

**The State of Essential Newborn Care for Skilled Home Deliveries  
and Facility Deliveries in Bangladesh**

By

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A paper presented to the faculty of The University of North Carolina at  
Chapel Hill in partial fulfillment of the requirements for the  
degree of Master of Science in Public Health in the  
Department of Maternal and Child Health.

Chapel Hill, N.C.

11/12/15

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First Reader

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Second Reader

## **Abstract**

### *Background*

Essential newborn care (ENC) around the time of birth is critical in improving neonatal survival. This study assessed the coverage of ENC performed at or immediately after birth and examined the odds of newborns receiving ENC based on the mothers' place of delivery and assistance during delivery in Bangladesh.

### *Methods*

Weighted descriptive statistics and logistic regressions were performed on ENC practices from the 2011 Bangladesh Demographic and Health Survey dataset. ENC practices included: non-application of substances to the cord; application of antiseptic to the cord; drying newborn within 5 minutes; wrapping newborn within 5 minutes; delaying first bath until after the first 72 hours; and breastfeeding within 1 hour. The key predictor variables included unskilled home delivery, skilled home delivery and facility delivery.

### *Results*

Coverage for ENC practices was generally low. Compared to unskilled home delivery, delivery at sub-district level health facilities and secondary/tertiary health facilities showed significantly higher odds for all ENC practices except non-application of substances to the cord and breastfeeding within 1 hour. The odds ratios between unskilled home delivery and skilled home delivery as well as delivery at lower level health facilities were not statistically significant for many ENC practices.

### *Conclusions*

These findings have significant public health implications as lower level health facilities are typically the first point of entry into the healthcare system. The coverage of ENC should be closely monitored for skilled delivery at home and particularly, for delivery at lower level health facilities in Bangladesh.

## **Background**

Essential newborn care (ENC) practices around the time of birth are critical in improving neonatal survival [1]. ENC practices at or immediately after birth include newborns receiving hygienic cord care during the delivery process, adequate thermal protection after delivery to prevent hypothermia, proper feeding to prevent under-nourishment and stunting and newborn resuscitation to manage birth asphyxia [2].

The mainstream intervention approach for improving ENC in Bangladesh has mostly been community-based, targeting deliveries occurring at home [3 – 10]. This is due to high proportion of home deliveries assisted by unskilled birth attendants [11 – 17] and prevailing cultural beliefs about newborn care [14 – 18]. The literature reports several unsafe newborn care practices routinely performed by traditional birth attendants such as unsterile cord-cutting, application of substances to the cord, leaving the newborn wet and unwrapped and bathing the newborn early [15, 16, 18, 19]. In addition, the cultural belief about cleansing the mother and the newborn from evil spirits often lead to behaviors that increase the risk of neonatal mortality and morbidity [15, 16, 18, 19].

The community-based interventions in Bangladesh have reported some success in overcoming these barriers and improving ENC coverage at home [3 – 10]. Two main types of community-based interventions were implemented: The first type of interventions focused on home visits by trained community health workers [3 – 8]; and the second type of interventions focused on regular women's groups to promote behavior change [9, 10]. For both types of interventions, the coverage of recommended ENC at or immediately after birth showed improvement in the intervention arms compared to the control arms of receiving usual care [3 – 10]. These studies

most frequently reported positive improvements in the areas of appropriate feeding, thermal care and cord care [3 – 10].

The current body of literature seems to be lacking, however, on assessments of ENC coverage in health facilities. Some of the community-based interventions did include trainings for facility-based providers on ENC and management of newborn illnesses as a part of their program activities [4, 6, 9, 10]. Even in these studies, facility-based provider trainings are insufficiently described and their impact on ENC coverage is not reported [4, 6, 9, 10].

To date, only a small number of studies describe the current state of ENC in health facilities [13, 20 – 22]. Pagel et al. notes that coverage of ENC in health facilities is far from universal [13]. Recommended feeding practices and thermal care were especially low across health facilities in Bangladesh [13]. In addition, Crowe et al. found that coverage of ENC among attended deliveries can drop while it increases among unattended deliveries over time, asserting that complete coverage of ENC should not be assumed for attended deliveries [20].

Low and inconsistent coverage of ENC in health facilities poses a serious concern as the proportion of facility deliveries rises in Bangladesh. The proportion of facility deliveries in Bangladesh has been steadily rising from 12% in 2004 to 29% in 2011 [11]. As both facility delivery and home delivery with a skilled birth attendant remain a national priority [23, 24], it is important that ENC coverage in health facilities receives just as much attention as ENC coverage at home. This study therefore has the following objectives: (1) assessing the coverage of ENC performed at or immediately after birth and (2) examining the odds of newborns receiving ENC based on the mothers' place of delivery and the person assisting during delivery in Bangladesh.

## **Methods**

### *Data and Sample*

Data came from the 2011 Bangladesh Demographic and Health Survey (BDHS), a nationally representative survey that provides information on demographic rates, family planning coverage, sexually transmitted diseases, nutritional status of women and children and maternal and child health services [11].

The primary sampling unit for the survey was an enumeration area which contained approximately 120 households. Using a two-stage sampling design, a total of 600 enumeration areas were selected, of which 207 were from urban areas and 393 were from rural areas. Then, from each enumeration area, a sample of 30 households were selected to provide representative statistical estimates for various demographic and health indicators.

The BDHS contains several types of questionnaires: a Household Questionnaire, a Woman's Questionnaire, a Man's Questionnaire, a Community Questionnaire and Verbal Autopsy Questionnaires. This study used information provided by the Woman's Questionnaire which interviewed ever-married women age 12 – 49 about their background characteristics, reproductive history, family planning use and fertility preferences, husband's background characteristics, HIV/AIDS awareness, food security and use of various maternal and child health services.

A total of 18,222 ever-married women age 12 – 49 were eligible for interview in 17,511 households. From these, 17,842 women were actually interviewed. The main reason for non-response among eligible women were their absence at the time of visits by the interviewers.

This study was reviewed and exempted by the Institutional Review Board at the University of North Carolina at Chapel Hill.

#### *Justification for Using BDHS Data*

Section 9.4 of the 2011 BDHS report mentions that only the women who did not deliver their last-born child in a health facility were asked about newborn care practices such as cord-cutting, drying, wrapping, and bathing of the newborn following birth [11]. However, section 4 of the Woman's Questionnaire in Appendix F shows skip patterns that contradict the statement [11]. According to the skip pattern for newborn care questions, only those asking about usage of clean delivery kits, instruments used to cut the cord and whether instruments were boiled before use were asked exclusively to women who did not deliver in a health facility [11]. It is clear from the way the questionnaire was designed that all other newborn care questions, including the ones analyzed in this study, have been asked to both women who delivered at home and women who delivered in health facilities.

#### *Descriptive and Regression Analyses*

Weighted descriptive statistics and chi-square tests were performed on demographic (Table 1) and outcome variables (Table 2) stratified by place of delivery, with home delivery further stratified by person assisting during delivery. Hence, three categories were used to stratify the variables: home delivery with an unskilled birth attendant, home delivery with a skilled birth attendant and facility delivery. Demographic variables included women's age, women's education, husband's education, women's parity, household wealth, women's employment and urban or rural residence. Outcome variables included recommended ENC practices at or immediately after birth such as non-application of substances to the cord, application of

antiseptic to the cord, drying newborn within 5 minutes, wrapping newborn within 5 minutes, delaying newborn first bath until after the first 72 hours of delivery and breastfeeding within 1 hour [11, 25]. All of the ENC practices except breastfeeding within 1 hour were only asked for the most recent vaginal birth in the 3 years preceding the survey [11].

In 2013, the World Health Organization (WHO) issued new recommendations regarding appropriate cord care [26]. For home deliveries occurring in settings with high neonatal mortality (30 or higher neonatal deaths per 1000 live births), the WHO recommends that 4% chlorhexidine, a type of antiseptic, should be applied to the cord for the first week of life [26]. For facility deliveries, the recommendation is not applying any substances to the cord [26]. This study included both measures because Bangladesh, at the time of the survey, was considered to have high neonatal mortality, 32 deaths per 1000 live births in 2011 [11].

The key predictor variable was created based on women's place of delivery and assistance during delivery at home. Home delivery was further stratified by assistance during delivery because the government of Bangladesh not only emphasizes delivering at health facilities but also promotes delivering with a skilled birth attendant at home [23, 24]. Facility delivery was stratified by four levels of health facilities: non-governmental organization (NGO) clinics, union level health facilities, sub-district level health facilities and secondary/tertiary health facilities. At the union level, health and family welfare centers were included. At the sub-district level, upazilla health complexes were included. Finally, at the secondary/tertiary hospital level, government hospitals, special medical colleges, district hospitals, maternal and child welfare centers, private hospitals and clinics and private medical college hospitals were included for analysis. Besides the demographic and predictor variables aforementioned, antenatal visits during pregnancy was also included as a covariate.



Weighted logistic regression analyses were performed on each of the outcome variables separately. All outcome variables were recoded as binary variables with “1” indicating compliance with recommended practice and “0” indicating non-compliance. Tables 1 and 2 were based on a regression sample with breastfeeding within 1 hour as an outcome because it was the largest sample (n=7204) among all regression samples.

## **Results**

Table 1 describes basic demographic characteristics of the sample by three categories: home delivery with unskilled assistance, home delivery with skilled assistance and facility delivery.

The mean age of women with unskilled home delivery was the highest (25.8 years). As for education, the proportion of women with no education was the highest among those with unskilled delivery at home (43.58%). The proportion of women with secondary education or higher, on the other hand, was the highest among those with facility delivery (32.68%).

Husband’s education followed similar patterns as women’s education except that husbands whose wives had skilled home delivery, had the highest proportion of secondary education or higher (81.58%). This was overwhelmingly higher than the proportion of husbands whose wives had unskilled home delivery (42.27%).

High proportions of women with skilled home delivery or facility delivery had a parity of one or two while women with unskilled home delivery had comparable proportions across parities. In addition, women with skilled home delivery or facility delivery were found to be in richer wealth quintiles than women with unskilled home delivery. As for residence, the majority of women with unskilled home delivery lived in rural areas. For women with skilled home delivery or

facility delivery, the proportions of urban and rural residence were close to even. Lastly, employment was generally low for all women in the study.

Table 2 describes the coverage of ENC practices, stratified by the same categories as Table 1.

Compared to women with unskilled home delivery, women with skilled home delivery or facility delivery had higher coverage for most recommended ENC practices for their newborns. The only exceptions were application of substances to the cord and breastfeeding within 1 hour. Women with facility delivery had the lowest proportion of non-application of substances to the cord and the lowest coverage for breastfeeding within 1 hour. The coverage for all recommended ENC practices was low across all three categories. Only 2.75% of the sample reported that all immediate ENC were performed. Women with unskilled home delivery reported the lowest coverage of all immediate ENC (2.18%). The coverages for women with skilled home delivery and facility delivery were a little higher, 7.69% and 6.25% respectively.

Table 3 presents the odds ratios (ORs) of recommended ENC practices, adjusted for number of antenatal visits, women's age, women's education, husband's education, parity, women's employment, wealth and residence. With the unskilled home delivery category as the reference, delivery at sub-district level health facilities and secondary/tertiary health facilities showed significantly lower odds for non-application of substances to the cord, ORs of 0.62 (95% CI 0.42 – 0.92) and 0.46 (95% CI 0.35 – 0.61) respectively. For application of antiseptic to the cord, on the other hand, delivery at NGO clinics, sub-district level health facilities and secondary/tertiary health facilities showed significantly higher odds compared to the odds of the referent category, ORs of 3.32 (95% CI 1.53 – 7.22), 2.08 (95% CI 1.17 – 3.71) and 4.12 (95% CI 2.87 – 5.93) respectively.

As for newborn dried within 5 minutes, delivery at sub-district level health facilities and secondary/tertiary health facilities showed significantly higher odds compared to the odds of the referent category, ORs of 1.75 (95% CI 1.17 – 2.62) and 2.10 (95% CI 1.61 – 2.72) respectively. Newborn wrapped within 5 minutes had similar results with delivery at sub-district level health facilities and secondary/tertiary health facilities showing significantly higher odds compared to the odds of the referent category, ORs of 1.73 (95% CI 1.18 – 2.54) and 1.83 (95% CI 1.42 – 2.35) respectively. Skilled home delivery also showed significantly higher odds for newborn wrapped within 5 minutes compared to the odds of the referent category, OR of 2.89 (95% CI 1.22 – 6.83). With delayed first bath of the newborn until after the first 72 hours, delivery at all levels of health facilities from NGO clinics to secondary/tertiary health facilities showed significantly higher odds compared to the odds of the referent category, ORs of 2.69 (95% CI 1.56 – 4.65), 4.08 (95% CI 1.29 – 12.89), 2.99 (95% CI 1.99 – 4.49) and 3.04 (95% CI 2.31 – 3.98) respectively. Lastly, delivery at secondary/tertiary health facilities showed significantly lower odds for breastfeeding within 1 hour compared to the odds of the referent category, OR of 0.55 (95% CI 0.48 – 0.64).

All other ORs not mentioned were not statistically significant with p-values much higher than the conventional standard of 0.05. The majority of these non-significant ORs, however, did indicate higher odds of receiving ENC for skilled home delivery, delivery at NGO clinics and delivery at union level health facilities compared to the odds of the referent category. The exceptions were non-application of substances to the cord and breastfeeding within 1 hour which had mixed results depending on the level of health facility being assessed.

Finally, although not presented in the methods or results, weighted logistic regression was also performed for a combined outcome of non-application of substances to the cord and application

of antiseptic to the cord. The ORs for skilled home delivery and all levels of health facilities were not statistically significant with p-values ranging from 0.214 to 0.750.

## **Discussion**

In recent years, the gap in ENC coverage in health facilities has been highlighted by a few studies [13, 20 – 22]. Because facility delivery and skilled home delivery are both national targets [23, 24], it is important that providers at health facilities and skilled birth attendants at home have the capacity to provide high quality ENC. To the researcher's knowledge, this is the first study to compare the odds of receiving ENC between unskilled home delivery and skilled home delivery as well as delivery in varying levels of health facilities in Bangladesh.

The most important discovery from the findings is that the ORs between unskilled home delivery and delivery at NGO clinics or union level health facilities were not statistically significant with substantial p-values for many of the ENC practices: not applying any substances to the cord (p-values of 0.494 and 0.764); drying newborn within 5 minutes (p-values of 0.726 and 0.652); wrapping newborn within 5 minutes (p-values of 0.578 and 0.500); and breastfeeding within 1 hour (p-values of 0.770 and 0.084). These findings support those of previous studies [13, 20].

Ideally, newborns delivered at NGO clinics or union level health facilities would have a significantly higher odds of receiving ENC than their counterparts who were delivered with an unskilled birth attendant at home. These findings have significant public health implications as lower level health facilities are meant to be the first point of contact with the healthcare system for hard-to-reach populations [23]. More policy and programmatic attention should therefore be given to improving the coverage of ENC provided at lower level health facilities. As practical steps, NGOs could regularly monitor the coverage of ENC provided at their clinics and strive to

maintain a high level of coverage. At union level health facilities, medical providers' knowledge and attitude about ENC can be assessed and refresher trainings can be provided as a follow-up.

Another interesting discovery was that the ORs between unskilled home delivery and skilled home delivery for most of the ENC were not statistically significant with p-values ranging from 0.180 to 0.937. This poses a concern as the majority of past interventions focused on home visits by trained community health workers to increase coverage of ENC at home [3 – 8]. These findings may imply that the immediate impact created during the interventions might have worn off over time or that skilled birth attendants in non-intervention areas are not being adequately supported. A recent program review by UNFPA hints that the latter is more probable [24]. In addition, only 4.4% of deliveries were being attended by skilled birth attendants at home in 2010 [24]. This calls for a scale-up of interventions that train community health workers for skilled home deliveries and an establishment of support systems for skilled birth attendants after they have been trained. For families with strong traditional and cultural beliefs that are not likely to seek facility-based care in the short run, skilled birth attendance at home may be the only feasible alternative for access to skilled care.

Among the ORs that were statistically significant, two were found to be unusual. First, delivery at higher level health facilities had a lower odds of not applying any substances to the cord compared to unskilled home delivery. This may be partially explained by delivery at higher level health facilities having a higher odds of applying antiseptic to the cord compared to unskilled home delivery. The WHO currently recommends not applying any substances to the cord for facility deliveries [26]. While using 4% chlorhexidine can still be useful in resource-limited facilities where unhygienic deliveries may be common [27], this study presents no evidence that 4% chlorhexidine as opposed to other types of antiseptic is primarily being used in higher level

health facilities. Second, delivery at higher level health facilities had a lower odds of breastfeeding within 1 hour compared to unskilled home delivery. A possible explanation for this is that secondary/tertiary health facilities receive a high volume of patients who are referred for serious pregnancy complications [23]. These conditions may not enable women to initiate breastfeeding soon after delivery. Other results with regards to higher level health facilities were not surprising as they are expected to be staffed with highly skilled medical providers.

Finally, none of the recommended ENC practices had satisfyingly high coverage among skilled home deliveries and facility deliveries. In fact, the coverage of all recommended ENC practices was staggeringly low for both skilled home deliveries and facility deliveries. Such low numbers are disappointing as ENC encompasses simple, life-saving interventions that are easy to administer. This suggests that although past interventions have had some success in improving ENC coverage in their respective program areas [3 – 10], more work needs to be done to increase coverage overall.

Improved overall coverage of ENC will help to reduce the burden of neonatal mortality in Bangladesh. Under-5 mortality has sharply declined between 1990 and 2013 from 144 deaths per 1000 live births to 41 deaths per 1000 live births in Bangladesh [28]. The decline in neonatal mortality during the same period has not been as sharp as that of under-5 mortality [28]. Neonatal mortality declined from 55 deaths per 1000 live births to 24 deaths per 1000 live births, which actually represents a 20% increase in the share of neonatal mortality among under-5 mortality [28]. Advocating for universal coverage of ENC both for skilled home deliveries and facility deliveries will expedite the rate of decline for neonatal mortality or at the very least, maintain the momentum of it.

There are a few limitations to the study. First, the cross-sectional design of the study does not allow for causal inferences to be made between the predictor and outcome variables [29].

Second, there was a small number of observations for skilled home delivery which could have rendered low statistical power to detect meaningful differences for ORs. Third, questions about ENC practices were not asked to women who delivered via a caesarean section. Interpretation of findings therefore should be done with caution, especially for higher level health facilities that are capable of providing caesarean section as comprehensive emergency obstetric care centers. It is possible that some of the wealthy, highly educated and non-parous women have been excluded from the higher level health facilities category as caesarean section was reported to be the highest among women with first births, with secondary education, in the highest wealth quintile and living in urban areas [11]. Finally, this study did not include maternal and neonatal complications as covariates in the analysis model. This is important for several reasons. Women who experienced severe complications during delivery may not accurately recall the events that occurred during delivery. Depending on the number of staff available at the moment, newborns could have been neglected so that more attention can be given to stabilizing the condition of the mothers. In addition, newborns with severe complications might be separated from their mothers immediately following delivery for further care and treatment, which can limit ENC practices that require interaction of the mothers and newborns.

Non-inclusion of select predictors can certainly affect the validity of the study's findings. However, the degree of bias generated as a result of non-inclusion may be less important for lower level health facilities in the analysis model. According to the health service delivery system of Bangladesh, women at risk of severe complications should have been referred to higher level health facilities for proper management [23]. High-risk women who delivered at

lower level health facilities were either not referred to higher level health facilities or were not compliant with referrals. Considering that women in such circumstances have a lower chance of survival, it is probable that women in the study sample had normal deliveries or suffered from mild complications. Even for normal deliveries, recall bias may still exist due to the demanding nature of a birthing event.

## **Conclusions**

Despite the limitations, this study offers important insights for decision-makers in Bangladesh. First, it challenges the conventional notion that coverage of ENC is high for newborns delivered in health facilities or at home with skilled birth attendants. Second, it draws more research and programmatic attention to monitoring the coverage of ENC for skilled delivery at home and particularly, for delivery at lower level health facilities such as NGO clinics and union level health facilities. This will become increasingly important over time as more and more women choose to deliver with skilled birth attendants at home or deliver in health facilities in Bangladesh.



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Appendix. Tables 1, 2 & 3

**Table 1. Characteristics of the Sample by Delivery Place and Assistance**

	Total		Home Delivery with Unskilled Assistance		Place of Delivery Home Delivery with Skilled Assistance		Facility Delivery	
	n	% or Mean ± SD	n	% or Mean ± SD	n	% or Mean ± SD	n	% or Mean ± SD
	<b>Age, y</b>	7204	25.51 ± 6.13	5037	25.77 ± 6.18	38	25.42 ± 5.69	2047
<b>Education</b>								***
No Education	2525	35.45%	2195	43.58%	6	15.79%	324	15.83%
Primary Education	3578	50.24%	2500	49.63%	24	63.16%	1054	51.49%
Secondary Education or Higher	1019	14.31%	342	6.79%	8	21.05%	669	32.68%
<b>Husband's Education</b>								***
No Education	1293	18.16%	1156	22.95%	4	10.53%	133	6.50%
Primary Education	2123	29.81%	1752	34.78%	3	7.89%	368	17.98%
Secondary Education or Higher	3706	52.04%	2129	42.27%	31	81.58%	1546	75.53%
<b>Parity</b>								***
1	2415	33.91%	1427	28.33%	14	36.84%	974	47.58%
2	2132	29.94%	1488	29.54%	11	28.95%	633	30.92%
3	1249	17.54%	949	18.84%	6	15.79%	294	14.36%
4+	1326	18.62%	1173	23.29%	7	18.42%	146	7.13%
<b>Wealth</b>								***
Poorest	1483	20.82%	1329	26.38%	4	10.53%	150	7.33%
Poorer	1356	19.04%	1160	23.03%	2	5.26%	194	9.48%
Middle	1376	19.32%	1063	21.10%	5	13.16%	308	15.05%
Richer	1428	20.05%	914	18.15%	14	36.84%	500	24.43%
Richest	1479	20.77%	571	11.34%	13	34.21%	895	43.72%
<b>Residence</b>								***
Urban	2256	31.68%	1197	23.76%	18	47.37%	1041	50.85%
Rural	4866	68.32%	3840	76.24%	20	52.63%	1006	49.15%
<b>Employment</b>								
No	6385	89.65%	4507	89.48%	32	84.21%	1846	90.18%
Yes	737	10.35%	530	10.52%	6	15.79%	201	9.82%

*Note*

The table includes sample from regression on breastfeeding within 1 hour because it contained the largest number of observations out of all regression samples.

Columns within a categorical variable sum to 100%.

\*p<0.05 \*\*p<0.01 \*\*\*p<0.001

**Table 2. Coverage of Immediate Essential newborn Care Practices by Delivery Place and Assistance**

	Total		Home Delivery with Unskilled Assistance		Place of Delivery Home Delivery with Skilled Assistance		Facility Delivery		
	n	% or Mean ± SD	n	% or Mean ± SD	n	% or Mean ± SD	n	% or Mean ± SD	
<b>Application of Substances to the Cord</b>									***
No	2264	52.11%	2042	54.76%	12	44.44%	210	35.65%	
Yes	2081	47.89%	1687	45.24%	15	55.56%	379	64.35%	
<b>Application of Antiseptic to the Cord<sup>a</sup></b>									***
No	1572	75.58%	1352	80.19%	12	80.00%	208	54.88%	
Yes	508	24.42%	334	19.81%	3	20.00%	171	45.12%	
<b>Drying Newborn within 5 minutes</b>									***
No	2101	45.90%	1866	48.73%	12	42.86%	223	30.97%	
Yes	2476	54.10%	1963	51.27%	16	57.14%	497	69.03%	
<b>Wrapping Newborn within 5 minutes</b>									***
No	3002	65.50%	2614	68.20%	13	46.43%	375	51.94%	
Yes	1581	34.50%	1219	31.80%	15	53.57%	347	48.06%	
<b>Delayed First Bath until after the First 72 hours</b>									***
No	3578	78.19%	3140	82.26%	22	75.86%	416	56.99%	
Yes	998	21.81%	677	17.74%	7	24.14%	314	43.01%	
<b>Breastfeeding within 1 hour</b>									***
No	3734	52.43%	2474	49.12%	18	47.37%	1242	60.67%	
Yes	3388	47.57%	2563	50.88%	20	52.63%	805	39.33%	
<b>All Immediate ENC Practices<sup>b</sup></b>									***
No	4100	97.25%	3551	97.82%	24	92.31%	525	93.75%	
Yes	116	2.75%	79	2.18%	2	7.69%	35	6.25%	

*Note*

The table includes sample from regression on breastfeeding within 1 hour because it contained the largest number of observations out of all regression samples.

Columns within a categorical variable sum to 100%.

\*p<0.05 \*\*p<0.01 \*\*\*p<0.001

<sup>a</sup>"No" responses indicate that the respondents applied other substances to the cord such as antibiotics, sprit/alcohol, mustard oil with garlic, chewed rice, tumeric juice/powder, ginger juice, shidur, boric powder, gentian violet, talcom powder, ash/cow dung, heat, mustard oil and other unknown substances.

<sup>b</sup> All Immediate ENC Practices include non-application of substances to the cord or application of antiseptic to the cord, drying newborn within 5 minutes, wrapping newborn within 5 minutes, delayed first bath until after the first 72 hours and breastfeeding within 1 hour.



**Table 3. Weighted Logistic Regression of Essential Newborn Care Practices**

	Non-application of Substances to Cord			Application of Antiseptic to Cord			Drying Newborn within 5 minutes			Wrapping Newborn within 5 minutes			Delayed First Bath until after the First 72 hours			Breastfeeding within 1 hour		
	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value
<b>Place of Delivery</b>																		
Unskilled Delivery at Home (ref)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Skilled Delivery at Home	0.65	(0.28 - 1.52)	0.318	1.35	(0.27 - 6.78)	0.717	1.78	(0.77 - 4.11)	0.180	2.89	(1.22 - 6.83)	0.016	1.74	(0.64 - 4.74)	0.277	1.03	(0.50 - 2.13)	0.937
NGO Clinics	0.79	(0.40 - 1.55)	0.494	3.32	(1.53 - 7.22)	0.002	1.11	(0.61 - 2.01)	0.726	1.16	(0.68 - 1.97)	0.578	2.69	(1.56 - 4.65)	0.000	0.94	(0.63 - 1.41)	0.770
Union Level Health Facilities	1.21	(0.34 - 4.32)	0.764	5.54	(0.52 - 58.70)	0.155	1.31	(0.40 - 4.26)	0.652	1.47	(0.48 - 4.47)	0.500	4.08	(1.29 - 12.89)	0.017	2.70	(0.88 - 8.36)	0.084
Sub-district Level Health Facilities	0.62	(0.42 - 0.92)	0.018	2.08	(1.17 - 3.71)	0.013	1.75	(1.17 - 2.62)	0.007	1.73	(1.18 - 2.54)	0.005	2.99	(1.99 - 4.49)	0.000	0.85	(0.63 - 1.15)	0.287
Secondary/Tertiary Health Facilities	0.46	(0.35 - 0.61)	0.000	4.12	(2.87 - 5.93)	0.000	2.10	(1.61 - 2.72)	0.000	1.83	(1.42 - 2.35)	0.000	3.04	(2.31 - 3.98)	0.000	0.55	(0.48 - 0.64)	0.000

*Note* . Odds ratios are adjusted for number of antenatal visits, women's age, women's education, husband's education, parity, women's employment, wealth and residence