

ORIGINAL ARTICLE
CORD CARE PRACTICES AND THEIR DETERMINANTS AMONG
MOTHERS OF UNDER-FIVES RESIDING IN BAYELSA STATE,
NIGERIA

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ABSTRACT

Background

The adoption of good cord care practices is key to ensuring newborn survival. The aim of this study was to determine cord care practices and their predictors among mothers of under-fives in Bayelsa State, South-South Nigeria.

Methods

This community-based, descriptive, cross-sectional study involved 600 randomly selected mothers of under-five children residing in Bayelsa State. A semi-structured questionnaire was used in collecting data, which included mother's socioeconomic characteristics, knowledge and practice of cord care and influencing factors. Responses to questions on cord care practices were categorized as 'poor' or 'good'. Multivariate logistic regression analysis was used to identify predictors of good cord care practices. Significance level was set at p -value < 0.05.

Results

The mean age of the mothers was 30.2 (\pm 6.8) years, 73.2% of them were married and 76.3% had at least secondary education. Only a third of the mothers (34%) adopted "good" cord care practices. Although methylated spirit, a recommended antiseptic was used in 90.5% of cases, it was combined with other substances in up to 74% of cases. Only 25.5% used chlorhexidine gel for cord care. Majority (90.0%) used a clean object to cut the cord but less than half (47.5%) cleaned their babies' cords up to 3 times daily. Predictors of good cord care practices included sourcing information from health workers (aOR=1.76; 95%

CI: 1.07-2.88), urban residence (aOR=1.77; 95% CI 1.03 - 3.04), antenatal clinic (ANC) attendance at a health facility (aOR=3.33; 95% CI: 1.28 - 8.68) and Fair: (aOR = 1.78; 95% CI: 1.12 - 2.82) or good (aOR = 7.39; 95% CI: 3.79 - 14.40) level of knowledge of cord care.

Conclusion

Programmes aimed at encouraging uptake of antenatal care in health facilities and health education of rural-dwelling women on good newborn cord care practices are strongly recommended.

KEYWORDS: Determinants, newborn, cord care, practices, under-fives, mothers, Bayelsa State.

INTRODUCTION

Newborns continue to die from preventable conditions such as neonatal infections in low- and middle- income countries like Nigeria despite improvements in under-five mortality globally.^{1,2} Infections of the umbilical cord are common in the neonatal period and together with neonatal tetanus and sepsis, account for up to 36% of all-cause of neonatal mortality.¹⁻³ The 2019 Nigerian Verbal and Social Autopsy Survey of the deaths recorded in the 2018 Nigeria Demographic and Health Survey showed that infections (sepsis, pneumonia, meningitis, diarrhoea and neonatal tetanus) accounted for 45.2-46.3% of the all cause neonatal deaths.⁴

Omphalitis, an infection of the umbilical stump, accounts for 7-15% of causes of neonatal mortality in developing countries especially in places where home deliveries are common.¹⁻⁵ Neonatal tetanus is also an important cause of neonatal mortality as there were an estimated 34,000 deaths recorded from neonatal tetanus worldwide in 2015.⁶ Neonatal tetanus commonly occurs through the seeding of umbilical stump with the causative organism *Clostridium tetani* from poor cord care practices such as unsterile cutting of the cord and application of various substances to the stump.⁶ The stump may serve as an important focus of infection in the neonatal period.¹⁻³

Cord care is largely related to the immediate postnatal practices adopted by the nursing mother which is often influenced by persisting cultural beliefs and practices.^{1,3,7} Appropriate umbilical cord care is one of the essential newborn practices recommended by the World Health Organization (WHO) as a key strategy to improving newborn survival.⁸ Different strategies have been adopted to ensure that the cord is kept healthy and free from infection till it falls off, usually before the end of the first week of life. Recommended practices include keeping the stump clean and dry in settings where deliveries are conducted in public facilities or regular cleaning with methylated spirit or application of chlorhexidine gel in settings with poor obstetric care and high neonatal mortality rates.⁸⁻¹⁰

Despite these recommendations, potentially harmful and unbeneficial practices abound especially in low- and middle- income countries of sub-Saharan Africa and Asia.¹¹⁻¹³ These include the application of substances such as cow dung, toothpaste, petroleum jelly, breast milk and ash to the cord, hot fermentation of the cord and even the use of unsterilized sharps.¹¹⁻²² These practices are not considered harmful by the users because of their perceived ability to enhance drying,

promote healing and hasten cord separation which is desirable in most traditional settings.^{1,13}

Socioeconomic factors such as the places of residence and delivery, maternal education and social class of parents have been reported as predictors of these poor cord care practices by several authors.¹⁵⁻²³ Several studies have described poor knowledge and practices of good and appropriate cord care by mothers in Nigeria and other countries in sub-Saharan Africa; however the underlying reasons for the adoption of these cord practices have not been fully elucidated.^{1,11,12,15-23} This study was conducted to determine the cord care practices and their predictors among mothers of under-fives in Bayelsa State, Nigeria

METHODOLOGY

Study design

This was a state-wide, community-based, descriptive, cross-sectional study which was carried out in Bayelsa State, Nigeria over a 2-month period (1st May to 30th June 2021).

Study area

Bayelsa State is one of the southern States, located within the Niger Delta region of Nigeria. It has an estimated population of 2,633,466 by 2021 projected from the 2006 census. Bayelsa State is made up of 8 local government areas (LGAs) with 105 wards and its capital is Yenagoa. Bayelsa State is made up of both urban and rural LGAs and most of the inhabitants are civil servants and farmers. The state has two tertiary health institutions located in Yenagoa LGA, and several primary and secondary health centres in the urban and rural areas.

Study population

The study population was made up of women aged 15 to 49 years who had been residing in Bayelsa State for at least one year before the study period, who had at least one under-five

aged child and consented to participate in the study. Mothers who were ill or mentally incompetent to respond to the questionnaire were excluded from the study.

Sample size determination

Sample size for the study was estimated using the Cochran formula.²⁴ Using a prevalence of 61.4% (0.614) in a report by Ndikon et al,²⁵ a 95% confidence interval ($Z=1.96$), precision level of 5% (0.05) and a design effect factor of 1.5 to correct for clustering in a community study,²⁶ a minimum sample size of 547 was calculated and with an anticipated 10% non-response rate, a sample size of 607 was proposed for the study.

Sampling technique

A multistage probability sampling technique was used to select the participants for the study. This involved the selection of one local government area from each of the 3 senatorial districts of Bayelsa State (Central, East and West) by simple random sampling method. Thereafter, one ward was selected from each of the selected LGAs, and then, two communities were chosen from each ward by simple random sampling method. The six communities that were finally selected for the study were Tungbo and Tungbabiri from Angalabiri ward of Sagbama LGA, Ekeki and Azikoro from Epie III ward of Yenagoa LGA and Kolo I and Kolo II from Kolo ward of Ogbia LGA.

In each community, household mapping was done to select the houses by systematic random sampling. A sampling interval was determined by the number of houses enumerated in the mapping exercise divided by the number of participants to be recruited from each community. In the selected houses, where there was only one household that met

the criteria for participation, the mother in such household was recruited for the study. However, where there was more than one household, a household was chosen for the study by simple random sampling. In cases, where a mother declined participation, the next household was chosen before resuming the sequence of house selection. This was repeated until the desired sample size was obtained.

Study instrument

A self-developed interviewer-administered semi-structured questionnaire which assessed the knowledge and practice of cord care and the socio-demographic characteristics of the participants was used for the study. It had previously been pre-tested among 30 mothers residing in a local government area which was not involved in the main study.

The knowledge of good cord care was assessed among participants using 17 questions of the study questionnaire. Using the mean scores and standard deviations, participants were categorized as having 'poor', 'fair' and 'good' levels of knowledge. Participants who scored below the mean score were classified as having poor knowledge. Those who had scores ranging between the mean score and 1 standard deviation above the mean score were deemed to have fair knowledge and those whose scores were greater than the mean score plus 1 standard deviation were considered to have good level of knowledge.

Cord care practices were assessed by 11 items on the questionnaire that explored the instrument used in cutting the newborn's cord, frequency of cleaning, cleaning agents used, cord clamp practice and hand washing practice while caring for the cord. Good cord care

practices were defined as washing hands before and after cord care, cutting the cord with a clean and sterile instrument, clamping the cord with clean thread or cord clamp, application of an antiseptic (methylated spirit or chlorhexidine gel) and not applying any other substance on the cord and cleaning the cord 3 or more times a day after every nappy change. Participants who indicated preferred actions were scored 1 point and those who indicated otherwise were scored 0. Scores were summed and participants who scored at least 8 points were categorised as having 'good' cord care practice while those with less were classified as having 'poor' cord care practice.

Data analysis

Data was analyzed with Statistical Package for Social Sciences (SPSS) software version 25. Descriptive analysis was done to determine socio-demographic characteristics of the population, knowledge and sources of information about cord care practices. Association between cord care practice and various categorical variables was determined using chi-square test of proportions. For those explanatory variables that were significantly associated with good cord care practices ($p < 0.05$), the strength of association was further explored using a multivariate logistic regression analysis. Explanatory variables that remained significantly related to good cord care were considered predictors of good cord care practice. The level of significance was set at $p\text{-value} < 0.05$.

Ethical considerations

Ethical approval for the study was obtained from the Research Ethics Committee of the University of Port Harcourt, Rivers State with reference number: PH/CEREMAD/REC/MM74/059. Permission for the study was

obtained from the Community Heads in all the selected communities before the commencement of the study. Written informed consent was obtained from all eligible participants before their participation.

completed the study was 30.2 ± 6.8 years. Most of them were married or co-habiting (73.2%), christians (96.8%), with about half having a secondary education (50.3%) and up to 1 in every 5 mothers (22.8%) being unemployed (Table1).

RESULTS

The mean age of the 600 mothers who

Table 1: Socio-demographic characteristics of 600 respondents in the study

| Characteristics | Frequency n = 600 | Percent (%) |
|-----------------------------------|-------------------|-------------|
| Age group | | |
| <20 years | 20 | 3.3 |
| 20 - 29 years | 283 | 47.2 |
| 30 - 39 years | 236 | 39.3 |
| >40 years | 61 | 10.2 |
| Mean Age (\pm SD) years | 30.2 ± 6.8 | |
| Marital Status | | |
| Single | 96 | 16.0 |
| Married/Co-habiting | 439 | 73.2 |
| Separated/Widowed/Divorced | 65 | 10.8 |
| Religion | | |
| Christianity | 581 | 96.8 |
| Others | 19 | 3.2 |
| Educational attainment | | |
| No formal education | 45 | 7.5 |
| Primary | 97 | 16.2 |
| Secondary | 302 | 50.3 |
| OND/NCE | 84 | 14.0 |
| University | 72 | 12.0 |
| Occupation | | |
| Senior public servant/Manager | 61 | 10.2 |
| Intermediate grade public servant | 58 | 9.7 |
| Junior school teachers/artisans | 72 | 12.0 |
| Petty trader/labourers/messengers | 272 | 45.3 |
| Unemployed/homemaker/student | 137 | 22.8 |

| Number of children by respondents | | |
|--|-----|------|
| 1 - 2 Children) | 252 | 42.0 |
| 3 - 4 Children | 226 | 37.7 |
| ≥ 5 Children | 122 | 20.3 |
| Locality | | |
| Rural | 400 | 66.7 |
| Urban | 200 | 33.3 |
| Local government area | | |
| Yenagoa | 200 | 33.3 |
| Ogbia | 200 | 33.3 |
| Sagbama | 200 | 33.3 |

OND/NCE Ordinary National Diploma/ National Certificate of Education

Antenatal care (ANC) was sought mostly from government-owned primary health centres, traditional birth attendant (TBA) homes and government-owned secondary health facilities by 34.8%, 34.5% and 32.3% of mothers respectively. Other places where ANC was received included government tertiary health facilities, proprietary patent medicine ("chemist") shops and private hospitals in 13.8%, 9.3% and 9.0% of the mothers. Up to 7.2% of the mothers did not receive any antenatal care.

Majority of the women (93.5%) who participated in the study were aware of various cord care practices with the leading sources of information being the respondents' mothers (62.7%), health workers (60.8%), friends and neighbours (51.0%) and grandmothers (28.3%).

The minimum, maximum and mean knowledge scores were 0, 15 and 8.6 (SD± 2.8) points. A total of 296 (49.3%) mothers had a

poor knowledge of good cord care practices while 201 (33.5%) and 103 (17.2%) had fair and good knowledge of good cord care practices respectively.

Majority of the participants knew that good cord care practices involved cutting the umbilical cord with a clean instrument (94.2%), cleaning the cord with methylated spirit (94.0%) and tying the cord stump with a clean thread/cord clamp (93.0%). However, up to 95.0% of the women did not know that in caring for their babies' cord, the cord could be exposed to air to dry.

The good cord care a practices adopted by the mothers included clamping the cord with clean thread or cord clamp (93.7%), cutting the cord with a clean instrument (90.2%) and the application of methylated spirit to the cord (90.3%) (Table 2). However, methylated spirit was applied in combination with other substances in up to 74% of cases.

Table 2: Response pattern to questions investigating Cord care practices among respondents

| Questions | Responses - Frequency N = 600 (100%) | | |
|---|--------------------------------------|------------|-------------|
| | Yes | No | No response |
| Cord care practices adopted by respondents | 516 (86.0) | 70 (11.7) | 14 (2.3) |
| Washing my hands before and after handling the cord | | | |
| Cleaning/ wash the cord with water only | 90 (15.0) | 494 (82.3) | 16 (2.7) |
| Application of methylated spirit | 542 (90.3) | 44 (7.3) | 14 (2.3) |
| Application of 4% chlorhexidine gel | 153 (25.5) | 433 (72.2) | 14 (2.3) |
| Exposing the cord to air to allow it to dry | 39 (6.5) | 546 (91.0) | 15 (2.5) |
| Applying substances ^a to the cord | 444 (74.0) | 142 (23.7) | 14 (2.3) |
| Applying herb ^b to cord | 220 (36.7) | 366 (61.0) | 14 (2.3) |
| Cutting the cord with a clean instrument | 541 (90.2) | 45 (7.5) | 14 (2.3) |
| Clamping the cord with a clean thread or cord clamp | 562 (93.7) | 24 (4.0) | 14 (2.3) |
| Instrument used to cut cord of Index child | | | |
| Cut cord with new razor blade | 162 (27.0) | 438 (73.0) | 0 (0.0) |
| Cut cord with knife | 15 (2.5) | 585 (97.5) | 0 (0.0) |
| Cut cord with surgical blade | 131 (21.8) | 469 (78.2) | 0 (0.0) |
| Cut cord with scissors | 232 (38.7) | 368 (61.3) | 0 (0.0) |
| Cord cleaning frequency in the Index child | | | |
| Clean cord once a day | 2 (0.3) | 585 (97.6) | 13 (2.1) |
| Clean cord twice a day | 108 (18.0) | 121 (79.9) | 13 (2.1) |
| Clean cord three times a day | 285 (47.5) | 302 (50.4) | 13 (2.1) |
| Clean cord four times a day | 54 (9.0) | 533 (88.9) | 13 (2.1) |
| Clean cord greater than four times a day | 36 (6.0) | 551 (91.9) | 13 (2.1) |
| Clean cord after every nappy change | 102 (17.0) | 485 (80.9) | 13 (2.1) |

^asubstances include salt, ash, antibiotic cream such as penicillin ointment, vaseline, toothpaste

^bHerb used was the "Africa never die leaf" combined with Alligator pepper;

The most common substances used for cord care in combination with methylated spirit were antibiotic ointment (71.1%), vaseline (55.0%) and tooth paste (27.2%). Another practice of cord care that was found to be common was the act of pressing the cord with dry heat or hot water which was reported by

87.0% of the mothers. Only 3.7% of the mothers used methylated spirit alone to clean their babies' cords. Chlorhexidine gel was used for cord care in only 25.5% of the respondents. Majority (90.0%) used a clean object to cut the cord but less than half (47.5%) cleaned their babies' cords up to three times daily. (Table 3).

Table 3: Substances mothers used in the care of newborn babies' cord.

| Substance | Frequency n= 600 | Percent (%) |
|--------------------------------------|------------------|-------------|
| Substances used for cord care | | |
| Methylated Spirit | 543 | 90.5 |
| Hot water press | 522 | 87.0 |
| Antibiotic Ointment | 430 | 71.1 |
| Vaseline | 330 | 55.0 |
| Toothpaste | 163 | 27.2 |
| Chlorhexidine gel | 154 | 25.7 |
| Breast milk | 89 | 14.8 |
| Ash | 45 | 6.7 |
| Alligator pepper | 12 | 2.0 |
| Salt | 12 | 2.0 |
| Medicated powder | 10 | 1.7 |
| Cow or Human Urine | 7 | 1.2 |
| Cow dung | 6 | 1.0 |
| Mud | 6 | 1.0 |
| Honey | 6 | 1.0 |

The minimum and maximum score for cord care practices were 0 and 10 point(s) respectively with a mean practice score of 6.9 (SD± 1.6) points. Overall, a third of the women (34.0%) had good cord care practices while 66% had poor cord care practices.

Of the socio-demographic characteristics investigated in this study, mothers' level of education ($\chi^2=13.41$; $p = 0.009$), mothers' occupation ($\chi^2=10.92$; $p= 0.027$), local government area ($\chi^2=16.22$; $p= 0.001$) and locality of residence ($\chi^2=10.69$; $p =0.001$) showed significant positive associations with the use of good cord care practices (Table 4).

Table 4: Association between socio-demographic factors and good cord care practices in Bayelsa State

| Variable | Total | Good Practice | Poor Practice | Chi-square | P Value |
|------------------|-------|---------------|---------------|------------|---------|
| Age group | | | | | |
| < 20 years | 20 | 4 (20.0) | 16 (80.0) | 3.52 | 0.318 |
| 20 – 29 years | 283 | 105 (37.1) | 178 (62.9) | | |
| 30 – 39 years | 236 | 76 (32.2) | 160 (67.8) | | |
| ≥ 40 years | 61 | 19 (31.1) | 42 (68.9) | | |

| | | | | | |
|---|-----|------------|------------|-------|--------|
| Marital Status | | | | | |
| Single | 96 | 29 (30.2) | 67 (69.8) | 1.20 | 0.550 |
| Married/Co-habiting | 439 | 150 (34.2) | 289 (65.8) | | |
| Separated/Widowed/ Divorce | 65 | 25 (38.5) | 40 (61.5) | | |
| Religion | | | | | |
| Christianity | 581 | 200 (34.4) | 381 (65.6) | 1.47 | 0.226 |
| Others | 19 | 4 (21.5) | 15 (78.5) | | |
| Respondent's Educational Level | | | | | |
| No formal education | 45 | 10 (22.2) | 35 (77.8) | 13.41 | 0.009* |
| Primary | 97 | 28 (28.9) | 69 (71.1) | | |
| Secondary | 302 | 96 (31.8) | 206 (68.2) | | |
| OND/NCE | 84 | 40 (47.6) | 44 (52.4) | | |
| University | 72 | 30 (41.7) | 42 (58.3) | | |
| Respondent's Occupation | | | | | |
| Senior public Servant and Managers | 61 | 31 (50.8) | 30 (49.2) | 10.92 | 0.027* |
| Intermediate grade officers and Senior secondary Teachers | 58 | 21 (36.2) | 37 (63.8) | | |
| Junior Teachers/Artisans | 72 | 25 (34.7) | 47 (65.8) | | |
| Pretty Trader | 272 | 90 (33.1) | 182 (66.9) | | |
| Unemployed/Homemaker | 137 | 37 (27.0) | 100 (73.0) | | |

| Local government area | | | | | |
|------------------------------|-----|------------|------------|-------|--------|
| Ogbia | 200 | 70 (35.0) | 130 (65.0) | 16.22 | 0.001* |
| Sagbama | 200 | 48 (24.0) | 152 (76.0) | | |
| Yenagoa | 200 | 86 (43.0) | 114 (57.0) | | |
| Locality | | | | | |
| Rural | 400 | 118 (29.6) | 282 (70.4) | 10.69 | 0.001* |
| Urban | 200 | 86 (43.0) | 114 (57.0) | | |

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As shown in Table 5, a good knowledge was associated with the use of a good cord care practice ($\chi^2=49.22$; $p=0.001$). Concerning the source of knowledge of cord care practice, only mothers who obtained information about cord care practice from health workers applied good cord care practice ($\chi^2=19.33$; $p=0.001$).

Table 5: Association between Level of knowledge of cord care, Sources of information about cord care, Antenatal care attendance, Place of antenatal care and delivery, birth attendants and Good Cord care practice

| Variable | Total | Good Practice | Poor Practice | Chi-square | P-Value |
|--|-------|---------------|---------------|------------|---------|
| Level of Knowledge of cord care | | | | | |
| Poor knowledge | 296 | 74 (25.0) | 222(75.0) | 49.82 | 0.001* |
| Fair knowledge | 201 | 65 (32.3) | 136 (67.7) | | |
| Good knowledge | 103 | 65 (63.1) | 38 (36.9) | | |
| Source of information about Cord care | | | | | |
| Mother | 376 | 123 (32.7) | 253 (67.3) | 0.74 | 0.388 |
| Grandmother | 170 | 51 (30.0) | 119 (70.0) | 1.69 | 0.193 |
| Health worker | 365 | 149 (40.8) | 216 (59.2) | 19.33 | 0.001* |
| Friends/Neighbours | 306 | 103 (33.7) | 203 (66.3) | 0.03 | 0.858 |
| Media | 57 | 23 (40.4) | 34 (59.6) | 1.13 | 0.287 |
| Church | 29 | 11 (37.9) | 18 (62.1) | 0.21 | 0.647 |
| Others | 8 | 2 (25.0) | 6 (75.0) | 0.29 | 0.589 |
| Antenatal Care attendance | | | | | |
| Had ANC in last pregnancy | 557 | 199 (35.7) | 358 (64.3) | 10.33 | 0.001* |
| No ANC in last pregnancy | 43 | 5 (11.6) | 38 (88.4) | | |

| | | | | | |
|--|-----|------------|------------|-------|--------|
| Place of Antenatal care | | | | | |
| Primary health care | 209 | 73 (34.9) | 136 (65.1) | 0.12 | 0.726 |
| Secondary health facility | 194 | 63 (32.5) | 131 (67.5) | 0.29 | 0.585 |
| Tertiary health facility | 83 | 35 (42.2) | 48 (57.8) | 2.86 | 0.162 |
| Private hospital | 54 | 23 (42.6) | 31 (57.4) | 1.95 | 0.091 |
| TBA homes | 207 | 49 (23.7) | 158 (76.3) | 15.02 | 0.001* |
| Chemist | 56 | 15 (26.8) | 41 (73.2) | 1.43 | 0.231 |
| Home | 54 | 11 (20.4) | 43 (79.6) | 4.91 | 0.027* |
| Place of delivery of the last child | | | | | |
| Primary health care center | 115 | 39 (33.9) | 76 (66.1) | 17.23 | 0.008* |
| Secondary Government hospital | 134 | 48 (35.8) | 86 (64.2) | | |
| Tertiary health facility | 74 | 32 (43.2) | 42 (56.8) | | |
| Private hospital | 68 | 31 (45.6) | 37 (54.4) | | |
| TBA home | 76 | 16 (21.1) | 60 (78.9) | | |
| Church/Chemist | 32 | 13 (40.6) | 19 (59.4) | | |
| Home | 101 | 25 (24.8) | 76 (75.2) | | |
| Birth Assistant at delivery^a | | | | | |
| Nurse | 381 | 144 (37.8) | 237 (62.2) | 6.70 | 0.010* |
| Doctor | 187 | 80 (42.8) | 107 (57.2) | 9.33 | 0.002* |
| Midwife | 262 | 93 (35.5) | 169 (64.5) | 0.46 | 0.496 |
| Traditional birth attendant | 191 | 45 (23.5) | 146 (76.5) | 13.61 | 0.001* |

ANC = antenatal care, TBA = traditional birth attendant

Mothers who had antenatal care from health workers (35.7%) had good cord care practices compared to those who did not have ANC (11.6%) ($\chi^2=10.33$; $p=0.001$). The places where mothers delivered ($\chi^2=17.23$; $p=0.008$) and the birth attendants ($p<0.05$) also had significant positive associations with the use of good cord care practices. Significantly, more mothers delivered by doctors (42.8%) and nurses (37.8%) used good cord care practices compared to those delivered by traditional birth attendants (23.5%), reflecting that deliveries by health workers were more associated with the use of good cord care practices than the deliveries conducted by non-health workers (Table 5).

Using multivariate logistic regression analysis (table 6), obtaining information about cord care from health care workers (aOR – 1.76; $p = 0.025$; 95% CI :1.07 – 2.88), living in Yenagoa local government area (aOR – 1.90; $p=0.023$; 95% CI: 1.09 – 3.29), urban residence (aOR – 1.77; $p - 0.039$; 95% CI: 1.03 – 3.04), having antenatal care from health facilities (aOR – 3.33; $p - 0.014$; 95% CI: 1.28 – 8.68) and level of knowledge of cord care (Fair: aOR – 1.78; $p - 0.015$; 95% CI: 1.12 – 2.82) Good: aOR – 7.39; $p- 0.001$; 95% CI: 3.79 – 14.40) were identified as significant positive predictors of good cord care practice.

Table 6: Predictors of good cord care among mothers of under-five children in Bayelsa State.

| Characteristics (Reference group) | Univariate Analysis | | Multivariate Analysis | |
|---|---------------------|---------|-----------------------|---------|
| | Crude OR (95%CI) | p-value | aOR (95%CI) | p-Value |
| Educational attainment (No Formal Education) | | | | |
| Primary | 1.42 (0.62 – 3.25) | 0.407 | 1.21 (0.41 – 3.55) | 0.729 |
| Secondary | 1.63 (0.78 – 3.43) | 0.197 | 1.38 (0.59 – 3.22) | 0.456 |
| OND/NCE | 3.18 (1.40 – 7.25) | 0.006* | 0.95 (0.48 – 1.90) | 0.892 |
| University | 2.50 (1.07 – 5.82) | 0.033* | 1.93 (0.89 – 4.19) | 0.096 |
| Occupation (Unemployed) | | | | |
| Senior public Servant and Managers | 2.79 (1.49 – 5.23) | 0.001* | 1.91 (0.85 – 4.29) | 0.118 |
| Intermediate grade officers and Senior secondary Teachers | 1.53 (0.80 – 2.95) | 0.200 | 0.95 (0.42 – 2.17) | 0.902 |
| Junior Teachers/Artisans | 1.44 (0.78 – 2.66) | 0.247 | 1.49 (0.71 – 3.13) | 0.298 |
| Pretty Trader | 1.34 (0.85 – 2.10) | 0.210 | 1.44 (0.85 – 2.43) | 0.173 |
| Source of information(Non- health workers) | | | | |
| Health worker | 2.29 (1.56 – 3.37) | 0.001* | 1.76 (1.07 – 2.88) | 0.025* |
| Local Government Area (Sagbama) | | | | |
| Ogbia | 1.71 (1.10 – 2.64) | 0.001* | 1.18 (0.65 – 2.15) | 0.580 |
| Yenagoa | 2.39 (1.56 – 3.67) | 0.016* | 1.90 (1.09 – 3.29) | 0.023* |
| Locality (Rural) | | | | |
| Urban | 1.79 (1.26 – 2.56) | 0.001* | 1.77 (1.03 – 3.04) | 0.039* |
| Level of Knowledge (Poor) | | | | |
| Fair | 1.43 (0.97 – 2.13) | 0.074 | 1.78(1.12– 2.82)) | 0.015* |
| Good | 5.13 (3.18 – 8.28) | 0.001* | 7.39(3.79– 14.40) | 0.001* |
| Place of ANC (PHC) | | | | |
| Tertiary government health facility | 1.19 (0.61 – 2.35) | 0.612 | 1.11 (0.42 – 2.88) | 0.839 |
| TBA | 0.55 (0.36 – 0.85) | 0.007* | 0.63 (0.37 – 1.09) | 0.098 |
| Church | 0.79 (0.49 – 1.24) | 0.298 | 0.82 (0.48 – 1.41) | 0.483 |
| Home | 0.96 (0.41 – 2.28) | 0.943 | 1.09 (0.43 – 2.75) | 0.856 |

Antenatal care (No ANC)

| | | | | |
|---------|---------------------|--------|--------------------|--------|
| Had ANC | 4.23 (1.64 – 10.91) | 0.003* | 3.33 (1.28 – 8.68) | 0.014* |
|---------|---------------------|--------|--------------------|--------|

Place of Delivery (PHC)

| | | | | |
|-------------------------|--------------------|-------|--------------------|-------|
| Secondary govt hospital | 1.70 (0.96 – 3.01) | 0.071 | 1.10 (0.56 – 2.19) | 0.779 |
|-------------------------|--------------------|-------|--------------------|-------|

| | | | | |
|-------------------------------|---------------------|--------|--------------------|-------|
| Tertiary govt health facility | 4.86 (1.46 – 16.23) | 0.010* | 1.30 (0.41 – 4.15) | 0.660 |
|-------------------------------|---------------------|--------|--------------------|-------|

| | | | | |
|------------------|--------------------|--------|--------------------|-------|
| Private hospital | 2.55 (1.32 – 4.91) | 0.005* | 0.83 (0.37 – 1.85) | 0.647 |
|------------------|--------------------|--------|--------------------|-------|

| | | | | |
|----------|--------------------|-------|--------------------|-------|
| TBA home | 0.81 (0.40 – 1.65) | 0.564 | 0.82 (0.27 – 2.47) | 0.726 |
|----------|--------------------|-------|--------------------|-------|

| | | | | |
|----------------|--------------------|-------|--------------------|-------|
| Chemist/Church | 1.09 (0.36 – 3.32) | 0.885 | 0.48 (0.18 – 1.26) | 0.138 |
|----------------|--------------------|-------|--------------------|-------|

| | | | | |
|---------------|--------------------|-------|--------------------|-------|
| Home delivery | 0.64 (0.35 – 1.16) | 0.841 | 0.79 (0.36 – 1.75) | 0.562 |
|---------------|--------------------|-------|--------------------|-------|

Birth Assistant at Delivery (Midwife)

| | | | | |
|-------|--------------------|--------|--------------------|-------|
| Nurse | 1.61 (1.12 – 2.31) | 0.010* | 1.10 (0.62 – 1.97) | 0.740 |
|-------|--------------------|--------|--------------------|-------|

| | | | | |
|--------|--------------------|--------|--------------------|-------|
| Doctor | 1.74 (1.22 – 2.49) | 0.002* | 1.07 (0.59 – 1.95) | 0.813 |
|--------|--------------------|--------|--------------------|-------|

| | | | | |
|-----|--------------------|--------|--------------------|-------|
| TBA | 0.51 (0.33 – 0.91) | 0.001* | 0.81 (0.33 – 1.96) | 0.638 |
|-----|--------------------|--------|--------------------|-------|

aOR – Adjusted Odds ratio, TBA – Traditional birth attendant, PHC – Primary health care centre, ANC – Antenatal care. govt- Government

DISCUSSION

This study showed that the practice of good cord care by mothers of under-fives in Bayelsa State was low as only a third of the mothers adopted good cord care practices; an observation that has previously been reported by other authors.^{15,16,27} Though a majority of the women used methylated spirit, a recommended antiseptic for cord care, most of them used it in combination with other substances like herbs, toothpaste, antibiotic cream, breast milk, salt and ash as previously reported by various authors in Nigeria and sub-Saharan Africa.^{11-22,28} The popularity of the use of these traditional substances was related to the belief that while the methylated spirit would sterilise the stump, the other agents would aid in drying the stump and therefore faster separation.¹⁹⁻²³ In other African countries like Uganda and Zambia, substances like chicken or lizard droppings and cow dung were reported to be commonly used by mothers for cord care,²² a practice which has

been found to increase the incidence of omphalitis and neonatal tetanus. The use of chlorhexidine gel, another potent antiseptic for cord care was also low in the present study despite the fact that it is recommended by the World Health Organisation for application to the umbilical cord stump in the early neonatal period for those born at home in settings with a high neonatal mortality.²⁹ The low use of chlorhexidine gel by the mothers in this study suggests that there is low awareness and knowledge of its usefulness by women in Bayelsa State. This may however be related to the fact that chlorhexidine gel prolongs separation time of the umbilical cord which has been found to reduce its cultural acceptability by mothers as reported by some authors.^{21,30}

Various factors have been found to influence the adoption of good cord care practices by mothers. In this study, the low maternal knowledge of good cord care practice was a major factor influencing their practice; an

observation earlier noted by Ndikom et al in Ibadan²⁵, Mohammed et al in Jos³⁰ and Anjo et al in Sokoto.³¹ The major source of knowledge on cord care was from the participants' mothers which is likely to have had a major impact on their practice as had been noted by other authors.^{15,32} Abhulimhen-Iyoha and Ibadin³² found that information on cord care received by mothers influenced the cord care practice adopted by them. It is therefore possible that the information that the mothers in the present study received encouraged the use of these traditional substances thus accounting for the poor cord care practised by them.

Other factors such as maternal education, occupation and locality of residence, found to be significantly associated with the adoption of good cord care practices by mothers in this study were similarly reported by Opara *et al*¹⁵ in Yenagoa in 2012. In their facility-based study, less educated mothers and those of lower socio-economic classes were found to be more likely to use potentially harmful substances for cord care than their educated counterparts. Similarly, Abhulimhen-Iyoha and Ibadin¹⁴ found that the adoption of good cord care practices was higher among the more educated mothers but in contrast, they also noted an association with significantly older women and those who had male babies. It is possible that maternal education enabled the mothers to have a better understanding of the importance of good cord care practices while those with better occupations and urban residence had better financial means to afford the "modern" and recommended cord care agents.

Similar to the findings by Opara *et al*,¹⁵ mothers who had antenatal care and delivered at health facilities assisted by health workers in this study adopted good practices compared to

those whose deliveries were assisted by TBAs in their homes. This finding could be due to the poor knowledge and practice of cord care practices adopted by the TBAs during the antenatal, delivery and early postnatal period which could influence the information they give to the mothers.³²⁻⁻³⁴ Similarly, Abhulimhen-Iyoha and Ibadin³² reported a significant relationship between cord care information and the cord care practices adopted by mothers and found that TBAs usually encouraged the use of cord care practices such as application of methylated spirit in combination with balm and hot compress. Furthermore, Lamawal *et al*³³ from their study of TBAs in Yenagoa noted that most TBAs recommended the use of methylated spirit followed by the application of local herbs to aid fast cord separation. These practices were encouraged because of their perceived "ability" to aid faster cord separation.^{18, 33} In contrast, Isah *et al*³⁴ who interviewed 300 mothers in Jos reported that there was no significant association between the maternal educational level and the cord care practices they adopted. They also noted that the presence of a health facility and antenatal care attendance did not impact on the choice of good cord care practices in contrast to the findings in this study. The reasons for these disparities are unclear.

In the present study, sourcing information about cord care from health workers, living in an urban locality, having antenatal care and fair or good level of knowledge of cord care were identified as significant predictors of good cord care practice as previously reported by Afolaranmi *et al*.¹⁸ Obtaining health information from the health facility during health talks is a main component of most antenatal services as the health workers have been trained to give accurate health.

information and thus are able to appropriately educate women on good and appropriate cord care practices.

The low level of practice of good newborn cord care among mothers in Bayelsa State and the fact that knowledge of cord care was a significant predictor of good cord care practice found in this study has been similarly reported by other authors.^{18,25} In contrast, Ango *et al*³¹ in their study reported that though most of the respondents had a good knowledge of cord care, their practice was poor. It is to be expected that knowledge should influence practice of any health-care intervention as usually people need to have information and thereafter understand the need to adopt a particular practice. Unlike other studies, socio-demographic factors like income, older maternal age, number of children and religion were not predictors of good cord-care practice.^{15,21,30,35} The reasons for these disparities are unclear but may point to the strong influence of cultural practices which vary across socio-economic and educational groups. This study had some limitations. It was based on self reports, and it is therefore possible that there could have been some information and recall biases which could have affected the responses by the participants.

CONCLUSIONS

The practice of good cord care by mothers of under five children in Bayelsa State is low. There is a high preponderance of the use of harmful substances for cord care among the mothers. Factors which significantly predict the adoption of good cord care practices are cord care information sourced from health workers, urban residence, health facility antenatal care attendance and fair or good knowledge of good cord care practices.

RECOMMENDATIONS

Health education of all women in the community on good newborn cord care practices should be encouraged through health communication and promotion programmes. Good cord care practices should also form a major part of health talks by health care workers during antenatal clinics to improve its knowledge among intending mothers.

REFERENCES

1. Coffey P.S., & Brown, S.C.. Umbilical cord-care practices in low- and middle-income countries: A systematic review. *BMC Pregnancy and Childbirth*; 2017;17 (1):1. <https://doi.org/10.1186/s12884-017-1250-7>
2. World Health Organization (WHO): Newborns: Improving survival and well-being. Fact sheets <https://www.who.int>. 2019. Assessed on 12th December 2020
3. Mir F, Tikmani SS, Shakoore S, Warraich HJ, Sultana S, Ali SA et al. Incidence and etiology of omphalitis in Pakistan: a community based cohort study. *J Infect Dev Ctries*, 2011; 5(12): 828-33.
4. National Population Commission (NPC) [Nigeria] and CIRCLE, Social Solutions International, Inc. 2020. Nigeria 2019 Verbal and Social Autopsy Study: Main Report. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and Social Solutions International, Inc.
5. Fraser N, Davies BW, Cusack J. Neonatal omphalitis: a review of its serious complications. *Acta Paediatr*; 2006; 95(5):519-22

6. World Health Organization (WHO): Maternal and neonatal tetanus (MNT) elimination. <https://www.who.int>. 2019. Assessed on 12th December 2020.
7. Abegunde D., Orobato N, Beal K., Bassi A., Bamidele, M, Akomolafe T., et al. Trends in newborn umbilical cord care practices in Sokoto and Bauchi States of Nigeria: The where, who, how, what and the ubiquitous role of traditional birth attendants: A lot quality assurance sampling survey. *BMC Pregnancy and Childbirth*. 2017; 17 (1):. <https://doi.org/10.1186/s12884-017-1551-x>
8. World Health Organization (WHO) Recommendations on postnatal care of the mother and newborn. 2014 :. Geneva https://www.who.int/maternal_child_adolescent/documents/924159084x/en/index/html. Accessed on 12th December 2020.
9. Federal Ministry of Health. Saving newborn lives in Nigeria: Newborn health in the context of the Integrated Maternal, Newborn and Child Health Strategy. 2nd Edition. Abuja: Federal Ministry of health, Save the Children, Jhpiego; 2011
10. Olorunsaiye C.Z., Harris A, Yusuf K.K. Characteristics of early newborn care: a descriptive analysis of recent births in Nigeria. *International Journal of Maternal and Child Health and AIDS*. 2020; 9 (1): 93-102
11. Alparslan O, Demirel Y. Traditional neonatal care practices in Turkey. *Jpn J Nurs Sci*. 2013; 10 (1):47-54. <https://doi.org/10.1111/j.1742-7924.2012.00209>
12. Herlihy JM, Shaikh A, Mazimba A, Gagne N, Grogan C, Mpamba C, et al. Local perceptions, cultural beliefs and practices that shape umbilical cord care: A qualitative study in Southern Province, Zambia. *PLoS ONE* 2013; 8 (11). <https://doi.org/10.1371/journal.pone.0079191>
13. Sacks E, Moss W.J, Winch P.J, Thuma, P, Van Dijk JH., Mullany, LC. Skin, thermal and umbilical cord care practices for neonates in southern, rural Zambia: A qualitative study. *BMC Pregnancy Childbirth*. 2015; 15 (1). <https://doi.org/10.1186/s12884-015-0584-2>
14. Abhulimhen-Iyoha BI, Ofili A, Ibadin MO. Cord care practices among mothers attending immunization clinic at the University of Benin Teaching Hospital, Benin City. *Nig J Paed*. 2011; 38 (3):104-108
15. Opara P, Jaja, T, Dotimi, D, Alex-Hart B. Newborn Cord Care Practices Amongst Mothers in Yenagoa Local Government Area, Bayelsa State, Nigeria. *Int J Clin Med*. 2012; 3 (1): 22-27.
16. Opara PI, Jaja T, Okari, TG. Newborn Cord Care Practices Amongst Mothers In Port Harcourt, Nigeria. *Jos Journal of Medicine* 2012; 6 (3): 33-36
17. Kaoje AU, Okafoagu N.C, Raji MO, Adamu YH., Nasir MA. Bello M et al Home Delivery, Umbilical Cord Care Practices and Postnatal Care Utilization among Mothers in a Rural Community of Sokoto State. *Journal of Community Medicine and Primary Health Care*. 2018; 30 (2):36-46.
18. Afolaranmi TO, Hassan ZI., Akinyemi OO., Sule SS., Maletete, MU, Choji, CP. et al. Cord Care Practices: A Perspective of Contemporary Africa

- Settings. *Front Public Health*.2018; 6: 10. <https://doi.org/10.3389/fpubh.2018.00010>
19. Asiegbu, UV., Asiegbu O.G., Ezeonu CT, Ezeanosike O.B., Onyire BN. Determinants of Cord Care Practices among Mothers in Abakaliki, Ebonyi State, South East, Nigeria. *Open J Prev Med* 2019; 9 (5):43-50.<https://doi.org/10.4236/ojpm.2019.95005>
 20. Obiora, OL, Ezenduka P, Ndie EC, Umeonwuka I., Nwachukwu-umeonwuka, J.O. New born cord care practices among parturient women in a rural contemporary Nigeria setting. *International Journal of Public Health and Clinical Sciences*.2019;6(3): 117-29
 21. Udosen I, Olaoye,T, Esienmoh E, Udosen, G, Amaechi D. Practice of Nursing Mothers towards Umbilical Cord Care in Calabar Metropolis, Cross River State. *Asian J of Med Prin and Clin Pract*2019; 2(2): 1-12.
 22. Mukunya D, Haaland MES, Tumwine JK, Tylleskar T, Nankabirwa V, Moland KM. "the cord is the child": Meanings and practices related to umbilical cord care in Central Uganda. *BMC Pediatrics*. 2020; 20 (1): <https://doi.org/10.1186/s12887-020-2002-9>
 23. AbhulimhenIyoha, BI., Ibadin M.O. Determinants of cord care practices among mothers in Benin City, Edo State, Nigeria. *Niger J Clin Pract*. 2012;15: 210-3.
 24. Cochran WG. Sampling techniques (3rd ed.), New York: John Wiley & Sons, Inc 1971.
 25. Ndikom C, Oluwatosin, F, Oluwatosin O. A. Umbilical Cord Care Knowledge and Practices of Mothers attending selected Primary Health Care Centres in Ibadan, Nigeria. *Int J Caring Sciences*. 2020; 13 (1):143-51
 26. Umulisa C. Sampling Methods and Sample Size Calculation for the SMART Methodology June 2012 [Online] Available @ www.smartmethodology.org. Accessed 22nd August 2019
 27. Osuchukwu EC, Ezeruigbo CS, Eko JE. Knowledge of Standard Umbilical Cord Maagement among Mothers in Calabar South Local Government Area, Cross River State, Nigeria. *Int J Nurs Sci*. 2017;7(3): 57-62
 28. Asiedu SS, Apatu NA, Tetteh R, Hodgson A. Neonatal Cord Care Practices among Mothers and Caregivers in the Volta Region of Ghana. *Int J of MCH and AIDS* (2019). 2019; 8 (1): 63-69.
 29. World Health Organization (WHO) 2014: Recommendations on postnatal care of the mother and newborn. Geneva. https://www.who.int/maternal_child_adolescent/documents/924159084x/en/index/html. Accessed on 12th December 2020.
 30. Mohammed A, Envuladu EA, Osagie IA, Difa JA. Assessment of knowledge and cord care practices among pregnant women in selected PHCs in Jos metropolis, Plateau state. *Int J Community Med Public Health*. 2020;7(4):1215-19
 31. Ango U, Adamu A, Umar M, Tajudeen M, Ahmad A, Abdulrahman H. Knowledge and Practices of Umbilical Cord Care among Mothers Attending Antenatal Care in the Health Facilities in Sokoto Metropolis, Nigeria. *Int J Cont Med Res*, 20218 (1) ISSN (Online): 2393-

- 915X;(Print). 2021; 2454-7379
32. Abhulimhen-Iyoha BI., Ibadin, M.O. Cord care education and its content given to mothers at antenatal clinics at various health facilities in Edo State, Nigeria. *Sahel Med J* 2015;18: 12933.
 33. Lamawal A, Agada J, Aluye-Benibo, D, Igbans, R. Umbilical Cord Care Practices by Traditional Birth Attendants in Yenagoa, Nigeria. *IOSR Journal of Nursing and Health Science* 2015; 4(2):92-6. e-ISSN: 2320-1959.p- ISSN: 2320-1940
 34. Isah HO, Bassi AP, Chima G. Cord care among mothers of sub-urban Lewllem community of Jos South LGA, Plateau State, Nigeria. *African Journal of Pharmaceutical Research and Development* 2018; 10 (1): 15-21.
 35. Chidiebere OD, Uchenna E, Stanley O, Bernard EE. Umbilical Cord Care Practices and Incidence of Febrile Illnesses in the First Month of Life among Newborns- A Population Based Study. *Br J Med Med Res* 2015; 5(11):1422-30