

Knowledge related to umbilical cord care among mothers of neonates attending outpatient departments in Sherpur district, Bangladesh

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Abstract:

Background: Proper umbilical cord care prevents neonatal infections and reduces neonatal mortality. Despite global recommendations for evidence-based cord care practices, traditional beliefs, and inadequate maternal knowledge often lead to unsafe practices, particularly in low-resource settings like Bangladesh. This study aimed to assess the understanding of umbilical cord care among mothers of neonates in Sherpur District, Bangladesh, and identify factors associated with knowledge levels. **Methods:** A descriptive cross-sectional study was conducted from July to October 2020 at Sherpur Sadar Hospital. A total of 193 mothers of neonates were recruited using a non-randomized purposive sampling method. Data was collected through a pre-tested, semi-structured, interviewer-administered questionnaire. Knowledge levels were categorized as "Good" (>6) or "Poor" (≤6) based on responses to 10 structured questions. Statistical analyses, including chi-square tests and crude odds ratios (COR), were performed to identify socio-demographic factors associated with knowledge levels. **Results:** Of the 193 participants, 48.7% demonstrated "Good" knowledge, while 51.3% had "Poor" knowledge. Education level ($p = 0.01$), occupation ($p = 0.02$), family type ($p < 0.001$), and family size ($p = 0.04$) were significantly associated with knowledge levels. Mothers with higher education and those from joint families exhibited better knowledge. However, 28.5% of respondents were unaware of the typical umbilical cord-shedding timeframe, and 44% could not identify signs of infection. Unsafe practices, such as using medications (14.5%) or hot compression (7.2%) for drying the cord, were reported. **Conclusion:** The study reveals significant gaps in maternal knowledge regarding umbilical cord care in Sherpur District, driven by socio-demographic disparities and cultural practices. Targeted health education programs, emphasizing evidence-based cord care practices and leveraging local social structures, are urgently needed to improve neonatal health outcomes in similar resource-limited settings. Future research should evaluate the effectiveness of these interventions to inform policy and practice.

Keywords: Umbilical Cord Care, Neonatal Health, Maternal Knowledge, Rural Bangladesh, Evidence-Based Practices

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Highlights

What is Known on the Topic

- Proper umbilical cord care prevents neonatal infections and reduces neonatal mortality.
- In low-resource settings, traditional beliefs and practices often lead to suboptimal umbilical cord care.
- Education level and family structure influence the knowledge and practices of umbilical cord care among mothers.

What this Paper Adds

- Provides detailed insights into the socio-demographic factors influencing knowledge levels on umbilical cord care in Sherpur District, Bangladesh.
- Highlights the prevalence of unsafe practices, such as the use of hot compression and medications for drying the umbilical cord.
- Recommends targeted health education interventions to bridge knowledge gaps and improve neonatal health outcomes.

Key Findings

- Only 48.7% of mothers demonstrated good knowledge of proper umbilical cord care, indicating significant gaps in understanding.
- Higher educational attainment and living in joint families are associated with better knowledge of umbilical cord care.
- Education and culturally sensitive health initiatives are crucial for overcoming traditional beliefs and improving care practices.

1. Introduction

Proper umbilical cord care is essential for neonatal health, as it plays a critical role in preventing infections, sepsis, and other complications that can contribute to neonatal morbidity and mortality. Globally, neonatal mortality remains a major public health challenge, with approximately 2.3 million neonatal deaths reported in 2022 [1]. Infections, including neonatal sepsis, account for 36% of these deaths, underscoring the importance of early neonatal care practices [2]. While substantial progress has been made in reducing neonatal mortality worldwide, low- and middle-income countries (LMICs), including Bangladesh, still face significant challenges including low birth weight among newborns [3,4]. In Bangladesh, the neonatal mortality rate was reported at 20 per 1,000 live births in 2022, a rate disproportionately higher than in developed countries [5]. Low birth weight rate is also high (20.9%) among the neonates in Bangladesh as reported by a study conducted in Dhaka, Bangladesh [6]. Among the leading causes of neonatal deaths in LMICs, umbilical cord infections—often stemming from inadequate or unsafe cord care practices—are both preventable and treatable with proper interventions [7,8]. The WHO recommends evidence-based practices for umbilical cord care to reduce infection risks, including the use of sterile tools for cord cutting, proper tying, and promoting dry cord care without the application of harmful substances [9]. In settings where the risk of infection is high, the use of chlorhexidine for cord care has been shown to significantly reduce neonatal infections and mortality [10]. Despite these guidelines, studies conducted in LMICs reveal that traditional practices, cultural beliefs, and a lack of maternal knowledge often result in unsafe umbilical cord care. For instance, a study in Ethiopia found that 34.4% received care within 24 hours, varying by region [11]. Similarly, research in Nigeria revealed that while most mothers provided adequate umbilical cord care (mean score: 65.48%), suboptimal practices like applying toothpaste (12.9%), shea butter (27.9%), and herbs (27.4%) were still prevalent [12]. These findings highlight the persistent gaps in knowledge and practices regarding neonatal care in resource-limited settings. In Bangladesh, traditional beliefs and cultural practices surrounding childbirth and neonatal care further complicate efforts to promote evidence-based practices [13]. Many mothers, particularly in rural areas, lack access to formal healthcare services and rely on traditional

birth attendants or family members for delivery and neonatal care [14,15]. A study conducted in Sylhet, Bangladesh, reported that more than half of mothers were unaware of safe cord care practices, and nearly 30% applied harmful substances, such as mustard oil or turmeric, to the umbilical stump [16]. These practices not only increase the risk of infection but also undermine public health efforts to improve neonatal outcomes [17]. Sherpur District, located in the Mymensingh Division of Bangladesh, is a predominantly rural area with limited healthcare infrastructure [18]. The district's neonatal mortality rate reflects the broader challenges faced by rural and underserved communities in Bangladesh, including inadequate health education, cultural barriers, and insufficient healthcare access [19,20]. Sherpur Sadar Hospital, a sub-district hospital with a capacity of 150 beds, serves a large population with diverse healthcare needs but remains under-resourced in terms of health education programs for mothers [19]. The lack of awareness and knowledge about umbilical cord care among mothers attending this hospital has likely contributed to the persistence of neonatal infections and poor outcomes [21]. This study was designed to assess the knowledge of umbilical cord care among mothers of neonates attending outpatient departments in Sherpur District. The study aims to quantify the gaps in maternal knowledge, understand the socio-demographic factors associated with knowledge levels, and provide evidence to inform targeted health education interventions. By addressing these knowledge gaps, this research seeks to support the development of effective strategies to improve neonatal health outcomes in Sherpur District and similar settings across Bangladesh and other LMICs. Additionally, this study highlights the importance of integrating culturally appropriate health education programs into existing healthcare services to enhance maternal knowledge and promote safe neonatal care practices.

2. Methodology

2.1. Study design

A descriptive cross-sectional study was conducted to assess knowledge related to umbilical cord care among mothers of neonates.

2.2. Study population

The study population included patients attending the outpatient department (OPD) of selected general hospitals in Sherpur District of Mymensingh Division, Bangladesh. The sample population consisted of mothers of neonates who met the inclusion criteria and were selected from the study sites.

2.3. Study site and area

The study was carried out at Sherpur Sadar Hospital, a sub-district hospital under Sherpur District. The hospital is a specialized facility providing outdoor and indoor medical services with a capacity of 150 beds. The two-storied hospital spans a total floor area of approximately 93,000 square feet and serves a large population with diverse healthcare needs.

2.4. Study period

The study was conducted over four months, from July 2020 to October 2020.

2.5. Sample size

The required sample size was calculated using the formula $n = z^2pq/d^2$. Here, n = Desired sample size, z = Standard normal deviate corresponding to a 95% confidence interval (1.96), p = Proportion of the target population with the characteristic of interest (15% prevalence), q = Proportion without the characteristic ($1-p$), d = Degree of accuracy desired (0.05). The calculated sample size was 193.

2.6. Inclusion criteria

- Mothers of neonates attending the OPD of Sherpur Sadar Hospital for treatment of neonatal sepsis or other neonatal diseases.
- Mothers who consented to participate and complete the questionnaire.

2.7. Exclusion criteria

- Mothers who refused to provide informed consent.

2.8. Sampling technique

A non-randomized purposive sampling method was employed to recruit participants for the study.

2.9. Data collection tools

Data was collected using a pre-tested, modified, semi-structured, interviewer-administered questionnaire. The questionnaire was developed based on the study objectives and included variables relevant to umbilical cord care practices.

2.10. Data management and analysis

Collected data were edited, checked, and analyzed using SPSS version 19.0 (Chicago, IL). The data was presented according to study variables, and relationships between variables were examined using appropriate statistical methods.

2.11. Knowledge scoring

Respondents' level of knowledge was assessed based on scoring. The knowledge-related questions included the gaps in awareness and misconceptions regarding essential aspects such as cord cutting, tying, cleaning, drying, and recognizing signs of infection. The scoring was derived from correct responses to a series of structured questions, with higher scores representing better knowledge. The knowledge scoring was categorized as Good = >6 or Poor = ≤ 6 based on their responses to the 10 questions assessing their understanding of umbilical cord care practices.

2.12. Limitations of the study

The findings of this study are only applicable to similar settings in Bangladesh and neighboring countries. The study may have been influenced by selection bias and information bias. Inclusion and exclusion criteria and non-randomized sampling may have introduced bias into the data collection and analysis.

3. Results

Table 1 summarizes the socio-demographic characteristics of the respondents ($N = 193$). The mean age was 24.93 years ($SD \pm 5.58$). Most respondents were aged between 27–32 years (34.72%), followed by 21–26 years (31.09%), 15–20 years (26.42%), and 33–38 years (7.77%). The mean age of respondents' babies was 14.90 days ($SD \pm 6.99$), with 47.15% aged 1–14 days and 52.85% aged 15–28 days. Most respondents identified as Muslim (77.72%), with smaller proportions identifying as Hindu (20.21%) or Christian (2.07%). The mean number of children per respondent was 1.97 ($SD \pm 1.00$). Most respondents had one (36.79%) or two children (40.41%), while fewer had three (15.03%), four (5.18%), five (2.07%), or six children (0.52%). In terms of education, 39.90% of respondents had completed secondary education, followed by 25.91% with higher secondary education, 18.65% with primary education, and 11.40% with no formal education. Only 4.15% had attained graduate-level education or higher. Regarding occupation, 74.61% of respondents were homemakers, while 21.76% were engaged in service-related work, and 3.63% were involved in business. Family structure was almost evenly split, with 51.81%

living in nuclear families and 48.19% in joint families. The mean family size was 5.17 members ($SD \pm 2.32$). Families with 5–8 members comprised 55.44% of the sample, while smaller families (<5 members) accounted for 38.86%, and larger families (>8 members) represented 5.70%.

Table 1. Socio-demographic characteristics of the respondents (N=193)

Socio-demographic variables	No. of respondents (n)	Percentage (%)
Age group (Mean 24.93 years and $SD \pm 5.58$)		
15-20 years	51	26.42%
21-26 years	60	31.09%
27-32 years	67	34.72%
33-38 years	15	7.77%
Age of baby (Days) (Mean 14.90 days and $SD \pm 6.99$)		
1-14 days	91	47.15%
15-28 days	102	52.85%
Religion		
Islam	150	77.72%
Hinduism	39	20.21%
Christianity	4	2.07%
Number of children of the respondents (Mean 1.97 and $SD \pm 1.00$)		
1	71	36.79%
2	78	40.41%
3	29	15.03%
4	10	5.18%
5	4	2.07%
6	1	0.52%
The level of education of the respondents		
No formal education	22	11.40%
Primary	36	18.65%
Secondary	77	39.90%
Higher Secondary	50	25.91%
Graduate or above	8	4.15%
Occupation of the respondents		
Housewife	144	74.61%
Service	42	21.76%
Business	7	3.63%
Family type		
Nuclear	100	51.81%
Joint	93	48.19%
Family size (Mean 5.17 and $SD \pm 2.32$)		
<5	75	38.86%
5 to 8	107	55.44%
>8	11	5.70%

Table 2 presents the survey responses regarding participants' knowledge of umbilical cord care ($N = 193$). The findings highlight varied levels of understanding of recommended practices and beliefs surrounding umbilical cord care. Regarding the method of cutting the umbilical cord, most respondents (76.68%) identified the correct tool as a blade, while 11.92% mentioned scissors. A small proportion (3.63%) believed a bamboo stick could be used, and 7.77% were unaware of the appropriate method. When

asked about what should be used to tie the umbilical cord, most participants (77.72%) correctly identified thread as the suitable material. However, 15.54% suggested a clump, 6.22% mentioned rope, and 0.52% indicated other materials. Knowledge about cleaning the umbilicus varies widely. While 26.42% of participants mentioned using normal water, a significant proportion (47.15%) stated that nothing should be used for cleaning. Smaller groups indicated the use of Nebanol (8.81%), Hexisol (2.07%), or Savlon (1.04%). However, 14.51% reported that they did not know what to use for cleaning. For drying the umbilical cord, 78.24% of respondents believed that nothing should be applied, while 14.51% mentioned medication, and 7.25% suggested hot compression. When asked about the necessity of hot compression for umbilical cord shedding, 62.18% believed it was required, while 16.58% disagreed, and 21.24% were unsure. Similarly, 41.97% of respondents thought medication was necessary for umbilical cord shedding, while 37.31% disagreed, and 20.73% were uncertain. The knowledge of umbilical cord shedding time was limited. While 43.01% correctly identified that the cord typically sheds within one week, 27.98% thought it occurred within two weeks, and 28.50% did not know the expected timeframe. A very small proportion (0.52%) believed the shedding could take up to one month. Regarding awareness of cleanliness, only 29.02% of respondents reported knowing about umbilical cord cleanliness, while 70.98% admitted to lacking knowledge on this topic. When asked to identify signs of umbilical cord infection, 36.27% recognized pus draining from the umbilicus as a sign, while 11.92% mentioned redness of the umbilical skin, and 7.77% reported foul smells. However, 44.04% of respondents were unaware of the signs of infection. Finally, when questioned about dietary restrictions for the mother to facilitate umbilical cord shedding, 21.76% believed certain foods were restricted, while 63.73% disagreed, and 14.51% did not know.

Table 2. Survey responses on knowledge related to umbilical cord care among participants (N=193)

Questions	Answer options	No. of respondents (n)	Percentage (%)
What should be used to cut the umbilical cord?	Blade	148	76.68%
	Scissor	23	11.92%
	Bamboo stick	7	3.63%
	Don't know	15	7.77%
What should be used to tie the umbilical cord?	Thread	150	77.72%
	Rope	12	6.22%
	Clump	30	15.54%
	Others	1	0.52%
What should be used to clean the umbilicus?	Normal water	51	26.42%
	Savlon	2	1.04%
	Hexisol	4	2.07%
	Nebanol	17	8.81%
	Nothing	91	47.15%
	Don't know	28	14.51%
What should be used to dry the umbilical cord?	Nothing	151	78.24%
	Hot compression	14	7.25%
	Medication	28	14.51%
Is hot compression necessary for umbilical cord shedding?	Yes	120	62.18%
	No	32	16.58%
	Don't know	41	21.24%
Is medication necessary for umbilical cord shedding?	Yes	81	41.97%
	No	72	37.31%
	Don't know	40	20.73%

What is the umbilical Cord shedding time of newborn?	Within 1 week	83	43.01%
	Within 2 weeks	54	27.98%
	Within 1 month	1	0.52%
	Don't know	55	28.50%
Do you know about the cleanliness of the umbilical cord?	Yes	56	29.02%
	No	137	70.98%
What is the sign of umbilical cord infection?	Redness of umbilical skin	23	11.92%
	Pus draining from the umbilicus	70	36.27%
	Foul smelling from the umbilicus	15	7.77%
	Don't know	85	44.04%
Are certain food items restricted for the mother to facilitate the shedding?	Yes	42	21.76%
	No	123	63.73%
	Don't know	28	14.51%

Figure 1 illustrates the knowledge levels of respondents regarding umbilical cord care practices ($N = 193$). Among the participants, 48.70% ($n = 94$) demonstrated a "Good" level of knowledge, while the remaining 51.30% ($n = 99$) were categorized as having a "Poor" level of knowledge. The classification of knowledge levels was based on the participant's responses to key questions assessing their understanding of umbilical cord care. Despite nearly half of the respondents exhibiting satisfactory knowledge, the slightly higher proportion of participants with poor knowledge (51.30%) indicates that significant gaps remain in understanding safe and recommended practices for umbilical cord care.

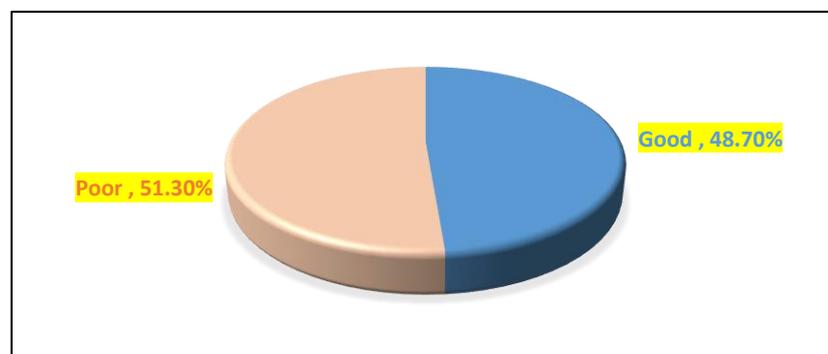


Figure 1. Knowledge level of respondents on umbilical cord care practices ($N=193$)

Table 3 presents the association between socio-demographic variables and the level of knowledge regarding umbilical cord care practices among the respondents ($N = 193$). The distribution of knowledge levels (categorized as "Good" or "Poor") across various socio-demographic groups is described, along with the results of chi-square tests assessing the statistical significance of these associations.

The respondents were divided into four age groups: 15–20 years (26.42%), 21–26 years (31.09%), 27–32 years (34.72%), and 33–38 years (7.77%). The proportion of respondents with good knowledge ranged from 12.95% in the youngest group to 16.58% in the 27–32 years group. However, no statistically significant association was observed between age and knowledge level ($\chi^2 = 0.255$, $p = .66$). Regarding the age of the baby, 47.15% of respondents cared for babies aged 1–14 days, while 52.85% cared for babies aged 15–28 days. The percentage of respondents with good knowledge was nearly equal in both groups (23.83% and 24.87%, respectively), and the association between the age of the baby and knowledge level was not statistically significant ($\chi^2 = 0.181$, $p = .73$). Most respondents

were Muslim (77.72%), followed by Hindu (20.21%) and Christian (2.07%). Among Muslims, 38.34% had good knowledge compared to 9.33% of Hindus and 1.04% of Christians. Despite the differences in proportions, the association between religion and knowledge level was not significant ($\chi^2 = 0.085$, $p = .83$). Most of the respondents had one (36.79%) or two (40.41%) children, with fewer having three (15.03%), four (5.18%), five (2.07%), or six children (0.52%). The proportion of respondents with good knowledge was highest among those with two children (20.21%). The chi-square test indicated no significant association between the number of children and knowledge level ($\chi^2 = 1.179$, $p = .41$). The respondents' educational levels ranged from no formal education (11.40%) to graduate or above (4.15%). A significant association was found between education level and knowledge ($\chi^2 = 2.678$, $p = .01$). Respondents with secondary (18.65%) and higher secondary education (16.06%) had higher proportions of good knowledge compared to those with no formal education (3.63%). Most respondents were housewives (74.61%), followed by those engaged in service (21.76%) or business (3.63%). A significant association was observed between occupation and knowledge level ($\chi^2 = 5.453$, $p = .02$) with service workers demonstrating higher levels of good knowledge (16.58%) compared to housewives (30.57%) and business owners (1.55%). The sample included both nuclear families (51.81%) and joint families (48.19%). A statistically significant association was identified between family type and knowledge ($\chi^2 = 14.586$, $p < .001$). Respondents from joint families were more likely to have good knowledge (33.16%) than those from nuclear families (15.54%). Most respondents had families of 5–8 members (55.44%), followed by families with fewer than 5 members (38.86%) and those with more than 8 members (5.70%). Family size was significantly associated with knowledge ($\chi^2 = 6.402$, $p = 0.04$). Respondents from families of 5–8 members had the highest proportion of good knowledge (33.16%).

Table 3. Association of Socio-Demographic Variables with Knowledge Level on Umbilical Cord Care Practices among Respondents (N = 193)

Socio-demographic variables	No. of respondents		Level of knowledge				χ^2 value	P value
	n	%	Good		Poor			
			n	%	n	%		
Age group								
15-20 years	51	26.42%	25	12.95%	26	13.47%	0.255	.66
21-26 years	60	31.09%	28	14.51%	32	16.58%		
27-32 years	67	34.72%	32	16.58%	35	18.13%		
33-38 years	15	7.77%	9	4.66%	6	3.11%		
Age of baby (Days)								
1-14 days	91	47.15%	46	23.83%	45	23.32%	0.181	.73
15-28 days	102	52.85%	48	24.87%	54	27.98%		
Religion								
Islam	150	77.72%	74	38.34%	76	39.38%	0.085	.83
Hinduism	39	20.21%	18	9.33%	21	10.88%		
Christianity	4	2.07%	2	1.04%	2	1.04%		
Number of children of the respondents								
1	71	36.79%	28	14.51%	43	22.28%	1.179	.41
2	78	40.41%	39	20.21%	39	20.21%		
3	29	15.03%	16	8.29%	13	6.74%		
4	10	5.18%	7	3.63%	3	1.55%		
5	4	2.07%	3	1.55%	1	0.52%		
6	1	0.52%	1	0.52%	0	0.00%		
Level of education of the respondents								
No formal education	22	11.40%	7	3.63%	15	7.77%	2.678	.01

Primary	36	18.65%	13	6.74%	23	11.92%		
Secondary	77	39.90%	36	18.65%	41	21.24%		
Higher Secondary	50	25.91%	31	16.06%	19	9.84%		
Graduate or above	8	4.15%	7	3.63%	1	0.52%		
Occupation of the respondents								
Housewife	144	74.61%	59	30.57%	85	44.04%	5.453	.02
Service	42	21.76%	32	16.58%	10	5.18%		
Business	7	3.63%	3	1.55%	4	2.07%		
Family type								
Nuclear	100	51.81%	30	15.54%	70	36.27%	14.586	.00
Joint	93	48.19%	64	33.16%	29	15.03%		
Family size								
<5	75	38.86%	22	11.40%	53	27.46%	6.402	.04
5 to 8	107	55.44%	64	33.16%	43	22.28%		
>8	11	5.70%	8	4.15%	3	1.55%		

Table 4 presents the crude odds ratios (COR), log odds, standard errors, and 95% confidence intervals (CI) for socio-demographic variables associated with the level of knowledge (categorized as "Good" or "Poor") regarding umbilical cord care practices among respondents. COR quantifies the likelihood of having good knowledge compared to poor knowledge across various socio-demographic groups.

The COR for respondents aged 33–38 years was 1.500 (95% CI: 0.870–2.585), indicating that this group was 1.5 times more likely to have good knowledge than poor knowledge, although the confidence interval includes 1, suggesting no statistically significant association. Other age groups had CORs below 1, with the lowest for the 21–26 years group (COR = 0.875, 95% CI: 0.767–0.998), nearing statistical significance. Respondents caring for babies aged 1–14 days had a COR of 1.022 (95% CI: 0.938–1.114), showing no significant difference in knowledge levels compared to those caring for babies aged 15–28 days (COR = 0.889, 95% CI: 0.823–0.960). Muslim respondents had a COR of 0.974 (95% CI: 0.924–1.026), while Hindus had a COR of 0.857 (95% CI: 0.700–1.049), indicating no significant association between religion and knowledge. Christians had a COR of 1.000, reflecting a balance between good and poor knowledge levels, though this result is limited by a small sample size. Respondents with four children had a COR of 2.333 (95% CI: 0.918–5.933), and those with five children had a COR of 3.000 (95% CI: 0.220–40.931), indicating higher odds of good knowledge. However, confidence intervals were wide, reflecting variability due to smaller sample sizes. Respondents with one child had significantly lower odds of good knowledge (COR = 0.651, 95% CI: 0.580–0.731). Education showed a strong association with knowledge levels. Respondents with graduate or higher education had the highest COR (7.000, 95% CI: 0.745–65.751), although the wide confidence interval reflects variability. Those with higher secondary education had a COR of 1.632 (95% CI: 1.381–1.927), indicating significantly higher odds of good knowledge. Conversely, respondents with no formal education had the lowest COR (0.467, 95% CI: 0.309–0.704), reflecting significantly reduced odds of good knowledge. Service workers were 3.2 times more likely to have good knowledge compared to other occupations (COR = 3.200, 95% CI: 2.474–4.139). In contrast, housewives had reduced odds of good knowledge (COR = 0.694, 95% CI: 0.656–0.734). Business owners showed no significant association (COR = 0.750, 95% CI: 0.239–2.353). Family type was significantly associated with knowledge levels. Respondents from joint families were more likely to have good knowledge (COR = 2.207, 95% CI: 2.000–2.435) compared to those from nuclear families (COR = 0.429, 95% CI: 0.390–0.470). Respondents from larger families (>8 members) had the highest odds of good knowledge (COR = 2.667, 95% CI: 1.086–6.548). Those from medium-sized families (5–8 members) also had higher odds (COR = 1.488, 95% CI: 1.379–

1.606), while those from smaller families (<5 members) had significantly lower odds ($COR = 0.415$, 95% $CI: 0.366-0.471$).

Table 4. Crude Odds Ratios (COR) of Socio-Demographic Variables Associated with Knowledge Level on Umbilical Cord Care Practices among Respondents (N = 193)

Socio-demographic variables		Level of knowledge		Crude Odds Ratios (COR)	Log odds	Standard Error of the COR	95% CI Lower (COR)	95% CI Upper (COR)
		Good	Poor					
Age group	15-20 years	25	26	0.962	-0.038	0.078	0.824	1.121
	21-26 years	28	32	0.875	-0.131	0.067	0.767	0.998
	27-32 years	32	35	0.914	-0.088	0.060	0.813	1.028
	33-38 years	9	6	1.500	0.379	0.278	0.870	2.585
Age of baby (Days)	1-14	46	45	1.022	0.022	0.044	0.938	1.114
	15-28	48	54	0.889	-0.117	0.039	0.823	0.960
Religion	Islam	74	76	0.974	-0.026	0.027	0.924	1.026
	Hinduism	18	21	0.857	-0.150	0.103	0.700	1.049
	Christianity	2	2	1.000	0.000	1.000	0.141	7.099
The number of children of the respondents	1	28	43	0.651	-0.423	0.059	0.580	0.731
	2	39	39	1.000	0.000	0.051	0.904	1.106
	3	16	13	1.231	0.201	0.139	0.936	1.618
	4	7	3	2.333	0.762	0.476	0.918	5.933
	5	3	1	3.000	0.847	1.333	0.220	40.931
	6	1	0	<i>inf</i>	1.099	<i>inf</i>		<i>inf</i>
The level of education of the respondents	No formal education	7	15	0.467	-0.726	0.210	0.309	0.704
	Primary	13	23	0.565	-0.554	0.120	0.446	0.716
	Secondary	36	41	0.878	-0.128	0.052	0.793	0.973
	Higher Secondary	31	19	1.632	0.480	0.085	1.381	1.927
	Graduate or above	7	1	7.000	1.609	1.143	0.745	65.751
Occupation of the respondents	Housewife	59	85	0.694	-0.363	0.029	0.656	0.734
	Service	32	10	3.200	1.130	0.131	2.474	4.139
	Business	3	4	0.750	-0.251	0.583	0.239	2.353
Family type	Nuclear	30	70	0.429	-0.838	0.048	0.390	0.470
	Joint	64	29	2.207	0.782	0.050	2.000	2.435
Family size	<5	22	53	0.415	-0.866	0.064	0.366	0.471
	5 to 8	64	43	1.488	0.394	0.039	1.379	1.606
	>8	8	3	2.667	0.887	0.458	1.086	6.548

4. Discussion

This study revealed significant knowledge gaps regarding umbilical cord care among mothers of neonates attending outpatient departments in Sherpur District, Bangladesh. Despite nearly half of the participants demonstrating a "Good" level of knowledge, unsafe practices, and misconceptions remain prevalent, underscoring the need for targeted interventions to improve neonatal health outcomes. The findings aligned with studies conducted in other low-resource settings, where traditional practices and limited health education hinder the adoption of evidence-based practices. For instance, 76.68% of respondents in this study correctly identified blades as the appropriate tool for cutting the umbilical cord. This is consistent with findings from Nigeria, where 65.48% of mothers exhibited adequate knowledge [12]. However, the improper use of substances such as medications (14.51%) or hot compression (7.25%) for drying the umbilical cord mirrors concerns raised in Ethiopia, where 34.4% of mothers reported unsafe practices due to a lack of education [11]. Such findings suggest that while awareness of basic practices is

improving, critical gaps remain in adopting recommended care methods. The study also highlighted cultural influences on neonatal care. A significant proportion of respondents (28.50%) were unaware of the normal umbilical cord-shedding timeframe, while 21.24% believed that hot compression was necessary for cord shedding. Similar trends have been observed in Sylhet, Bangladesh, where mustard oil and turmeric application to the umbilical stump was reported by 30% of mothers [16]. These practices not only increase the risk of infection but also reflect deeply ingrained cultural beliefs that are difficult to change. Public health initiatives must consider these cultural nuances to design effective health education campaigns that resonate with local communities. Education level emerged as a critical determinant of knowledge. Mothers with secondary or higher education were significantly more likely to demonstrate good knowledge about umbilical cord care. This trend has been observed in other studies in rural Bangladesh and Kenya, emphasizing the role of maternal education in improving neonatal health outcomes [13, 21]. Interestingly, family dynamics also influenced knowledge levels. Respondents from joint families or larger households exhibited better knowledge, likely due to shared caregiving experiences and collective decision-making. This finding highlights the potential of leveraging existing social structures in rural communities to enhance maternal knowledge and practices. While education and family type were significantly associated with knowledge levels, no significant associations were found with age, religion, or the number of children. This indicates that knowledge gaps are pervasive across different demographic groups, reinforcing the importance of universal health education strategies. The lack of association with age suggests that both younger and older mothers require tailored educational interventions to address their specific needs. Healthcare providers play a critical role in addressing these gaps. Despite global recommendations, such as the World Health Organization's emphasis on dry cord care and the use of chlorhexidine in high-risk settings [10], the awareness of these practices was notably low among respondents. Nearly 44% of mothers could not identify the signs of umbilical cord infection, such as redness or pus, highlighting a critical area for improvement. Similar gaps have been documented in studies from other low-income countries, where inadequate counseling and training among healthcare workers exacerbate the issue [7]. Strengthening the capacity of healthcare providers to deliver culturally sensitive and evidence-based education is essential to bridge these gaps [22]. This study also emphasizes the broader challenges faced by rural and underserved areas like Sherpur District, including limited healthcare infrastructure and inadequate health education programs [23]. These systemic issues are compounded by socio-cultural barriers, such as reliance on traditional birth attendants and family members for neonatal care, which further delay the adoption of evidence-based practices. Community-based health initiatives, supported by local leaders and healthcare professionals, could play a pivotal role in overcoming these barriers [24]. Ultimately, the findings from this study contribute to the growing body of evidence on the importance of maternal education and culturally appropriate interventions in improving neonatal health outcomes. Future research should explore the effectiveness of community-driven education programs and identify innovative ways to integrate traditional practices with evidence-based care to ensure sustainable improvements in neonatal care practices.

4.1. Implications for Practice

- Healthcare providers should focus on delivering culturally appropriate and accessible education about umbilical cord care to mothers in rural areas, ensuring that it aligns with WHO recommendations for evidence-based practices.
- Implementation of community-based health education programs that leverage the influence of local health workers and traditional birth attendants to extend the reach of key messages on neonatal care.

- Policymakers and healthcare leaders need to integrate findings on socio-demographic influences into existing public health strategies to specifically target communities with lower educational and economic backgrounds.

4.2. Limitations and Recommendations

- The study's use of a non-randomized purposive sampling method may limit the generalizability of the findings across different rural settings. Future studies should consider using randomized sampling to enhance representativeness.
- The assessment of maternal knowledge was based on self-reporting, which might be subject to social desirability bias. Subsequent research should incorporate observational methods or validated questionnaires to verify self-reported practices.
- The study underscores the need for longitudinal research to evaluate the effectiveness of educational interventions over time, which can help to ensure that improvements in knowledge translate into sustained changes in behavior.

5. Conclusion

This study highlights significant knowledge gaps among mothers of neonates in Sherpur District, Bangladesh, regarding umbilical cord care practices. While nearly half of the participants demonstrated satisfactory knowledge, a substantial proportion adhered to unsafe practices, such as using hot compression and medications for drying the umbilical cord or failing to recognize signs of infection. Education level, family type, and household size were strongly associated with knowledge levels, underscoring the critical role of socio-demographic factors in shaping maternal awareness and practices. The findings underscore the urgent need for targeted health education interventions, particularly in rural and underserved areas, to address misconceptions and promote evidence-based neonatal care practices. Community-driven initiatives that leverage local social structures, alongside culturally sensitive education programs delivered by healthcare professionals, could play a pivotal role in bridging these knowledge gaps. By addressing the identified barriers and strengthening health education efforts, policymakers and healthcare providers can improve neonatal outcomes and contribute to reducing neonatal morbidity and mortality in resource-limited settings like Sherpur District. Future research should focus on evaluating the impact of such interventions and exploring innovative strategies to integrate traditional practices with evidence-based care for sustainable improvements in neonatal health.

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Conflict of interest disclosure

The authors declare there are no conflicts of interest related to this study.

Consent for publication

All authors have provided their consent for the publication of this manuscript.

Ethical approval statement

This study was conducted by ethical guidelines and received approval from the Research Ethics Committee of the Faculty of Health and Life Sciences, Daffodil International University.

Informed consent statement

Written informed consent was obtained from all participants before their inclusion in the study.

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