

Urban–rural differences in the utilization of maternal healthcare services in Bangladesh

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ABSTRACT

Background and Objectives: Antenatal care (ANC) during pregnancy and skilled delivery attendance (SDA) during delivery are the most key policy concerns for reducing maternal deaths in both urban and rural areas. The main objective of this study is to investigate the urban-rural differences in the utilization of maternal healthcare services in Bangladesh. **Methods:** The dataset has been extracted from Bangladesh Demographic Health Survey (BDHS), 2014, consisted of a total of 4476 (urban: 1443 and rural: 3033) women aged 15-49 years. Bivariate analysis along with chi-square test has been performed to examine the association between different selected factors of ANC and SDA. Additionally, binary logistic regression has been also applied to investigate the significance of the factors of maternal healthcare for both urban and rural areas based on the adjusted odds ratio (AOR) along with p-value in Bangladesh. **Results:** The study reveals that the rate of receiving ANC service (urban: 88.10% & rural: 73.90%) and SDA service (urban: 57.50% & rural: 31.50%) by urban mothers is higher than the rural mothers. Logistic regression model demonstrates that women with no education and uneducated husband belonging to poor families are less likely to access ANC services for rural areas compared to urban areas. Also, women with no education and uneducated husband belonging to the poor families are less likely to access SDA services for both areas but women exposure to watching television are more likely to receive SDA service compared to their counterpart for rural areas only. **Conclusion:** Overall, this study shows that three factors: education, wealth index, and watching television are the most significantly associated factors of ANC and SDA services. Urban mothers receive more ANC and SDA maternal healthcare services than rural mothers as these significant factors affect more in rural areas than urban areas in Bangladesh.

Therefore, this study strongly recommends that Bangladesh Government needs to act deliberately to improve maternal healthcare services in rural areas and should take the necessary steps to make awareness among rural mothers about it.

Keywords: Urban-rural, Antenatal care, Skilled delivery attendance, Maternal healthcare, and Bangladesh.

INTRODUCTION

According to the World Health Organization (WHO), maternal health refers to the health of women during pregnancy, childbirth, and the postpartum period (WHO, 2015). Maternal healthcare is care for the health of a pregnant woman provided by doctors, midwives, trained birth attendants, hospitals, health center, and clinics. Globally, in 2015, according to a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group, approximately 830 women die every day due to complications during pregnancy/childbirth; around 99% of these deaths take place in developing countries (PAHO, 2018; Alkema *et al.*, 2016). In 2017, the maternal mortality ratio of Bangladesh was 173 deaths per 100,000 live births and fell gradually from 432 deaths per 100,000 live births in 1998 to 173 deaths per 100,000 live births (Chowdhury *et al.*, 2009). The maternal mortality rate was declined significantly due to reduce fertility rate, increased access to maternal healthcare and the use of maternal health services during delivery as well as antenatal periods together with the improvement of socioeconomic conditions. It is well established that the use of maternal health services diminish maternal mortality and morbidity. According to the 2014 Bangladesh Demographic and Health Survey (BDHS) report, about 74% of women who have given birth during the 3 years preceding the survey and received antenatal care (ANC) from a medically trained provider, 31% received the recommended four or more ANC visits, 36% of all deliveries took place at health facilities and received 42% a skilled birth attendance (SBA) (NIPORT, 2014). In developing countries like Bangladesh millions of women experience life threatening and many others serious health problems related to pregnancy. Maternal healthcare utilization is one of the major factors of maternal health and it is essential to improve health outcomes for both mothers and children (Nuamah *et al.*, 2019). When global efforts to reduce maternal mortality to 70% or less per 100,000 live births, it is important to look at its determinants and also the rate of taking these facilities. The utilization of maternal health care services depends on various factors so it requires our attention. Several studies have been conducted in Bangladesh and abroad, including Roy *et al.*, (2016) showed a review of maternal health care situation in Bangladesh in their study. Shahabuddin *et al.*, (2017) found a scoping review of literature about the utilization of maternal health care services among adolescent women in Bangladesh. Hajizaded *et al.*, (2014) conducted a study about social inequalities in the utilization of maternal care in Bangladesh. Mahumud *et al.*, (2019) reported the reasons of preferring maternal healthcare services in Bangladesh. Biswas

et al., (2019) studied the quality of maternal newborn healthcare services and identifying the gap and provisions for improvement. Singh *et al.*, (2019) a study in Uttar Pradesh, India, showed the utilization of maternal healthcare services and its determinants. El and van, (2015) identified some influential factors for the utilization of maternal health care services by nomads in Sudan. A study from Ethiopia by Zelalem *et al.*, (2014) demonstrated some factors affecting the utilization of maternal healthcare services. So the area is an important influencing factor on maternal healthcare services. Jolly *et al.*, (2016) found some indicators of maternal healthcare services in the urban slum of Bangladesh. Kamal *et al.*, (2016) showed the trends of inequity in use of maternal healthcare services in both urban and rural areas in Bangladesh. Chakraborty *et al.*, (2003) found the status and the utilization of maternal healthcare services in a selected rural area of Bangladesh. On the other hand, Rahman *et al.*, (2008) revealed their study only the rural-urban differentials in the utilization of antenatal healthcare services in Bangladesh. However, to the best of our knowledge, very few researchers conducted their studies comparing the differences in the utilization of maternal healthcare services in rural and urban areas of Bangladesh. In Bangladesh urban area are developed than rural area, so the people of rural area are not aware much about maternal healthcare. Improving maternal healthcare practices is essential to save lives along with improving health outcomes for both mothers and children. Thus the purpose of the current study is to investigate the associated factors of urban-rural differences in the utilization of maternal healthcare services in Bangladesh using proper statistical techniques.

The main objectives of the study are:

- To identify the determinants of maternal healthcare services of antenatal care (ANC) as well as skilled delivery attendance (SDA).
- To investigate the significant factors of urban-rural differences in the utilization of maternal health services in Bangladesh.

While these objectives are addressed, readers find the following novelties in our current study compared to the existing study.

1. The present study shows the usage of the latest BDHS,2014 data
2. For the first time, this study has been utilized 10 covariates compared to the existing studies with limited covariates.

3. Pearson's chi-square (χ^2) test is implemented to assess the association between different factors with ANC and SDA on the basis of p-values.
4. Utilization of binary logistic regression to identify the potential determinants of maternal healthcare services (ANC, SDA) in Bangladesh based on the adjusted odds ratio (AOR) along with p-values.
5. Finally, examined the factors for urban-rural differences in the utilization of maternal health care services in Bangladesh and recommendation.

The overall layout of this paper is organized as follows. Section 2 represents the materials and methods including data source and statistical analysis. The results are discussed in section 3. Section 4 represents the discussion in detail and finally, the conclusion is presented in section 5.

1 MATERIALS AND METHODS

1.1 Data source

The dataset used in this study, which has been collected from Bangladesh (BDHS), 2014. It is a nationally representative secondary record, cross-sectional, probability sample survey is conducted between June and November 2014, and covering all the population with seven administrative regions of Bangladesh (NIPORT, 2014). The BDHS, 2014 data is utilized under the authority of the National Institute of Population Research and Training (NIPORT), Ministry of Health and Family Welfare. The dataset of this survey is publicly available in the DHS program web link: <https://dhsprogram.com/>. Briefly, to obtain the data, a two-stage stratified cluster sampling procedure was used. In the first stage of sampling, 600 enumerations areas (EAs) (urban: 207 and rural: 393) were selected with probability proportional to the EAs size. In the second stage of sampling, 30 households on average were selected per each EA using systematic sampling (NIPORT, 2014). Based on the sampling design, a total of 17,989 residential households were selected and 17,565 were found occupied. Among them, 17300, or 99 percent of households were interviewed successfully and containing a total of 17,863 ever-married women aged range between 15–49 years (NIPORT, 2014). We consider all these 17,863 ever-married women for the current study. Excluding the missing values and non-responders from the sample about 4476 (urban: 1443 and rural: 3033) respondents have been selected for the final analysis.

1.2 Variable

In this study, two types of variable have been adopted which are (1) Outcome variable and (2) independent variable.

1.2.1 Outcome (dependent) variable

The living status of the child in our study is considered as outcome variable under the name of “Antenatal care” (ANC) and “Skilled delivery attendance” (SDA).

1.2.2 Independent variable (Factors)

In this study, we consider 10 independent variables as potential risk factors which are known to be associated with seeking ANC and SDA based on the previous studies (Islam et al., 2018; Bhowmik et al., 2019; Rahman et al., 2016; Yaya et al., 2016; Mumtaz et al., 2019; Al Kiria et al., 2017; Amin et al., 2010; Saha et al., 2017). The factors include division, education level, husband’s education level, working status, wealth index, age at first birth, birth order, family size, watching television, and source of drinking water. Detail descriptions along with categorization of the selected factors have been shown in **Table 1**.

Table 1: Description and categorization of the selected factors in the study

SN	Factors	Description	Categorization
R1	Division	Division	“Barisal”, “Chittagong”, “Dhaka”, “Khulna”, “Rajshahi”, “Rangpur”, “Sylhet”
R2	Education level	Education level of the respondents	“No education”, “Primary”, “Secondary”, “Higher”
R3	Husband’s education level	Level of husband’s education	“No education”, “Primary”, “Secondary”, “Higher”
R4	Working status	Working status of the respondents	“No”, “Yes”
R5	Wealth index	Wealth index	“Poor”, “Middle”, “Rich”
R6	Age at first birth	Age at first birth	“12-18”, “19-25”, “>25”
R7	Birth order	Birth order	“First birth”, “>1”
R8	Family size	Family size of the respondents	“≤4”, “5-8”, “≥9”
R9	Watching television	watching television of the respondents	“No”, “Yes”
R10	Source of drinking water	Source of drinking water	“Unsafe”, “Safe”

1.3 Statistical analysis

This study uses three levels of statistical analysis such as univariate, bivariate, and multivariate. Univariate analysis is adopted to portray an overall image of the data. The background characteristics of the study, women have been presented as numbers (%) for the selected factors. Pearson’s chi-square (χ^2) test is implemented to assess the association between different factors and ANC and SDA. Finally, binary logistic regression (LR) model is utilized to investigate the relationship between the outcome variables and independent variables. The results of the binary logistic regression analyses have been shown using adjusted odds ratios (AOR) along with 95% confidence intervals (CI). A variable with a p-value<0.05 in the bivariate analysis is considered

statistically significant and thus, included in the final logistic regression model. All statistical analysis is performed by SPSS software (version IBM 25).

2 RESULTS

2.1 Univariate analysis

Figure 1 shows the rate of receiving antenatal care (ANC) and skilled delivery attendance (SDA) between urban and rural areas. Among 4476 respondents, around 3033 (67.76%) respondents come from rural areas and 1443 (32.24%) respondents come from urban areas. The percentage of receiving ANC service among the respondents from urban areas is (88.10%) whereas rural areas are (73.90%). Likewise, the percentage of receiving SDA service among the respondents from urban areas is (57.50%) and rural areas is (31.50%). So, the percentages of receiving all the two services (ANC & SDA) by urban mothers are higher than the rural mothers.

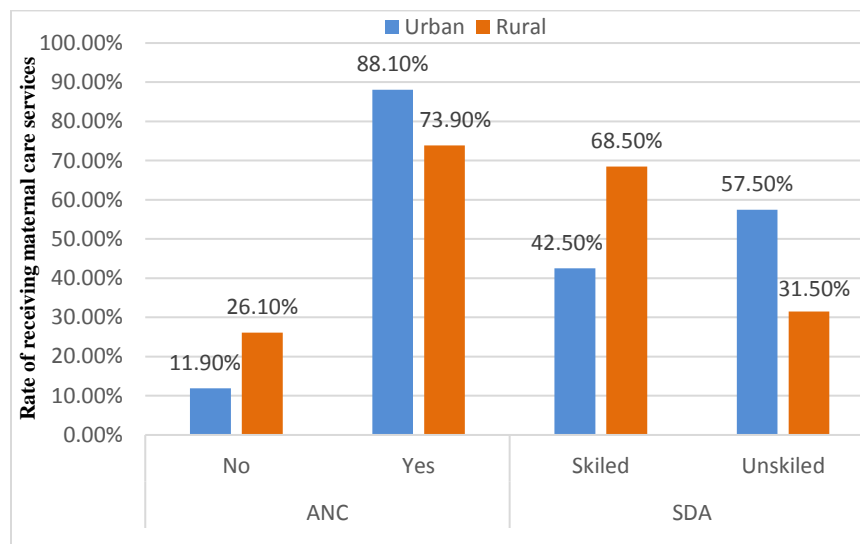


Figure 1: Comparison between urban and rural area of receiving ANC and SDA.
ANC: Antenatal care; SDA: Skilled delivery attendance

2.2 Background characteristics of the participants along with association of the factors

The background characteristics of the study participants have been presented in **Table 2**. The first column of **Table 2** represents the attributes of the selected factors in ordered to be tested the association. Comparing ANC services with seven divisions, Rajshahi division shows the highest percentage (93.1%) for receiving ANC services among women living in urban areas. Conversely Khulna division shows the highest percentage (87.0%) for receiving ANC services among women living in rural areas. The association between ANC and divisions is statistically

significant for both urban and rural areas (urban: $p\text{-value}<0.001$ & rural: $p\text{-value}<0.001$). Similarly, Khulna division shows the highest percentage (72.9%) for receiving SDA among women living in urban areas compared with living in rural areas (49.9%) and the association between SDA and divisions is also statistically significant for both urban and rural areas (urban: $p\text{-value}<0.001$ & rural: $p\text{-value}<0.001$). Regarding the education level, approximately, three-fourth of the women (71.8 %) receiving ANC services with no education, primary education (80.4%), secondary education (91.0%), and higher education (98.9%) for urban areas while 50.4% with no education, primary education (64.7%), secondary education (83.8%) and higher education (93.8%) for rural areas. Similarly, about three-fourth (71.1 %) of the women receiving SDA services with no education, primary education (60.7%), secondary education (38.0%) and higher education (16.1%) for urban areas whereas 14.5% with no education, primary education (21.3%), secondary education (36.9%) and higher education (69.2%) for rural areas. The ANC utilization rate is greater among women who have husband with higher education for urban areas than in rural areas. The SDA rate is larger among women who have husband with no education for urban areas contrarily the SDA rate is larger among women who have husbands with higher education for rural areas. The association between education level with ANC and SDA for both women and her husbands is statistically significant for both urban and rural areas. The percentage (88.8%) of ANC facilities of women who don't work outside shows higher for urban areas than rural areas (74.4%) but the association between ANC and working status is not statistically significant for both urban and rural areas. For urban areas the higher percentage (59.1%) of SDA facilities of women who don't work outside than rural areas (33.2%) and the association between SDA with working status is significant. Among three categories of wealth index, rich families' women show the higher percentage (92.6%) of receiving ANC for urban areas than rural areas (38.0%). Similarly, rich families' women show the higher percentage (67.1%) of receiving SDA for urban areas compared to rural areas (53.5%). It is evident that the association between wealth index with ANC and SDA is statistically significant for both urban and rural areas. Looking at differentials by age at first birth, aged between 19-25 years is quite higher percentage (92.3%) of receiving ANC services for urban areas but aged between 12-18 years is quite higher percentage (62.2%) of receiving ANC services for rural areas. Similarly, the rate of receiving SDA services among women age at first birth >25 years is higher for both urban and rural areas. Age at first birth with ANC and SDA is statistically significant for both urban

and rural areas. Based on the birth order, women who have 1st birth shows the higher percentage (91.6%) of taking ANC services for urban areas compared to rural areas (80.6%). Similarly, women who have 1st birth show higher percentage of receiving SDA in both urban and rural areas. Birth order is significantly associated with ANC and SDA for both urban and rural areas. The higher percentage (89.7%) of taking ANC facilities is those family whose family members ≤ 4 for urban areas but rural areas higher percentage (77.6%) of taking ANC facilities is those family whose family members ≥ 9 . The higher percentage of attaining SDA facilities is those family whose family members ≥ 9 for both urban and rural areas. Family size has no significant association with receiving ANC and SDA facilities of maternal health care services for both urban and rural areas. Women's living in households watching the television show higher percentage (91.3%) of receiving ANC for urban areas than rural areas (85.6%). Similarly, women's living in households with watching television shows higher percentage (62.5%) of receiving SDA for urban areas compared to rural areas (43.8%). Receiving of ANC and SDA is also significantly associated with watching television for both urban and rural areas. Source of drinking water plays an insignificant role of receiving ANC services for both urban and rural areas (urban: p-value<0.751 & urban: p-value<0.142). For urban areas higher percentage (61.4%) of SDA facilities of women who drink safe water than rural areas (40.0%) and the association between source of drinking water and SDA is statistically significant.

Table 2: Background characteristics of receiving ANC and SDA facilities respondents

Factors	Urban						Rural					
	ANC			SDA			ANC			SDA		
	Total n(%)	Yes n(%)	p-value	Total n(%)	Skilled n(%)	p-value	Total n(%)	Yes n(%)	p-value	Total n(%)	Skilled n(%)	p-value
Division			<0.001			<0.001			<0.001			<0.001
Barisal	159(11.0)	130(81.8)		159(11.0)	83(52.2)		371(12.2)	268(72.2)		371(12.2)	81(21.8)	
Chittagong	268(18.6)	239(89.2)		268(18.6)	139(51.9)		591(19.5)	424(71.7)		591(19.5)	180(30.5)	
Dhaka	328(22.7)	299(91.2)		328(22.7)	196(59.8)		463(15.3)	369(79.7)		463(15.3)	162(35.0)	
Khulna	181(12.5)	166(91.7)		181(12.5)	132(72.9)		347(11.4)	302(87.0)		347(11.4)	173(49.9)	
Rajshahi	173(12.0)	161(93.1)		173(12.0)	123(71.1)		370(12.2)	267(72.2)		370(12.2)	124(33.5)	
Rangpur	148(10.3)	133(89.9)		148(10.3)	81(54.7)		399(13.2)	318(79.7)		399(13.2)	132(33.1)	
Sylhet	186(12.9)	143(76.9)		186(12.9)	76(40.9)		492(16.2)	294(59.8)		492(16.2)	103(20.9)	
Education level			<0.001			<0.001			<0.001			<0.001
No education	149(10.3)	107(71.8)		149(10.3)	106(71.1)		454(15.0)	229(50.4)		454(15.0)	66(14.5)	
Primary	336(23.3)	270(80.4)		336(23.3)	204(60.7)		897(29.6)	580(64.7)		897(29.6)	191(21.3)	
Secondary	679(47.1)	618(91.0)		679(47.1)	258(38.0)		1442(47.5)	1208(83.8)		1442(47.5)	532(36.9)	
Higher	279(19.3)	276(98.9)		279(19.3)	45(16.1)		240(7.9)	225(93.8)		240(7.9)	166(69.2)	
Husband's education			<0.001			<0.001			<0.001			<0.001
No education	229(15.9)	160(69.9)		229(15.9)	155(67.7)		793(26.1)	477(60.2)		793(26.1)	134(16.9)	
Primary	358(24.8)	298(83.2)		358(24.8)	196(54.7)		994(32.8)	682(68.60)		994(32.8)	250(25.2)	
Secondary	501(34.7)	471(94.0)		501(34.7)	198(39.5)		913(30.1)	770(84.3)		913(30.1)	367(40.2)	
Higher	355(24.6)	342(96.3)		355(24.6)	64(18.0)		333(11.0)	313(94.0)		333(11.0)	204(61.3)	
Working status			0.068			0.011			0.250			<0.001
No	1165(80.7)	1035(88.8)		1165(80.7)	689(59.1)		2334(77.0)	1737(74.4)		2334(77.0)	776(33.2)	

Yes	278(19.3)	236(84.9)		278(19.3)	141(50.7)		699(23.0)	505(72.2)		699(23.0)	179(25.6)	
Wealth index			<0.001			<0.001			<0.001			<0.001
Poor	239(16.6)	176(73.6)		239(16.6)	72(30.1)		810(26.7)	66(8.1)		1548(51.0)	282(18.2)	
Middle	184(12.8)	150(81.5)		184(12.8)	74(40.2)		675(22.3)	137(20.3)		675(22.3)	240(35.6)	
Rich	1020(70.7)	945(92.6)		1020(70.7)	684(67.1)		1548(51.0)	588(38.0)		810(26.7)	433(53.5)	
Age at first birth			<0.001			<0.001			<0.001			<0.001
12-18	771(53.4)	644(83.5)		771(53.4)	358(46.4)		1886(62.2)	536(28.4)		1886(62.2)	500(26.5)	
19-25	584(40.5)	539(92.3)		584(40.5)	391(67.0)		1066(35.1)	238(22.3)		1066(35.1)	407(38.2)	
> 25	88(6.1)	17(10.1)		88(6.1)	81(92.0)		81(2.7)	17(21.0)		81(2.7)	48(59.3)	
Birth order			<0.001			<0.001			<0.001			<0.001
1 st birth	654(45.3)	601(91.9)		654(45.3)	423(64.7)		1164(38.4)	938(80.6)		1164(38.4)	476(40.9)	
>1 birth	789(54.7)	670(84.9)		789(54.7)	407(51.6)		1869(61.6)	1304(69.8)		1869(61.6)	479(25.6)	
Family size			0.082			0.429			0.105			0.079
≤4	505(35.0)	453(89.7)		505(35.0)	302(59.8)		886(29.2)	657(74.2)		886(29.2)	295(33.3)	
5-8	750(52.0)	661(88.1)		750(52.0)	421(56.1)		1678(55.3)	1221(72.8)		1678(55.3)	500(29.8)	
≥9	188(13.0)	157(83.5)		188(13.0)	107(56.9)		469(15.5)	364(77.6)		469(15.5)	160(34.1)	
Watching television			<0.001			<0.001			<0.001			<0.001
No	251(17.4)	183(72.9)		251(17.4)	85(33.9)		1594(52.6)	1010(63.4)		1594(52.6)	325(20.4)	
Yes	1192(82.6)	1088(91.3)		1192(82.6)	745(62.5)		1439(47.4)	1232(85.6)		1439(47.4)	630(43.8)	
Source of drinking water			0.751			0.047			0.142			<0.001
Unsafe	1000(69.3)	879(87.9)		1000(69.3)	558(55.8)		2598(85.7)	1908(73.4)		2598(85.7)	781(30.1)	
Safe	443(30.7)	392(88.5)		443(30.7)	272(61.4)		435(14.3)	334(76.8)		435(14.3)	174(40.0)	

Note: ANC: Antenatal care; SDA: Skilled delivery attendance; P-value: Probability value.

2.3 Binary logistic regression model

For bivariate analysis, we consider only significantly associated risk factors are regarded as independent variables for both ANC and SDA in the binary logistic regression models.

2.3.1 Determinants for receiving ANC facilities of maternal health care services

The results of binary logistic regression models for receiving ANC facilities of maternal health care services between urban and rural areas have been shown in **Table 3**. The results reveal that division, education level, and watching television are the most significant factors of receiving ANC for urban areas whereas divisions, mother education level, husband education level, wealth index, birth order and watching television are the most significant risk factors of receiving ANC for rural areas. Results demonstrate that women living in Khulna 2.26 times (95% CI: 1.15-4.45; p-value=0.01), Rajshahi 2.39 times (95% CI: 1.14-4.98; p-value=0.013); Rangpur 2.05 times (95% CI: 1.03-4.08; p-value=0.029) more likely to receive ANC services than women living in Sylhet for urban areas. In contrast, for rural areas, women living in Barisal 1.72 times (95% CI: 1.25-2.37; p-value<0.001), Dhaka 2.16 times (95% CI: 1.57-2.96; p-value<0.001), Khulna 3.45 times (95% CI: 2.34-5.08; p-value=0.001), Rajshahi 1.47 times (95% CI: 1.07-2.03; p-value=0.017), and Rangpur 2.46 times (95% CI: 1.76-3.42; p-value=0.000) more likely to receives ANC services than women living in Sylhet. Women with no education 0.11 times (95% CI: 0.02-0.42; p-value=0.001), primary education 0.13 times (95% CI: 0.04-0.49; p-

value=0.003), and secondary education 0.19 times (95% CI: 0.055-0.66; p-value=0.009) less likely to take ANC services compared to women who have higher education for urban areas. On the other hand, for rural areas, women with no education 0.34 times (95% CI: 0.18-0.65; p-value=0.001), and primary education 0.49 times (95% CI: 0.27-0.99; p-value=0.025) less likely to receive ANC services than women who have higher education. Additionally, women who have husband with no education 0.38 times (95% CI: 0.22-0.66; p-value<0.001), primary education 0.36times (95% CI: 0.22-0.61; p-value=0.001), and higher education 0.50 times (95% CI: 0.29-0.84; p-value=0.010) less likely to receive ANC services compared to women who have husband with higher education for rural areas only. Compared to rich families women, women from poor, and middle class families are less likely to utilizes ANC services 0.31 times (95% CI: 0.25-0.45; p-value<0.001), and 0.465 times (95% CI: 0.33-0.65; p-value<0.001), respectively for rural areas. Besides the results shows that the women who are giving birth her first children 1.25 times (95% CI: 1.02-1.52; p-value=0.028) more likely to take ANC service than women who have more than one birth for rural areas. Looking at the watching television, women who do not watch television 0.62 times (95% CI: 0.40-0.96; p-value=0.029) less likely to receive ANC services compared to their counterpart for urban areas whereas, women who do not watch television 0.60 times (95% CI: 0.48-0.74; p-value<0.001) less likely to receive ANC services compared to women from rural areas watching television.

Table 3: The results of binary logistic regression analysis to identify the determinants for receiving ANC facilities of maternal health care services between urban and rural area of Bangladesh

Factors	Estimated regression coefficients (β)	Urban				Estimated regression coefficients (β)	Rural			
		AOR	p-value	95% CI of AOR			AOR	p-value	95% CI of AOR	
				Lower	Upper				Lower	Upper
Division										
Sylhet(Ref)										
Barisal	-0.125	0.88	0.891	0.48	1.59	0.552	1.72	0.001	1.25	2.37
Chittagong	0.430	1.53	0.109	0.87	2.71	0.094	1.09	0.537	0.82	1.46
Dhaka	0.533	1.70	0.062	0.96	2.99	0.779	2.16	<0.001	1.57	2.96
Khulna	0.815	2.26	0.010	1.15	4.45	1.245	3.45	<0.001	2.34	5.08
Rajshahi	0.871	2.39	0.013	1.14	4.98	0.400	1.46	0.017	1.07	2.03
Rangpur	0.719	2.05	0.029	1.03	4.08	0.911	2.46	0.000	1.76	3.42
Education level										
Higher(Ref)										
No education	-2.200	0.11	0.001	0.02	0.42	-1.065	0.34	0.001	0.18	0.65
Primary	-2.002	0.13	0.003	0.04	0.49	-0.698	0.49	0.025	0.27	0.99
Secondary	-1.658	0.19	0.009	0.055	0.66	-0.187	0.83	0.537	0.461	1.49
Husband's Education										
Higher(Ref)	-0.714									
No education	-0.286	0.49	0.072	0.23	1.05	-0.954	0.38	<0.001	0.22	0.66
Primary	0.419	0.75	0.461	0.37	1.54	-1.011	0.36	0.001	0.22	0.61
Secondary		1.52	0.228	0.74	3.13	-0.689	0.50	0.010	0.29	0.84

Wealth index						0.048				
Rich(Ref)										
Poor	-0.461	0.631	0.069	0.38	1.04	-1.166	0.31	<0.001	0.25	0.45
Middle	-0.457	0.633	0.066	0.39	1.54	-0.767	0.465	<0.001	0.33	0.65
Age at first birth										
>25(Ref)										
12-18	0.287	1.33	0.156	0.89	1.98	0.098	1.10	0.319	0.91	1.34
19-25	18.142	1.15	0.98	0.97	1.38	-0.022	0.98	0.957	0.55	1.85
Birth order										
>1 birth (Ref)										
1st birth	0.212	1.25	0.212	0.85	1.80	0.217	1.25	0.028	1.02	1.52
Watching Television										
Yes(Ref)										
No	-0.485	0.62	0.029	0.40	0.96	-0.511	0.60	<0.001	0.48	0.74

Note: AOR: Adjusted odds ratio; P-value: Probability value.

2.3.2 Determinants for receiving SDA facilities of maternal healthcare services

The results of binary logistic regression models for receiving SDA facilities of maternal healthcare services between urban and rural areas have been presented in **Table 4**. The results show that divisions, education level, husband education, working status, wealth index and age at first birth are the most significant factors of receiving SDA for urban areas whereas divisions, education level, husband education, working status, wealth index, age at first birth, and watching television are the most significant factors of receiving SDA for rural areas. Table 4 demonstrates that women living in Khulna 3.74 times (95% CI: 2.26-6.17; p-value<0.001), Rajshahi 3.73 times (95% CI: 1.64-4.55; p-value<0.001); Rangpur 1.57 times (95% CI: 0.94-2.62; p-value=0.036) more likely to receive SDA services, than women living in Sylhet for urban areas while for rural areas women living in Dhaka 2.78 times (95% CI: 1.29-2.45; p-value<0.001), Khulna 3.55 times (95% CI: 2.53-4.99; p-value<0.001), Rajshahi 1.92 times (95% CI: 1.36-2.06; P-value<0.001), and Rangpur 2.48 times (95% CI: 1.77-2.39; p-value<0.001) higher likely to receives SDA services than women living in Sylhet. Among four categories of education level, two categories, no education 0.33 times (95% CI: 0.18-0.61; p-value<0.001), and primary education 0.45 times (95% CI: 0.27-0.75; p-value=0.002) less likely to receive SDA services compared to women who have higher education for urban areas. On the other hand, for rural areas, women with three categories, no education 0.40 times (95% CI: 0.25-0.64; p-value=0.001), primary education 0.47 times (95% CI: 0.31-0.69; p-value<0.001), and secondary education 0.56 times (95% CI: 0.40-0.79; p-value=0.001) less likely to receive SDA services than women who have higher education. Also, The odds of receiving SDA services of women who have husband with no education 0.45 times (95% CI: 0.27-0.75; p-value=0.002), primary education 0.53 times (95% CI: 0.34-0.82; p-value=0.004), and secondary education 0.61 times

(95% CI: 0.29-0.84; p-value=0.015) lower than women who have husband higher education for urban areas while for rural areas primary education 0.56 times (95% CI: 0.40-0.77; p-value<0.001), and secondary education 0.65 times (95% CI: 0.49-0.88; p-value=0.005) less likely to receive SDA services compared to women who have husband higher education. For urban areas, the likelihood of receiving SDA facilities of women who don't work outside at home 1.58 times (95% CI: 1.15-2.17; p-value<0.004) greater than women who work outside at home whereas woman who don't work outside at home received 1.34 times (95% CI: 1.08-1.66; p-value<0.007) higher SDA facilities than who work outside at home for rural areas. Based on the categories of wealth index, women who belongs to the poor families 0.41 times (95% CI: 0.28-0.62; p-value<0.001), and middle families 0.50 times (95% CI: 0.35-0.72; p-value<0.001) less likely to take SDA services compared to women who belongs to the rich families for urban areas but for rural areas women who belong to the poor families 0.39 times (95% CI: 0.33-0.49; p-value<0.001), and middle families 0.63 times (95% CI: 0.49-0.79; p-value<0.001) less likely to receive SDA services compared to women who belongs to the rich families. For urban areas, the odds of receiving SDA facilities among women age range between 12-18, 1.52 times (95% CI: 1.17-1.95; p-value<0.002), and age range between 18-25, 6.11times (95% CI: 2.60-14.34; p-value<0.001) times higher than age above 25 years while the odds of receiving SDA facilities among women aged range between 12-18, 1.32 times (95% CI: 1.09-1.58; p-value<0.003), and age range between 18-25, 2.621times (95% CI: 1.53-4.49; p-value<0.001) times higher than age >25 years. Looking at the birth order, women who are giving birth her first child is more likely to take SDA care 1.45 times (95% CI: 1.21-1.73; p-value<0.029) than women who have more than one birth for rural areas only. Furthermore, women's exposure to watching television 0.68 times (95% CI: 0.55-0.83; p-value<0.001) less likely to receive SDA service compared to those with do not watch television in rural areas.

Table 4: The results of binary logistic regression analysis to identify the determinants for receiving SDA facilities of maternal healthcare services between urban and rural area of Bangladesh

Factors	Estimated regression coefficients (β)	Urban				Estimated regression coefficients (β)	Rural			
		AOR	p-value	95% CI of OR			AOR	p-value	95% CI of OR	
				Lower	Upper				Lower	Upper
Division										
Sylhet(Ref)										
Barisal	0.248	1.28	0.325	0.78	2.10	0.123	1.13	0.506	0.79	1.62
Chittagong	0.145	1.16	0.512	0.76	1.78	0.205	1.23	0.195	0.90	1.67
Dhaka	0.335	1.39	0.128	0.91	2.15	0.576	2.78	<0.001	1.29	2.45
Khulna	1.319	3.74	<0.001	2.26	6.17	01.268	3.55	<0.001	2.53	4.99

Rajshahi	1.006	3.73	<0.001	1.64	4.55	0.688	1.92	<0.001	1.36	2.06
Rangpur	0.449	1.57	0.036	0.94	2.62	0.652	2.48	<0.001	1.77	3.69
Education level										
Higher(Ref)										
No education	-1.097	0.33	<0.001	0.18	0.61	-0.917	0.40	0.001	0.25	0.64
Primary	-0.789	0.45	0.002	0.27	0.75	-0.764	0.47	<0.001	0.31	0.69
Secondary	-0.374	0.69	0.095	0.44	1.07	-0.572	0.56	0.001	0.40	0.79
Husband's Education										
Higher(Ref)										
No education	-0.791	0.45	0.002	0.27	0.75	-0.775	0.46	0.32	0.66	0.001
Primary	-0.638	0.53	0.004	0.34	0.82	-0.587	0.56	<0.001	0.40	0.77
Secondary	-0.487	0.61	0.015	0.42	0.90	-0.425	0.65	0.005	0.49	0.88
Working status										
Yes(Ref)										
No	0.459	1.58	0.004	1.15	2.17	0.294	1.34	0.007	1.08	1.66
Wealth index										
Rich(Ref)										
Poor	-0.870	0.41	<0.001	0.28	0.62	-0.948	0.39	<0.001	0.33	0.49
Middle	-0.688	0.50	<0.001	0.35	0.72	-0.465	0.63	<0.001	0.49	0.79
Age at first birth										
>25(Ref)										
12-18	0.421	1.52	0.002	1.17	1.95	0.277	1.32	0.003	1.09	1.58
19-25	1.810	6.11	<0.001	2.60	14.34	0.964	2.62	<0.001	1.53	4.49
Birth order										
>1 birth (Ref)										
1st birth	0.201	1.22	0.110	0.96	1.56	0.372	1.45	0.029	1.21	1.73
Watching Television										
Yes(Ref)										
No	-0.318	0.73	0.081	0.51	1.04	-0.385	0.68	<0.001	0.55	0.83
Source of drinking water										
Safe(Ref)										
Unsafe	-0.020	0.98	0.889	0.74	1.29	0.134	1.1.4	0.274	0.89	1.45

Note: AOR: Adjusted odds ratio; P-value: Probability value.

3 DISCUSSION

The main purpose of the present study is to investigate the urban-rural differences in the utilization of maternal healthcare services (ANC and SDA) in Bangladesh. This study reveals that the rate of receiving ANC and SDA services is higher among women living in urban areas compared with women live in rural areas. Previous studies using DHS data on women showed similar findings in Ghana (Afful-Mansah *et al.*, 2014) as well as in Bangladesh (Chanda *et al.*, 2020; Hashan *et al.*, 2020). Findings of the study suggest that a wide range of factors such as division (Barisal, Dhaka), husband education, wealth index, and birth order number are significantly associated with receiving ANC facilities and play a pivotal role in maternal

healthcare services from rural areas. Women live in Barisal and Dhaka division is more likely to seek ANC services, especially contact with qualified doctors compared with women who live in Sylhet. The regional variations in ANC contact, however, are not exclusive in Bangladesh as studies from other parts of the world. Bangladesh and other neighboring countries provided similar results (Defar *et al.*, 2019; Haruna-Ogun, 2019). Women who have husbands with no education, primary education, and secondary education are less likely to take ANC services than higher education. Compared with the rich family's women, women from poor and middle-class families are less likely to utilize ANC services. Women who are giving birth her first child is more likely to receive ANC services than their counterpart. Similar findings reported in earlier studies (Muchie, 2017). However, Division (Khulna, Rajshahi, and Rangpur), women education, and watching television put significant effect on maternal healthcare for both rural and urban areas. Bangladesh Government needs to consider these indicators in both urban and rural areas because ANC is an important determinant for reducing maternal mortality rate as well as one of the basic components of maternal care on which the life of mothers and babies depend. Likewise, for SDA, among all the factors, Division (only Dhaka) and watching television show significantly associated with receiving SDA for rural areas whereas rest of all the factors such as Division (Khulna, Rajshahi, Rangpur), education level, husband education level, working status, wealth index, age at first birth are the significantly associated with SDA for both urban and rural areas. Dhaka is one of the best performing divisions to receive SDA facilities than Sylhet. Women exposure to do not watching television is less likely to receive SDA service compared to their counterpart. However, for improving the health condition of children in all rural areas of Bangladesh maternal education should be given top priority. The Bangladesh Government has taken steps to increase the literacy rate by adopting a national education policy that provides free education through the secondary level (NIPORT, 2011). The government also provides subsidies for girls from poor families to attend school. The public policies focus not only education but also consider all other factors, such as access to health facilities like this. Health awareness campaign should be providing broadly for the reason that this is as part of the public health promotion efforts. Some studies in Cambodia and India have shown that women who attended ANC care are more likely to seek skilled delivery care (Titaley *et al.*, 2009; Yanagisawa *et al.*, 2006). The findings of the current study are quite similar to another previous study where the reason for seeking and not seeking ANC services from medically trained personnel (MTP) was

due to receiving ANC visits from different healthcare providers. The utilization of skilled delivery can reduce the maternal mortality rate high in Bangladesh. Bangladesh adopted the policy of training and deploying skilled birth attendance (SBA) in rural areas; where health facilities are reduce the delays in seeking care during pregnancy (Bloom *et al.*, 1999). Some variables may belong in more than one of these categories. Inequities were measured in terms of wealth index, area of residence and parental education (Chowdhury *et al.*, 2006; Kakwani, 1984). The use of skilled medical attendants was found to be insufficient with the poorer section of the population not utilizing their services (Yao *et al.*, 1999). BDHS, 2014 reported that 15% of deliveries women in the lowest wealth quintile occurred in a facility compared with 70% of deliveries women in the highest wealth quintile (NIPORT, 2014). In some areas, 82% of women from the poorest quintile and 16% of women from the richest are not using skilled attendants during the delivery period (Anwar *et al.*, 2008). We all know that behavioral change is not easy and takes time to achieve but these affecting factors influence has achieved that by creating awareness as well as strengthening the supply side of the health system. Effective and safe medical treatment improves patient confidence which encourages women, especially the women from poorer sections to use health care facilities.

4 Conclusion

Antenatal care (ANC) as well as skilled delivery attendance (SDA) is essential for the health of both mother and child for both urban and rural areas over the world including Bangladesh. The hypothesis of our study is to investigate the associated factors of urban-rural differences in the utilization of maternal healthcare services in Bangladesh. Overall, this study demonstrates that three factors: education, wealth index, and watching television are the most significant factors for receiving ANC and SDA services. However, the most of the ANC and SDA utilization appears to be heavily skewed to the rural areas. In order to improve women's access to ANC and SDA services, it is essential to enhance the literacy of women, diminish the cost of services, increase the number of facility-based care centers and improve rural transport. Finally, the findings highlight the need for coordinated effort from government and stakeholders to improve women's education, husband's education, wealth index as well as strengthen community participation.

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Conflict of interest

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