

ORIGINAL ARTICLE



Knowledge of essential newborn care and neonatal danger signs amongst post-natal mothers in Dar es Salaam, Tanzania

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Abstract

Background. Tanzania has high infant mortality. Essential newborn care (ENC) and neonatal danger indicators are vital for reducing neonatal morbidity and mortality. This study examined postnatal moms' knowledge of ENC and neonatal danger indicators in Dar es Salaam.

Methods: Post-natal moms from four hospitals in Dar es Salaam, Tanzania, participated in a hospital-based, cross-sectional study employing sequential sampling. Interviewees completed a structured questionnaire. SPSS 20.0 was used for data analysis. We employed frequencies to summarize ENC and neonatal risk signs knowledge. When the p-value was less than 0.05, statistical significance was assumed for the adjusted odds ratio.

Results. There were 825 people registered. Most were married (71.8%) and had a primary education (59%). Over 85% of women visited the prenatal clinic at least four times, however only 33.1% received ENC education during ANC visits and 70.5% following birth. Nurses and midwives trained 86% of them. 64.2% of postnatal mothers were ENC-savvy. Fever and difficulty to breastfeed were the most prevalent neonatal risk signals. Participants who did not receive ENC education before delivery were 1.74 times more likely to have bad knowledge (AOR 1.74 [95% CI (1.22-2.49)], p0.002), while moms who did not obtain education after delivery were 4.2 times more likely to have poor knowledge (AOR 4.20 [95% CI 3.00-5.88]).

Conclusions. Over 35% of postnatal mothers lacked ENC and newborn danger sign awareness. Prenatal and postnatal education increased maternal knowledge. Before and after delivery, ENC and neonatal risk indicators should be emphasized.

Key words: Knowledge, mothers, essential newborn care, neonatal danger signs.

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INTRODUCTION

Globally, remarkable progress has been made in reducing child mortality over the past several decades. Nonetheless, neonatal mortality rates lag behind, particularly in low- and middle-income nations. Meanwhile, neonatal mortality accounts for between 40% and 47% of deaths among children under five.¹ The majority of these deaths occur within the first week of life and are preventable by interventions supported by scientific evidence.^{1–3} The Essential Newborn Care (ENC) guidelines of the World Health Organization (WHO) include these fundamental interventions to improve neonatal outcomes and address newborn care. These include cleanliness, breastfeeding, cord care, eye care, thermoregulation, vaccinations, care for infants with low birth weight, and recognition of neonatal danger signs.^{4,5} In Tanzania, neonatal mortality was reported to be 25 per 1000 live births in 2015⁵, and substantial effort is required to achieve Sustainable Development Goal (SDG)³, which aims to reduce neonatal mortality to 12 per 1000 live births by 2030. Essential to reducing preventable neonatal deaths is mothers' knowledge of ENC and neonatal danger signs as primary caregivers.^{6–9}

The Maternal and Newborn Healthcare Capacity Building Team (MHCB) of the local non-governmental organization Comprehensive Community-Based Rehabilitation in Tanzania (CCBRT) provides regular training and mentoring for nurses and doctors working in maternal and newborn care at 23 public health facilities in the Dar es Salaam region. The severe shortage of nurses is a crucial factor in providing high-quality neonatal care. In order to care for their sick or preterm neonates, mothers must quickly acquire fundamental nursing skills. In order to empower these mothers, MHCB developed a structured training program based on the principles of newborn care and the recognition of neonatal danger signs. This project's first step was to conduct a baseline study to assess the knowledge of post-natal mothers regarding ENC and neonatal danger signs in order to identify potential knowledge gaps and then to tailor the training package accordingly.

MATERIALS AND METHODS

Study design and setting. A hospital-based, cross-sectional descriptive study was conducted in October and November 2019 at the neonatal care units of Muhimbili National Hospital (MNH) in Dar es Salaam, which is the national referral hospital of Tanzania; and Amana, Mwananyamala and Temeke Hospital, the three regional referral hospitals of Dar es Salaam. Dar es Salaam is the commercial center of the country with a nearly 6 million population and about 130,000–140,000 deliveries per year, 85% of which occur in health facilities. MNH admits about 6400 neonates annually, whereas the three regional hospitals each receive between 3000 and 4400 neonatal admissions per year.

Sample size. A minimum sample of 768 participants was calculated using a single population proportion formula and the expected level of knowledge of post-natal mothers on essential newborn care was estimated to be 50%; since no similar study has been done before in Tanzania.

Study population. Post-natal mothers whose newborn infants were admitted at the 4 neonatal care units of MNH, Mwananyamala, Amana, and Temeke hospitals in Dar es Salaam during the time of the study. Mothers who were either very sick and unable to answer a series of questions, or whose newborn infants were critically sick, and mothers who suffered from still birth or neonatal death were excluded.

Data collection methods and instruments. Proportional sampling was used to determine the contribution of each hospital towards the minimal sample size and this was based on the proportion of admission in respect of the total annual admissions from the previous year. In this respect MNH contributed two-fold of the sample of the three regional referral

Supplementary information The online version of this article ([Figures/Tables](#)) contains supplementary material, which is available to authorized users.

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hospitals. Consecutive sampling technique was then used to enroll post-natal mothers in each of the four hospitals.

The study participants were interviewed face-to-face by the principal investigator and four trained research assistants using a structured, pre-tested questionnaire to determine the level of knowledge on essential newborn care (ENC) and neonatal danger signs. The questionnaire was translated into Kiswahili, the national language. To determine the level of knowledge we used “all or nothing” scoring method to analyse the responses of mothers. For all 20 questions, each correct response received one (1) point and an incorrect response received zero (0) points. Using the upper quartile as a cut-off point, post-natal mothers scoring above 75% were classified as having a high level of knowledge and those scoring below 75% had a low level of knowledge.

Data management and statistical analysis. Data was analysed using SPSS v. 20. The descriptive statistics and the level of knowledge on each component was summarised as frequencies or proportions. Univariate analysis was done to determine factors influencing the level of knowledge on ENC and neonatal danger signs and those showing a significant association were further analysed using multivariate logistic regression to determine the predictors of the level of knowledge among participants. The Adjusted Odds ratio (AOR) was used to determine independent predictors of level of knowledge on ENC. The results were considered of statistical significance when p-value was ≤ 0.05 .

Ethics approval and consent to participate. Ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences Institutional Review Board (Ref. No.DA25/111/01/) and permission to conduct this study was sought from Temeke, Amana and Mwananyamala municipal authorities and from the MNH authorities. All post-natal mothers who agreed to participate and signed written informed consent prior to enrolment. In order to maintain confidentiality, each participant was issued a unique study identification number so that information could not be traced back to specific participants and data was entered into a password-protected computer.

RESULTS

In total, 825 post-natal mothers from 4 hospitals in Dar es Salaam were interviewed. The mean age of study participants was 26.9 years ($SD \pm 6.2$), most of the mothers were married (71.8%) and slightly over half (59.3%) had a primary level of education. Among the participants, 69.5% were self-employed and a large majority (85.4%) had attended ANC 4 times or more, as shown in Table 1

Only one third of the participants reported having received health education on ENC during their ANC visits, whereas 70.5% were educated after delivery. Nurses were the primary source of health education. During ANC visits, the main topics taught on ENC were breastfeeding and neonatal danger signs. Post-natally, cord care and immunisation were in addition emphasised. The other components of ENC were rarely taught as shown in Table 2.

The knowledge on breastfeeding was high, although only 65.6% of participants were aware of the importance of colostrum. When asked about cord care, the majority of the participants (76.7%) mentioned dry cord care, but only 44.1% of mothers knew that the umbilical stump should not be covered. Knowledge of hand hygiene was limited. While nearly every mother correctly responded that her baby needs immunisation to prevent diseases, only 55.2% were aware that neonates are immunised against tuberculosis (TB) and polio on their first day of life as shown in Table 3.

The majority of the participants knew of at least two ways of keeping the baby warm, by wrapping it in warm clothes (81.3%) and by skin-to-skin contact (71.9%). Other methods of thermoregulation were less frequently mentioned as shown in Figure 1.

Overall, 85.3% of the participants had heard of neonatal danger signs citing fever and inability to breastfeed as the most common danger signs, whereas other danger signs were mentioned less frequently, as depicted in Table 4.

Almost two thirds, 64.2% (530) post-natal mothers were classified as having a high level of knowledge on ENC, but when analysed by subgroups across the four hospitals, there was variability in those categorised as having a high level of knowledge

ranging from 47.3% to 86.1%.

Univariate analysis was done to determine factors influencing the level of knowledge of post-natal mothers on ENC and neonatal danger signs and those showing a significant association were further analysed using bivariate logistic regression to determine the predictors of the level of knowledge on ENC among participants. Post-natal mothers who did not receive health education on ENC before delivery were 1.7 times more likely to present with poor knowledge (AOR 1.74 [95% CI (1.22-2.49)], $p < 0.002$), whilst mothers who did not receive education after delivery were 4.2 times more likely to present with poor knowledge (AOR 4.20 [95% CI 2.998-5.88], $p < 0.001$). compared to their counterparts. The level of knowledge on ENC was neither influenced by age, parity, level of education, marital nor employment status as shown in Table 5.

DISCUSSION

The purpose of this study was to determine the level of knowledge of postnatal mothers in Dar es Salaam regarding newborn care and danger signs. A total of 825 individuals from one tertiary hospital and three regional referral hospitals were enrolled. The majority of participants had attended ANC at least four times in accordance with Tanzanian guidelines, but only one-third reported receiving ENC education during ANC visits, with an emphasis on breastfeeding and neonatal danger signs. Post-natally, however, more than two-thirds of the participants received ENC education, which was primarily focused on breastfeeding, neonatal danger signs, immunization, and cord care. Overall, the level of breastfeeding knowledge among post-natal mothers was high, which corresponds well with the participants' reports that breastfeeding was the most frequently taught topic. A study conducted in South Sudan yielded comparable results, indicating that healthcare providers place a significant emphasis on breastfeeding.⁸ This is likely due to the fact that breastfeeding is the most valued method of infant nutrition in African culture.

Fever and the inability to breastfeed were the most frequently mentioned neonatal danger signs, which

is consistent with the findings of a community-based study conducted in Nigeria, in which 92% of participants cited fever as the primary neonatal danger sign.⁷ Similar to a Kenyan study,⁹ very few postnatal mothers were aware of hypothermia as a neonatal danger sign, despite the fact that newborns with hypothermia have a greater risk of developing serious complications.

Contrary to expectations, the age of post-natal mothers did not influence their level of ENC knowledge. This contradicted the findings of a Rwandan study that indicated maternal age should be considered when providing ENC education.¹⁰⁻²¹ Our research also revealed that maternal knowledge of ENC and neonatal danger signs varied across the four hospitals. We also discovered a significant correlation between the health education mothers received before and after childbirth and their level of ENC knowledge. Therefore, it is highly probable that the health education programs offered in the four hospitals differed significantly.

Limitations

This was a hospital-based study conducted in an urban setting, and the vast majority of post-natal mothers who were interviewed had given birth in a hospital. Therefore, it is possible that this study does not reflect the knowledge of post-natal mothers who delivered at home or who reside in rural areas. In addition, the absence of a standardised assessment tool for calculating the level of knowledge on essential newborn care limits the study's comparability with other research.

CONCLUSIONS

Sixty-four percent of postnatal mothers exhibited a high level of knowledge regarding ENC and were able to identify at least three neonatal danger signs. Only one-third of postnatal mothers reported receiving health education on ENC and neonatal danger signs, which is also provided minimally during antenatal clinic visits, where the primary focus was on maternal health.

The maternal health education regarding essential newborn care and neonatal danger signs should be expanded beyond breastfeeding, particularly during ANC visits. The development of structured teaching materials and programs, as well as the implementation of scheduled training for the nurses who are the primary educators of mothers, are required.

INFORMATION

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Authors' contributions. HM provided major contributions in concept, data collection, data analysis and literature review. EA was a co-first author contributing towards the concept, data analysis, literature review and in writing the manuscript. AN and FM contributed to concept and data collection. AZ provided major contributions to concept, literature review, data collection and manuscript. All authors read and approved the final manuscript.

Conflict of interest. The authors declare no potential conflict of interest.

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Availability of data and materials. The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate: Ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences Institutional Review Board (**Ref. No.DA25/111/01/**) and permission to conduct this study was sought from

Temeke, Amana and Mwananyamala municipal authorities and from the MNH authorities. All post-natal mothers who agreed to participate signed and written informed consent prior to enrolment. In order to maintain confidentiality, each participant was issued a unique study identification number so that information could not be traced back to specific participants and data was entered into a password-protected computer.

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TABLE 1: Socio-demographic characteristics of the post-natal mothers in Dar es Salaam.

Variables	Frequency (%) (n=825)
Maternal age (years)	
Less than 19	94 (11.4)
20-29	457 (55.4)
30-39	255 (30.9)
40-49	19 (2.3)
Marital status	
Married	592 (71.8)
Not married	233 (28.2)
Education level	
Never been to school	57 (0.9)
Primary school	489 (59.3)
Secondary school	237 (28.7)
College or university	42 (5.1)
Employment status	
Employed	43 (5.2)
Self-employed	530 (64.2)
Unemployed	252 (30.5)
Parity	
Primiparous	351 (42.5)
Multiparous	474 (57.5)
Mode of delivery	
Spontaneous vaginal delivery	644 (78.1)
Caesarean section	181 (21.9)
Place of birth	
Hospital	813 (98.5)
Home	12 (1.5)
Number of ANC visits	
None	3 (0.4)
Less than 4	117 (14.2)
4 or more	705 (85.4)

ENC = essential newborncare; ANC = antenatal clinic.

TABLE 2: Education on essential newborn care received by post-natal mothers in Dar-es-Salaam during antenatal visits and after delivery.

Variable	During ANC Frequency (%)	After delivery Frequency (%)
Education on ENC received	n=825	n=825
Yes	273 (33.1)	582 (70.5)
No	552 (66.9)	243 (29.5)
Source of ENC education antenatal	n=273	n=582
Doctors	8 (2.9)	30 (5.2)
Nurses	247 (90.4)	504 (86.6)
Family/ friends	15 (5.5)	39 (6.7)
Mass media	3 (1.1)	9 (1.5)
ENC information received on	n=273	n=582
Breast feeding	237 (86.8)	543 (93.2)
Cord care	57 (20.9)	227 (39.0)
Eye care	14 (5.1)	34 (5.8)
Thermoregulation	19 (7.0)	70 (12.0)
Care of preterm	13 (4.8)	24 (4.1)
Danger signs	140 (51.3)	393 (67.5)
Immunisation	60 (22.0)	312 (53.6)
Hygiene	30 (11.0)	60 (10.3)

ENC = essential newborn care; ANC = antenatal clinic.

TABLE 3: Knowledge on essential newborn care components of amongst post-natal mothers in Dar-es-Salaam.

Correct knowledge on	Frequency (%) n=825
Breastfeeding	
Baby should not be given prelacteal feeds	747 (90.5)
Baby should be given colostrum	541 (65.6)
Breastfeeding on demand	697 (80.5)
Exclusive breastfeeding for 6 months	771 (93.5)
Cord care	
Umbilical cord stump should not be covered	364 (44.1)
Nothing should be applied to the cord	633 (76.7)
Hygiene	
Washing hands before touching the baby	478 (57.9)
Washing hands after changing diaper	182 (22.1)
Immunisation	
Newborns need immunisation	820 (99.4)
Immunisation prevents diseases	800 (97.0)
Newborns are immunised against TB and polio	455 (55.2)

ENC = essential newborn care; ANC = antenatal clinic; TB = tuberculosis.

TABLE 4: Knowledge of post-natal mothers in Dar es Salaam on neonatal danger signs.

Variable	Frequency(%) n=825
Have ever heard of neonatal danger sign	
Yes	704 (85.3)
No	121 (14.7)
Knowledge on different danger signs	
Inability to breastfeed	478 (57.9)
Fever	563 (68.2)
Hypothermia	49 (5.9)
Convulsion	242 (29.3)
Lethargy	62 (7.5)
Difficulty in breathing	233 (28.2)
Chest indrawing	15 (1.8)
Jaundice	357 (43.3)
Able to mention danger signs	
Less than three signs	291 (35.3)
Three or more signs	534 (64.7)

TABLE 5: Bivariate logistic regression of factors associated with level of knowledge of post-natal mothers on ENC.

Variable	Crude OR (95% CI)	AOR	(95% CI)	p value
Age of mother				
≤29 years	0.66	0.84	(0.57-1.23)	0.375
>29 years	(0.48-0.90)	(1.00 reference)		
Employment status				
Employed	1.71	1.35	(0.98-1.86)	0.063
Unemployed	(1.28-2.29)	(1.00 reference)		
Marital status				
Married	1.49	(1.00 reference)		
Not married	(1.09-2.04)	1.33	(0.93-1.89)	0.115
Level of education				
Primary school and below	0.912	0.825	(0.59- 1.16)	0.262
Above primary school	(0.67-1.24)	(1.00 reference)		
Parity				
Primiparous	0.66	0.88	(0.61-1.26)	0.488
Multiparous	(0.49-0.88)	(1.00 reference)		
Received health education during ANC				
Yes	2.56	(1.00 reference)		
No	(1.84-3.56)	1.74	(1.22-2.48)	0.002
Received health education after delivery				
Yes	4.73	(1.00 reference)		
No	(3.44-6.51)	4.18	(3.00-5.83)	0.000

ENC = essential newborn care; ANC = antenatal clinic

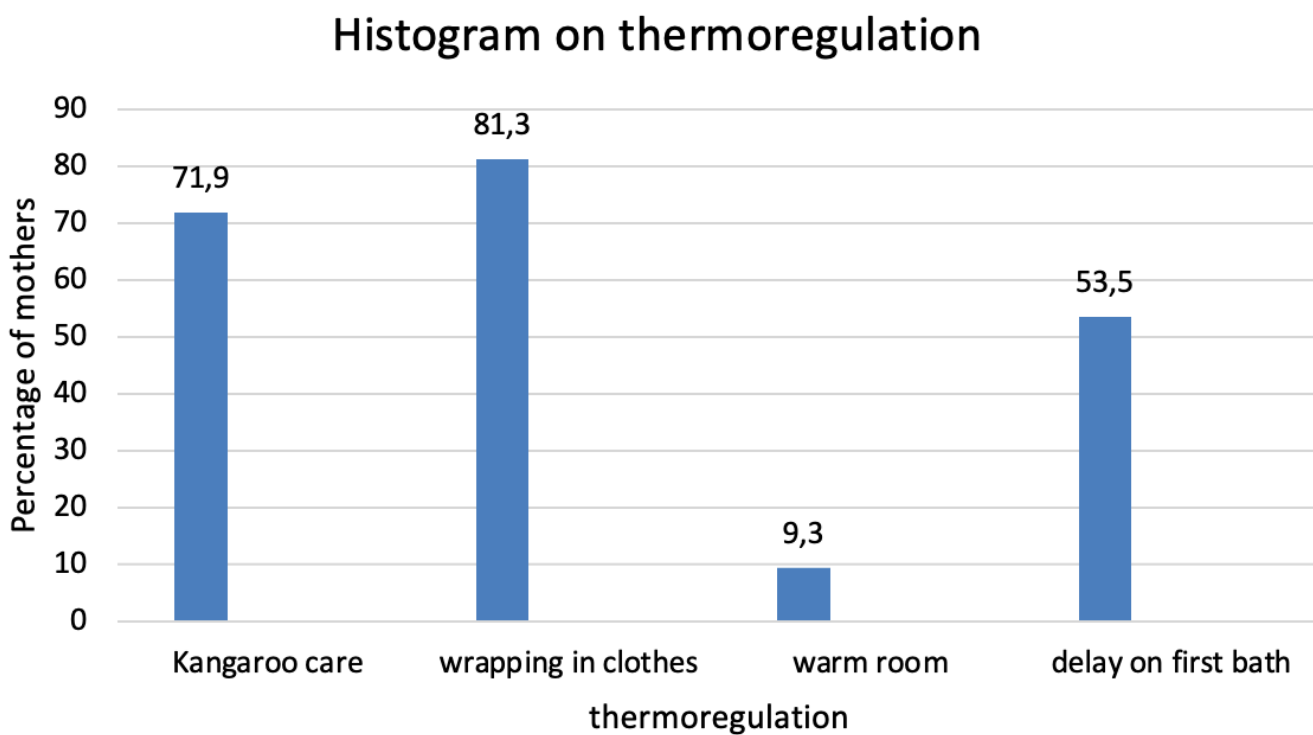


FIGURE 1: Proportion of post-natal mothers in Dar-es-Salaam with knowledge on methods of thermoregulation.