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Institutional delivery rate and associated factors among women in rural communities: analysis of the 2017–2018 Bangladesh Demographic and Health Survey

Agani Afaya [ORCID],[1] Meherun Nesa,[2,3] Jotsna Akter,[2,3] Taewha Lee[4]

For numbered affiliations see end of article.

Correspondence to
Meherun Nesa;
meherunnesa1995@gmail.com

ABSTRACT

Background Institutional delivery rate among women in rural communities in Bangladesh remains low after several governmental interventions. A recent analysis of maternal mortality in Bangladesh revealed that women in rural communities were more likely to die from maternal complications than those in urban areas.

Objective This study assessed the institutional delivery rate and associated factors among women in rural communities in Bangladesh.

Design This was a cross-sectional study that used the 2017–2018 Bangladesh Demographic and Health Survey for analysis. To determine the factors associated with institutional delivery, multivariate logistic regression analysis was performed.

Setting and participants The study was conducted in Bangladesh and among 3245 women who delivered live births 3 years before the survey.

Main outcome measure The outcome variable was the place of delivery which was dichotomised into institutional and home delivery/other non-professional places.

Results The institutional delivery rate was 44.82% (95% CI 42.02% to 47.65%). We found that women between the ages of 30 and 49 years (aOR=1.51, 95% CI 1.05 to 2.18), women whose partners attained higher education (aOR=2.02, 95% CI 1.39 to 2.94), women who had antenatal visits of 1–3 (aOR=2.54, 95% CI 1.65 to 3.90), 4–7 (aOR=4.79, 95% CI 3.04 to 7.53), and ≥8 (aOR=6.13, 95% CI 3.71 to 10.42), women who watched television (aOR=1.35, 95% CI 1.09 to 1.67) and women in the middle (aOR=1.38, 95% CI 1.05 to 1.82), rich (aOR=1.84, 95% CI 1.34 to 2.54) and richest (aOR=2.67, 95% CI 1.82 to 3.91) households were more likely to use institutional delivery. On the other hand, women who were working (aOR=0.73, 95% CI 0.60 to 0.89), women who were Muslims (aOR=0.62, 95% CI 0.44 to 0.89) and women who gave birth to two (aOR=0.61, 95% CI 0.48 to 0.77) or ≥3 children (aOR=0.46, 95% CI 0.35 to 0.60) were less likely to use institutional delivery.

Conclusion The study revealed that a low proportion of women in rural communities in Bangladesh used institutional delivery. The results of this study should be taken into account by policy-makers and governmental efforts when creating interventions or programmes aimed at increasing institutional delivery in Bangladesh.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The use of nationally representative data and a population-based sample allows the generalisability of the findings to the entire country, which is a key strength of our research.

⇒ Although the main outcome was self-reported in this study, we do not anticipate any memory bias on our primary outcome since we expect mothers to recall the location of their child's birth.

⇒ Because this was a cross-sectional survey, the findings cannot be interpreted causally.

INTRODUCTION

Maternal mortality is still a significant global health issue, especially in low-income and middle-income countries.[1] In 2020, approximately 287 000 women died from pregnancy and childbirth-related complications worldwide, which equates to about 800 maternal fatalities each day, or 1 every 2 min.[1 2] This is more than a third fewer than the predicted 446 000 maternal fatalities in 2000.[2] In 2020, approximately 95% of all maternal deaths occurred in low-income and middle-income countries and most could have been prevented.[2] Southern Asia and sub-Saharan Africa accounted for around 87% (253 000) of the estimated global maternal deaths in 2020.[1]

The maternal mortality in Bangladesh fell gradually from 437 deaths per 100 000 live births in 2001 to 123 deaths per 100 000 live births in 2020. The current maternal mortality rate in Bangladesh falls short of the sustainable development goal target 3.1 which is to reduce maternal mortality to less than 70 maternal deaths per 100 000 live births by 2030.[2] The majority of these mortalities are caused by pregnancy-related delivery complications (eg, postpartum haemorrhage,

pre-eclampsia, hypertensive disorders, pregnancy-related infections and complications of unsafe abortion), which can be avoided by having childbirth in a hospital rather than at home.[3 4] A recent analysis of maternal mortality in Bangladesh revealed that women were more likely to die from maternal causes when they lived in rural areas and had lower socioeconomic status.[5] In Bangladesh, pooled data from Demographic and Health Surveys from 2007 to 2017 revealed that 47% of urban women gave birth at health facilities as opposed to 24% of rural women.[4]

The government of Bangladesh has taken steps to promote institutional delivery and speed up the slow and uneven improvement in indicators of maternal and newborn health.[6] A pilot maternity voucher programme was established in Bangladesh in 2007 through which mothers can receive money for antenatal care and delivery at a public or private facility or home with a trained birth attendant.[7] The scheme has reached over 10 million people (7% of the population) in 31 subdistricts.[8 9] However, despite these efforts by the government, the institutional delivery rate among women in underserved communities still remains low. To ensure the prevention, detection and management of complications during pregnancy and childbirth, all women should have access to expert care. To end avoidable maternal and newborn mortality, assistance from adequately trained health professionals working in supportive environments is required. All births should take place in healthcare facilities where obstetric complications can be properly managed when they occur. This is a crucial step in ensuring expert care throughout childbirth. Governments at the national or local levels should establish the minimum target for this indicator, and many nations have made institutional delivery of all babies their primary method of lowering maternal mortality.

The biggest influences on institutional delivery among rural women in low-income and middle-income countries included parity, maternal education, partner's education, age, household wealth, antenatal care utilisation, media exposure, and so on.[10–12] Several studies have been conducted in Bangladesh on factors that contribute to institutional deliveries,[4 13 14] but no study has examined the factors associated with institutional delivery among women in deprived areas in Bangladesh using a nationally representative data. Therefore, the current study sought to assess the institutional delivery rate and associated factors among women in rural communities in Bangladesh.

METHODS
Data source and study design
This was a cross-sectional study that used the 2017–2018 Bangladesh Demographic and Health Survey (BDHS) for analysis.[15] The 2017–2018 BDHS was implemented through a collaborative effort of the National Institute of Population Research and Training and ICF International. The United States Agency for International

Development/Bangladesh provided financial support for the survey.[15] The BDHS is a nationally representative survey that collects data on several health indicators including fertility, fertility preferences and fertility regulation, childhood mortality, maternal and child health, and many others. Bangladesh consists of eight administrative divisions: Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur and Sylhet. Each division is divided into zilas and each zila into upazilas and it is through these that those urban and rural areas are created.

The 2011 Population and Housing Census data were used to generate the list of enumeration areas (EAs) for the survey as a sampling frame. The primary sampling unit of the survey was an EA with approximately 120 households. The survey used a two-stage stratified sample of households in both rural and urban areas. The first stage consisted of 675 EAs (250 in urban areas and 425 in rural areas) which were selected based on probability proportional to EA size following the specifications provided by ICF that include cluster allocation and instructions on sample selection. To provide a sampling frame for the second-stage selection of households, a complete household listing operation was carried out in all selected EAs. In the second stage, systematic sampling was undertaken with an average of 30 households per EA to provide statistically reliable estimates of key demographic and health variables for urban and rural areas separately, and for each of the 8 divisions. The survey was carried out in 672 clusters after the elimination of three clusters (one urban and two rural) that were completely eroded by floodwater. A total of 20 160 households were selected for the survey.[15]

Among the 20 160 households selected, interviews were successfully completed in 19 457 (99%) of the occupied households. Among the 20 376 ever-married women aged 15–49 eligible for interviews, 20 127 were interviewed, yielding a response rate of 99%. Urban areas consisted of 7374 and rural communities consisted of 12 753 women. In this survey, we extracted data from women in rural communities for analysis. After data cleaning and management, a total of 3245 women had complete data based on the outcome variable.

Outcome variable
The outcome variable was the place of delivery which was dichotomised into institutional (hospital, clinic, health centre, MCWC, etc) and home delivery or other non-professional places. The outcome variable was binary and coded as zero (0) for women who delivered at home delivery/other non-professional places and one (1) for those who delivered in a health facility.

Explanatory variables
The explanatory variables were selected based on an extensive related literature search and their availability within the BDHS data. The explanatory variables included age, educational level, partners' educational level,

Table 1 Sociodemographic characteristics of participants (n=3245)

Variables	Categories	Number	%	Prevalence (95% CI)
Place of delivery	Home/others	1791	55.2	55.18 (52.35 to 57.98)
	Institution	1454	44.8	44.82 (42.02 to 47.65)
Age	<20	593	18.3	49.42 (44.34 to 54.51)
	20–29	1982	61.1	45.41 (42.31 to 48.54)
	30–49	670	20.6	39.01 (34.57 to 43.65)
Educational level	No education	199	6.1	22.21 (16.71 to 28.89)
	Primary	922	28.4	28.90 (25.10 to 33.03)
	Secondary	1650	50.9	48.63 (45.52 to 51.76)
	Higher	474	14.6	72.01 (67.27 to 76.30)
Partner's education	No education	499	15.4	25.64 (21.45 to 30.33)
	Primary	1140	35.1	35.01 (31.32 to 38.89)
	Secondary	1098	33.8	51.06 (47.06 to 55.04)
	Higher	508	15.7	72.17 (67.35 to 76.52)
Working status	Not working	1873	57.7	50.05 (46.45 to 53.65)
	Working	1372	42.3	37.68 (34.31 to 41.16)
Religious status	Hinduism/Buddhism	276	8.5	59.58 (50.77 to 67.80)
	Islam	2969	91.5	43.45 (40.61 to 46.33)
Antenatal visits	No	292	9.0	12.30 (08.40 to 17.65)
	1–3	1565	48.2	37.01 (33.83 to 40.30)
	4–7	1096	33.8	58.76 (55.06 to 62.36)
	≥8	292	9.0	66.81 (59.98 to 72.99)
Parity	1	1198	36.9	57.72 (53.79 to 61.57)
	2	1043	32.1	43.88 (40.12 to 47.70)
	≥3	1004	31.0	30.39 (26.89 to 34.14)
Listening to radio	No	3085	95.0	43.85 (40.97 to 46.77)
	Yes	160	5.0	63.63 (54.54 to 71.84)
Reading newspaper	No	2994	92.3	42.97 (40.14 to 45.85)
	Yes	251	7.7	66.92 (60.07 to 73.11)
Watching television	No	1351	41.6	31.86 (28.39 to 35.54)
	Yes	1894	58.4	54.06 (50.93 to 57.16)
Aware of community clinic	No	905	27.9	43.90 (39.48 to 48.41)
	Yes	2340	72.1	45.18 (42.07 to 48.33)
Household head	Female	459	14.2	46.24 (40.40 to 52.19)
	Male	2786	85.8	44.58 (41.70 to 47.47)
Wealth index	Poorest	810	25.0	27.18 (23.42 to 31.30)
	Poorer	826	25.4	35.70 (31.87 to 39.72)
	Middle	708	21.8	48.62 (44.09 to 53.19)
	Richer	573	17.7	61.14 (56.10 to 65.96)
	Richest	328	10.1	74.65 (68.98 to 79.58)

Continued

Table 1 Continued

Variables	Categories	Number	%	Prevalence (95% CI)
Distance to a health facility	Big problem	1441	44.4	40.41 (36.95 to 43.95)
	Not a big problem	1804	55.6	48.34 (45.08 to 51.62)
Division	Barisal	209	6.5	63.34 (56.31 to 69.86)
	Chittagong	722	22.3	54.49 (47.52 to 61.28)
	Dhaka	577	17.8	52.81 (43.99 to 61.47)
	Khulna	312	9.6	42.19 (36.15 to 48.46)
	Mymensingh	311	9.6	65.34 (59.16 to 71.05)
	Rajshahi	424	13.1	50.66 (44.53 to 56.77)
	Rangpur	402	12.4	56.48 (48.26 to 64.36)
	Sylhet	287	8.8	63.72 (55.69 to 71.04)

working status, religious status, antennal visits, listening to radio, reading newspapers/magazines, watching television, household head, distance to a health facility, household wealth and region. We categorised age as <20, 20–29 and 30–49, educational and partners' educational level were categorised as no education, primary, secondary and higher, while working status was categorised as not working and working. The rest of the explanatory variables were categorised as follows: religious status (Hinduism/Buddhism, Islam), antennal visits (no visit, 1–3, 4–7, ≥8), parity (1, 2, ≥3), listening to radio, reading newspapers/magazines and watching television (no, yes), aware of community clinic (no, yes), household head (female, male), distance to a health facility (big problem, not a big problem), household wealth (poorest, poorer, middle, rich, richest) and region (Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, Sylhet).

Data analyses

The data analysis was conducted using Stata V.16. Descriptive statistics such as frequencies and percentages were used to assess the delivery rate and sociodemographic characteristics of the study population. Bivariate logistic regression analysis was carried out to identify significant explanatory factors associated with institutional delivery. The significant explanatory variables in the bivariate analysis were assessed for multicollinearity and none of the explanatory variables had a variance inflation factor exceeding 10 necessary for exclusion from the multivariate analysis (mean VIF=1.33; min=1.04; max=1.86). To examine the factors associated with institutional delivery, multivariate binary logistic regression analysis was performed. To account for the clustering and stratification of the data, we applied the sampling weight (v005/1 000 000) and used the survey set command (svy) in Stata to account for the complex sampling design. The results of the multivariate binary logistic regression were reported as adjusted OR (aOR) with their 95% CI. Statistical significance was determined by $p<0.05$. The study was reported in line with the Strengthening the Reporting of

Observational Studies in Epidemiology guideline for all observational studies.

Patient and public involvement

The women or the public were not involved in the designing, conducting and reporting of this study.

RESULTS

Sociodemographic characteristics of participants

This study included 3245 women who delivered live births 3 years before the survey. Most of the women were 20–29 years of age (61.1%), while those aged below 20 years were 18.3%. The majority of the women had secondary education (50.9%) while 33.8% of their partners had secondary. The majority of the women were not working (57.7%) while more than two-thirds of the women were aware of a clinic within the community (table 1).

The overall prevalence of institutional delivery was 44.82% (95% CI 42.02% to 47.65%). The prevalence of institutional delivery was higher among women below the age of 20 compared with those aged between 30 and 49 years. The prevalence of institutional delivery was higher among women with higher education compared with no formal education, primary or secondary education. Regarding antenatal visits women who had 8 or more visits had the highest proportion of institutional delivery than those who had no visits, 1–3 visits or 4–7 visits. Women who watched television had the highest proportion of institutional delivery compared with those who did not watch television. Institutional delivery was also higher among women in the richest households compared with women in the poorest, poor, middle or rich households (table 1).

Factors associated with institutional delivery among women in rural communities

Women between the ages of 30 and 49 years were more likely to have health facility delivery (aOR=1.51, 95% CI 1.05 to 2.18) compared with those below 20 years. Women whose partners attained higher education were more likely to deliver in a health facility (aOR=2.02, 95% CI 1.39 to 2.94) compared with those with no formal education/ did not know. Women who were working were less likely to have delivered in a health facility (aOR=0.73, 95% CI 0.60 to 0.89) compared with those who were not working. Women who were Muslims were less likely to give birth in a health facility (aOR=0.62, 95% CI 0.44 to 0.89) compared with those who were Hindus/Buddhists. Women who had antenatal visits of 1–3 (aOR=2.54, 95% CI 1.65 to 3.90), 4–7 (aOR=4.79, 95% CI 3.04 to 7.53) and ≥8 (aOR=6.13, 95% CI 3.71 to 10.42) were more likely to use institutional delivery compared women with no antenatal attendance. Women who gave to 2 (aOR=0.61, 95% CI 0.48 to 0.77) and ≥3 (aOR=0.46, 95% CI 0.35 to 0.60) children were less likely to use institutional delivery compared with primiparous women. Women who watched television were more likely to use institutional delivery (aOR=1.35,

95% CI 1.09 to 1.67) compared with those who did not watch television. Women in the middle (aOR=1.38, 95% CI 1.05 to 1.82), rich (aOR=1.84, 95% CI 1.34 to 2.54) and richest (aOR=2.67, 95% CI 1.82 to 3.91) households were more likely to use institutional delivery to those in the poorest households (table 2).

DISCUSSION

This study assessed the prevalence and factors associated with institutional delivery among women in rural communities in Bangladesh using nationally representative data. The overall prevalence of institutional delivery was 44.82%. This finding shows that a low proportion of women in rural communities in Bangladesh had institutional delivery. In contrast to the current finding, a study among rural women of the Chandpur district of Bangladesh revealed that 74% of women delivered in a health facility.[12] Our study finding is also lower than several other studies conducted in a rural district in Nepal (55%),[16] rural Myanmar (54.7%), rural communities in Afghanistan (71.8%)[17] and rural communities in Ethiopia (58.17%).[18] That notwithstanding, our study finding is higher than a study conducted in rural communities in Eritrea[19] where researchers found that only 24.6% of women had institutional delivery. The disparity in the findings of the current study and the other studies could be attributed to improved access to healthcare, increased awareness and other sociodemographic variations in these situations.[17] Despite several efforts by the government to improve health facility delivery, the rate among women in rural Bangladesh still remain low.

Our study found that women between the ages of 30 and 49 years were more likely to have health facility delivery compared with those below 20 years. Similarly, a study conducted in rural areas of the Chandpur district of Bangladesh found women between the ages of 30 and 49 had greater odds of using institutional delivery services than those between the ages of 15 and 29.[12] In contrast to this finding, a study conducted in Uganda revealed that younger women were more likely to give birth in health facilities than older women.[20]

Consistent with a study conducted among women In rural Ghana, women whose partners attained higher education were more likely to deliver in a health facility.[11] In Bangladesh, males frequently have the power to make decisions for their wives, which may account for the link between husbands' educational level and the use of maternity services. However, the finding that partner education predicted the women's preference for where to give birth supports the claim that males typically make household decisions, particularly those pertaining to women's health.[11]

The study found that Muslim women were less likely to give birth in a health facility which is consistent with previous studies.[21][22] Islamic women may receive less medical help due to their cultural and religious practices. Additionally, their husbands may forbid them from

Table 2 Factors associated with institutional delivery among rural women in Bangladesh

Variables	Categories	cOR (95% CI)	aOR (95% CI)
Age	<20	Reference	Reference
	20–29	0.85 (0.69 to 1.05)	1.20 (0.92 to 1.57)
	30–49	0.65*** (0.51 to 0.85)	1.51* (1.05 to 2.18)
Educational level	No education	Reference	Reference
	Primary	1.42 (0.96 to 2.11)	0.94 (0.59 to 1.49)
	Secondary	3.31*** (2.29 to 4.80)	1.25 (0.79 to 1.95)
	Higher	9.00*** (6.00 to 13.51)	1.56 (0.94 to 2.59)
Partner's education	No education	Reference	Reference
	Primary	1.56*** (1.20 to 2.03)	1.13 (0.83 to 1.53)
	Secondary	3.03*** (2.34 to 3.90)	1.28 (0.94 to 1.74)
	Higher	7.52*** (5.60 to 10.09)	2.02*** (1.39 to 2.94)
Working status	Not working	Reference	Reference
	Working	0.70*** (0.50 to 0.73)	0.73** (0.60 to 0.89)
Religious status	Hinduism/ Buddhism	Reference	Reference
	Islam	0.52*** (0.36 to 0.75)	0.62** (0.44 to 0.89)
Antenatal visits	No	Reference	Reference
	1–3	4.19*** (2.75 to 6.38)	2.54*** (1.65 to 3.90)
	4–7	10.16*** (6.50 to 15.89)	4.79*** (3.04 to 7.53)
	≥8	14.35*** (8.70 to 23.66)	6.13*** (3.71 to 10.42)
Parity	1	Reference	Reference
	2	0.57*** (0.47 to 0.70)	0.61*** (0.48 to 0.77)
	≥3	0.32*** (0.26 to 0.39)	0.46*** (0.35 to 0.60)
Listening to radio	No	Reference	Reference
	Yes	2.24*** (1.51 to 3.31)	1.10 (0.70 to 1.72)
Reading newspaper	No	Reference	Reference
	Yes	2.68*** (1.98 to 3.64)	1.06 (0.76 to 1.48)
Watching television	No	Reference	Reference
	Yes	2.52*** (2.07 to 3.05)	1.35** (1.09 to 1.67)
Wealth index	Poorest	Reference	Reference
	Poorer	1.49** (1.17 to 1.90)	1.09 (0.84 to 1.41)
	Middle	2.54*** (1.98 to 3.25)	1.38* (1.05 to 1.82)
	Richer	4.21*** (3.19 to 5.56)	1.84*** (1.34 to 2.54)
	Richest	7.88*** (5.62 to 11.06)	2.67*** (1.82 to 3.91)
Distance to a health facility	Big problem	Reference	Reference
	Not a big problem	1.38*** (1.18 to 1.62)	1.04 (0.88 to 1.24)
Region	Barisal	Reference	Reference

Continued

Table 2 Continued

Variables	Categories	cOR (95% CI)	aOR (95% CI)
	Chittagong	1.44 (0.96 to 2.16)	1.00** (0.69 to 1.47)
	Dhaka	1.54 (0.97 to 2.44)	1.05 (0.70 to 1.58)
	Khulna	2.37*** (1.61 to 3.49)	1.64 (1.12 to 2.41)
	Mymensingh	0.92 (0.62 to 1.36)	0.86 (0.59 to 1.25)
	Rajshahi	1.68** (1.15 to 2.47)	1.31 (0.93 to 1.86)
	Rangpur	1.33 (0.86 to 2.07)	1.11 (0.75 to 1.65)
	Sylhet	0.98 (0.63 to 1.53)	0.94 (0.64 to 1.40)

*P<0.05, **p<0.01, ***p<0.001.
aOR, adjusted OR; cOR, unadjusted OR.

visiting male healthcare professionals which might have replica effect of them having institutional delivery.[21]

Our finding is similar to a study conducted among Ghanaian women where those who had had antenatal attendance during pregnancy were more likely to use institutional delivery compared with women who did not attend for antenatal care.[23] Antenatal care provides expectant mothers the chance to learn about delivery complications and to prepare for delivery.[23] Additionally, antenatal attendance also provides a good moment to highlight the advantages of healthcare facility delivery. These elements could potentially have an impact on their decision to choose institutional delivery.[24]

Consistent with previous studies conducted in rural and urban areas, first-order birth women were more likely to use institutional delivery services than second-order or higher-order birth women.[21 25–27] One possible explanation is that women who have more children gain the experience of childbirth and the confidence to do so at home.[21] It is also plausible that multiparous women who might have had a bad experience with a health facility delivery may prefer to give birth at home.[24]

Women who watched television were more likely to use institutional delivery compared with those who did not watch television. Similarly, a study conducted in rural communities in Pakistan found that women who were exposed to mass media were more likely to use institutional delivery services.[10] Also, a study in Ethiopia revealed that women who frequently watched television were more likely to use institutional delivery services.[28] A likely explanation is that people may easily access a variety of health messages, knowledge about maternal health risk factors and advocacy for institutional delivery through television health programmes.[21] The findings of this study indicate that emphasising institutional delivery services' relevance through television advertising could aid Bangladesh in achieving its goals for maternal and child health.[21]

Women's decisions regarding where to give birth, access to healthcare, transportation and other costs might be influenced by the household's income. The current study revealed that women in high-income households were more likely to use institutional delivery than those in

the poorest households which is consistent with previous studies.[10 13 18]

The study has some strengths and limitations. This study's key strength is the use of nationally representative data, which allows us to generalise our findings to the entire country. Despite the fact that our study's major outcome was self-reported, we do not anticipate memory bias since we anticipate that mothers will be able to recall the location of their child's birth. Because this was cross-sectional research, our results cannot be interpreted causally.

Implication for policy and equity

According to this survey, a higher proportion of women in underserved communities in Bangladesh did not have institutional delivery. Therefore, to increase the number of births that take place in these settings, public health policies and interventions like offering birth centres, training skilled birth attendants, using the media to raise awareness and educate the public about health issues, and allowing men to participate in pregnancy and childbirth should be put into place. Despite the gradual increase in institutional deliveries over the past years in Bangladesh among women of reproductive age, it is apparent that women with lower socioeconomic status face significant barriers to receiving facility delivery. We recommend that urgent attention should be given to multisectoral initiatives to improve facility delivery services across the country, with a focus on rural communities in Bangladesh where institutional deliveries are very low. According to this study, the majority of women deliver their first baby in a health facility, but as birth rates rise, this rate declines. As a result, policy-makers should offer incentives to mothers who deliver their subsequent babies the health facilities.

Conclusion

This study found an exceptionally low institutional delivery rate among women in rural regions, indicating the need to implement interventions to increase health facility delivery among rural women. We found that women's age, partners' education, prenatal care, parity, employment and household affluence all had a substantial impact on institutional delivery. Policy-makers and government efforts should take this study's findings into account when developing policies or programmes to boost institutional delivery in Bangladesh.

Author affiliations
[1]Department of Nursing, School of Nursing and Midwifery, University of Health and Allied Sciences, Ho, Ghana
[2]College of Nursing, Yonsei University, 50-1 Yonsei-ro, Seodaemun-gu, 03722, Seoul, South Korea
[3]National Institute of Advanced Nursing Education and Research, Mugda, Dhaka-1214, Bangladesh
[4]Mo-Im Kim Nursing Research Institute, College of Nursing, Yonsei University, 50-1 Yonsei-ro, Seodaemun-gu, 03722, Seoul, South Korea

ORCID iD
Agani Afaya http://orcid.org/0000-0002-7918-2999

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