

Determinants of Immediate Essential Newborn Care Practice in Eastern Rural Nepal

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Abstract: Neonatal mortality remains high in Nepal. Improvement in immediate essential newborn care practices such as "use of clean instrument to cut the umbilical cord", "drying and wrapping the baby before placenta was delivered", "initiation of breastfeeding within an hour of delivery" and "first bathing of neonate after 24 hours of delivery" can reduce neonatal deaths. However, this can only be accomplished if factors associated with reduced neonatal mortality can be identified. A regional study was carried out with 252 randomly selected women having child aged 11 months or younger; of which about 70 percent, 18 percent and 20 percent had received delivery assistance with skilled birth attendant, trained health professional and untrained friend/relatives respectively. Skilled Birth Attendant appeared as the determinant of the use of clean instrument to cut the umbilical cord (OR=164.33), first bathing of neonate after 24 hours of delivery (OR= 5.14) and drying and wrapping the baby before placenta was delivered (OR= 50.75) whereas Trained Health Professionals turned out to be the determinant of the use of clean instrument to cut the umbilical cord (OR=3.81) and first bathing of neonate after 24 hours of delivery (OR=3.14) only (Reference: Untrained relatives/friends). Maternal age (OR= <20:10.59 and 20-30: 6.39; Ref: >30 years) and education (OR=Primary-21.81; Secondary-20.11; Ref-Higher) appeared the determinant of initiation of breastfeeding within an hour of delivery. The time gap between delivery and the mother receiving the baby was also significantly positively associated with initiation of breastfeeding within an hour of delivery. This result indicates the need to increase the coverage of health facilities which can provide SBA, empower women to involve a SBA in delivery and provide newborn care education to women and family members. In order to better understand how to decrease neonatal mortality, further study should focus on understanding why there were better newborn care practices in births assisted by a SBA than THPs.

Keywords: Breastfeeding, Delivery Attendant, Health Facility, Hypothermia, Logistic Regression, SBA.

INTRODUCTION

Globally, an estimated 4 million babies die in their first 4 weeks of life, of which 3 million die within their first week of life [1]. Furthermore, neonatal deaths account for about 38 percent of the annual 10.6 million childhood deaths recorded worldwide. Out of this, 98 percent occur in developing countries [2]. In Nepal, the neonatal mortality rate is 33 per 1,000 live births and accounts for two-thirds of infant deaths (48/1000 live births) [3]. High mortality rates documented in Nepal have prompted strategies to address neonatal mortality in the 'National Neonatal Health Strategy (NNHS) 2004' and 'Maternal and Neonatal Health Care Package (MNH) 2006'. The goal of the NNHS is to improve the health and survival of newborn babies through strategies 'focusing on enhancing adoption of healthy newborn care practices' and 'reducing prevailing harmful practices and strengthening neonatal health' [4]. The MNH Package outlines activities implemented from the family level to the district level of the health care delivery system in order to ensure that every pregnancy results in the best possible outcome for the mother as well as the newborn [5]. However, household newborn care practices are poor and some

are even harmful thereby [6] resulting in higher neonatal mortality.

There are significant disparities in neonatal mortality rate (NMR) between urban and rural setting in Nepal. In 2006, the NMR was 40 per 1,000 live births in rural areas whereas in urban areas it was 25 per 1,000 [3]. Immediate post-delivery care practices contribute to the risk of newborn morbidity and mortality. World Health Organization recommends a set of essential newborn care practices which include hygienic practices when handling the umbilical cord (clean hands and delivery surface, nothing unclean to be introduced into the vagina, clean cutting and tying instruments and applying nothing to the umbilical cord), thermal care (immediate drying and wrapping of the baby after delivery, skin-to-skin contact with the mother and not washing the baby in the first 24 hours after delivery in order to reduce the risk of hypothermia), extra care for low birth-weight/preterm neonates (additional warmth, cleanliness, nutrition and early recognition of diseases) and early and exclusive breastfeeding to reduce the risk of neonatal deaths in both community and facility based deliveries [7]. Traditional household newborn care practices may conflict with these essential newborn care practices. For instance, the Nepal Demographic and Health Survey 2011 found that 41% of babies had variety of substances (usually oil, an ointment, turmeric or ash) placed on their umbilical stump and 19% of babies had on unknown ointment/powder placed on

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their umbilical stump between the period 2006 and 2010 [8].

The adherence to recommended care practices during delivery and the post partum period, both in health facilities and in the household, has a significant impact on newborn health [9]. Therefore, studies of newborn care practices are important in better understanding ways to reduce neonatal morbidity and mortality. By identifying factors which are associated with either proper or improper newborn care practices, future public health interventions could target these practices in order to improve healthy newborn care practices.

METHODS AND MATERIALS

This was a regional study conducted in the catchment area of Shanischare Primary Health Care Center (PHCC), the largest government community health institution of Jhapa district in Eastern Nepal. Shanischare PHCC provides health services directly to 20,432 people living in Shanischare village development committee (VDC) and indirectly to 50,907 people living in other three VDCs (Arjundhara, Khudunabari and Budhabare) through three sub-health posts [9-10], each located in the respective VDCs. VDC is the second lowest administrative unit of the state delivering administrative and developmental services to the people at the grassroots and it is also the base for providing health services to the people at community level through sub health post. Shanischare PHCC includes eight health facilities, including four birthing centers, of which four are government and four are private facilities. It is also served by over 30 pharmacies and private clinics. Shanischare PHCC is located within 30 kilometers of the Mechi Zonal Government Hospital and 50 kilometers of the hospital of the Association of Medical Doctors of Asia (AMDA).

Each women interviewed in this survey constitutes the sampling unit of the study. Previously applied "maternal recall method" was employed to receive the information on newborn care practices [3, 11, 12, 13, 14]. Only women who delivered a live baby within past 12 months were included in the study in order to reduce possible recall bias. The sampling frame was defined based on the immunization records of babies available in 3 sub health posts and the Shanischare PHCC. Immunization records utilized for this study was updated within a week after the initial meeting of Female Community Health Volunteers (FCHVs) and

PHCC/sub health posts. FCHVs provided information related to births within their community in this meeting and the list of babies/mothers was updated up until the latest monthly meeting. In addition to immunization information, the immunization record also includes the date of birth of the baby and name & address of the parents. The immunization records were scrutinized by the date of birth of baby (born between January 1, 2009 and December 30, 2009). In this period, the coverage of BCG immunization in Jhapa district was 100 percent and the percentage of live birth was 98.5 [15]. Altogether 835 children and their mothers were recorded in immunization records as giving birth within past 12 months from the commencement date of the study. The first mother was selected randomly from the first 3 mothers in the list and every third mother thereafter was selected for interview. Using this method, of selection, the sample included 252 women.

Two female interviewers having bachelor's level education were trained about the questionnaire for two days. The questionnaire was prepared in simple Nepali (native) language. The pre testing of questionnaire was done at the similar setting of out of study area, i.e. area of Dhairan sub-health post. Final questionnaire was prepared incorporating the feedback of the pre-testing. Female interviewers had approached the respondents for face to face interview at household survey. The survey was implemented from 3 January to 14 February 2010. A total 30 women from the sample got excluded during study; of which eight got excluded because of the death of their last child, 15 women could not be found during study and 7 women did not want to participate in the study. In place of these women, the alternate women corresponding to the next position in the list were interviewed.

Study Approval

This study was approved by the evaluation committee of Central Department of Population Studies, Tribhuvan University, Nepal. Working approval was obtained from Shanischare PHCC and concerned sub health posts. Verbal consent was obtained from each respondent after explaining the purpose of the study, procedure for maintaining confidentiality, the collective use of data, the academic use of the findings and the right of the respondent not to participate in the study. Moreover, they were assured of their ability to withdraw voluntarily from the study at any time and this would not affect their medical care.

Study Variables

Outcome Variables

Indicators of immediate essential newborn care such as use of clean instruments (clean instruments includes new or boiled blade, instruments from a child health delivery kit, sterilized scissors) to cut the umbilical cord, practice of drying or wrapping baby before the placenta was delivered, initiation of breastfeeding within an hour of delivery and first bathing of neonate after 24 hours of delivery were used in the analysis as binary variables.

Explanatory Variables

The role of socio-economic, demographic and knowledge factors were assessed. The socio-economic factors included in the study were ethnicity (Khas, Dalit, Janajati), family type (Nuclear, Joint), main occupation of the family (Farming, Wage Labor, Service/Business and Foreign Labor), access to health services (distance to the nearest health facility, <30 minutes, 30 to 60 minutes, >60 minutes), mother's education (Illiterate, Primary: Up to 5 years of schooling, Secondary: 6 to 10 years of schooling and Higher Secondary: more than 10 years of schooling) and mother's occupation (Housework and Out home). Demographic factors assessed were mother's age (≤ 19 years, 20 to 29 years and ≥ 30 years), sex of baby (Male, Female), parity of the most recent birth (Primi Para and Multi Para) and history of a death of a child (Yes, No). Previous antenatal care (ANC) visit, presence of a delivery attendant, place of delivery and baby receiving time were assessed as knowledge related factors. ANC visits were categorized into 3 groups: No ANC, 1 to 3 times and ≥ 4 times. Delivery attendants were categorized as skilled birth attendant (SBA), trained

health professional and untrained attendant. In Nepal, a SBA is defined as a doctor, nurse and auxiliary nurse midwife (ANM) while trained health professional includes health assistant (HA), auxiliary health workers (AHW) and maternal & child health workers (MCHW). Any other attendants not qualifying as the above professionals were categorized as untrained attendants. The academic program and training of SBA and trained health professional is given in Box I. Place of delivery was categorized as one of the following: hospitals, primary health care center, sub health post & private clinics and home delivery. Baby receiving time was not categorized and used as explanatory variable of time of initiating breastfeeding. Baby receiving time is defined as the period of time from the birth of the baby to the moment mother receives the baby, taken as recalled by mothers/ correspondents during the interview.

Statistical Analysis

Data were entered in Epi-data 3.1 and exported to the Statistical Package for Social Sciences (SPSS) version 16 for the analyses. Descriptive statistics were used to determine the prevalence of explanatory variables and newborn care practices. Proportions were compared by four outcome measures (use of clean instruments to cut the umbilical cord, practice of drying or wrapping baby before the placenta was delivered, initiation of breastfeeding within an hour of delivery and first bathing to neonate after 24 hours of delivery) using Pearson's chi-square test. Variables which were found to be significantly associated in Pearson's chi-square were then entered in multi-variate binary logistic model. All tests were two sided and a $P < 0.05$ was considered statistically significant.

Box I: Academic program and Training of SBA and Trained Health Professional in Nepal.

SBA

Doctor: Six and half year's academic program of general medicine including training of 27 core competencies of SBA after the completion of 12th grade.

Nurse: Three years academic program of nursing including 27 core competencies of SBA training after 10th grade.

ANM: Eighteen months of vocational midwifery training along with the practice in clinical setting after the completion of 10th grade. ANM have also got 27 core competencies training of SBA

The core competencies of SBA are mentioned in Policy on Skilled Birth Attendant [16, 17].

Trained Health Professional

Health Assistant: Three years academic program of general medicine including maternal care services after the completion of 10th grade

Auxiliary Health Worker: Two years vocational training of community medicine after the completion of 10th grade

Maternal & Child Health Worker: Six months basic training in clinical setting including normal delivery care services after the completion of 8th grade

Trained health professionals are the ones who particularly work at community level service centers. As the prevalence of home delivery practice is higher in rural areas and the trained health professionals actually work in the community level but their academic program does not, normally, include delivery care services, they are provided training on delivery by the government and non-government agencies.

RESULTS

Univariate Analysis

Table 1 summarizes the background characteristics of the mothers interviewed for this study. The mean maternal age was 24.6 years (SD: 5.4, range: 15 to 40 years). Mean age at marriage was 18.9 (SD: 3.4, range: 12 to 30 years). Eighty six percent of the mothers interviewed were literate and 79% were involved only in the housework chores. The median duration of schooling was 8 years and 61% of the literate mothers completed 10 years of education. Fifty eight percent of families/mothers had to travel less than the average distance of 37.4 minutes to the nearest health facility. Eight out of ten (79.4%) mothers had more than 4 antenatal care (ANC) visits (the currently recommended number of ANC visit) and 68% had received ANC services from a SBA. Sixty-eight percent of deliveries were in a health facility and 31% occurred at home. A SBA assisted 70% of deliveries while 20% of deliveries were assisted by untrained relatives. Median time until mothers received the baby after birth

was 30 (IQR: 55, Range: 2 to 1000) minutes after delivery.

Women reported that clean instruments were used to cut the umbilical cord, no substance was applied to the cord stump and clean material was used to tie the cord in 82.1%, 92% and 77.8% of the time, respectively. Nearly 53% of women reported that the newborn was dried and wrapped before the placenta was delivered. The median time to bathing the newborn for the first time was 26.5 (IQR: 33, range: <1 to 288 hours) hours, and 62% of newborns were bathed for the first time greater than 24 hours after delivery. The median time to initiate breastfeeding was 1 (IQR: 3, range: <1 to 99) hour. Only 39% of women initiated breastfeeding within an hour of delivery, approximately 56% initiated breastfeeding within 1 to 24 hours of delivery and 0.8% initiated after 99 hours of delivery. Around 86% of mothers fed colostrums to their newborn. Around half of mothers (50.4%) reported that their babies were fed either breast milk and/or pre-lacteal feedings in the first three days after delivery, most commonly honey and cow milk. Ninety two

Table 1: Descriptive Statistic of Background Characteristics (N=252)

Characteristics	N (%)	Characteristics	N (%)	Characteristics	N (%)
Ethnicity		Health Accessibility		Age of Mother	
Khas	134(53.2)	<30 minute	143(56.7)	<20	49(19.4)
Dalit	42(16.7)	30-60	96(38.1)	20-29	157(62.3)
Janajati	76(30.2)	60+ minute	13(5.2)	30+	46(18.3)
Types of Family		Previous Child Death		Sex of Baby	
Nuclear	108(42.9)	Yes	32(12.7)	Male	116(46.0)
Joint	144(57.1)	No	220(87.3)	Female	136(54.0)
Parity		Mother's Occupation		Place of Delivery	
Primi Para	111(44.1)	Housework	199(79.0)	Health facility	173 (68.7)
Multi Para	141(55.9)	Out home	53(21.0)	Home	79(31.3)
Education		Family Occupation		Delivery Assistance	
Illiterate	36(14.3)	Farming	74(29.4)	SBA	176(69.8)
Primary	47(18.7)	Wage Labor	47(18.7)	Trained	26(17.5)
Secondary	154(61.1)	Service/Business	95 (37.7)	Untrained	50(19.8)
Higher	15(6.0)	Foreign Labor	36(14.3)	Time Gap*	
Baby Receiving Time (in minute)		ANC Visit		0 month	24 (9.5)
<30	132 (52.4)	No ANC	8 (3.2)	1-3 month	70 (27.8)
30-60	50 (19.8)	1 to 3	44 (17.5)	4-6 month	65 (25.8)
60+	70 (27.8)	4+	200 (79.4)	7-9 month	60 (23.8)
				10+ month	33 (13.1)

Index: * Duration between birth of baby and interview with mothers.

Table 2: Descriptive Statistics of Newborn Care Practice (N=252)

Essential Newborn Care Information	Option	N (%)
Instrument used to cut the cord	Clean**	207 (82.1)
Baby dried and wrapped	Yes	133 (52.8)
Time of initiation of breastfeeding	< 1 hrs	99 (39.3)
Time of first bathing	>24 hrs	156 (61.9)
Hand washing by soap & water by DA*	Yes	209 (82.9)
Material used to tie the cord	Clean †	196 (77.8)
What was put on the cord?	Nothing/RM ‡	231 (91.7)
Practice of skin to skin touch	Yes	50 (19.8)
Birth weight practice	Yes	163 (64.7)
Colostrums feeding	Yes	217 (86.1)
Pre-lacteal feeding	No	127 (50.4)
BCG immunization	Yes	232 (92.1)

Note: *Delivery Attendant; **New, boiled or child health delivery kit (CHDK) blade, or sterilized scissors; † Boiled or CHDK thread or sterilized cord clamp; ‡ Recommended Medicine i.e. Betadine.

percent of newborns received BCG within a month of delivery (Table 2).

Bivariate Analysis

The type of instrument used to cut the umbilical cord was significantly associated with ethnicity, education, access to television, parity, number of ANC visits, place of delivery. Ethnicity, education, type of family, access to health facility, access to television, access to land, parity, previous child loss experience, number of ANC visits and place of delivery were significantly associated with the practice of drying and wrapping baby before the expulsion of placenta. Maternal education, age and baby receiving time after birth were significantly associated with initiation of breastfeeding. Education, ethnicity, type of family, access to health facility, access to television, family occupation, access to land, number of ANC visits and place of delivery were significantly associated with timing of first bath of newborn (Table not shown).

Except initiation of breastfeeding, delivery attendance was significantly associated with instrument used to cut the umbilical cord, practice of drying and wrapping baby before the expulsion of placenta and timing of first bath of newborn (Table 4). About 99 percent (174 out of 176) SBAs had used clean instrument to cut the umbilical cord and around 73 percent (129 out of 176) SBAs dried and wrapped baby before the placenta was delivered. The general practice in rural areas is that delivery attendant suggests for bathing the newborn after 24 hours of birth to the mother/family. Around 73 percent (128 out of 176) SBA assisted births had first bath after 24 hours of

delivery whereas around 58 percent (15 out of 26) assisted by trained professional and 26 percent (13 out of 50) assisted by untrained friends/relatives had first bath after the same period (Table 4). Obstetric care from the trained provider during delivery is recognized as critical for the reduction of maternal and neonatal mortality and morbidity. However, 34 percent births of Janajati ethnicity, 41 percent of uneducated mothers, 39 percent of mother residing far distances (60+ minutes) from the health facility, 36 percent of births of mothers having no access to television, about one third of births of the mother's aged more than 30 years (30.4%) & the mothers who experienced the previous child death (31.2%), and about two third of births delivered at home (63.3%) were found to have delivered without assistance of health personnel. SBAs are more likely to attend births to Khas ethnicity (79.9%), first order births (85.6%), young mothers aged less than 20 years (85.7%), joint family (77.1%), less distance (<30 minutes) from the health service center (72%) and inexperienced mothers of previous child death. There was strong positive relationship between mother's education and delivery by an SBA. Births to higher educated women were nearly 2 times (80%) as likely as births to uneducated mothers (44.4 %) to receive assistance from SBA (Table 3).

Multivariate Analysis

Factors Associated with the Use of Clean Instrument (UCI)

Predictors explained 63.5% (Nagelkerke $R^2 = 0.635$) of the variance in the use of a clean instrument to cut the umbilical cord. Only delivery assistance is significant contributors in the model. The odds of

Table 3: Association of Delivery Attendant with Socio-economic, Demographic and Immediate Essential Newborn Care Practice

	SBA- N (%)	Trained- N (%)	Untrained- N (%)
Ethnicity*			
Khas	107 (79.9)	10 (7.5)	17 (12.7)
Dalit	30 (71.4)	5 (11.9)	7 (16.7)
Janajati	39 (51.3)	11 (14.5)	26 (34.2)
Education**			
Illiterates	16 (44.4)	5 (13.9)	15 (41.7)
Primary	31 (66.0)	5 (10.6)	11 (23.4)
Secondary	117 (76.0)	14 (9.1)	23 (14.9)
Higher	12 (80.0)	2 (13.3)	1 (6.7)
Types of Family***			
Nuclear	65 (60.2)	15 (13.9)	28 (25.9)
Joint	111 (77.1)	11 (7.6)	22 (15.3)
Health Accessibility***			
<30 minute	103 (72.0)	19 (13.3)	21 (14.7)
30-60	67 (69.8)	5 (5.2)	24 (24.0)
60+ minute	6 (46.2)	2 (15.4)	5 (38.5)
Access to Television*			
Yes	137 (77.0)	18 (10.1)	23 (12.9)
No	39 (52.7)	8 (10.8)	27 (36.5)
Age of Mother***			
<20	42 (85.7)	2 (4.1)	5 (10.2)
20-29	108 (68.8)	18 (11.5)	31 (19.7)
30+	26 (56.5)	6 (13.0)	14 (30.4)
Previous Child Death***			
Yes	16 (50.0)	6 (18.8)	10 (31.2)
No	160 (72.7)	20 (9.1)	40 (18.2)
Place of delivery*			
Health facility	171 (98.8)	2 (1.2)	0 (0.0)
At home	5 (6.3)	24 (30.4)	50 (63.3)
ANC visits*			
No ANC	3 (37.5)	1 (12.5)	4 (50.0)
1 to 3	19 (43.2)	5 (11.4)	20 (45.5)
4+	154 (77.0)	20 (10.0)	26 (13.0)
Parity*			
Primi para	95 (85.6)	7 (6.3)	9 (8.4)
Multi para	81 (57.4)	19 (13.5)	41 (29.1)

(Table 3). Continued.

	SBA- N (%)	Trained- N (%)	Untrained- N (%)
Family Occupation***			
Farming	55 (74.3)	6 (8.1)	13 (17.6)
Wage Labor	24 (51.1)	6 (12.8)	17 (36.7)
Business/Service	72 (75.8)	11 (11.6)	12 (12.6)
Foreign Labor	25 (69.4)	3 (8.3)	8 (22.2)
Use of Cord Cutting Instrument*			
Clean	174 (84.1)	17 (8.2)	16 (7.7)
Not clean	2 (4.4)	9 (20.0)	34 (75.6)
Drying and Wrapping Baby*			
Yes	129 (97.0)	2 (1.5)	2 (1.5)
No	47 (39.5)	24 (20.2)	48 (40.3)
Initiation of Breastfeeding			
<1 hour	106 (69.3)	17 (11.1)	30 (19.6)
>1 hour	70 (70.7)	9 (9.1)	20 (20.2)
First Bathing Time of Newborn*			
>24 hours	128 (82.1)	15 (9.6)	13 (8.3)
<24 hours	48 (50.0)	11 (11.5)	37 (38.5)

Index: *P<0.001, **P<0.01, ***P<0.05.

utilization of clean instrument differed with respect to the type of delivery attendant. Interestingly, SBA was 194 times (95%CI: 38.88 -821.35, P<0.001) and trained health personal was 4 times (95%CI: 1.29-1.21, P<0.05) more likely to use a clean instrument to cut the umbilical cord while conducting delivery in comparison to untrained relatives/neighbors (Table 4).

Factors Associated with Drying and Wrapping Baby Before the Placenta was Delivered (DWPD)

Predictors explained 55.9% of variance (Nagelkerke $R^2 = 0.559$) related to keeping the baby dried and wrapped before placenta delivery. Only type of delivery attendant was a significant contributor in the model. Births conducted by a SBA were significantly likely to perform drying and wrapping of the baby before the placenta was delivered (OR = 50.75; 95%CI: 11.09-232.19; P< 0.001) when compared to births assisted by untrained attendants. Births assisted by trained professionals were also more likely to perform drying and wrapping of the baby before the placenta was delivered but this was not statistically significant (OR = 1.46; 95%CI: 0.18-11.59, P >0.05) when compared to the birth assisted by untrained attendants (Table 4).

Factors Associated with the Initiation of Breastfeeding within an Hour of Delivery (IBD)

Predictors explained 67.2% of variance (Nagelkerke $R^2=0.672$) in the likelihood of initiation of breastfeeding within an hour of delivery. Maternal age, education and

time for the mother to receive the baby after delivery were significant contributors in the model. Mother's age less than 20 years and 20 to 30 years were significantly more likely to initiate breastfeeding within the recommend time (OR=10.59; 95%CI:1.25-89.83 and OR= 6.39; 95%CI: 1.40-29.09 respectively, P < 0.05) compared to those with age more than 30 years. As expected, a positive association was found between the time between delivery and the mother receiving the baby and time to initiation of breastfeeding. For each additional minute it took for the mother to receive the baby after delivery, the time between delivery and initiation of breastfeeding was increased by 54.6 (OR= 0.91*60=54.6 second; 95%CI: 51.6-60; P<0.001) seconds. Mothers who had completed ten years' of education were 21 times (95%CI: 1.60-289.63) and those who had completed twelve years' of education were 20 times (95%CI: 1.42-285.46) more likely to initiate breastfeeding within recommended timeframe compared to the illiterate mothers (P < 0.05) (Table 5).

Factors Associated with First Bath of Baby After 24 hour of Delivery (FBD)

Only the delivery attendant category had a significant effect on whether the baby was bathed for the first time after 24 hours of delivery. The likelihood of the first bath of the newborn occurring after 24 hours of birth was 5 times higher among deliveries conducted by a SBA (OR=5.14; 95%CI: 2.30-11.49; P <0.001) and 3 times higher in deliveries conducted by a trained

Table 4: Multivariate Analysis of Use of Clean Instrument (UCI) and Drying and Wrapping Baby before the Expulsion of Placenta (DWRP)

	UCI	DWRP		UCI	DWRP
Model χ^2	123.121*	136.703*	H & L χ^2 ‡	11.530	5.767
Nagelkerke R ²	0.635	0.559	P value	0.173	0.673
Predictors	OR (95% CI)	OR (95% CI)	Predictors	OR (95% CI) DWRP	
Constant (OR)	4.181	0.028			
Ethnicity			Previous child loss		
Khas	1.14 (0.34 - 3.79)	1.70 (0.67 - 4.29)	Yes	1.05 (0.33 - 3.32)	
Dalit	1.79 (0.44 - 7.22)	0.81 (0.29 - 2.23)	No	1	
Janajati	1	1			
Education			Ownership of land		
Illiterate	0.23 (0.01 - 4.38)	0.41 (0.05 - 3.18)	Yes	1.09 (0.37 - 3.20)	
Primary	0.41 (0.02 - 6.81)	0.28 (0.04 - 1.75)	No	1	
Secondary	0.63 (0.05 - 8.33)	0.69 (0.13 - 3.69)			
Higher	1	1	Types of family		
Parity			Nuclear	1.33 (0.59 - 2.98)	
Primi Para	1.02 (0.31-3.35)	2.29 (1.05 - 5.02)	Joint	1	
Multi Para	1	1			
Delivery assistant			Access to health (in minute)		
SBA	164.33 (38.88 - 821.35)*	50.75 (11.09-232.19)*	<30	3.34 (0.59 - 19.04)	
Trained	3.81 (1.29 - 11.21) ‡	1.46 (0.18-11.59)	30-60	1.84 (0.31-10.90)	
Untrained	1	1	60+	1	
Access to TV					
Yes	0.95 (0.33 - 2.76)	1.05 (0.45-2.42)			
No	1				
No. of ANC visit					
1 to 3	0.18 (0.02 - 1.69)	0.54 (0.05-5.48)			
4+	0.22 (0.02 - 2.16)	0.59 (0.06-5.61)			
No ANC	1	1			

Index: *P < 0.001, **P < 0.01, † P < 0.05, ‡ Hosmer and Lemeshow Test-Chi-square Goodness of Fit.

professional (OR=3.14; 95% CI: 1.03-9.53; P<0.05) compared to deliveries conducted by an untrained neighbor/relative. The predictors used in the final model explained 27.7% (Nagelkerke R²=0.277) of variance of the timing of first bath (Table 5).

DISCUSSION

Proper newborn care practices begin when the mother is preparing for her pregnancy. Quality of care of pregnant women during pregnancy, during labor and after delivery contributes to proper newborn care practices. This study has analyzed four essential newborn care practices during and after delivery (the

use of clean instruments during delivery, drying and wrapping the baby before the placenta is delivered, bathing the neonate for the first time after 24 hours of delivery and initiating breast feeding within an hour of birth) in a sample of selected mothers and examined the association of these practices with socio-economic, demographic and knowledge related factors. This is the first study to describe and analyze newborn care practices of Jhapa district.

Birth Place and Attendance During Delivery

Proper medical attention and hygienic conditions during delivery can reduce the risk of complications

Table 5: Multivariate Analysis of Initiation of Breastfeeding (IBD) and First Bathing of Baby after 24 hours of Birth (FBD)

	IBD	FBD		IBD	FBD
Model χ^2	89.519*	57.283*	H & L χ^2 †	4.020	9.943
Nagelkerke R ²	0.672	0.277	P value	0.855	0.269
Predictors	OR (95% CI)	OR (95% CI)	Predictors	OR (95% CI) FBD	
Constant	0.879	0.172			
Age of mothers			Delivery Assistant		
≤ 19	10.59 (1.25 - 89.83)**	NA	SBA	5.14 (2.30-11.49)*	
20-29	6.39 (1.40 - 29.09) **	NA	Trained	3.14 (1.03-9.53) **	
30+	1	NA	Untrained	1	
Education			No. of ANC visit		
Illiterate	6.03 (0.37 - 99.27)	0.90 (0.17- 4.85)	1 to 3	0.90 (0.15-5.60)	
Primary	21.81 (1.60 - 296.63)**	0.63 (0.13 -3.03)	4+	0.91 (0.15-5.41)	
Secondary	20.11(1.42 - 285.46) **	0.78 (0.19-3.19)	No ANC	1	
Higher	1	1	Access to land		
Access to TV			Yes		
Yes	NA	1.65 (0.84-3.23)	No		
No	NA	1	Family occupation		
Types of family			Farming		
Nuclear	NA	0.93 (0.48-1.79)	Wage Labor		
Joint	NA	1	Service/Business		
Access to health			Foreign Labor		
< 30	NA	3.25 (0.78-13.38)	Ethnicity		
30-60	NA	2.02 (0.487-8.58)	Khas		
60+	NA	1	Dalit		
BRTM	0.91(0.86 - 1.00)*	NA	Janajati		
				1	

*P < 0.001, **P < 0.05, NA-Not Applicable due to insignificant result in chi-square test, † Hosmer and Lemeshow Test-Chi-square Goodness of Fit, **BRTN**-Baby receiving time of mother after delivery, OR: Adjusted Odds Ratio.

and infections that have the potential to cause serious illness and even death of the mother, baby or both [3]. The National Safe Motherhood Program of Nepal emphasizes the provision of round-the-clock emergency obstetric services. Since 2005, this program has implemented a system of financial incentives to encourage mothers to deliver in a health facility. Starting in 2009, this program also expanded free delivery services at all public health facilities and at a number of private facilities across all 75 districts in Nepal in order to encourage expectant mothers to deliver in health facilities [11, 18]. The proportion of deliveries which occurred in health facilities described in this study (68.7%) is significantly higher than that of national level (28.1%) [8]. Greater availability of private health services at the local level, provision of free delivery services by the government and easy

transportation to zonal public hospitals and the AMDA hospital could all be contributing factors to explain the higher proportion of deliveries occurring in health facilities described in this study in Jhapa District. This may also contribute to a higher prevalence of SBA assisted deliveries in this population.

Birth attendants play a key role in providing immediate newborn care including cord cutting, cord tying, bathing, drying and wrapping, encouraging initiation of breastfeeding within a recommend time frame, and providing emergency obstetric services in case of complications which could occur in the mother, the neonate or both. However, the level of training of the birth attendant is mostly dependant on where the birth takes place. When delivery occurs at home, it is more likely to occur without assistance from a health professional, whereas when delivery occurs at a health

facility it is more likely to occur with the assistance of a health professional with at least minimal training in the provision of normal delivery services [19]. The international consensus is that skilled care at every birth is the key to making childbirth safer for women and their newborns [20]. The Government of Nepal endorsed the Policy on Skill Birth Attendant in 2006 which led to the implementation of the National In - Service Training Strategy for Skilled Birth Attendants in 2007. This strategy outlines approaches for achieving the formidable task of training around 5,000 SBAs required by 2012 in order to meet the Millennium Development Goal target of 60% of all births being attended by an SBA by 2015. Currently there are 15 functioning SBA training sites around the country which include the AMDA and Mechi zonal hospital which are located in Jhapa District. Each of these hospitals has a team of trainers and the capacity to provide didactic teaching with model practice and supervised clinical practice. Nurses and ANMs based in peripheral health facilities are a priority as they have received little support in the past while holding the responsibility of being front line service providers for rural women [21]. The fact that 69.8% of births in study area are attended by a SBA is encouraging, especially given that it is much higher than the Nepal national average of 18.7% [3]. The multivariate model indicated that the type of attendants who assisted during delivery is the most significant indicator of newborn care practice in the rural areas. A study conducted in a rural part of India reported that the presence of a skilled attendant at delivery was significantly associated with clean cord care and early breastfeeding, but not with proper thermal care [22].

On the other hand, 31% of women delivered their baby at home and one fifth (19.8%) of births were assisted by untrained friends/relatives in this study. Due to cultural customs, the decision of where the baby should be delivered may be influenced by the husband or mother-in-law over the wishes of the mother. The reasons for poor utilization of maternity services may be due to the socio-cultural factors. Therefore, interventions should address not only the medical factors which lead to increased maternal and neonatal morbidity and mortality, but also the social and cultural factors which may lead to poor utilization and acceptance of these practices. One such intervention might include education programs about the benefits of choosing delivery at a health facility which would target other family members (such as husbands and mother-in-laws) who may have significant influence over the

decision of where delivery takes place. Interventions should also focus to improve the status of women in society which include increasing female literacy and empowerment to help improve maternal health [23]. There are a number of reasons why education of women has a significant positive relationship with maternal health care utilization. Educated women are more likely to realize the benefits of using maternal health services; therefore, they are more likely to use the services. In addition, education may enhance female autonomy, hence increasing women's ability to make decisions regarding their own health. Education also increases the knowledge of modern health care, thus increasing the demand for modern health services [24, 25, 26]. A qualitative study carried out in Kathmandu in 2005 reported that pregnant women, husbands and service providers were accepting towards interventions to encouraging greater male involvement in maternal health services [27].

Use of Clean Instruments to Cut the Umbilical Cord (UCI)

The proper practice of cord care/cord cutting refers to hygienic practices such as using antiseptics and spirit/alcohol to sterilize equipment for cutting and tying the umbilical cord [28]. A sterile and sharp instrument, such as a new razor blade or scissors, is usually recommended for cutting the cord [29] to prevent neonatal infection. However, in Nepal, birth injury (19%) remained the primary cause of neonatal death in 2006. A qualitative study on cord care practice has shown that the type of instrument used for cord cutting depends on the person assisting during delivery [30]. Presence of SBA at child birth was the strong determinant of using clean instruments to cut the umbilical cord in this study. Likewise, the prevalence of using a clean instrument to cut the umbilical cord found in this study (82.1%) is higher than the prevalence described in a study conducted in an urban slum in Delhi in 2005 (78%) [31], rural women of Uttar Pradesh, India between the period 2001-2005 (73%) [22] and the Nepal national average in 2006 (60.7%) [3]. The cause of the higher proportion of using a clean instrument could be due to the high corresponding rate of a SBA being present at deliveries in study area. Another study conducted in western Nepal in 2006 showed that 90% of births had used a new/boiled blade [12]. The differences of the prevalence of safe cord cutting between western Nepal and the study area may be due to differences in the study setting. The study of western Nepal was carried out in the urban area while this study is carried out in rural area.

Drying and Wrapping Baby Before the Placenta was Delivered (DWRP)

Maintaining good thermal care at birth is crucial in order to prevent hypothermia. Drying and wrapping the baby immediately after birth and delaying bathing of the newborn baby for at least 24 hours after birth are best practices to prevent hypothermia. If adequate thermal protection is not maintained immediately after birth, the newborn will lose heat rapidly at a rate of heat loss as high as 4°C within the first minute [32]. Thus, practices such as wrapping and drying the baby immediately after birth without waiting for the placenta to be delivered, having skin-to-skin contact with the mother, and not leaving the baby unattended during the period between birth and the delivery of the placenta are recommended as part of the essential newborn care [7, 33]. The practice of keeping the newborn warm is uncommon in Nepal. The general practice is to look for clothes after the baby is born, and in most cases, families do not have warm clothes ready at the time of delivery. The newborn is kept naked or covered by a thin piece of cloth until the placenta is delivered or the umbilical cord is cut [34]. In this study, 52.8% newborns were dried and wrapped before the placenta was delivered which is higher than the Nepal national prevalence of this practice between 2001-2005 [3] but less than the rate of this practice in deliveries which occurred in a health facility (68.7%) in this study. This result suggests that the practice of drying and wrapping of baby before the placenta is delivered in peripheral health facilities are not well practiced. Therefore, the importance of newborn thermal care should be communicated to both health care providers of rural areas and pregnant women. In this study, only assistance from SBA predicted drying and wrapping of baby immediately after birth. Hence, skilled birth attendants might be expected to promote newborn thermal care. Similar result have found from a study conducted in Barabanki district of Uttar Pradesh, India between the period 2001-2005 [22].

First Bath to Newborn After 24 Hours of Delivery (FBD)

A newborn baby should not be bathed until 24 hours after birth. Bathing babies early can increase the risk of hypothermia, and in low birth weight babies, this risk is increased. Hypothermia is a major cause of mortality among newborns. A study conducted in a hospital in India shows that 9.6% of total neonatal deaths were due to hypothermia [35]. The NDHS 2006 showed that only 9% of babies from non-institutional births had their

first bath greater than 24 hours from their delivery [3]. Cultural factors are likely impacting the time of newborn bathing. In Nepal, bathing a baby soon after birth is widely prevalent because the baby's body is coated with vernix, which is considered dirty. Therefore, bathing a baby soon after delivery is a custom meant to purify the baby [36]. People also fear that if the baby's skin is not cleaned soon after delivery, the baby will get a skin infection. In rural Nepal, usually the TBAs assist deliveries and some of them believe that immediate newborn bathing is also required to protect the baby from cold. Usually, babies are bathed with lukewarm water, after cord cutting, within 30 minutes to one hour after birth [36]. In our study, descriptive statistics showed that 62% of newborns were first bathed more than 24 hours of delivery which is higher than the national level prevalence [3] and prevalence in three districts in Bangladesh (44%) [37]. A possible factor which may contribute to improved bathing practices of the newborn could be increased prevalence of SBAs at births in the study area.

Initiation of Breastfeeding (IBD)

Delayed initiation of breastfeeding leads to a delay in maternal development of oxytocin reflexes, which is critical for post-partum uterine contraction and production of breast milk [38]. Hence, initiation of breastfeeding within an hour of delivery is recommended [7]. However, late initiation of breastfeeding and use of pre-lacteal feeding were prevalent in this study. In this study, only 39% of mothers had started breastfeeding in the recommended timeframe which is similar to rates found nationally (35.4%) and in rural areas in Nepal (34.8%) [3]. Studies in Western Nepal describe higher (57.9%) rates but the study in Western Nepal differs from our study because that study evaluated an urban area with a large sample of women who delivered their babies at health institution only [12]. Education of the mother in regards to good newborn care practice (during pregnancy, at the time of birth and after birth) is critical [39] and empowers women through improving knowledge about maternal and newborn health. This study shows that as the educational status of the mother increases, the likelihood of early breastfeeding also increases, which is in-line with the findings of previous studies [3, 22, 28, 37]. Lower maternal age was also found to be associated with early initiation of breastfeeding which might be due to the fact that lower maternal age and higher education is correlated ($r = -0.178$, $P < 0.01$) and both of these variables are associated with early breastfeeding in this study. The

setting of the delivery influences the practice of initiating breastfeeding in rural areas of Nepal. When the baby is delivered at home, mothers receive the baby after washing herself which can delay the initiation of breastfeeding. In case of cesarean section, the time of receiving baby increases due to inability of mothers to carry the baby which further increases the time until initiation of breastfeeding. Initiation of breastfeeding within an hour of delivery at home is possible only if the delivery is normal, the health of the mother and the child is good, and family members and/or the mother is properly educated about good newborn practices. Early initiation of breastfeeding, to some extent, is associated the duration of time between delivery and when the baby is received by the mother. This study found that 72% mothers receive their baby within an hour of delivery and the time to initiation of breastfeeding is significantly associated with the time of receiving baby.

Limitations

The sampling frame of the study included only those mothers who had records of immunization within the three sub-health posts and the PHCC. Thus, there may be been mothers who were excluded in this study because they did not have immunization records. The survey was conducted only in four VDCs in Jhapa district in the eastern plains of Nepal and used a relatively small sample size. Hence the findings of this study may not be generalizable to the entire country or other geographical regions of Nepal such as the hill and mountain regions. Data in the study was obtained *via* interviewing mothers who had a baby in the last 12 months and excluded those whose most recent newborn had died. Since the data relied on maternal recall of newborn practices, there is a potential for recall bias on the part of the mothers who were interviewed. To minimize the recall bias, interviews were limited to mothers who had a baby in the last 12 months. Despite new mothers are more likely to report every detail regarding the applied newborn care practices, some recall bias cannot be ruled out in case of multi paraous mothers.

CONCLUSION

Despite the above mentioned limitations, this study reports important information about newborn care practices in rural settings in Nepal. This information could be used to inform public health policy regarding ongoing safe motherhood programs and child survival programs in Nepal. There is an urgent need to increase

the coverage of health facilities which provide SBAs and empower women to utilize the services of a SBA during delivery. It should sensitize the target women especially from the Janajati community, illiterates, nuclear family, aged 20 years and higher, higher parity, previous child loss experienced, unexposed in television, home delivered and no ANC visits on the benefit of the presence of skilled birth attendant and utilizing delivery at health facilities vis-à-vis the risks and vulnerabilities associated with home based deliveries on the health of mother and baby. There is also a need for providing community based newborn care education for women and family members which have the potential to improve newborn care practices. Further investigations could focus on understanding why newborn care practices were better in health facilities and understanding the reasons for why births attended by a trained health professional had poorer newborn care compared to births attended by a SBA in rural areas. This study also did not address socio-cultural factors which impact newborn and delivery care practices which could be a future topic of qualitative study.

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COMPETING INTERESTS

The author declares no competing interests.

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