

# Promoting Kangaroo Mother Care in Selected Hospitals of Nepal through the Training and Provision of a Baby Wrap

Final Report



Submitted:  
April 13, 2016

Submitted by:  
Chandra Rai  
Country Director, Jhpiego Nepal

Cover photos by A. Dhakal, Jhpiego Research Officer, Koshi Zonal Hospital, Biratnagar, Nepal.  
Photo captions: *(left)* Mother with low birthweight baby practices KMC using CarePlus wrap in the hospital; *(right)* Mother with low birthweight baby practices KMC using traditional wrap in the hospital.

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Published by:  
Jhpiego  
Brown's Wharf  
1615 Thames Street  
Baltimore, Maryland 21231-3492, USA  
[www.jhpiego.org](http://www.jhpiego.org)

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# Abbreviations

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AMDA	Asian Medical Doctor's Association
FGD	focus group discussion
KMC	kangaroo mother care
KZH	Koshi Zonal Hospital
LBW	low birth weight
MoH	Ministry of Health
NHTC	National Health Training Center
PNC	Postnatal care
SBA	skilled birth attendant
STS	skin-to-skin

# Background

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## Kangaroo Mother Care

Globally, 60–80% of newborn deaths occur in low birth weight (LBW) babies<sup>1</sup>. Many of these deaths are due to an inability to control body temperature, which causes hypothermia and increases the risk of infections. Kangaroo mother care (KMC) is a proven, cost-effective intervention to care for stable preterm/LBW babies and is an alternative to incubation. Key features of KMC include: early, continuous and prolonged skin-to-skin (STS) contact between mother and baby; exclusive breastfeeding; initiation in the hospital and continuation at home; and support and follow-up to mothers<sup>2</sup>. There have been over 200 publications on KMC and 14 randomized controlled trials evaluating the effect of KMC on mortality, temperature, breastfeeding, weight gain, and infections<sup>3</sup>. Studies conducted in Nepal to determine the effectiveness of KMC all reached similar conclusions: that LBW babies showed better weight gain and fewer incidences of morbidities than those who did not receive KMC<sup>4</sup>.

## Newborn Health in Nepal

There is a considerable need in Nepal to accelerate KMC rollout and improve adherence. While the country has made important gains in addressing maternal mortality, infant mortality has remained stagnant. There are 81,000 premature/LBW newborns born annually, with approximately 10,400 infant deaths due to LBW complications<sup>5</sup>. Management of LBW babies varies among districts and facilities. Though KMC guidelines are included in the current training packages for health workers, KMC is not widely practiced or promoted. Many health workers do not understand the therapeutic benefits of KMC, and thus, do not promote KMC to their clients. There are also user-related challenges with the traditional cloth, or Sari, to practice KMC. Research focused on understanding the perspective of mothers found: a) the cloth requires an assistant to apply; b) the tie across the user's back is uncomfortable; c) there are baby security concerns, especially during household duties; and d) fabric is traditionally worn by women, making fathers less inclined to attempt KMC<sup>6</sup>.

Laerdal Global Health developed and field-tested a new hands-free wrap design, CarePlus, that allows mothers to tie the wrap independently, provides freer movement, and keeps the baby more securely in place than the traditional cloth wrap.

## Study Rationale

In 2014, the Nepal Ministry of Health (MoH) Family Health Director requested a study to field test the new CarePlus wrap in Nepal before incorporating the package into national policy. In response, Jhpiego, in partnership with MoH National Health Training Center (NHTC), conducted a study to improve the uptake and continuation of KMC by: a) providing simplified training for both health workers and clients and b) offering new mothers the choice between a traditional wrap for carrying the baby and CarePlus. The study also aimed to understand the opinions and experiences of health workers and mothers of preterm/LBW

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<sup>1</sup> The Lancet, (2005) 365 (9462): i891-i900. DOI:10.1016/S0140-6736(05)71048-5

<sup>2</sup> <http://apps.who.int/iris/bitstream/10665/42587/1/9241590351.pdf>

<sup>3</sup> Evidence for Facility KMC, <http://www.healthynewbornnetwork.org/resource/evidence-facility-kmc>, Healthy Newborn Network 2013

<sup>4</sup> Acharya, N., Singh, R., Bhatta, N., & Poudel, P. (2014). Randomized control trial of Kangaroo Mother Care in low birth weight babies at a tertiary level hospital. *Journal of Nepal Paediatric Society*, 34(1), 18–23. doi:10.3126/jnps.v34i1.8960

<sup>5</sup> The Lancet, (2012) 379 (9832): i2151-i2161. DOI:10.1016/S0140-6736(12)60560-1

<sup>6</sup> [http://cdn.laerdal.com/downloads/f3271/LGH\\_CarePlus\\_8pager.pdf](http://cdn.laerdal.com/downloads/f3271/LGH_CarePlus_8pager.pdf)

babies in using both wraps. Financial support was provided by Asmund S. Laerdal Foundation for Acute Medicine, Inc and technical support was provided by Laerdal Global Health. Results of the study will contribute to understanding the challenges in KMC practice at facility and community levels and help Nepal advance its efforts to decrease neonatal mortality due to LBW.

## Study Aims and Setting

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### Research Questions

The research questions included:

- Did health care workers' knowledge and skills related to KMC change after the training?
- How do levels of KMC initiation and continuation in the facility change following the training intervention and introduction of the new wrap?
- What is the rate of KMC continuation following hospital discharge, following the training intervention, among mothers offered a choice between the traditional and new wrap design?
- How do health care workers' opinions of the new wrap compare to their opinions of traditional wraps?
- What are mothers' opinions regarding the benefits of the chosen wrap, particularly with regard to security of baby and comfort?

### Study Setting

The study was implemented in two hospitals—Koshi Zonal Hospital (KZH) in Morang district (9,000 births per year) and Asian Medical Doctor's Association (AMDA) Damak Hospital in Jhapa district (6,000 births per year)—in the eastern development region in Nepal over a period of five months, May to October 2015. Eastern development region was selected because of its high prevalence of LBW (16%), in comparison to the national average (12%)<sup>7</sup>. The hospitals were selected because of the high number of annual births and the range of health services provided.

A KMC unit was established in both hospitals. In KZH Hospital, the room originally identified for the unit was not large enough to accommodate the number of cases. In response to this need, nurses and auxiliary nurse-midwives identified a passage within the hospital to create more space for the unit.

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<sup>7</sup> Nepal Demographic Health Survey 2011



Figure 1. Hospital before establishment of the KMC unit



Figure 2. Hospital after establishment of the KMC unit

## Ethical Considerations

Ethical approval was obtained from the Johns Hopkins School of Public Health Institutional Review Board and the Nepal Health Research Council, Kathmandu, to conduct the study. The Nepal Social Welfare Council also provided approval for implementation. Oral consent was obtained from the two hospital in-charges to conduct a facility audit. Written consent was obtained from nursing staff, prior to completion of the knowledge and skills assessment. Written consent was obtained from all women, prior to enrollment, at the health facility from trained nursing staff. The consent document was read aloud to the prospective participants by the trained nurse, and participants were asked if they had questions. All questions were answered before participants were asked to provide written consent. Consent was also confirmed by the study staffs as part of follow up telephone survey.

## Training

### Training Package Development

A competency-based training package was developed for health workers from peripheral health facilities on care of LBW babies with KMC. The package consists of: a) facilitator's guide; b) learner's guide; c) flash cards; d) KMC register; e) log book; and f) flex charts illustrating the steps to use CarePlus and the traditional wrap, danger signs of LBW babies, and benefits of KMC. The training package was field tested during the first two batches of training in Koshi Zonal Hospital, Biratnagar. After insights from the field test were incorporated, the package was finalized, endorsed by the MoH, and disseminated in the NHTC 34th Training Working Group meeting of July 6, 2015. The training package is available in Nepali and English.

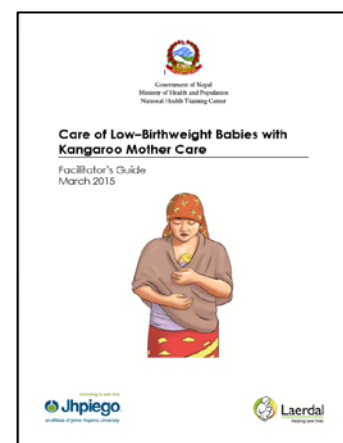


Figure 3. Facilitator's Guide

## Capacity Development

To update health professionals on management of LBW babies with KMC, a one-day orientation was conducted in the two study sites. The participants were drawn from different levels of the health system and included the medical superintendent, matron, head of departments and consultants, medical officers, nursing in-charge, nurses, and auxiliary nurse-midwives from the gynaecology and obstetrics and pediatrics departments.

To equip health providers with KMC knowledge and skills, a three-day training was conducted for 23 nurses (in two batches) from the two hospitals participating in the study. The first two days covered clinical aspects of KMC and the third day was used to train on data management. Data management included the following topics: study process; adverse events; identifying eligible mothers; recruitment; informed consent; performing random allocation; and completing the KMC register. The PremieNatalie, MamaBreast, and CarePlus wrap were used to give trainees the opportunity to practice skills through simulation exercises.



Figure 4. Trainees practicing skills

In response to a request from the nursing campus during the study, an additional two batches of training were conducted for 24 nursing tutors from government and private campuses to strengthen KMC knowledge and skills. The training for the nursing tutors was not a part of the study, but it addressed an important need to build capacity within the pre-service education system.

### Changes in Health Workers Knowledge, Skill and Understanding After KMC Training

Table 1 summarizes changes in knowledge and skills following the training intervention. Participants scoring 85% received a pass rating, and those scoring below 85% failed. Only 17% of nurses passed knowledge tests before training. Similarly, the level of skill observed was poor. Before training, none of the nurses passed in all five skills combined. Findings of the pre-test knowledge and skill assessment are consistent with findings of focus group discussion (FGD) with nursing staff, which found that understanding of KMC was limited to STS practices and benefits was limited to method of care for hypothermic babies. They were unaware of KMC as method of care for LBW infants. Though LBW management was a component of skilled birth attendant (SBA) training and the hospital was a SBA training site, none of the health workers had counseled mothers of LBW babies for KMC prior to the study's training.



**Table 1 Changes in Knowledge and Skills Following Training Intervention**

Results	Training	
	Pre-test	Post-test
Passed Knowledge Test	4 (17%)	23 (100%)
<b>Pass Rates for Skills Test</b>		
Breastfeeding	0 (0%)	23 (100%)
Expressed milk and cup feeding	3 (13%)	23 (100%)
KMC counseling	2 (9%)	23 (100%)
Use of traditional wrap	0 (0%)	23 (100%)
Use of CarePlus wrap	0 (0%)	23 (100%)
<b>Combined all skills (skill 1 to 5)</b>		
Passed	0 (0%)	23 (100%)
Failed	23 (100%)	0 (0%)
<b>Total</b>	<b>23</b>	<b>23</b>

## Consumer Preference

### Methodology

#### Study Design

The study design consisted of two components: a) training evaluation and; b) consumer preference and acceptability study on the chosen wrap design. Both components had one study group and no comparison group.

#### Study Population

1. Recently delivered mothers at Koshi Zonal Hospital and AMDA Hospital with stable LBW babies with weight between 1800 grams to 2499 grams.
2. Health workers involved in providing routine postpartum care services to mothers and newborns from Koshi Zonal Hospital and AMDA hospital.

#### Sample Size

##### *Baseline and Endline Facility Audit*

A key informant interview was conducted with the in-charges of the hospital postpartum ward to estimate KMC coverage and describe services.

##### *Providers Knowledge and Skills Assessment*

All consenting health workers (N=23) involved in providing routine postpartum care services to mothers and newborns from Koshi Zonal Hospital and AMDA hospital were enrolled in the study.

### Consumer Preference Study

It was estimated that ninety women would be a sufficient sample size to estimate 80% KMC continuation rates after one month with a confidence interval of 66-86% if all women had four data points or 63 to 83% if the number of data points varied from 0-4. It was anticipated

that some mothers might enroll, but discontinue KMC prior to hospital discharge. Therefore, 30 women were added to the sample size to account for potential attrition.

Nursing staff identified eligible mothers using pre-established inclusion and exclusion criteria. Women were eligible for inclusion if they: a) gave birth to a stable, pre-term (<37 weeks gestational age) and/or LBW infant (< 2500 grams); b) provided informed consent to be interviewed shortly after delivery and contacted via phone four times over a four week period; and c) had access to a telephone. In-depth interviewees were a subgroup of participants who completed the four-week follow-up and completed a four-week postnatal visit to the facility. The study team excluded women who experienced complications during childbirth that resulted in obvious pain, or who were heavily medicated. Sick babies were also excluded.

Nursing staff informed mothers and family members the weight of the baby, the importance of KMC, and the study. All eligible mothers were recruited by nursing staff in the delivery ward and transitioned to the study team in the postnatal ward. The nurses in the postnatal ward re-assessed mothers against eligibility criteria. Those who were found non-eligible received routine care from the hospital, and eligible mothers were enrolled. Nursing staff systematically counseled the mother and family members using the flex chart. KMC demonstrations were conducted using the traditional wrap, CarePlus wrap, and the PremieNatalie model. Family members were invited to practice KMC. After nurse-midwives were comfortable with the family members' confidence practicing KMC, they provided one wrap based on randomization and allowed them to practice KMC for six hours on their baby. After six hours, nurse-midwives provided the other wrap and allowed them to perform KMC for another six hours. After the collective 12 hours, the mother chose one wrap. Mothers and babies stayed in the health facility for 72 hours, with the exception of one mother and baby who stayed for 48 hours. They were routinely monitored and supported by postnatal ward nurse-midwives during their hospital stay. The 72-hour timeframe was established based on the following:

- Newborn sepsis, the leading cause of newborn death, will be apparent within 72 hours of birth<sup>8</sup>. By allowing mothers to stay for 72 hours at health facility, we aimed to capture sepsis at early stage for treatment at the facility.
- According to government policy, mothers and newborns should receive the first postnatal care (PNC) visit within 24 hours of birth and the second visit within 72 hours<sup>9</sup>.

Nurse-midwives documented the details of the KMC service in the newly introduced KMC register. After three days, if the baby and mother were healthy, they were discharged with continuing KMC from health facility with the selected wrap to continue KMC at home. The mothers were followed up by research officers four times by phone, regardless of continuation of KMC. The mother was encouraged to complete the four-week postnatal visit. Nurse-midwives examined mother and baby, weighed the baby, and provided counseling. Research officers interviewed mothers during the PNC visit.

Panel data analysis was used to compare hours of STS care by day among the mothers in each of the two wrap groups. The equation for the fixed effects model becomes:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \dots + \beta_k X_{k,it} + \alpha_i + u_{it}$$

Where

- $\alpha_i$  ( $i=1\dots n$ ) is the unknown intercept for each entity ( $n$  entity-specific intercepts).
- $Y_{it}$  is the dependent variable (DV) where  $i$  = woman and  $t$  = days since delivery

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<sup>8</sup><http://emedicine.medscape.com/article/978352-overview>

<sup>9</sup> HMIS Indicators, 2070, Government of Nepal, Ministry of Health and Population

- $X_{k_{it}}$  represents independent variables (IV),
- $\beta_k$  is the coefficient for that IV,
- $u_{it}$  is the error term

## Women’s In-Depth Interviews

In-depth interviews were conducted with a subset of 12 mothers (six each from study site) who were discharged from the hospital and had the intention of continuing KMC. Stratified random sampling was used to select mothers who achieved high and low KMC usage among both wraps. Participants for in-depth interviews were randomly selected by an independent consultant hired for conducting the in-depth interviews and focus group discussion (FGD).

## Focus Group Discussions

One FGD from each study site was conducted and included health care workers who had helped to implement the study.

## Pretesting the Data Collection Tools

The tools were pretested in Kathmandu Medical College by pediatricians who are experts in KMC, training, and research design. Feedback from the pre-test was incorporated prior to finalization.

# Results

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## Screening and Enrollment

All eligible mothers from both hospitals were offered enrollment until reaching the sample size of 90 mothers who were discharged with the intention of continuing KMC from the health facility. In order to discharge 90 mothers with the intention of continuing KMC from health facility, a total of 96 mothers were enrolled. Of these participants, six discontinued from the study. Five had babies transferred to the neonatal intensive care unit, and one mother changed her mind about participating.

## Wrap Selection; Sample Characteristics

Of the 96 mothers enrolled in the study, 82 (85%) chose the CarePlus wrap, and 14 (15%) chose traditional wrap. A total of 97 LBW babies, including one set of twins, were enrolled in the study. Of the 97, mothers of six babies dropped out of the study for various reasons, and 90 mothers (i.e., 91 babies) were discharged from the health facility with the intention of continuing KMC. KMC practice data for the pair of twins, who were in the traditional wrap group, were identical. Consequently, results were counted for only one twin. Of the 90 mothers discharged with the intention of continuing KMC at home, 78 selected the Careplus wrap and 12 selected the traditional wrap.

## Sample Characteristics

Table 2 summarizes the characteristics of 90 babies enrolled in the study. No significant differences were evident between mothers who selected the traditional wrap and those who selected the Careplus wrap.

**Table 2 Sample Characteristics of Enrolled Babies and Mothers**

Characteristics	Wraps				Total	
	Traditional		CarePlus		N	%
	N	%	N	%		
<b>Caste/ethnicity</b>						
Disadvantaged	9	75	67	85.9	76	84.4
Not disadvantaged	3	25.0	11	14.1	14	15.6
Pearson chi2(6) = 0.9402 Pr = 0.332						
<b>District</b>						
Illam	0	0.0%	1	1.3%	1	1.1%
Jhapa	0	0.0%	7	9.0%	7	7.8%
Morang	11	91.7%	52	66.7%	63	70.0%
Sunsari	1	8.3%	16	20.5%	17	18.9%
Udaypur	0	0.0%	1	1.3%	1	1.1%
terathum	0	0.0%	1	1.3%	1	1.1%
Pearson chi2(5) = 3.2838 Pr = 0.656						
<b>Gravida</b>						
1	9	75.0%	56	71.8%	65	72.2%
2	2	16.7%	16	20.5%	18	20.0%
3	1	8.3%	4	5.1%	5	5.6%
4	0	0.0%	2	2.6%	2	2.2%
Pearson chi2(3) = 0.5917 Pr = 0.898						
<b>Parity</b>						
1	9	75.00%	57	73.10%	66	73.30%
2	2	16.70%	15	19.20%	17	18.90%
3	1	8.30%	5	6.40%	6	6.70%
4	0	0.00%	1	1.30%	1	1.10%
Pearson chi2(3) = 0.2530 Pr = 0.969						
<b>Hospital</b>						
AMDA	2	16.70%	12	15.40%	14	15.60%
KZH	10	83.30%	66	84.60%	76	84.40%
Pearson chi2(1) = 0.0130 Pr = 0.909						
Pearson chi2(2) = 2.1808 Pr = 0.336						
<b>Sex</b>						
F	5	41.70%	42	53.80%	47	52.20%
M	7	58.30%	36	46.20%	43	47.80%
Pearson chi2(1) = 0.6183 Pr = 0.432						
Total number 12			78		90	

Rate of KMC Continuation at Health Facility and Following Discharge Among Two Types of Wraps

**Table 3. Proportion distribution of skin-to-skin practice by day and by wrap, among all mothers discharged with the intention of practicing KMC**

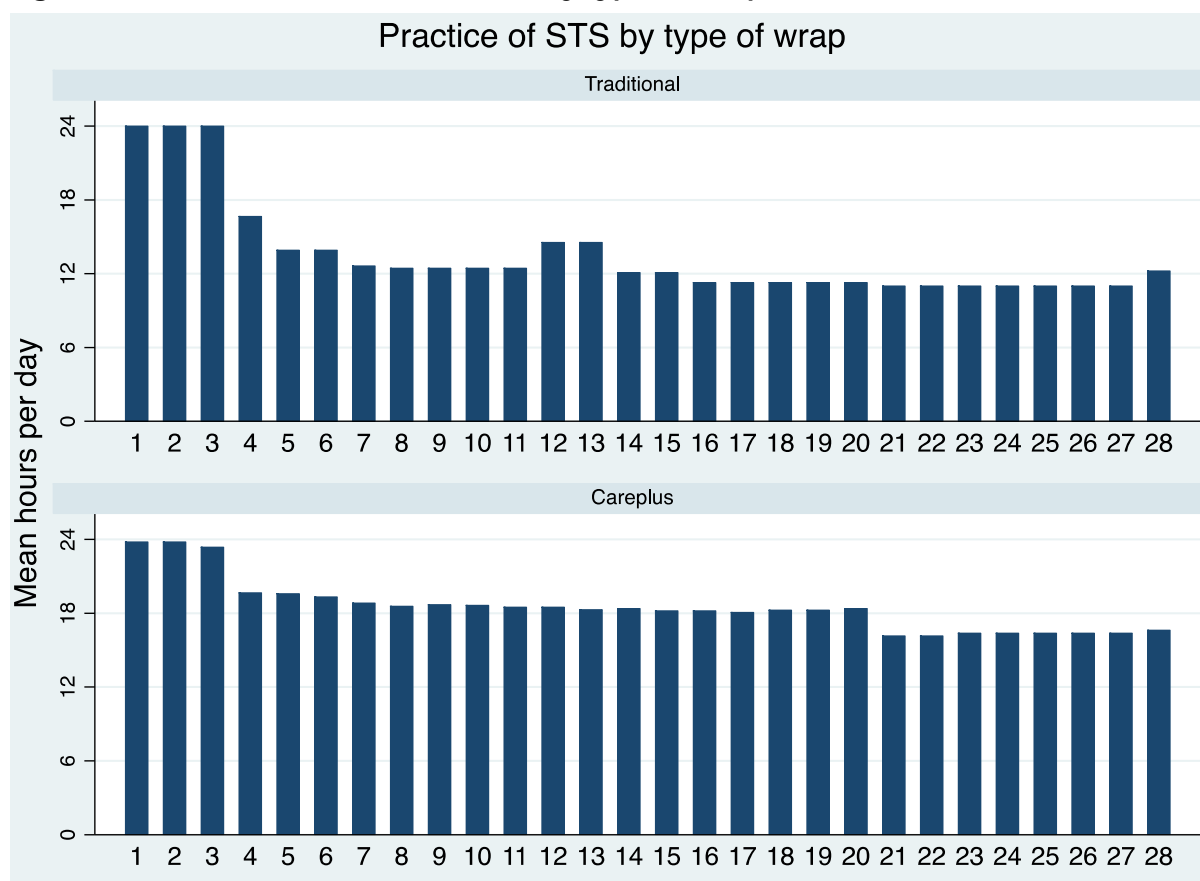
	Traditional (%)	Careplus (%)	Total (%)
<b>Day 1-2</b>			
<20 hours	0	1.3	1.1
20+hours	100	98.7	98.9
<b>Day 3</b>			
<20 hours	0	3.8	3.3
20+hours	100	96.2	96.7
<b>Day 4</b>			
<20 hours	41.7	20.5	23.3
20+hours	58.3	79.5	76.7
<b>Day 5</b>			
<20 hours	50	20.5	24.4
20+hours	50	74.4	71.1
Missing data	0	5.1	4.4
<b>Day 6</b>			
<20 hours	50	21.8	25.6
20+hours	41.7	70.5	66.7
Missing data	8.3	7.7	7.8
<b>Day 7</b>			
<20 hours	58.3	25.6	30
20+hours	33.3	66.7	62.2
Missing data	8.3	7.7	7.8
<b>Day 8</b>			
<20 hours	58.3	26.9	31.1
20+hours	33.3	60.3	56.7
Missing data	8.3	12.8	12.2
<b>Day 9-10</b>			
<20 hours	58.3	25.6	30
20+hours	33.3	60.3	56.7
Missing data	8.3	14.1	13.3
<b>Day 11</b>			
<20 hours	58.3	26.9	31.1
20+hours	33.3	59	55.6
Missing data	8.3	14.1	13.3
<b>Day 12</b>			
<20 hours	50	26.9	30
20+hours	41.7	59	56.7
Missing data	8.3	14.1	13.3

	Traditional (%)	Careplus (%)	Total (%)
<b>Day 13</b>			
<20 hours	50	28.2	31.1
20+hours	41.7	57.7	55.6
Missing data	8.3	14.1	13.3
<b>Day 14</b>			
<20 hours	58.3	25.6	30
20+hours	33.3	60.3	56.7
Missing data	8.3	14.1	13.3
<b>Day 15</b>			
<20 hours	58.3	26.9	31.1
20+hours	33.3	57.7	54.4
Missing data	8.3	15.4	14.4
<b>Day 16-17</b>			
<20 hours	66.7	26.9	32.2
20+hours	25	57.7	53.3
Missing data	8.3	15.4	14.4
<b>Day 18-20</b>			
<20 hours	66.7	25.6	31.1
20+hours	25	59	54.4
Missing data	8.3	15.4	14.4
<b>Day 21</b>			
<20 hours	66.7	29.5	34.4
20+hours	25	55.1	51.1
Missing data	8.3	15.4	14.4
<b>Day 22</b>			
<20 hours	66.7	29.5	34.4
20+hours	25	35.9	34.4
Missing data	8.3	34.6	31.1
<b>Day 23</b>			
<20 hours	66.7	28.2	33.3
20+hours	25	37.2	35.6
Missing data	8.3	34.6	31.1
<b>Day 24-27</b>			
<20 hours	66.7	28.2	33.3
20+hours	25	37.2	35.6
Missing data	8.3	34.6	31.1
<b>Day 28</b>			
<20 hours	50	21.8	25.6
20+hours	41.7	43.6	43.3
Missing data	8.3	34.6	31.1
<b>Total Number</b>	<b>12</b>	<b>78</b>	<b>90</b>

Figure 5 presents the mean duration of STS practiced from day 1 to day 28 by type of wrap selected. The duration of STS practiced decreased gradually over time, from a mean usage of 23.8 hours on the first day postpartum, when all babies were still in the hospital, to 15.8 hours

on day 28 postpartum. On average, careplus wrap users performed STS for an extra 77.4 hours than traditional wrap users mean hours (standard deviation)—429.1(160.9) vs 351.7 (183.2).

Figure 5. Practice of skin-to-skin care by type of wrap



### Level of KMC Initiation and Continuation at Health Facility

Audit findings from both facilities revealed that initiation and continuation of KMC improved following training. During the baseline, it was reported that KMC was not practiced as a method of care for LBW babies. Findings are consistent with reports from FGD participants that they were not aware about KMC benefits for LBW babies prior to training. Following training, KMC was systematically institutionalized in both health facilities. Nursing staff witnessed the benefits of KMC when mothers returned to the facility for postnatal visits, and it reinforced staff to continue promoting KMC. After training, 97 LBW babies received KMC over a five month period. The KMC register was maintained in both health facilities during the study.

### Cost of the wrap

During the three-week postpartum follow-up telephone call, women were asked if they would be willing to buy the wrap themselves and, if so, how much they could pay for it. This data was only available from 30 women, because of: a) loss to follow-up; and b) questions were later added to the questionnaire after some data collection was complete. Twenty eight women (of the 30) said that they would be willing to pay for the wrap. The remaining two responded that they were “not sure”. Eight of 30 women were reluctant to suggest a specific price. Ten said that they would pay up to NRs. 500/4.16 EUR/4.70 USD.

**Table 4. Suggested price for the wrap, by type of wrap selected, among a subset of women who completed the three-week follow-up telephone call**

	Traditional		Careplus	
	Number	%	Number	%
Up to NRs. 100/0.83 EUR/0.94 USD	0	0.0	2	7.4
Up to NRs. 500/4.16 EUR/4.70 USD	2	66.7	8	29.6
Up to NRs. 1000/8.32 EUR/9.41 USD	1	33.3	7	25.9
Up to NRs. 2000/16.64 EUR/18.83 USD	0	0.0	2	7.4
Not sure/"At any cost"	0	0.0	8	29.6
Total Number	3		27	

*Note: currency exchange rates obtained from [www.xe.com](http://www.xe.com) on March 30, 2016*

Mothers Opinions About Benefits of Chosen Wrap, (particularly with regard to security of baby and comfort)

Three mothers under the traditional wrap category (Koshi-Continuous\_Traditional, AMDA-Continuous\_Traditional, AMDA-Intermittent\_Traditional) were selected automatically, rather than sampled, as there was only one mother in the group. One mother from Koshi-Continuous\_Traditional could not be located during data collection, so as an alternative to her, Koshi-Intermittent\_Traditional was interviewed.

Among the eight mothers interviewed who selected the CarePlus wrap, almost all said it was easy to tie, due to availability of belts, in comparison to the traditional wrap. They said it was an advantage that it could be tied alone without the help of another person. The majority of mothers reported that they felt more secure with CarePlus wrap than traditional wrap because it was tied securely with the belt. Mothers using CarePlus wrap also reported that it was easy to rest in a bed or chair while practicing KMC, in comparison to the traditional wrap. The knot of the traditional wrap made it very difficult for the mother to rest with the baby in the KMC position. Four mothers mentioned that it is easy to carry the baby like a baby carrier, even when the babies have grown larger, and it looks nice and tidy. One mother mentioned that the baby can breathe easily, and the mother felt less hot in the Careplus wrap than the traditional wrap in the summer because no cloth covers the back. The majority of mothers also stated that it is easy to hold and remove the baby from the KMC position using the CarePlus wrap. Mothers also stated that it was easy to feed the baby and is comfortable for moving around.

One mother who used traditional wrap reported that the only reason she selected the traditional wrap was due to the material, which was softer against the baby's skin; she felt that the material of CarePlus wrap might irritate the baby's skin.

Similarly, another mother who selected the traditional wrap reported that the size of CarePlus was large for her body size, and thus, the baby's position was not maintained. She also stated that the traditional wrap covered the baby completely and comfortably. The leading factor for another mother was the amount and quality of cloth in traditional wrap, which could be used for sewing baby clothes when baby no longer required KMC.

Among mothers who selected the traditional wrap: more than half mentioned that they experienced difficulty tying the traditional wrap; half said they had fears of the baby falling and experiencing injury; and two stated that the traditional wrap kept the baby too tight against the mother's chest.



## Opinion of Health Worker About Traditional and CarePlus Wrap

As reported during FGDs, all participants preferred CarePlus wrap for KMC in both health facilities. They reported that CarePlus wrap can hold the baby securely, as it is easy to tie, carry the baby, and move around. They explained that CarePlus wrap provides proper support, because of its shoulder band and comfort for mother and family members while sleeping. Participants reported that it is easy to breastfeed with the CarePlus wrap. The decent appearance was an added advantage of the CarePlus wrap, and is more user friendly for the male family members.

The participants reported that the traditional wrap is inconvenient and not practicable for use. A second person is needed to keep the baby in the KMC position, and the risk of baby falling is high. The mother feels hot and sweats a lot in summer due to the thick traditional cloth that fully covers the body. Furthermore the cloth does not provide support to the baby's head. It is uncomfortable for breastfeeding and for mother/family to sleep/rest while doing KMC due to the knot in back. Participants reported that male family members were not interested in carrying the baby with the traditional wrap.

## Conclusions

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Building capacity of nurse-midwives and provision of a wrap resulted in enhanced KMC practice at facility and community levels. Most participants selected the CarePlus wrap because mothers perceived it provided more security to the baby, comfort, and received more support from the family.

Expansion of the capacity building package and further involvement of nurse-midwives would help Nepal advance its efforts to decrease neonatal mortality due to LBW. Based on the results of this study, Jhpiego, in collaboration with Laerdal Global Health, applied for a Saving Lives at Birth validation grant to establish proof of concept for using the CarePlus wrap for LBWs through the engagement of local women's groups who will generate income through its reproduction.