

**Midwifery in Bangladesh: Its Role in Reducing Maternal Mortality
and the Reasons Behind its Underutilization**

by Anjum Noor Choudhury

under the Direction of
Professor Michael D. Robinson

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Economics Department
Mount Holyoke College
South Hadley, MA 01075

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CHAPTER 1

INTRODUCTION

The state of maternal healthcare in Bangladesh is indicative of its achievements in human development over the last two decades. Increased access to medical knowledge and administrative management combined with the initiative to achieve the UN's Millennium Development Goals — of which Goal 5 is to reduce the maternal mortality ratio by three quarters and achieve universal access to maternal healthcare — propelled the Ministry of Health and Family Welfare in Bangladesh to invest in training more Skilled Birth Attendants (SBAs), establish more Emergency Obstetric Care facilities (EmOCs) and spread awareness about maternal and infant care through Family Planning Programmes. The initiatives implemented by the government with the aid of the United Nations Population Fund (UNFPA), World Health Organization (WHO) and USAID has lead to a gradual decline in the nation's maternal mortality, infant mortality and total fertility rates.

Despite significant achievements in areas of maternal healthcare, there is still much to be done. The maternal mortality ratio remains high at 170 deaths per 100, 000 live births as of 2013 and only 31.7 percent of total births are attended by an SBA as of 2011 (World Bank, 2014). There may be two root causes for the

under-utilization of SBAs and consequently high maternal mortality ratio. The first is the issue of supply and affordability of maternal healthcare services and facilities. The second is the underutilization of existing services due to traditional values that restrict women from making decisions for the household and themselves, and treat pregnancy and childbirth as a familial matter rather than a medical one. Given these barriers, it is important for the Ministry of Health and Family Welfare to draw and implement future maternal healthcare initiatives based on two goals. The first is to make SBAs affordable for households belonging to all existing income groups and the second is to train SBAs that can socially integrate into their designated communities such that they are accepted as substitutes to relatives in the event of childbirth.

Midwives satisfy both of these goals. The UNFPA defines the work done by midwives as, “the health services and health workforce needed to support and care for women and newborns, including sexual and reproductive health and especially pregnancy, labor and postnatal care” (UNFPA et al., 2014). They are cheaper to train than doctors, more affordable and more accessible to mothers in rural areas where the need for professional maternal care is greatest. Midwives provide women with a socially acceptable alternative to traditional birth attendants and relatives. Their appeal to the traditional sensibility of the Bangladeshi people and their capability of creating widespread awareness about the medical needs associated with pregnancy and childbirth gives them a crucial role in the reduction of Bangladesh’s maternal mortality ratio.

This study evaluates the difference in degree of preference for assistance by: (i) Doctors; (ii) Midwives and; (iii) Relatives during childbirth in Bangladesh using a series of binary logistic regressions. Independent variables included in the models to explain the preference of assistance during delivery cover various aspects of socio-economic status, household composition and personal details. The results of the regressions provide numerical evidence that midwives have greater public appeal than doctors and will therefore be more effective in combatting the high maternal mortality ratio in Bangladesh. The results also provide an insight into the proportion of Bangladesh's female population that are still assisted by untrained relatives and the factors responsible for such circumstances. Knowledge of these factors and the extent of their influence will aid policy-makers in tailoring future policies such that SBAs and Family Planning Programmes can cater to their sensibilities.

This study first provides a brief overview of economic development trends in Bangladesh with a special focus on areas instrumental to gender equality and maternal health. Next, the study will explore previous studies on the utilization of midwives in developing countries and their role in the reduction of national maternal mortality ratios.

A brief account of the data and methods used in this study will then be presented, followed by the models evaluating the preferences for the three different sources of assistance during delivery. Finally, the study will present policy recommendations based on the findings and propose areas that require further study.

CHAPTER 2

HIGHER MATERNAL HEALTH STANDARDS AND ECONOMIC DEVELOPMENT IN BANGLADESH

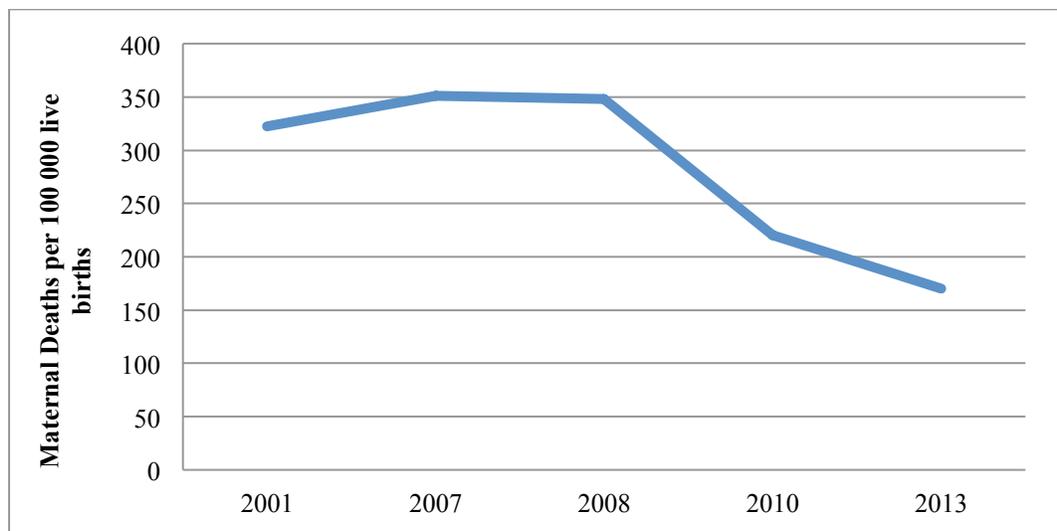
The utilization of Skilled Birth Attendants (SBAs), or underutilization of them, in Bangladesh is closely linked to the state of women's empowerment in Bangladesh. The improvement of living standards for women is crucial for economic development. In the case of Bangladesh, women are rarely the household head or breadwinners of the family but they are integral to the functionality of the family. They are primary caregivers to children and elders of the family and in rural areas, they are responsible for unpaid informal work such as harvesting crops, water gathering etc. that is essential for the economic well being of the household. Improvement in the living standards of women and enhancing their empowerment would amplify progress in economic development. Greater attainment of education for women makes them eligible for formal work that would help them contribute to their households financially. It also exposes them to information about sexual and reproductive health that enables them to take necessary measures to stay healthy during pregnancy and childbirth. Their active and prolonged contribution to their households produces educated offspring who go on to be more educated, healthier and better off financially. It is therefore

critical to ensure the well being of mothers in order to insure the well being of society.

Evidence illustrates that household wealth plays a central role in the utilization of SBAs during delivery. Due to the lack of a strong social welfare system in most developing countries, patients must bear all medical costs on their own. These costs are not limited to the medical procedures but also extend to additional transportation and medicinal costs. Members of low-income households, especially women whose medical needs are often disregarded due to societal norms, therefore choose not to employ the assistance of medical professionals. Paruzzolo et al. (2010) note the stark difference in utilization of SBAs between different wealth quintiles in South Asia. Only 22 percent of women employ the services of SBAs in the lower wealth quintiles while 80 percent of women in higher wealth quintiles employ do so. The trend is consistent in developing countries spanning East Asia, Sub-Saharan Africa and the Middle East.

Initiatives undertaken to increase the number of obstetric facilities, SBAs and family planning programmes across Bangladesh have improved the standards for maternal health in the last 25 years. As illustrated by Figure 2.1, after reaching a high of 350 deaths per 100, 000 live births in the 2000s, the maternal mortality ratio has gradually declined from 2008.

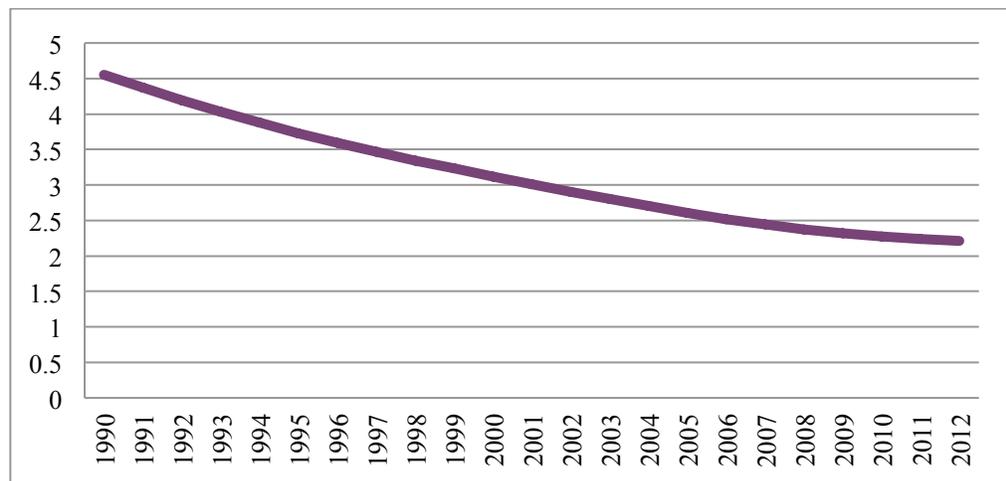
Figure 2.1.
Maternal Mortality Ratio (National Estimate per 100,000 live births)



Source: World Bank (2015)

It is worth noting that the Bangladeshi government launched an initiative to train 3000 midwives in 2010. The matriculation of midwives from the established three year direct-entry midwifery education programme will no doubt lead to a further decline in the MMR (UNFPA et al. , 2014) and other indicators related to sexual and reproductive health such as Bangladesh’s Total Fertility Rate (Figure 2.2) which has decreased from a little over 4.5 births per woman to 2.25 births per woman in the last 25 years.

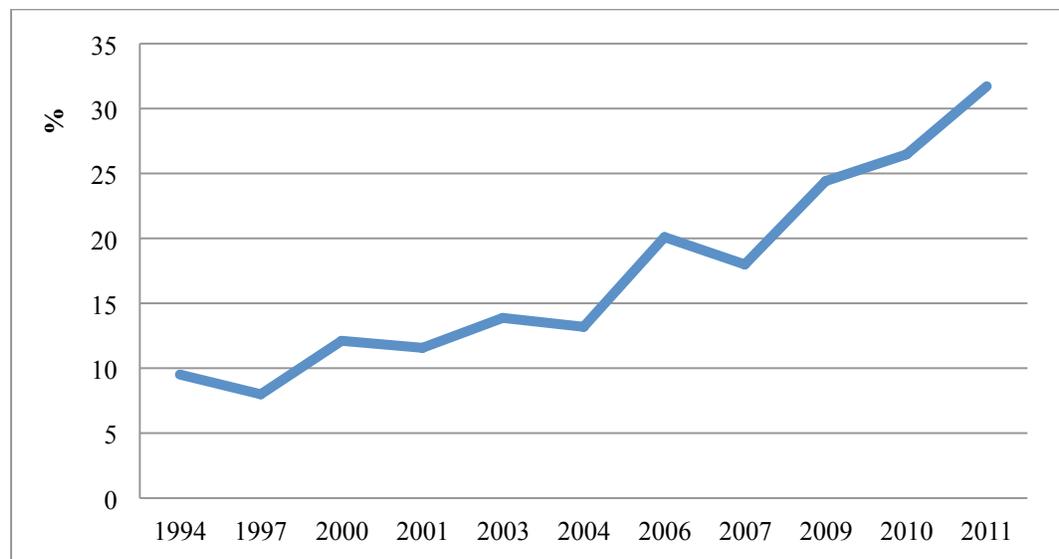
Figure 2.2.
Total Fertility Rate (Births Per Woman)



Source: World Bank (2015)

The utilization of SBAs remains very low. However, as Figure 2.3 shows, there seems to be a growing acceptance for SBAs assisting during deliveries. This may be attributed to any number of reasons such ranging from the increase in number of SBAs available, decline in the total fertility rate to the increasing empowerment of women in Bangladesh.

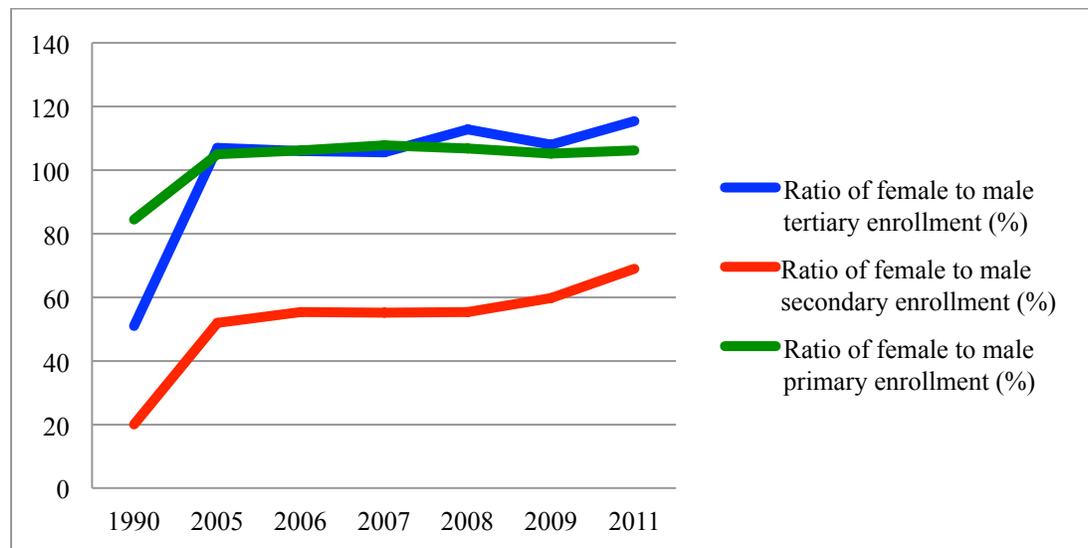
Figure 2.3
Births Attended by Skilled Birth Attendants (% of total births)



Source: World Bank (2015)

On the subject of gender inequality, despite some improvements in quality of living standards for women in Bangladesh, existing structural and societal institutions that support outdated patriarchal norms coupled with a lack of policy initiatives to ensure women’s security in the labor force put women at a disadvantage in the economic landscape (Unnayan Onneshan, 2011). While female enrollment of girls in primary education has come to be at par with male enrollment over the last two decades, female enrollment in secondary education has not (Figure 2.4). Not only does not having a secondary education restrict women from achieving their full economic potential in the labor market, it is also detrimental to their agency in medical and maternal health decisions as they will not have access to an avenue where they learn about sexual and reproductive health.

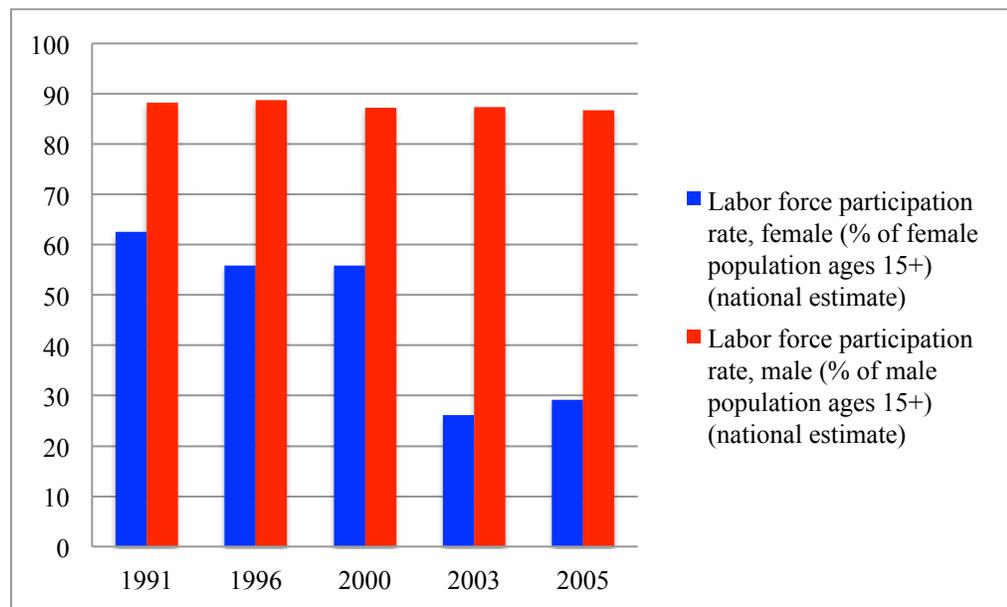
Figure 2.4.
Ratio of Female to Male Education Enrollment



Source: World Bank (2015)

Despite a gradual increase in female enrollment in primary and secondary education, the percentage of the female population participating in the labor force has decreased since 1991 due to a lack of employment opportunities outside of urban areas and increasing security concerns.

Figure 2.5.
Labor Force Participation Rate Female & Male

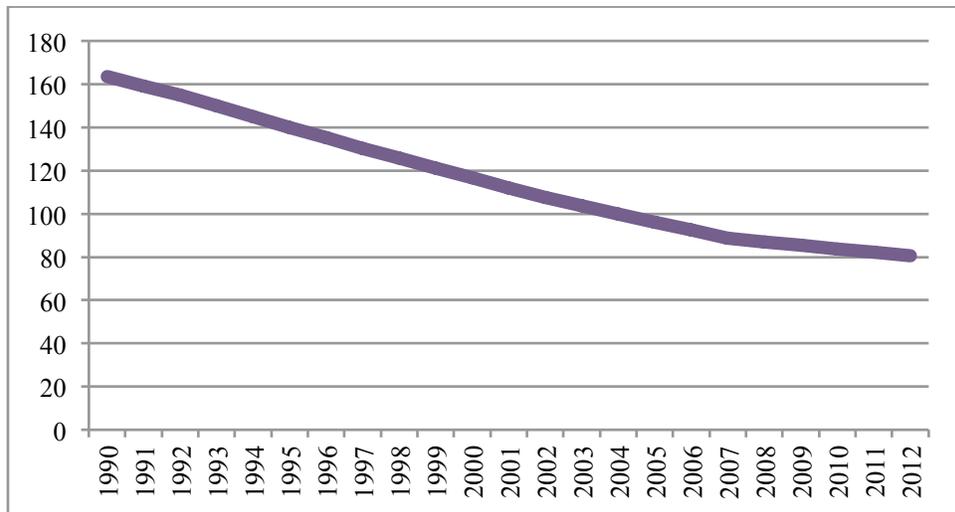


Source: World Bank (2015)

It has long been suggested that the underutilization of SBAs for delivery and high maternal mortality ratio in Bangladesh is a consequence of the large number of underage marriages and adolescent pregnancies (Chen et al., 1974). Despite a 51 percent decrease in Bangladesh's adolescent fertility rate over the between 1990 and 2012, 81 women per 1000 women giving birth were between the ages of 15 and 19. Underage marriages force young women to forgo basic primary and secondary education in the interest of their household duties. They are, therefore, ill informed about and often helpless in seeking out the right care during their pregnancies and deliveries.

Figure 2.6.

Adolescent Fertility Rate (Births per 1000 women ages 15-19)



Source: World Bank (2015)

CHAPTER 3

LITERATURE REVIEW

This section reviews literature that supports the promotion and utilization of midwifery as a means to alleviating maternal mortality. Section 3.1 looks at the success of midwifery programmes in, currently developed countries when they were still in their developing stages. Section 3.2 reviews studies that evaluate the different approaches to collecting and processing data for a study of this nature. Section 3.3 consists of studies that helped narrow down the list of socio-economic, household and personal variables used in this study. Section 3.4 looks at case studies where similar research regarding the utilization of maternal healthcare facilities and personnel and, its impact on maternal mortality was conducted and finally, Section 3.5 looks at similar studies conducted in Bangladesh.

3.1 Decreasing Maternal Mortality through Midwifery: Past Successes

Historically, midwifery programmes have helped developed countries decrease maternal mortality. Hogberg (2004) analyzes the role of midwifery in the decline in maternal mortality in Sweden between the 18th and 19th century by comparing the maternal deaths prevented by community midwives, medical institutions and antiseptic practices. Results of the study showed that community midwives, that were accessible to 90 per cent of pregnant women who lived in

rural areas of Sweden prevented the greatest number of maternal deaths between the 18th and the 19th century. Loudon (2000) systematically reviews cross country data from developed countries to find that the most maternal deaths prevented in the United States, UK and Sweden were a result of the care of midwives.

Loudon (2000) also finds that maternal deaths within the upper classes were more common than they were in lower classes. This raises the question of whether income and poverty play a significant role in the state of maternal mortality in a country. Loudon (2000) believes that they do not. The maternal deaths between the late 19th and early 20th century that occurred in the upper classes occurred in formalized medical institutions that most likely over-medicalized the delivery process in the interest of earning profits. That is why midwifery programmes proved to be the more effective approach in combatting maternal mortality. While Hogberg (2004) would agree that community midwives in Sweden played a significant role in the decline of maternal mortality, the study does not eliminate the possibility that household income and other factors such as the level of nutrition obtained by expecting mothers also played a role in the gradual decline in maternal mortality rates.

One thing that is apparent from both studies is that an extensive national level database of maternal care records needs to be maintained in order to facilitate research that will help implement policies and programmes that will help reduce national maternal mortality rates. Vital population statistics have been maintained in Sweden since the 16th century (Hogberg, 2004) and the UK has

maintained similar data since the 1830s. Along with the implementation of midwifery programmes, such data has been helpful in integrating Skilled Birth Attendants (SBAs) or midwives into their respective communities so that more expectant mothers felt comfortable approaching them and midwives could develop a cordial and fruitful relationship with physicians at Emergency Obstetric Care (EmOC) facilities for complicated delivery cases (Hogberg, 2004).

3.2 Conceptual Framework and Research Design for Measuring Utilization of Available Maternal Healthcare Services and its Impact on Maternal Mortality

Determining whether or not midwifery is an effective means to alleviate maternal mortality requires data that is representative of women across the country being studied. This presents various options for methods of data collection. Campbell et al. (1997) evaluate the various research designs by which the effects of maternal healthcare interventions such as midwifery programmes can be measured. The report offers two approaches to studying these effects: i) Experimental design and; ii) Observational and descriptive design. Experimental designs such as Randomized Control Trials (RCT) and Community Randomized Trials (CRT) require the implementation of maternal healthcare interventions for the sole purpose of research. They are not cost-effective. Such designs tend to be impractical as control communities can't be kept separate from intervention communities. Therefore, results may not be reliable. Since experimental designs are restricted to a small pool of subjects, results may also not be representative of the entire population. Therefore, the report suggests that an observational and

descriptive design would be more appropriate for research of this sort. Such designs would examine already existing maternal healthcare intervention schemes, gather data for specific indicators from individuals in the correct demographic group and measure the effect those indicators have on overall maternal mortality rates.

Within the observational and descriptive design it is important to develop a conceptual framework to measure the impact of maternal healthcare interventions on maternal mortality. Anderson & Newman (2005) suggests that one way of approaching the measurement of effects of the healthcare system is by looking at the utilization of healthcare services available. Overarching areas to consider include: i) Structure of the national healthcare system; ii) State of relevant medical technology and social acceptance of that technology and; iii) individual reasons for use of health care services. The study highlights the importance of distinguishing the factors that constitute social determinants (technology, accessibility, resources of health care system) from those that constitute individual determinants (age, income, number of previous pregnancies, level of emergency etc.) to relay a comprehensive set of results that represent the behavioral patterns of the community in question. Anderson & Newman also put emphasis on having a uniform unit of analysis in such studies for more accurate results. These units of analysis can include the number of appointments patients make with healthcare service provider, whether or not patient has had contact with a healthcare service provider etc.

Echoing the theory that there are various social and individual determinants involved in the use of health care services, Ensor & Cooper (2004) argue that it is important to examine the demand-side barriers that prevent individuals from using available health care services and facilities such as midwifery programmes alongside the supply of such services in order to obtain a holistic understanding of the factors that effect maternal mortality in a nation. The demand function for health services, according to Ensor & Cooper, consists of individual and household factors, community factors and prices of health services. From a systematic cross-country review of various national health systems, the study finds that that there are six major demand-side barriers that exist in the market for healthcare: i) Individuals are unable to identify medical problems; ii) Costs of healthcare services cannot be covered by low income; iii) Lack of awareness of healthcare services available; iv) Religious restrictions; v) Laws restrict access to certain healthcare services such as abortions; vi) Medical facilities are geographically inaccessible. The study admits that it is difficult for governments to overcome certain cultural barriers such as religious and gender restrictions in the short term but recommends greater investment towards educating people so that healthcare services such as midwifery programmes are better utilized and more lives are saved.

In order to make sure that measures are taken to overcome these demand-side barriers in the healthcare service market with regard to maternal healthcare, the World Health Organization (WHO), United Nations Children's Fund (UNICEF) and United Nations have set specific quotas for obstetric care facilities

(15 percent of women should deliver in Emergency Obstetric Care (EmOC) facilities and 5 percent of pregnant women should deliver by caesarian section). Ronsmans et al. (2002) thus, finds a method of finding the most effective means of combatting maternal mortality by examining three factors: i) The proportion of total births in Essential Obstetric Care (EOC) facilities; ii) The proportion of births that were EmOC cases and; iii) the Caesarian section rate. While this method offers some indication of the most utilized obstetric services available in a country, since most of the data used is restricted to existing medical institutions, the study does not account for the services utilized and needed by women in more remote and rural areas of the country being studied.

A more comprehensive analysis of the role of midwifery programmes in decreasing maternal mortality requires a thorough analysis of the demand-side and supply-side factors in the maternal healthcare industry.

3.3. Identification of Indicators Effecting Use of Midwifery

There are various demand and supply factors that influence the choice of birth attendant during delivery. This section reviews a few of these factors identified by previous studies.

3.3.A. Demand-Side Factors Affecting Use of Midwifery Services

It is assumed that maternal mortality decreases if trained professionals supervise deliveries. Therefore, the utilization of maternal healthcare services is indicative of whether or not a maternal health intervention such as training Tradition Birth Attendants (TBAs) in midwifery or increasing the number of SBAs is appropriate. There are a number of cultural factors that affect women's utilization of maternal healthcare services such as midwifery. Harmful measures such as fundal pressure to reduce labor time, preference of spiritual guidance over medical guidance and, the socio-economic status of expectant mothers influence patterns in maternal healthcare utilization (Evans, 2012). This section will review the various studies that have identified demand-side factors that have a significant impact on the effectiveness of maternal health programmes such as midwifery. Rath et al. (2007) establishes six key factors to examine the effects of Nepal's Safe Motherhood Project between 1997- 2004. The six factors identified were: i) Availability and accessibility of birthing facilities; ii) Mobility of SBAs or midwives; iii) State of formal referral links between Traditional Birth Attendants (TBAs), SBAs and facilities; iv) Cost of services and transport; v) Public accountability for quality maternal care and; vi) Regulatory Guidance. The analysis of data from a seven year time span reveals that despite the increase in

health facilities, the majority of deliveries take place of home and are attended by TBAs because there not enough SBAs in service. Examination of the other factors reveals that high costs in relation to low incomes and, the low education levels and social status of women also deter the use of available maternal health services.

Anwar, et al. (2008) limits the scope of study of maternal health services to specific regions in Bangladesh to ascertain whether supply-side inadequacies or demand-side barriers stemming from cultural beliefs and socio-economic backgrounds are responsible for the use of maternal healthcare services. Indicators considered are: i) Number of deliveries carried out by a SBA; ii) Number of caesarian sections; iii) Number of women using postnatal care; iv) Individual household incomes and; v) Level of education of the mother. A multivariate regression of the data finds that educated mothers and households with higher incomes are more likely to employ the services of SBAs. While this study does not directly link the use of maternal healthcare services to changes in maternal mortality it is apparent that along with training SBAs, educating prospective mothers leads to a greater number of deliveries supervised by SBAs. Therefore, education is a major factor in the measurement of the effects of midwifery programmes on maternal mortality.

Chakrabarty et al. (2003) used data from the Bangladesh Institute of Research for Promotion of Essential Reproductive Health and Technologies that was collected by interviewing expecting mothers at various stages of pregnancy. Factors analyzed in the study's bivariate and multivariate logistic regressions

included: i) Age of the mother and level of education; ii) number of children (the greater number of children meant the less likely mothers were to use available healthcare services); iii) Household income; iv) geographical accessibility to healthcare facilities; v) state of women's employment and; vi) the expectant mother's state of health. The bivariate analyses produced results that suggested that geographical accessibility was the least significant factor affecting the utilization of maternal healthcare services and, age and education are the most significant. The multivariate analysis shows that none of the factors aside from the state of the expectant mother's health is significant as a woman is more likely to seek medical attention if her condition is more critical. The study utilizes multi-stage random sampling that spanned the entirety of Bangladesh so it is representative of the state of the national utilization of maternal healthcare services.

Brunsun (2010) conducted an ethnographic study in semi-urban parts of Kathmandu to determine how social factors such as class and caste effect the utilization of the services of SBAs such as midwives or physicians. Through interviews and subject observations, the study found that the decline in Total Fertility Rate (TFR) was the leading cause of decline in maternal mortality. Though there has been an increase in maternal healthcare services and facilities, women still do not use them due to the social perception that childbirth is more of a familial matter than it is a medical matter. Rude caregivers are also cited as a reason why expectant mothers avoid using maternal healthcare services such as midwifery programmes. While factors such as rude behavior and neglect of health

workers play a significant role in the demand for such services, these are issues that have to be dealt at the supply-side of healthcare services. This is discussed at length in the next section.

3.3.B. Supply-Side Factors Affecting the Use of Midwifery Services

It has been recognized that increasing the quantity of maternal healthcare services such as midwifery programmes alone will not reduce maternal mortality as women belonging to certain income groups and cultures are not comfortable seeking the aid of such services. Data from discussion groups on facility-based childbirths and individual interviews with policy makers reveal many women opt not to use the services of SBAs due to abusive and neglectful caregivers (Bowser & Hill, 2010). Alongside increasing the quantity of services, it is therefore also important to improve the quality of care by strengthening healthcare infrastructures, information systems and continuously training SBAs and their support staff to be more approachable to women with certain cultural reservations (Lange, 2012) as discussed in the previous section.

The first supply-side factor to tackle is scarcity of trained medical workers in rural areas. The World Health Organization (2010) conducted a cross-country systematic review of observational studies of the state of health workforces in rural areas and called for inter-ministerial action from Ministry of Health, the Ministry of Education, local authorities and various other professional associations. The first observation made in the report was the need for comprehensive data and a fully functional information system for respective policy makers to have a thorough understanding of the local health workforce. To

increase the number of health workers, including midwives, in rural areas the report recommended the following: i) Establishment of training schools in rural areas; ii) Continue education during practice in rural areas and; iii) Enforce compulsory service in rural areas. While this reports offers a general overview of the shortage of midwives and other health workers in rural areas, a more comprehensive study for policy strategy would require studies with more localized observations.

Willis-Shattuck et al. (2008) conducted a systematic review of the factors influencing medical worker retention in developing countries. The results found that the main factors for low retention in these countries were: i) Low financial compensation; ii) Low scope of advancement; iii) No continuous education; iv) Poor infrastructure and low resource availability and; v) No recognition or appreciation from community. The study concludes that, in order to increase healthcare service availability such as midwifery services, it is important to tackle issues of low salaries, poor underdeveloped infrastructure and curb rural to urban migration induced by lack of opportunities. Solutions to the problem retention are explored in Dieleman & Hammeijer (2008). In South Africa medical students have to complete compulsory service in rural areas after graduation. Failure to complete this requirement leads to suspension from service.

In addition to this, Dieleman & Hammeijer also examines the factors determining the quality of services provided by health workers. As mentioned before, poor infrastructure and outdated regulatory frameworks are the major influences on health worker performances. The systematic review outlines that the indicators

that best represent the effectiveness of a particular medical service such as midwifery: i) The speed of responsiveness; ii) availability of infrastructure; iii) communication channels; iv) procedure adherence to international standards; v) case fatality rates (such as maternal deaths); vi) satisfaction of patients and; vii) number of staff for each patient. It cites several examples of policies implemented in various countries to tackle poor service and performance of health workers such as midwives. In Ecuador and Vietnam, health workers are subject to performance reviews by their peers and their institutions while in Rwanda, health workers are given performance-based salaries.

Hoope-Bender et al. (2014) investigates the supply-side indicators in health care services that are crucial to reducing maternal mortality by systematically reviewing case studies and modeling deaths averted because of midwifery programmes using the Lives Saved Tool, a programming software developed by the Institute of International Programs at the Johns Hopkins Bloomberg School. The supply-side factor in need of the greatest attention, according to the study, is the delivery of midwifery services to larger number of women. Indicators measuring the quality of midwifery programmes include: i) Number of intrapartum stillbirths; ii) Early neonatal mortality and; iii) response time and mechanisms to emergencies. The study also highlights that there is a significant time lag in between implementation of maternal health policy and the fruition of actual results in the form of greater availability of such services for a greater number of women.

3.4. Case Studies of Measuring Impact of Maternal Healthcare Initiatives

In terms of methodology, the measurement of how effective maternal healthcare initiatives are can be separated into two categories: a) Qualitative and; b) Quantitative. Sample sizes in both methods vary from a few people, a region of a country, national survey statistics to cross country statistics.

3.4.A. Quantitative Studies on Maternal Mortality Reduction

Quantitative studies provide concrete evidence for successes and failures of various healthcare initiatives implements in the region or country of study. Day-Stirk & Fauveau (2012) focuses on the costs of providing all possible maternal healthcare globally. The study also uses secondary data from the Guttmacher Institute and highlights the findings of the Global State of the World's Midwifery (SoWMy) Report. It notes that of the 49.8 percent of the global population that are women of reproductive age, 60 million do not utilize or have access to SBAs. Factors that offer an understanding of what can help reduce MMR include: i) Number of unsafe abortions; ii) Family planning programmes; iii) Access to maternal and newborn care and; iv) Socioeconomic status. The study recognizes that midwifery and the effect it has on overall MMRs, differs from area to area as certain sections of society are reluctant to employ the services of SBAs due to gender inequalities prevalent in those areas. However, the global estimates that constitute the majority of the study rely on the assumptions that all maternal healthcare needs can be met and that identical healthcare systems will work for all countries. Therefore, it does not present a clear and specific methodology for measuring the impact midwifery has on maternal mortality.

Walker et al. (2013) is similar to Day-Stark & Fauve au (2012) in that it attempts to extrapolate existing global data to predict maternal and under-5 child mortality rates 2035. The methodology used in this study produces more descriptive results. It uses data from 69 countries between 1990 and 2011. Variables were chosen on the basis of what the authors believed could possibly affect mothers and children under age 5. They included i) Access to SBAs during birth; ii) antimalarial treatment; iii) proven access to sanitation facilities; iv) availability of HIV/AIDS treatment v) access to clean drinking water etc. The changes in coverage in these areas were calculated using a Loess Regression Model. Results found that the rate of change in coverage in certain areas is too slow to lead to a significant reduction in child mortality rates by 2035, thereby implying that some programmes are more effective than others in certain areas. The study thus illustrates a more tangible picture of the areas in the field of maternal healthcare that require more attention from policy makers.

Pyone et al. (2012) offer a method of learning whether midwifery programmes are effective. The study conducted a systematic review of quantitative studies on strategies that had the greatest impact on maternal mortality in low-income settings. Strategies were categorized into three types: i) Strategies to improve quality of maternal healthcare; ii) Strategies that bring services to expectant mothers and; iii) Strategies that bring women to services. Taking cultural and socio-economic factors into account, all categories would apply to midwifery programmes. Therefore, it is not surprising that results for the study were inconclusive. On a conceptual note, the study emphasizes the

importance of clear distinction for key maternal healthcare concepts such as the differences between Skilled Birth Attendants (SBAs) i.e. midwives and Traditional Birth Attendants (TBAs). The disparities in defining key variables in the studies reviewed makes it impossible to compile a comprehensive global dataset that is empirical in nature for maternal healthcare and therefore makes it difficult for international organizations and national policy makers to take steps to combat maternal mortality.

Haththotuwa et al. (2012) presents the most pragmatic method of measuring the effectiveness of maternal healthcare programmes on a national level in Sri Lanka. Results of the study illustrated the risk of dying from childbirth to be 1: 430 and the utilization of institutional care and midwife care to be at 98 percent. The study found an inverse relationship between MMR and the formal training of TBAs. However, it also recognizes that other factors such as a high literacy rate, family planning programmes, aid from international organizations and the launch of the Annual Maternal Death Review in Sri Lanka also played a significant role in reducing MMR. The study concludes that Sri Lanka's success lies in the symbiosis of all these factors.

3.4.B. Qualitative Studies in Maternal Mortality Reduction

Qualitative studies on maternal mortality reduction provide an insight into the cultural influences behind varying birthing practices around the world. An understanding of cultural norms in areas of study can aid in implementing programmes that cater to specific groups of people and therefore reduce maternal mortality. Sharma et al. (2013) provides a detailed account of the demand-side

issues encountered in the maternal health care industry in Gujarat, India from data collected through focus groups comprising of women from the area. A clear transition from employing the services of TBAs to SBAs in the form of trained midwives or physicians has been observed. The study suggests that midwifery may even be a safer method of delivery as the over-medicalization of deliveries in institutions can lead to fatal complications. In another study in the same region, Sharma et al. (2012) explores supply-side complications encountered by participants working as midwives. Indian law requires midwives are required to complete dual registration as a midwife as well as a nurse. Since nursing positions hold more esteem, a significant deskilling of midwives has been observed. Therefore, though Sharma et al. (2013) highlights the positive effect midwifery has on maternal mortality in Gujarat, Sharma et al. (2012) observes institutional weaknesses that prevent midwifery services from accomplishing their potential in reducing maternal mortality in the region.

Sarfraz & Hamid (2014) investigate the functionality of midwives in the Attock district in Pakistan. Midwives are trained under the New Community Midwives (CMW) Programme, the Lady Health Visitors (LHV) or the Lady Health Workers (LHWs). The study consisted of a focus group of a total of ten birth attendants selected through purposive sampling that consisted of workers from each programme. An inductive analysis was conducted using the answers obtained from the focus group. Since only 39 per cent of Pakistan's women give birth in the presence of SBAs, the study concludes that midwives need governmental support through provision of appropriate equipment, referral

systems, ample salaries, transportation and higher education of female population to initiate a shift from employing the services of a TBA to those of an SBA.

Descriptive studies compiled in the Pyone et al (2012) reveal that there is no 'one size fits all' prescription for reducing maternal mortality. For example, maternal mortality in Java, Indonesia remains high even though SBAs are available. In Nigeria, maternal mortality remains high despite improvements in Emergency Obstetric Care (EmOC). Therefore, policy-makers would benefit from country-specific studies that follow a standardized definition of concepts and analyze which avenues of maternal care would have the greatest effect on maternal mortality.

3.5. Midwifery and Maternal Healthcare in Bangladesh

Bangladesh has made more progress in human development in comparison to other developing countries with similar per capita incomes. Bangladesh's progress in development is, however, not a result of strong governance or foreign aid. Rather, its development is largely attributed to the strong presence of NGOs in the country. Over the years, NGOs have led nationwide campaigns for increased female education and family planning that are believed to be responsible for the decline in fertility rates. Moving forward, it is recommended that more public spending and foreign aid be directed towards the field of maternal health in order to lower the nation's MMR (Asadullah et al., 2014).

A study from the late '60s illustrates that the majority of maternal deaths in Bangladesh were due to direct causes that can be avoided with the attention of an SBA. Complications include eclampsia, obstructed labor, uterine rupture etc. The age group that incurred the most maternal deaths was between 10-14 years old. (Chen et al. 1974). Though abortions for reasons besides critical health conditions are outlawed in Bangladesh, the access to procedures such as Menstrual Regulation have helped decrease the number of unsafe abortion related deaths and curbed the number of underage mothers (Hossain, Maddow-Simet, & Singh, 2012). Direct causes of maternal death that can be avoided under the care of an SBA still continue to be a problem as there are cultural perceptions and accessibility barriers that still need to be overcome in order for all deliveries to be supervised by an SBA.

Chowdhury et al. (2009) investigates the possible causes of decline in maternal mortality in the district of Matlab in Bangladesh by analyzing the Maternal Mortality Rates (MMR) and the antenatal services utilized by women in the area. Women were separated into two categories: i) Women under the jurisdiction of International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B) and; ii) Women under the jurisdiction of government maternal care. The first specializes in providing Skilled Birth Attendants (SBAs) i.e. midwives during birth and the second focuses on providing institutional facilities such as clinics and educating women about maternal health and childcare. Conclusions of the study find that the decline of MMR in the area is independent of any one precaution taken by either the ICDDR,B or the government but is dependent on the cumulative efforts of both organizations. The data used for this study came from secondary sources such as the Health and Demographic Surveillance system, pregnancy monitoring cards, facility records for pregnancy and delivery care, health and socioeconomic surveys and, periodical socioeconomic censuses. Some data was obtained through in-depth interviews and focus groups constituting Traditional Birth Attendants and village doctors. The data was presented in a tabulated form to illustrate the marked decline in MMR from 1987 to 2005, the primary causes of maternal deaths and the facilities most commonly used by

women in the area. The study's methodology does not however demonstrate the effect a particular programme or service implemented by the ICDDR,B has on maternal mortality rates. A regression analysis would have supplied the study with a more definite conclusion than it currently has.

CHAPTER 4

DATA OVERVIEW

4.1. Description of Data

This study uses Bangladesh's, 'Births Recode' survey dataset collected by the National Institute of Population Research and Training (NIPORT) along with Mitra and Associates of Dhaka on behalf of the Demographic Health Surveys (DHS) Program under USAID. The nationwide fieldwork for this data was carried out between July 2011 and December 2011. It constitutes of responses from a total of 45,884 Bangladeshi women. 41,290 or 90.1 percent of these women belong to households headed by men and the remaining 4,551 or 9.9 percent come from female-headed homes.

Of the women interviewed, 14,369 women are from urban areas and 31,475 women are from rural areas in Bangladesh. The regression analyses in this study require women to have experienced childbirth at least once. Since societal norms in Bangladesh prohibit women from having children before marriage, only the 17,842 women who are listed in the survey as being married are included in the regression analyses for the purpose of limiting statistical biases.

The regression analyses in this study evaluate the factors affecting preferences in utilization of delivery assistance services. DHS survey data accounts for all possible modes of delivery assistance in Bangladesh starting from

doctors, nurses/midwives/paramedics and family welfare workers to relatives, traditional birth attendants and no one at all. This study only looks at the factors affecting utilization of doctors, nurses/midwives/paramedics and relatives.

A number of cases in the survey have utilized more than one mode of delivery assistance. For the purpose of limiting statistical bias, only the cases that used one of three modes of delivery assistance were used have been used in the regression analyses. The frequency of cases that used one form of delivery assistance only is displayed in the shaded cells in the table below. The cells not shaded display the cases that have experience with more than one form of delivery assistance.

**Table 4.1.1.
Frequencies of Modes of Delivery Assistance Used**

	Doctors	Nurse/Midwife/Paramedic	Relatives
Doctors	152	1652	56
Nurse/Midwife/Paramedic	1652	821	401
Relatives	56	401	5770

4.2. Limitations of Data

The survey design accounts for all delivery experiences of respondents. This may range from one delivery to multiple. It does not, however, specify which form of delivery assistance was used for each individual birth. Therefore, a large portion of respondents is shown to have consulted more than one form of assistance for one birth. Due to the absence of specifics, analytical software such as SPSS reads this as utilization of multiple forms of assistance for the same birth. These respondents, therefore, cannot be included in the analysis because of

chances of statistical bias. A change in survey design that specifies individual births and their corresponding forms of delivery assistance will render the data fit to be included in analysis of this nature and contribute towards producing more significant results.

Proximity and access to skilled birth attendants and emergency obstetric care (EmOC) facilities have been cited as being crucial to utilization of available services (Day-Stirk & Fauveau, 2012; Rath et al., 2007). The DHS data for 2011 does not include a variable that records respondents' geographical proximity to health facilities. This study tries to compensate for the absence of this data by including the de facto type of place of residence of respondents based on the assumption that respondents in urban areas will have greater access to maternal healthcare than respondents in rural areas. This variable is, however, not as reliable as an absolute geographical distance that the respondent must travel in order to receive healthcare.

Ideally the most comprehensive study would include the effect the utilization of different delivery services has on Bangladesh's maternal mortality ratio. The DHS program has formulated a method of gathering individual-level maternal mortality data that constitutes of asking respondents if any of their sisters have died in childbirth. This question is, however, not included in Bangladesh's 2011 population survey.

CHAPTER 5

METHODOLOGY

5.1. Structure of Analysis

This study evaluates the patterns in utilization of three modes of delivery assistance: i) Assistance of doctor during delivery; ii) Assistance of nurse/midwife/paramedic during delivery; or iii) Assistance of Relatives. Three sets of regressions are carried out for this purpose. Each set has a different dependent variable with which three sets of independent variables are used in formulating binary logistic regressions.

5.2. Dependent variables

In order to compare utilization patterns of different modes of assistance during delivery the variables (i) Assistance of Doctor during delivery; (ii) Assistance of Nurse/Midwife/Paramedic during delivery and; (iii) Assistance of Relatives during delivery are transformed into three different categorical variables: (i) Assisted by Doctor or Nurse/Midwife/Paramedic; (ii) Assisted by Relatives or Doctors and; (iii) Assisted by Relatives of Midwives. The new variables were assigned the values 0 and 1. For example, for the ‘Assisted by Doctor or Nurse/Midwife/Paramedic’ variable, respondents who were only

assisted by doctors were assigned the value 0 and those who were assisted by a nurse/midwife/paramedic were assigned the value 1.

5.3. Independent Variables

5.3.A. Model 1

The first set of independent variables evaluates the effect of socio-economic factors on the choice of delivery assistance. They are:

- **Wealth Index:** As defined by the DHS Methodology (2013) manual, the Wealth Index variable is a composite measure of the respondents' household living standards. Factors taken into consideration for calculating this index include household assets such as televisions, fridges etc.; facilities such as plumbing, proper sanitation etc.; and construction materials used to build the respondent's place of residence. The wealth index is separated into five wealth quintiles: (i) Poorest; (ii) Poor; (iii) Middle; (iv) Rich and; (v) Richer.

The Wealth Index demonstrates the respondent's or her household's ability to afford the skilled birth attendant of their choice and the additional costs associated with childbirth such as transportation costs to reach EmOC facilities if applicable (Ensor & Cooper, 2004; Anwar, et al., 2008).

- **Highest Level of Education Attainment:** This variable accounting for the highest level of education consists of four categories: (i) No Education; (ii) Primary education; (iii) Secondary Education and; (iv)

Higher Education. It is included in the study based on the assumption that higher education attainment creates greater awareness about family planning and healthcare (Haththotuwa et al., 2012). It is also assumed that educated women have a greater voice in household decisions that include utilization of skilled birth attendants during delivery (Day-Stirk & Fauveau, 2012).

- De facto type of place of residence: This variable distinguishes whether the respondent's residence belongs to an urban or rural area in Bangladesh. It is included to test the presumption that women in rural areas are less likely to be assisted by a skilled birth attendant during delivery (Day-Stirk & Fauveau, 2012; Rath et al., 2007).

5.3.B. Model 2

The second set of independent variables includes the socio-economic variables and includes intra-household variables that evaluate the influence of household dynamics on choice of birth attendant. They are:

- Age of head of household: As per the DHS dataset, the majority of heads of households in Bangladesh are male. Social norms generally dictate that they make all decisions in the household, including the choice of birth attendant. Though, men belonging to older generations may perceive childbirth to be more of a family matter than a medical matter (Brunsun, 2010), younger household heads may think otherwise. This study tests whether the age of household heads have a negative influence on the utilization of skilled birth attendants.

- Age of respondent at first birth: Child marriages are underage pregnancies have been identified as significant contributors of high maternal mortality (Chen et al., 1974). This study assumes that underage women have less agency than older women and tests age has a significant influence on the choice of assistance during delivery.
- Total number of children ever born: Mothers who have more than one child may be more knowledgeable about the possible complications that accompany childbirth and may therefore be more inclined to seek the assistance of skilled birth attendants with any children born later (Chakrabarty et al., 2003).

5.3.C. Model 3

The third set of independent variables includes personal variables that may influence the choice and utilization of birth attendants during delivery. The new variables are:

- Respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth: Mothers with a history of pregnancy related complications might be more likely to consult a skilled birth attendant during childbirth (Chakrabarty et al., 2003). Furthermore, respondents who terminated pregnancies by way of medical procedure such as abortions and menstrual regulation are more likely to be aware of the benefits of using a doctor or a midwife during delivery (Hossain et al., 2012).

For the purpose of simplification all the modes of pregnancy termination have been combined into one category, '1' and the absence of pregnancy termination of any form have been recorded as, '0'.

- Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers): Exposure to information regarding family planning increases awareness about use of modern methods of contraception and safe birthing practices that use skilled birth attendants (Haththotuwa et al., 2012). Evaluating the extent of influence media exposure has on choice of skilled birth attendant during delivery may shed light on whether the government and corresponding NGOs should invest more in promoting the utilization of doctors or midwives.

For this study, any media exposure to campaigns concerning family planning has been recorded as, '1' and no media exposure in the form of TV, radio or newspapers has been recorded as, '0'.

5.4 Regression Analysis

The study uses binary logistic regressions to examine the effects of various independent variables on the binary dependent variables that reflect a choice in mode of assistance during delivery. The three models used for each of three dependent variables are structured as follows:

5.4.A. Model 1

Y = The Dependent Variable [i.) Doctors or Midwives; ii) Only Relatives or Doctors or ; iii) Only Relatives or Midwives.]

$$\Pr(Y_i = 1, Y_i = 0) = \hat{p} = \frac{\exp(B_0 + B_1x_1 + B_2x_2 + B_3x_3)}{1 + \exp(B_0 + B_1x_1 + B_2x_2 + B_3x_3)}$$

$$\ln\left(\frac{\hat{p}}{(1-\hat{p})}\right) = B_0 + B_1x_1 + B_2x_2 + B_3x_3$$

Where, x_1 = Wealth Index;

x_2 = Highest level of education attainment and;

x_3 = De facto region of residence.

5.4.B. Model 2

$$\hat{p} = \frac{\exp(B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6)}{1 + \exp(B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6)}$$

$$\ln\left(\frac{\hat{p}}{(1-\hat{p})}\right) = B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6$$

Where $x_1 - x_3$ are the same as in Model 1 and.

x_4 = Age of head of respondent's household;

x_5 = Age of respondent at first birth;

x_6 = Total number of children ever born.

5.4.C. Model 3

$$\hat{p} = \frac{\exp (B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + B_7x_7 + B_8x_8)}{1 + \exp (B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + B_7x_7 + B_8x_8)}$$

$$\ln \left(\frac{\hat{p}}{(1 - \hat{p})} \right) = B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + B_7x_7 + B_8x_8$$

Where x_1 to x_6 are the same as the previous models and,

x_7 = Respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth;

x_8 = Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers).

CHAPTER 6

RESULTS

6.1 Choosing Between Doctors and Midwives for Delivery

The first set of regressions evaluated the socioeconomic factors that effected respondents' choice to seek the assistance of doctors or midwives for the delivery of a baby.

6.1.A. Model 1

Model 1 consisted of the *Wealth Index* of respondents, the highest education level they achieved and their region of residence as explanatory variables. The respondents categorized as 'Poorest', 'Poor' and 'Middle' in the *Wealth Index* had significant coefficients. According the odds ratio of the model, the poorest respondents are 3.6 times more likely to employ the services of a midwife than they are to employ those of a doctor, the poor are approximately 4 times more likely and the respondents categorized as middle are approximately 3 times more likely to employ a midwife instead of doctor. Respondents recorded as rich did not produce a significant coefficient in this model.

The *Highest Education Level Attained* variable produced significant results. Respondents with no education were 3.2 times more likely to employ the assistance of a midwife for delivery than a doctor and those who had a secondary education were 2.8 times more likely to do so. The group most likely to employ

the assistance of midwives, however, constituted of the respondents who had completed their primary education. They were 4.4 times more likely to use a midwife instead of a doctor during delivery.

The region of residence of the respondent also produced significant results in Model 1. Respondents in rural areas are 2 times more likely to employ a doctor for delivery than they are likely to employ a midwife.

6.1.B. Model 2

The second model includes the *Age of Family Head*, *Respondent's Age at First Birth* and *Total Number of Children Ever Born*. While the odds ratio for the *de facto type of place of residence* remained consistent with Model 1, the addition of three variables lead to decreases in the explanatory coefficients and subsequently the odds ratios of the *Wealth Index* and the *Highest Education Level Attained*. Notable in the *Wealth Index*, the odds ratio of employing midwives instead of doctors for respondents categorized as, 'Poor,' decreased from 4.0 in Model 1 to 3.4. In *Highest Education Level Attained*, the odds ratio for employing midwives instead of doctors for respondents with no education decreased from 3.2 to 2.4. Similarly the odds ratio decreased from 4.4 to 3.9 for respondents with primary education and 2.9 to 2.2 for respondents with secondary education.

Of the three new variables in Model 2, *Age of Head of Household* and *Total Number of Children Ever Born* did not produce significant results. *Respondent's Age at First Birth* did produce significant results. It produced an explanatory coefficient of -0.084 that suggests a 0.084 decrease in the chance of employing a midwife with every one-year increase in age.

6.1.C. Model 3

The third model includes *Respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth and Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers)*. Similar to Model 2, the odds ratio for employing midwives instead of doctors according to region of residence has remained consistent to Model 1 in this model.

In *Wealth Index*, the odds of the poorest employing midwives instead of doctors decreases from 3.2 to in Model 2 to 3.0 in this model. The odds of the poor doing so decreases from 3.4 to 3.1 and the odds of respondents from middle income households doing so decrease from 2.6 to 2.5.

The odds ratios for *Highest Education Level Attained* have also changed. Respondents with no education did not produce significant results in this model while the odds ratio decreased from 3.9 to 1.9 for respondents with a primary education and 2.2 to 1.8 for respondents with secondary education.

Age of Head of Household, Age of Respondent at First Birth and Total Number of Children Ever Born did not produce significant results in this model.

Of the two additional variables included in this model, *Respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth* does not produce significant results. On the other hand, *Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers)* produced an explanatory coefficient of 1.185, which produced a 3.3 odds ratio of employing the services of midwife instead of a doctor during delivery.

6.2. Choosing Between Relatives and a Doctor for Delivery

The second set of regressions evaluates the factors determining a respondent's choice to have doctors assist during a delivery instead of relatives.

6.2.A. Model 1

This model, consisting only of the *Wealth Index* in which respondents are categorized in, *Highest Education Level Attained* and *De Facto Type of Place of Residence*, produced very high odds ratios favoring the assistance of relatives instead of doctors.

In the *Wealth Index*, the poorest respondents are 7.6 times more likely to seek the assistance of a relative instead of a doctor and the poor are 7.4 more likely to do so. There is a significant drop in the likelihood of being dependent on relatives during delivery in the higher categories in the wealth index. Respondents categorized as being 'middle' and 'rich' are only 4.33 and 1.57 times more likely to seek the assistance of relatives instead of doctors respectively.

A similar trend presents itself in Highest Education Level Attained. Respondents with no education and primary education are 16.9 and 17.15 times more likely to depend of relatives than on doctors during delivery respectively. On the other hand, respondents with a primary secondary education are only 5.9 times more likely to do so.

The *De Facto Type of Place of Residence* of the respondent does not produce significant results.

6.2.B. Model 2

Notable in the *Wealth Index* are the odds ratios for the poorest and poor respondents that decreased from 7.6 in Model 1 to 7 in this model and from 7.4 to 6.9 respectively.

In *Highest Education Level Attained* the odds ratio for depending on relatives instead of seeking the assistance of a doctor decreased from 16.9 in Model 1 to 8.6 in this model for respondents with no education, 17.1 to 9.5 for respondents with primary education and 5.9 to 3.8 for respondents with secondary education.

The decrease in the above odds ratio can be attributed to *Respondents Age at First Birth* and *Total Number of Children Ever Born*. The significant results for this *Respondents Age at First Birth* produced an explanatory coefficient of 0.120, meaning that there is a 0.120 unit increase in the possibility of employing the services of a doctor during a delivery instead of a relative with every one-year increase in the respondent's age during her first birth. The variable produced an odds ratio of $1.13 \approx 1$, meaning that the odds of choosing a relative or a doctor given the respondent's age during her first birth are equal. *Total Number of Children Ever Born* produced an explanatory coefficient of -0.195, implying that there is 0.195 unit decrease in possibility of employing a doctor for delivery with every child born into a household.

Age of Household Head and region of residence did not produce significant results.

6.2.C. Model 3

In the *Wealth Index*, the odds ratio of depending on relatives instead of doctors decreases from 7.0 in Model 2 to 6.7 for the poorest, 6.9 to 6.5 for the poor and 4.0 to 3.8 for middle-income respondents.

Highest Education Level Attained also undergoes some changes. The odds ratio of respondents with no education depending on relatives during delivery instead of seeking the assistance of doctors decreased from 8.6 to 6.5. There are also further decreases in odds ratios for respondents with primary education (9.5 to 7.5) and secondary education (3.7 to 3.1).

Age of Respondent at First Birth and *Total Number of Children Ever Born* continue to have significant results in this model.

Of the additions to this model, only *Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers)* produces significant results. The model predicts that respondents are 3.4 times more likely to be assisted by relatives instead of doctors during delivery.

As was the case in the two previous models, *De Facto Type of Place of Residence* and the *Age of Head of Household* do not produce significant results in this model. *Respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth* does not produce significant results either.

6.3. Choosing Between Relatives and Midwives for Delivery

The third set of regressions looks evaluates the extent to which socioeconomic and personal factors influence the choice of employing the services of a midwife instead of depending on a relative during a birth.

6.3.A. Model 1

As was the case with the regressions evaluating the choice between relatives and doctors, the odds ratios favors the assistance of relatives during delivery instead of midwives.

The *Wealth Index* in this model does not exhibit a dramatic change in the dependence on relatives for deliveries with changes in income levels.

Respondents classified as the poorest are 2.1 times more likely to be assisted by relatives than by midwives and respondents classified as poor and middle were 1.9 and 1.5 times more likely to be assisted by relatives than by midwives respectively. The rich did not produce significant results.

Highest Education Level Attained exhibits greater fluctuation in between levels. Respondents with no education are 6.1 times more likely to seek the assistance of a relative instead of a midwife, 4.3 times more likely to do so if they have a primary education and 2.3 times more likely to do so if they have a secondary education. This is indicative of the fact that educating women can lead to increased use of midwives for delivery.

The *De Facto Type of Place of Residence* also produced significant results. Respondents in rural regions are 2.7 times more likely to rely on relatives than on midwives for their deliveries.

6.3.B. Model 2

The inclusion of *Age of Household Head*, *Respondent's Age at First Birth* and *Total Children Ever Born* did not lead to much of a change in the odds ratios for the *Wealth Index*. Respondents classified as poorest, poor and middle had more or less similar odds of choosing the assistance of a relative instead of a midwife and the rich produced insignificant results.

There is a considerable decrease in odds ratios for choosing relatives instead of midwives in the *Highest Education Level Attainment* variable but the trend of greater education levels reducing dependence on relatives persists in this model. The odds of being assisted by relatives instead of midwives decreased from 6.1 in model 1 to 4.1 in this model for respondents with no education, 4.3 to 3.4 for respondents with primary education and 2.3 to 2.0 for respondents with secondary education.

Age of Household, *Respondent's Age at First Birth* and *Total Number of Children Ever Born* produced significant results. All three variables produced odds ratios of approximately 1 that imply an equal probability of seeking the assistance of a relative and the assistance of a doctor by mothers and heads of households of various ages. The explanatory coefficient for the *Age of Household Head*, though very small, is significant and negative. This implies heads of households who are younger may be more willing to employ the services of a midwife as they are more aware of the medical aspects of childbirth.

Respondent's Age at First Birth produced a positive explanatory coefficient. This illustrates the possibility that respondents who are older during their first birth are

more likely to seek the services of a midwife during delivery. *Total Number of Children Ever Born* has a negative explanatory coefficient implying that respondents are less likely to seek out a midwife for delivery if they have more children.

6.3.C. Model 3

The variable that records *respondent's history of terminated pregnancies in form of miscarriage, abortion or stillbirth* and *Exposure to Family Planning Program campaigns through media outlets (radio, TV and newspapers)* does not produce significant results. The explanatory coefficients and odds ratios of the older variables therefore remained the same as in model 2.

6.4. Comparing the Use of Doctors and Midwives Relative to Family Relatives

While the first set of regressions evaluating the utilization of doctors and midwives illustrate greater odds of utilization of midwives instead of doctors in sections of the population classified as poorest, poor and middle it may not be a compelling enough argument to invest in more midwifery programmes. Since Bangladesh is a very traditional society, it is important to take into account that many mothers may not even have a skilled birth attendant present during the delivery of their babies. Instead, they are assisted by untrained relatives. The second and third set of regressions evaluate whether mothers tend to seek the assistance of doctors or midwives instead of their relatives. In both cases, the assistance of relatives trumped the assistance of skilled birth attendants but the

odds ratios for being assisted by a relative in terms of the wealth index and level of education attainment were much lower for midwives than they were doctors. Midwives may have higher odds than doctors because they are more affordable, they are easier to access geographically than doctors who are usually based in urban areas, they are considered more trustworthy because they are female and may come from the same community and socioeconomic background. The contrast between these two sets of regressions reveal that it may be easier to convince expectant mothers to seek medical attention from midwives than from doctors. It is therefore important to put greater emphasis on training midwives across the country.

6.5. Tables of Regressions

Table 6.1.A.
Model 1 for Dependent Variable Doctors vs. Midwives
 (N= 973)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	1.286 (0.003)*	0.429	3.619
	Poor	1.385 (0.001)*	0.405	3.996
	Middle	1.082 (0.000)*	0.311	2.951
	Rich	0.257 (0.260)	0.229	1.294
Highest Education Level	No education	1.171 (0.005)*	0.418	3.226
	Primary	1.472 (0.000)*	0.328	4.359
	Secondary	1.047 (0.000)*	0.234	2.850
Region	Rural	0.745 (0.000)*	0.206	2.106

Note: Doctor = 0; Midwife =1; *p < 0.05

Table 6.1.B.
Model 2 for Dependent Variable Doctor vs. Midwives
(N = 973)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	1.169 (0.007)*	0.433	3.218
	Poor	1.231 (0.003)*	0.411	3.423
	Middle	0.961 (0.002)*	0.317	2.613
	Rich	0.175 (0.457)	0.235	1.191
Highest Education Level	No education	0.864 (0.049)*	0.439	2.373
	Primary	1.164 (0.001)*	0.348	3.870
	Secondary	0.786 (0.002)*	0.251	2.194
Region	Rural	-0.689 (0.001)*	0.209	0.502
Household Dynamics	Age of head of household	-0.006 (0.361)	0.006	0.994
	Respondent's age at first birth	-0.084 (0.004)*	0.030	0.919
	Total Number of Children Ever Born	0.008 (0.931)	0.088	1.008

Note: Doctor = 0; Midwife = 1; *p < 0.05

Table 6.1.C.
Model 3 for Dependent Variable Doctors vs. Midwives
(N=973)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	1.099 (0.012)*	0.436	3.002
	Poor	1.145 (0.006)*	0.414	3.143
	Middle	0.913 (0.004)*	0.320	2.491
	Rich	0.110 (0.646)	0.239	1.116
Highest Education Level	No education	0.629 (0.161)	0.449	1.876
	Primary	0.996 (0.005)*	0.449	1.876
	Secondary	0.612 (0.019)*	0.260	1.843
Region	Rural	-0.767 (0.000)*	0.214	0.464
House-hold Dynamics	Age of head of household	-0.008 (0.230)	0.006	0.992
	Respondent's age at first birth	-0.072 (0.17)	0.030	0.930
	Total Number of Children Ever Born	0.014 (0.876)	0.089	1.014
Personal Factors	Has had a terminated pregnancy	-0.019 (0.939)	0.243	0.982
	Has heard of Family Planning through media	1.185 (0.001)*	0.344	3.269

Note: Doctor = 0; Midwife = 1; *p < 0.05

Table 6.2.A.
Model 1 for Dependent Variable Relatives vs. Doctors
(N= 5555)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-2.026 (0.000)*	0.418	0.132
	Poor	-2.004 (0.000)*	0.383	0.135
	Middle	-1.465 (0.000)*	0.290	0.231
	Rich	-0.453 (0.030)*	0.209	0.636
Highest Education Level	No education	-2.825 (0.000)*	0.405	0.059
	Primary	-2.842 (0.000)*	0.309	0.58
	Secondary	-1.777 (0.000)*	0.216	0.169
Region	Rural	-0.235 (0.216)	0.190	0.791

Note: Relatives = 0; Doctors = 1; *p < 0.05

Table 6.2.B.
Model 2 for Dependent Variable Relatives vs. Doctors
(N= 5555)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-1.950 (0.000)*	0.421	0.142
	Poor	-1.937 (0.000)*	0.387	0.144
	Middle	-1.392 (0.000)*	0.294	0.249
	Rich	-0.391 (0.064)	0.211	0.676
Highest Education Level	No education	-2.150 (0.000)*	0.423	0.117
	Primary	-2.250 (0.000)*	0.329	0.105
	Secondary	-1.326 (0.000)*	0.238	0.265
Region	Rural	-0.211 (0.283)	0.196	0.810
Household Dynamics	Age of head of household	-0.003 (0.667)	0.006	0.997
	Respondent's age at first birth	0.120 (0.000)*	0.028	1.128
	Total Number of Children Ever Born	-0.195 (0.022)*	0.085	0.823

Note: Relatives = 0; Doctors = 1; *p < 0.05

Table 6.2.C.
Model 3 for Dependent Variable Relatives vs. Doctors
(N=5555)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-1.895 (0.000)*	0.422	0.150
	Poor	-1.880 (0.000)*	0.388	0.153
	Middle	-1.339 (0.000)*	0.296	0.262
	Rich	-0.357 (0.096)	0.214	0.700
Highest Education Level	No education	-1.875 (0.000)*	0.433	0.153
	Primary	-2.017 (0.000)*	0.433	0.133
	Secondary	-1.127 (0.000)*	0.249	0.324
Region	Rural	-0.168 (0.398)	0.199	0.845
Household Dynamics	Age of head of household	-0.001 (0.901)	0.006	0.999
	Respondent's age at first birth	0.116 (0.000)*	0.028	1.123
	Total Number of Children Ever Born	-0.217 (0.011)*	0.085	0.805
Personal Factors	Has had a terminated pregnancy	0.11 (0.960)	0.229	1.011
	Has heard of Family Planning through media	-1.234 (0.000)*	0.308	0.291

Note: Relatives = 0; Doctors = 1; *p < 0.05

Table 6.3.A.
Model 1 for Dependent Variable Relatives vs. Midwives
(N=6224)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-0.728 (0.000)*	0.146	0.483
	Poor	-0.629 (0.000)*	0.139	0.533
	Middle	-0.402 (0.001)*	0.124	0.669
	Rich	-0.246 (0.32)	0.115	0.782
Highest Education Level	No education	-1.803 (0.000)*	0.199	0.165
	Primary	-1.465 (0.000)*	0.175	0.231
	Secondary	-0.815 (0.000)*	0.162	0.443
Region	Rural	-1.011 (0.000)*	0.086	0.364

Note: Relatives = 0; Midwives = 1; *p < 0.05

Table 6.3.B.
Model 2 for Dependent Variable Relatives vs. Midwives
(N=6224)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-0.774 (0.000)*	0.149	0.461
	Poor	-0.656 (0.000)*	0.141	0.519
	Middle	-0.410 (0.001)*	0.126	0.663
	Rich	-0.245 (0.035)*	0.116	0.783
Highest Education Level	No education	-1.412 (0.000)*	0.209	0.244
	Primary	-1.217 (0.000)*	0.184	0.296
	Secondary	-0.684 (0.000)*	0.169	0.505
Region	Rural	-0.962 (0.000)*	0.088	0.382
Household Dynamics	Age of head of household	-0.008 (0.005)*	0.003	0.992
	Respondent's age at first birth	0.036 (0.014)*	0.14	1.036
	Total Number of Children Ever Born	-0.183 (0.000)*	0.034	0.833

Note: Relatives = 0; Midwives = 1; *p < 0.05

Table 6.3.C.
Model 3 for Dependent Variable Relatives vs. Midwives
(N=6224)

		Explanatory Coefficient	S.E.	Odds Ratio
Wealth Index	Poorest	-0.773 (0.000)*	0.149	0.462
	Poor	-0.655 (0.000)*	0.141	0.519
	Middle	-0.410 (0.001)*	0.126	0.664
	Rich	-0.244 (0.035)*	0.116	0.783
Highest Education Level	No education	-1.409 (0.000)*	0.211	0.244
	Primary	-1.214 (0.000)*	0.186	0.297
	Secondary	-0.682 (0.000)*	0.170	0.506
Region	Rural	-0.962 (0.000)*	0.088	0.382
Household Dynamics	Age of head of household	-0.008 (0.002)*	0.003	0.992
	Respondent's age at first birth	0.036 (0.014)*	0.014	1.036
	Total Number of Children Ever Born	-0.183 (0.000)*	0.034	0.833
Personal Factors	Has had a terminated pregnancy	-0.122 (0.231)	0.102	0.885
	Has heard of Family Planning through media	-0.025 (0.924)	0.264	0.975

Note: Relatives = 0; Midwives = 1; *p < 0.05

CHAPTER 7

CONCLUSION

7.1. Summary of Findings

Aggregate data from the World Bank suggests that maternal mortality in Bangladesh shares an inverse relationship with the utilization of SBAs. Since individual level data on maternal deaths is unavailable it must be sufficient to assume that increasing the utilization of SBAs during delivery will decrease the national maternal mortality ratio for the time being. Maternal health and mortality can, therefore, only be improved by identifying the factors responsible for the current underutilization of SBAs in Bangladesh.

The study finds that the majority of deliveries in Bangladesh are assisted by relatives. Of those that are assisted by SBAs, the majority prefers the assistance of midwives to that of doctors. Mothers are therefore less likely to use the assistance of relatives given the choice of using a midwife than they are given the choice of using a doctor.

Human development plays a crucial role in the utilization of SBAs by the Bangladeshi populace. The level of education attained by mothers has the most volatile relationship with choice of seeking the assistance of a SBA or a relative as higher levels of education attainment are accompanied by higher employment

of SBAs during delivery. The wealth index has the second most volatile relationship with the choice of assistance during delivery. Wealthier members of the population can afford the costs of trained professionals and the various additional costs such as transportation costs and prescription costs.

The aggregate development data concerning gender inequality suggests an inverse relationship between the number of adolescent marriages in Bangladesh and the national maternal mortality ratio. The results of this study find this to be true. Adolescent mothers are less likely to employ SBAs during delivery, most likely due to a lack of knowledge concerning maternal health or lack of agency in decisions regarding their own health. The cultural stigma against seeking professional assistance in Bangladesh may, however, gradually be on the decline. The results of this study find that households with younger household heads are more likely to employ SBAs than older household heads. The societal perception that childbirth is a family matter rather than a medical one may, therefore, be changing for the better with every generation as greater progress – both institutional and cultural – is made in educating families on sexual health and reproduction and, making SBAs, especially midwives, more visible as entities in local communities across the nation.

7.2. Policy Recommendations

1. Increase Education Level Attainment

Figure 2.4 in Chapter 2 illustrates that the ratio of female to male enrollment in primary education has plateaued at a little over 100 %. This ratio experiences a drastic drop when it comes to secondary education enrollment. Women not enrolled in secondary education usually marry despite being underage, have fewer job opportunities and have limited knowledge and access to information regarding sexual and reproductive health.

The results of this study find that women with secondary education have the greatest likelihood of employing a SBA during delivery. It is, therefore, imperative for the Ministry of Primary and Mass Education and, the Ministry of Education of Bangladesh to promote secondary education for girls and offer poor families incentives to send their daughters to secondary school.

2. Creation of National Social Welfare System

As of now, medical costs in Bangladesh have to be borne by individuals and their families as there is no social welfare system in place to cover them. This, along with the additional costs associated with seeking professional care, creates a general reluctance to seek medical attention. The medical problems pertaining to women are more likely to go ignored than those of a man due to their inferior status in society.

Therefore, the Ministry of Health and Family Welfare of Bangladesh should take the initiative to establish a welfare system that gives equal attention to the medical needs of both men and women. This system should also cover the necessary costs associated with pre and post-natal treatments along with deliveries of children under the supervision of a SBA.

3. *Decrease intra-country income inequality*

Raising the wealth of lower income groups will grant them the same access to SBAs and other health professionals and facilities as required. In short, this will require the Bangladeshi government to diversify its industry to sectors with higher productivity, improve access to capital for domestic producers and improve connectivity within Bangladesh.

4. *Implement and enforce ban on underage marriage*

Though the legal minimum age of marriage for females is 18 in Bangladesh under the 1929 Marriage Restraint Act, authorities rarely enforce it and ramifications of facilitating underage marriages, as specified by the document, are too lax in nature due to the outdated nature of the document. Recent considerations to revise the law to lower the legal age for marriage to 16 would indefinitely impede any prospect of reducing gender inequality in Bangladesh. While the 1929 Marriage Restraint Act does need to be revised, it is not the minimum age for marriage that needs

to be revised; it is the punishments for facilitating underage marriages that need to be made more appropriate for the times we live in.

7.3. Areas of Further Study

1. Inclusion of geographical distance from services and facilities in analysis

One of the personal factors that is unavailable for inclusion in the regressions in this study is the respondent's geographical distance from the nearest SBA or medical facility. The inclusion of geographical distance from medical personnel and health facilities would provide insight into how accessibility affects the choice to seek out SBAs for delivery.

Furthermore, it provides a means to evaluate whether health initiatives taken by the Ministry of Health and Family Welfare and, various other organizations are reaching the intended recipients of care and provide insight into the geographical regions where doctors, midwives and medical facilities need to be allocated.

2. Regression Analysis for Utilization of SBAs for Antenatal and Postnatal Care

While women are at medical risk during childbirth, they are also at risk during the length of their pregnancies and after childbirth. Thus, the monitoring of maternal health by SBAs during the course of pregnancies is equally as important as being assisted by a SBA during the delivery itself. The utilization of SBAs for Antenatal and Postnatal care should, therefore, also be analyzed using similar regression models to those used in this study.

3. Patterns of Utilization of SBAs over a series of years

This study only analyzes the data available for 2011. However, the DHS has data available for the 1993, 1996, 1999, 2001, 2004 and 2007. Analyzing the data using the same regression models as the ones used in this study would allow for analysis of the changes in degree of influence human development, household and personal factors have on the utilization of assistance of doctors and midwives and, also be indicative of whether government initiatives to improve the factors included in the models have been proven to be effective.

4. Impact of utilization of midwifery services on national maternal mortality

Individual level data on maternal mortality is not available. Therefore, it is not yet possible to determine whether there is a causality between the utilization of midwives or doctors and the decline in maternal mortality. As mentioned in Chapter 4, the DHS has a maternal mortality module designed to collect data on maternal mortality but has not used it in Bangladesh. Including the maternal mortality module in the national health survey would provide researchers with the required data to examine the aforementioned relationship.

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