An Overview of the Maternal and Neonatal Health Situation in Bangladesh and the Scopes for Improvement

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Abstract

This article has two objectives, to have an overview of the maternal health situation over time in Bangladesh especially, during and after deliver with a case study in Sylhet district and to find out scopes for further improvement. The main method was secondary resource analysis, for example reviewing books, journals and government agency reports. It is found that the Maternal Mortality Rate (MMR) in Bangladesh has decreased from 550 in 1990 to 143 in 2014 (per 100,000 live births) keeping an exception for Sylhet region where maternal death is 678 per 100,000 live births. Still now, the postpartum care of the mother is less important to rural areas where majority of the respondents (42.4%) didn't receive PNC at all. *Maternal mortality occurs highly in postpartum period in Bangladesh. At present, postpartum hemorrhage (31%) is the leading cause of maternal death. So, in Bangladesh, postnatal care (PNC) of the mother and the infant is found as a neglected area, even for women who give birth in a health facility. As the Current Maternal Mortality Ratio in Bangladesh is 173 per 100,000 live births and we have been considerably much closer to meet the MDG target of 143 maternal deaths per 100,000 live births by 2015. However, this progress is not running equally throughout the country, specially the coastal areas, hill tracks and some conservative areas like Sylhet. Women and their family members generally do not perceive birth spacing as a priority, and most recently delivered women are not using contraceptives. Finally there are major gaps in human resources which affected the efficiency of the delivery of maternal and neonatal health services. This report can help policy makers and researchers to work in the specified areas for ensuring maternal and neonatal health in Bangladesh and beyond.*

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An Overview of the Maternal and Neonatal Health

Introduction

Maternal health refers to the health of women during pregnancy, childbirth and the postnatal period (WHO, 2016.) and postnatal care refers to health care for the mother and new-born in the postnatal period- from immediately after the birth until around six weeks (Mamaye dictionary, 2015). Maternal death refers to the death of pregnant woman or within six weeks after the pregnancy termination from any case related to or aggravated by the pregnancy or its management, instead of from any accidental or incidental cause (WHO, 2016).

The world mortality rate has declined 45% since 1990, but still 800 women die every day from pregnancy or childbirth related causes. The United Nations Population Fund (UNFPA) finds it equivalent to about one woman every two minutes where for every woman who dies 20 or 30 encounter complications with serious or long-lasting consequences and most of these deaths and injuries are entirely preventable (UNFPA, 2017).UNFPA estimated that 289,000 women died of pregnancy or childbirth related causes in 2013 (UNFPA, 2017). These causes range from severe bleeding to obstructed labour, all of which have highly effective interventions. Data collected from a systematic review since 1997-2002 shows that, in Asia, 31% maternal deaths occurs for Hemorrhage, 12% for Sepsis/infection, 13% because of Anemia, obstructed labour causes 9% maternal deaths (Khan, Khalid, et al., 2006, p.1069).

As women have gained access to family planning and skilled birth attendance with backup emergency obstetric care, the global maternal mortality ratio (defined as the number of maternal deaths per live birth in a given period) has fallen from 380 maternal deaths per 100,000 live births in 1990 to 210 deaths per 100,000 live births in 2013. This has resulted in many countries halving their maternal mortality rates (defined as the number of maternal deaths per 100,000 women of reproductive age during a given period) (UNFPA, 2017).While there has been a decline in world-wide mortality rates (declined by 44% from 1990 to 2015) (UNICEF, 2017), high rates still exists, particularly in impoverished communities with over 85% living in Africa and Southern Asia (UNFPA, 2017).

According to the report of WHO, since 1990, maternal deaths worldwide have dropped by 45 percent, but still 340,000 maternal deaths occur worldwide each year (Saleem et al, 2014). Almost all of these deaths occur in low-income settings as a result of conditions that include severe bleeding, infection, high blood pressure, and complications during delivery.

Bangladesh has a population density of about 990 per square kilometer with a population of more than150 million and a land size of 144,000 km square. Recent economic growth in Bangladesh has been robust, averaging 6% annually between 2001 and 2012despite periods of political turmoil and

frequent natural disasters; income per head reached US$848 per year in 2012. Progress has also been rapid in the social sector within creasing educational levels, especially for women (Bangladesh Economic Review, 2010). However, Bangladesh remains one of the poorest countries in the world, with nearly a third (32%) of the population living below poverty and 29% underemployed (Bangladesh Bureau of Statistics, 2010 and 2012). Total health expenditure has remained low, representing only 3% of gross domestic product (GDP), with only a quarter of health spending coming from the public sector (National Health Accounts 1997-2007, 2010).

Bangladesh is one of the only nine Countdown countries that are on track to achieve the primary target of Millennium Development Goal (MDG) 5 by 2015.The Countdown to 2015 for maternal, newborn, and child survival in its 2012 cycle reports that only nine of the 75 Countdown countries are on track to achieve the Millennium Development Goal (MDG) 5 target to reduce the maternal mortality ratio (MMR, maternal deaths per100 000 live births) by three-quarters between 1990 (385 per 100,000 live births) and2015 (216 per 100,000 live births) (Requejo, 2012) (Trends in maternal mortality, 2015).Bangladesh is also successful to reduce maternal mortality from 574 in 1990 to 170 (per 100,000 live births) in 2015 (MDG, progress report, Bangladesh, 2015).

Though the improvement has been achieved nationally, the improvement at disaggregated level is still far behind the target. As an example of improvement in disaggregated level, the study has attempted to present the different highlighted parts of maternal and neonatal health in Bangladesh. Maternal health is closely linked to new-born survival. While great strides have been made in reducing global child mortality, new-borns now account for 44 percent of all childhood deaths. Each year, 2.9 million new-borns needlessly die within their first month and an additional 2.6 million are stillborn. The main causes, which are preventable and treatable, are complications due to prematurity, complications during delivery, and high-impact interventions are available, but they are not reaching all of the women and new-borns who need them. Although facility births are increasing in all regions and income groups, quality of care at birth remains a major challenge. Many women give birth at home and may not have any skilled health worker before or after delivery. Also the skilled health workers often lack access to critical supplies like instrument used to cut the umbilical cord and material applied to the cord, and medicines. One of the main goals of this article is to bring all problems relate to maternal health and possible solutions together so that future initiatives could be in the right track and time, as well as cost effective. The main objectives of this study are (i) to present an overview of the maternal and neonatal health situation at national and regional level of Bangladesh, (ii) to present a comparative analysis for meeting the scopes of improvement, and (iii) to present the maternal health situation in Sylhet region as a case study.

Methods of the Study

Data have been extracted from various secondary sources including international, national and local-level survey reports particularly for the period of 1990-2014. The main resources include the study reports of Bangladesh Maternal Mortality and Health Care Survey (BMMS: 2001, 2010), Bangladesh Demographic and Health Survey (BDHS: 1993, 1997, 2000, 2004, 2007, 2011, 2014), Bulletin of the World Health Organization (WHO) and several related research works conducted by different non-government organizations (particularly by ICDDR'B) with in-depth analysis. In the BMMS survey, data on maternal mortality have been collected from a nationally representative sample of reproductive age women following two-stage cluster sampling design covering both rural and urban areas. In BDHS survey, demographic and health related information of children and women have been collected from nationally representative sample of reproductive age women covering rural and urban parts of all the divisions following two-stage stratified sampling design. A number of micro-level studies conducted by recognized institutions like ICDDR'B and independent researchers have also been considered for extracting estimates at disaggregated administrative units particularly to portrait the actual scenario. In particular, the scenario of child and maternal health condition in the districts under Sylhet division are focused as example of disaggregated administrative units.

Results of the Study

The findings on maternal and neonatal mortality at national and disaggregated levels, maternal health care indicators at national and disaggregated levels, variations in maternal and new-born health indicators by background characteristics, causes of neonatal and maternal mortality, and disparities in maternal and new-born health interventions have been presented in the following subsections.

Maternal Mortality

The target of Millennium Development Goal 5 (MDG 5) was to reduce the MMR by three-quarters between 1990 and 2015. However, there are challenges involved in monitoring progress towards MDG 5 and in evaluating the impact of safe motherhood initiatives because accurately estimating maternal mortality is very problematic (Ahmed & Hill, 2011). This is especially in developing countries, where vital registration systems are usually incomplete.

The maternal mortality pattern has been improved during the last decade according to the last survey on maternal mortality and health (BMMS, 2010). Figure 1 presents the maternal mortality ratio (MMR) has been decreased to 194 per 100,000 live births in 2010 from 322 in 2001.The similar pattern has also been found as expected in maternal mortality rate (MMRate), the rate has been reduced to 170 maternal deaths per 100,000

women of reproductive age in 2010 from 367 in 2001. The percentage change in MMR and MM Rate are estimated at about 40% and 57% during the period of 2001-2010. According to World Fact Book (2017), the estimated MMR is 176 per 100000 live births, which indicates that the target of MMR (143 maternal death per 100000 live births) has not been yet fulfilled by 2015 though the reduction rate was tremendous during 2001-2010.

As figure 1 shows, the success in the reduction of MMR and MM Rate at national highly masks the actual scenario at the division level particularly in Sylhet division, where the MMR decreased only 10% during the 10 years period (MMR: 425 in 2010 and 471 in 2001). The improvement has been observed in Khulna Division where both MMR and MMRate are below significantly below 100 and followed by Rajshahi division. In other divisions except Sylhet, the figures have been reduced but not at the expected level. In Sylhet division, both MMR and MMRate seems stack at the same point though several interventions have been done (as example: Projhanmo I and Ma Moni implemented by USAID, ACCESS and it partners and MAMATA).

Table 1 shows MMR and MM Rate according to women residence, age, education and household wealth status. The MMR in rural area reduced at a considerable number from 326 in 2001 to 199 in 2010 compared to urban area where the percentage change has been estimated at about 32% against 39% in rural area. However, the MMR and MM Rate in rural area (MM Rate: 179 in 2010) are found still higher than those in the urban area (MMR: 178 and MM Rate: 143 in 2010) in both 2001 and 2010.

The MMR and MM Rate for mother's age group of 30-34 show worse condition than other age groups. Improvement rate for MMR and MM Rate for this is 22% and 41%, where the condition of mother's age group 15-19 is better. Both of its MMR and MM Rate in 2010 are below 100 and improvement ratio is about 71% and 78%.

There is also an impact of wealth status in both MMR and MMRate, so variety has been seen in maternal mortality on the basis of wealth. MMR and MMRate among the women of middle wealth quintile are surprisingly high in both the study year 2001 and 2010 (MMR: 473 per 100,000 live births in 2001 and 278 in 2010; MMRate: 527 per 100,000 women of reproductive age in 2001 and 402 in 2010). The improvement has been observed in MMRate of highest wealth quintile is below 100 and in 2010, the MMR has been decreased 40% than 2001 (208 to 123 per 100,000 maternal deaths). The ratio of improvement in MMR and MMRate of middle wealth quintile is relatively 41% and 55% which indicates to a hope of much improve.

At disaggregated administrative level, no study has been found to calculate the MMR and MMRate. Ahmed and Hill (2011) studied both MMR and MMRate at district level using the 2000 BDHS data and showed

that both the indicators are significantly higher in the districts of Sylhet division. Among them, the MMR and MMRate were estimated as 102 per 100000 women (78-127) and 678 per 100000 live births (518-839). These indicators are significantly higher than not only at national level (MMR: 322, MMRate: 367) but also at Sylhet division (MMR: 471, MMRate: 665). These findings may indicate that the district level MMR and MMRate may be higher than the division level in the recent time as well.

Neonatal Mortality

Figure 2 shows the improvement in reducing the neonatal mortality rate during1994 -2014 extracted from BDHS surveys. National level NMR declined from 52 to28 per 1,000 live births which is almost half during this period with a percentage change of about 46%. The recent study indicates that the estimated NMR is about 21 per 1000 live birth which is still below compared to the target of MDG (14 per 1000 live births).

The improvement in NMR significantly varies by the background characteristics, particularly division, place of residence, sex of child, mother's age at birth, mother's education, and household wealth status. Figure 2 suggest that the highest improvement has occurred in Barisal division and poorest in Sylhet division. The performance in Sylhet division does not change much in 2014 from 2001 compared to other divisions. As the table presents, Sylhet continues the literary worse situation than others by having continuous high rate of neonatal mortality during the year 1994 to 2014. Improvement rate of Sylhet division is 40% where Barisal, having highest improvement in neonatal mortality 63 in 1994 to 21 in 2014 per 1,000 live births, has improvement rate of about 67%. For Khulna division the improvement in neonatal mortality rate seems stack, though it shows huge improvement in maternal mortality.

Table 2 shows neonatal mortality rate according to women's residence, age, education, household wealth status and child's sex. The neonatal mortality rate in rural area is reduced from 66 in 1994 to 31 in 2014 which is almost half. In compared to rural area, neonatal mortality rate in urban area is relatively low 44 in 1994 to 21 in 2014 per 1,000 live births. But the rate of improvement in rural area (53%) is almost equal to urban area (52%).

Neonatal mortality rate on the basis of mother's age shows that, the age group of mother's <20 years age has the highest rate of mortality from the year 1994 to 2014 and the rate of reduction is 62% from 81 in 1994 to 31 in 2014. On the other hand, situation of age group 20-29 is much better compared to others (56 in 1994 and 27 in 2014) though the success rate of all the age group is higher than 50%.

Mother' education has also an impact on neonatal mortality which is presented by demographic and health survey report (BDHS 1994-2014). Result of the table 4 presents that, the situation of mother's having no education is comparatively worse (71 in 1994 and 26 in 2014) than others

and its improvement rate is 63%. But mothers completed secondary education has the lowest rate in mortality (41 in 1994 and 13 in 2014) having an improvement rate of about 68%.

Neonatal mortality rate among the women of lowest wealth quintile are surprisingly high (55 per 1000 live births in 2004 and 35 in 2014). The improvement has been observed in neonatal mortality of highest wealth quintile is 14 in 2014, the neonatal mortality has been decreased 56% than 2004 (41 per 1000 live births). The ratio of improvement in neonatal mortality of lowest wealth quintile is relatively slow (36%).

Neonatal mortality rate on the basis of child's sex shows high rate of mortality among the male child in all the study year from 1994 to 2014 (71 in 1994 and 31 in 2014) where mortality rate among female child is relatively low (56 in 1994 and 26 in 2014). But the improvement rate in both the group is almost equal and higher than 50%.

Antenatal Care

Figure 3 shows the coverage of antenatal care (ANC)at national level has a positive trend during the observed period of 1994-2014. The sharp increase of at least 4 ANC visits reached at only 31.2% in 2014 from very poor condition (only 5.5%) in 1994.The improvements indicate about the proportion of pregnant women received at least 4 times antenatal check-ups has increased by 81% at national level, though the current proportion is still very low. The improvement in antenatal care of at least 4 antenatal check-ups fulfills the MDG 5.5 goals (increase antenatal care up to 50%).

To expand the knowledge base regarding population health and health-related behavior in urban areas of Bangladesh(BUHS 2006 and 2013) NIPORT et al conducted survey based on multi-stage sampling scheme in slum and non-slum areas of city corporations in 2006 and 2013. It shows that, in 2006, slightly more than half (53%) of women in the non-slums completed at least 4 ANC visits which increase to 58% in 2013, compared with 22% in slums (28.5% in 2013) and 38% District Municipalities later increased to 35.8% in 2013.

The statistics on at least 4 ANC at division level are not available in all the BDHS and BMMS surveys. Figure 4 represents the variation at division level for the year 2001, 2011 1nd 2014. It is observed that pregnant women in Khulna division are more likely (14.6% in 2001 and 28.2% in 2014) to receive ANC, while women in Sylhet are less likely (10.4 in 2001 and 9.6 in 2014) to receive at least 4 ANC during the period 2001-2014. The graph clearly depicts that the improvement has been occurred only in Khulna division, while there were no significant improvement in other divisions in the period 15 years. The alarming issue is that around 15% or below pregnant women received at least 4 ANC in all the divisions except in Khulna (49% positive change).

To present the condition of antenatal care at disaggregate level, a few studies have been found. In a community surveillance study across four districts Thakurgaon, Jamalpur, Moulvibazar, and Narail conducted by Centre for Injury Prevention and Research Bangladesh (CIPRB), it is observed that near about two-third pregnant women received at least one ANC during the period of 2011-2012, which is very close to the national level (67.7%) (Halim et al., 2016).

Facility Delivery

Safe motherhood has multiple immediate consequences. It saves the lives of pregnant women and their neonates. Facility delivery with involvement of skilled birth attendants has demonstrated effects on maternal and neonatal mortality reduction (Brouwere and Lerberghe, 2001; Tura et al. 2013). Figure 5 presents the percentage of delivery at health facility in both national and sub-national levels. At the national level, percentage of facility delivery shows a great improvement (increased by 89%) from 3.5% in 1994 to 37.4% in 2014. The dramatic improvement has been observed after mainly after 2004 not only at national but also at division level. BUHS reports show that, in 2006, only 12% birth was taken placed at health facility by slum women which improved to 36.7% in 2013, compared with 46% in the non-slum (65.1% in 2013) and 31% in district municipalities which improved to 52.6% in 2013.

At the sub-national level, improvement is not like this. Sylhet division has the worse situation than others by having 22.6% delivery at health facility in 2014 where Khulna has 54.6%.The alarming issue is that around 30% or below delivery occurred at health facility in all the divisions except in Khulna (92% positive change).

BUHS 2013 in urban areas of Dhaka city indicates that less than two-fifths deliveries (37%) occurred in facilities. A recent paper by ICDDR,B shows that increased travel time is a major disincentive for seeking facility-based obstetric care among the urban poor in Sylhet, Bangladesh. More than half of the mothers interviewed delivered at the health facility mainly were mainly conducted public (17 % in 2013), NGO facilities (16 %), and private facilities (10 %) (Khan et al., 2016).

Skilled Birth Attendance

The Government of Bangladesh is committed to achieving MDG-5 by increasing skilled attendance at birth to 50 percent by 2016 (MDG, 2013). Figure 6 presents distribution of skilled birth attendance at both national and sub-national level. At national level, percentage of skilled birth attendance has improved to 42.1% in 2014 from 9.5% in 1994, which is about 77% increase.

At the sub-national level, Sylhet division has the worse situation with 27.1% where Khulna has near about 60%SBA in 2014. The issue is that only in Khulna the improvement is upto the level compared to the target of

MDG (reached at 50% improvement). As BUHS reports presents, less than one in five (18%) women in 2006 in the slum had medically trained assistance during delivery which improved at 37.3% in 2013, compared with 56% in the non-slum (increased to 67.7% in 2014) and 38% in the district municipalities (improved at 55.6% in 2013).

In the study of CIPRB in the four districts (Halim et al., 2016), one-in-five deliveries were conducted with the presence of a trained birth attendant and the rate of skilled birth attendant was remarkably poor compared to national level (31.4%).

Postnatal Care

Figure 7and Figure 8show the positive trend in the coverage of postnatal care for both women and new-born satnational and sub-national levels. The sharp increased of postnatal care reached at 39.4% and 36.5% in 2014 from 17% and 24% in 1994 for women and new-born respectively. These statistics suggest about 34% and 57% improvement in PNC for women and new-borns during the period 1994-2014at national level. According BUHS reports, in 2013, 65.1% women of non-slum area received PNC than 51% in 2006, 36.7% of slum improved than 18% in 2006 and 52.6% in district municipalities (instead of 39% in 2006) receive PNC. Similar pattern were observed for PNC for the newborn.

The improvement in PNC coverage at division level is not consistent as the national level. The postnatal checkup for women is found steadily increase in Khulna, while there is no consistent improvement has been observed in Sylhet division over the whole period (Figure 7). Similarly, the status of PNC for newborn has no consistent improvement by division.

In the study of CIPRB in the four districts (Halim et al., 2016), more than two-thirds (68.3%) newborn babies sought treatment before their death.

Causes of Maternal Mortality

The causes of maternal mortality are mainly direct and indirect obstetric complications. According to the last two BMMS survey during the period of 2001-2010, number of maternal deaths for direct obstetric causes decreased from 225 to 123 per 100,000 maternal deaths, about 50% reduction of the maternal deaths. However, no reduction has been found in case of indirect obstetric complications (49 in 2001 and 68 in 2010). In 2010, about 30% and 20% maternal deaths are found due to the most common direct obstetric complication - Hemorrhage and Eclampsia. A remarkable number of maternal deaths (35%) are due to indirect obstetric complications.

Causes of Neonatal Mortality

The main causes of neonatal mortality are birth asphyxia, prematurity, birth injuries and acute respiratory infections (ARI). In 2004, about 44.9% neonatal deaths causes for birth asphyxia and birth trauma, 15% due to prematurity (ICDDR,B). According to 2004 BDHS report, 21% neonatal

mortality occurred due to birth asphyxia and trauma, 11% for prematurity and 10% due to ARI. In comparison to 2004, there was no significant change in the causes of neonatal mortality in 2011 (NIPORT et al, 2013). According to a recent study in 2015, 23% neonatal deaths causes due to birth asphyxia, 30% due to prematurity, about 20% due to sepsis, 13% due to congenital anomalies and 6% due to ARI.

Disparities in Maternal and Newborn Health Indicators in Bangladesh

The study shows disparities in the key maternal and newborn health care indicators in Bangladesh based on the BDHS and BMMS survey findings. Table 3 shows that highest disparities between the highest and lowest performing divisions and it is found that in most of the indicators Sylhet division has the higher disparities compared to the highest performing division.

Areas to Focus

Following areas could be focused while improving maternal and neonatal health is very necessary:

For addressing the primary risk factors for maternal and newborn deaths, more work is needed to adapt existing preventive and curative tools, technologies, and treatments as well as develop new ones that are more effective and affordable and will be more readily accepted by families and health workers particularly in rural and community clinics, health centers, and hospitals. Community-based interventions to reduce neonatal mortality in Bangladesh run by USAID implement a project 'Projahnmo I' in Sylhet district for advancing the health of newborns and mothers in 2007. This program identifies 16 interventions with proven efficacy and effectiveness and shows that provision of key ENC drugs and supplies in Upazilla Health Complex, Family Welfare Clinic and Community Health Workers are important (Baqui& El-Arefeen, 2007).

Save the Children partners with the Ministry of Health and Family Welfare (MOHFW), SHIMANTIK and Friends in Village Development, Bangladesh (FIVDB) implement an integrated safe motherhood, newborn care and family project (MaMoni) in 7 upazilas in Sylhet districts and 8 upazilas in Habiganj under Sylhet division. For safe motherhood, newborn and family planning the project introduces Kangaroo Mother Care, use of antenatal corticosteroids to prevent the complication to preterm births and establishment of Special Care Newborn Units (SCNU) at district hospitals (Save the Children, MOHFW, SHIMANTIK, FIVDB, n.d.)

More effort is needed to help the community-level healthcare providers in advancing their knowledge and skills, and expanding their use of innovative tools. One key priority is improving the quality of care in primary healthcare facilities where women give birth. Health workers can also improve outcomes for women and children by disseminating good health practices such as hand washing, immunization, postpartum family

planning, and exclusive breastfeeding. As example MAMATA is a non-profit, strategic organization working in health and family planning sector since 1984 being financed by MOHFW, USAID, ADB, UNFPA, SIDA, etc. Having focus on maternal care, neonatal care, ANC, delivery care, PNC, etc. To achieve success they follow Behaviour Change Communication (BCC) focusing awareness campaign, motivation and clinical counselling.

A formative research conducted by Ahmed et al. (2013) titled 'Operation research to add postpartum family planning to maternal and neonatal health to improve birth spacing in Sylhet district, Bangladesh' showed that women and their family members generally did not perceive birth spacing as a priority, and most recently delivered women were not using contraceptives. Community Health Workers visited over 90% of women in both intervention and comparison groups during pregnancy and the first 3 months postpartum. (Ahmed et al, 2013)

By strengthening the skills and capacities of local advocates, policies could be promoted and strategies could be adopted that would enable different places in the country to increase the use of lifesaving health interventions, raise awareness of overlooked risk factors for new-born and maternal mortality, and expand the use of essential medicines. Sayedur Rahman and colleagues completed a research on the basis of Bangladesh Demographic and Health Survey 2014 which shows among the eight administrative divisions, the facility delivery rate is lowest in the Sylhet divisions (22.6%). They assessed the effect of integrated supply-and demand-side interventions on the facility-based delivery. After completing their study, the suggested 3 components to improve- financial incentives to cover expenses, a provision of emergency transport, and referral support to a tertiary-level hospital. The results of the implementation were observed by them and found lower rates of institutional deliveries when only supply-side interventions were implemented. The proportion rose to 47.1% and continued increasing when the project emphasized addressing the financial barriers to accessing obstetric care in a health facility. They suggested an integrated supply and demand-side intervention associated with a substantial increase in institutional delivery (Rahman et al, 2017).

Probable Strategies

Maternal, new-born and child health programs could work to expand coverage of high-impact interventions to ensure women and newborns survival, healthy childbirth and beyond. More investment could be done to provide efforts to adapt and develop innovative tools, technologies and treatments; improve the quality of healthcare services and practices and the interactions between health workers and families; and advocate for national and global policies that benefit maternal, new-born, and child survival and health. Combined activities by the government with different agencies, NGOs, and the private sector, and collaboration programs in areas such as discovery, integrated delivery, nutrition, family planning, childhood

infectious diseases, policy and advocacy, and communications could bring a significant outcome. Appreciating and supporting research across discovery, development, and implementation sciences in many parts of the country that can lead to better ways to save the lives of women and newborns and improve their health. Various intervention designs and strategies can be tailored to identify what combination of interventions may produce the optimum result (Rahman et al, 2017). From a program planning perspective, to achieve the maternal mortality target of the United Nations' Sustainable Development Goals (SDGs) and to achieve the target of 50% of deliveries attended by SBAs of the Government of Bangladesh, it is important to consider the modifiable factors that affect the presence of SBAs during childbirth. To increase the number of deliveries attended by SBAs at the population level, community-based programs should focus on the positive factors such as ANC visits by a skilled provider and surveillance for complications during pregnancy; based on priority, health programs should include these components to increase awareness in rural areas and the divisions with a lower presence of SBAs during childbirth. Effective collaboration with stakeholders should be ensured, and further studies should be conducted to reveal unexamined factors associated with the presence of SBAs during childbirth (Kibria et al 2017).

Concluding Remarks

The study shows how much the maternal and child health care indicators improved during the last two decades. The findings explicitly support that though the national level indicators have been improved as per expected level, the trends at the disaggregate levels (such as Division, place of residence, mother's age during delivery, mothers education, household wealth status and child's sex) have not been observed as national level. The worst conditions in almost all indicators are observed in Sylhet division during the period of 1994-2014. To improve the situation particularly in Sylhet region, increasing the coverage of family planning services, especially among high-risk adolescent girls, can help significantly reduce maternal and newborn mortality. Improvement in the quality of antenatal and postpartum services can help strengthen the link between family planning and maternal and newborn health. Understanding people and their culture would be necessary to be successful for any kind of steps to reduce maternal and neonatal deaths in Bangladesh. Rigorous implementation research studies are needed to draw confident conclusions (Rahman et al, 2017). The study may help to see how much far from the SDG levels of these indicators.

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An Overview of the Maternal and Neonatal Health

Figure 1: Maternal mortality ratio (MMR) and Maternal mortality rate (MMRate) at national and sub-national level in Bangladesh, 2001-2010
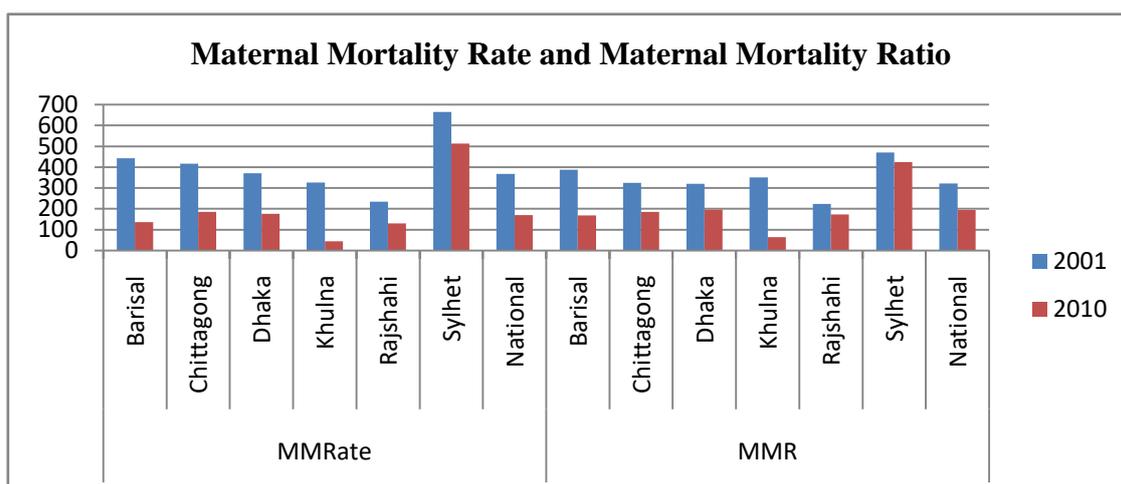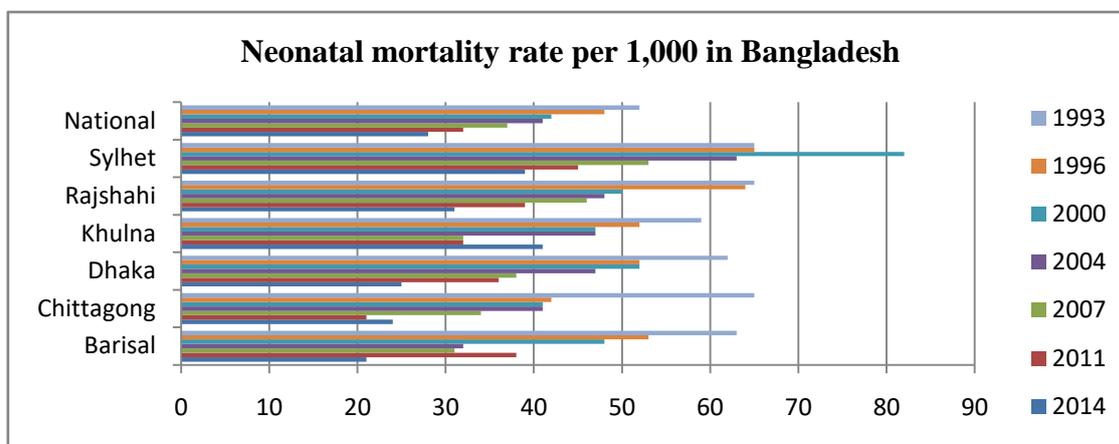

Source: NIPORT et al. (2001, 2010)

Table 1: Differentials in Maternal mortality ratio (MMR) and Maternal mortality rate (MMRate) by background characteristics, 2001-2010

		MMRate (Per 100,000 women of reproductive age)		*MMR* (Per 100,000 live births)	
		2001	*2010*	*2001*	*2010*
Residence	*Urban*	233	143	262	178
	Rural	386	179	326	199
Mother's education	*No education*		270		439
	Primary incomplete		104		114
	Primary complete		300		297
	Secondary incomplete		89		90
Wealth quintile	*Lowest*	499	254	343	234
	Second	392	165	302	182
	Middle	527	239	473	278
	Fourth	272	116	268	143
	Highest	177	93	208	123
Mother's age	*15-19*	228	51	170	49
	20-24	439	209	236	130
	25-29	535	238	358	194
	30-34	499	293	517	402
	35-39	262	286	493	928

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	40-44	387	56	1946	561
	45-49	149	42	2436	1798

Source: NIPORT et al, 2001, 2010

Figure 2: *Neonatal mortality rate at nation and sub-national level in Bangladesh, 1994-2014*

Source: NIPORT et al, 1994, 1997, 2000, 2004, 2007, 2011, 2014

Table 2: *Differentials in neonatal mortality rate by background characteristics, 1994-2014*

		Neonatal mortality rate per year						
		2014	**2011**	**2007**	**2004**	**2000**	**1997**	**1994**
Residence	Urban	21	32	33	44	42	41	44
	Rural	31	33	41	47	52	56	66
Mother's education	No education	26	32	47	51	55	58	71
	Primary incomplete	31	38	35	44	51	56	56
	Primary complete	31	32	44	51	43	45	55
	Secondary incomplete	33	30	39	38	-	-	-
	Secondary complete or higher	13	33	21	35	41	45	41
Wealth quintile	Lowest	35	34	48	55	-	-	-
	Second	35	38	44	43	-	-	-
	Middle	34	32	40	50	-	-	-
	Fourth	23	33	32	39	-	-	-
	Highest	14	23	27	42	-	-	-
Child's	Male	31	39	42	52	55	60	71

An Overview of the Maternal and Neonatal Health

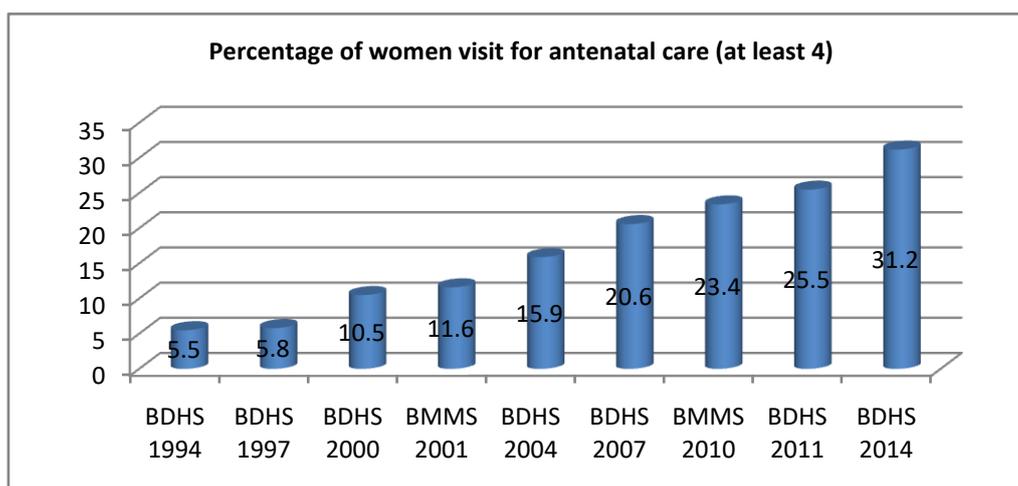| sex	Female	26	26	36	40	46	49	56
Mother's age	<20 years	31	45	55	58	72	70	81
	20-29	27	26	30	37	41	47	56
	30-39	28	26	38	48	40	47	57

Source: NIPORT et al, 1994, 1997, 2000, 2004, 2007, 2011, 2014

Table 3: *Disparities in maternal and newborn health indicators in Bangladesh*

|		MMR (2010)	NMR	ANC at least 4 (%)	Skilled birth attendance (%)	Facility delivery (%)	PNC for newborn (%)	PNC for Mothers (%)
Region	National	194	28	31.2	42.1	37.4	36.5	39.4
	Barisal	168	21	16.9	36.7	29.9	36.8	36.4
	Chittagong	186	24	19.9	43.9	35.2	39.7	39.0
	Dhaka	196	25	15.1	43.5	40.5	34.8	40.3
	Khulna	64	41	28.2	58.2	54.6	47.8	54.4
	Rajshahi	173	31	10.2	41.6	39.2	38.8	43.4
	Rangpur	-	27	33.4	37.9	34.3	34.8	36.6
	Sylhet	425	39	9.6	27.1	22.6	24.6	24.9
Regional performance	Highest value	Sylhet	Khulna	Rangpur	Khulna	Khulna	Khulna	Khulna
		425	41	33.4	58.2	54.6	47.8	54.4
	Lowest value	Khulna	Barisal	Sylhet	Sylhet	Sylhet	Sylhet	Sylhet
		64	21	9.6	27.1	22.6	24.6	24.9
	Ratio (highest to lowest)			54.6	53.4	58.6	48.5	54.2

Source: Maternal and Newborn Health Disparities (2015, p. 6)

Figure 3: *Antenatal care for women at national level (at least 4 visits)*

Percentage of women visit for antenatal care (at least 4)

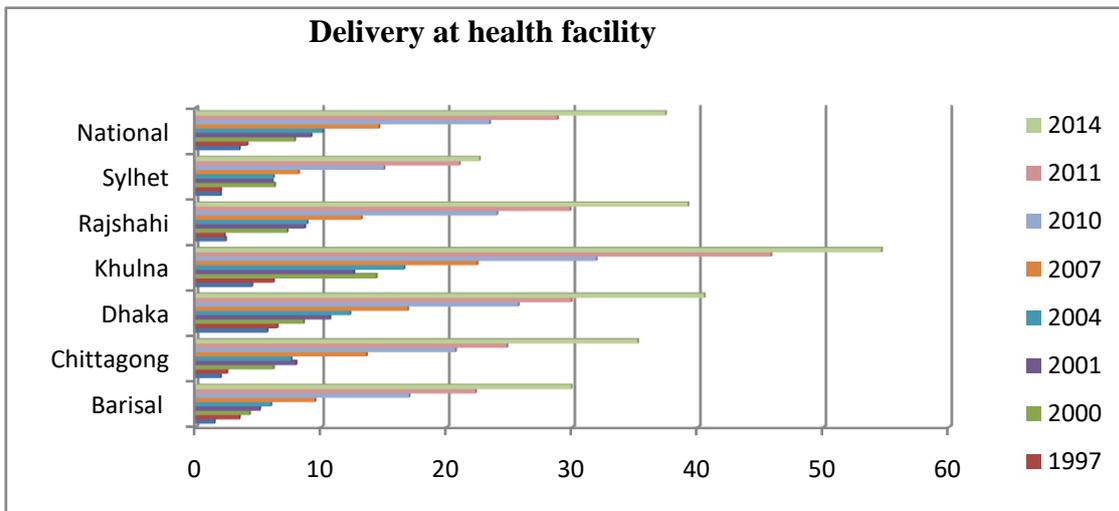| BDHS 1994	BDHS 1997	BDHS 2000	BMMS 2001	BDHS 2004	BDHS 2007	BMMS 2010	BDHS 2011	BDHS 2014
5.5	5.8	10.5	11.6	15.9	20.6	23.4	25.5	31.2

Source: *NIPORT et al, 1994, 1997, 2000, 2001, 2004, 2007, 2010, 2011, 2014*

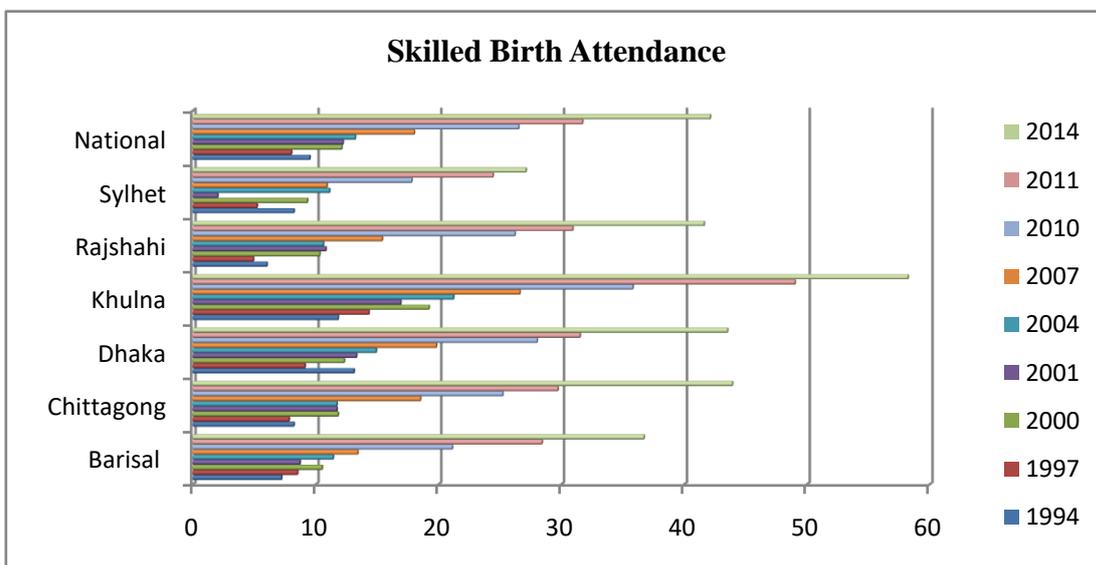**Figure 4***: Antenatal care for women at sub-national level (at least 4 visits)*
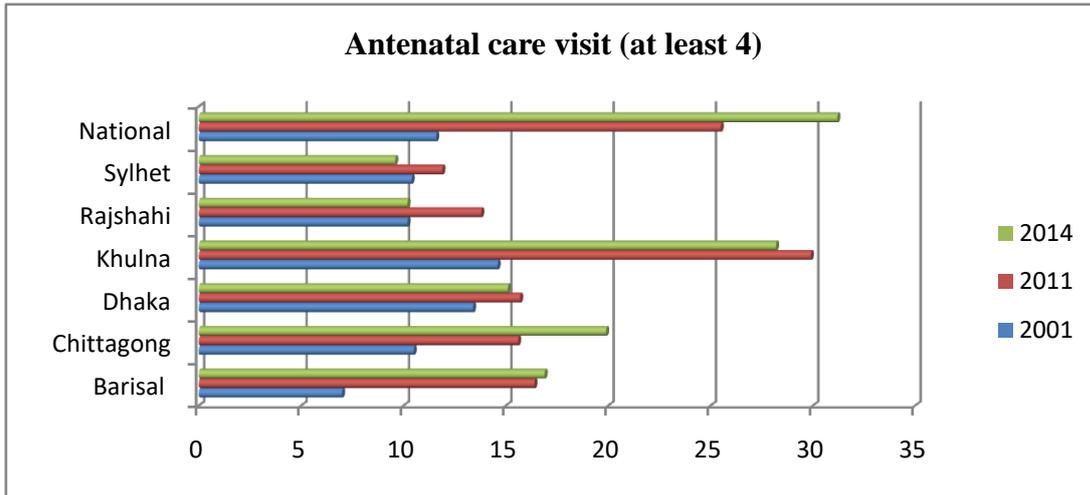
Source: NIPORT et al, 2001, 2011, 2014

Figure 5*: Delivery at health facility*

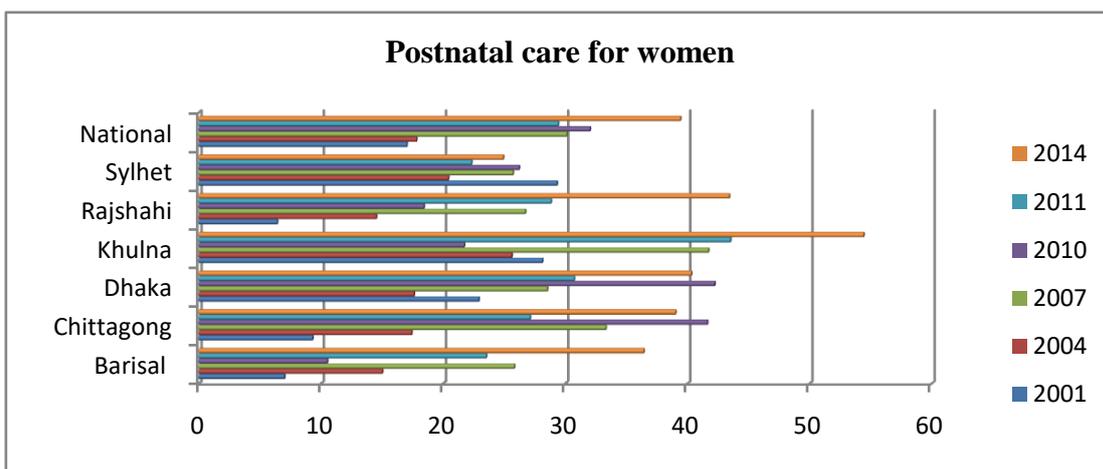*Source: NIPORT et al, 1994, 1997, 2000, 2001, 2004, 2007, 2010, 2011, 2014*

Figure 6: *Percentage of delivery by medically trained persons*

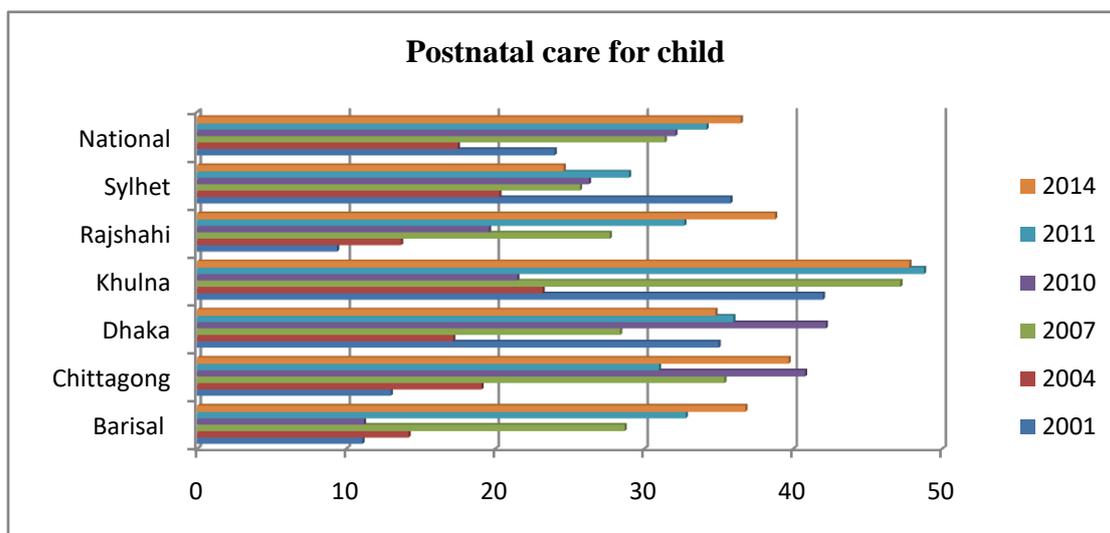***Source:*** *NIPORT et al, 1994, 1997, 2000, 2001, 2004, 2007, 2010, 2011, 2014*

Figure 7: *Postnatal care for mother*

Source: *NIPORT et al., 2001, 2004, 2007, 2010, 2011, 2014*

Figure 8: *Postnatal care for child*

Source: *NIPORT et al., 2001, 2004, 2007, 2010, 2011, 2014*