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Prevalence of essential newborn care practices and its associated factors among infants whose mother attends postnatal clinics in Kilimanjaro region, Tanzania

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Abstract

Background: Newborn health is a critical public health concern, with essential newborn care (ENC) practices proven to reduce neonatal mortality. Despite its effectiveness, neonatal deaths remain high, especially in low-income countries like Tanzania, where neonatal infections, birth asphyxia, and preterm complications are the leading causes of death. This study aims to assess the prevalence of ENC practices and identify factors influencing their adoption in Kilimanjaro Region, Tanzania in order to improve newborn health outcomes.

Methods: A facility-based cross-sectional study was conducted from 13th July to 3rd August, 2021, in Kilimanjaro Region, Tanzania, focusing on two councils: Moshi Municipal and Moshi District. The study included women attending postnatal clinics with infants under three months at selected health facilities. A total of 351 women participated, with convenience sampling used to select eligible participants. Data were collected through semi-structured interviews, and the study assessed essential newborn care practices, including breastfeeding, thermal care, and cord care. Data were analyzed using SPSS, with descriptive statistics and multivariable logistic regression to identify factors associated with newborn care practices. Ethical approval was granted, and informed consent was obtained from all participants.

Results: This study involved 351 participants with a mean age of 26.6 years, primarily married women with 1 to 3 number of pregnancies. Most attended antenatal care and delivered at health facility. Overall, 72.4% of newborns received all six essential newborn care practices. Postnatal care attendance, newborn general assessments, and counseling on keeping the baby warm were significantly associated with better essential newborn care.

Conclusion: This study found 77.2% of newborns received essential care practices, showing overall positive adherence, though improvements are needed. While practices like drying, clean wrapping, and delayed bathing were well followed, skin-to-skin contact and early breastfeeding initiation were less common. These results highlight the need for better postnatal care training and adherence to protocols.

Keywords: Essential newborn care; Practices; infants; Post natal care

1. Introduction

Newborn health is the major public health concern as an important area for introducing programs to ensure child survival. Essential newborn care strategy aims to improve newborn health. It is one of the cheapest approaches for child survival. The WHO defines essential newborn care as the routine care necessary to newborns from birth to 28 days of

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life at a health facility or at home. It includes: - early initiation and exclusive breastfeeding, thermal care (including prompt drying and covering at birth, maximizing skin-to-skin contact, delayed bathing, maintaining "warm chain") and hygiene practices (including cord-care and caregiver hand washing (1,2).

WHO recommended essential newborn care practices that all babies should receive thermal protection (skin to skin contact), Hygienic umbilical cord and skin care, Early and exclusive breastfeeding, assessment for signs of serious health problems, or need of addition care (e.g. those that are low birth weight, sick or have an HIV infected mother) and preventive treatment (e.g. Immunization BCG, and hepatitis B, vitamin K and ocular prophylaxis) (3).

Globally 47% of under-five death occurs in the first month of life. In 2019, an estimated 2.4 million children died in their first month of life, which is approximately 6,700 newborn every day, with about a third of all neonatal deaths occurring within the first day after birth, and close to three-quarters occurring within the first week of life (4). The large majority of newborn deaths (80%) are due to complications related to preterm birth, intrapartum events such as birth asphyxia, or infections such as sepsis or pneumonia. All these can be preventable and treatable with low-cost intervention like ANC, quality care at birth, PNC and essential newborn care practices (5). Children who die within the first 28 days of life suffer from conditions and diseases associated with lack of quality care at birth or skilled care and treatment immediately after birth and in the first days of life. The vast majority of newborn deaths take place in low and middle-income countries (6). Many studies have reported low prevalence of essential newborn care practice due to non-adherence to available intervention in low and middle-income countries (7).

The burden of neonatal death is still high in developing countries, including Tanzania. According to TDHS 2020/2021 the neonatal mortality rate in Tanzania is 24 deaths per 1000 live birth. With this regard, Tanzania has a huge task to reach sustainable development goal by 2030 number 3.2 which target to reduce neonatal mortality rate up to 12 deaths per 1000 live birth by 2030. According to modeled estimates for Tanzania, 79% of newborn deaths are due to three main causes: infections including sepsis/pneumonia (29%), birth asphyxia (27%); and complications of preterm birth (23%) (8,9).

Essential newborn care practice is the vital for the reduction of neonatal mortality and morbidity. Effective care can reduce almost 3 of the 4 million deaths of babies less than one month of age. The essential care package includes antenatal care for the mother, obstetric care and birth attendant's ability to resuscitate newborns at birth. Most infection-related deaths could be avoided by treating maternal infections during pregnancy, ensuring a clean delivery, care of the umbilical cord and immediate and exclusive breastfeeding (10). It is important for the mother to adopt essential newborn care practices to reduce mortality and morbidity rate.

Tanzania has made efforts to reduce newborn death through interventions which are Community mobilization and engagement in antenatal and postnatal domiciliary. Behaviors change communication to promote evidence-based neonatal care practices (breastfeeding, optimal thermal care, clean and cord care), care-seeking, demand for quality clinical care), Promotion of clean delivery and referral of complications (home birth), Kangaroo mother care (11). Key interventions include care by a skilled birth attendant, emergency obstetric care, immediate care for every newborn baby (including breastfeeding support and clean birth practices such as cord and thermal care) and newborn resuscitation. Care for small and sick newborns could avert 30 per cent of neonatal deaths. Key interventions include kangaroo mother care, prevention or management of neonatal sepsis, addressing neonatal jaundice and preventing brain damage after birth-related oxygen deprivation (12).

The coverage of basic newborn care in Tanzania is low with only 20 per cent of dispensaries and 39 per cent of health centers offering delivery services that provide all signal functions. Exclusive breastfeeding and early initiating breast by 59% and 51% respectively (9). Few studies have been done on essential newborn care practices demonstrated low essential newborn care practices in some aspects like low practice of exclusive breastfeeding, rarely skin to skin contact, bathing with cold water immediately after delivery, applying substance on the cord to help it dry and fewer mother breastfeeding their babies within an hour. However the studies have missed reasons for applying substances to the cord, and the study did not study factors associated with essential newborn care practices (13). Also, little is known on essential newborn care practices and factors associated with essential newborn care practices, there is no published study on essential newborn care practices in Northern Tanzania particularly in Kilimanjaro region, there is no study done in health facilities to assess mothers on essential newborn care practices in Tanzania. There, is also limited data of mother essential newborn care practices in the setting. Thus, this study aims to assess the prevalence of essential newborn care and factors associated with essential newborn care practices in Kilimanjaro region Moshi District and Moshi Municipal.

2. Methods

2.1. Study setting, period, population and design

A facility based cross-sectional study was done from 13st, July 2021 to 3rd, August 2021 in Kilimanjaro Region located in the north-eastern part of Tanzania with seven administrative councils where two councils (Moshi Municipal council and Moshi District councils) were selected based on accessibility and availability of health facilities with highest volume of postnatal care attendances.

2.2. Population

All women who attended postnatal clinics with infants aged less than 3 months in the selected health facilities within the time of data collection.

2.3. Sample size and sampling techniques

The sample size was calculated by using Leslie and Kish formula used in cross-sectional studies. A total 331 study participants were estimated for this study. However, the final sample used for this study was 351.

The districts and health facilities were purposively selected. Selection on the health facilities was based on high number of women attending for postnatal care and routine growth monitoring for the children. In each of the selected facility, convenience sampling technique was used to select women who were attending for postnatal care and met the inclusion criteria were invited to participate in the study.

2.4. Eligibility criteria

Inclusion Criteria: All Women who delivered at health facilities, have infant aged less than 3 months and attended for routine PNC services and women who consented to participate in the study.

Exclusion Criteria: Women who were not the biological mother of the infant, because they had no complete information of the infant on care practices immediately after delivery

2.5. Data collection

Data were collected by lead author as Principal Investigator (PI) and trained research assistants using a semi-structured interview. A set of questions were translated from English to Swahili and pretested to verify consistence and accuracy of data collection tool.

2.6. Study variables

The dependant variable in this study was essential newborn care practice defined by measurement of newborn care practice using six key components that have been identified to save neonatal lives: 1. Drying the baby immediately after birth 2. Skin to skin contact 3. Wrapping the baby within an hour with dry and clean cloth 4. Initiation of breastfeeding within 1 hour after birth 5. Bathing the baby after 24 hours and 6. Hygienic cord care at facility and at home (10).

The independent variables included children, maternal and clinical characteristics. Child characteristics include age, sex, model of delivery, place of delivery, type of feeding.

Maternal characteristics included age, level of education, occupation, number of living children, number of deliveries and counselling during the current pregnancy.

2.7. Data management and analysis

- **Data management**: The data collected was reviewed by the principal researcher on a daily basis to ensure completeness and consistency before analysis.
- **Data analysis**: Data analysis was performed using Statistical Package for Social sciences (SPSS) version 20. Data collected was checked for errors, out of range values, missing values. Descriptive statistics were summarized using frequency and percentage for categorical variables and measure of central tendency (mean with standard deviations or median with inter-quartile range) for numeric variables. Odds ratio with their respective 95% confidence intervals were used to assess the strength of association between essential new practices and exposure variables.

Multi variable logistic regression was used to estimate factors associated with essential newborn care practices with P-value of < 0.05 considered a statistically significant result.

2.8. Ethical approval

Ethical approval to conduct the study was obtained from Kilimanjaro Christian Medical University Ethical Review (**certificate no.PG 02/2021**) The permission to carry out the study was obtained from the District Executive Director of Moshi Municipal council and Moshi District council for government health facilities. The health facility in charges provided permission for private health facilities. Informed consent was obtained from each of the study participants. The obtained information was kept confidential and participants' codes were used instead of names.

3. Results

3.1. Socio demographic characteristics

A total of 351 participants were enrolled. The mean age of women was 26.6 (standard deviation of 6.2) years. Most of study participants were youth less than 35 years 313 (89%), were married 266 (76.6%) and living in Municipal Council 195 (55.6%). Majority were Christians 254 (72.4%) with formal education ranging from primary education 173 (49.2%) and secondary to high education 175 (49.9%) but were not formally employed to receive monthly salary 319 (90.9%). **(Table 01).**

Table 1 Social demographic characteristics of the study participants (N=351)

Variable	Frequency	Percentage
Mother's age(years)		
Mean (±SD)	26.6 (6.2)	
15 -24	159	45.3
25 -34	154	43.9
35+	38	10.8
Marital status		
Single/ Never Married	82	23.4
Married/Living together	269	76.6
District		
Moshi Municipal Council	195	55.6
Moshi District Council	156	44.4
Level of education		
No formal education	3	0.9
Primary education	173	49.2
Secondary and higher education	175	49.9
Employed and received salary		
No	319	90.9
Yes	32	9.1
Religion		
Muslims	97	27.6
Christian	254	72.4

3.2. Reproductive and maternal health characteristics of the participants

The median number (IQR) of pregnancies among respondent was 2 (IQR: 1, 3). Majority had one to three pregnancies 291 (82.9%) with at least one living children 296 (84.3%). Majority had no history of stillbirth 343 (97.7%), attended antenatal during the current pregnancy 340 (96.9%), most attended postnatal care 276 (78.6%). Majority had Spontaneous vaginal delivery 301 (85.8%) at health center 173 (49.3%), most delivery were at term 338 (96.3%) with no complications 311 (88.6%). (Table 02).

Table 2 Reproductive and maternal characteristics of the study participants (N = 351)

Variable	Frequency	Percentage
Number of pregnancies		
Median (IQR)	2(1,3)	
1 – 3	291	82.9
4 – 7	60	17.1
Number of living children		
Median (IQR)	2(1,3)	
1 – 3	296	84.3
4 – 7	55	15.7
History of stillbirth		
No	343	97.7
Yes	8	2.3
History of neonatal death at the past		
No	337	96.0
Yes	14	4.0
ANC attended during pregnancy of current child		
No	11	3.1
Yes	340	96.9
Number of ANC visits(n=340)		
1-3	62	18.2
4	156	45.9
5-8	122	35.9
PNC attended after delivery (0-42 days)		
No	75	21.4
Yes	276	78.6
PNC time periods(n=276)		
At 2-3 days after birth	50	14.2
At 7 days after birth	125	35.6
At 28 days	71	20.2
At 42 days	164	46.7
Mother complications during pregnancy (i.e. current child)		
No	311	88.6

Yes	40	11.4
Level of facility you have delivered		
Dispensary	29	8.3
Health Centre	173	49.3
Hospital	149	42.4
Mode of delivery		
Normal delivery	301	85.8
Caesarean Section	50	14.2
Pregnancy term		
No	13	3.7
Yes	338	96.3

3.3. Child characteristics

The median age of children was 47 (IQI: 52) days, and majority were girls 188 (53.6%), with normal birthweight 310 (88.3%), cried immediately after birth 340 (96.9%) and had no complication during delivery 318 (90.6%). **(Table 03).**

Table 3 Children background characteristics (N =351)

Variable	**Frequency**	**Percentage**
Child age(days)		
Median (IQR)	47(22-74)	
0 -30	94	26.8
31 - 60	126	35.9
61 -91	131	37.3
Sex of a children		
Boy	163	46.4
Girl	188	53.6
Birth weight of the baby		
< 2.4	17	4.9
2.5 – 3.9	310	88.3
≥ 4	24	6.8
Baby cry immediately after birth		
No	11	3.1
Yes	340	96.9
Children complications after immediately after delivery		
No	318	90.6
Yes	33	9.4

3.4. Counselling of the mothers on key essential newborn practices

Majority of women reported not being counselled on danger signs during pregnancy and after delivery 199 (56.7%), maternal nutrition 244 (69.5%), mother and child hygiene 193 (55%). Majority received counselling on exclusive breastfeeding, how to keep the baby warm, cord care, and danger signs of the newborn **(Table 04).**

Table 4 Counseling given to mothers after delivery by health providers (N = 351)

Variable	Frequency	Percentage
Counselled on danger signs of newborn		
No	199	56.7
Yes	152	43.3
Counselled on exclusive breastfeeding		
No	73	20.8
Yes	278	79.2
Counselled on frequency of breastfeeding		
No	98	27.9
Yes	253	72.1
Counselled on cord caring		
No	184	52.4
Yes	167	47.6
Counselled on mother and child hygiene		
No	193	55.0
Yes	158	45.0
Counselled on when to give your child a first bathing		
No	245	69.8
Yes	106	30.2
Counselled on kangaroo mother care if a child is preterm		
No	323	92.0
Yes	28	8.0
Counselled on how to keep a baby warm		
No	167	47.6
Yes	184	52.4
Counselled on danger signs for mother after delivery		
No	235	67.0
Yes	116	33.0
Counselled on maternal nutrition		
No	244	69.5
Yes	107	30.5
Counselled on contraceptives use or family planning		
No	173	49.3
Yes	178	50.7

3.5. Assessment of the newborn and routine care practices immediately after delivery

Majority of women reported to receive newborn and routine care practices immediately after delivery. Including: General assessment to their children 304 (86.6%), assisted in starting breastfeeding 365 (75.5%), baby weight was checked 350 (99.9) and children given immunization/vaccination 252 (71.8%) (Table 05).

Table 5 Newborn assessment practices and routine care offered by health providers among the 351 children

Variable	Frequency	Percentage
General assessment of the baby done		
No	47	13.4
Yes	304	86.6
Assisted on starting breastfeeding		
No	86	24.5
Yes	265	75.5
Baby weight checked		
Yes	350	99.7
I don't know	1	0.3
Baby height checked		
No	100	28.5
Yes	101	28.8
I don't know	150	42.7
Child given immunization/vaccination		
No	96	27.4
Yes	252	71.8
I don't know	3	0.8
Child given eye care/eye drops		
No	169	48.1
Yes	111	31.6
I don't know	71	20.3

3.6. Prevalence of newborn who received essential newborn care

In this study, six indicators were used to measure essential newborn practices; skin to skin contact, immediate drying after birth, wrapping by dry and clean cloth, breastfeeding within one hour after birth, bathing the newborn after 24 hours and care of the cord stump. Majority of newborns were placed on the mother's abdomen for skin-to-skin contact immediately after birth 198 (56.4%). A significant proportion of babies 307 (87.5%) were dried immediately by the provider after birth. Furthermore, almost all newborns 336 (95.7%) were wrapped in clean and dry cloths. Most mothers 303 (86.3%) delayed bathing their newborns for more than 24 hours, and the majority of babies 190 (54.1%) started breastfeeding within the first hour after birth. Additionally, 329 (93.7%) did not apply anything to the umbilical stump after it was cut. Overall, 271 participants (77.2%) practiced essential newborn care (Table 06).

Table 6 Prevalence of essential newborn care practices (N = 351)

Variable	Frequency	Percentage
Baby placed by provider after birth		
On mother abdomen (skin to skin contact)	198	56.4
On a clean surface	1	0.3
On bed	129	36.8
Others	23	6.5
Baby immediately dried by the provider after birth		
No	44	12.5
Yes	307	87.5
Baby immediately wrapped by clean cloth and dry cloth		
No	15	4.3
Yes	336	95.7
How long after birth did you starting bathing the child		
Within 24 hours	48	13.7
After 24 Hours	303	86.3
Time when baby started to breastfeed after birth		
Within 1 hour	190	54.1
After 1 hour	142	40.5
Did not breastfeed	19	5.4
Anything applied on the stump after the baby cord was cut		
No	329	93.7
Yes	22	6.3
Overall essential newborn care practiced		
No	**80**	**22.8**
Yes	**271**	**77.2**

3.7. Factors associated with receiving essential newborn practices

Table 07, shows the association between several factors and essential newborn practices. In crude analysis, complications of the mother or newborn and C/section were associated with less odds for the newborns to receive essential newborn care practices than others. Postnatal care attendance, birth weight of 4 kg or more, receiving counseling on hygiene, counseled on how to keep baby warm and performance of general assessment on the newborn after birth were associated with higher odds of receiving essential newborn care practices (Table 07)

Table 7 Factors associated with essential newborn care practices (N = 351)

Variable	N(Total)	Prevalence of ENC offered n (%)	Crude OR (95% CI)	P-value
Mother age				
15 -24	159	34(21.4)	1	
25 -34	154	35(22.7)	1.08(0.63-1.85)	0.77

35+	38	11(28.9)	1.50(0.68-3.32)	0.32
Child age				
0 -30	94	22(23.4)	1	
31- 60	126	32(25.4)	1.11(0.60-2.08)	0.73
61 - 91	131	26(19.8)	0.81(0.43-1.54)	0.52
Marital status				
Single/ Never Married	82	16(19.5)	1	
Married/Living together	269	64(23.8)	1.29 (0.70-2.38)	0.42
District				
Moshi Municipal Council	195	46(23.6)	1	
Moshi District Council	156	34(21.8)	0.90(0.55-1.49)	0.69
Level of education				
No formal education and primary education	176	37(21.0)	1	
Secondary and higher education	175	43(24.6)	1.22(0.74-2.02)	0.43
Employed and received salary				
No	319	74(23.2)	1	
Yes	32	6(18.8)	0.76(0.30-1.93)	0.57
Religion				
Muslims	97	16(16.5)	1	
Christian	254	64(25.2)	1.71(0.93-3.13)	0.09
Number of pregnancies				
1 – 3	291	69(23.7)	1.39(0.68-2.81)	0.37
4 – 7	60	11(18.3)	1	
Number of living children				
1 – 3	296	70(23.6)	1.39(0.67-2.91)	0.38
4 – 7	55	10(18.2)	1	
History of stillbirth				
No	343	78(22.7)	1	
Yes	8	2(25.0)	1.13(0.22-5.72)	0.88
History of neonatal death at the past				
No	337	78(23.1)	1	
Yes	14	2(14.3)	0.55(0.12-2.53)	0.45
ANC attend during currency pregnancy				
No	11	2(18.2)	1	
Yes	340	78(22.9)	1.34(0.28-6.33)	0.71
Number of ANC visit*				
1-3	62	11(17.1)	1	

4	156	35(22.4)	1.34(0.63-2.85)	0.445
5-8	122	32(26.2)	1.65(0.77-3.55)	0.201
PNC attended after last delivery				
No	75	6(8)	1	
Yes	276	74(26.8)	4.21(1.76-10.11)	0.001
Mother complications during delivery (i.e. current child)				
No	311	79(25.4)	1	
Yes	40	1(2.5)	0.08(0.01-0.56)	0.011
Level of facility you have delivered				
Dispensary	29	5(17.2)	1	
Health Centre	173	40(23.1)	1.44(0.52-4.03)	0.48
Hospital	149	35(23.5)	1.47(0.52-4.15)	0.46
Mode of delivery				
Normal delivery	301	79(26.2)	1	
Caesarean Section	50	1(2.0)	0.06(0.01-0.42)	0.005
Sex of a children				
Boy	163	34(20.9)	1	
Girl	188	46(24.5)	1.23(0.74-2.03)	0.42
Baby cry immediately after birth				
No	11	4(36.4)	1	
Yes	340	76(22.4)	0.50(0.14-1.77)	0.28
Children complications after immediately after delivery				
No	318	76(23.9)	1	
Yes	33	4(12.1)	0.08(0.01-0.56)	0.011
General assessment of the baby done				
No	47	3(6.4)	1	
Yes	304	77(25.3)	4.98(1.50-16.45)	0.009
assisted on starting breastfeeding				
No	86	13(15.1)	1	
Yes	265	67(25.3)	1.90(0.99-365)	0.054
Baby height checked				
No	100	17(17.0)	1	
Yes	101	34(33.7)	2.48(1.27-4.82)	0.008
Baby birth weight				
< 2.4	17	1(5.9)	0.23(0.03-1.74)	0.15
2.5 – 3.9	310	67(21.6)	1	

≥ 4	24	12(50.0)	3.63(1.56-8.44)	0.003
Child immunization/vaccination				
No	96	28(29.2)	1	
Yes	252	52(20.6)	0.63(0.37-1.08)	0.09
Child given eye care/eye drops				
No	169	43(25.4)	1	
Yes	11	21(18.9)	0.68(0.38-1.23)	0.21
Counselled on danger signs of newborn				
No	199	41(20.6)	1	
Yes	152	39(25.7)	0.75(0.46-1.24)	0.26
Counselled on exclusive breastfeeding				
No	73	17(23.3)	1	
Yes	278	63(22.7)	1.04(0.56-1.91)	0.91
Counselled on frequency of breastfeeding				
No	98	19(19.4)	1	
Yes	253	61(24.1)	1.32(0.74-2.35)	0.35
Counselled on cord caring				
No	184	38(20.7)	1	
Yes	167	42(25.1)	1.29(0.78-2.13)	0.32
Counselled on mother and child hygiene				
No	193	54(28.0)	1	
Yes	158	26(16.5)	1.97(1.17-3.33)	0.01
Counselled on when to give your child a first bathing				
No	245	61(24.9)	1	
Yes	106	19(17.9)	0.66(0.37-1.17)	0.16
Counselled on kangaroo mother care if a child is of preterm				
No	323	76(23.5)	1	
Yes	28	4(14.3)	0.54(0.18-1.61)	0.27
Counselled on how to keep a baby warm				
No	167	53(31.7)	1	
Yes	184	27(14.7)	0.37(0.22-0.62)	P<0.001
Counselled on danger signs for mother after delivery				
No	235	53(22.6)	1	
Yes	116	27(23.3)	0.96(0.57-1.63)	0.88

*COR-Crude odds ratio

3.8. Multivariable logistic regression for factors associated with essential newborn care practices.

In multivariable logistic regression analysis, postnatal attendance after last delivery, general assessment of the newborns and counseling on keeping the baby warm remained significantly associated with receiving essential newborn care practices. Women who received PNC and whose newborn received general assessment had 6 higher odds of ENC than others. Women who received counseling on baby warm had 76% lower odds of ENC than others (Table 08)

Table 8 Multivariable logistic regression for factors associated with essential newborn care practices

Variable	Adjusted OR (95%CI)	P-value
PNC attended after last delivery		
No	1.00	
Yes	6.01(0.34-26.94)	0.019
Children complications after immediately after delivery		
No	1.00	
Yes	0.66(0.19-2.87)	0.559
General assessment of the baby done		
No	1.00	
Yes	6.42(1.30-31.65)	0.022
Baby height checked		
No	1.00	
Yes	1.32(0.59-2.91)	0.498
Counseled on mother and child hygiene		
No	1.00	
Yes	0.88(0.40-1.92)	0.748
Counseled on how to keep a baby warm		
No	1	
Yes	0.24(0.09-0.66)	0.006
Counseled on contraceptives use or family planning		
No	1	
Yes	1.31 (0.56-3.04)	0.532

*AOR-Adjusted

4. Discussion

This study aimed to assess the prevalence of essential newborn care and its associated factors. The overall prevalence of essential newborn care practices in all six components was 77.2% based on mothers' reported practice of immediate drying after birth, skin to skin contact, wrapping with a dry and clean cloth, breastfeeding within one hour after birth, bathing the newborn after 24 hours and care of the cord stump. This is below the WHO recommendation of universal coverage of ENC practices to reduce neonatal mortality and threatens the achievement of Tanzania's neonatal health target to reduce neonatal mortality to 12 per 1,000 live births by 2030. The observed non-adherence to ENC practices may increase the risk of neonatal hypothermia, neonatal infections and sepsis which are leading causes of newborn deaths in Tanzania and globally (14,15). The overall prevalence of good essential newborn care practices in this study (77.2%) aligns with similar studies done in Nepal (79.8%) and Sudan (63.8%) (16,17). It is also greater than the study done in Ghana, which reported a prevalence of 15.8%, Western Ethiopia (44.1%) and Southwest Ethiopia (41%) (10,18). The observes similarities and differences in findings across different studies attributed by multiple factors such as health system factors, socioeconomic factors, cultural norms, and policy-related factors (19).

Skin-to-skin contact and early breastfeeding initiation were notably lower in this study. The relatively low rates of skin-to-skin contact (56.4%) and early breastfeeding initiation (54.1%) indicate gaps in immediate postnatal care. These practices are critical for neonatal survival, thermoregulation, immune protection, and bonding. The possible reasons for these lower rates could be due in in-adherence to newborn care guidelines and protocols by healthcare workers and ineffective maternal education and awareness (20).

In another instance, several essential newborn care practices showed high adherence, with immediate drying (87.5%), wrapping the baby in a clean, dry cloth (95.7%), delayed bathing at 86.3%, and no harmful application to the cord (93.7%). These findings indicate strong compliance with newborn care guidelines, highlighting effective measures to prevent hypothermia, infection, and early neonatal complications.(7,21).

Immediate drying and clean cloth wrapping are crucial for thermal regulation, while delayed bathing preserves natural immunity and prevents skin infections. Not applying harmful substances to the cord is vital for reducing infection risks. These high adherence rates demonstrate good healthcare delivery but also point to areas for improvement, particularly in achieving universal practice of these vital measures across all settings(1,19).

Receiving full essential newborn care was significantly associated with attending PNC after previous pregnancy, baby receiving general assessment at birth and counseled on keeping the baby warm. These factors play a crucial role in promoting better adherence to ENC practices, ensuring the health and well-being of both mother and newborn (22).

Attending postnatal care (PNC) after a previous pregnancy has been consistently linked with improved neonatal outcomes. Studies have shown that women who attend postnatal care are more likely to receive counseling on essential newborn care, including breastfeeding practices, newborn hygiene, and thermal protection. PNC attendance serves as an opportunity to reinforce key newborn care practices, such as immediate drying, skin-to-skin contact, and early breastfeeding initiation, which are fundamental to improving neonatal health. Moreover, PNC attendance provides a platform for healthcare providers to address any concerns or complications that may arise during the early days of the newborn's life (23).

The study also highlights the significance of general assessments at birth, which are critical in ensuring that essential newborn care practices are implemented immediately after birth. General assessments at birth allow healthcare providers to assess the newborn's health status, identify any potential complications, and provide timely interventions. Early identification of health issues—such as birth asphyxia or hypothermia—ensures that newborns receive immediate care, thereby improving adherence to thermal protection measures like skin-to-skin contact and early breastfeeding (4,5,12,15). The general assessment also ensures that the newborn's health and survival are prioritized from the moment of birth, supporting the timely application of essential newborn care practices (24).

Finally, the study revealed that counseling on keeping the baby warm is another important factor associated with receiving full ENC. Counseling mothers on the importance of thermal protection is crucial in preventing hypothermia, a leading cause of neonatal mortality. According to UNICEF, counseling on keeping the newborn warm immediately after birth—by practices such as immediate drying, skin-to-skin contact, and wrapping the baby in a clean, dry cloth—significantly reduces the risk of cold stress and improves neonatal health outcomes. By providing caregivers with clear guidance on these practices, healthcare providers can empower them to maintain optimal thermal conditions for the newborn in the early postnatal period (5,12,15).

5. Conclusion

In this study, the prevalence of essential newborn care practices was found to be 77.2%, which indicates a generally positive adherence to recommended newborn care measures, although there is still room for improvement. Practices such as immediate drying, clean cloth wrapping, delayed bathing, and no harmful application to the cord demonstrated high adherence, reflecting strong healthcare delivery. However, practices like skin-to-skin contact and early breastfeeding initiation were notably lower, highlighting gaps in postnatal care that need urgent attention. These findings emphasize the need for consistent training and reinforcement of newborn care protocols, particularly focusing on the immediate postnatal period.

Recommendation

On a global scale, promoting adherence to essential newborn care practices, including skin-to-skin contact and early breastfeeding initiation, should be prioritized by global health organizations like WHO and UNICEF. These practices are critical in reducing neonatal mortality and improving infant health worldwide. WHO should encourage countries to

integrate these practices into national health guidelines and support their implementation, particularly in low-resource settings. Furthermore, regular monitoring and evaluation of essential newborn care practices should be conducted globally, with a focus on strengthening postnatal care services. These efforts will contribute to better neonatal health outcomes globally, ensuring that all newborns receive the care they need to survive and thrive.

To improve essential newborn care in Tanzania, there is a need to enhance adherence to skin-to-skin contact and early breastfeeding initiation, which were notably lower in this study. Healthcare workers should receive continuous training and support to emphasize these crucial practices, which are vital for neonatal survival. Additionally, the high adherence to other essential newborn care practices, such as immediate drying, clean cloth wrapping, delayed bathing, and no harmful application to the cord, should be maintained and further encouraged through regular supervision and monitoring. Strengthening postnatal care services is also essential, especially for mothers who have had previous pregnancies, as these visits provide an opportunity for reinforcing newborn care practices and ensuring the well-being of both mother and baby.

5.1. Study strengths and limitations

This study's strength lies in its large sample size and comprehensive assessment of essential newborn care practices, providing valuable insights into neonatal health in Tanzania setting. However, it has limitations, including reliance on self-reported data, which may introduce recall bias, and its cross-sectional design, which doesn't allow for establishing causal relationships. Additionally, the study may not fully represent variations in newborn care practices across different regions of Tanzania.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest relevant to the content of this article.

Statement of ethical approval

Ethical approval for this study was obtained from Kilimanjaro Christian Medical University Ethical Review board.

Statement of informed consent

Informed consent was obtained from the study participants and parents' consent and assent for participants under the age of 18 years. The aim, objectives and importance of this study were explained to study participants before invitation to participate in this study.

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