

# Thermoregulation Practices among Mothers with New-Born Babies Attending Kenyatta National Hospital, Kenya

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## ABSTRACT

Thermal protection is a major challenge for new-born survival in most developing regions. Despite continued emphasis on correct thermoregulation care practices, suboptimal care still persists. This study therefore sought to determine the practices for maintenance of optimal neonatal body temperature among mothers with new-born babies attending Kenyatta National Hospital. The study adopted a mixed methods cross sectional design using qualitative and quantitative methods. The study population comprised of mothers with new-born babies attending the postnatal clinic and paediatric emergency unit at Kenyatta National Hospital. Slovin's Formula was used to determine a sample size of 200 respondents. The study used primary data through questionnaires, focus group discussion and observation. Descriptive statistics and chi-square analysis were conducted with the help of SPSS. Results showed that majority 66.5% (n=133) had good thermoregulation practices. Age (p=0.001) and level of education (p=0.000) were significant. Thermoregulation practices among mothers with new-born babies attending Kenyatta National Hospital were good. All the same, mothers should therefore be sensitised on covering their baby well during movement and checking of wet diapers and clothing to ensure that the baby is kept warm at all times.

**Keywords:** Thermoregulation Practices, Thermal protection, new-born care, neonatal body temperature

## INTRODUCTION

Most neonatal deaths arise from preventable causes. The major causes relate to cord care, temperature control and early initiation of breastfeeding. Improving practices related to cord care, temperature control and breastfeeding can prevent neonatal morbidity and mortality (Tafere, Afework & Yalew, 2018). The World Health Organization emphasizes the need to continuously improve care practices at birth in order to decrease neonatal morbidity and mortality (WHO, 2013). The care practices are described in details as components of essential new-born care (ENBC) practices. ENBC comprises of cord care, thermal care and early initiation of breast feeding. Cord care involves keeping the babies cord clean and dry. Thermal practices protect the baby from low temperatures, and breastfeeding should be initiated immediately after birth or within the first hour after birth. Adhering to ENBC is key in ensuring better neonatal outcomes in poor resource settings. However coverage of ENBC is far below the universally recommended levels in majority of the low resource setups (Pagel *et al.*, 2014).

ENBC is a strategy intended to improve the outcomes of new-borns through a series of interventions in the preconception, during pregnancy, soon after birth, and in the postnatal period (Chichiabellu *et al.*, 2018). ENBC practices include drying (wiping) and wrapping the new-born immediately after birth, initiating skin-to-skin contact with the mother or relative volunteer, dry cord care, immediate initiation of breastfeeding and delayed bathing (WHO, 2011). There is evidence that adherence to recommended essential new-born care practices substantially reduces morbidity and mortality risk, especially for low birth weight infants (Sakelo *et al.*, 2020).

Hypothermia is a condition in which the body temperature falls below normal levels immediately after birth. It remains a worldwide issue and, if prolonged, is associated with neonatal morbidity and mortality (McCall *et al.*, 2018). The universally acceptable core body temperature for the human body 37°C (Leduc & Woods, 2013; McCall *et al.*, 2018). Several areas of the body can be used to assess the temperature of new-borns. However, the axillary temperature is preferred owing to less complications arising from the method. According to Leduc and Woods (2013), hypothermia in new-borns occurs when core temperature drops below 36.3°C. Thermal care protection of new-born is essential to reduce neonatal morbidity and mortality. To protect the new-born from hypothermia, specific practices are recommended to at birth and the first few days of life. The practices include prompt drying after birth, direct skin-to-skin contact and covering the baby with warm clothing (Khanal, Gavidia, Adhikari, Mishra & Karkee, 2014; Sobel *et al.*, 2011).

It is recommended that practices that expose the new-born to low temperatures such as bathing be delayed in the first day of life (Khan *et al.*, 2018). Breastfeeding encourages contact between the mother and baby and ensures the baby is kept warm by

the mother (Sobel *et al.*, 2011). However, it has been established that there is inadequate utilization of thermal care practices across South Asia and sub-Saharan Africa (Khan *et al.*, 2018). Coalter and Patterson (2017) attribute poor thermal care practices to be a significant contributor to neonatal deaths in low resource households.

Thermal protection is a major challenge for new-born survival in most developing regions. Lunze *et al.* (2014) found that a majority caregivers' and health workers' have the relevant knowledge of thermo protective practices. The identified practices include a chain of protective measures from birth. They entail; birth room warming, drying and covering with warm clothing, delayed bathing, and immediate initiation of exclusive breastfeeding. However, they also noted that there were critical breakages of the warm chain in the first hours after birth. An inconsistency in keeping the infants warm puts their survival at risk. Shamba *et al.* (2014) assessed adoption and communally acceptable recommendations regarding thermal care practices in Tanzania. Evidently, only 42% of babies were correctly dried after birth. Only 27% were correctly wrapped within five minutes of birth. The study noted that delayed wrapping and drying was due to failure to have someone attend to the baby as the placenta was being delivered. Delayed bathing was not practiced at satisfactory levels.

Shamba *et al.* (2014) noted that only 45% of hospital delivery babies and 19% of home delivery babies were bathed six or more hours after delivery. The delayed bathing in the same study was attributed to health worker advice. A significant discovery was that some babies were bathed early because mothers thought they were dirty. In particular, this happened if the baby had an obvious vernix which the mothers believed was sperms. However, majority of the mothers covered their babies continuously to avoid cold. Direct skin to skin care by the mother or guardian was not practices by a majority of the mothers. It

was not considered normal practice because of fears it might be harmful to the fragile neonates (Shamba *et al.*, 2014).

Despite continued emphasis on correct thermoregulation care practices, suboptimal care still persists. Consequently neonatal mortality rates have remained constant over time and contribute about 40% of all under-five deaths globally (Saaka, Ali and Vuu, 2018). Globally, more than three million neonates die every year (Saaka *et al.*, 2018). Statistics from Ghana show a neonatal mortality of 29 /1000 live births. That means 68% of all under five deaths occur before a child's first birthday and 48% occur in the first month of life (Saaka *et al.*, 2018). Statistics from Ethiopia peg neonatal mortality at 37/1000 live births (Misgna, Gebru & Birhanu, 2016). Kenya Demographic Health Survey (KDHS) pins neonatal mortality rate at 22 /1000 live births. All this statistics presents neonatal mortality rates way above the Sustainable Development Goal (SDG) 3. SDG 3 aims to decrease neonatal mortality rate to 12/1000 live births by 2030 (Amolo, Irimu & Njai, 2017).

Data from Kenyatta National Hospital (KNH) health information department also show a stagnant trend in neonatal mortality. Data from 2014, 2015, 2016, 2017 and 2018 places neonatal mortality at 18.44%, 16.1%, 20.29%, 18.75% and 20.09% respectively. According to the Health Information Department at KNH, sepsis, jaundice and pneumonia stands as the leading causes of neonatal death. Despite sensitization of mothers on the importance of essential new-born care, common infections such as diarrhoea, sepsis and pneumonia of neonates persist at Kenyatta National Hospital which is an indication that new-born care practices are not observed as recommended. Most of the neonatal infections and infection-related deaths could be avoided by complying with thermal care recommendations. This study therefore sought to determine the practices for maintenance of optimal neonatal body temperature among mothers with new-born

babies attending Kenyatta National Hospital.

*H<sub>0</sub>1: There is no association between the maternal factors and thermoregulation practices.*

## **MATERIALS AND METHODS**

The study adopted a mixed methods cross sectional design using qualitative and quantitative methods. The researcher collected, analyzed and interpreted quantitative and qualitative data in a single study to investigate new-born care practices. The study was carried out in Kenyatta National Hospital. Kenyatta National Hospital (KNH) was established in 1901 and has become the largest hospital in Kenya and East Africa. More than 500 babies are born at Kenyatta National Hospital every month. The New Born Unit caters for 100 babies a day. KNH New-born Unit also includes the country's only Neonatal Intensive Care Unit in a public health institution. In the postnatal clinic, mothers are educated on breastfeeding, breast care, cord care family planning options, both maternal and infant danger signs. The postnatal clinic is done once a week and sees an average of about 30 mothers per week. The paediatric emergency unit is open daily and attends to about 70 clients per week. The participants from this study were recruited from the postnatal clinic and the paediatric emergency unit.

The study population comprised of mothers with new-born babies attending the postnatal clinic and paediatric emergency unit at Kenyatta National Hospital. The specific target population was breastfeeding mothers attending the postnatal clinic and paediatric emergency unit. The average monthly attendance in both units was about 400 mothers. The paediatric emergency unit attend to an average of 70 clients in a week, that is, an average of 280 clients a month. The postnatal clinic is scheduled once a week and sees an average of 30 clients every week, that is, about 120 clients in a month. Slovin's Formula was used

determine the sample size (Burns, Grove, & Gray, 2011).

$$n = N / (1 + N e^2)$$

Where: n= sample size, N= population, e =margin of error.

Therefore in a population of 400 mothers attending the post-natal clinic and paediatric emergency unit, the study used a sample of 200 mothers as shown in the formula below

$$n=400/(1+400*0.05*0.05) =200$$

The study therefore used a sample of 200 mothers attending the Post-Natal Clinic and Paediatrics Emergency Unit in Kenyatta National Hospital. Systematic random sampling was used to select eligible subjects. The number recruited in each unit was proportionate to the number of clients attended in a week. According to proportionate size, 140 (0.7x200) participants was from the paediatric emergency unit and 60 (0.3x200) from the postnatal clinic. The researcher selected the starting point randomly in the clinic register and then select every nth member in the register. Therefore, every 2nd mother was selected for the study. If a mother did not consent, the next mother was approached.

The study used primary data through questionnaires, focus group discussion and observation. The interviewer-administered questionnaire collected data on socio-demographic characteristics of respondents and thermoregulation practices. The questionnaire had both closed and open-ended questions. A focused group discussion guide was used to capture additional qualitative data. Only mothers who met the inclusion criteria and were participants in the paediatric emergency unit were included in the observation and focused group. Each focused group included 10 mothers. An observation guide was also adopted and was used to gather data on the actual thermoregulation practices by the mothers while in the paediatric ward.

Collected data was sorted, coded and entered into a computer using SPSS. Univariate data analysis for the four study variables was conducted using descriptive

statistics comprising frequencies and percentages. Analysis was conducted with the help of SPSS version 24. Findings were presented using tables and figures. Chi-square was used to establish association the various factors and thermoregulation practices. The qualitative data was transcribed to identify major themes. The themes formed the basis of comparison and analysis along with the descriptive statistics obtained from the quantitative data.

## RESULTS

A total of 200 respondents participated in the study.

### Socio-Demographic Characteristics of Respondents

Results in Table 1 show that 44.5% (n=89) of the respondents were aged between 18 and 25 years while 35.5% (n=71) were aged between 26 and 33 years. Majority 73.5% (n=147) were married. The results show that half 50% (n=100) of the respondents had secondary education as their highest level of education while 28% (n=56) had acquired college education. On occupation, 36% (n=72) were unemployed while 33.5% (n=67) were self-employed. Among those who were married, slightly less than half (43.5%, n=50) of their spouses were self-employed while 32% (n=33) were had a salaried job.

Table 1 Socio-Demographic Characteristics of Respondents

Demographic Characteristic	Category	Frequency	Percent
Age (years)	18-25	89	44.5
	26-33	71	35.5
	34-41	36	18
	42-49	4	2
Marital Status	Single	53	26.5
	Married	147	73.5
Level of education	None	2	1
	Primary	36	18
	Secondary	100	50
	College	56	28
	University	6	3
Occupation	Unemployed	72	36
	Casual	13	6.5
	Self-employed	67	33.5
	Salaried job	30	15
	Student	18	9
Spousal Occupation	Unemployed	8	6.1
	Casual	14	15.0
	Self-employed	50	43.5
	Salaried job	33	32.0
	Student	5	3.4

### Thermoregulation Practices

Table 2 presents the results of the analysis of data collected from the questionnaire. The vast majority 95% (n=190) kept their baby warm by using warm clothes while 54% kept the baby in a room with closed door and windows.

Results in Table 2 show that the vast majority 89.5% (n=179) assessed their baby's temperature using their hand. Majority 80% (n=160) of the respondents indicated that they were not trained on thermoregulation.

Table 2 Thermoregulation Practices

Practice	Response	Frequency	Percent
Keeping baby warm (multiple responses)	Warm clothes	190	95.0
	Room with closed door and windows	108	54.0
	Warm environment with a heater	2	1.0
Assessment of baby's temperature	Hand	179	89.5
	Thermometer	21	10.5
Training on thermoregulation	Yes	40	20.0
	No	160	80.0

Table 3 presents results of the study from analysis of observation. Majority 83.5% (n=167) were observed to cover their baby with loose clothing and blanket. Majority 67% (n=134) of the respondents put a cap to cover the baby's head. Majority 86.5% (n=173) put socks to cover the baby's feet. Slightly above half 51%

(n=102) covered their baby well during movement. However, slightly above half 56% (n=12) did not cover their baby well during diaper change. Slightly above half 57.5% (n=115) of the participants were observed checking to change wet diapers and clothing.

Table 3 Thermoregulation Observation Results

Practice	Yes		No	
	n	%	n	%
Baby covered with loose clothing and blanket	167	83.5	33	16.5
Baby wearing cap to cover the head	134	67	66	33
Baby wearing socks to cover feet	173	86.5	27	13.5
Baby well covered during movement	102	51	98	49
Baby well covered during diaper changes	88	44	112	56
Mother checking to change wet diapers and clothing	115	57.5	85	42.5

In the focus group discussion, participants were asked to indicate some of the ways they kept the baby warm. Participants indicated that they used heavy clothing to keep the baby warm. Participants covered their baby with shawls and they closed doors and windows.

*"I clothe the baby in several warm clothes"*

Fgd4

*"I wrap the baby in a shawl"* Fgd3

*"I make sure the doors and windows are closed when the baby is sleeping"* Fgd7

*"I use a heater when it is very cold"* Fgd4

When asked whether there were any factors affecting their thermoregulation practice, participants indicated that they did not have enough money to buy adequate clothes and shawls to keep the baby warm.

*"I don't have money to buy some warm clothes and shawls that I'd like"* Fgd6

*"This house is quite cold"* Fgd3

*"Sometimes I have to travel with the baby when it's cold"* Fgd1

All participants indicated that they had no beliefs, taboos nor traditional practices related to thermoregulation. The researcher analysed the questionnaire and observation results to come up with an overall thermoregulation practices assessment. Respondents who scored highly in 2 of the 3 thermoregulation practices in Table 2 and those who scored highly in 4 of the 6 observation items in Table 3 were classified as having good thermoregulation practises. Results in Figure 1 showed that majority 66.5% (n=133) had good thermoregulation practices.

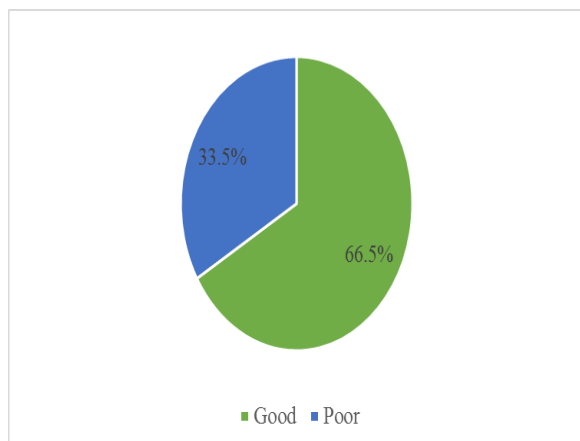


Figure 1 Summary of Thermoregulation Practices

### Relationship between Maternal Factors and Thermoregulation Practices

Chi-square analysis was done between maternal factors and thermoregulation Practices. Results in Table 4 show that age ( $p=0.001$ ) and level of education ( $p=0.000$ ) were significant. There was a significant association ( $p=0.001$ ) between age and thermoregulation practices among mothers with new born babies in Kenyatta National Hospital. Cross tabulation showed that young mothers (<30 years) were 2.8 times more likely to have good new-born care practices. There was also a significant association ( $p=0.000$ ) between the level of education and thermoregulation among mothers with new born babies in Kenyatta National Hospital. Analysis showed that well educated (college and university) mothers were 3.6 times more likely to have good new-born care practices. The above results therefore show that age and level of education were significant. The null hypothesis is therefore rejected and the study concludes that there is an association between the maternal factors and thermoregulation.

Table 4 Relationship between Maternal Factors and Thermoregulation Practices

Maternal factors	Chi-square value	Degrees of freedom (df)	P-value
Age	21.719	5	0.001***
Level of education	38.598	10	0.000***
Marital status	20.136	15	0.167
Occupation	12.509	15	0.640

## DISCUSSION

The study sought to determine thermoregulation practices among mothers with new-born babies attending Kenyatta National Hospital. Results showed that majority (66.5%) had good thermoregulation practices. The vast majority kept their baby warm by using warm clothes. However, majority of the respondents indicated that they were not trained on thermoregulation. When asked whether there were any factors affecting their thermoregulation practice, majority indicated that they did not have enough money to buy adequate clothes and shawls to keep the baby warm. Age ( $p=0.001$ ) and level of education ( $p=0.000$ ) were significant. Young mothers (<30 years) were 2.8 times more likely to have good new-born care practices. Analysis also showed that well educated (college and university) mothers were 3.6 times more likely to have good new-born care practices. This result is similar to that of Berhea *et al.* (2018) which found that about 80% of respondents were aware that wrapping in a warm dry cloth is essential in protecting the baby from cold. The finding is similar to that of Semanew *et al.* (2019) where 80.8% of mothers reported to have wrapped the baby with warm clothes immediately after birth. The result is also similar to findings of Mesekaa *et al.* (2017) where there modes of thermoregulation identified by the mothers were the use of warm clothing and rooming-in. However, the results differ from Degefie *et al.* (2014) who discovered that most neonates received substandard thermal care.

## CONCLUSION

Thermoregulation practices among mothers with new-born babies attending Kenyatta National Hospital were good. Mothers used warm clothes and ensured that the baby was in a room with closed door and windows to ensure that the baby is kept warm. However, babies were not well covered during movement and checking of wet diapers and clothing was not done

frequently. The study concludes that there is an association between maternal factors and thermoregulation practices among post-natal mothers attending Kenyatta National Hospital. Mothers should therefore be sensitised on covering their baby well during movement and checking of wet diapers and clothing to ensure that the baby is kept warm at all times

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