Disparities in Maternal and Newborn Health Interventions in Bangladesh: Evidence from the latest Demographic and Health Survey

Md. Mortuza Ahmmed[1],Shumaya Aziz Anee[2], Md. Ashraful Babu[3*], Zahir Rayhan Salim[4], Md. Shohel Babu[5], Jamee Ahmad[4], Dr. Md. Abud Darda[6]

[1]Department of Mathematics, American International University – Bangladesh (AIUB), Dhaka, Bangladesh.
[2]Sub Assistant Community Medical Officer,Upazila Health Complex, Bheramara, Kushtia, Bangladesh.
[3]Department of Quantitative Sciences, International University of Business Agriculture and Technology, Dhaka, Bangladesh.
[4]College of Business Administration, International University of Business Agriculture and Technology, Dhaka, Bangladesh.
[5]Department of CSE, Southeast University, Dhaka, Bangladesh.
[6]Department of Statistics, National University, Gazipur, Bangladesh.

[*]**Corresponding Author:**

Md. AshrafulBabu

 ashraful388@gmail.com; babu@iubat.edu

 Tel: +8801720810780

Abstract

Maternal and newborn healths are two important aspects of public health in a country. The objective of this study is to reveal the disparities in maternal and newborn health interventions the with respect to relevant socio-economic and demographic variables. Data from the Bangladesh Demographic and Health Survey (BDHS) - 2017 has been utilized to serve the purpose. The selection of variables has been done applying Grossman's model for Bangladesh viewpoint. Graphical analysis and frequency distributions have been constructed not only to see the patterns and trends of selected variables from 1995 to 2018, but also to reveal the required disparities among the variables. Urban mothers as well as their children have been found to be comparatively in safer health conditions than the rural ones. Visible variations have also been observed across different divisions in the country. The inequity ratios between women in the richest and poorest wealth quintiles have already reduced to the targeted level of the fourth Health Nutrition and Population Sector Program (HPNSP) taken by the government. Mothers with secondary or higher education have been found to be in better health conditions along with their newborns than mothers with primary or no education. Other than few exceptions, the likelihood of maternal and newborn health interventions has been found to be decreasing with age and increasing with birth order. Further research is

needed to detect the roots of these inequalities so that effective initiatives could be taken by the government to reduce them and ensure improved maternal and newborn health status. Otherwise, the objective of an excellent initiative of the government like the HPNSP-2017 would not be accomplished.

How to cite this article:Ahmmed MM, Anee SA, et al (2020): Disparities in maternal and newborn health interventions in Bangladesh: Evidence from the latest demographic and health survey, Ann Trop Med & Public Health; 23(S16): SP231639. DOI: http://doi.org/10.36295/ASRO.2020.231639

Introduction

As stated by UNICEF (United Nations International Children's Emergency Fund), roughly 8428 babies were expected to be born in Bangladesh on the first Day of 2020 [1]. At this rate, around 3076220 babies will be born in the country this year. The universal maternal mortality ratio (MMR)decayed by almost 38%between 2000 to 2017 [1].Bangladesh has experienced exceptional progress in maternal and child health over the last few decades, but improvement for the newborns has been on the slower side [2]. As said by theBangladesh Maternal Mortality and Health Care Survey (BMMS)-2016, the MMRwas 196 per 100000 live births in 2016 which wasidentical to the estimate of 2010 (194 per 100000 live births)[3]. Complications at the time of delivery was considered to be the main cause of maternal deaths in Bangladesh [4] whereas low utilization of already existing health care services was responsible for newborn deaths[5]. Besides, antenatal care and delivery assistance by medically trained personnel (MTP) is the key to safe childbirths. Intheirstudy,Islam et al. observed that women receiving antenatal care by Skilled Birth Attendants (SBAs) were 2.62 times more likely to have safe deliveriescompared to those who did not [6].Between 1991 to 2011,alarge number of childbirths happened at home, assisted by Traditional Birth Attendants (TBAs) whowere not trained healthcare professionals [7]. This was hazardous for maternal and newborn health and safety.

Approximately 86% women in rural areas of Bangladesh were found to receive health care services from non-qualified health-care providers [8].The rural women in Bangladesh usually face serious hurdles to choose the most convenient delivery attendant for them due to cultural traditions. However, owing to rising level of education and awareness among people, the circumstances are being upgraded day by day. Moreover, the peripheral level public health facilities in providing basic and extensive emergency obstetric care services in a phased way have been encouraged by the government of Bangladesh in recent years. Malnutrition is an additionalaspectof the rural mothers in Bangladesh. Alimentary practices are crucialfor the safety of theexpectantmothers' care seeking behavior. After investigating expectantmothers

in a rural part of Bangladesh, it was reported that despite beinginformed aboutthe dietary requirements, half of themwere testified aseither unchanged or reduced food intake during pregnancy [9]. Furthermore, delay in accessing obstetric care facilities is highly related to maternal mortality in rural areas of Bangladesh [10].

It wasobserved in a study that only one in three women in Bangladesh seek treatment from a qualified provider [11]. In a separate study, place of delivery was identified as the underlyingfactor for various complications during childbirths [12]. Besides, gender was found tobe accountable for early and excessive child bearing [13]. Women's lack of power in decision making about their reproductivehealth care services plays a vital role in maternal and newborn health. In another study,after examining definitions of care seeking for maternal health complications by families in rural Bangladesh, it was concluded that families generally seek care for complications but the ways they seek care do not correspond to the definitions used by various health programs [14]. A study based on Andersen's health seeking behavior model revealed that education level is one of the most important determinants for maternal and newborn health [15].

In this paper, inequalities in maternal and newborn health interventions in Bangladesh regarding associated socio-economic and demographic variables have been revealed. Alongside, trends in maternal and newborn health over the years have also been highlighted. A clear understanding about the disparities in maternal and newborn health interventions in Bangladesh has been attained by doing this study.

Materials and Methods

2.1 Source of the data

The study is mainly based on information retrieved from Bangladesh Demographic and Health Survey (BDHS)-2017 conducted by the National Institute of Population Research and Training (NIPORT) which providesthe latest information on various aspects of maternal and newborn health [2]. Besides, the Sample Vital Registration System (SVRS)-2018 conducted by Bangladesh Bureau of Statistics (BBS) has been used to retrieve data on maternal and neonatal deaths to see their trends and patterns over the years [16].

2.2 Variables under study

Based on Grossman'smodel, the selection of variables has been done for Bangladesh perspective [17].The variables are classified as:socio-economic variables including residence, division, wealth quintile, and mother's education, demographic variablesinvolving mother's age and birth order.

2.3 Statistical analyses

To see the patterns and trends of selected variables from 1995 to 2018, graphical analysisis performed. Also, frequency distributions have been constructed to reveal the required disparities among the variables.

2.4 Ethics approval

Authors declare that there has been no conflict of interest whatsoever. Data used in this study are gathered with due permission from National Institute of Population Research and Training (NIPORT), the authority of the BDHS datasets.

Results and Discussion

3.1 Maternal and Newborn Health in Bangladesh

The trends of both maternal and neonatal deaths in Bangladesh from 1995 to 2018 have been displayed in Figure 1. It is observed that the maternal mortality rate (per 1000 live births) has declined from 4.47 in 1995 to 1.69 in 2018 while the neonatal mortality rate (deaths during the first 28 completed days of life per 1000 live births) has declined by 46% during that period. This is a positive consequence of increasing health care facilities regarding safe delivery practices over the last two decades in Bangladesh [5]. Mothers are being supported with more qualified assistance during pregnancy and delivery than ever before [16].

The countrywide target is to lower the maternal mortality rate by further 37.87% (1.05 per 1000 live births) at the end of 2021, whereas reducing the under-5 mortality rate to at least as low as 25 per 1000 live births by 2030 has been stated as the third Sustainable Development Goal (SDG) to prevent child deaths and guarantee healthy lives for the children [1]. Although visible progress has happened in maternal and newborn health over the last 24 years, faster developmentin programs for lessening the neonatal deaths is needed to achieve the SDG 3 asit contributes 67% of overall under-5 mortality in Bangladesh [2].
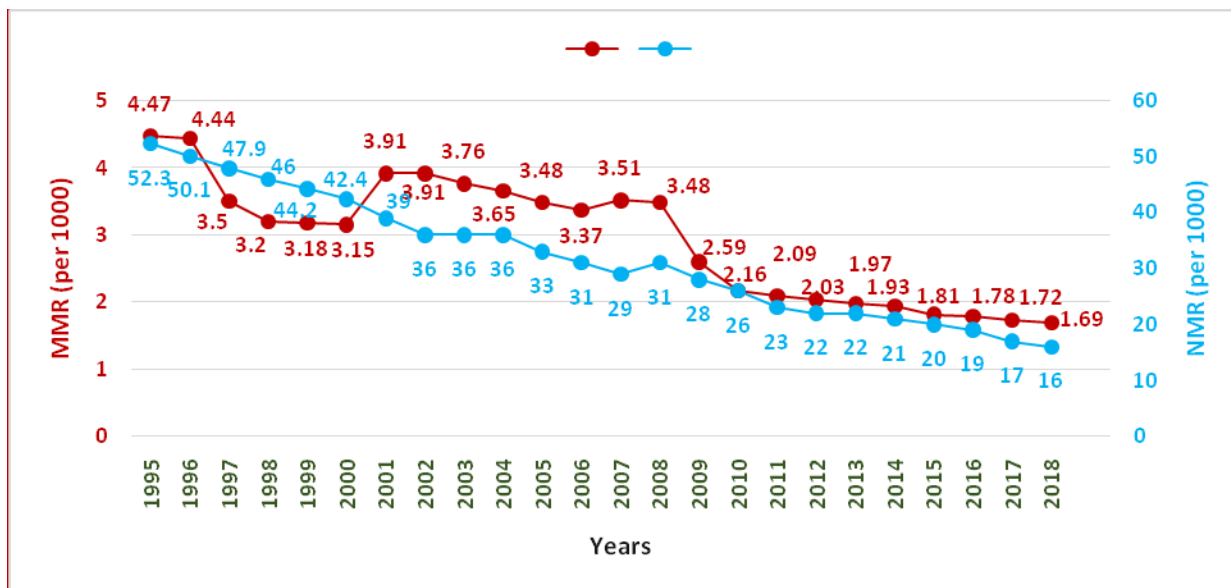
Figure 1: Maternal and Neonatal mortality rates in Bangladesh [Source: SVRS - 2018]

Proportional contributions of various causes of maternal and neonatal deaths are shown in Figure 2. The main causes of neonatal deaths in Bangladesh are prematurity, birth asphyxia and trauma, and sepsis [18], while, Postpartum Hemorrhage (PPH), Antepartum Hemorrhage (APH), complexity in pregnancy, delivery and abortion have been detected to be the major causes of maternal deaths in Bangladesh [16].
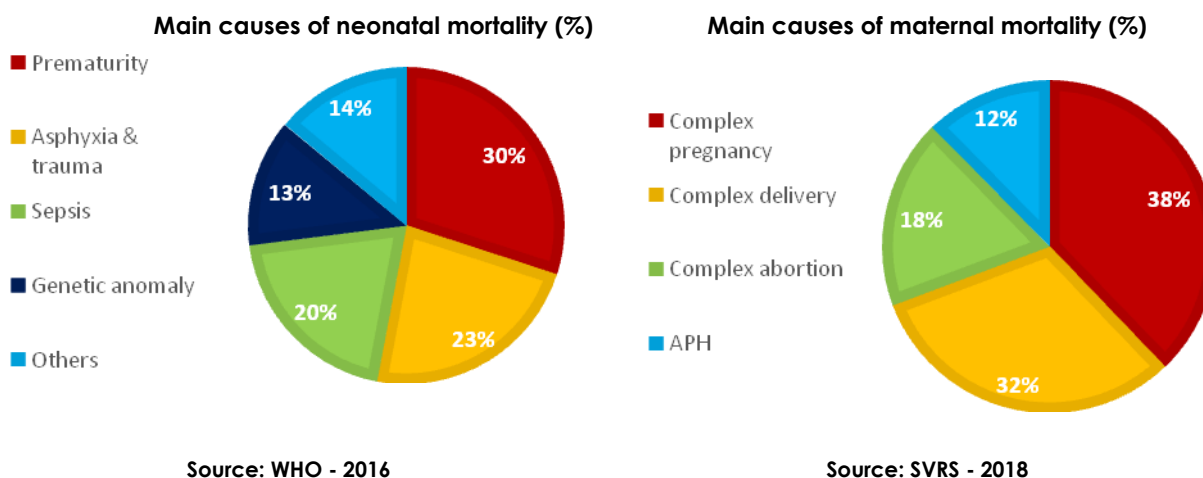

Figure 2: Major causes of Maternal and Neonatal mortality in Bangladesh

Figure 2 shows that newborns are severely vulnerable to prematurity which is responsible for 38%of overallneonatal deaths. Birth asphyxia and trauma comes next with 23%, followed by sepsis (20%) and genetic anomaly (13%). In contrast, complex pregnancy (31%) is the most noticeablecause for maternal mortality,followed bycomplex delivery contributingjust over one-fourth of all maternal deaths (26%) andcomplex abortion (15%).Postpartum hemorrhage and antepartum hemorrhage jointly account for the remaining 43% maternaldeaths.

3.2 Disparities in Maternal Health Interventions in Bangladesh

3.2.1 By Socio-economic Variables

Disparities in maternal health interventions regarding socio-economic variables are illustrated in Table 1. It can be seen that women residing in urban areas are 1.42 times more likely to deliver in health facilities in comparison to their rural counterparts. Almost similar ratios can be seen in case of skilled attendant at birth, delivery by C-section, antenatal care from skilled provider, and demand for family planning met by modern methods. Not only the levels of educational attainment are higher in urban than in rural areas, but also urban mothers have higher access to mass media than the rural ones [2], guaranteeing better knowledge and awareness about health care facilities provided by the government as well as various private institutions. Mass media was found to havepositive impact on the utilization of maternal health services [20]. Moreover, the varied nature of the health care setup in urban and rural areas results in the disparities of maternal and newborn health care services [21].

Khulna has the highest proportion of births delivered in health facility (61%), while Sylhet has the lowest one (38.4%) across divisions. Analogous results have been found for skilled attendant at birth, delivery by C-section, and antenatal care from skilled provider. Women's education is a key factor behind these results. There are more women with secondary educational attainment in Khulna than any other divisions in the country, whereas Sylhet division has the lowest proportions in each of the categories above primary level accomplishment [2].

However, in case of demand for family planning met by modern methods, Rangpur division has the highest proportion (75.7%), while Chattogram has the lowest one (62.4%), just ahead of Sylhet(64.8%). It is to be noted that Rangpur has the lowest proportion of unmet need for family planning (8%) while Chattogramhas the highest one (18%) across divisions [2].Between the last two BDHSs, the use of modern methods in Sylhet has increased by 4%, but has slightly declined in Chattogram (2%). The

government has taken programs to ensure 50% modern method use in Sylhet as well asChattogram by 2022 [2].

Table 1: Disparities in Maternal Health Interventions in Bangladesh by Socio-economic Variables

		Delivery in health facility (%)	Skilled attendant at birth (%)	Delivery by C-section (%)	Antenatal care from skilledprovider (%)	Demand for familyplanning met by modern methods (%)
Residence	Urban	63.4	67.8	43.7	89.8	73.6
	Rural	44.6	47.2	28.7	79.0	69.0
Division	Barishal	39.2	47.1	24.5	76.5	67.4
	Chattogram	46.1	50.2	26.0	83.2	62.4
	Dhaka	57.4	60.5	42.7	87.0	70.7
	Khulna	61.0	63.6	42.7	90.7	71.3
	Mymensingh	39.0	41.8	26.1	72.2	75.6
	Rajshahi	52.8	54.7	35.6	84.5	74.1
	Rangpur	47.5	49.1	27.8	74.6	75.7
	Sylhet	38.4	39.3	22.6	71.4	64.8
Wealth quintile	Lowest	26.4	27.8	13.0	63.6	75.1
	Second	37.7	40.6	22.3	74.3	70.1
	Middle	48.5	52.3	30.8	84.1	69.8
	Fourth	59.5	62.5	38.1	91.5	69.0
	Highest	78.3	82.6	61.3	97.2	67.9
Mother's education	Illiterate	26.0	29.1	16.4	60.3	70.0
	Primary	32.9	34.9	18.6	72.3	70.7
	Secondary	50.6	54.3	32.2	84.2	70.8
	Higher	76.4	79.7	57.1	96.0	68.9

Source: Bangladesh Demographic and Health Survey (BDHS) - 2017

Other than demand for family planning met by modern methods, disparities in delivery in health facilities, skilled attendant at birth, delivery by C-section, and antenatal care from skilled provider among women in the highest and lowest wealth quintiles are very high. The economic status of the respondents significantly affects the maternal and newborn health care services [22]. Economically richer women are more likely to access better health care facilities than the poor ones. Financial incapability limits the

mothers in the lowest quintile to get access to various free health-related services. In case of demand for family planning met by modern methods, opposite pattern of disparity is found as the use of any long-acting and permanent methods of contraception decreases with the increase of economic status, measured by wealth quintile [2].

Education of mother is an important factor regarding maternal and newborn health. It has positive effects on developing health awareness. Table 1 indicates that women with higher education are nearly three times more likely to deliver in health facilities than the illiterate ones.The absolute disparities in skilled attendant at birth, delivery by C-section, and antenatal care from skilled provider between the illiterate and higher educated mothers are 50.6, 40.7, and 35.7 percentage points respectively. However, there is little variation in demand for family planning met by modern methods with respect to mother's education.

3.2.2 By Demographic Variables

Table 2 summarizes the disparities in maternal health interventions according todemographic variables.The likelihood of delivery in a health facility is higher for younger mothers compared to those agedbetween 35 to 49 years. Identical patterns of inequality have been found for skilled attendant at birth and antenatal care from skilled provider as well. Proportion of deliveries conducted by C-section and demand for family planning met by modern methods are the highest ones for mothers aged between 20 to 34 years and lowest for those aged between 35 to 49 years. The prospect of maternal and newborn health care services decreases with age as old cultural habits are more anchored in older age groups [22].

Table 2: Disparities in Maternal Health Interventions in Bangladesh by Demographic Variables

		Delivery in health facility (%)	Skilled attendant at birth (%)	Delivery by C-section (%)	Antenatal care from skilled provider (%)	Demand for family planning met by modern methods (%)
Mother's age	Below 20	50.0	53.6	30.5	84.3	67.9
	20 – 34	49.8	52.5	33.9	81.1	77.7
	35 – 49	43.7	49.0	29.1	76.9	64.0
Birth order	1	60.2	63.9	40.2	88.9	Not available
	2 -3	46.9	49.5	31.6	80.8	Not available
	4 – 5	29.2	31.4	14.4	68.4	Not available
	6 +	14.6	21.0	7.3	45.1	Not available

Source: Bangladesh Demographic and Health Survey (BDHS) - 2017

Women with birth order 1 are four times more likely to deliver in health facilities than those with birth order 6 or more. Skilled attendant at birth also decreases sharply as birth order increases.The ratio of C-section deliveries by women with birth order 1 and birth order 6 or more is 5.5:1. Besides, women with less than 4 live births (birth order of 1 to 3)are more likely to receive antenatal care from skilled provider than higher birth order.

3.3 Disparities in Newborn Health Interventions in Bangladesh

3.3.1 By Socio-economic Variables

Essential newborn care practiceincludes tools boiled before cord cutting, immediate start of breastfeeding, nothing applied to the umbilical cord or applied only chlorhexidine after it was cut and tied, dried inside 0-4 minutes after birth, delayed bathing (72+ hours after birth) [2]. Disparities in newborn health interventions with respect to socio-economic variables are illustrated in Table 3.

Table 3: Disparities in Newborn Health Interventions in Bangladesh by Socio-economic Variables

		Tools boiled before cord cutting (%)	Immediatestart of breast-feeding (%)	Nothingappliedto theumbilical cord / appliedonly chlorhexidine after it wascut and tied(%)	Dried inside 0-4 minutes after birth (%)	Delayed bathing (72+hours after birth) (%)
Residence	Urban	84.8	67.7	46.3	63.2	44.5
	Rural	85.9	68.9	47.4	62.7	45.8
Division	Barishal	87.4	73.1	29.8	67.0	58.7
	Chattogram	87.6	65.1	41.3	63.3	39.8
	Dhaka	85.4	66.6	43.7	61.6	40.7
	Khulna	85.8	64.2	40.2	61.8	46.1
	Mymensingh	86.1	68.6	52.1	64.7	35.3
	Rajshahi	72.1	70.7	57.1	58.7	48.8
	Rangpur	90.8	73.9	66.6	63.2	57.0
	Sylhet	90.0	74.1	47.7	64.0	54.8
Wealth quintile	Lowest	84.3	72.9	47.4	63.2	47.5
	Second	86.5	70.0	48.4	61.3	45.9
	Middle	85.8	64.0	47.8	64.7	43.7
	Fourth	84.5	64.1	45.5	63.6	42.3

	Highest	90.5	69.6	44.8	59.4	48.2
Mother's education	Illiterate	82.5	64.9	44.5	64.9	37.5
	Primary	86.4	69.4	47.9	60.1	47.0
	Secondary	85.7	70.0	46.9	63.0	46.1
	Higher	87.2	64.6	45.5	68.2	49.4

Source: Bangladesh Demographic and Health Survey (BDHS) - 2017

A boiled tool has been used before cord cutting in 85.9% of the births to women residing in rural areas compared with 84.8% in urban areas. Among the divisions, proportion of tools boiled before cord cutting is the maximum for Rangpur and minimum for Rajshahi. The use of a boiled tool before cord cutting ranges from 84.3% in the lowest wealth quintile to 90.5% in the highest quintile and 82.5% in illiterate mothers to 87.2% in mothers with higher education. Overall, the use of boiled tools has increased from 83% in 2014 to 85.7% in 2017 [2].

Immediate start of breastfeeding is vital for the newborns as the first breast milk contains highly nutritious colostrum which has antibodies to protect the newborn from diseases [2]. Table 3 shows that rural newborns are more likely to be immediately breastfed after birth in comparison to urban newborns.Visible disparities have been found across divisions as well. The proportion of newborns breastfed immediately after birth is the highest in Sylhet (74.1%) and lowest in Khulna (64.2%). Proportion of mothers initiating breastfeeding straight away after the birth of their newborns is 72.9% in the lowest wealth quintile, higher than mothers in any other quintiles. Whereas, mothers with higher education are less likely to do so than mothers with other levels of educational attainment.

In case of 47.4% of the newborns in rural areas,either nothing applied to the umbilical cord or applied only chlorhexidine after it was cut and tied,in comparison to46.3% in urban areas. The proportion is the highest one in Rangpur (66.6%) and lowest for Barishal (29.8%) across divisions, whileit ranges from 44.8% in the highest wealth quintile to 48.4% in the second quintile. The proportion varies slightly across levels of mother's education as well.

Newborns are needed to be dried inside 0 to 4 minutes after birthto reduce the risk of hypothermia [18]. Table 3 shows that there is very little variation in early drying of newborns by their area of residence.The proportion of newborns dried inside 0 to 4 minutes after birth is the highest in Barishal (67%) and lowest in Rajshai (58.7%) across divisions.The proportion is 64.7% in the middle wealth quintile, higher than

mothers in any other quintiles, while mothers with higher education are more likely to do so than mothers with other levels of educational attainment.

Bathing after 72 hours or later from birthdoes not vary substantially with area of residence. Barishal (58.7%) has the highest proportion ofnewborns bathed after 72 hours of delivery, while Mymnsingh (35.3%) has the lowest oneamong the divisions. Delayed bathing is more prevalent among newborns in the highest wealth quintile (48.2%).Nearly 38% of newborns to illiterate mothers are bathed at least 72 hours after birth,in comparisonto49.4% of newborns to mothers with higher education.

3.3.2 By DemographicVariables

Table 4 summarizes the disparities in newborn health interventions regarding demographic variables.The proportion of tools boiled before cord cutting increases with mother's age, while it isthe percentage is the highest one for birth order 4 to 5 and lowest for birth order 1.Proportion of mothers starting breastfeeding straight away after the birth of their newborns varies slightly with age, whilethe absolute differencein immediate start of breastfeeding between women with birth order 1 andwomen with birth order 6 or more is 11 percentage points.

Table 4: Disparities in Newborn Health Interventionsin Bangladesh by DemographicVariables

		Toolsboiled beforecord cutting (%)	Immediate start of breast-feeding (%)	Nothing applied to the umbilical cord / applied only chlorhexidine after it was cut and tied (%)	Dried inside0-4 minutes after birth (%)	Delayed bathing (72+hours after birth) (%)
Mother's age	Below 20	80.9	68.0	46.4	61.5	43.8
	20 – 34	87.6	68.9	47.8	63.1	46.5
	35 – 49	88.4	69.9	42.5	66.2	42.6
Birth order	1	82.7	66.2	46.0	59.8	45.1
	2 -3	86.9	70.2	49.4	65.9	47.0
	4 – 5	87.8	66.7	42.4	56.7	44.2
	6 +	83.9	77.2	43.2	65.5	33.0

Source: Bangladesh Demographic and Health Survey (BDHS) - 2017

The proportion of either nothing applied to the umbilical cord or applied only chlorhexidine after it was cut and tied is the highest one for mothers aged between 20 to 34 years and lowest for those aged between

35 to 49 years, whileit is the highest one for birth order 2 to 3 and lowest for birth order 4 to 5.The likelihood of newborns dried inside 0 to 4 minutes after birth is higher for mothers aged between 35 to 49 years in comparison to younger mothers.

Women with birth order 4 to 5 has the least percentage of drying newborns inside 0 to 4 minutes after birth. Delayed bathing is most common among babiesborn to women aged between 20 to 34 years as well as having birth order 2 to 3.Comparing the last two BDHSs, it is observed that drying newborns inside 0 to 4 minutes after birth has decreased from 67% in 2014 to 63% in 2017, whereas delayed bathing has increased from 34% in 2014 to 46% in 2017[2].

Conclusion

The results of this study have presented us a clear picture about the latest scenario on disparities in maternal and newborn health interventions in Bangladesh regardingselected socio-economic and demographic variables. Divisional variations andurban-rural inequalities in mother's education need to beremoved. The government should focus a lot in this area aseducation boosts the ability of mothers to reach desired health goals. The fourth Health Nutrition and Population Sector Program(HPNSP)-2017 has been taken by the governmentto ensure that all citizens of Bangladesh enjoy health and well-being by expanding access to quality and equitable health care in a healthy environment [23].One of the goals is for 65% of deliveries to be attended by skilled birth attendants by 2022.More effective initiatives should be taken to motivate people to make deliveries happened at places where skilled birth attendants are readily available.Another target of reducing the inequity ratio in the use of facility delivery between women in the richest and poorest wealth quintiles to 3.5 by 2022has already been achieved. Between the last two BDHSs, the volume of deliveries by C-section has increased from 23% to 33% [2].The 4th HPNSP also aims to improve modern method use both in Chattogram and Sylhet to 60% by 2022.The proportion of newborns receiving all the recommended essentialnewborn care practices among the non-institutional deliveries has increased by1% between the last two BDHSs. The 4th HPNSP objective is to increasethis coverage to 25% by 2022. The aforementioned recommendations should be given proper attention and followed accordingly by the respective authorities not only to reduce the existing disparities of maternal and newborn health interventions in the country, but also to achieve all the goals of 4th HPNSP.

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