

REVIEW

Developing community-based intervention strategies to save newborn lives: lessons learned from formative research in five countries

Neonatal Mortality Formative Research Working Group¹

This paper summarizes lessons learned from formative research conducted in Bangladesh, Ghana, India, Mali and Nepal to inform the development of newborn health interventions, mostly in the context of field trials. Current practices, constraints to the adoption of optimal practices and implications for implementing interventions to improve newborn survival are discussed for: optimal care during pregnancy; skilled care at birth; optimal delivery and newborn care practices; special care of low birth weight babies; and timely and appropriate care seeking for newborn illness. General lessons concerning target audiences and intervention strategy are also drawn. In brief, interventions to reduce neonatal mortality need to start during pregnancy not only to promote birth preparedness and institutional delivery, but also to start the process of change concerning early newborn care practices. Their target audience should not only be pregnant or recently delivered women, but also include the main gatekeepers, particularly traditional birth attendants, grandmothers and other family members. Health providers' opinions also matter as care practices are less likely to change if families receive conflicting messages from different sources. Interventions are more likely to succeed if they are not simply message based, but include problem solving approaches, and a behavior change component to address community norms. Although antenatal care (ANC) is theoretically a good channel for newborn interventions, capitalising on its potential is not straightforward, and will require considerable investment and intervention development in its own right in order to improve ANC counselling, which will need to extend beyond training and tackle the many working day constraints encountered by ANC providers. Removing or subsidising the cost of deliveries may be a necessary action to increase institutional deliveries, but it is unlikely to be sufficient; measures will need to be put in place to ensure the basic quality of institutional deliveries and

newborn care, and to change staff attitudes and practices. Post-natal visits should include observation of the baby, referral and counselling of the mother concerning danger signs in addition to promoting optimal care practices. The lessons learned should guide the development of interventions in other contexts, and ensure that key essential elements are not overlooked. They do not, however, mean that formative research will not be needed in other contexts, although the list of questions to address should be considerably reduced; successful intervention strategies require adaptation to make them local, context-specific if they are to be effective, and ongoing process monitoring to ensure the quality of intervention delivery, to check that it is having its intended effect, and to respond to any concerns from its implementers, recipients or the community. Finally, major gaps in evidence are highlighted. These include: establishing levels of recognition of asphyxiated babies and effectiveness of local solutions for resuscitation; clarifying the extent of the overlap between community perceptions of 'at risk' babies and low birthweight babies; developing and evaluating effective interventions to enable ANC services to deliver effective behaviour change counselling for pregnant and newborn health; evaluating effectiveness of delivering community-based newborn interventions at scale through routine services.

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Introduction

Every year four million babies die during the neonatal period, the first 4 weeks of life.¹ Another 4 million are stillborn;² they die *in utero* in the last 3 months of pregnancy, 0.9 million during the 12 h before delivery. Neonatal deaths now account for 36% of the 10.6 million child deaths every year that occur.³ Preventing them is therefore essential to achieving the millennium development goal for child survival, which demands a two-third reduction in child mortality by 2015 from the 1990 level. Until recently, however, most child survival efforts were targeted to older children, with very little progress made in reducing neonatal deaths.¹

In the second paper of the 2005 seminal *Lancet* Neonatal Survival Series, Darmstadt *et al.*⁴ reviewed the evidence for a range of interventions covering the continuum of care from the antenatal

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through the intrapartum to the postpartum period, and identified 16 with proven effectiveness, which they divided into three delivery mode packages, namely community–family, outreach and facility-based clinical care. They concluded that universal coverage with these known interventions could prevent 41 to 72% of current newborn deaths. They further concluded that not only delivering the community–family package was essential in all settings but also that in high mortality settings with weak health systems, it is possible to prevent a substantial proportion of neonatal deaths through this package alone.

Newborn care practices likely to impact on neonatal health and survival include antenatal care seeking and health promotion during pregnancy; birth and emergency preparedness; seeking skilled care at birth; early initiation of breastfeeding; exclusive breastfeeding; keeping the newborn warm; hygienic cord care; prompt care seeking for illness and providing additional care (thermal care and feeding) of low-birth-weight (LBW) babies.

Each of these practices involves a complex set of behaviors. To be effective, community-based intervention strategies to change them must be evidence-based and culturally appropriate. In this paper, we present lessons learned from formative research⁵ to inform the development of such strategies, which was conducted in five countries to achieve one or more of the following:

- (a) Understand what needs to be changed, what can be changed and what cannot. This includes the identification of gaps between current and optimal newborn care practices, the identification of supports and barriers for optimal practices (at the level of the individual and family, the community and the health services) and the definition of ‘constraints’ as informational, social, cultural or economic.
- (b) Select key practices to be targeted, develop key intervention messages and materials and test their content to ensure they are culturally appropriate and sensitive.
- (c) Conceptualize how change can be effected through identifying and evaluating potential delivery channels and how the selected behaviors can best be tackled using them; determining the primary and secondary target audiences for inclusion in the intervention and recommending actions likely to strengthen supports and reduce barriers.
- (d) Ensure the intervention is logistically feasible.
- (e) Inform advocacy to effect policy change.

In particular we present the implications of this research for interventions to save newborn lives in other settings. These lessons learned are drawn from presentations at a World Health Organization-Saving Newborn Lives (WHO-SNL) sponsored workshop held in April 2006 in Udaipur, Rajasthan, and from the companion papers in this volume.

Study settings

The five countries were selected to cover the two priority regions of the world, namely South Asia, which has the largest number of newborn deaths, and Sub-Saharan Africa, which has the highest risks.¹ The countries are *South Asia*: Bangladesh (Mirzapur and Sylhet), India (Rajasthan and Uttar Pradesh), Nepal (Makwanpur); *Sub-Saharan Africa*: Ghana (Brong Ahafo), Mali (six districts to give national representativeness).

All sites were predominantly rural. In Mali, the formative research was conducted as a prelude for setting national policy; it determined the selection of behaviors to be promoted in essential newborn care, informed program strategy and led to pilot projects in two districts.⁶ In the other settings, it was conducted with the intention to demonstrate the effectiveness of the resulting intervention by a cluster randomized controlled trial, in most cases with the intervention implementation closely controlled by the research team. In Bangladesh,⁷ India^{8,9} and Ghana,¹⁰ the formative research aimed to inform the development of a home visits-based intervention supported by a behavior change communication (BCC) strategy, and in Nepal,¹¹ the development of a women’s group intervention. The approach in Ghana was somewhat different, with the intervention being developed with and delivered by the district health teams and also being implemented immediately at scale.¹²

The studies used a range of formative research methods, including in-depth interviews with key informants, focused group discussions, observations, case studies, illness/death narratives, social mapping, pile sorts, free listing, pictures, hypothetical scenarios, cross-sectional surveys, intervention workshops, trials of improved practices and piloting; site-specific details can be found in the accompanying papers to this volume.

Lessons learned

In all settings, there were large gaps between current and optimal newborn care practices. The focus in this paper is not to describe these gaps nor is it a detailed description of the types of constraints that interventions need to address and, where they exist, facilitators to closing these gaps; these are covered in the accompanying papers.^{7–9,13,14} Also included in this volume are two papers detailing how specific formative research findings were used to make decisions about the content and delivery of the intervention. These papers cover the two main community-based approaches to reducing neonatal mortality, namely women’s groups¹¹ and home visits by community-based volunteers.¹² The focus in this paper is on general lessons learned from the formative research that can inform intervention development in other contexts. Several universalities in key practices, constraints to optimal practices and implications for interventions emerge.

Interventions to promote optimal care during pregnancy

Key practices and constraints. In most sites, continuing to work hard during pregnancy appears to be more common than eating down to achieve an easy labor, although there are constraints on what should or should not be eaten during pregnancy.⁸ An important lesson for interventions that seek to identify and visit women early in pregnancy is that it is common for pregnancy to be kept secret for as long as possible; it is often seen as a time of danger and vulnerability. Even highly resourced and intensive longitudinal research studies that make regular enquiries about the onset of pregnancy have found that generally women do not disclose before the fourth month.¹⁵ Contact with antenatal care (ANC) services is generally high with more than 50% of pregnant women making at least one visit; the exception is Nepal where only 15% attend. However, only a small fraction of women make the requisite four visits; for example, in Ghana, 86% of pregnant women attend at least once, but only 33% make four visits; the main motivating factor for the high attendance was the need to be registered to avoid delays or provoke annoyance in case of an institutional delivery. In all settings, the perceived quality and usefulness of the visits is low, counseling skills of ANC providers poor and delivery of health education messages ineffectual, as for example detailed in the accompanying paper on early initiation of breastfeeding.¹⁵ ANC currently appears to be a missed opportunity both for health education and for delivery of essential interventions such as intermittent presumptive treatment with antimalarials in endemic countries.

Intervention implications. Interventions to reduce neonatal mortality must start during pregnancy and should promote antenatal care seeking, reduce women's workload, improve their diet and encourage birth preparedness and institutional delivery. In addition, counseling on early neonatal care practices, such as prompt initiation of breastfeeding and wrapping and drying the baby immediately after birth, must be done during pregnancy. Waiting until after delivery is too late, as the behaviors are required during or immediately after birth, and will take time to change; although desired behaviors can be reinforced by health providers, they are more likely to be maintained if they are addressed explicitly during pregnancy, with all decision makers involved and supported by community BCC strategies.

Keeping pregnancy secret for as long as possible has implications for the promotion of early visits for ANC. The secrecy is culturally embedded; a community-wide BCC approach will be required, but it may prove difficult to effect change. It is important that community-based interventions recognize this in their planning, monitor whether it is a problem in their implementation and retain flexibility concerning contact times during pregnancy and which behaviors can or cannot be targeted through this approach.

Capitalizing on the potential of ANC attendance as a delivery channel for behavior change will require considerable investment, including detailed formative research to develop appropriate interventions to improve ANC counseling; these will need to extend beyond training on counseling skills to tackle the many working day constraints encountered by ANC providers.

Interventions to promote skilled attendance during delivery

Key practices and constraints. There is a large gap between levels of ANC coverage and institutional delivery, with the percentage of home births ranging from about 50% in Ghana to about 90% in Bangladesh and Nepal. The key constraints are physical and financial lack of access, which goes beyond the cost of the delivery itself; planning for transport and other costs was a key issue tackled by the woman's group intervention in Nepal.¹¹ In Ghana, although deliveries are now covered by insurance schemes, women can only be admitted if they have a package of essential items for the baby, and this is expensive.¹⁰ Furthermore, physical and financial lack of access are only part of the picture; there are several other constraints that need to be tackled. There was a general lack of birth preparedness in all countries, secrecy concerning the onset of labor, a strong preference for home births, fear of Cesarean sections and delays seeking admission even where an institutional delivery was desired, often resulting in an unplanned home birth.

Intervention implications. Three main lessons for intervention strategies can be drawn from the formative research. First, intervention strategies should consider using a problem-solving approach to help the family plan for any delivery costs and transport for emergencies. Although removing or subsidizing the cost of deliveries may be necessary to increase institutional deliveries, it is unlikely to be sufficient.

Second, it may be helpful to include a BCC component to change community norms, in particular that ignoring the onset of labor, carrying on irrespective of pain and delivering at home equate with a 'strong' woman, who deserves respect; instead, care should be sought immediately after labor starts.

Third, community-based strategies need to be supported by a facility-based component, with measures put in place to ensure the basic quality of institutional deliveries, including the availability of essential equipment and drugs, and adequate levels of skilled personnel to meet any increased demand and to change staff attitudes and practices so that services are seen as supportive and women are not turned away for 'coming too early' in labor.

Interventions to improve delivery and newborn care practices

Key practices and constraints. Hygiene was universally a big issue for home deliveries, with the floor being the usual delivery surface in all five countries. In Rajasthan, vaginal examinations were carried out using bare, unwashed hands in all home births

observed (and in some facility births).⁸ In all settings, birth attendants carried out a variety of procedures aimed at helping women to deliver quickly; manual abdominal compression or pushing was common, and in Rajasthan, oxytocin injections were used to intensify contractions.⁸

In all settings, the focus remains on the mother until the placenta is delivered, at which point the cord can be cut; the newborn is left unattended, generally on the floor until then, and is not picked up, wiped or dried. Although local solutions exist for the resuscitation of newborns, such as immersion in cold water, applying hot pepper to the skin and slapping the soles of the feet,¹⁰ they are of unproven effectiveness and delays in resuscitation attempts occur; inspection of the baby, including its breathing, often waits until after the placenta is delivered.

Early bathing is common and culturally embedded; for example, in Nepal, 92% of babies were reported as having their first bath within an hour of birth, and in Ghana, it is universally considered important to bathe newborns frequently in order to prevent body odor in adult life. Rajasthan was an exception. Immediate bathing is a relatively new phenomenon, and takes place unless the baby is perceived to have some trouble or *lafdo* or *bolma*. The older custom was delayed bathing for all babies till the sun ceremony (5/7/9 days). Frequent bathing of young babies and massaging with oil at bath time continues through the neonatal period.

A variety of substances, many of which are unhygienic, are commonly applied to the cord in all settings. The choice of substances differs from place to place, as does the rates of umbilical infections; in Sylhet district in Bangladesh, 9% of mothers reported umbilical infections in their babies,⁷ whereas in Ghana this appears to be a rare problem.

Breastfeeding is initiated for almost all babies but is often delayed until several hours, or in some cases, days after delivery. Use of pre-lacteals is ubiquitous in all settings; the practice of discarding colostrum is more variable, and importantly it is not always the predominant constraint to prompt initiation. A major constraint was a lack of awareness of the benefits of prompt initiation in Ghana,¹³ where the national breastfeeding program had concentrated its efforts more on health facilities than on the community, missing many of the key influencers of the practice. Furthermore, the main attention had been on encouraging exclusivity rather than on early initiation. However, despite the gaps in the flow of information on early initiation of breastfeeding from national, regional and district levels to health staff, many health workers attending deliveries were using their authority to successfully encourage early breastfeeding.

Intervention implications. Four main lessons emerge. Strategies need to be put in place to ensure that the newborn gets immediate attention, for example, by introducing an additional attendant responsible for the baby. Promotion of some practices can be

further supported by a home visit on the day of birth by a community health worker.

Second, interventions cannot be entirely facility-based, however high the ANC attendance, or institutional delivery rate. They must address community norms and involve the main gatekeepers, particularly traditional birth attendants (TBAs), grandmothers, mother-in-laws and family members who attend the delivery, as they are usually the mother's main source of advice and they, rather than the mother, control what happens at the birth.

Third, policy alone is not enough; monitoring implementation and impact through to the intended recipients is crucial, as evidenced by the gaps highlighted in the Ghana breastfeeding analysis.¹³

Finally, many newborn care practices are culturally embedded, and achieving the ideal practice may not be feasible. For example, promoting immediate wrapping and delay of the first bath for at least a day to reduce the risk of hypothermia may meet strong resistance. In such situations, interventions should negotiate with the main actors to identify compromise behaviors. For example, it may be better to focus on speed of the first bath and adapting practices to minimize hypothermia such as using a damp warm cloth and wiping the baby rather than immersing in water.

Interventions to promote special care for LBW babies

Key practices and constraints. Preterm and other LBW babies are at a substantially increased risk of mortality; they account for 60 to 80% of all neonatal deaths¹. These can be prevented with special care (kangaroo mother care or skin-to-skin contact) to prevent hypothermia, frequent breastfeeding and active care seeking.⁴ To target interventions to LBW babies requires that they can be successfully identified at the community level, yet little is known about the feasibility of doing this. The companion paper from Uttar Pradesh⁹ addresses this in detail; they found that LBW *per se* was not considered an important determinant of risk nor was it a trigger for care seeking. Instead, newborn babies are classified by the population into types based on observable characteristics, such as feeding habits, growth, the level of activity or vigor, frame and overall appearance. Of particular interest are those classified as *babut kamjor* (twins and premature babies are almost always in this category), which literally means very weak, and were considered to be 'at risk.'

Similarly, formative research in Ghana found low agreement between mother's perception of the size of birth and birth weight as recorded on the health card for 3264 babies born in hospital.¹⁶ Although mother's perception of her baby as 'very tiny' or 'smaller than average' identified 80% of all babies with birth weights below 2000 g, it only identified 29% of those with birth weights between 2000 and 2499 g. The specificity was high at 96%; however, babies with birth weights of 2500 g or more constituted 57% of babies perceived by mothers as 'very tiny' or 'smaller than average.'

Implications for interventions. In settings where a substantial proportion of births take place at home, interventions promoting special care for LBW babies have three choices: (i) to include weighing babies, for example by giving community health workers (CHWs) scales and training them to weigh babies in their homes, preferably within 24 h of birth, to identify LBW babies; (ii) to use a proxy for LBW babies, such as babies perceived by the community to be 'at risk' (in the case of Uttar Pradesh and Ghana, this is likely to include premature babies and twins), although currently evidence is lacking as to the sensitivity and specificity of the possible proxies; or (iii) to promote the behavior for all babies. The latter is the approach being adopted in Uttar Pradesh,⁹ with skin-to-skin contact being promoted for all babies.

Interventions to promote newborn care seeking

Key practices and constraints. Several constraints exist to achieving prompt and appropriate newborn care seeking. The gap between current and optimal care seeking is large: in rural Rajasthan,¹⁴ outside care is considered only for babies who are classified as being 'at risk' from birth, or shortly thereafter, and even then rarely in the first month of life; and in Ghana, mothers reported seeking care outside the home for only 36% of newborns reported as having had a serious illness. Non-hospital illnesses, that is illness categories for which modern medicine cannot help or is not appropriate, exist in most cultures.¹⁷ Sequential care seeking is common, for example trying herbs and home care first, then druggists, then traditional healers and then finally the formal sector. Mothers are not autonomous in decision making, particularly when costs are involved; this can lead to delays while key decision makers such as the husband are approached. In addition, mothers do not make decisions in a vacuum, but are constrained by cultural beliefs. In particular, many cultures fear the potential risk of 'evil eye' that contact with strangers can bring, and its harmful consequences to the baby. There is often a fixed period of confinement in the home after birth both to avoid this and to allow the mother and baby to rest.

Implications for interventions. Changing community norms and involving all key decision makers in the intervention process will be key, just as they are to changing other newborn care practices. In addition, interventions should consider including druggists, traditional healers and private practitioners, as they are a major source of health providers in most settings. However, given the size of the gap in newborn care seeking, BCC interventions or women's group interventions are unlikely to be sufficient. Home visits by CHWs, including observation of the baby, referral and counseling of the mother concerning danger signs, are also likely to be necessary; the problem of 'evil eye' may pose challenges for this approach, and will need to be explicitly addressed through formative research.

General lessons regarding target audiences of behavior change communication

It is important to cover all main communication channels in the intervention strategy, so that everyone is speaking from the same sheet. Mothers do not operate in a vacuum. For example, formative research in Mali highlighted the key role played by *Mussokoroba* (MK);⁶ this is an elderly female member within the extended family structure, who is in charge of family life education, and to whom the wife or wives of the head of the family are entrusted. A pilot project, which targeted MKs, identified MK leaders (MKLs) in consultation with communities and used them as agents of change, and found that, contrary to expectations, MKLs fairly readily accepted the 'new' behaviors for newborn health and were able to change their practices.⁶

More generally, as discussed earlier, newborn interventions must involve the main gatekeepers, particularly TBAs, grandmothers, mother-in-laws and family members who attend the delivery, as they are usually the mother's main source of advice and they, rather than the mother, control what happens at the birth. They are also often the primary carer of the newborn in the early days. Thus, the women's groups in Nepal were open to all women in the community; they were not restricted to pregnant women, or even to women in their childbearing years, in recognition of the importance of older women and other mothers as a source of advice and decision makers.¹¹

Providers' opinions and behaviors also matter; care practices are less likely to change if women receive conflicting messages from different sources. All relevant providers therefore need to be targeted, including ANC and delivery providers, TBAs, other health workers and traditional healers.

Conclusions for intervention development

- Interventions to reduce neonatal mortality (whether home visits, women's groups, BCC or a combination) should start during pregnancy not only to promote birth preparedness and institutional delivery but also to start the process of change concerning early newborn care practices.
- Interventions should not be entirely facility-based, however high the ANC attendance, or institutional delivery rate, nor should they be focused only on the pregnant or on recently delivered woman.
- Interventions will benefit from including a BCC component to address community norms. All main communication channels should be involved, so that everyone is speaking from the same sheet; care practices are less likely to change if women receive conflicting messages from different sources. Providers' opinions and behaviors matter, as well as gatekeepers and key family decision makers, particularly TBAs, grandmothers, mother-in-laws, fathers and other family members.

- Although ANC is theoretically a good channel for newborn interventions, capitalizing on its potential is not straightforward, and will require considerable investment and intervention development in its own right to improve ANC counseling, which will need to extend beyond training and to tackle the many working day constraints encountered by ANC providers.
- Home visit interventions by community-based workers or volunteers should include at least two visits during pregnancy, a visit on the day of birth and at least two thereafter. Visits during pregnancy and on the day of birth need to recognize the secrecy concerning the onset of pregnancy and labor in their planning, monitor whether it is a problem in their implementation and retain flexibility concerning contact times during pregnancy and which behaviors to target when. Postnatal visits should include observation of the baby, referral and counseling of the mother concerning danger signs, in addition to promoting optimal care practices.
- Interventions should not simply be message based, but should include problem-solving approaches, particularly essential to birth preparedness, and planning for delivery costs and for transport in case of emergencies for either mother or baby.
- Removing or subsidizing the cost of deliveries may be a necessary action to increase institutional deliveries, but it is unlikely to be sufficient. Interventions should include a facility-based component, with measures put in place to ensure the basic quality of institutional deliveries and newborn care, including the availability of essential equipment and drugs and adequate levels of skilled personnel, and to change staff attitudes and practices.
- Strategies need to be put in place to ensure that the newborn gets immediate attention after a home birth, for example by introducing an additional attendant responsible for the baby.
- Many newborn care practices are culturally embedded, and achieving the ideal practice may not be feasible. In such situations, interventions should negotiate with the main actors to identify compromise behaviors.
- In the settings where a substantial proportion of births take place at home, interventions targeted at LBW babies have three choices: (i) to include weighing babies, for example by giving CHWs scales and training them to weigh babies in their homes preferably within 24 h of birth; (ii) to use a proxy for LBW babies, such as babies perceived by the community to be 'at risk,' although currently evidence is lacking as to the sensitivity and specificity of the possible proxies; or (iii) to promote the behavior (for example, skin-to-skin contact) for all babies.
- Policy alone is not enough; monitoring implementation and impact through to the intended recipients is crucial.

Discussion

The lessons learned from formative research in five countries provide an overall framework for developing interventions in other

contexts. They should ensure that key essential elements are not overlooked. They do not, however, mean that formative research will not be needed in other contexts, although the list of questions to address should be considerably reduced. Successful intervention strategies require adaptation to make them local, context-specific if they are to be effective. In particular, formative research will be needed to finalize the key practices to be targeted and to identify compromise behaviors where necessary; to adapt and test key intervention messages and materials to ensure they are culturally appropriate and sensitive; to confirm the target audiences and to modify intervention approaches and delivery channels to fit the local context.

In addition, ongoing process monitoring using formative research methods with regular analysis and discussion of results is strongly recommended to ensure the quality of intervention delivery, to check that it is having its intended effect and to respond to any concerns from its implementers, recipients or the community.

Finally, major gaps in evidence remain. These include establishing levels of recognition of asphyxiated babies and the effectiveness of local solutions for resuscitation; clarifying the extent of the overlap between community perceptions of 'at-risk' babies and LBW babies; developing and evaluating effective interventions to enable ANC services to deliver effective behavior change counseling for pregnant and newborn health and evaluating the effectiveness of delivering community-based newborn interventions at scale through routine services.

Disclosure

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