

Original Article

Umbilical Cord Care Knowledge and Practices of Mothers attending Selected Primary Health Care Centres in Ibadan, Nigeria

Ndikom Chizoma M., RN, PhD

Lecturer, Department of Nursing, Faculty of Clinical Sciences, College of Medicine, University of Ibadan, Nigeria

Oluwatosin, Fisayo, MBBS, MSc, MWACP

Senior Registrar, Community Medicine, University College Hospital, Ibadan, Nigeria

Oluwatosin O. Abimbola, RN, PhD

Associate Professor, Department of Nursing, Faculty of Clinical Sciences, College of Medicine, University of Ibadan, Nigeria

Corresponding author: Dr Chizoma M. Ndikom, Department of Nursing, University of Ibadan, Nigeria
E-mail: cmndikom@gmail.com

Abstract

Background: Poor umbilical cord care (UCC) practices have been linked with infections and mortality in newborns. Some mothers use multiple agents in umbilical cord care. It is imperative to assess the knowledge of UCC and its practices among women at the lowest level of care.

Methods: The study utilized a cross-sectional design. Multistage sampling technique was used to select 414 mother-baby pairs (dyad) attending infant welfare clinics in the selected Primary Health Centres (PHCs). Data was collected using structured validated questionnaire after obtaining ethical approval and informed consent. Descriptive statistics were used for analysis of data and hypotheses were tested using chi-square statistic at $p=0.05$.

Results: One hundred and ninety nine (48.1%) of the respondents had a good level of knowledge of appropriate UCC, 254(61.4%) respondents practiced good cord care. Even though most (95.7%) mothers used methylated spirit to clean the cord, quite a number, 270(65.5%) applied mentholated balm to the umbilicus. Above 60% of those who received information on UCC had good practice compared to those that did not ($p=0.04$). Also, 125(62.8%) of the respondents with good knowledge of UCC had good cord care practices compared to 74(37.2) with poor practices. Respondents' knowledge of UCC was not significantly associated with their cord care practices.

Conclusion: Gaps were observed in both knowledge and practices of umbilical cord care among the mothers attending primary health care centres. Strategies need to be instituted by health care workers to improve knowledge of umbilical cord care and inappropriate practices should be strongly discouraged.

Keywords: Knowledge, Mothers, Newborns, Practices, Umbilical Cord Care

Background

Mortality among children especially newborns has become one of the global concerns. It is known that neonatal mortality and morbidity have remained high in many settings but the situation is worse in developing countries. The World Health Organization (2016), reported that the vast majority of newborn deaths take place in developing countries where access to health care is low and the main causes of newborn deaths are prematurity,

low birth weight, infections, asphyxia and birth trauma. Consequently, improving newborn survival is a global priority (Moran, Kerber, Sitrin, et al., 2013) Neonatal mortality accounts for forty-three percent of under-five mortality and the decline in neonatal mortality from 1990 to 2015 has been slower than that of post-neonatal under-5 mortality (WHO, 2016). Of the several other factors, infections and sepsis remained as persistent and significant cause of mortality and

morbidity among neonates (Mitul, 2015; Agrawal, Agrawal, Mullany, et al., 2012). The newly cut umbilical cord can therefore be a pathway for bacteria that can cause newborn sepsis and death (Coffey & Brown, 2017). The umbilical cord area supports the growth of some innocuous or beneficial microorganisms (commensals) as well as pathogenic micro-organisms such as *Clostridium tetani* (Bhatt, Malik, Jindal, et al., 2015). Umbilical cord care practices immediately following delivery can contribute to new-borns' risk of infection and mortality (Agrawal, Agrawal, Mullany, et al., 2012; Karumbi, Mulaku, Aluvaala, et al., 2013). Care of the neonate's umbilical cord is crucial during the neonatal stage of life and poor umbilical cord practices have been linked with infections (Sacks, Moss, Winch, et al., 2015). Cord infection may be localized to the umbilical cord (omphalitis) or after entry into the blood stream, become systemic (neonatal sepsis). Umbilical cord care has been found to be poor among mothers in developing nations (Joel-Medewase, Oyedeji, Elemile, et al., 2008; Cobo, Kacerovsky, Andrys, et al., 2013). Optimal umbilical cord care practices for newborns and during the first week of life, has the potential to reduce preventable neonatal deaths (Coffey & Brown, 2017; Padiyath, Bhat & Ekambaram, 2010). A study which examined the association between clean cord care practices and neonatal mortality in rural Uttar Pradesh, India showed that only thirty percent of the mothers practiced clean cord care (Agrawal, et al., 2012; Karumbi, Mulaku, Aluvaala, English & Opiyo, 2013). The study revealed that clean cord care was associated with thirty-seven percent lower neonatal mortality [OR=0.63; 95% CI 0.46 to 0.87] (Agrawal, et al., 2012).

Despite the efforts to improve cord care practices in many rural areas where deliveries are conducted by untrained hands, guidelines for umbilical cord care are seldom followed (Padiyath, et al., 2010). Various studies carried in developing countries reported that mothers apply substances like mustard oil, turmeric, cow dung, and antiseptic lotion on the cord stump (Kesterton & Cleland, 2009). A study of home deliveries in Tanzania revealed that behaviour change was acceptable for all behaviours, except cord care, for which there were strong beliefs about the importance of putting

something on the cord to help it dry and fall off (Shamba, Schellenberg, Penfold, et al., 2013). Similarly, another study reported that harmful cord practices was commoner among women who delivered outside the Teaching Hospital in Benin City Edo State, Nigeria (Abhulimhen-Iyoha & Ibadin, 2012). Umbilical cord care practices studied among South-western Nigerian women revealed that cord care practice was fair among the mothers (Cobo, et al., 2013). Many mothers with poor cord care practices used multiple agents for cord care. The major reason for this is ignorance regarding better methods (Padiyath, et al., 2010). Since most mothers will need to take care of their baby's umbilical cord on their own without supervision after discharge from the hospital, they may not do it correctly if they were not shown how to do it well or due to various cultural practices. Reducing umbilical cord infections through teaching proper hygienic household cord care practices to mothers may help to reduce new born deaths from infections. If urgent interventions to combat neonatal infections are not taken, neonatal deaths are projected to increase from forty-five percent of under-five deaths in 2015 to fifty-two percent by 2030 (WHO, 2016). Therefore, this study was done to assess umbilical cord care knowledge and practices of mothers attending infant welfare clinics of selected primary health care facilities in Ibadan.

Objectives

1. To assess the mother's knowledge of umbilical cord care in rural and urban settings
2. To examine cord care practices of the mothers in rural and urban settings
3. Determine the association between Umbilical Cord Care Practice and selected variables.

Methodology

A cross sectional study design was used to assess the knowledge of umbilical cord care among mothers of newborns attending infant welfare clinics of selected Primary Health Centers in Ibadan, Oyo State. The study was carried out between February and August, 2016. The study was carried out in Ibadan, the capital of Oyo State in South West Nigeria. Oyo State covers a total land area of about 27,249 square kilometres. It is

bounded in the south by Ogun State and in the north by Kwara State, in the west is bounded partly by Ogun State and partly by the Republic of Benin while in the east it is bounded Osun State. Ibadan zone was used for the study as it has 11 Local Government Areas out of the 33 LGAs in the State. There are 126 PHCs in Ibadan, 12 secondary health facilities and 1 tertiary health facility. Other sources of care are from traditional healers, traditional birth attendants and faith based facilities etc. The study sites were the infant welfare clinics of selected Primary Health Centres in Ibadan, Oyo State. The Study Population consisted 1280 mother-baby pairs in the selected health facilities with their babies alive and aged between two and eight weeks as stipulated in the inclusion criteria and attending the selected facilities during the study period. Mothers with babies aged less than 2 weeks or above eight weeks or women who were not biological mothers of babies brought to clinic were excluded from the study.

Sample size was calculated using Leslie Kish formula for calculating sample size using a single proportion (Kish, 1965). $n = \frac{Z_{\alpha}^2 PQ}{d^2}$

$$n = \frac{1.96^2 \times 40 \times 60}{25} = 368,$$

(p = 40.7%, proportion of mothers who cleaned their babies' umbilical cord properly in a study done in Northern Nigeria (Kaoje, Okafoagu, Raji, Adamu, Nasir, Bello & Ango, 2018)

Adjusting for a non-response rate, r = 10%. Sample size = 410 mothers/baby pair.

Selection of participants was done using multistage sampling in three stages: Stage 1 - Selection of LGAs was done using simple random sampling. Four LGAs were picked from the five LGAs in inner Ibadan and four LGAs were picked from the six LGAs in outer Ibadan. Stage 2 - Depending on the clientele, one or two PHC facilities were selected from a list of all PHC facilities in each of the selected LGAs through random sampling using balloting. The selections were as follows: Inner Ibadan: Ibadan North West (IBNW) LGA – Oniyarin PHC; Ibadan South West (IBSW) LGA - Odoona PHC; Ibadan South East (IBSE) LGA – Oranyan PHC; Ibadan North (IBN) LGA -

Idiogun PHC; Outer Ibadan: Egbeda LGA – Egbeda and Alakia PHCs; Iddo LGA - Ologuneru PHC; Onaara LGA - Abaemu and Gbaremu PHCs; Lagelu LGA– Iyana Church PHC.

Stage 3: Purposive sampling was used to select all accessible mothers whose babies were between two and eight weeks attending infant welfare clinics in the selected Primary Health Centres.

The instrument for data collection was an interviewer-administered questionnaire developed by the researchers from reviewed literature. The questionnaire was back translated to Yoruba language. Subsequently Cronbach alpha reliability test was carried out with a coefficient value of 0.8. Data collection commenced after obtaining ethical approval from Oyo State Research Ethics Committee (Approval number: AD13/479/529). The period of data collection lasted four (4) weeks in each facility. The completed questionnaires were cross checked, coded and entered into the Statistical Package for Social Sciences (IBM, SPSS 20.0). The relevant frequency tables and corresponding means were generated. The questions related to knowledge and practice of good cord care were coded either 0 representing wrong responses or 1 for correct responses. Total obtainable scores for knowledge and practice of good cord care were 24 and 13, respectively. The knowledge score was divided into good and poor knowledge using the median score as a cut-off, while for practice, any individual who practiced any unhygienic method of cord care was termed to have an unacceptable level of cord care practice. The chi-squared test was used to assess the association between sociodemographic and knowledge of cord care and also both with practice of good cord care.

Results

Socio-demographic Characteristics

Data collected from 414 women was analyzed, 256 (61.8%) of the respondents were between the ages of 25 and 34 years while a quarter were between 15 and 24 years of age. About half 210 (51%) had completed secondary school education and most of the respondents were married 395 (95.4%). Less than half 195 (47.1%) were Christians with slightly above half 217 (52.1%) being Muslims. The highest proportion of respondents were traders 181 (43.7)

and artisans 155 (37. %) and 196 (47.3%) earned 10,000.00 or less per month as seen on table 1.

Table 1: Socio-demographic characteristics of mothers

Variable	Frequency (n=414)	Percent
Age groups		
15-24	105	25.4
25-34	256	61.8
35 and above	53	12.8
Educational Level		
No Formal	10	2
Primary	38	9
Junior Secondary School	55	13
Senior Secondary School	210	51
Post-Secondary	81	20
University	16	4
No Response	4	1
Respondents Income/Month (in Naira)		
10,000 or less	196	47.3
11,000 to 20,000	129	31.2
21,000 to 30,000	16	3.9
31,000 to 40,000	15	3.6
41,000 and Above	8	1.9
No response	50	12.1
Marital status		
Single	11	2.7
Married	395	95.4
Separated	3	0.7
Divorced	2	0.5
No response	3	0.7
Religious Affiliation		
Christianity	195	47.1
Islam	217	52.1
No Response	2	0.5
Occupation		
Trading	181	43.7
Artisan	155	37.4
Civil servant	50	12
Unemployed	11	2.7
No response	17	4.1

Table 2: Knowledge and source of information on cord care of mothers

Variable	Frequency	Percent
Received information on umbilical cord care (n=414)		
Yes	375	90.6
No	34	8.2
No Response	5	1.2
Sources of Information (n=375)		
Health care workers	253	67.5
Relations	80	21.3
TBA	17	4.5
Others	25	6.7
Overall knowledge n=414		
Good	199	48.1
Poor	215	51.9

Table 3 Factors associated with mothers' knowledge of cord care

Characteristics	Knowledge		χ^2	P-value
	Good (n=199) n (%)	Poor (n=215) n (%)		
Age groups (years)				
15-24	43 (41.0)	62 (59.0)	3.14	0.21
25-34	131 (51.2)	125 (48.8)		
35 and above	25 (47.2)	28 (52.8)		
Education				
Below secondary	45 (43.7)	58 (56.3)	1.5	0.47
Completed secondary	107 (51.0)	103 (49.0)		
Above secondary	46 (47.4)	51 (52.6)		
Perception of income				
Very poor	12 (60.0)	8 (40.0)	8.17	0.04
Poor	41 (64.1)	23 (35.9)		
Average	62 (50.0)	62 (50.0)		
Above average	68 (43.9)	87 (56.1)		
No of children				
1	56 (41.8)	78 (58.2)	3.88	0.14
2-3	128 (51.4)	121 (48.6)		
>4	12 (57.1)	9 (42.9)		

Table 4: Umbilical cord care practice of mothers

Variable	Frequency (%)
Adequate cleaning cord after delivery	350 (84.5)
Proper material used to tie the cord	121 (29.2)
Cleaning cord at home correctly	370 (89.4)
Proper care of cord after it fell off	18 (4.3)
Proper cleaning agent used	396 (95.7)

Umbilical cord practice	
Good	254 (61.4)
Poor	160 (38.6)

Table 5 Factors associated with mothers' umbilical cord care practices

Characteristics	Practice		χ^2	p-value
	Good (%)	Poor (%)		
Age groups (years)				
15-24	64 (61.0)	41 (39.0)	0.2	0.91
25-34	156 (60.9)	100 (39.1)		
35 and above	34 (64.2)	19 (35.8)		
Education				
Below secondary	67 (65.0)	36 (35.0)	0.897	0.64
Completed secondary	125 (59.5)	85 (40.5)		
Above secondary	59 (60.8)	38 (39.2)		
Had information about cord care				
Yes	234 (62.4)	141 (37.6)	3.09	0.04
No	16 (47.1)	18 (52.9)		
Number of Children				
1	86 (64.2)	45 (35.8)	0.83	0.66
2-4	148 (59.4)	101 (40.6)		
>4	13 (72.2)	5 (27.8)		
Knowledge				
Good	125 (62.8)	74 (37.2)	0.345	0.56
Poor	129 (60.0)	86 (40.0)		

Knowledge of umbilical cord care and associated factors: Table 2 shows the knowledge and source of information on cord care. Three hundred and seventy five (90.6%) of women had received information in the past on umbilical cord care with 253 (67.5%) of them having received this information from health care workers. The median knowledge score of umbilical cord care was 13 ± 4.4 out of a total score of 24. Slightly less than half of the respondents 199(48.1%) had a good level of knowledge of appropriate cord care. The respondent's perception of her income was significantly associated (however inversely) with knowledge of proper cord care. Up to 60% of those who deemed themselves very poor had a good knowledge of cord care while less than half (43.9%) of those who deemed themselves financially above average had good knowledge ($p=0.04$) as seen on table 3. A higher proportion of respondents with more than four children (57.1%) had a good knowledge of proper cord care compared to those with two to four children (51.4%) and one child (41.8%), although this was not statistically significant. An almost equal proportions of respondents who lived in rural (48.6%) and urban (47.6%) areas had good knowledge of proper cord care.

Umbilical Cord Care Practices and Associated Factors: The mean practice score of umbilical cord care practices is 12.3 ± 1.2 . 254 (61.4%) respondents practiced good cord care as seen on table 4. Table 5 indicates that a higher proportion of respondents who received information about appropriate cord care (62.4%) in the course of pregnancy practiced appropriate cord care compared to those who did not ($p=0.04$). The practice of appropriate cord care was highest in mothers 35 years and above (64.2%) followed by those within the ages of 15 and 24 years (61.0%) although this was not statistically significant.

Discussion

Findings from this study in Ibadan has shown that knowledge about umbilical cord care among the respondents in the present study was poor for the greater percentage. This could be due to the fact that the women learn more from observing others caring for the cord instead of proper teaching. Though over half claimed they had secondary education, their income shows that they are from

low socioeconomic group. This is comparable to a study in South India which also showed that mothers' knowledge of cord care was poor (Padiyath, et al., 2010). Also, a study among women in Calabar by Osuchukwu, Ezeruigbo & Eko (2017) indicated that poor knowledge of umbilical cord care. On the contrary, a study in two communities of Plateau State, North central Nigeria showed that majority of them had good overall knowledge and practices of umbilical cord care but there were gaps in area of practice (Afolaranmi, Hassan, Akinyemi, et al., 2018).

Practice of umbilical cord care was good among respondents in this present study but they still applied unprescribed agents like mentholatum to the cord. Being a facility based study, many observed proper cleaning method in the clinics but application of mentholated balm has remained an age long practice that has been difficult to change. A related study in South west Nigeria revealed poor practices but the application of mentholated balm on the umbilical cord and stump by some of the mothers was similar to our study (Joel-Medewase, et al, 2008). Similarly, a study by Bhatt, et al., (2015) which assessed cord care practices among mothers of new-borns in urban areas of Rohtak Haryana showed poor knowledge and practice with application of various agents by the mothers too, many women in their study still believe that mentholated balm should be applied to the cord. In another study Sokoto Nigeria by (Kaoje, et al, 2018) revealed that some mothers applied toothpaste to the umbilical cord. The application of multiple agents on the cord was also reported from a study carried out in rural Ghana (Amare, 2014) and similar report also in another cord care study in Ethiopia (Herlihy, Shaikh, Mazimba, et al, 2013). This is consistent with the study on local perceptions, cultural beliefs and practices that shape umbilical cord care in Southern Province, Zambia which revealed that the mothers believe strongly that substances should be applied to the umbilical cord for it to dry up promptly (Moyer, Aborigo, Logonia, et al., 2012)

Though cord care knowledge and practice improved with the increasing number of children but this was not significant. This may indicate that mothers gain more knowledge about cord care as they have more children. Mothers who received information on cord care in the facilities practiced

umbilical cord care better than those that did not in our study. This has shown that giving information to women in health facilities is very important. Most women in our study gave birth with skilled providers and received information on umbilical cord care from them. This is supported by a study in South India which showed that women who had skilled care during delivery had better cord care practices (Upadhyay, Singh, Rai, Anand, 2012). A significant relationship has been found between content of health education on cord care and method of cord care practiced by mothers (Abhulimhen-Iyoha, & Ibadin, 2015). Health education on cord care was seen as being deficient in some of our facilities (Moran, et al., 2013). Targeted health education is really important to improve cord care practices. Improving knowledge of cord will further improve cord care practices and enhance survival of newborns.

The Implications of the findings to Public Health are based on the fact that the health of the newborn is very important as it contributes to a large percentage of under-5 mortality if not well managed and it is of Public Health Concern. Umbilical cord is a very important portal of entry for pathogenic agents thus parents especially mothers need to understand the necessity for appropriate cord care practices.

Limitation: There was no direct observation of the respondents' practices as the study utilized self-report though this appropriate for the study design. This method of research may have some reporting bias from the mothers. The mothers were with their babies and this distracted them from full concentration and a lot of persuasion was needed to get their appropriate responses in some sections resulting in some areas of non-responses. This was a facility-based study which could have missed out some women that did not bring their babies to the infant welfare clinic whose practices could be worse than those using skilled care.

Conclusion: This study has shown that there were gaps in both knowledge and umbilical cord care practices of the mothers. Those who received information on cord care practiced more appropriately. Strategies need to be instituted to improve knowledge of umbilical cord care and inappropriate practices such as application of mentholated balms which should be strongly

discouraged. Health workers should endeavour to demonstrate cord care to mothers always before discharge health facilities. Mothers should recognize the importance of proper cord cleaning using the right agent.

Recommendations: Information on appropriate umbilical cord care should be given to mothers during antenatal care and before discharge from health care facilities by Health Care Workers.

Facilities should have standard protocol for umbilical cord care which should be communicated to all women and carers by their health care providers including doctors and nurses.

Further studies could be carried out in the community setting to further explore cultural beliefs and practices influencing cord care.

Acknowledgement: This study was carried out by the authors with support from Bassir-Thomas Biomedical Foundations small grants. We wish to thank the Bassir-Thomas Foundation for funding this research

We thank all our research assistants especially, Miss Timileyin Aina and Mrs Peju Ogundeji who helped in data collection. We thank all mothers who participated in this study and the workers at the Primary Health Centres used for their cooperation.

References

- Abhulimhen-Iyoha BI, Ibadin MO. (2015) Cord care education and its content given to mothers at antenatal clinics in various health facilities in Edo State, Nigeria. *Sahel Medical Journal*. 18: 129-133
- Abhulimhen-Iyoha BI, Ibadin MO. (2012) Determinants of Cord Care Practices among Mothers in Benin City, Edo State, Nigeria. *Nigerian Journal of Clinical Practice* 15: 210-213.
- Afolaranmi TO, Hassan ZI, Akinyemi OO, Sule SS, Malete MU, Choji CP, Bello DA. (2018) Cord Care Practices: A Perspective of Contemporary African Setting. *Public Health* 6:10. doi: 10.3389/fpubh.2018.00010
- Agrawal PK, Agrawal S, Mullany LC, Darmstadt GL, Kumar V, Kiran U, et al. (2012) Clean cord care practices and neonatal mortality: evidence from rural Uttar Pradesh, India. *Journal of Epidemiology and Community Medicine* 66(8): 755-758
- Amare, Y. (2014) Umbilical cord care in Ethiopia and implications for behavioral change: a qualitative

- study. BMC International Health and Human Rights 14:12. doi:10.1186/1472-698X-14-12
- Bhatt B, Malik JS, Jindal H, Sahoo S, Sangwan K. A. (2015) Study to Assess Cord Care Practices among Mothers of New Borns in Urban Areas of Rohtak Haryana. Int J Basic and Applied Medical Science 5 (1): 55-60 <http://www.cibtech.org/jms.htm> ISSN: 2277-2103
- Cobo T, Kacerovsky M, Andrys C, et al. (2013) Umbilical Cord Blood IL-6 as Predictor of Early-Onset Neonatal Sepsis in Women with Preterm Prelabour Rupture of Membranes. Zakar T. PLoS ONE. 8(7): e69341. doi:10.1371/journal.pone.0069341.
- Coffey PS, Brown SC. (2017) Umbilical cord-care practices in low- and middle-income countries: a systematic review. BMC Pregnancy and Childbirth 17, 68. <http://doi.org/10.1186/s12884-017-1250-7>
- Herlihy JM, Shaikh A, Mazimba A, Gagne N, Grogan C, et al. (2013) Local Perceptions, Cultural Beliefs and Practices That Shape Umbilical Cord Care: A Qualitative Study in Southern Province, Zambia. PLoS ONE. 8(11): e79191. doi:10.1371/journal.pone.0079191
- Joel-Medewase VI, Oyedeji OA, Elemile PO, Oyedeji, GA. (2008) Cord Care Practices in South west Nigerian Mothers. Int J Tropical Medicine 3(2) : 15-18.
- Kaoje AU, Okafoagu NC, Raji MO, Adamu YH, Nasir MA, Bello M, Ango UM (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
- Karumbi J, Mulaku M, Aluvaala J, English M, Opiyo N. (2013) Topical Umbilical Cord Care for Prevention of Infection and Neonatal Mortality. The Pediatric Infectious Disease Journal 32(1): 78–83. <http://doi.org/10.1097/INF.0b013e3182783dc3>
- Kesterton AJ, Cleland J. (2009) Neonatal care in rural Karnataka: healthy and harmful practices, the potential for change. BMC Pregnancy Childbirth 9(9) 1-13. doi: 10.1186/1471-2393-9-20.
- Kish L. (1965). Survey Sampling. New York: John Wiley and Sons, Inc. p 79-94.
- Mitul AR. (2015) Surgical Neonatal Sepsis in Developing Countries. Journal of Neonatal Surgery 4(4): 41-45
- Moran AC, Kerber K, Sitrin D, Guenther T, Morrissey CS, Fishel J et al. (2013) Measuring Coverage in MNCH: Indicators for Global Tracking of Newborn Care. PLoS Med. 10(5): e1001415. Accessed 26/04/2016 from www.plosmedicine.org
- Moyer CA, Aborigo RA, Logonia G, Affah G, Rominski S, Adongo PB, et al. (2012) Clean delivery practices in rural northern Ghana: a qualitative study of community and provider knowledge, attitudes, and beliefs. BMC Pregnancy and Childbirth. 12:50. <http://www.biomedcentral.com/> doi: 10.1186/1471-2393-12-50
- 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
- Padiyath A, Bhat AV, Ekambaram BM. (2010) Knowledge, attitude and practice of neonatal care among postnatal mothers. Curr Ped Research. 14(2): 147-152.
- Sacks E, Moss WJ, Winch PJ, Thuma P, van Dijk JH, Mullany LC. (2015) Skin, thermal and umbilical cord care practices for neonates in southern, rural Zambia: a qualitative study. BMC Pregnancy Childbirth. 15: 149. doi:10.1186/s12884-015-0584-2
- Shamba DD, Schellenberg J, Penfold SC, Mashasi I, Mrisho, M, Manzi, F, et al. (2013) Clean Home-delivery in Rural Southern Tanzania: Barriers, Influencers, and Facilitators. Journal of Health Population Nutrition. 31(1): 110-117
- Upadhyay RP, Singh B, Rai, SK, Anand K. (2012) Role of Cultural Beliefs in Influencing Selected Newborn Care Practices in Rural Haryana, Journal Tropical Pediatrics. 58(5): 406-408 <https://doi.org/10.1093/tropej/fmr113>
- World Health Organization (2016) New-borns: reducing mortality Fact sheet, Accessed 26/09/2016 from <http://www.who.int/mediacentre/factsheets/fs333/en/>