

# Umbilical Cord Care Practices among Lactating Mothers in Bauchi State, Nigeria

Dr. Saidu Isah<sup>1</sup>, Rabiatsu Abubakar Imam<sup>1</sup> and Dr. Abdullahi Mohammed Isyaku

<sup>1</sup>Department of Physical and Health Education, Aminu Saleh College of Education, Azare, Bauchi State, Nigeria. <sup>2</sup>Department of Public Health, Faculty of Medical Sciences, Bauchi State University Gadau.

Corresponding author: [saiduisah557@gmail.com](mailto:saiduisah557@gmail.com)

## Abstract

This study assessed the umbilical cord care practices and management of outcomes among lactating mothers in Bauchi State. Cross-sectional household survey was adopted for the purpose of this study. The population of this study comprised the entire lactating mothers in Bauchi State which is estimated at 342,687 lactating mothers as at 2022 and multi-stage sampling technique was used to select the sample of 600 lactating mothers for the study. The research instrument was validated and the result was divided into two halves which were correlated using Pearson Product Moment Correlation coefficient and Coefficient of 0.78 was determined. Descriptive statistical techniques of frequency count and percentage were used to organize the demographic characteristics of the respondents and one sample t-test was used to analyzed all postulated hypotheses all advanced at 0.05 level of significance. The major findings of study showed that there is no significant difference in the knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria; there is no significant difference in the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria; there is no significant difference in the techniques for cord management among lactating mothers in Bauchi State; there is significant relationship between the knowledge of accepted cord care management practices and the various substance used by lactating mothers in Bauchi State; It was recommended among others that governmental and non-governmental organizations should be organizing sensitization campaigns at regular intervals to educate women of child bearing age in general and pregnant mothers in particular on the accepted cord care practices to prevent neonatal infection, hence reducing the newborn deaths through adopting proper cord stump care and house to house free distribution of Chlorhexidine pregnant mothers in third trimester should be made on quarterly basis to discourage use of various unhealthy substances used for umbilical cord care by lactating mothers.

**Keywords:** Cord Care, Knowledge, Practice, Mothers, Bauchi

## Introduction

The umbilical cord (UC) is a tube connects the baby and placenta in uterus (the womb) is made of blood vessels and connective tissue (Abba, 2018; Alam, & Murray, 2018). The cord is a unique tissue which has two arteries and one vein which at term is about 56cm in length and extends normally from the centre of the placenta to the umbilicus of the unborn baby (Abba, 2018). During pregnancy, the umbilical cord connects the fetus to the mother through the placenta. The blood flowing through the cord brings nutrients and oxygen from the mother to the fetus and carries away carbon dioxide and other metabolites from the

fetus (World Health Organization, 2016; Bello & Omotara, 2010; Ezenduka & Eze, 2022). The umbilical stump represents a unique but universally acquired wound in which devitalized tissue provides a medium that could support bacterial growth (Farhani, 2018). However, WHO (2017) recommended that the cleaning once daily and as often as each diaper is changed. The normal practice is to clean the cord with cotton swab soaked in methylated spirit and left uncovered to promote drying, healing and cord separation (Mueller & Johnson, 2019).

It was reported that infection in the first two weeks of life is a major cause of newborn mortality (WHO, 2017). Umbilical cord infection is the infection of the umbilicus and/or surrounding tissues, occurring primarily in the neonatal period. Umbilical cord infection risk is 62% higher in neonates receiving topical cord applications of potentially unclean substances (Turyasiima, et al 2020). Of the several other factors, infections and sepsis known as omphalitis (Chizoma, et al., 2020). The study further defined omphalitis as an umbilical infection, which occurs due to lack of cleanliness at the time of division of umbilical cord, and lack of care of the umbilical stump.

The normal practice is to clean the cord with cotton swab soaked in methylated spirit and left uncovered to promote drying, healing and cord separation (Chizoma, et al., 2020). Moreover, Osuchukwu (2014) added that the cord normally falls off between 5 to 15 days after birth. It was reported that in some communities in Bangladesh, healthcare providers and mothers often cleanse the cord stump with dry gauze, cotton ball or topical application of antimicrobial agents. In Nepal, colostrum, saliva or herbal preparations are applied to facilitate early cord separation and healing, but rather these constitute serious sources of neonatal infections. Clean cord care at birth and in the days following birth is effective way in preventing cord infections; increase the rate of child survival and reduction in neonatal deaths (WHO, 2016; Letizia, et al., 2016).

WHO (2017) opines that clean cord care involves washing hands with soap and water before delivery, tying and cutting the umbilical cord with sterile instrument and finally laying the baby on a clean surface. Moreover, WHO (2016) added that hygienic practices during birth helps to prevent consequences of unclean cord care which may include umbilical cord infections and neonatal deaths. Thus, mothers are to adopt current standard of cord care which are based on the principles of asepsis that help in the reduction of cord infections (Ezenduka & Eze, 2012). The sterile materials that can be used in tying the umbilical cord include sterile plastic cord clamp, narrow tapes and threads of cloth (Joel-Madewase, et. al., 2008). These materials if sterile and properly applied will effectively prevent infection of the umbilical cord and death of the neonates (Farhani, 2018). It was also recommended that instruments used in cutting the cord should be sharp and sterile to avoid trauma and infection of the cord (Osuchukwu, 2014). Amin and Khan, (2009) added that drying and separation of the cord is facilitated by exposure to air.

The cord stump (CS) dries, falls off and the wound heals. During the first few weeks after birth, the umbilical cord stump gradually dries and heals. It falls off on its own within a few

weeks (Amin & Khan, 2019; Ambe, et. al., 2020). During this time, some simple care is needed to keep the cord clean and dry. One should be alert for any signs of infection or bleeding (Bello & Omotara, 2010). This is a route of neonatal infection, thus should be kept clean through proper cord care (Peter & Johnson, 2020). In developing countries umbilical cord infections constitute a major cause of neonatal morbidity and pose significant risk for mortality (WHO, 2019). Cord management introduced to mothers in both developed and developing countries to reduce exposure of the cord to infectious pathogens include clean cord cutting, hygienic cleaning and washing of hands before and after cord care (Garner, 2018).

Methods of caring for the umbilical cord vary greatly between communities depending on their cultural and religious beliefs, level of education and resources. In the developing countries most deliveries occur at home where health care services may not be available. Sometimes materials used to tie the cord include strings, thread and strips of cloth, scissors and sharp stone (Obuekwe & Obuekwe, 2018). The risk of cord infection is increased by unhygienic cutting of the cord and application of unclean substances such substances sand from door post mixed with saliva, herbal preparations and lantern wax. Even babies delivered in hospitals may be affected by traditional practices after discharge which most times lead to umbilical cord infection and dead among the neonates (Ahmed & Verber, 2021).

Chlorhexidine cord cleansing and dry cord care significantly reduces neonatal mortality related to umbilical cord infection (Turyasiima, et al 2020). Practice of umbilical cord care was good among respondents in this present study but they still applied unprescribed agents like mentholatum to the cord (Chizoma, et al 2020). Similarly, another study conducted in Sokoto Nigeria found that some mothers applied toothpaste to the umbilical cord (Kaoje, et al, 2018). All of the caregivers applied traditional substances to the cord and mustard oil was the commonest (75%) practice. Out of 80 neonates, 60 (75%) were found to had mustard oil applied to the umbilical cord and boric powder in 20 (25%). 25% of the newborns, in whom mustard oil was used, developed omphalitis (Chizoma, et al., 2020).

A study indicated that about 130 million babies are delivered annually and over 4 million newborns (3.1%) die within the neonatal period first 4 weeks of life. The study further added twenty- five percent (25%) of these deaths are as a result of umbilical infection. Many hospital-based studies in Nigeria have reported cases of umbilical cord infections. For instance, umbilical cord infection accounted for 10% of neonatal admissions and 30% of neonatal deaths (Antai & Effiong, 2009). A review of umbilical infection in Ibadan showed that it accounts for 18% of neonatal deaths (Bennet & Adetunde, 2020). While, in Calabar South Local Government of Cross River State, 49% of neonatal deaths were due to umbilical cord infection while the condition was responsible for 19% of all newborn admissions (Antai & Effiong, 2019). Many of the neonatal deaths occur at home and therefore unseen and unaccounted for in official statistics (Ambe, et. Al., 2020; Green, et al. 2016; Garner, 2018). Globally, neonatal tetanus accounts for 7% of neonatal deaths, but

accounts for more than 48% in Africa (Peter & Johnson 2020). Nigeria has one of the highest infant mortality rates of 94 deaths/1,000 live births (WHO, 2019). According to the report, 26% was due to umbilical infection (Peter & Johnson 2010). Based on this backdrop, it is therefore desirable to determine the umbilical cord care practices among lactating mothers in Bauchi State, Nigeria.

### Research Objectives

The study aims at assessing the umbilical cord care practices among lactating mothers in Bauchi State, Nigeria. Specifically, the objectives of the study are to:

- i Find out the knowledge of accepted cord management practices among lactating mothers in Bauchi State, Nigeria.
- ii Identify the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria.
- iii Determine the techniques for cord management among lactating mothers in Bauchi State.

### Research Questions

The following research questions were asked to guide the conduct of the study:

- i Do lactating mothers in Bauchi State have the knowledge of accepted cord management?
- ii What are the various substances used for cord care by lactating mothers for umbilical cord management in Bauchi State, Nigeria?
- iii What are the techniques used for cord management among lactating mothers in Bauchi State?

### Research Hypotheses

The following sub-hypotheses were postulated to guide the conduct of the study:

**HO<sub>1</sub>:** There is no significant difference in the knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria.

**HO<sub>2</sub>:** There is no significant difference in the various substances used by lactating mothers for umbilical cord care management in Bauchi State, Nigeria.

**HO<sub>3</sub>:** There is no significant difference in the techniques for cord care management among lactating mothers in Bauchi State.

### Methodology

Cross-sectional household survey was adopted for the purpose of this study. Cross-sectional household survey is viewed by Emaiku, (2006) as a study in which measurements are done as a single observation like 'snap shot'. It involved observation of all of a population, or a subset, at a particular point in time with the aim to describe a situation e.g. distribution of an event in a population in relation to age, sex and other specified characteristics. The population of this study comprised the entire lactating mothers in

Bauchi State with an estimated population of 342,687 lactating mothers as at 2022. The sample of the study used was 600 lactating mothers were selected using multi-stage sampling techniques

The instrument used for data collection in this study was researcher-developed questionnaire based on modified Likert scale of 22 items which was divided into three sections A-C on the umbilical cord care practices among lactating mothers in Bauchi State, Nigeria. The statements were made in a positive way. The basis for making decision is 2.5. Any score above 2.5 was considered positive and anything below 2.5 was regarded as negative in this study. Split-half method was used and the reliability of the instrument based on the full-length Spearman brown prophecy formula was used and Coefficient of 0.78 was determined. Descriptive statistical techniques were used for organizing demographic information while hypotheses one, two and three were analyzed using one sample t-test all advanced at 0.05 level of significance.

## Results

This study assessed the umbilical cord care practices among lactating mothers in Bauchi state, Nigeria. Six hundred questionnaire forms were administered in the six selected local government in the state but only data from 557 duly filled questionnaires forms were analyzed. The result is presented as follows:

The demographic information of respondents for this study is presented in Table 4.2.1:

**Table 1 Information on Demographic Characteristics of the Respondents**

| Variables          |              | Respondents | Percentage |
|--------------------|--------------|-------------|------------|
| Bauchi North       | Shira        | 89          | 16.0%      |
|                    | Katagum      | 92          | 16.5%      |
| Bauchi Central     | Misau        | 93          | 16.7%      |
|                    | Ganjuwa      | 90          | 16.2%      |
| Bauchi South       | Bauchi       | 95          | 17.1%      |
|                    | T/Balewa     | 98          | 17.5%      |
| Total              |              | 557         | 100%       |
| Age                | 15 -22 Yrs   | 203         | 36.4%      |
|                    | 23- 35 Yrs   | 173         | 31.1%      |
|                    | 36 – 45 Yrs  | 181         | 32.5%      |
| Total              |              | 557         | 100%       |
| Religion           | Islam        | 437         | 78.5%      |
|                    | Christianity | 109         | 19.5%      |
|                    | Others       | 11          | 2.0%       |
| Total              |              | 557         | 100%       |
| Educational Status | Primary      | 187         | 33.6%      |
|                    | Secondary    | 164         | 29.4%      |

|                             |               |            |             |
|-----------------------------|---------------|------------|-------------|
|                             | Tertiary      | 160        | 28.7%       |
|                             | Others        | 46         | 8.3%        |
| <b>Total</b>                |               | <b>557</b> | <b>100%</b> |
| <b>Residential Location</b> | Rural         | 206        | 46.9%       |
|                             | Urban         | 261        | 53.9%       |
| <b>Total</b>                |               | <b>557</b> | <b>100%</b> |
| <b>Occupational Status</b>  | Civil servant | 85         | 15.3%       |
|                             | Business      | 116        | 20.8%       |
|                             | Farmers       | 74         | 13.3%       |
|                             | Housewife     | 282        | 50.6%       |
| <b>Total</b>                |               | <b>557</b> | <b>100%</b> |

Table 1 shows the demographic information of the respondents. The table revealed that no significant difference in the number of instruments retrieved from the selected area of the study ranging from least 16.0% to the highest with 17.7%. The age range of the respondents 15 – 22 has the highest frequency and accounts for 36.4% while the least is 23- 35 which accounts for 31.1%. The table further showed that most of the respondents are Muslims 437 which accounts for 78.5% while those practicing any religion other than Islam and Christianity accounts for 2.0%. With regards to educational status, predominant lactating mothers had primary education 33.6% while 46 had no any form of formal education. Two hundred and six lactating mothers (46.9%) are living in rural areas where as 261 (53.9%) are urban residents. Two hundred and eighty two respondents (50.6%) are full time house wives with only 74 (13.3%) into farming.

### Sub-Hypothesis One

There is no significant difference in the knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria.

**Table 2: Summary of One sample t-test analysis on knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria.**

| Variable  | N   | Aggregate Mean | Std. | df  | t-value | P-value |
|-----------|-----|----------------|------|-----|---------|---------|
| Knowledge | 557 | 12.17          | 2.20 | 556 | 130.48  | .000    |

**t-cal (130.48) > 1.960, .000 < 0.05**

Table 2 revealed that knowledge of accepted cord care management among lactating mothers in Bauchi State, Nigeria is significant. This is because the one sample t-test calculated value is 130.48 which is greater than the critical value of 1.960 at the 556 degree

of freedom and the probability value of 0.000 is equally less than 0.05 level of significance. Thus, the hypothesis which predicted that there is no significant difference in the knowledge of accepted cord care management among lactating mothers in Bauchi State, Nigeria is hereby therefore rejected.

### Sub-hypothesis Two

There is no significant difference in the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria.

**Table 3 Summary of One sample t-test analysis on various substances used by lactating mothers for umbilical cord management in Bauchi state, Nigeria.**

| Variable                              | N   | Aggregate Mean | Std. | df  | t-value | P-value |
|---------------------------------------|-----|----------------|------|-----|---------|---------|
| Various substances Used For cord care | 557 | 15.28          | 2.54 | 556 | 141.84  | .000    |

**t-cal (141.84) > 1.960; 0.000 < 0.05**

The results in Table 3 shows that the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria is significant because the t-value of one sample t-test 141.84 is greater than the critical value of 1.960 at the 556 degree of freedom. Similarly, the probability value of 0.000 is less than 0.05 level of significance. This indicated that the hypothesized statement which predicted that there is no significant difference in the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria is therefore rejected.

### Sub-hypothesis Three

**HO<sub>3</sub>:** There is no significant difference in the techniques for cord management among lactating mothers in Bauchi State.

**Table 4 Summary of One sample t-test analysis on techniques used for cord management among lactating mothers in Bauchi State, Nigeria.**

| Variable                      | N   | Aggregate Mean | Std. | df  | t-value | P-value |
|-------------------------------|-----|----------------|------|-----|---------|---------|
| Techniques used For cord care | 557 | 14.83          | 2.64 | 556 | 132.65  | .000    |

**t-cal (132.65) > 1.960; 0.000 < 0.05**

Table 4 showed that the result on techniques used for cord care management among lactating mothers in Bauchi State Nigeria is significant. This is because the one sample t-test calculated value is 132.65 which is greater than the critical value of 1.960 at the degree of freedom 556 with a probability value of 0.000 which is also less than 0.05 level of significance. In view of this, the hypothesis which stated that there is no significant difference in the techniques for cord management among lactating mothers in Bauchi State, Nigeria. is hereby rejected.

### Discussion

The finding of this study indicated that significant difference did not exist in the knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria. This is not surprising, because the finding tend to be in the same vein with Chizoma, et al (2020) study which reported that slightly less than half of the respondents 199(48.1%) had a good level of knowledge of appropriate cord care and also a study carried out among women in Calabar by Osuchukwu, et al., (2017) which showed that poor knowledge of umbilical cord care. However, this outcome is quietly amazing considering the finding of many studies, the outcome contradicted the study carried out in two communities of Plateau State, North central Nigeria, a neighboring state to the area under survey which revealed that majority of the participants had good overall knowledge and practices of umbilical cord care but there were gaps in area of practice (Afolaranmi, et al., 2018). The median knowledge score of umbilical cord care was  $13 \pm 4.4$  out of a total score of 24.

Similarly, the study showed that significant difference did not exist in the knowledge various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria. This is surprising because Ezenduka and Eze, (2012) suggested that mothers are to adopt current standard of cord care which are based on the principles of asepsis that help in the reduction of cord infections. Due to the fact, that Farhani, (2008) study revealed that if these substances and materials are well sterilized and properly applied will effectively prevent infection of the umbilical cord and death of the neonates. Osuchukwu, (2014) equally recommended that instruments used in cutting the cord should be sharp and sterile to avoid trauma and infection of the cord. Another, study also stated that sterile materials should be used in tying the umbilical cord as equally recommended by Ezenduka and Eze (2022) should include sterile plastic cord clamp, narrow tapes and threads of cloth contrarily to the use of saliva, use herbal solution, application of salt and first breast milk (colostrum) on the cord which increase the chance of transmitting diseases which can even lead to newborn deaths. The finding tallies with Chizoma, et al (2020) study which showed that poor knowledge leads to application of traditional substances to the newborn cord by many women in their study such as mentholated balm, mustard oil and boric powder which result into the development of omphalitis.

The finding of the study also revealed that significant difference did not exist in the knowledge of techniques used for cord management among lactating mothers in Bauchi State. This amazing considering the fact that Amin and Khan, (2009) reported that drying and separation of the cord is facilitated by exposure to air. And many studies added that washing hands with soap and clean water before delivery, tying and cutting of the umbilical cord with sterile materials and instrument play an important role in newborn health. But the outcome disagrees with a study carried out by Turyasiima, et al (2020) which revealed that majority of the mothers 168 (70%) do not use the recommended umbilical cord care practices. Among these, 73 (30.4%) do not cleanse the cord while 95 (39.6%) cleanse with application of a dangerous substance. Similarly, the finding contradicted Castellanos, et al, (2019) study which posited that dry cord care involves initial cleansing of the stump with tepid water and a neutral soap and then keeping the cord dry. More measures of covering the stump with clean gauze, exposing it to air and keeping it outside the diaper or avoiding its immersion in water is a good cord care practice that should be adhered to.

## Conclusions

Based on the analysis, the following major findings of results were made:

- There is no significant difference in the knowledge of accepted cord care management practices among lactating mothers in Bauchi State, Nigeria.
- There is no significant difference in the various substances used by lactating mothers for umbilical cord management in Bauchi State, Nigeria.
- There is no significant difference in the techniques for cord management among lactating mothers in Bauchi State.

## Recommendations

Based on the conclusions made, the following recommendations were proffered:

- Governmental and non-governmental organizations should be organizing sensitization campaigns at regular intervals to educate women of child bearing age in general and pregnant mothers in particular on the accepted cord care practices to prevent neonatal infection, hence reducing the newborn deaths through adopting proper cord stump care.
- House to house free distribution of Chlorhexidine pregnant mothers in third trimester should be made on quarterly basis to discourage use of various unhealthy substances used for umbilical cord care by lactating mothers.
- Pamphlets accompanied with pictures for easy comprehension of the correct techniques for cord care should be prepared in local languages and be distributed to pregnant mothers during ante-natal care visit to avoid unhealthy cord care practices.

## References

Abba, K. T. (2018). Management of Puberty and Child Birth. Philadelphia: Saunders. P 25-38.

- Afolaranmi, T. O, Hassan, Z. I, Akinyemi, O. O, Sule, S. S, Malet, M. U., Choji, C. P, & Bello, D. A. (2018) Cord Care Practices: A Perspective of Contemporary African Setting. *Public Health* 6:10. doi: 10.3389/fpubh.2018.00010
- Ahmed, O. & Verber (2021). Home Delivery and Newborn Care among Women in Nigeria. *Global Journal of Medical Sciences* 9 (7): 204-209.
- Ambe, J., Bello, M., Yahaya, S. & Omotara, B. (2010). Umbilical Cord Practices in Konduga Local Government Area of Bornu State, North East Nigeria. *Journal of Tropical Medicine* 9 (6): 87 - 92
- Alam, M. A. & Murray, C. O. (2018). Newborn Umbilical Cord and Skin Care in Sylhet District, Bangladesh: Implication for Promotion of Umbilical Cleansing with Topical Chlorhexidine. *Biomedical Journal* 17(8): 13 -16.
- Amin, R. & Khan, A. H. (2019). Traditional Beliefs and Cord Care in Rural Bangladesh. *Journal of Tropical Pediatrics*. 60(4): 293-295.
- Antai, T. E. & Effiong, F. O. (2019). Septicaemia among Neonates with Tetanus. *Journal of Tropical Pediatrics* 3 (10) 210-213.
- Bello, K. & Omotara, B. (2020). Neonatal Tetanus: Mode of Infection, Prevalence and Prevention. *International Journal of Epidemiology* 67(9): 56 - 59
- Bennett. J. & Adetunde, T. (2020). Influence of Native Customs on Newborn Care in Nigeria. *International Journal of Epidemiology* 25(4): 879-884.
- Chizoma, N., Fisayo, O. & Abimbola, O. O. (2020). Umbilical Cord Care Knowledge and Practices of Mothers attending Selected Primary Health Care Centres in Ibadan, Nigeria. *International Journal of Caring Sciences*, 13 (1) 143- 151
- Emaiku, S. O. (2006). Fundamentals of Research Methods and Statistics. Makurdi, Selfers Academic Press limited
- Ezenduka, P.O. & Eze, P. (2022). Umbilical Cord Care among Nursing Mothers in Enugu East Local Government Area, Enugu. *West Africa Journal of nursing* 13(2) 110-111.
- Farhani, L. A. (2018) Effect of Tropical Application of Breast Milk and Dry Cord Care on Bacterial Colonization and Umbilical Cord Separation Time in Neonate. *Clinical Medicine* 3(6) 18-24.
- Garner, F. V. (2018). Care In Normal Birth: A Practical Guide. New York: Jack ken. P.18-31
- Green, P. T., Udoh, E. & Peters, J. (2016). Clinical Study of Septicemia. *Journal of Pediatrics* 43: 328-332.
- Joel-Medewase, V. I, Oyediji O. A, Elemile P. O. & Oyediji, G. A. (2008). Cord Care Practices in South west Nigerian Mothers. *Int J Tropical Medicine* 3(2) : 15- 18.
- Kaoje, A. U, Okafoagu, N. C., Raji, M. O., Adamu, Y. H., Nasir, M. A., Bello, M, & Ango, U. M. (2018). 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*. 30 (2) 36-46
- Letizia, G.; Anna, L., Tiziano, B.; Silvio, B. & Rosanna, Q. (2016). Umbilical Cord Care After the First Day from Birth: A Case Control Study in a Northeastern Italian Hospital. *Open Journal of Pediatrics and Neonatal Nursing* [doi.org/10.17140/PNNOJ-3-118](https://doi.org/10.17140/PNNOJ-3-118)
- Mueller, H. & Johnson, M. (2019) Avoiding Neonatal Deaths: An Intervention Study of Umbilical Cord management. *Journal of Tropical Pediatrics* 23 (4): 50 - 54
- Obuekwe, T. R. & Obuekwe, E. (2018). Identifying Indigenous Health Technology Used by women in a Rural Community in Nigeria on the Stumps of Newborns: An Increase in Cord Infection and Neonatal Tetanus. *Clinical Pediatr* 36:648-652.
- Osuchukwu E.C, Ezeruigbo C.S.F, Eko J. E. (2017). Knowledge of Standard Umbilical Cord Management among Mothers in Calabar South Local Government Area, Cross River State, Nigeria. *International Journal of Nursing Science* 7(3): 57-62 doi: 10.5923/j.nursing.20170703.01
- Peter, O. & Johnson, J. (2020). Risk Factors for Neonatal Infections. *Global Journal* 12:40-46.

- Turyasiima, M., Martin N., Silva, M. A., Gloria, K., Walufu, I. E., Bernis, M. M., & Robinson, S. L. (2020). Neonatal Umbilical Cord Infections: Incidence, Associated Factors and Cord Care Practices by Nursing Mothers at a Tertiary Hospital in Western Uganda. *Open Journal of Pediatrics*, (10) 288-301
- World Health Organization (2016). Neonatal and Perinatal Mortality: Country, Regional and Global Estimate. Available At <http://www.who.int>. Accessed January 18, 2022.
- World Health Organization (2017). Review of Evidence on Cord Care Practices. Available at <http://www.who.int> Accessed Jan 18. 2022
- World Health Organization (2019). Essential Newborn Care. Report of a Technical Working Group. Geneva P. 22-28.