0	3,792
Rajshahi	6.3	3.3	1.6	0.4	1.0	0.0	93.7	0.0	100.0	8,359
Sylhet	28.5	15.0	1.9	0.4	10.5	0.6	71.4	0.2	100.0	2,980
Mother's education										
No education	11.3	4.1	1.0	0.4	5.4	0.3	88.7	0.1	100.0	17,668
Primary incomplete	14.1	5.8	1.3	0.5	6.1	0.3	85.8	0.1	100.0	7,296
Primary complete	15.6	8.3	1.2	0.5	5.3	0.2	84.4	0.1	100.0	4,220
Secondary+	25.9	18.9	2.4	0.4	3.7	0.3	74.0	0.1	100.0	10,340
Household wealth index										
1	10.4	3.0	0.9	0.4	5.6	0.3	89.6	0.1	100.0	9,893
2	12.0	4.4	1.1	0.5	5.7	0.3	87.9	0.1	100.0	8,670
3	13.5	6.1	1.2	0.5	5.2	0.3	86.5	0.0	100.0	7,504
4	17.2	9.4	2.1	0.5	4.9	0.2	82.8	0.1	100.0	6,948
5	32.1	25.6	2.4	0.4	3.3	0.4	67.8	0.2	100.0	6,509
Antenatal care visits										
None	8.7	3.0	0.5	0.3	4.8	0.2	91.3	0.0	100.0	20,714
1-3	18.6	9.3	2.0	0.5	6.3	0.4	81.4	0.1	100.0	14,165
4+	41.4	32.7	4.2	1.0	2.7	0.5	58.6	0.2	100.0	4,596
Total	16.1	8.7	1.5	0.4	5.1	0.3	83.9	0.1	100.0	39,525

Note: Total includes 49 births for which antenatal care visits are missing. FWV = Family welfare visitor, MA = Medical assistant, SACMO = Sub-assistant community medical officer, HA = Health assistant, FWA = Family welfare assistant.

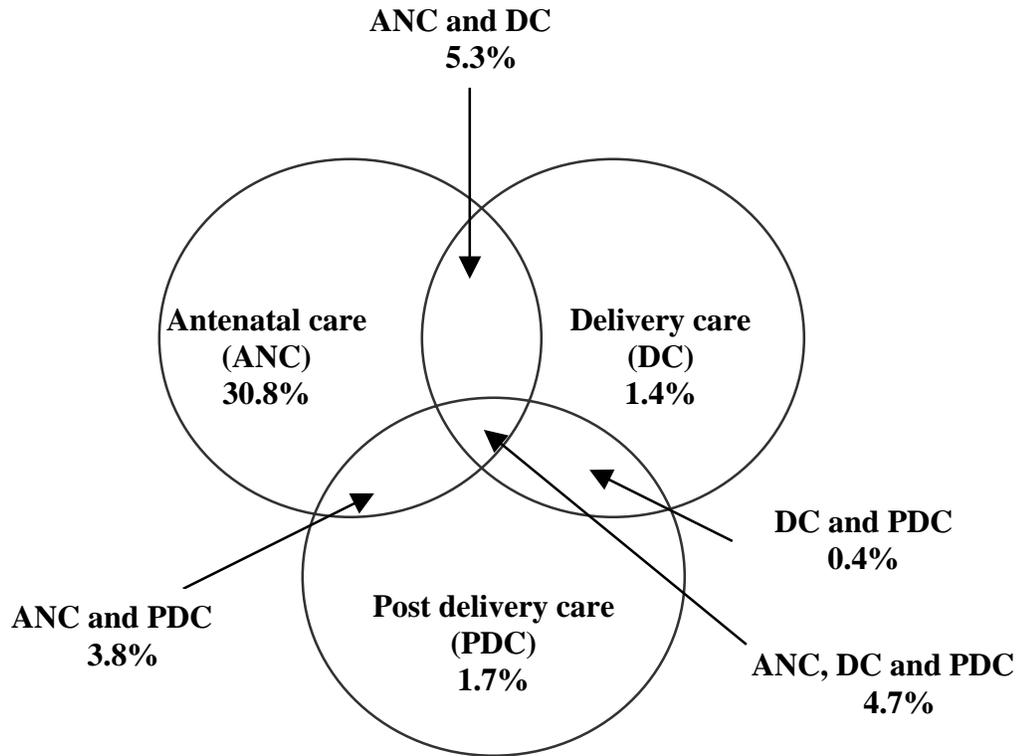
Table 2.9 Antenatal, delivery and post delivery care

Percent distribution of live births in the three years preceding the survey by whether the mother received antenatal care (ANC), delivery care (DC), and post delivery care (PDC) from medically trained persons¹, according to background characteristics, Bangladesh, 2001

Background characteristic	ANC only	DC only	PDC only	Both ANC and DC	Both ANC and PDC	Both DC and PDC	ANC, DC and PDC	Neither ANC, nor DC, nor PDC	Missing	Total	Number of births
Mother's age at birth											
< 20	33.9	1.7	1.4	5.1	3.9	0.5	3.7	49.6	0.2	100.0	12,562
20-34	30.0	1.3	1.8	5.7	3.9	0.4	5.4	51.5	0.2	100.0	24,312
35+	23.4	1.2	2.5	2.8	3.1	0.6	2.4	63.9	0.2	100.0	2,650
Pregnancies in last 3 years											
1	31.3	1.4	1.7	5.6	3.8	0.4	5.1	50.4	0.2	100.0	33,218
2	28.1	1.4	1.9	3.4	3.6	0.5	2.3	58.5	0.3	100.0	6,217
3	22.2	7.6	2.0	3.9	5.2	0.0	7.0	52.0	0.0	100.0	89
Birth order											
1	34.2	2.0	1.3	8.3	4.4	0.8	8.4	40.4	0.3	100.0	11,663
2-3	32.3	1.2	1.6	5.4	3.9	0.3	4.2	51.1	0.1	100.0	16,405
4-5	27.3	1.1	2.0	2.4	3.3	0.2	1.9	61.6	0.2	100.0	7,102
6+	21.8	1.1	2.8	1.6	2.9	0.4	1.0	68.2	0.3	100.0	4,355
Residence											
Urban	32.6	1.8	1.3	11.7	5.3	0.6	12.9	33.6	0.2	100.0	6,826
Rural	30.4	1.3	1.8	3.9	3.5	0.4	2.9	55.5	0.2	100.0	32,699
Division											
Barisal	22.4	1.5	1.5	5.0	2.3	0.2	1.9	65.3	0.0	100.0	2,615
Chittagong	28.4	1.6	1.1	6.2	2.7	0.2	3.6	56.4	0.0	100.0	8,247
Dhaka	32.0	1.0	2.4	4.5	4.4	0.6	6.6	48.0	0.4	100.0	13,531
Khulna	35.3	1.8	2.0	6.6	4.9	0.9	7.1	41.2	0.2	100.0	3,792
Rajshahi	32.0	1.8	0.5	6.2	2.3	0.2	2.2	54.7	0.0	100.0	8,359
Sylhet	30.3	1.0	3.7	2.2	8.4	0.3	4.9	48.8	0.4	100.0	2,980
Mother's education											
No education	25.9	1.1	1.9	1.8	2.3	0.4	0.9	65.4	0.2	100.0	17,668
Primary incomplete	32.0	1.7	1.8	3.7	3.8	0.5	1.5	54.8	0.1	100.0	7,296
Primary complete	34.9	1.7	2.1	4.8	4.3	0.4	3.3	48.5	0.1	100.0	4,220
Secondary+	36.6	1.5	1.2	12.6	6.1	0.6	13.9	27.3	0.3	100.0	10,340
Household wealth index											
1	23.9	1.1	1.6	1.5	2.0	0.4	0.4	69.0	0.2	100.0	9,893
2	28.4	1.5	1.9	2.4	2.8	0.3	1.0	61.7	0.2	100.0	8,670
3	33.0	1.2	1.9	3.7	3.6	0.5	1.9	54.1	0.2	100.0	7,504
4	37.9	1.7	2.0	5.9	5.0	0.6	4.3	42.3	0.2	100.0	6,948
5	34.4	1.4	1.3	16.1	7.0	0.5	19.5	19.5	0.3	100.0	6,509
Total	30.8	1.4	1.7	5.3	3.8	0.4	4.7	51.7	0.2	100.0	39,525

¹ Doctor, nurse, paramedic, family welfare visitor, sub-assistant community medical officer, health assistant, and family welfare assistant.

Figure 2.1 Selected maternal care in Bangladesh



**Percentage of births for which mothers received
neither ANC nor DC nor PDC: 51.7 percent**

2.4 Consistency of Maternal Service Use

Those women who had given birth in last three years, only 8 percent had more than one birth. The patterns of maternal service use among these respondents can be studied using a woman-based analysis as presented in Tables 2.10 and 2.11. The question of interest is whether women can be considered as consistent users or nonusers of maternal health services such as antenatal care and delivery care. While this analysis does not provide a comprehensive picture of service use over a lifetime, it does suggest that for this sub-sample of respondents, more than half consistently failed to receive antenatal care and 88 percent consistently failed to receive medical assistant at the time of delivery. Differentials are reinforced in this analysis as we see women who are older, less educated, living in rural areas, and from poorer households more commonly fail to receive maternal care.

Table 2.10 Patterns of antenatal care

Percent distribution of women with two or more births in the three years preceding the survey by consistency of antenatal care (ANC), for the two most recent births, according to background characteristics, Bangladesh 2001

Background characteristic	Women with more than one birth in last 3 years			Total	Number of women
	Received ANC for both births	Received no ANC for either birth	Received ANC for one birth		
Residence					
Urban	39.3	39.4	21.1	100.0	447
Rural	23.9	55.3	20.6	100.0	2,590
Division					
Barisal	13.4	68.3	18.3	100.0	162
Chittagong	25.0	56.7	18.3	100.0	710
Dhaka	26.7	52.3	20.8	100.0	1,027
Khulna	34.9	41.0	24.1	100.0	212
Rajshahi	24.2	52.5	23.2	100.0	557
Sylhet	30.8	48.3	20.2	100.0	369
Education					
No education	17.0	62.8	20.1	100.0	1,563
Primary incomplete	24.9	52.9	22.2	100.0	531
Primary complete	31.3	46.5	22.1	100.0	336
Secondary+	48.3	31.3	20.2	100.0	607
Household wealth index					
1	15.7	66.8	17.3	100.0	898
2	19.0	58.1	22.8	100.0	729
3	25.7	52.6	21.5	100.0	585
4	35.2	40.5	24.2	100.0	470
5	56.5	24.2	19.0	100.0	355
Total	26.2	53.0	20.7	100.0	3,037

Table 2.11 Patterns of delivery care

Delivery care (DC) received from medically trained personnel among women with more than one birth in the three years prior to survey, by consistency of receipt of DC between the last birth and the previous births and background characteristics, Bangladesh, 2001

Background characteristic	Women with more than one birth in last 3 years			Total	Number of women
	Received DC for both births	Received no DC for either birth	Received DC for one birth		
Residence					
Urban	9.2	76.7	14.0	100.0	447
Rural	2.5	90.1	7.1	100.0	2,590
Division					
Barisal	1.2	93.1	5.7	100.0	162
Chittagong	3.0	88.2	8.8	100.0	710
Dhaka	2.9	88.6	7.7	100.0	1,027
Khulna	7.1	81.9	11.0	100.0	212
Rajshahi	4.3	86.9	8.8	100.0	557
Sylhet	3.8	90.1	5.8	100.0	369
Education					
No education	1.0	93.7	4.9	100.0	1,563
Primary incomplete	2.5	88.9	8.3	100.0	531
Primary complete	3.3	86.1	10.6	100.0	336
Secondary+	10.9	74.2	14.7	100.0	607
Household wealth index					
1	0.7	94.7	4.3	100.0	898
2	1.1	92.1	6.1	100.0	729
3	2.6	90.1	7.3	100.0	585
4	3.5	84.3	12.2	100.0	470
5	17.1	65.1	17.5	100.0	355
Total	3.5	88.1	8.1	100.0	3,037

III. MATERNAL HEALTH COMPLICATIONS AND CARE SEEKING BEHAVIOR

3.1 Knowledge of Life-threatening Conditions

An additional objective of the BMMS was to gain a better understanding of Bangladeshi women's knowledge of, reported prevalence of, and associated treatment-seeking behavior for maternal health complications. To investigate this issue, all eligible women interviewed in the BMMS were questioned about their knowledge concerning specific life-threatening complications during pregnancy, delivery, and after delivery. In addition, the sub-sample of women who reported a pregnancy within the 36 months preceding the survey were asked an extensive series of questions about complications experienced during pregnancy, delivery, and after delivery and whether they were perceived as dangerous or potentially life threatening; whether treatment was sought for complications; decision making concerning treatment of complications; associated delays in the recognition, travel, and treatment of complications; and the overall costs of treatment. This chapter presents selected key findings from the survey on maternal complications and related health-seeking behavior. A more extensive set of findings will be presented in the final survey report.

Knowledge about life-threatening conditions of pregnancy is a precursor to treatment-seeking behavior and reductions in maternal mortality and morbidity. In the BMMS, women were asked which symptoms or conditions of pregnancy could be serious or life threatening. Awareness of life-threatening conditions during pregnancy, delivery, or after delivery appears low among Bangladeshi women (Table 3.1). While 56 percent of women cited tetanus as life threatening, only a minority of women identified retained placenta (38 percent), obstructed labor (37 percent), convulsions (26 percent), bad fetal position (25 percent), or excessive bleeding (18 percent) as potentially life threatening. While knowledge of life-threatening conditions was somewhat lower among the youngest group of women (13-19 years), differentials in knowledge according to demographic, residential or socioeconomic status were modest, with low levels of knowledge evident for almost all subgroups.

3.2 Complications During Pregnancy, Delivery, or After Delivery

Table 3.2 shows the prevalence of reported maternal complications among all pregnancies that occurred in the three years preceding the BMMS survey. It is striking that for 60 percent of these pregnancies, women reported one or more complications; only 40 percent of pregnancies were free of complications. The most commonly reported complication overall is headache/blurry vision/high blood pressure/edema (50 percent), followed by breech delivery/prolonged or obstructed labor/torn uterus (24 percent), then abdominal pain and related complications (15 percent), and excessive bleeding (13 percent). Less commonly reported complications include convulsions (6 percent), retained placenta (5 percent), and high fever with foul-smelling discharge (4 percent).

Overall, 45 percent of all pregnancies with complications were perceived as dangerous or potentially life threatening. Among women who experience the complications of retained placenta and breech delivery/prolonged/obstructed labor, 76 percent and 70 percent, respectively viewed these conditions as dangerous or potentially life threatening. A majority of respondents who reported having convulsions (59 percent) and excessive bleeding (55 percent) viewed them as dangerous or potentially life threatening. Lower but still significant proportions of women reporting abdominal pain and related complications (44 percent), headache/blurry vision/high blood pressure/edema (31 percent), and high fever with foul smelling discharge (30 percent) viewed them as dangerous.

Table 3.1 Knowledge of life-threatening conditions during pregnancy, delivery, and after delivery

Percentage of women who know of life-threatening conditions during pregnancy, at delivery, and after delivery, by type of condition and background characteristics, Bangladesh 2001

Background characteristic	Severe headache, blurry vision, high blood pressure	Edema/pre-eclampsia	Con-vulsions/eclampsia	Excessive vaginal bleeding	Foul smelling discharge with high fever	Jaundice	Tetanus	Baby's hands or feet come first/baby in bad position	Pro-longed labor	Obstruct-ed labor	Retained placenta	Torn uterus	Anemia	Weakness	Mal-nutrition	Other	Don't know any	Number of births
Age																		
13-19	5.2	5.4	17.1	11.6	0.8	3.1	43.3	18.3	10.9	27.8	28.8	3.3	2.9	1.2	0.7	4.7	20.8	15,097
20-24	7.2	7.0	24.1	16.9	0.9	3.9	52.5	24.2	12.0	34.2	36.6	4.5	4.5	1.4	0.8	5.5	10.4	19,417
25-29	8.4	7.6	27.7	19.1	0.9	4.4	58.5	25.3	12.1	37.0	39.3	5.1	5.2	1.4	0.7	5.6	7.4	17,840
30-34	8.7	8.3	28.7	20.4	1.0	4.9	61.1	26.4	12.6	39.1	41.2	5.3	5.6	1.7	0.8	5.9	5.9	16,736
35-39	8.6	7.9	28.8	20.0	1.0	4.4	60.6	26.1	12.0	41.0	41.5	5.6	5.0	1.4	0.8	5.2	6.3	13,809
40-44	8.3	7.5	28.8	19.7	1.0	4.5	58.9	26.8	12.2	42.7	41.1	5.6	4.9	1.3	0.6	6.0	6.6	11,083
45-49	7.3	7.5	28.7	18.8	0.9	4.3	58.4	27.2	12.8	44.2	41.9	5.6	4.1	1.3	0.6	6.0	6.9	8,190
Residence																		
Urban	9.7	8.5	27.6	20.6	1.0	5.6	55.8	24.9	11.3	33.5	33.5	5.1	8.2	2.0	1.2	6.2	9.5	19,896
Rural	7.1	6.9	25.3	17.1	0.9	3.9	55.4	24.4	12.1	37.7	39.0	4.8	3.7	1.3	0.6	5.3	10.0	83,900
Division																		
Barisal	7.2	7.0	23.6	19.7	0.7	3.2	61.4	23.0	9.5	30.9	41.0	6.7	1.5	0.1	0.1	1.1	12.0	6,839
Chittagong	8.4	8.1	16.3	17.6	0.9	5.8	50.2	32.7	10.2	32.7	30.3	4.9	1.3	0.1	0.1	0.9	15.0	18,275
Dhaka	5.8	7.1	27.1	17.1	0.8	4.5	59.4	22.9	13.2	41.3	34.0	5.2	6.8	2.7	1.4	9.7	7.7	35,848
Khulna	5.9	6.5	28.5	19.3	1.2	3.7	59.3	21.7	10.9	40.2	40.9	5.3	9.3	2.7	1.5	9.4	6.5	12,307
Rajshahi	7.7	6.6	25.7	19.6	1.0	3.3	55.0	22.8	10.9	33.3	50.3	4.1	2.8	0.1	0.0	0.9	10.3	24,495
Sylhet	18.8	8.8	42.9	9.2	0.9	2.7	35.9	22.9	19.3	37.8	25.1	3.0	2.8	1.9	0.6	9.9	10.7	6,032
Education																		
No education	6.8	5.7	25.4	14.4	0.8	3.6	53.3	23.7	12.2	39.1	39.1	4.6	2.7	1.3	0.4	5.3	10.6	48,243
Primary incomplete	6.7	6.6	25.2	17.3	0.9	4.2	57.2	24.5	12.5	39.8	40.8	5.2	3.9	1.6	0.5	6.2	8.9	18,630
Primary complete	7.1	7.8	24.9	17.9	1.0	4.4	57.4	23.8	12.4	36.4	37.7	5.3	4.5	1.5	0.6	5.4	10.1	10,764
Secondary+	9.8	10.1	27.1	24.1	1.3	5.1	57.4	26.1	10.9	30.9	33.9	4.9	8.6	1.4	1.6	5.2	9.2	26,159
Household wealth index																		
1	7.1	5.4	26.1	12.8	0.7	3.3	51.0	22.0	12.1	37.6	37.6	4.5	2.3	1.2	0.3	5.5	12.1	21,186
2	6.6	6.1	25.0	15.0	0.8	3.5	55.4	23.2	12.3	38.4	39.9	4.9	3.0	1.2	0.5	5.5	10.3	20,982
3	6.6	6.4	23.9	17.0	0.9	4.0	57.1	24.1	11.9	38.3	40.2	4.6	3.8	1.4	0.5	5.2	9.8	20,491
4	7.1	7.9	23.7	19.2	1.1	4.5	58.2	25.7	12.0	37.6	39.5	5.2	4.3	1.3	0.7	5.1	9.4	20,257
5	10.5	10.3	29.8	25.0	1.2	5.7	55.8	27.4	11.5	32.5	32.7	5.2	9.6	1.9	1.7	6.0	7.9	20,880
Total	7.6	7.2	25.7	17.8	0.9	4.2	55.5	24.5	12.0	36.9	38.0	4.9	4.6	1.4	0.7	5.5	9.9	103,796

<u>Table 3.2 Prevalence of complications during pregnancy, delivery, or after delivery</u>		
Percentage of pregnancies in the last three years with complications during pregnancy, at delivery, or after delivery, by type of complication, and of those with a complication the percentage that were considered dangerous or potentially life threatening, by background characteristics, Bangladesh 2001		
Complication	Percentage reporting complications	Among those with specific complication, percentage considered life threatening
No complication	40.0	NA
Headache, blurry vision, high blood pressure, edema, pre-eclampsia	49.8	31.1
Excessive bleeding	13.1	55.3
High fever with foul smelling discharge	4.3	29.5
Convulsions, eclampsia, tetanus,	5.5	59.1
Hands/feet came first, prolonged labor, torn uterus, obstructed labor	24.3	70.2
Retained placenta	4.6	76.0
Abdominal pain, vomiting, diarrhea, weakness, premature leakage, other	15.3	43.8
Total	60.0 ¹	45.0 ²
Number of pregnancies in last three years	39,525	NA
Number of pregnancies with any complication	NA	23,696
NA = Not applicable; ¹ Any complications; ² Any life threatening complications		

3.3 Time Taken to Recognize Complications

For all complications, one-fourth were recognized immediately and another one-fourth within six hours of their onset; 17 percent were not recognized until seven or more days after their onset (Table 3.3). While 55 percent of life-threatening complications were recognized within six hours of their onset, only 40 percent of non-life-threatening complications were recognized this early. Little variation in delay in recognizing complications was evident by urban-rural or divisional residence or educational attainment.

3.4 Time Delay Between Recognizing Complications and Deciding to Seek Treatment

Table 3.4 provides information about delays between symptom recognition and the decision to seek treatment. Overall, the decision to seek treatment was made within 6 hours for 61 percent of cases with complications for which the mother sought treatment. For 19 percent of complication cases, this decision required 3 or more days. The decision to seek care rapidly (<6 hours) was more common when the complication was perceived as life threatening (64 percent versus 50 percent of cases). Urban women were somewhat more likely than rural women to make the decision to seek treatment within 6 hours of recognition of complications. Separate analysis (not shown) indicates that a very high proportion of women (90 percent) actually initiated seeking care soon after they reached the decision to do so.

Table 3.3 Time taken to recognize complications									
Among pregnancies in the last three years with a complication, percent distribution by length of time taken to recognize complication, according to background characteristics, Bangladesh 2001									
Complication/ Background characteristic	Time to recognize complication						Don't know/ missing	Total	Number of pregnancies
	Immediately	< 6 hours	6-23 hours	1-2 days	3-6 days	7+ days			
Complication									
Life threatening	25.9	28.8	5.8	11.0	7.8	15.0	5.6	100.0	17,335
Non-life threatening	23.7	16.7	2.9	11.7	10.5	22.5	12.0	100.0	6,362
Residence									
Urban	25.8	25.7	5.6	11.1	8.7	16.5	6.7	100.0	4,232
Rural	25.2	25.5	4.9	11.2	8.5	17.2	7.5	100.0	19,464
Division									
Barisal	26.5	22.7	5.0	10.7	10.4	18.1	6.6	100.0	1,284
Chittagong	22.2	28.8	5.6	11.8	9.2	17.4	4.9	100.0	4,048
Dhaka	27.1	24.0	4.9	11.3	8.0	16.2	8.6	100.0	9,692
Khulna	24.6	25.7	5.5	11.0	8.4	17.0	7.9	100.0	2,811
Rajshahi	24.0	28.5	5.3	10.7	8.7	17.7	5.1	100.0	3,731
Sylhet	25.6	22.8	4.1	10.9	8.2	18.5	9.9	100.0	2,131
Total	25.3	25.5	5.1	11.2	8.5	17.1	7.3	100.0	23,696

Table 3.4 Time between recognizing the complication as a problem and making the decision to seek treatment									
Percent distribution of pregnancies in the last three years for which the mother sought treatment for the most recent complication, by time between recognizing the complication as a problem and making the decision to seek treatment, according to type of complication and background characteristics, Bangladesh, 2001									
Complication/ Background characteristic	Time taken to decide to seek treatment					Don't know/ missing	Total	Number of pregnancies	
	< 6 hours	6-24 hours	1-2 days	3-6 days	7+ days				
Complication									
Life threatening	63.5	4.8	14.6	7.0	9.9	0.2	100.0	10,640	
Non-life threatening	49.8	3.3	20.1	10.0	16.7	0.2	100.0	2,688	
Residence									
Urban	67.2	4.0	14.3	6.1	8.1	0.2	100.0	2,722	
Rural	59.1	4.6	16.0	8.0	12.1	0.2	100.0	10,606	
Division									
Barisal	59.3	4.3	14.6	8.2	13.5	0.1	100.0	662	
Chittagong	64.2	3.6	15.3	7.7	9.1	0.1	100.0	2,517	
Dhaka	58.9	4.8	16.6	7.9	11.4	0.3	100.0	5,245	
Khulna	59.6	6.1	14.7	6.9	12.4	0.2	100.0	1,628	
Rajshahi	65.4	3.5	14.5	6.7	9.8	0.1	100.0	2,043	
Sylhet	56.1	4.1	16.7	8.3	14.6	0.1	100.0	1,233	
Total	60.8	4.5	15.7	7.6	11.3	0.2	100.0	13,328	

3.5 Care-seeking by Type of Complications

Table 3.5 shows that overall, women sought medical care for 56 percent of pregnancies with complications over the past three years. The propensity to seek care also varied considerably according to the specific complication reported: over three-fourths of women reporting either abdominal pain and related complications or convulsions sought care, as contrasted with 60 percent with excessive bleeding, 55 percent with prolonged or obstructed labor, and only 36 percent with retained placenta. The likelihood of seeking care varied substantially by the perceived severity of the complication: medical care was sought in 61 percent of the cases perceived as dangerous or life threatening, compared with only 42 percent of cases viewed as non-life threatening, a difference which was maintained within each specific set of complications. Urban residence and especially mother's education were both positively related to the propensity to seek treatment, while differentials by division were relatively minor.

Table 3.5 Seeking care for complications						
Among pregnancies in the last three years with a complication, percentage for which mothers sought care, by whether complication was life threatening or not, according to most recent complications, and background characteristics, Bangladesh, 2001						
Most recent complication/ Background characteristic	Life threatening		Non-life threatening		All	
	Sought care	Number	Sought care	Number	Sought care	Number
Most recent complications						
Headache, blurry vision, high blood pressure, edema, pre-eclampsia	55.4	4,511	34.1	3,579	46.0	8,090
Excessive bleeding	64.6	2,539	37.7	581	59.6	3,120
High fever with foul smelling discharge	74.3	374	54.1	127	69.2	501
Convulsions, eclampsia, tetanus	77.7	982	57.7	87	76.1	1,069
Hands/feet came first, prolonged labor, torn uterus, obstructed labor	56.8	5,433	43.6	691	55.3	6,124
Retained placenta	37.7	1,206	19.7	124	36.1	1,330
Abdominal pain, vomiting, diarrhea, weakness, premature leakage, other	83.8	2,290	70.0	1,071	79.4	3,361
Residence						
Urban	68.8	3,065	52.7	1,168	64.3	4,232
Rural	59.8	14,270	39.9	5,194	54.5	19,464
Division						
Barisal	55.1	1,007	38.8	277	51.6	1,284
Chittagong	67.0	3,018	48.0	1,030	62.2	4,048
Dhaka	59.3	6,984	40.6	2,708	54.1	9,692
Khulna	64.8	1,984	41.3	827	57.9	2,811
Rajshahi	60.7	2,714	39.0	1,017	54.8	3,731
Sylhet	60.6	1,628	49.1	503	57.9	2,131
Education						
No education	53.1	7,422	33.1	2,785	47.6	10,206
Primary incomplete	58.3	3,355	39.3	1,176	53.4	4,532
Primary complete	64.6	1,835	44.2	625	59.4	2,460
Secondary+	75.4	4,723	57.9	1,776	70.6	6,498
Total	61.4	17,335	42.2	6,362	56.2	23,696

3.6 Type of Assistance Sought

Table 3.6 shows the breakdown by type of assistance sought for maternal complications. It is notable that among the 56 percent of women who sought care for complications, a higher proportion sought non-facility treatment than treatment at a facility (30 percent versus 26 percent). Women who reported potentially life-threatening complications were more likely to seek both facility and non-facility assistance than women with non-life-threatening complications. The proportion of complications where non-facility assistance was sought did not vary much by demographic or socioeconomic conditions. However, women giving birth for the first time, urban women, women who were more highly educated, and women in the highest socioeconomic strata were all substantially more likely to seek facility-based care.

Shown in Table 3.7 is the distribution by place where treatment for complications was initially sought among women who went to a facility for treatment. The facilities where women most commonly sought treatment were diverse; most commonly mentioned were government hospital facilities (hospital, Upazila Health Complex, or Maternal and Child Welfare Centre) (40 percent), followed by private doctors (20 percent), then NGOs and private health facilities (19 percent), and private traditional doctors (16 percent). Women with life-threatening complications who attended a facility were more likely than those with non-life-threatening complications to have sought treatment from a government hospital facility (43 percent vs. 30 percent), and less likely to have sought treatment from a private or traditional doctor. Treatment at a government hospital was more common among younger women and those pregnant with their first child. Utilization of NGO/private health facilities was much more common among urban respondents (30 percent versus 15 percent), and those of higher socioeconomic status, while seeking care through traditional doctors was much more prevalent among rural respondents and those of lower socioeconomic status.

Table 3.6 Type of assistance sought for complication					
Percent distribution of pregnancies in the last three years with complications by type of assistance sought, according to background characteristics, Bangladesh 2001					
Complication/ Background characteristic	Type of assistance sought			Total	Number of pregnancies
	Did not seek assistance	Sought assistance, but not at facility	Went to a facility/doctor		
Complication					
Life threatening	38.6	33.8	27.6	100.0	17,335
Non-life threatening ¹	57.7	20.3	22.0	100.0	6,354
Mother's age at birth					
< 20	45.1	30.5	24.4	100.0	7,626
20-34	42.8	29.8	27.4	100.0	14,424
35+	45.6	31.9	22.6	100.0	1,639
Birth order					
1	39.1	30.1	30.8	100.0	7,456
2-3	45.5	28.9	25.7	100.0	9,371
4-5	46.3	31.1	22.6	100.0	4,189
6+	46.8	33.2	20.0	100.0	2,672
Residence					
Urban	35.7	25.0	39.4	100.0	4,231
Rural	45.5	31.3	23.2	100.0	19,457
Division					
Barisal	48.4	29.0	22.6	100.0	1,284
Chittagong	37.8	34.9	27.2	100.0	4,048
Dhaka	45.9	27.8	26.4	100.0	9,685
Khulna	42.1	30.3	27.7	100.0	2,811
Rajshahi	45.2	30.9	23.9	100.0	3,731
Sylhet	42.1	31.1	26.9	100.0	2,129
Mother's education					
No education	52.4	29.9	17.7	100.0	10,203
Primary incomplete	46.6	30.6	22.7	100.0	4,530
Primary complete	40.6	32.4	27.0	100.0	2,460
Secondary+	29.4	29.3	41.3	100.0	6,496
Household wealth index					
1	54.4	28.9	16.7	100.0	5,830
2	49.9	30.9	19.2	100.0	5,101
3	45.0	32.6	22.5	100.0	4,442
4	37.4	33.7	28.8	100.0	4,109
5	26.4	24.9	48.7	100.0	4,207
Total	43.7	30.2	26.1	100.0	23,688

¹ Includes missing

Table 3.7 Type of facility visited for complication

Percent distribution of pregnancies in the last three years with complications for which mother visited a facility for treatment by first place where treatment was sought, according to background characteristics, Bangladesh 2001

Complication/ Background characteristic	Place respondent first went for treatment						Total	Number of pregnancies
	Government Hospital/ UHC/ MCWC	UHFWC, Satellite/ EPI clinic	NGO and private health facility	Private doctor	Traditional doctor/ other	Don't know/ missing		
Complication								
Life threatening	42.9	5.0	18.9	18.0	15.1	0.2	100.0	4,790
Non-life threatening	30.5	5.5	19.7	25.1	19.2	0.0	100.0	1,396
Mother's age at birth								
< 20	44.4	5.2	16.2	18.6	15.5	0.2	100.0	1,863
20-34	38.5	4.8	20.7	20.2	15.6	0.2	100.0	3,953
35+	35.8	7.9	16.1	17.3	22.6	0.3	100.0	370
Birth order								
1	46.2	4.2	23.1	15.9	10.5	0.1	100.0	2,297
2-3	38.0	5.3	19.1	20.7	16.7	0.2	100.0	2,407
4-5	35.3	6.1	13.6	23.4	21.2	0.3	100.0	948
6+	32.1	5.9	11.6	23.2	27.0	0.2	100.0	534
Residence								
Urban	40.9	2.8	30.4	17.3	8.4	0.2	100.0	1,666
Rural	39.8	5.9	14.9	20.4	18.8	0.2	100.0	4,519
Division								
Barisal	46.8	6.3	10.7	21.4	14.8	0.0	100.0	290
Chittagong	42.4	4.7	16.3	22.2	14.3	0.0	100.0	1,102
Dhaka	37.1	4.4	21.9	18.8	17.5	0.4	100.0	2,554
Khulna	40.0	4.9	24.6	13.1	17.2	0.2	100.0	778
Rajshahi	49.1	7.5	17.1	15.3	11.0	0.0	100.0	891
Sylhet	31.9	4.8	11.4	32.6	19.2	0.1	100.0	572
Mother's education								
No education	35.8	8.0	8.9	21.0	26.1	0.2	100.0	1,805
Primary incomplete	38.9	5.7	13.8	19.7	21.7	0.2	100.0	1,030
Primary complete	45.0	4.4	13.7	21.6	14.9	0.4	100.0	665
Secondary+	42.2	3.1	29.3	18.0	7.3	0.1	100.0	2685
Household wealth index								
1	37.0	6.5	6.4	18.2	31.8	0.2	100.0	972
2	38.5	6.7	9.9	19.9	24.6	0.3	100.0	982
3	41.0	5.8	11.1	20.7	21.4	0.1	100.0	998
4	47.3	5.9	14.7	21.5	10.4	0.2	100.0	1,185
5	37.8	2.8	35.9	18.4	4.9	0.1	100.0	2,049
Total	40.1	5.1	19.1	19.6	16.0	0.2	100.0	6,186

Note: Table excludes 8 cases missing data on all complications

UHC = Upazila health complex; MCWC = maternal and child welfare centre; UHFWC = union health and family welfare centre; EPI = Expanded program of immunization; NGO = nongovernmental organization

3.7 Travel Time to Facility

Table 3.8 shows data concerning the travel time to the facility, for those women who sought treatment at a facility for complications. Overall, 37 percent of women with complications required less than 30 minutes to reach the facility; 38 percent required travel of 30-60 minutes, and 19 percent required travel of longer than 60 minutes to reach the facility. A significant differential in travel time is evident for urban and rural respondents. Among urban respondents, 61 percent traveled less than 30 minutes to reach the facility, and only 7 percent had to travel more than one hour. Among rural respondents, however, only 28 percent traveled less than 30 minutes, while 23 percent had to travel longer than 60 minutes to reach the facility. Table 3.8 also shows that respondents with perceived dangerous or life-threatening complications appear more willing to travel further to reach facilities: 20 percent with dangerous complications versus 13 percent with non-dangerous complications traveled more than 60 minutes to reach the facility.

Table 3.8 Travel time to facility							
Percent distribution of pregnancies in the last three years with complications for which the mother visited a facility or medical professional for treatment, by travel time to facility, according to type of complication and background characteristics, Bangladesh 2001							
Complication/ Background characteristic	Travel time to facility					Total	Number
	< 30 minutes	30-60 minutes	1-2 hours	More than 2 hours	Don't know/ missing		
Complication							
Life threatening	34.8	38.4	13.8	6.6	6.4	100.0	4,790
Non-life threatening	43.1	37.7	9.9	3.5	5.9	100.0	1,396
Residence							
Urban	61.4	26.6	4.8	1.7	5.5	100.0	1,666
Rural	27.6	42.5	15.9	7.5	6.5	100.0	4,519
Division							
Barisal	33.3	31.9	17.9	9.6	7.3	100.0	290
Chittagong	36.8	40.8	13.1	5.0	4.4	100.0	1,102
Dhaka	39.8	36.5	12.2	5.3	6.2	100.0	2,554
Khulna	37.2	40.7	11.4	4.5	6.1	100.0	778
Rajshahi	32.8	38.3	14.0	6.8	8.2	100.0	891
Sylhet	29.7	40.8	13.3	9.3	6.9	100.0	572
Total	36.7	38.2	12.9	5.9	6.3	100.0	6,186

3.8 Waiting Time in Facility

Table 3.9 shows that a majority of women (64 percent) with pregnancy complications were seen immediately at the medical facility. For all complications, 86 percent of cases were seen within an hour after arrival at the health facility; only 2 percent had to wait more than two hours to be seen. Waiting time did not appear to vary significantly by whether the condition was perceived as life threatening or not. Similarly, little difference is evident in waiting time according to urban-rural residence or division.

Table 3.9. Waiting time in facility							
Percent distribution of pregnancies in the last three years with complications for which the mother visited a facility or medical professional for treatment, by waiting time in the facility before treatment was received for the complication, according to type of complication and background characteristics, Bangladesh 2001							
Complication/ Background characteristic	Waiting time in facility					Total	Number of pregnancies
	Seen immediately	Less than 1 hour	1-2 hours	More than 2 hours	Don't know/ missing		
Complication							
Life threatening	64.8	20.4	12.0	2.2	0.6	100.0	4,790
Non-life threatening	61.2	25.2	11.2	1.9	0.5	100.0	1,396
Residence							
Urban	64.8	21.9	10.2	2.1	1.0	100.0	1,666
Rural	63.7	21.3	12.4	2.2	0.4	100.0	4,519
Division							
Barisal	61.9	23.1	12.3	2.6	0.0	100.0	290
Chittagong	60.6	24.3	12.8	2.3	0.0	100.0	1,102
Dhaka	63.7	21.7	12.1	1.5	1.0	100.0	2,554
Khulna	61.2	23.7	11.0	3.4	0.7	100.0	778
Rajshahi	70.8	16.2	9.7	3.2	0.0	100.0	891
Sylhet	66.3	18.8	13.1	1.2	0.6	100.0	572
Total	64.0	21.5	11.8	2.1	0.6	100.0	6,186

3.9 Number of Facilities Where Treatment Sought

Table 3.10 shows that among women who attended a facility for treatment of complications, the vast majority sought treatment from only one place (88 percent). Seeking treatment from multiple facilities was somewhat more common when the condition was viewed as life threatening (13 percent) than non-life threatening (8 percent). Little variation in the propensity to seek treatment from multiple facilities was evident by urban-rural residence or educational attainment. It is interesting to note that significant variation existed across divisions in the likelihood of seeking treatment from more than one place—from a high of 19 percent of women attending facilities in Khulna Division to a low of 7 percent in Barisal Division.

Overall, 93 percent of women who attended a facility for complications indicated that they would recommend the last facility they attended to a friend for delivery (data not shown). This percentage did not differ significantly according to the whether the complication was perceived as life-threatening, urban-rural residence, division or educational attainment. It is notable that willingness to recommend to friends exceeded 90 percent for all facility types, with the exception of traditional doctors (88 percent).

3.10 Cost of Treatment for Complications

Table 3.11 shows the reported household expenditures for treatment for all deliveries/ complications during the three years preceding the survey. The costs of care varied markedly by whether complications occurred as well as by where treatment for complications was sought. For pregnancies/deliveries without complications, 43 percent of cases involved no treatment costs, and median expenditures were only 28 taka. For pregnancies/deliveries with complications, on the other hand, one-quarter of cases spent 1000 taka or more for treatment, and the median expenditure was 300 taka. Among pregnancies/deliveries with

complications, costs varied sharply by the treatment decision. Among those women with complications who did not seek treatment, 35 percent spent nothing and median expenditure was only 50 taka. Among women with complications who sought treatment other than a facility, 50 percent spent 500 taka or less on care and the median expenditure was 401 taka. Expenditures by women who sought facility-based care were substantially higher: 58 percent spent more than 1000 taka on treatment and 24 percent spent 5000 taka or more. Median expenditure for this group was 1000 taka. (The substantial gap between median and mean expenditures is a reflection of a skewed expenditure distribution, where a small proportion of respondents spent very large amounts on medical treatment).

Urban respondents spent considerably more than rural respondents to treat complications (median of 1400 versus 971 taka), despite the greater travel costs of the latter. Median expenditures were significantly lower for women with pregnancy complications in the Barisal and Rajshahi Divisions. Median expenditures were roughly five times higher among women with a secondary or higher education compared to uneducated women—among the latter, 22 percent indicated that they had paid nothing for treatment.

Table 3.10 Number of places visited when mothers went for treatment of complications				
Percent distribution of pregnancies in the last three years with complications for which the mother visited a health facility or medical professional for treatment by number of places visited, according to type of complication and background characteristics, Bangladesh 2001				
Complication/ Background characteristic	Number of places visited			Number of pregnancies
	One place only	More than one place	Total	
Complication				
Life threatening	86.6	13.3	100.0	4,790
Non-life threatening ¹	92.2	7.8	100.0	1,396
Residence				
Urban	87.0	12.9	100.0	1,666
Rural	88.2	11.8	100.0	4,519
Division				
Barisal	92.6	7.4	100.0	290
Chittagong	90.9	9.1	100.0	1,102
Dhaka	87.3	12.6	100.0	2,554
Khulna	81.3	18.7	100.0	778
Rajshahi	89.4	10.6	100.0	891
Sylhet	88.9	11.1	100.0	572
Education				
No education	89.3	10.7	100.0	1,805
Primary incomplete	87.5	12.5	100.0	1,030
Primary complete	88.2	11.8	100.0	665
Secondary+	87.0	12.9	100.0	2,685
Total	87.9	12.1	100.0	6,186
¹ Includes missing				

Table 3.11 Delivery cost.

Cost of deliveries with and without complications in the last three years according to selected background characteristics, Bangladesh 2001

	Delivery related cost						Mean and median delivery related cost		Number of women	Urban		Rural	
	Nothing	< 500	500 - 999	1000- 4999	5000 or more	DK/ missing	Mean	Median		Mean	Median	Mean	Median
Pregnancies/delivery without complications	43.1	40.0	7.1	6.1	1.7	2.0	404.0	28.4	15828	1115.0	101.0	266.0	21.0
Deliveries with complications	16.9	40.0	14.4	18.0	7.6	3.2	1460.9	300.0	23696	2947.0	500.0	1138.0	250.0
Who did not seek treatment	34.9	46.9	8.4	6.1	1.2	2.5	353.3	50.5	10368	658.0	101.0	301.0	50.0
Who sought treatment in a facility	1.9	21.0	16.5	33.5	24.1	2.9	4037.3	1000.3	6186	6143.0	1400.0	3960.0	971.0
Who sought treatment, but not in a facility	3.7	46.4	21.3	21.6	2.6	4.3	835.5	400.7	7142	1143.0	500.0	783.0	400.0
Total	27.4	40.0	11.5	13.2	5.2	2.7	1034.7	150.9	39525	2250.0	300.0	783.0	130.0

IV. MATERNAL MORTALITY

A major objective of the Bangladesh Maternal Mortality Survey was to measure maternal mortality at the national level and for major population subgroups. With this objective in view, the survey instruments included a variety of questions aimed at measuring maternal mortality. The household questionnaire included a section concerning deaths of usual residents of the household since April 1997. If any death was reported, further details regarding the name, sex, age at death, month and year of death, and cause of death were collected. In addition, if the deceased person was a woman age 13-49 at the time of death, three questions were asked—whether the woman died while she was pregnant, giving birth, or within 2 months of the end of the pregnancy, and a verbal autopsy was conducted with the household to ascertain whether or not the death was maternal.

The Women's Questionnaire was administered to all ever-married female household members age 13-49. This questionnaire included a complete sibling history: the name, sex, survival, age if still alive, age at and years ago of death if dead, for every live birth the respondent's mother had, excluding the respondent herself. Further, for any sisters who died at age 12 or later, the time of death relative to pregnancy, childbirth and the first two months after the end of the pregnancy was also ascertained.

Survey fieldwork was conducted during the first six months of 2001, and half the households covered had been interviewed by the end of March. Although household deaths were recorded for the period from April 1997 to the time of the survey, such deaths have only been tabulated for the 36 months before interview date, excluding the month of interview. Mortality estimates from the retrospective information on household deaths thus refer roughly to the period 1998 to 2000. The questions on household deaths allow two estimates of maternal mortality, one based on time of death relative to pregnancy (*pregnancy-related* deaths in WHO parlance) and the other based on the verbal autopsy (attempting to identify true *maternal* deaths). The data also permit the estimation of mortality rates by age and sex from all causes.

This chapter presents estimates of maternal mortality from the various types of information. This preliminary report will not examine differentials, which will be a focus of the final survey report. It will be useful first to review the overall estimates of mortality, in comparison with other data available for Bangladesh.

4.1 Mortality Estimates

Table 4.1 shows the numbers of deaths in the three years before the BMMS by sex and five-year age group, estimates of the person-years lived by the population for the corresponding age and sex groups, and the resulting age-specific mortality rates.² Table 4.1 also shows summary mortality measures, the probabilities of dying between 15 and 50, ${}_{35}q_{15}$, and 15 and 60, ${}_{45}q_{15}$.

Table 4.1 Mortality rates from household deaths						
Mortality rates by sex and age group 1998-2001 based on deaths in preceding three years reported in the household, Bangladesh 2001						
Age group	Males			Females		
	Deaths 1998-2001	Exposure time (years)	Age-specific mortality ¹	Deaths 1998-2001	Exposure time (years)	Age-specific mortality ¹
0-4	1,726	95,743	0.01836	1,436	92,417	0.01586
5-9	124	100,425	0.00125	137	97,856	0.00142
10-14	83	99,699	0.00085	91	99,247	0.00094
15-19	96	73,803	0.00133	97	89,302	0.00111
20-24	64	53,580	0.00122	78	70,824	0.00112
25-29	88	50,099	0.00178	91	57,358	0.00161
30-34	91	47,387	0.00195	100	49,076	0.00208
35-39	99	47,217	0.00214	90	40,523	0.00227
40-44	138	37,283	0.00376	86	31,834	0.00275
45-49	149	30,550	0.00498	104	24,180	0.00440
50-54	228	22,954	0.01010	111	19,856	0.00571
55-59	173	16,171	0.01091	217	18878	0.01176
60-64	447	17,066	0.02669	446	16,984	0.02682
65-69	365	11,856	0.03131	334	8,797	0.03874
70-74	733	13,383	0.05580	548	7,622	0.07338
75-79	325	5,648	0.05857	222	2,933	0.07717
80+	1,285	8,360	0.15676	1,149	6,388	0.18366
Missing	115			111		
Total	6,328	731,753	0.00865	5,447	734,842	0.00741
${}_{35}q_{15}$			0.08221			0.07384
${}_{45}q_{15}$			0.17735			0.15537

¹ Deaths with missing age at death have been distributed proportionately.

These rates refer approximately to the time period 1998 to 2000. Data from the sibling history can also be used to calculate age-specific mortality rates. Table 4.2 shows the age and sex specific mortality rates for the age range 15 to 50 for the time periods 0 to 4, 5 to 9 and 10 to 14 years before the survey, and the summary measure, the probability of dying between 15 and 50, ${}_{35}q_{15}$, for each period.

²Mortality rates were calculated from reported deaths and an estimate of the person-years of exposure based on the 2001 recorded numbers of persons and estimates of the population growth rates of each age group derived from the 1994 BDHS household age distribution and an estimate of overall population size in 1994.

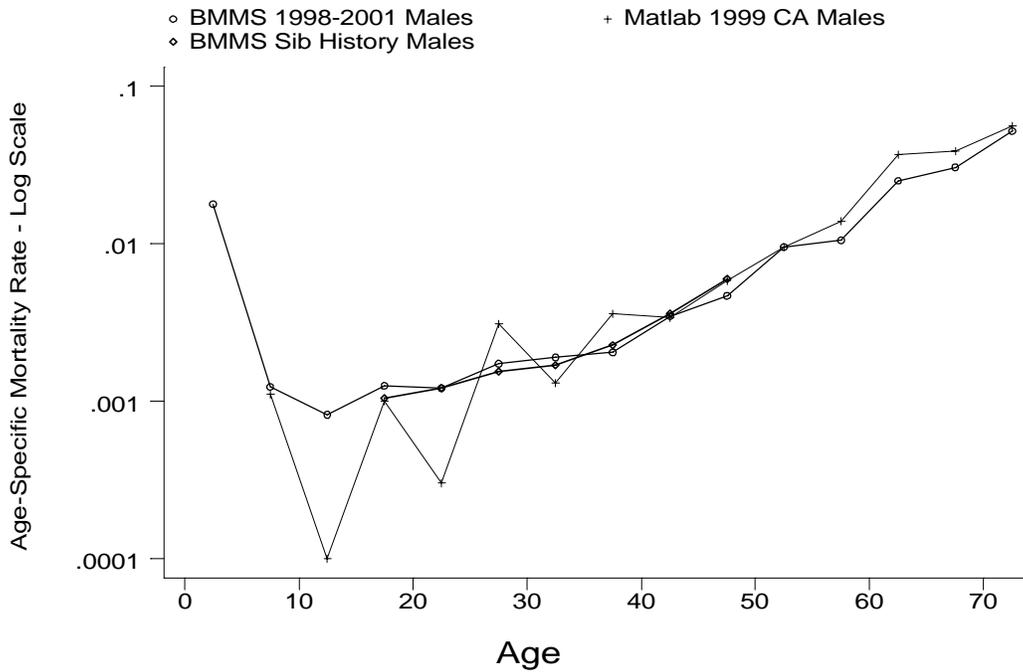
Age group	Male age-specific mortality rates			Female age-specific mortality rates		
	1986-1991	1991-1996	1996-2001	1986-1991	1991-1996	1996-2001
15-19	0.00132	0.00092	0.00104	0.00211	0.00196	0.00166
20-24	0.00153	0.00130	0.00121	0.00252	0.00264	0.00166
25-29	0.00170	0.00136	0.00154	0.00259	0.00221	0.00188
30-34	0.00256	0.00212	0.00168	0.00357	0.00276	0.00200
35-39	0.00322	0.00222	0.00227	0.00357	0.00326	0.00243
40-44	0.00676	0.00492	0.00361	0.00662	0.00498	0.00348
45-49	0.00571	0.00732	0.00595	0.00714	0.00590	0.00449
$_{35}q_{15}$	0.10783	0.09594	0.08289	0.13125	0.11019	0.08423

Fully validated national estimates of adult mortality for comparable time periods are not available. However, meticulous data gathering in Matlab Thana by ICDDR,B provides mortality measures that are deemed to be accurate for a rural population, albeit one that cannot be regarded as nationally representative. Figure 4.1 plots age-specific mortality rates from the Matlab Comparison Area for 1999 with the BMMS retrospective estimates for 1998-2000 and the BMMS sibling history estimates for 1996-2001 on a logarithmic scale, for males in Part a, for females in Part b. For males, the age specific mortality rates from the three sources are remarkably similar, except for sharp fluctuations in the rates between 10 and 30 from the Comparison Area, presumably the result of small numbers of deaths. Above age 50, the Comparison Area rates are slightly higher than the BMMS retrospective rates, and below age 30 the Comparison Area rates are on average somewhat lower than the BMMS rates. The probability of dying between 15 and 60, $_{45}q_{15}$, a standard measure of adult mortality, is 17.7 percent from the BMMS compared with 19.0 percent from the Comparison Area. The sibling history and retrospective rates from the BMMS between 15 and 50 are virtually indistinguishable: the probabilities of dying between 15 and 50, $_{35}q_{15}$ are 8.3 percent and 8.2 percent, respectively. The female rates show somewhat greater differences by source. The Comparison Area rates are lower at all ages except 15 to 19 than either of the BMMS sets, the $_{45}q_{15}$ estimates being 11.7 percent for the Comparison Area and 15.5 percent for the BMMS retrospective deaths. The BMMS sibling history rates are higher than the BMMS retrospective rates at all ages between 15 and 50, although the differences are trivial for the age groups 15 to 19 and 30 to 34; the summary $_{35}q_{15}$ values are 8.4 percent and 7.4 percent, respectively.

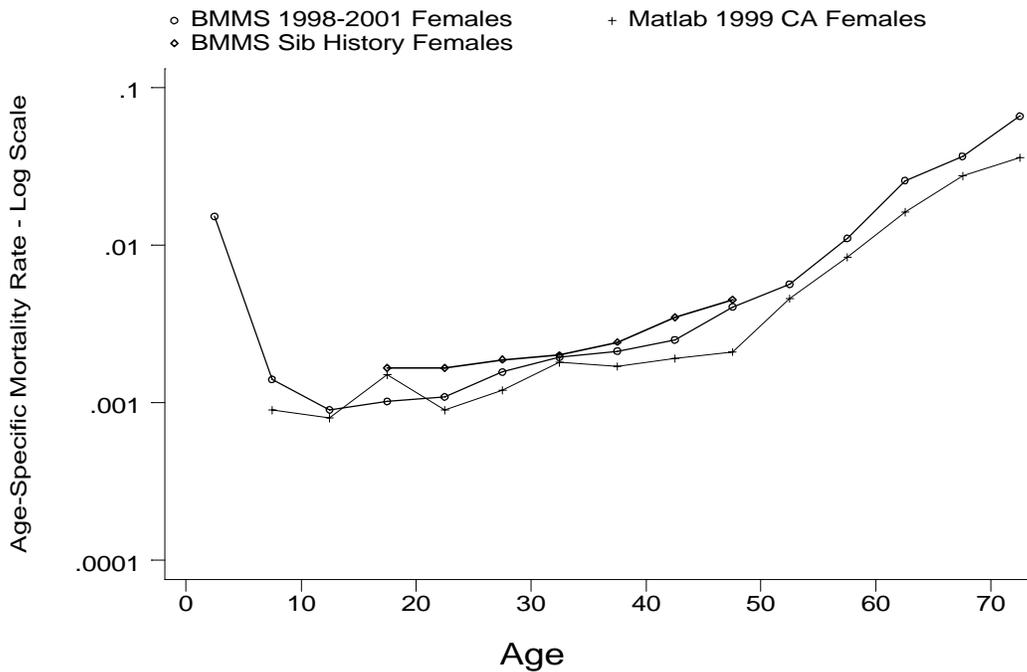
These comparisons provide no evidence for concern about data quality from the BMMS, though further analysis of data quality will be conducted for the final survey report. The mortality rates from both the information on deaths in the period 1998 to 2000 and the information on sibling survival give mortality estimates broadly consistent with indicators from Matlab. However, it should be noted that the sources indicate rather low adult mortality. The probability of dying between 15 and 60—in the range of 16 to 19 percent for both males and females—is comparable to mortality risks in the U.S. as recently as 1970.

Figure 4.1: Age-specific mortality rates from BMMS retrospective reporting of deaths, BMMS Sibling History for 1996-2001, and Matlab comparison Area 1999

a) Males



b) Females



4.2 Maternal Mortality

Measures of maternal mortality are available from the BMMS sibling history and from the BMMS retrospectively reported household deaths. Two methods of analysis have been proposed for the data on sisters, an indirect method due to Graham et al. (1989), and a direct method developed by Rutenberg and Sullivan (1991). The indirect method assumes (among other things) constant fertility, and since fertility has been falling rapidly in Bangladesh over the last two decades, it will not be used in this analysis. The BMMS retrospective deaths allow the estimation of a pregnancy-related mortality ratio based on a categorization of deaths by time of death relative to pregnancy, and the estimation of the maternal mortality ratio based on deaths categorized as maternal by the verbal autopsy.

4.2.1 Maternal Mortality Estimated from Deaths of Sisters

Rutenberg and Sullivan (1991) propose that information from a complete sibling history can be used to estimate maternal mortality rates directly. The event history format provides maternal deaths by age and period, plus exposure time by age and period, permitting the calculation of age-specific maternal mortality rates for defined periods. The periods used in this chapter are 0-4, 5-9 and 10-14 years before the survey. Table 4.3 shows maternal deaths, sister years of exposure and maternal mortality rates by age group of sister for each period.

The maternal mortality ratio (MMR) is obtained from the overall maternal mortality rate for the age range 15 to 49 by dividing by the general fertility rate (GFR) 15 to 49. The direct sisterhood estimates show a consistent downward trend in the MMR, from 514 for the period 10-14 years before the survey to 400 in the period 0-3 years before the survey.

4.2.2 Estimates of Maternal Mortality from Household Deaths and Time of Death Definition

Table 4.4 shows the estimated exposure time, the number of deaths during pregnancy, delivery, and the two months postpartum, and the maternal mortality rates for the three years before the BMMS by age group. The overall maternal mortality ratio is estimated from the overall maternal mortality rate for women age 15-49 divided by the general fertility rate (GFR) for the same age range and time period. The maternal mortality rate in Table 4.4 is 426 per 1,000 women, the GFR for the same age range and time period is 113 per 1,000 women, and so the estimated MMR is 377 per 100,000 live births.³

³This estimate is somewhat lower than the direct sisterhood estimate for the comparable period 1998 to 2000 of 440, though both estimates fall comfortably within the 95% confidence interval of the other.

Table 4.3: Direct estimates of Maternal Mortality Rates from the BMMS Sibling History

Maternal deaths, woman-years of exposure, and maternal mortality rates for three 5-year periods and one 3-year period preceding the survey, Bangladesh 2001

Age Group	1986-1990			1991-1995			1996-2000			1998-2000		
	Maternal deaths	Sister exposure	Maternal mortality rate	Maternal deaths	Sister exposure	Maternal mortality rate	Maternal deaths	Sister exposure	Maternal mortality rate	Maternal deaths	Sister exposure	Maternal mortality rate
15-19	153	201,360	0.00076	112	205,084	0.00055	100	187,243	0.00054	48	109,058	0.00044
20-24	140	170,280	0.00082	165	198,992	0.00083	116	202,957	0.00057	61	120,526	0.00050
25-29	133	132,239	0.00100	123	168,298	0.00073	132	196,810	0.00067	64	120,740	0.00053
30-34	86	82,003	0.00105	104	130,366	0.00080	89	166,278	0.00054	52	103,286	0.00050
35-39	40	43,998	0.00092	67	80,727	0.00083	76	128,732	0.00059	40	82,961	0.00048
40-44	24	18,078	0.00130	43	43,011	0.00100	28	79,192	0.00035	16	52,688	0.00030
45-49	7	5,973	0.00119	9	17,596	0.00050	10	42,076	0.00023	7	28,497	0.00024
Total	584	653,932	0.00089	623	844,074	0.00074	552	1,003,288	0.00055	287	617,757	0.00046
GFR		184			151			119			113	
MMR		514 ¹			485 ²			449 ³			400 ⁴	

GFR = General fertility rate; MMR = Maternal mortality ratio; SE = Standard error of MMR; CI = Confidence interval

¹ 95% CI 453 to 574; ² 95% CI 438 to 532; ³ 95% CI 400 to 498; ⁴ 95% CI 337 to 462

<u>Table 4.4 Maternal deaths and mortality rates by time of death definition</u>						
Maternal deaths and maternal mortality rates by time of death definition and age, 1998-2001, Bangladesh 2001						
Age group	Exposure time	Deaths during pregnancy	Deaths during delivery	Deaths post-partum	Total "maternal" deaths	Maternal mortality rate '000'
15-19	89,302	13.0	2.1	11.5	26.6	0.298
20-24	70,824	10.9	2.5	17.3	30.7	0.433
25-29	57,358	10.7	5.0	16.1	31.8	0.554
30-34	49,076	11.2	4.5	15.6	31.3	0.638
35-39	40,523	7.2	2.7	7.5	17.4	0.429
40-44	31,834	2.4	0.0	6.3	8.7	0.273
45-49	24,180	7.3	0.0	0.9	8.2	0.339
Total	363,097	62.7	16.8	75.2	154.7	0.426
MMR ¹			377			
						¹ 95% CI 314 to 440

4.2.3 Estimates of Maternal Mortality from Household Deaths and Verbal Autopsy Definition

Table 4.5 shows the estimated exposure time, the number of deaths identified as maternal by verbal autopsy, and the resulting maternal mortality rates for the three years before the BMMS by age group. Using the Verbal Autopsy definition of a maternal death, the estimated maternal mortality rate is 0.362 per 1,000 woman years, implying (using the estimated GFR of 0.113) an maternal mortality ratio (MMR) of 320 per 100,000 live births. The last column of Table 4.5 shows the ratio of the maternal mortality rate calculated using deaths based on a time of death criterion to the maternal mortality rate calculated on the basis of deaths identified as maternal by the verbal autopsy. The overall ratio is 1.18, indicating that nearly 20 percent more deaths were identified as maternal by the time of death definition than by the verbal autopsy. The ratios show a general tendency to rise with age, with the exception of the 40 to 44 age group, for which the verbal autopsy actually identified more maternal deaths than the time of death definition. This pattern is to be expected: the higher the level of underlying non-maternal mortality, the larger the number of coincidental deaths that will occur during the defined time period. It should be noted, however, that the verbal autopsies identified a substantial number of accidental deaths; further exploration is required to determine whether a substantial number of these "accidental" deaths might have been associated with unreported pregnancies.

<u>Table 4.5 Maternal deaths and mortality rates by verbal autopsy definition</u>				
Maternal deaths and maternal mortality rates by verbal autopsy definition and age, 1998-2001, Bangladesh 2001				
Age Group	Exposure Time	Total Maternal Deaths	Maternal Mortality Rate '000'	Ratio: Maternal mortality rate from time of death : Maternal mortality rate from verbal autopsy
15 to 19	89,302	20.5	0.230	1.30
20 to 24	70,824	29.6	0.418	1.04
25 to 29	57,358	30.8	0.537	1.03
30 to 34	49,076	24.4	0.497	1.28
35 to 39	40,523	10.5	0.259	1.66
40 to 44	31,834	12.4	0.390	0.70
45 to 49	24,180	3.3	0.137	2.47
Total	363,097	131.4	0.362	1.18
MMR ¹			320	
				¹ 95% CI 263 to 377

4.2.4 Proportions of Female Deaths of Reproductive Age due to Maternal Causes

The data from both the sister history and the retrospective deaths provide estimates of the proportion of deaths of women of reproductive age due to maternal causes. Table 4.6 shows the proportion of female deaths due to maternal causes by age from retrospective deaths (using both a time of death definition and the verbal autopsy definition) and from deaths of sisters for the periods 0-4, 5-9 and 10-14 years before the survey. A summary measure of the proportion maternal of all deaths among women age 15-49 is also given; in the case of the sister deaths, this proportion was calculated by standardizing the age-specific proportions onto the distribution of the female population by exposure time in the three years before the survey from Table 4.1.

Age group	Household deaths		Deaths of sisters from sibling history		
	Time of death	Verbal autopsy	0-4 years before survey	5-9 years before survey	10-14 years before survey
15-19	0.275	0.212	0.324	0.279	0.360
20-24	0.394	0.379	0.345	0.366	0.328
25-29	0.351	0.340	0.357	0.330	0.388
30-34	0.313	0.244	0.269	0.290	0.295
35-39	0.193	0.116	0.245	0.254	0.256
40-44	0.102	0.145	0.102	0.201	0.196
45-49	0.079	0.031	0.052	0.086	0.166
Total	0.240	0.203	0.238 ^a	0.253 ^a	0.282 ^a

^a Age-standardized

As noted above, the verbal autopsy definition of maternal deaths identified fewer maternal deaths among the deaths of women of reproductive age than the time of death definition, the overall proportion maternal being 22 percent instead of 24 percent. The proportion maternal among deaths of sisters in the period 0-4 years before the BMMS is almost identical to the proportion based on time of death among household deaths in the three years before the survey. The proportion maternal rises steadily the further back the reference period goes, suggesting a falling trend over the recent past. Such a trend is not entirely surprising, given the decline in fertility over the past 15 years in Bangladesh. The age pattern of the proportion maternal also becomes somewhat less pronounced the further back in time the measures refer to, perhaps suggesting recall errors around age or time of death relative to pregnancy.

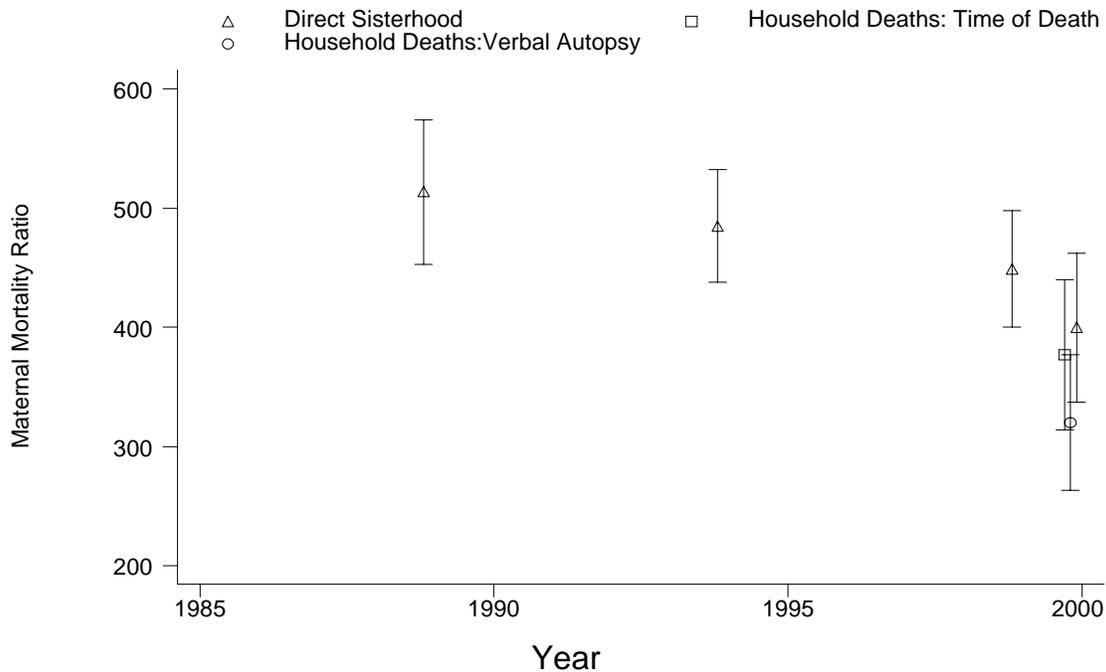
4.3 Comparison of Estimates and Preliminary Conclusions

Figure 4.2 shows the various estimates of the maternal mortality ratio available from the BMMS with 95% confidence intervals and by their reference date.

The estimates of the Maternal Mortality Ratio range from 514 (per 100,000 live births) for the period 1986 to 1991 from direct sisterhood to 320 in the period 1998 to 2001 based on household deaths with a verbal autopsy identification of maternal deaths. The direct sisterhood estimates show a steady decline over a decade, from 514 (1986 to 1991) to 400 (1998 to 2001), a decline of over 20 percent. However, the 95% confidence intervals overlap, despite the magnitude of the decline in the central value. The 1998-2001 estimate based on household deaths and a time of death relative to pregnancy definition is about 5 percent lower than

the direct sisterhood estimate for the same time period, and the estimate based on household deaths with a verbal autopsy identification of maternal deaths is approximately 15 percent lower than the estimate based on time of death. The point estimates from different methods for 1998 to 2001 are not significantly different from one another, however.

Figure 4.2 Estimates of the Maternal Mortality Ratio with 95% Confidence Intervals by Reference Date and Method, Bangladesh 2001



It is not always the case that direct sisterhood estimates show a downward trend. Stanton et al. report that, across 14 Demographic and Health Surveys, mostly in Africa, the sisterhood-based MMR for the period 0-6 years before the survey was higher than that for the period 7-13 years before the survey in 10 cases (Stanton et al., 1997). The authors argue that this pattern was at least partly due to data errors, on the grounds that proportions maternal were higher in the more recent period for only 5 out of the 14 countries, suggesting that deaths of sisters that occurred in the more distant past were omitted. The BMMS data set, in contrast, shows a steady downward trend in the MMR, and a steady downward trend in the proportion maternal. It is possible that this different pattern in the BMMS reflects better data collection regarding survival of sisters, given that these data were the primary focus of the survey.

Questions on household deaths are frequently found to omit a substantial proportion of deaths. Such omission could explain the lower MMR estimates (and low estimates of overall mortality) based on household deaths than on sister deaths. Standard methods have been developed for evaluating the coverage of household deaths and adjusting for misreporting. These methods will be applied to the data in the next phase of the analysis in order to assess whether the household deaths did suffer from some underreporting, and whether the MMR estimates need to be revised upward accordingly.

The provisional conclusion, on the basis of this preliminary analysis of the data, is that the MMR in Bangladesh during the period 1998 to 2001 was in the range of 320 to 400 per 100,000 live births. Can we narrow this range to any extent? The largest difference in the point estimates is between that based on the verbal autopsy (320) and those based on a time of death definition (377), and sibling histories (400), in theory the difference between *maternal mortality* and *pregnancy-related mortality*. However, the estimates from verbal autopsy excludes a substantial number of accidental deaths, some of which may have been associated with an undeclared pregnancy and may not have been fully coincidental, in which case they should have been classified as *maternal*. Further analysis of the data may be able to shed light on this issue. Further analysis may also lead to conclusions about the completeness of reporting of household deaths; if it appears that the number of deaths needs to be revised upwards, both the household estimates would also increase.

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APPENDIX

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