



# Just-in-time postnatal education programmes to improve newborn care practices: needs and opportunities in low-resource settings

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## ABSTRACT

Worldwide, many newborns die in the first month of life, with most deaths happening in low/middle-income countries (LMICs). Families' use of evidence-based newborn care practices in the home and timely care-seeking for illness can save newborn lives. Postnatal education is an important investment to improve families' use of evidence-based newborn care practices, yet there are gaps in the literature on postnatal education programmes that have been evaluated to date. Recent findings from a 13 000+ person survey in 3 states in India show opportunities for improvement in postnatal education for mothers and families and their use of newborn care practices in the home. Our survey data and the literature suggest the need to incorporate the following strategies into future postnatal education programming: implement structured predischarge education with postdischarge reinforcement, using a multipronged teaching approach to reach whole families with education on multiple newborn care practices. Researchers need to conduct robust evaluation on postnatal education models incorporating these programme elements in the LMIC context, as well as explore whether this type of education model can work for other health areas that are critical for families to survive and thrive.

## INTRODUCTION

The global health community has successfully worked to decrease neonatal mortality in the past three decades,<sup>1</sup> yet 2.5 million newborns still die each year within the first month of life, mostly in low/middle-income countries (LMICs).<sup>2</sup> Nearly three quarters of newborn deaths happen in the first week of life, so intervening in the first days after birth could save many lives.<sup>2</sup> Given the short length of stay in facilities after childbirth in LMICs (average 1.5 days for vaginal birth, 4.5 days for caesarean birth),<sup>3</sup> many newborn

## Key questions

- Postnatal education for families is an important investment to improve newborn health in low/middle-income countries (LMICs), but more data are needed on families' current receipt of postnatal education and use of evidence-based newborn care practices in LMICs.
- Recent findings from a 13 000+ person survey in 3 states in India highlight opportunities for improvement in postnatal education for families and use of evidence-based newborn care practices (breast feeding, skin-to-skin care, clean/dry umbilical cord care, hand hygiene) in the home.
- Overall, the literature and our survey data suggest the need to incorporate the following strategies into future postnatal education programming: implement structured predischarge education with postdischarge reinforcement, using a multipronged teaching approach to reach whole families and cover multiple newborn care practices.
- Researchers need to conduct robust evaluation on postnatal education models incorporating these programme elements in the LMIC context, as well as explore whether this type of education model can work for other health areas that are critical for families to survive and thrive.

deaths occur at home. These deaths could be prevented by improving families' use of practices that are shown to reduce newborn illness and death: keeping babies warm through appropriate thermal care (skin-to-skin care/kangaroo mother care), early and exclusive breast feeding, infection prevention including handwashing and clean/dry umbilical cord care, and timely recognition of and care seeking for newborn illness.<sup>4-9</sup>

Postnatal education for families, defined by Bryanton *et al* as ‘structured interventions where parents are provided with education or information related to caring for their newborn’<sup>10</sup> is a key evidence-based strategy to improve newborn care practices and outcomes in LMICs.<sup>11</sup> These educational interventions are a critical component of postnatal care, and can take multiple forms including provision of information and interactive skills building in newborn care practices. Postnatal education programmes for parents have been shown to reduce newborn illness and death by improving hygienic umbilical cord care, breast feeding and appropriate thermal care.<sup>4 6 12–14</sup> In a recent scoping review of 77 postnatal education interventions in LMICs, more than half (56%) of studies reported a positive change in newborn care practices or health outcomes.<sup>15</sup> Evidence indicates that newborn care counselling/education is more easily improved than other aspects of postnatal health services,<sup>16</sup> suggesting that it may be a ‘low-hanging fruit’ to contribute to improved newborn outcomes.

## RATES OF POSTNATAL EDUCATION AND NEWBORN CARE PRACTICES IN LMICS

### Gaps in the evidence base on postnatal education and newborn care practices

The literature is promising in terms of postnatal education’s effects on newborn care practices and outcomes in LMICs. However, there are some gaps in the evidence base that warrant further exploration. Most evaluated programmes had key limitations in topic coverage and target audience. The majority (61%) of postnatal education programmes in LMICs only cover a single topic, most commonly breast feeding and multitopic programmes also prioritise breast feeding (50%) over other topic areas (thermal care 37%, infection prevention 30%, recognition of danger signs 27%, umbilical cord care 13%).<sup>15</sup> In addition, few evaluated programmes have targeted family members beyond the mother,<sup>15</sup> despite evidence that other family members (ie, fathers, grandparents) often influence newborn care decisions.<sup>14 17 18</sup> Consequently, there is a lack of data on the effectiveness of multitopic postnatal education programmes for multiple family members in increasing families’ use of a set of newborn care practices.

There is also room for improvement in study size: half of the studies in the scoping review noted above had small sample sizes (fewer than 135 participants),<sup>15</sup> and a Cochrane review of postnatal education interventions indicated that more large well-designed studies are needed to detect clearer effects on newborn outcomes.<sup>10</sup> Population-based surveys like the Multiple Indicator Cluster Surveys<sup>19</sup> and the Demographic and Health Surveys<sup>20</sup> could potentially offer good measurement opportunities, but these surveys only collect data about receipt of postnatal care services broadly (not postnatal education specifically) and newborn feeding practices (not other newborn care practices). In order to address

**Table 1** Maternal and birth characteristics

N=13 730 n (%)	
<b>Respondent type</b>	
Mother	12 863 (93.7%)
Family caregiver	496 (3.6%)
Mother + family caregiver	371 (2.7%)
<b>Maternal characteristics</b>	
Maternal age (years; mean (SD))	24.2 (3.62)
Maternal years of schooling (Mean (SD))	8.52 (3.83)
Family owns smartphone	10 025 (73.0%)
<b>Birth characteristics</b>	
Singleton birth	13 625 (99.2%)
Primiparous	6305 (45.9%)
Caesarean section delivery	4887 (35.6%)
Baby sex: female	6616 (48.2%)
Birth weight (grams) per respondent recall or hospital discharge card (mean (SD))	2770 (533)
Sick Newborn Care Unit admission	2398 (17.5%)
Maternal length of stay (days; median (95% CI))	2.77 (2.73 to 2.81)

these gaps in the evidence base, the global community needs more robust studies in LMICs on postnatal education uptake and newborn care practices in the home.

### New data on postnatal education and newborn care practices from large-scale study in India

Recent evidence from a preintervention survey in India sheds light on the current state of postnatal education in health facilities, as well as families’ use of evidence-based newborn care practices in the home. From October 2018 to January 2019, we conducted a phone survey of mothers who had delivered a baby within the past month in three states in India (Punjab, Karnataka and Madhya Pradesh) in order to assess existing postnatal education and newborn care practices prior to implementation of a structured postnatal education intervention at scale. We identified 24 district-level hospitals for the study by randomly selecting high and low delivery-load hospitals from the universe of 91 district hospitals in the three states. As part of a larger study, we calculated respondent sample sizes to produce facility-level estimates. Trained investigators collected phone numbers from 18 557 mothers who delivered at the study hospitals, and successfully contacted 14 219 mothers/family caregivers (77% response rate) by phone at 4 weeks post delivery to administer a quantitative survey. Thirteen thousand seven hundred and thirty respondents completed the survey (excluding 489 families with a neonatal or maternal death). Investigators used a structured questionnaire to

**Table 2** Receipt of in-hospital postnatal education and topics taught

	<b>N=13 730 n (%)</b>
Received in-hospital postnatal education about newborn care*	
Yes	6120 (44.6)
No	7610 (55.4)
Type of in-hospital postnatal education received*	
Predischarge group education	2446 (17.8)
Predischarge bedside education	3042 (22.2)
Discharge education	1168 (8.5)
Other education	56 (0.4)
Topics taught (based on recall) *	
Exclusive breast feeding	3592 (26.2)
How to keep the baby clean	1312 (9.6)
Keeping the baby warm	780 (5.7)
Handwashing	484 (3.5)
Warning signs of newborn illness	442 (3.2)
Skin-to-skin care	258 (1.9)
Not applying anything on umbilical cord	42 (0.3)
Other	818 (6.0)
Do not know	424 (3.1)
Received postdischarge health messages or videos on smartphone	217 (1.6)

\*Among all respondents. Respondents could report multiple types of postdelivery education received and multiple topics taught, with some overlap expected in similar topics (ie, keeping the baby warm, skin-to-skin care).

ask respondents about demographic and birth characteristics, receipt of postnatal care education, newborn care practices, postdischarge complications and hospital readmissions. All participants provided verbal informed consent at the time of the follow-up phone survey. There were no funds or time allocated for patient or public involvement, so we were unable to involve patients in study design, outcome development, results interpretation, writing or editing of this document.

Almost all phone surveys were conducted with the mother only, with family caregivers joining a minority of phone calls (table 1). Mothers were in their mid-twenties on average, and the majority had a previous child. The study hospitals had typical caesarean section, Sick Newborn Care Unit (SNCU) admission rates and maternal length of stay for district-level hospitals. Demographic and delivery characteristics were similar across states (data not shown).

The survey data show clear gaps in receipt of postnatal education in this preintervention context (existing education offered in the study hospitals prior to a formal postnatal education intervention; table 2). Fewer than half of respondents received any postdelivery education on newborn care before leaving the hospital. Bedside education was the most commonly reported type; fewer respondents received group or discharge education. Recall of specific topics was generally low: one quarter of respondents recalled being taught about exclusive breast feeding, and fewer than 10% recalled being taught about hand hygiene, keeping babies warm/skin-to-skin care, umbilical cord care or warning signs of newborn illness. Mothers versus other family caregivers had similar recall of topics taught (data not shown). Postdischarge receipt of health messages or videos on smartphones was minimal.

Respondents' use of evidence-based newborn care practices in the home varied widely (table 3). More than three quarters of respondents exclusively breast fed their baby in the past 24 hours. Fewer than half of respondents practised proper umbilical cord care (put nothing on the cord) before the cord fell off. Practice of skin-to-skin care at any time was low, as were hand hygiene practices while feeding the baby or handling baby stool/urine. Newborn care practices were similar across states, with the exception of some variation in cord care practices (data not shown). Respondents who received any postnatal education had slightly higher rates of newborn care practices (with the exception of breast feeding; table 3), and rates of evidence-based practices varied slightly by type of education received (online supplementary table 1). Respondents who received topic-specific education on cord care, skin-to-skin care or handwashing had

**Table 3** Respondents' use of evidence-based newborn care practices in the home for the first month of life (reported at 4 weeks post delivery)

	<b>Baby exclusively breast feed in past 24 hours n (%)</b>	<b>Proper umbilical cord care (nothing on cord) n (%)</b>	<b>Ever practised skin-to-skin care n (%)</b>	<b>Washes hands when feeding baby* n (%)</b>	<b>Washes hands when handling baby stool/urine* n (%)</b>
All respondents (n=13 730)	10 621 (77.4)	6334 (46.1)	1109 (8.1)	2867 (20.9)	2578 (18.8)
Received any postnatal education (n=6120)	4764 (77.8)	3001 (49.0)	699 (11.4)	1434 (23.4)	1299 (21.2)
No postnatal education (n=7610)	5857 (77.0)	3333 (43.8)	410 (5.4)	1433 (18.8)	1279 (16.8)

\*Unprompted recall of key moments when respondents wash their hands.

higher rates of the corresponding newborn care practices (online supplementary table 2).

## IMPLICATIONS FOR POSTNATAL EDUCATION PROGRAMMING

### New study data highlight the need for postnatal education

Our survey results highlight a clear need for postnatal education aimed at improving families' use of evidence-based newborn care practices. More than half of respondents did not receive any postnatal education in this preintervention setting, and if they did, it was mainly about breast feeding. This is consistent with existing evidence that the majority of postnatal education in LMICs focuses on breast feeding.<sup>15</sup> The education rate for breast feeding (26%) is comparable to another study from India, although that study found higher education rates on hygiene and identifying danger signs of illness.<sup>21</sup> Our survey data show that mothers' use of evidence-based newborn care practices at 4 weeks post delivery is relatively low, with the exception of exclusive breast feeding. The high rate of exclusive breast feeding (77%) is consistent with other studies from India at 4 weeks post delivery<sup>21–23</sup> as well as the India National Family Health Survey 2015–2016 rate of exclusive breast feeding for babies under 2 months old,<sup>24</sup> and aligns with our study team's expectations given the country's investments in breastfeeding promotion programmes. The rate of proper umbilical cord care (46%) is consistent with a systematic review of cord care practices in LMICs that found widespread traditions of applying substances to the umbilical cord,<sup>25</sup> and aligns with the study team's experience that clean/dry cord care is not always discussed in hospital discharge instructions. The low rate of skin-to-skin care (8%) likely reflects the fact that relevant healthcare practice guidelines in India focus specifically on kangaroo mother care (a more detailed version of skin-to-skin care for low birth weight and preterm newborns), and those programmes have only recently been introduced in some states. One study in Nepal found a considerably higher rate of skin-to-skin care (70% in control group at 5–6 weeks post delivery),<sup>26</sup> indicating there may be variation in this practice across regions.

While these survey data are self-reported and from a specific setting in India, the study adds value to the literature by providing a robust dataset (13 000+respondents) on mothers' receipt of postnatal education and use of multiple evidence-based newborn care practices at a key timepoint (the first month of life) in an LMIC setting. We found one other study on postnatal education with a similar sample size, but it only measured breast feeding at 3 months.<sup>27</sup> We found very few studies measuring multiple newborn care practices in the first month of life, and most had small sample sizes. While we cannot infer causation in our preintervention descriptive study, the slightly higher rates of evidence-based newborn care practices among respondents who received postnatal education indicate its potential benefit. The low rate of respondents receiving postnatal education highlights

opportunities for improvement in both the reach and quality of this education. These opportunities may be relevant in similar LMIC settings, given that many parents in LMICs do not receive sufficient education about how to care for their newborns at home or when/how to seek additional care if needed.<sup>15</sup> While antenatal education can lay the groundwork for improving mothers' knowledge of newborn care practices,<sup>28</sup> not all mothers or their partners receive this messaging as part of antenatal care. Postnatal education is a key chance to reach families with essential evidence-based newborn care knowledge and skills. The median maternal length of stay of 2.8 days in our study indicates that there is time to approach families with postnatal education interventions, though length of stay may vary across other LMIC settings.

### Translating data to action for postnatal education programmes

While comprehensive evidence-based guidelines exist for postnatal care services in LMICs writ large,<sup>29 30</sup> the global community lacks specific programme guidelines for postnatal education. The literature is not always clear about what postnatal education programmes include, how they are implemented or rates of education uptake,<sup>15</sup> leaving evidence gaps in how to operationalise programmes. In order to develop evidence-based programme guidelines for postnatal education, researchers need to rigorously evaluate programmes that build on the programmatic gaps identified in our survey data and the literature: (1) implement structured educational interventions as a key strategy for continuity of care from hospital to home, using multipronged teaching strategies; (2) use a family-wide education approach involving the various caregivers in a household; (3) cover a variety of evidence-based newborn care practices.

### Education as a key strategy in the continuity of newborn care from hospital to home

A recent scoping review suggests that interventions using a combined approach of pre-discharge education and post-discharge follow-up have been successful in improving newborn care practices and outcomes in LMICs.<sup>15</sup> Given the global shift towards facility-based childbirth in LMICs,<sup>31 32</sup> the time spent at a facility after birth is a 'critical moment' to start newborn care messaging and skills building. This is especially true for families whose only or longest touchpoint with the health system is at delivery<sup>15 33</sup>; many families are lost to follow-up after discharge due to access gaps in postnatal care services.<sup>34 35</sup> Our survey shows that over 40% of mothers already receive some type of postnatal education prior to discharge from a health facility, which provides a foundation to build on, especially in hospitals where patient education infrastructure is already in place.<sup>15</sup> Questions remain about the most effective ways to implement pre-discharge education (ie, group vs bedside, prior to or at discharge—our study was not designed to analyse this in detail)—and post-discharge follow-up (at home, clinic visit, via mobile

phone). Our survey data show particular opportunities for improvement in smartphone messaging—70% of families owned a smartphone, yet only 2% of mothers received postdischarge phone messaging (likely due to lack of existing digital health programmes for postdischarge care—this is not a standard health system practice in India). In addition, we know educational interventions that inform *and* activate caregivers with practical skills are most effective in improving patient outcomes,<sup>36–39</sup> but we need more evidence about the right multipronged teaching approaches to convey information (eg, verbal, multimedia, written materials) and build skills (eg, modelling, role playing) in various LMIC settings.<sup>15</sup>

#### Family-wide education to engage key family decision-makers as care partners

Our survey data show that postnatal education gaps exist for both mothers and family caregivers (55% do not receive any education), and there is considerable room for improvement in newborn care practices that could be done by any family caregiver: skin-to-skin care, clean/dry umbilical cord care, hand hygiene and recognising signs of illness. Mothers are typically the primary caregivers for their newborns, but other family members (ie, fathers, grandparents, other extended family) often influence newborn care decisions,<sup>14 17</sup> so it is to implementers' advantage to include them in postnatal education efforts.<sup>15</sup> Family members can support mothers to sustain evidence-based newborn care practices, both through their influential role as decision-makers and by serving as newborn caregivers themselves. To reach family caregivers with education efforts, implementers could apply lessons from family-centred care in the sick/hospitalised newborn context (ie, SNCU/neonatal intensive care unit), in which healthcare is planned around the whole family rather than just an individual child, and providers respect and engage family caregivers as key partners in care.<sup>40</sup> There is evidence that a family-wide education model improves postdischarge caregiver behaviours and reduces patient complications in cardiac care,<sup>38</sup> so implementers could also draw on lessons from this space.

#### Multiple newborn care topics to fully prepare families

Our survey data and the literature show that most postnatal education programmes in LMICs focus on breast feeding, often at the expense of other topics. While exclusive breast feeding is a key practice to promote newborn health, education programmes should also cover other evidence-based practices from the WHO's postnatal care guidelines that benefit both preterm/low birth weight<sup>41–43</sup> and healthy newborns<sup>7 8</sup>: infection prevention (including clean/dry umbilical cord care), thermal care, immunisation and recognising and managing illness.<sup>29 44</sup> Questions remain about the best ways to teach these topics in accordance with adult learning principles—for example, by grouping practices that are closely related (skin-to-skin care and breast feeding; cord care and hand hygiene to

prevent infection). Educating families to recognise signs of newborn illness and seek care promptly is particularly important,<sup>45</sup> since short postpartum stays in LMICs<sup>3</sup> plus variable quality of postpartum care<sup>16 46</sup> may put newborns at risk for illnesses that show symptoms only after returning home. Our survey showed that only 3% of families recalled being taught about warning signs of newborn illness, indicating substantial room for improvement.

Overall, postnatal education approaches and content need to align with what women say matters most in the postnatal period: achieving confidence and competence as a mother, regaining health and well-being for their baby and themselves, and parenting in their own cultural context.<sup>47</sup>

#### CONCLUSION

As the global community continues to work towards achieving the sustainable development goal for neonatal mortality, we need to scale up implementation of evidence-based interventions to reduce newborn deaths at a faster pace.<sup>1</sup> Postnatal education is a sound strategy as an integral component of postnatal care programmes to provide families with information and skills to care for their newborns in the home, leading to better newborn outcomes. There is a compelling rationale to invest in postnatal care programmes that address existing programmatic gaps by initiating education at the critical moment of pre-discharge in facilities, using a multipronged education approach to reach whole families about multiple newborn care practices, and reinforcing messages post discharge. However, researchers need to test these programme models on larger, more representative populations and study samples, and carefully document how the educational interventions are implemented, to better understand which programme approaches are most effective.

Ultimately, we envision effective family-wide education programmes for LMICs that could not only improve newborn health but could also be expanded to maternal health (eg, newborn and mother-focused messages in antenatal care; postpartum education on danger signs and self-care for new mothers) and other critical health areas. We hope the evidence base in this area will continue to grow, and with it, the opportunity to help newborns and their families survive and thrive.

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