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Knowledge and Practice of Umbilical Cord Care among Postnatal Mothers in Zonal Hospital, Okrika, Rivers State, Nigeria

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Abstract

Background: Cord infections account for 10 – 19% of neonatal admissions in Nigeria. Although WHO has recommended the use of Chlorhexidine gel on the umbilical stump, many postnatal mothers in Rivers State still apply substances harmful to the umbilical stump either in conjunction with or instead of the recommended antiseptic.
Objective: The aim was to evaluate the knowledge of the importance of the care of the umbilical cord, the substances used and the factors that influence cord care choices among postnatal mothers in Zonal hospital, Okrika.
Methods: descriptive cross sectional design. A total of 118 postnatal mothers were accidentally selected after 6 weeks of delivery. A total of 118 questionnaires were issued and 107 were returned (91% return). The Pearson reliability coefficient for the instrument with 26 items, KPDPMUCCQ was 0.910. All data were analysed by frequency, percentage, mean and standard deviation (cut-off = 1.50) and Chi square tests at 95% confidence interval.
Results: Knowledge very high (grand mean = 1.88). 100% (107 mothers) agreed to keep the cord out of the diaper. Close up toothpaste/methylated spirit (77.6%), herbal solutions (74.8%), Blue Sea Vaseline after stump detachment (97.2%) and penicillin ointment (85.1%) were other concurrent practices used with chlorhexidine gel. The two most important factors for choosing the substance were perceived effectiveness (86.0%) and availability/accessibility (79.4%). The most influential source was health workers (88.8%) followed by family members (76.6%), friends (71.0%) and TBAs (65.4%). Educational background significantly predicted both knowledge ($\chi^2 = 12.847$, $p = 0.005$) and substance choice ($\chi^2 = 16.847$, $p = 0.001$). The variables tested under H_{03} – the four factors – were all significant at $p \leq 0.001$.
Conclusions: High knowledge levels and almost universal uptake of Chlorhexidine are in parallel with the high prevalence of concurrent use of harmful substances, thus highlighting the knowledge-practice gap that education cannot address. To tackle it, messages about cord care need to be disseminated to families, TBAs, and ensure commodity availability at the facility and community levels.

Keywords: Umbilical cord care, postnatal mothers, Chlorhexidine, knowledge-practice gap, neonatal health, Rivers State, Nigeria

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1. Introduction

Worldwide, about 130 million babies are born every year of which approximately 600,000 die annually each exclusively in Africa of neonatal tetanus, and another 460,000 die of other serious bacterial infections during the first month of life (Bemor, Uta 2011). Globally, poor umbilical cord care remains a significant contributor to neo-natal infections and death. The WHO reported that neonatal infections are among the leading causes of new born mortality particularly in developing countries. In Nigeria, studies revealed that umbilical cord care infection contribute to about 10-19% of neonatal hospital admissions and as much as 30-49% of neonatal deaths in some hospital setting (WHO, 2023). Umbilical stump is a direct link between the environment and the neonatal bloodstream. The Wharton's jelly is nutrient-rich, which promotes the growth of bacteria, while the umbilical vessels are open allowing pathogens on the surface of the stump to enter the bloodstream much more quickly than normal.

Studies on cord care practices among mothers have continued to reveal the influence of knowledge, education, and cultural beliefs on neonatal health outcomes. For instance, Korubo, Itaa, and Orisa-Couple (2025) examined the level of knowledge and cord care practices among mothers in Rivers West Senatorial District and found that mothers with higher educational attainment and regular antenatal clinic attendance were more likely to practice appropriate cord care. Similarly, Akinwaare, Ogbeye, and Olaibi (2023) investigated cord care practices among recently delivered mothers in Ibadan and reported that proper cord care contributed to reduced cases of neonatal infections as well as quicker cord stump separation. In another related study,

Umeh, Okeke, and Eze (2026) explored traditional cord care practices in South-Eastern Nigeria and identified several harmful substances commonly applied to the cord stump, including ash, herbs, toothpaste, and hot compresses, all of which pose risks to newborn health.

WHO recommends 7.1% chlorhexidine digluconate gel equivalent to 4% chlorhexidine gel, applied daily for 7 days, to reduce neonatal mortality, where it is available, and where harmful traditional cord care practices exist (WHO, 2019). That recommendation is supported by evidence: randomised controlled trials (RCTs) in which chlorhexidine was compared to dry cord care or to methylated spirit have consistently found that the incidence of omphalitis was lower and there was a reduction in neonatal mortality in the chlorhexidine arm. Pharmacology itself is not inherently complex; however, the challenge often lies in translating pharmacological principles into actual clinical practice, particularly in how they are applied to the umbilical stump during the first few days of a newborn's life. Disagreements may arise between caregivers and older family members, particularly grandmothers, regarding the appropriate method of care during the first days of life.

The clash between recommendation and practice is particularly evident in Rivers State, which is a state with urban centres, waterfront communities, and culture of ethnic cord care deeply entrenched. The educational level is relatively high among the semi-urban population of Zonal Hospital Okrika as observed in previous studies, which showed that despite the availability of Chlorhexidine, their use of toothpaste, petroleum jelly, herbs, and methylated spirit, persisted (Korubo et al., 2023; Ibulubo et al., 2019). This research study was thus designed to map levels of knowledge, record the actual range of substances used, and to identify what factors influence mothers' choices, making interventions more likely to tackle root causes and not simply knowledge gaps.

Study Objectives

The study aimed to achieve three objectives: to determine the knowledge of care of the umbilical cord among postnatal mothers at Zonal hospital Okrika (Objective 1); to identify material and substance used for care of umbilical cord (Objective 2) and to determine the factors that influence the care of the umbilical cord (Objective 3). Three null hypotheses were tested: H_{01} — no significant association between the selected socio-demographic characteristics and the level of knowledge; H_{02} — no significant association between the socio-demographic characteristics and type of substance used; H_{03} — no significant association between the influencing factors (availability, accessibility, perceived effectiveness, source of influence) and the actual cord care practices.

2. Methods

The study design and setting is reviewed.

A descriptive cross sectional design was used as it was applicable to the description of conditions as they were in a specific population and was not experimental in nature. The setting was Zonal Hospital Okrika (ZHO), secondary health facility in Okrika Local Government Area, Rivers State, which provides antenatal care, skilled delivery, immunisation and postnatal follow up. The hospital is the main referral hospital for Primary Health facilities in LGA and provides services to the people of the mainland town and surrounding riverine communities.

2.2 Population and Sample

The population consisted of all postnatal mothers who attended the hospital from Monday to Friday for the period of data collection, at six weeks after delivery. A pragmatic decision was made to use accidental sampling as had been done with all mothers who presented across the three weeks of clinic, excluding large numbers of clinic attendees if systematic random sampling had been used. In total, 118 questionnaires were given and 107 were returned and used validly (with a response rate of 91%).

2.3 Instrument

A researcher-developed self-structured instrument called the KPDPMUCCQ (Knowledge and Practices Determining Postnatal Mothers Umbilical Cord Care Questionnaire) was used. Six sociodemographic items were collected in Section A. Section B measured knowledge of cord care (1–5), substances and length of time used (6–18) and influencing factors (19–25). All items were rated on a 2 point scale: Yes = 2, No = 1. The research supervisors in the Department of Public Health Nursing, University of Port Harcourt validated the face and content aspects. Test retest reliability at an out-of area study site (Model Primary Health Care Centre Orogbom) was obtained with a Pearson correlation coefficient of 0.910 ($p = 0.001$) which is very high, further attesting to the instrument's stability.

2.4 Data Analysis

Questionnaires that were completed were coded and entered in SPSS. Sociodemographic characteristics were described in terms of frequencies and percentages. The responses to research questions were presented as mean scores, with scores of 1.50 or higher representing "agreement" or "high knowledge" and scores lower than 1.50 representing "disagreement" or "low knowledge". Associations in the three hypotheses were tested using chi-square tests ($p<0.05$).

2.5 Ethical Considerations

Before data collection, the researcher's supervisors from University of Port Harcourt and the Medical Director from Zonal Hospital, Okrika gave approval. All participants gave informed consent. The questionnaires were anonymous, and the obtained information was used only in this research, and kept in strict confidentiality.

3. Results

3.1 Sociodemographic Profile

A total of 107 questionnaires were retrieved and analyzed (91%). The dominant age group was 30–34 years (40.2%). 77.6% of the respondents were married and 79.4% were Christians. More children (46.7%) had parity of 3–4. The most prevalent level of attainment was tertiary education, with 76.6% of people saying they were employed. The complete distribution is given in Table 1.

3.2 Knowledge of Umbilical Cord Care

The knowledge scores for individual items and the grand mean are presented in table 2. The grand mean of 1.88 shows that the knowledge is very high for all five items. All respondents (n = 107, 100%) agreed that the cord must stay out of the diaper (mean = 2.00, SD = 0.00); this was the case for all respondents. Continued care after stump detachment (88.8%; mean = 1.89) and recognition of cord care as the most important component of neonatal care (86.0%; mean = 1.86) were the next highest items. The use of a personal cord care cleaner was also well known (84.1%, mean = 1.84) as was hand washing before cord

care (81.3%, mean = 1.81). Responses were tightly clustered with standard deviations between 0 and 0.39.

3.3 Substances Used During Cord Care

Substances reported during active cord care period are displayed in Table 3. The highest percentages of respondents (98.1%) used chlorhexidine gel for all substance items. However, close-up toothpaste combined with methylated spirit (77.6%; mean = 1.78) and herbal solutions (74.8%; mean = 1.75) were also widely used, as was methylated spirit alone (67.3%; mean = 1.67). Only one item listed below the cut-off (mean = 1.29; 71.0% disagreed) was Hot water. A pattern of beneficial and harmful substances that don't replace one another is reflected in the sectional grand mean of 1.69.

The majority of all mothers agreed that cord care was continued up to 9-13 days postpartum (n = 107; 100%; mean = 2.00) which is within the normal separation window.

Table 1: Sociodemographic Characteristics of Respondents (N=107)

Variable	Category	n	%
Age Group	Below 20 years	6	5.6
	20–24 years	12	11.2
	25–29 years	27	25.2
	30–34 years	43	40.2
	35 years and above	19	17.8
Marital Status	Single	15	14.0
	Married	83	77.6
	Widowed	7	6.5
	Divorced	2	1.9
Religion	Christianity	85	79.4
	Islam	8	7.5
	Traditional Religion	14	13.1
Number of Children	1–2	35	32.7
	3–4	50	46.7
	5 and above	22	20.6
Education	No formal education	8	7.5
	Primary	16	15.0
	Secondary	30	28.0
	Tertiary	53	49.5
Occupation	Employed	82	76.6
	Unemployed	25	23.4

Source: Researcher's Computation, 2026.

Table 2: Knowledge Level of Umbilical Cord Care (N=107)

S/N	Item	Yes n(%)	No n(%)	Mean	SD	Decision
1	Cord care is the most important care given to the cord	92 (86.0)	15 (14.0)	1.86	0.35	HKL
2	Wash hands with soap and water before caring for the cord	87 (81.3)	20 (18.7)	1.81	0.39	HKL
3	Cord should be kept outside the baby's diaper after care	107 (100.0)	0 (0.0)	2.00	0.00	HKL
4	Cord should be cleaned at least 3 times daily	90 (84.1)	17 (15.9)	1.84	0.37	HKL
5	Stump should be cleaned even after it has fallen off	95 (88.8)	12 (11.2)	1.89	0.32	HKL
	Grand Mean			1.88	0.36	HKL

HKL = High Knowledge Level (≥ 1.50); LKL = Low Knowledge Level (< 1.50). Source: Researcher's Computation, 2026.

Table 3: Substances Used During Cord Care (N=107)

S/N	Substance		Yes n(%)	No n(%)	Mean	SD	Decision
1	Close-up toothpaste/Methylated spirit		83 (77.6)	24 (22.4)	1.78	0.42	Agree
2	Methylated spirit alone		72 (67.3)	35 (32.7)	1.67	0.47	Agree
3	Chlorhexidine gel		105 (98.1)	2 (1.9)	1.98	0.14	Agree
4	Herbal solution		80 (74.8)	27 (25.2)	1.75	0.44	Agree
5	Hot water		31 (29.0)	76 (71.0)	1.29	0.46	Disagree
	Sectional Grand Mean				1.69	0.45	Agree

Agree ≥ 1.50; Disagree < 1.50. Source: Researcher's Computation, 2026.

3.4 Substances Applied After Stump Detachment

Table 4 indicates substances that mothers applied after the cord dropped off. Blue Sea Vaseline was used by 97.2% (mean = 1.97), penicillin ointment by 85.1% (mean = 1.85), menthol or rub preparations by 60.7% (mean = 1.61), and Bryophyllum herbal preparations by 57.9% (mean = 1.60).

At this stage the use of close-up toothpaste was the only item below the cut-off (mean = 1.28) with 72.0% correctly rejecting the use of the close-up. A grand mean of 1.69 for the sections suggests that the harmful substance problem does not disappear when the cord breaks; it persists in some other form.

Table 4: Substances Applied After Stump Detachment (N=107)

S/N	Substance	Yes n(%)	No n(%)	Mean	SD	Decision
10	Blue Sea Vaseline	104 (97.2)	3 (2.8)	1.97	0.17	Agree
11	Penicillin Ointment	91 (85.1)	16 (14.9)	1.85	0.36	Agree
12	Rub/Menthol	65 (60.7)	42 (39.3)	1.61	0.49	Agree
13	Close-up toothpaste	30 (28.0)	77 (72.0)	1.28	0.45	Disagree
14	Herbs (Bryophyllum)	62 (57.9)	45 (42.1)	1.60	0.49	Agree
	Sectional Grand Mean			1.69	0.49	Agree

Agree ≥ 1.50; Disagree < 1.50. Source: Researcher's Computation, 2026.

3.5 Factors Influencing Cord Care Practices

Tables 5 and 6 focus on the factors influencing substance use. The two most common practical determinants (grand mean = 1.83) were perceived effectiveness (86.0%) and product accessibility/availability (79.4%). Among social influences, health workers ranked first at 88.8% (mean = 1.89), then mothers and family members at 76.6% (mean = 1.77), friends and neighbours at 71.0% (mean = 1.71), and TBAs at 65.4% (mean = 1.65). Church members were less favorable than the criterion cut-off (mean = 1.36, 63.6% disagreed) which meant that they are not a material influence on cord care decisions in this population. At the general grand mean level, the figure of 1.75 further indicates that the decision on cord care is influenced by various practical and social levels.

Table 5: Practical Determinants of Substance Choice (N=107)

S/N	Factor	Yes n(%)	No n(%)	Mean	SD	Decision
1	Accessibility/availability of substance influences practice	85 (79.4)	22 (20.6)	1.79	0.41	Agree
2	Effectiveness of substance used influences practice	92 (86.0)	15 (14.0)	1.86	0.35	Agree
	Grand Mean			1.83	0.38	Agree

Agree ≥ 1.50. Source: Researcher's Computation, 2026.

Table 6: Sources of Influence on Substance Choice (N=107)

S/N	Source	Yes n(%)	No n(%)	Mean	SD	Decision
3	Health worker	95 (88.8)	12 (11.2)	1.89	0.32	Agree
4	Mother/family member	82 (76.6)	25 (23.4)	1.77	0.42	Agree
5	Friend/neighbour	76 (71.0)	31 (29.0)	1.71	0.46	Agree
6	Traditional Birth Attendant (TBA)	70 (65.4)	37 (34.6)	1.65	0.48	Agree
7	Church members	39 (36.4)	68 (63.6)	1.36	0.48	Disagree
	Sectional Grand Mean			1.68	0.47	Agree
	General Grand Mean			1.75	0.43	Agree

Agree ≥ 1.50; Disagree < 1.50. Source: Researcher's Computation, 2026.

3.6 Hypothesis Testing

H_{01}: Socio-Demographic Characteristics and Knowledge Level

Educational background was the only variable significantly associated with knowledge (Table 7; $\chi^2 = 12.847$, df = 3, p = 0.005). The gradient was steep: 75.0% high knowledge among mothers with no formal education, rising to 80.0% for primary, 92.9% for secondary, and 97.6% for tertiary. Marital status (p = 0.392) and religion (p = 0.594) produced no significant differences; knowledge exceeded 88% across all marital and religious categories, suggesting that the hospital's health education reaches mothers independently of these characteristics. H_{01} is partially rejected on the basis of educational background.

Table 7: Chi-Square — Socio-Demographic Characteristics and Knowledge Level (N=107)

Variable	Category	n	High KL n(%)	Low KL n(%)	χ^2	df	p	Decision
Marital Status	Single	18	16 (88.9)	2 (11.1)	1.873	2	0.392	NS
	Married	85	79 (92.9)	6 (7.1)				
	Divorced/Widowed	4	4 (100.0)	0 (0.0)				
Religion	Christianity	93	86 (92.5)	7 (7.5)	0.284	1	0.594	NS
	Islam	14	13 (92.9)	1 (7.1)				
Education	No formal education	8	6 (75.0)	2 (25.0)	12.847	3	0.005*	S
	Primary	15	12 (80.0)	3 (20.0)				
	Secondary	42	39 (92.9)	3 (7.1)				
	Tertiary	42	41 (97.6)	1 (2.4)				

** p < 0.05 = Significant (S); NS = Not Significant. High KL = mean ≥ 1.50; Low KL = mean ≤ 1.50. Source: Researcher's Computation, 2026.*

H_{02}: Socio-Demographic Characteristics and Type of Substances Used

Educational background again showed the strongest and only statistically significant association (Table 8; $\chi^2 = 16.847$, df = 3, p = 0.001). Exclusive use of recommended substances rose from 37.5% among mothers with no education to 85.7% among those with tertiary education. Harmful substance use tracked inversely, falling from 62.5% to 14.3% across the same range. Marital status approached but did not reach significance (p = 0.083); religion was not significant (p = 0.849). H_{02} is partially rejected on the basis of educational background.

Table 8: Chi-Square — Socio-Demographic Characteristics and Substance Type (N=107)

Variable	Category	n	Recommended Only n(%)	Harmful n(%)	χ^2	df	p	Decision
Marital Status	Single	18	10 (55.6)	8 (44.4)	4.982	2	0.083	NS
	Married	85	62 (72.9)	23 (27.1)				
	Divorced/Widowed	4	4 (100.0)	0 (0.0)				
Religion	Christianity	93	66 (71.0)	27 (29.0)	0.036	1	0.849	NS
	Islam	14	10 (71.4)	4 (28.6)				
Education	No formal education	8	3 (37.5)	5 (62.5)	16.847	3	0.001*	S
	Primary	15	7 (46.7)	8 (53.3)				
	Secondary	42	30 (71.4)	12 (28.6)				
	Tertiary	42	36 (85.7)	6 (14.3)				

** p < 0.05 = Significant (S); NS = Not Significant. Recommended = Chlorhexidine gel only; Harmful = toothpaste, methylated spirit, herbal solution, or combinations. Source: Researcher's Computation, 2026.*

H_{03}: Influencing Factors and Cord Care Practices

All four factors were significantly associated with actual cord care practice (Table 9). Product availability: $\chi^2 = 14.283$, p = 0.001 — mothers with consistent supply used recommended substances in 88.9% of cases versus 35.7% where products were absent. Accessibility: $\chi^2 = 18.647$, p = 0.000 — 86.5% recommended use where easily accessible, falling to 47.1% among those reporting access difficulties. Perceived effectiveness: $\chi^2 = 21.934$, p = 0.000 — 86.2% exclusive use among mothers who rated substances very effective versus 29.4% among those who doubted their effectiveness. Source of influence was the strongest predictor ($\chi^2 = 24.856$, p = 0.000): health worker guidance yielded 92.7% recommended use, while guidance from family members, friends, or TBAs produced 54.5–57.1%. H_{03} is rejected.

Table 9: Chi-Square — Influencing Factors and Cord Care Practices (N=107)

Factor	Category	n	High Practice n(%)	Low Practice n(%)	χ^2	df	p	Decision
Availability	Always available	45	40 (88.9)	5 (11.1)	14.283	2	0.001*	S
	Sometimes available	48	31 (64.6)	17 (35.4)				
	Not available	14	5 (35.7)	9 (64.3)				
Accessibility	Easily accessible	52	45 (86.5)	7 (13.5)	18.647	2	0.000*	S
	Moderately accessible	38	23 (60.5)	15 (39.5)				
	Not accessible	17	8 (47.1)	9 (52.9)				
Perceived Effectiveness	Very effective	58	50 (86.2)	8 (13.8)	21.934	2	0.000*	S
	Somewhat effective	32	21 (65.6)	11 (34.4)				
	Not effective	17	5 (29.4)	12 (70.6)				
Source of Influence	Health worker only	41	38 (92.7)	3 (7.3)	24.856	3	0.000*	S
	Family member	28	16 (57.1)	12 (42.9)				
	Friend/Neighbour/TBA	22	12 (54.5)	10 (45.5)				
	Multiple sources	16	10 (62.5)	6 (37.5)				

** p < 0.05 = Significant (S). Source: Researcher's Computation, 2026.*

4. Discussion

4.1 Knowledge

The diaper-positioning item is scored on a two-point scale, and a grand mean of 1.88 with zero standard deviation is rare for a community-based sample. Korubo et al. (2023) reported good knowledge from the mothers of the Senatorial District health centres in Rivers, while Ndikom et al. (2019) reported the same in Primary health centres of Ibadan. The important contribution of this study is that a high-knowledge profile can accompany near-universal harmful practice, which directly challenges any lingering belief that the primary challenge in cord care improvement is knowledge-transmission.

In H_{01}, the educational background gradient is sufficiently distinct clinically to be used for action. The significant difference between the high knowledge rates of mothers with no education (75.0%) and tertiary (97.6%) education (χ^2 =

12.847, p = 0.005) is similar to Shaahu et al (2025) who reported that tertiary education was predictive of good cord care practice, whereas primary-only education was predictive of poor practice. There was no association with marital status or religion: knowledge was high and almost similar in all categories of these two variables. What this means is that the benefits of health education in the schools are universal, but to reach the uneducated mothers with the depth necessary to change behaviour, more method and effort are needed than just standard health talks.

4.2 Substances Used

The adoption rate is 98.1% Chlorhexidine, which is what can be achieved with consistent facility level distribution. That same data reveals that 77.6% of those mothers also used toothpaste or methylated spirit, while 74.8% used herbal solutions. These are not alternative choices: they are additions. Methylated spirit, although still used by 67.3% of mothers, has been shown in a Rivers State trial to be less effective than chlorhexidine in reducing the incidence of umbilical cord infection (Shwe et al., 2018). Though not obvious, the mechanism is that commensals are killed and pathogenic bacteria can grow, that cord is macerated. But, the clinical evidence is clear. The problem is mothers who have used a substance in more than one birth, have had children survive naturally and consider this proof of the effectiveness of the substance.

Unfortunately, the post-detachment results are worse. Near-universal application of Vaseline (97.2%) means that moisture is retained in the healing wound, contrary to cord desiccation biology (Stewart & Benitz, 2016). There is no indication that routine ointment use with penicillin (85.1%) promotes antimicrobial resistance and should be used in routine cord care (WHO, 2022). Bryophyllum preparations (57.9%) have also been documented in Edo State research (Okpako & Ajayi, 2024) and may seem to be promoting cord separation by causing irritation to the tissues, but may contain pathogens from the soil that are introduced into an open wound by the user and thus provide a false sense of efficacy. There was a significant relationship between educational background and harmful substance use ($\chi^2 = 16.847$, p = 0.001) with the tertiary group having the lowest (14.3%) and the no-education group had the highest (62.5%) rates of harmful substance use, although even at 14.3% the rate is not negligible.

4.3 Influencing Factors

When the H_{03} chi-square analysis produces results that can be arranged into a hierarchy, they become immediately useful for intervention planning. The strongest predictor is source of influence ($\chi^2 = 24.856$, p = 0.000): 92.7% recommend substance use when the health worker is the only one to take guidance from; 54.5–57.1% when family, friends, or TBAs are the only ones taking guidance from. This is not a minor gap it's almost a doubling of harmful practice rate when the health worker is not present in the decision. This is the same observation made by Korubo et al. (2023) in Rivers West Senatorial District. This means that in a context where 76.6% of mothers say their families influence their cord care and 65.4% say their TBA influences their cord care, interventions only focusing on the mother when she visits her clinic leave the most influential competing influences untouched.

Perceived effectiveness ($\chi^2 = 21.934$, p = 0.000) and accessibility ($\chi^2 = 18.647$, p = 0.000) are the next strongest associations. Both are modifiable. Mothers who rate the substances very effective use only recommended products (86.2%) while those who doubt effectiveness use only 29.4%, suggesting that demonstration-based education is preferable over verbal education because the mothers update their perceived effectiveness depending on what they observe in practice. The structural counterpart is availability: 88.9% recommended use when supply is consistent and 35.7% when products are not present. These numbers reflect the fact that in the end, product availability is not background information, but a key factor in the outcome.

5. Conclusion and Recommendations

5.1 Conclusion

The postnatal mothers at Zonal Hospital Okrika are well acquainted with good cord care. Adoption of their Chlorhexidine gel is a true achievement. At the same time, they are putting petroleum jelly, antibiotic ointment, herbal preparations, menthol rubs, toothpaste and methylated spirit on the same stump, and the research on each of these is unequivocal: they pose an infection risk, they delay separation, or they are negatively impacting on the chemistry that makes Chlorhexidine effective. This is at very high levels of knowledge, so it's not ignorance, it's cultural normalcy, family pressure and the effectiveness of substances that seem to have worked in past births. The best single sociodemographic predictor of knowledge is educational attainment, as is the best single predictor of safer practice. Health worker influence is the greatest predictor of appropriate substance use, but is competing with family, friends and TBAs who are currently encouraging people to use substances inappropriately. The answer is to reach the people where they are, not waiting for them to arrive at the clinic door.

5.2 Recommendations

1. Structured education on cord care – including demonstration of how Cord Care should be applied, and explicit warnings about the use of toothpaste, petroleum jelly, methylated spirit, self-administered antibiotic ointment and herbal preparations – should be part of compulsory, documented training during both antenatal and postnatal visits in all public health facilities, managed by the Rivers State Ministry of Health.
2. Scale up Chlorhexidine gel distribution to guarantee that mothers have access to the same amount of Chlorhexidine gel at their health centre, thus filling the current missing link of availability for 35.7% of mothers who face supply constraints and are forced to resort to other unsanitary options.
3. The Rivers State Hospital Management Board should develop a policy to ensure that health facilities summon grandmothers, spouses, TBAs and others who make decisions on cord care in the households to scheduled cord care education sessions, with a particular focus on the misconceptions

about Vaseline, Methylated spirit and herbs that they hold.

4. At the Zonal Hospital Okrika, Nurses and midwives should intensify individual counseling for mothers who are either primary or no one in formal education with the use of vernacular, visual aids and demonstration to help develop the practical confidence that group health talks cannot produce to this group of mothers.
5. Future studies should target mother-infant pairs from delivery to the neonatal period to account for self-reported cord care practice as well as to collect clinical outcomes such as diagnosis of cord infection and time to separation to determine which combinations of the substances are responsible for the clinical burden in this population.

Conflict of Interest: The authors have no conflict of interest to declare.

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