

## Research Article

# Patterns and Determinants of Essential Newborn Care Practices in Rural Areas of Northern Ghana

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**Background.** This study was designed to understand the patterns and determinants of three essential newborn care practices: safe cord care, optimal thermal care, and neonatal feeding practices. **Methods.** A community-based cross-sectional study was carried out on a sample of 404 lactating mothers who have delivered a live baby at home within the past one year prior to the study. **Results.** Overall, the prevalence of essential newborn practices on safe cord care and optimal thermal care was exceptionally low. Of the 404 newborns, only 0.2% (1) had safe cord care, 5.2% (21) optimal thermal care, and 50.2% (203) were considered to have had adequate neonatal feeding. In logistic regression analysis, the main predictors of good neonatal feeding were maternal age, timing of the first antenatal care (ANC), and maternal knowledge of newborn danger signs. Women who could mention at least 4 danger signs of the neonate were 4 times more likely to give good neonatal feeding to their babies (AOR = 4.7, CI: 2.43–9.28),  $P < 0.001$ . **Conclusion.** Evidence from this study strongly suggests that the expected essential newborn care practices are not available to a substantial number of the newborns. Efforts should therefore be made by the Ghana Health Service (GHS) to expand essential newborn care interventions beyond institutional level into the communities.

## 1. Introduction

Reduction in under-five mortality rates by two-thirds by the year 2015 is one of the eight Millennium Development Goals (MDGs) [1]. Newborn morbidity and mortality contributes significantly to the infant mortality and under-five mortality rates in most developing countries including Ghana [2–4]. About two-thirds of all infant deaths and 38% of all under-five deaths occur during the neonatal period, resulting in about 4 million neonatal deaths globally per year [4, 5]. All indicators point to the fact that, unless the neonatal mortality rate is substantially reduced, the MDG for child survival cannot be achieved.

In Ghana, over a period of 18 years (i.e., 1990–2008), there has been a reduction in child mortality rates [6]. The under-five mortality rate has declined by 32.8%, from 119 per 1,000 live births to 80 per 1,000 live births [6]. In the same time period neonatal mortality rate (NMR) has declined by 26.8 percentage points from 41 per 1,000 live births to 30 per 1,000 live births [7]. Nationally, average NMR for Ghana is 30/1000

live births whilst in the Northern Region, it is 35/1000 live births [7, 8]. Northern Region is the largest region in terms of land size in Ghana and it is predominantly rural with scattered settlements.

Essential newborn care (ENC) practices that protect against newborn morbidity and mortality include clean cord care (cutting and tying of the umbilical cord with a sterilized instrument and thread), thermal care (drying and wrapping the newborn immediately after delivery and delaying the newborn's first bath for at least six hours or several days to reduce hypothermia risk), and initiation of breastfeeding within the first hour of birth [5, 9]. ENC aims at addressing poor care practices immediately following delivery.

In Ghana, 43.0% of all births occur at home [7]. Babies delivered at home may have a greater risk of being exposed to unhealthy care practices, compared to babies delivered in health facilities. Most neonatal deaths occur at home, unattended by skilled health professionals [4] and more than two-thirds die in their first week [10]. Therefore, good understanding of newborn care practices at the household

level is necessary for health care planners to design and prioritize appropriate child survival interventions that can substantially reduce neonatal morbidity and mortality.

By virtue of the fact that communities have their own unique cultures and traditions, traditional newborn practices may differ from community to community [11]. Good practices need to be identified and promoted whilst bad practices must be discouraged. However, very little is documented on the traditional newborn care practices in the Savelugu/Nanton District where a significant number of deliveries still take place at home. This study sought to describe the patterns and determinants of newborn care practices at home.

## 2. Materials and Methods

**2.1. Study Setting.** The study was conducted in Savelugu/Nanton District in the Northern Region of Ghana. The district has a population of 151,755, is mostly rural, and covers 218 communities with a population density of 58.7/square kilometer. This population is predominantly young, and people under 15 years of age constitute as many as 49% of residents [12]. The area is predominantly inhabited by the Dagomba ethnic group with a few other tribes from other parts of the country. Subsistence farming is the main economic activity in the municipality. But this is usually challenged by virtue of the fact that it is dependent on rainfall which is usually erratic. Health infrastructure and personnel appear to be inadequate with only one hospital serving as a referral centre at Savelugu. There are three operational community-based health planning and services (CHPS) zones and three (3) health centers.

**2.2. Study Design.** A community-based cross-sectional survey was conducted from February through March 2013 among 404 mothers and their infants aged 12 months or less. The researchers together with three trained health workers administered a structured questionnaire to the mothers who had delivered at home.

**2.3. Study Population, Sample Size, and Sampling Procedures.** The primary study population comprised women of reproductive age (15 to 49 years) who have delivered a live baby at home within the past 12 months prior to the conduct of this study. The 12-month limit was set with the intention of mitigating recall bias by the mother.

Three out of the six (6) subdistricts of the Savelugu/Nanton District were selected by way of simple random sampling. Savelugu subdistrict, Pong Tamale sub-district and Nanton subdistricts were selected at random. Using a two-stage probability proportionate to size (PPS) sampling methodology, 420 households were randomly selected from 30 clusters from within the three randomly selected subdistricts. The details of the sample size determination are as follows.

Out of the total population of 20,000 in the selected subdistricts, 4% (800) were children aged less than one year [7]. With this population size and assuming a 50% prevalence of home deliveries, aiming at an absolute precision of 5% at

the 95% confidence level, and further assuming a correction factor of 1.5. (The “design effect”) for cluster sampling, the required minimum sample size was 390. A provision of 10% (39) of total sample size was also considered to take care of incomplete/damaged questionnaires and that increased the sample size to 420. The sample size was estimated using OpenEpi software for epidemiologic statistics version 3.01.

In each cluster, a complete list of all households was compiled and systematic random sampling was used in selecting study participants. All the households in each cluster were serially numbered and the total number of households in a cluster was divided over the sample size to give the sampling interval. The first household was randomly selected by picking any number within the sample interval. Subsequent selections were made by adding the sampling interval to the selected number in order to locate the next household to visit. If the selected household does not have a target respondent, then next household was selected using the systematic sampling procedure. This was done until the sample size was obtained. A maximum of 14 postpartum women were randomly selected from a cluster giving a total of 420 respondents. Only one eligible participant was selected from each household using simple random sampling.

**2.4. Data Collection.** After consent was obtained from eligible mothers, face-to-face interviews using a pretested structured questionnaire were conducted. Data collected included maternal sociodemographic characteristics, knowledge of women about newborn danger signs, and experience of respondents in caring for their babies during the first one month of life.

**2.5. Dependent and Independent Variables.** The main outcome measures were cleanliness and hygiene practices during delivery, thermal control, and infant feeding practices. In determining good essential newborn practices, three composite outcome variables were created: (i) safe cord care (defined as use of a clean cutting instrument to cut the umbilical cord plus clean thread to tie the cord plus no substance applied to the cord stump); (ii) optimal thermal care (defined as baby wrapped within ten minutes of birth plus baby being dried/wiped immediately after birth plus first bath after 6 or more hours); and (iii) good neonatal feeding practices (defined as initiating breastfeeding within the first one hour after birth, giving no prelacteal and feeding the child with colostrum). These composite variables were then dichotomized to Yes (all practices present) or No (one or more practices missing).

The independent variables were sociodemographic factors including maternal age, educational attainment, ethnicity, religion, marital status, and occupation of mothers. Utilization of antenatal care services, maternal knowledge on newborn danger signs, and presence of skilled birth attendant (SBA) at delivery were also assessed as explanatory variables.

**2.6. Data Analysis.** Descriptive and inferential statistics were performed using Predictive Analytic Software (PASW) known formerly as SPSS for Windows version 18.0. In order

to make statistically valid population inferences from sample data, standard errors were computed using procedures in SPSS complex samples that took into account the complex nature of the cluster sample design.

Chi-square statistics were performed to compare the levels of each of the dependent variables with the explanatory variables. A multiple logistic regression (stepwise method) was used to identify independent factors that were associated with good neonatal breastfeeding. The variables that were entered as potential variables in the multiple linear regression models if they were significant at  $P < 0.1$  based upon the results of the bivariate tests. The variables included socio-demographic characteristics, mothers' knowledge of specific newborn danger signs, presence of skilled birth attendant (SBA) at delivery, and antenatal and delivery care.

Multicollinearity between independent variables was checked and eliminated. This was investigated by using the tolerance test in SPSS to produce collinearity statistics. To compute a tolerance statistic for an independent variable to test for multicollinearity, a multiple regression was performed with that variable as the new dependent and all of the other independent variables in the model as independent variables. In SPSS, collinearity statistics were produced to help determine the tolerance statistic ( $1 - R^2$ ). A tolerance value lower than 0.2 meant that variable was considered as a linear combination of other independent variables.

Statistical difference was considered significant if the  $P$  value was  $<0.05$  and 95% confidence intervals (CI) did not overlap.

**2.7. Ethical Considerations.** Ethics approval was obtained from the Ethics Committee of the School of Medicine and Health Sciences, University for Development Studies. Verbal informed consent was sought from all study participants before being interviewed. Study participants were free to refuse or withdraw from the study at any time without any penalty. The study's purpose and objectives were explained to each participant prior to interview.

### 3. Results

In all, 420 women were recruited for the study but due to incomplete responses, the number of valid completed questionnaires was 404 giving a response rate of 96.2%. The primary respondents were women in their fertility age (WIFA) who had infants aged 0–12 months.

**3.1. Sociodemographic Characteristics of Study Sample.** The 404 respondents were mothers who were residents in rural settings. The mean age was 28.6 (SD 5.8) years with a range of 16–45 years. A male to female ratio of the index children was 1:1.2 and most of them 191 (47.3%) were within the age range 0–3 months. The details of the sample characteristics including maternal educational level, marital status, religion of mothers, occupation of mothers, and maternal age distribution are shown in Table 1.

Most of the mothers 359 (88.6%) had no formal education and only 2 (0.5%) attained tertiary level of education.

TABLE 1: Sociodemographic characteristics.

	Freq	%
Age of mother		
15–24 years	104	24.7
25–34 years	232	57.4
35–44 years	65	16.1
45–49 years	3	0.7
Total	<b>404</b>	<b>100</b>
Marital status		
Single	43	10.6
Married	361	89.4
Total	<b>404</b>	<b>100</b>
Educational level		
Basic	38	9.4
Secondary	3	0.7
Tertiary	2	0.5
No education	361	89.4
Total	<b>404</b>	<b>100</b>
Age of baby		
0–3 months	191	47.3
4–6 months	129	31.9
7–12 months	84	20.8
Occupation		
Unemployed	81	20.0
Farmer	194	48.0
Civil/public servant	2	0.5
Petty trader	110	27.2
Others	17	4.2
Total	<b>404</b>	<b>100</b>
Religion		
Muslim	391	96.8
Christian	2	0.5
Traditionalist	11	2.7
Total	<b>404</b>	<b>100</b>
Sex of baby		
Male	184	45.5
Female	220	54.5
Total	<b>404</b>	<b>100</b>

Majority of the mothers 360 (88.9%) were married. Almost all the mothers were Muslims 391 (96.8%). Almost half 194 (48.0) of the mothers were farmers and only two mothers were civil servants. More than half 220 (54.3%) of the infants were females.

**3.2. Levels of Coverage of Essential Newborn Care Practices.** Out of a total of 404 respondents, 90.8% of them reported that the umbilical cord of their babies was cut using a new blade, 93.6% reported bathing their babies within 6 hours of delivery, and 99.8% reported putting something on the cord to help it dry (Table 2).

TABLE 2: Traditional newborn care practices.

Newborn care practice	Frequency (n)	Percentage (%)
Instrument used to cut the umbilical cord		
New blade	367	90.8
Old or unboiled blade	2	0.5
Scissors	29	7.2
Others	6	1.5
Total	<b>404</b>	<b>100.0</b>
Material used to tie cord		
Thread	259	64.1
Cord tie	78	19.3
Cord clamp	13	3.2
String	21	5.2
Others (specify)	33	8.2
Total	<b>404</b>	<b>100.0</b>
What was applied to cord		
Nothing	1	0.2
Oil/shear butter	230	56.9
Methylated Spirit	97	24.0
Shear butter with powder	58	14.4
Ointment	4	1.0
Total	<b>404</b>	<b>100.0</b>
Time baby was wrapped		
Less than 5 minutes	81	20.0
5 to 10 minutes	206	51.0
More than 10 minutes	108	26.7
Unknown	9	2.2
Total	<b>404</b>	<b>99.9</b>
Timing of newborn's first bath		
Soon after delivery	109	27.0
1 to 6 hours	269	66.6
More than 6 hours but less than 24 hours	18	4.5
More than 24 hours	5	1.2
Cannot tell	3	0.7
Total	<b>404</b>	<b>100.0</b>

3.3. *Assessment of Infant and Young Child Feeding (IYCF) Practices.* Majority of the newborns (84.2%) were given colostrum (first yellowish milk) as the first feed after delivery, though some mothers practice prelacteal feeding including water, spiritual water called "waligu", and mogu (herbal concoction). Other baby feeds given were tea and SMA baby milk.

Of the 320 children under 6 months, exclusive breastfeeding in the past 24 hours prior to the study was 88.1% compared to 85.0% exclusive breastfeeding in the past one month. Respondents cited various reasons for not practicing exclusive breastfeeding. These included the perception that the child's throat may be dry due to the harmattan (a dry dusty wind that blows along the northwest coast of Africa) season

TABLE 3: IYCF practices.

Practice	Frequency	Percent
Timely initiation of breastfeeding		
Within 30 minutes	129	31.9
During the first 1 hour	168	41.6
2-8 hours	83	20.5
The next day	21	5.2
Do not remember	3	0.74
Total	<b>404</b>	<b>99.9</b>
Prelacteal feeding		
Water	28	6.9
Colostrum	340	84.2
Waligu (spiritual water)	21	5.2
Mogu (herbal concoction)	4	1.0
Others	11	2.7
Total	<b>404</b>	<b>100.0</b>
Colostrum feeding		
Gave it to the baby	347	85.9
Discarded it/spilled it	57	14.1
Total	<b>404</b>	<b>100</b>
Exclusive breastfeeding in the past 24 hours		
Yes	38	11.9
No	282	88.1
Total	<b>320</b>	<b>100.0</b>
Exclusive breastfeeding in the past one month		
Yes	48	15.0
No	272	85.0
Total	<b>320</b>	<b>100.0</b>

and inadequate supply of breast milk. Timely initiation of breastfeeding (TIBF) rate (i.e., proportion of children born in the last 24 months who were put to the breast within one hour of birth) was 73.5% (297) (Table 3).

Table 4 shows the composite measures of traditional newborn care practices. Of the 404 newborns, only 0.2% (1) had safe cord care, 5.2% (21) optimal thermal care, and 50.2% (203) were considered to have had adequate neonatal feeding (Table 4). With the exception of only one, all the respondents reported having to apply some kind of substance mainly shea butter on the cord stump.

3.4. *Maternal Knowledge of Newborn Danger Signs.* The mothers were tested in their knowledge regarding nine newborn danger signs which included (i) poor suckling or not able to breastfeed, (ii) fast breathing, (iii) severe chest in-drawing, (iv) hypothermia, (v) fever, (vi) unconsciousness, (vii) convulsion, (viii) severe umbilical infection, and (ix) redness of skin around the cord and foul smelling discharge. A categorical variable was created as a measure for the mother's knowledge of newborn danger signs. The dummy categories included were: does not know any danger signs,

TABLE 4: Composite measures of traditional newborn care practices.

Newborn care practice	Frequency ( <i>n</i> )	Percentage (%)
Safe cord care		
Yes	1	0.2
No	403	99.8
Total	<b>404</b>	<b>100.0</b>
Optimal thermal care		
Yes	21	5.2
No	383	94.8
Total	<b>404</b>	<b>100.0</b>
Good neonatal feeding		
Yes	203	50.2
No	201	49.8
Total	<b>404</b>	<b>100.0</b>

knows 1–3 danger signs, and knows at least four danger signs. The results reveal that 77.2% (312) of respondents were aware of one to three newborn danger signs but 20.3% (82) representing less than a quarter of the women were aware of at least four danger signs while only 2.5% (10) of the mothers were not aware of any of the danger signs in the newborn.

*3.5. Predictors of Essential Newborn Care Practices.* We proposed to test whether three composite newborn care practices (safe cord care, optimal thermal care, and good neonatal feeding) were related to sociodemographic factors, use of antenatal services, birth preparedness, mothers' knowledge of specific newborn danger signs, and presence of SBA at delivery. However, with the exception of good neonatal feeding, the prevalence of the other two composite indicators was very low that there was not any discernible association between them and the explanatory variables measured in the study.

The chi-square test was performed to test whether good neonatal feeding practices had a significant relation with sociodemographic/antenatal care factors. There was a significant relation between good neonatal feeding practices and sociodemographic/antenatal care factors. However, maternal educational attainment and occupation were unrelated to good neonatal feeding in this study sample. Overall, the findings show that good neonatal feeding practices were commonly adopted among women aged 25–34 years, women who initiated antenatal care (ANC) early, and those who could mention at least 4 danger signs of the newborn (Table 5).

In logistic regression analysis, the main predictors of good neonatal feeding were maternal age, timing of first ANC visit, and maternal knowledge in newborn danger signs (Table 6). Compared to women aged at least 35 years, women aged 25–34 years were more than twice likely to give good neonatal feeding to their babies (AOR = 2.33, CI: 1.25–4.32),  $P = 0.007$ . Women who initiated ANC early in the first trimester were 2 times more likely to give good neonatal feeding to their babies (AOR = 2.26, CI: 1.43–3.57),  $P < 0.001$ , compared to women who initiate their first ANC late. Women who could mention at least 4 danger signs of the neonate were 4 times likely to

give good neonatal feeding to their babies (AOR = 4.75, CI: 2.43–9.28),  $P < 0.001$ .

Though the presence of SBA was a significant predictor of good neonatal feeding, it was not strong enough in the multiple regression analysis.

## 4. Discussion

This study was one of the few studies that has assessed the patterns and determinants of newborn care practices in the Northern Region of Ghana using a community-based cross section study design. The main finding was the striking low coverage of essential newborn care practices of safe cord care (0.2%), good neonatal feeding (50.2%), and optimal thermal care (5.2%). To the knowledge of the authors, no community level studies have evaluated traditional neonatal care in Northern Ghana and so the findings of this study will be useful guide to the design of interventions and policy for neonatal health, cognizant of the reality on the ground.

*4.1. Birth Preparedness.* Most of the women had attended ANC but birth preparedness was concentrated on buying items such as new clothes. In the study sample only one woman reported making arrangement for transport and six women contacted health worker as their birth preparedness.

Birth preparedness including managing money, transportation, food, and clothes, identifying a SBA, and identifying a person for a blood donation in case of emergency during pregnancy are important for healthy delivery. Education of the women in this area is also very crucial if home delivery without SBA is to be minimized or avoided altogether. With the Community-based Health Planning and Services (CHPS) concept, it should be possible to increase geographical access to delivery services.

*4.2. Coverage of Essential Newborn Care Practices.* Three composite newborn care practices (safe cord care, optimal thermal care, and good neonatal breastfeeding) were investigated and the coverage was generally low. These composite variables give a better reflection of safe cord, optimal thermal care, and neonatal feeding.

Safe cord care was defined in this study as use of a clean cutting instrument to cut the umbilical cord plus clean thread to tie the cord plus no substance applied to the cord. Our results show that in 90.8% of cases a new razor blade was used in cutting the umbilical cord of newborns and this was in line with the WHO recommendation. However, our data show that poor cord care was driven mainly by putting substances on the cord and that the cord was clamped with the recommended instrument (cord clamp and cord tie) in only 22.5% of the deliveries. With the exception of only one respondent who reported not applying any substance to the cord stump, the rest of the study participants applied various things including shea butter, methylated spirits, shea butter mixed with powder, a local alcoholic drink called "Akpeteshie", grounded shea nuts, shea butter mixed with amoxicillin in order to hasten healing process of the cord stump. Similar findings have been reported in

TABLE 5: Relationship among good neonatal feeding and sociodemographic and antenatal care factors.

Variable	N	Good neonatal feeding		Test statistic
		No n (%)	Yes n (%)	
Age (years)				
Under 25 years	104	54 (51.9)	50 (48.1)	Chi-square ( $\chi^2$ ) = 18.9, $P < 0.001$
25–34 years	232	98 (42.2)	134 (57.8)	
At least 35 years	68	49 (72.1)	19 (27.9)	
Total	404	201 (49.8)	203 (50.2)	
Presence of skilled birth attendant (SBA)				
No	383	195 (50.9)	188 (49.1)	Chi-square ( $\chi^2$ ) = 3.9, $P = 0.046$
Yes	21	6 (28.6)	15 (71.4)	
Total	404	201 (49.8)	203 (50.2)	
Timely ANC visit				
Late	272	155 (57.0)	117 (43.0)	Chi-square ( $\chi^2$ ) = 16.4, $P < 0.001$
Early	130	46 (35.4)	84 (64.6)	
Total	402	201 (50.0)	201 (50.0)	
Subdistrict				
Savelugu	138	74 (53.6)	64 (46.4)	$\chi^2 = 8.9, P = 0.012$
Pong Tamale	121	69 (57.0)	52 (43.0)	
Nanton	145	58 (40.0)	87 (60.0)	
Total	404	201 (49.8)	203 (50.2)	
Knowledge of newborn danger signs				
0-1	137	81 (59.1)	56 (40.9)	$\chi^2 = 37.9, P < 0.001$
2-3	185	104 (56.2)	81 (43.8)	
At least 4	82	16 (19.5)	66 (80.5)	
Total	404	201 (49.8)	203 (50.2)	

TABLE 6: Predictors of good neonatal feeding.

	Wald	Sig.	Exp (B)	95% C.I. for Exp (B)	
				Lower	Upper
Maternal age (years)	7.17	0.028			
Under 25	3.73	0.053	1.95	0.99	3.82
25–34	7.17	0.007	2.33	1.25	4.32
Early ANC initiation	12.27	<0.001	2.26	1.43	3.57
Knowledge in newborn danger signs	23.11	<0.001			
Mentions 2-3 signs	0.17	0.684	1.101	0.693	1.750
At least 4 signs	20.78	<0.001	4.75	2.43	9.28
Constant	15.69	0.000	0.287		

the Asante Akim North District in Southern Ghana [13] and in Bangladesh where unhygienic cord care practices were prevalent [14].

The current study was unable to immediately ascertain the adverse effects of these substances and it will be useful to conduct a prospective cohort study on this. One can only speculate that once these substances are coming from unsterile sources the likelihood of contamination will be high and may thus be harmful to newborns. The application of substances on cord stump is a common practice which should

be carefully examined and discouraged if found harmful and substituted with acceptable ones [11].

A significant proportion of babies were bathed within 6 hours of delivery making it impossible to maintain optimal thermal care (defined as baby wrapped within 10 minutes of birth plus first bath after six or more hours plus using warm water to bath the baby). Wrapping the newborn within 10 minutes of birth was practiced by majority of mothers but that alone is insufficient to give babies good thermal care because of early bathing. Keeping optimal neonatal thermal care was

not being achieved because bathing the baby soon after birth was a universal practice. In this study, 93.6% of the newborns were given a bath in less than six hours of delivery. Our findings therefore showed that only 5.2% of babies actually had optimal thermal care.

Bathing the newborn in less than six hours after delivery appears to be a common practice within many cultures. A study in Nepal reported that newborn babies are considered dirty since they came out of their mother's womb, so almost all newborn babies are bathed within the first hour of birth [15]. Another study conducted in low socioeconomic settlements of Karachi, Pakistan, revealed that newborns were bathed immediately after delivery as the vernix was considered "dirty looking" and it was felt it should be removed [16].

Apart from exposing newborns to hypothermia, early bathing removes maternal bacteria and the vernix caseosa (a potent inhibitor of *Escherichia coli*) [17] and eliminates the crawling reflex [18]. Vernix does more than act as a protective barrier from liquids while in the uterus. It acts as an antioxidant, skin cleanser, moisturizer, temperature regulator, and a natural, safe antimicrobial for the new baby postdelivery. These are some of the reasons why WHO recommended delay bathing up to 6 hours [19].

Good neonatal breastfeeding was practiced by barely half of the respondents. Timely initiation of breastfeeding (TIBF) rate was less than 80% but higher than what was obtained from the Ghana Demographic and Health Survey (GDHS), where early initiation of breastfeeding was below 50 percent for children residing in the Northern Region where this study was conducted [7].

The finding is similar to what was reported from the Asante Akim North District of Ghana where early initiation of breastfeeding within 1 hour after birth was practiced by 68% of the respondents [13]. It had been reported that in Pakistan, most women breastfed their babies, but initiation within 1 hour of birth and colostrum feeding were not common [20].

Early initiation of breastfeeding is encouraged for a number of reasons. Mothers benefit from early suckling because it stimulates breast milk production and facilitates the release of oxytocin, which helps the contraction of the uterus and reduces postpartum blood loss.

It is an established fact that the suckling reflex of a newborn is at its height 20 to 30 minutes after birth. If the infant is not fed at this time, the reflex diminishes rapidly to reappear adequately 40 hours later. Breastfeeding soon after delivery also has a laxative effect on the meconium. The early evacuation of meconium tends to decrease the reabsorption of bilirubin (the yellow pigment responsible for jaundice). Bilirubin is liberated by the breakdown of cast-off red blood cells present in the intestines. Decreased reabsorption of bilirubin reduces the appearance of jaundice.

The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. Early initiation of breastfeeding also fosters bonding between mother and child.

Poor neonatal feeding was mainly due to prelacteal feeding (giving feeds other than breast milk as the first

feed) and lack of exclusive breastfeeding. Of the 320 children under 6 months, exclusive breastfeeding in the past 24 hours prior to the study was 88.1% compared to 85.0% exclusive breastfeeding in the past one month. Respondents cited various reasons for not practicing exclusive breastfeeding. These included the perception that the child's throat may be dry due to harmattan season and inadequate supply of breast milk.

To avoid infection during delivery, cleanliness is very important. In this study, thirty percent of the attendants had washed their hands with soap before delivery, while 43.1% birth attendants used either gloves or plastic rubber bag to cover their hands before attending to the mother. This situation is less satisfactory. This coverage was very low and far from satisfaction because it opens opportunity for sepsis which is a result of infection during the conduct of delivery. Infection may account for up to 40.0% of neonatal mortality [21]. Key actions that protect child survival at birth include maintaining a clean delivery place, cleanliness of the hands of the birth attendants, clean tying, cutting of the umbilical cord and wrapping of the baby.

Some earlier studies conducted in Southern Ghana concluded that delivery surfaces, hand-washing, and cord cutting and tying appear appropriate for the majority of women [22, 23]. When we constructed composite indices for these practices in our study, it became clear that over 90% of deliveries are not conducted under optimal conditions at home. For example, optimal clean delivery behaviour (defined here as clean hands plus clean perineum and clean delivery surface) was only 3%. Also cord cutting with a new razor blade was commonly practiced (90.8%) but then when one takes a closer and more holistic approach to safe cord care (that is using composite indicators), only 0.2% really practiced that. This means assessing the situation using single practice indicators could be misleading.

Hygienic practices may be suboptimal for over 60 million births that occur world-wide outside facilities and even for facility births [24]. This evidence gives emphasis and credence to the WHO recommendation of the five principles of cleanliness throughout labour, delivery, and after birth until the separation of the cord stump. These five principles include clean perineum, clean hands, clean delivery surface, clean instrument used in cutting umbilical cord, and treatment of the cord.

Evidence from this study strongly suggests the expected essential newborn care practices are not available to a substantial number of the newborns. Poor newborn care practices together with poor maternal care and staff shortages in rural health facilities are major contributing factors of newborn mortality in developing countries [5]. For example, in Bangladesh, it has been reported that high proportion of deaths during the early neonatal period is caused by birth asphyxia attributable to lack of skilled birth attendance and newborn care for the large majority of births that occur in the home in rural areas [25]. Efforts should therefore be made by the Ghana Health Service (GHS) to expand essential newborn care practices beyond institutional level into the communities.

*4.3. Predictors of Good Newborn Care Practices.* Overall, the prevalence of essential newborn practices with regard to safe cord care and optimal thermal care was exceptionally low. Therefore, no statistically significant association between safe cord care, optimal thermal care, and most of independent variables (including, educational level, ANC attendance, maternal age, and knowledge of newborn danger signs) that were measured in this study. However, timing of ANC visits and knowledge of newborn danger signs were strong predictors of good neonatal feeding.

In logistic regression analysis, the main predictors of good neonatal feeding were maternal age, timing of the first ANC, and maternal knowledge of newborn danger signs. Our data strongly suggest that a woman's knowledge of danger signs was associated with increased odds of adopting good neonatal feeding. A similar study carried out in India showed that maternal knowledge of danger signs was positively associated with the odds of breastfeeding the newborn within 24 hours of birth, indicating that mothers who are more health conscious may be more aware of the benefits of early breastfeeding [5]. Training of community members especially the traditional birth attendants who are closer and more acceptable to women in dangers of newborn and essential newborn care practices will help solve the problem.

*4.4. Mothers' Knowledge of Newborn Care Danger Signs.* Overall, the mothers' knowledge of newborn care issues was not satisfactory in the sample population. In our study sample, majority of the mothers knew only one to three newborn danger signs out of the seven. Knowledge on critical newborn danger signs other than high body temperature, diarrhoea, and excessive crying was inadequate and similar findings have earlier been reported in the Asante Akim North District of Ghana [13].

Several studies have revealed that mothers from developing countries including Sri Lanka, Kenya, and Nepal had unsatisfactory level of knowledge in the recognition of newborn danger signs [5, 26–28]. Available evidence from the literature shows that the maternal knowledge is an important intermediate factor that may lead to good practices.

Though maternal knowledge of newborn danger signs was positively associated with the odds of good neonatal feeding, only a small proportion was knowledgeable in newborn danger signs. This means the majority of the sample women did not have adequate knowledge of good newborn care practices, so their newborn practices were likely to be adversely affected. The low knowledge levels of mothers may be due to inadequate messages received on newborn care practices at the ANC. This calls for strengthening of focused health education on newborn care practices especially during prenatal care to mitigate these problems. By integrating health education on newborn care practices into routine antenatal care services, it may increase a woman's knowledge and the ability to practice safe newborn care behaviours.

We also found that early initiation of ANC was positively associated with good neonate feeding practices. Most of the women who delivered at home attended ANC at least once.

Studies conducted in India have established similar relationship between maternal health service use and newborn care practices [5, 29]. There was, however, no association between good neonate feeding practices and the birth preparedness.

## 5. Conclusion and Recommendation

The level of coverage of essential newborn care practices in the district was generally low, suggestive of the fact that most essential neonatal interventions are not reaching newborns. Coverage of skilled attendants at delivery was very low. Birth preparedness practices were also poor and high-risk newborn care practices are common place; all of which point to the need for an urgent pragmatic intervention. The GHS and its stakeholders should not only concentrate efforts of reducing neonatal deaths at the institutional level but also intensify community-based newborn care strategies and create strong linkages between health facilities and the home to effectively handle risk factors which often lead to deaths.

## 6. Policy Implications and Recommendations

Overall, the findings show that good neonatal feeding practices were commonly adopted among women aged 25–34 years, women who initiated ANC early, and those who could mention at least four danger signs of the newborn. This emphasizes the need for health education on newborn dangers especially directed at expectant women aged at least 35 years.

The critical role of maternal knowledge in promoting essential newborn care practices was amply demonstrated in this study. Yet, only a small proportion of mothers were knowledgeable in newborn danger signs even among women who attended ANC. The low knowledge levels of mothers may be due to inadequate messages received on newborn care practices at the ANC. It is therefore recommended that focused health education on newborn care practices should be integrated into routine antenatal care services to help increase women's knowledge and ability to practice safe newborn care behaviours. It may also be necessary to conduct routine monitoring in the communities and research by relevant agencies including the GHS to understand why suboptimal newborn care practices are still prevalent despite high patronage for prenatal services.

## 7. Limitation of the Study

There are some limitations to the findings of this study. Only those deliveries that took place within one year of the study were included in order to avoid recall bias over a longer period of time. However, some amount of recall bias cannot be completely ruled out and this may affect the validity of information provided.

Our design was a cross-sectional study and as with all such studies, the strength of causality is weak. The cross-sectional nature of the data limits our ability to draw any causal conclusions on the relationships found in the current study. Despite these limitations, our results have shed more



light on critical areas of newborn care practices that need urgent pragmatic intervention.

### Conflict of Interests

The study was conducted purely on academic grounds and there is no conflict of interests.

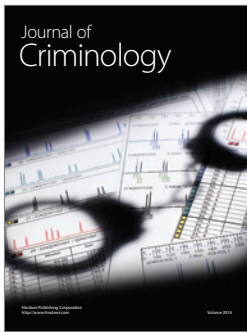
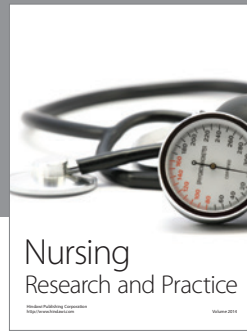
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