Community-based care at birth – what role can it play in maternal and newborn survival in high mortality settings?

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DRAFT FOR REVIEW
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Compass: Women’s and Children’s Health Knowledge Hub

Compass is a partnership between the Centre for International Child Health at University of Melbourne, Menzies School of Health Research and the Centre for International Health at Burnet Institute. The Hub draws on regional expertise to enhance the quality and effectiveness of WCH interventions in the Asia and Pacific regions. Our work focuses on supporting equitable progress towards Millennium Development Goals 4 and 5 – improved maternal and child health and universal access to reproductive health.

Working Papers

These Working Papers are intended to provoke discussion on important issues in Women’s and Children’s Health.

As Working Papers, they are intended for periodic update, especially as feedback is received. The title page includes the date of the latest revision. Compass invites and encourages feedback anyone who reads or uses this paper. We are interested in corrections and suggestions for expansion – including any topics that health planners or policy makers would find helpful.

Please contact the lead author with any queries or feedback.
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Maternal and newborn deaths in difficult settings

High rates of maternal and newborn mortality persist in many settings in Asia and the Pacific\textsuperscript{1,2} – and each death represents not just a family and community tragedy, but is a proxy for many more women and babies who suffer serious, often long-term morbidity. As well as slow progress in general\textsuperscript{3}, there is a particular difficulty with efforts to reduce maternal and newborn deaths, especially deaths of mothers, in difficult settings. The best guidance from global authorities promotes childbirth care in a health centre with a skilled birth attendant as the best means to reduce mortality\textsuperscript{1,4,5}. But for many women in remote and marginalised settings, characterised by high mortality and difficult access to services, most continue to deliver at home and the rates of either facility-based delivery and/or skilled attendance at delivery show very slow increase, if any. This is true for many settings\textsuperscript{2}, including those studied for this paper in Papua New Guinea (PNG), Solomon Islands, Lao PDR and the East Nusa Tenggara (NTT) province of Indonesia.

There is no doubt that work must continue to increase skilled childbirth care in facilities. But while this is attempted, there may be additional, complementary strategies that can more quickly lift some of the burden of maternal and newborn deaths from the communities where they are greatest\textsuperscript{6,7,8}. To be effective, new approaches must address some or all of the major direct causes of death in mothers\textsuperscript{9}: post-partum haemorrhage, puerperal infection, hypertensive diseases (eclampsia), obstructed labour, unsafe abortion; and of newborn death\textsuperscript{10,11}: post-partum infection, intra-partum related newborn deaths\textsuperscript{2}, and complications of preterm birth. At the top of this list are post-partum haemorrhage and infection; there is some evidence to suggest that these two problems, in high-mortality settings, may be direct causes of more than half of deaths of mothers or newborns\textsuperscript{11,12,13}, while unsafe abortion will vary considerably in importance, depending on local policy and practices. New approaches must also act at the right time: the period of “childbirth”\textsuperscript{4}– encompassing labour, delivery and the immediate post-partum period – is when up to half of maternal and newborn deaths, and one third of stillbirths, occur\textsuperscript{9,11}. In places where home-births are the norm, this is often because health services find it difficult or impossible to reach women on these days of highest risk.

In summary,

We reviewed recent systematic reviews, high quality modelling studies and new controlled trials reporting on the potential for community-based care to reduce maternal and newborn mortality around the time of childbirth. We applied this to our analyses of high mortality settings, where most women give birth at home, in Papua New Guinea, Solomon Islands, Lao PDR and Indonesia (NTT).

There are forms of community-based care that are not in place in these settings, including interim measures to meet the immediate crisis in maternal deaths. These include community-based distribution of contraception, community-based prevention of haemorrhage, management of infection, and community newborn care.

Such interventions could be integrated into current efforts to strengthen health services and reduce maternal and newborn deaths by 30% or more. However, they must be introduced in a carefully measured fashion, using a systems approach, to monitor for impact and unforeseen consequences.

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\footnote{Which used to be termed “birth asphyxia”}
The potential of community-based care, learnt from settings like Nepal

Community-based care is relevant to high-mortality settings because of its potential for rapid scale-up within existing resources, and the imperative to find new ways to reach women. There is strong consensus on the value of community-based care before pregnancy, during the antenatal period, and post-natally. However for health planners there are critical questions around the concept of community-based care at the time of childbirth: whether it is effective, whether community providers can provide care safely; and whether investing in community-based care would diminish their other efforts towards increased facility-based childbirth care.

There is recent evidence and new analysis that can help re-shape thinking for high-mortality settings in the Pacific and south-east Asia, much of it from studies in South Asia. Nepal is of special interest because: it is ethnically diverse, resource-poor and geographically challenging; it measured high maternal mortality ratios that declined from 539/100,000 live-births in 1996 to 281 in 2006; and has high rates of home birth which although improved are still close to 80%\textsuperscript{14}. Nepal has demonstrated the value of community-based care in reducing childhood mortality over many years\textsuperscript{15,16}, and more recently has successfully trialled a number of community-based approaches effective in reducing maternal and newborn deaths\textsuperscript{12,17,18,19}.

To prepare this paper we reviewed published and grey literature, focusing on good quality trials, systematic reviews, studies modelling potential impact, and commentary by global health leaders. This highlights the significant body of new work published on this issue since 2008. We interviewed public health researchers and program managers working in Nepal, India and Bangladesh and contacted global experts. To apply our findings, separate analyses were carried out for Papua New Guinea, Solomon Islands, Lao PDR and one province of Indonesia (with high mortality and home birth) by experienced public health practitioners familiar with those settings (annexed).

Community-based care before pregnancy and during the antenatal period

There are a number of community-based interventions with high impact in mortality reduction for which there is now clear consensus. Among interventions prior to pregnancy the priorities are: education of young women, access to family planning, and prevention and treatment of sexually transmitted infections\textsuperscript{4}. Analysis in Nepal\textsuperscript{14}, Bangladesh\textsuperscript{20} and elsewhere\textsuperscript{1} clearly identify these two factors as powerful drivers of improved maternal and newborn survival, even when skilled attendance at childbirth remains low, particularly when applied to settings with high maternal mortality and low contraceptive prevalence. There are many examples of community-based staff distributing contraceptives, even injectable forms, with successes in remote locations\textsuperscript{2,4,21,22}, including localised examples of good practice in Solomon Islands and Lao PDR demonstrated in our case studies.

Community antenatal visits can improve maternal and newborn outcomes\textsuperscript{21,23} when focused on specific interventions. Some of the most important can be delivered in homes or communities: multi-micronutrient supplements\textsuperscript{24} and intermittent malaria treatment, which improve birth-weight; as well as testing and treatment for sexually transmitted infections (including HIV)\textsuperscript{4,21} both demonstrated feasible in locations in our case studies in NTT and PNG. Calcium supplements, which can reduce hypertension in undernourished mothers, are currently under-used, but easily distributed at community level and may halve the risk of pre-eclampsia, with significant reduction in deaths from this cause\textsuperscript{25,26}. There is good evidence that well-supported birth-preparedness counselling can change care practices, including promotion of facility-based childbirth\textsuperscript{19,27,28,29}. There is less evidence that maternal waiting homes improve outcomes\textsuperscript{30}, a finding confirmed by our Lao case study and in East Timor\textsuperscript{31}.
Participatory education and action groups for women before and during pregnancy, when targeted and well facilitated, have reduced newborn deaths and, in some cases maternal deaths, in Nepal\textsuperscript{17} Pakistan\textsuperscript{27} and elsewhere. They promote both better care in the home, and increases in childbirth in health facilities. These are cost effective\textsuperscript{32}, can operate in the community and link to other service improvements. Additional effectiveness trials of the approach are underway in India and Bangladesh, however they show significant promise for introduction elsewhere, and are echoed in Indonesia’s “Village Alert” (Desa Siaga) program.

The careful analysis of safe motherhood options by Campbell and Graham in 2006\textsuperscript{1} identified the top priorities complementing skilled care at childbirth as first, family planning, and second, reduction in unsafe abortion. In Bangladesh localised declines in maternal deaths were attributed, in part, to safer abortion and post-abortion care\textsuperscript{20,33}. This has been echoed by recent modelling\textsuperscript{8}, demonstrating significant potential maternal mortality reductions with access to safer abortion (to the levels permitted by law) and post-abortion care. These analyses also show the potential for medical approaches to safe abortion at community level, by appropriately trained staff.

Community-based care at childbirth and in the immediate postnatal period

There is general agreement that community-based care before childbirth, and community postnatal care of the newborn (discussed below) can reduce deaths. But for childbirth and the immediate post-partum period, current global advice promotes the ideal of all women receiving skilled care – with the birth preferably occurring in a health facility with access to emergency care of complications\textsuperscript{1,4}. This was backed up with strong definitions of skilled birth attendants (SBAs)\textsuperscript{4,3}, as health professionals with sufficient midwifery or obstetric training. The seminal Lancet review\textsuperscript{1} did acknowledge that implementation may be slow and that “a legitimate question is what to do in the meantime” but argued that attempts to promote alternative interventions for home births would dilute efforts to strengthen health systems with conflicting priorities.

However, recently there has been increasing argument for practical support during childbirth at home, even if skilled care, in the full definition, cannot be provided. This is usually promoted as an interim measure suited for high mortality settings\textsuperscript{6,7,35,36,37}, and has been spurred by recent evidence regarding the potential to reduce deaths from post-partum haemorrhage or infection. These interventions are not currently deployed in the four sites we analysed, although community misoprostol distribution and postnatal care have been trialled in other parts of Indonesia.

Post-partum haemorrhage

Post-partum haemorrhage (PPH) causes around 30\% of maternal deaths\textsuperscript{38} and relevant measurements from Nepal in 1998\textsuperscript{39} suggest that it may be a greater proportion, perhaps over 45\%, in difficult settings such as those we studied. This has made PPH a focus of global effort\textsuperscript{40} and there is consensus that active management of third stage of labour (AMTSL) can prevent most of these deaths\textsuperscript{3}. Properly skilled SBAs should practice AMTSL, but many do not\textsuperscript{34} – making this a focus of training. One key element of AMTSL is provision of a uterotonic drug immediately after the baby has delivered. The usual choice is oxytocin\textsuperscript{4}, which is given by injection and has special storage requirements.

Misoprostol is an alternative to oxytocin. It is heat-stable and can be administered orally or by other means. A number of studies demonstrated misoprostol’s potential to treat or prevent PPH and a 2007 Cochrane review collated these and compared it with oxytocin\textsuperscript{41}: both are effective in reducing PPH, but oxytocin is superior. Misoprostol safety has been examined in a

\footnote{\textsuperscript{3} those due to uterine atony – failure of the uterus to contract}
2009 meta-analysis, which examined 46 trials of over 40,000 women, finding severe morbidity was rare and similar to placebo. Eight of the included trials recorded 11 deaths, which were slightly more frequent in the misoprostol than placebo group, but not at a level that was statistically significant. This and other studies examining side effects showed that shivering was more common with misoprostol, but that this was acceptable. The more relevant comparison is whether misoprostol is better than no AMSTL at all. In a randomised controlled trial in India, 1,620 women received misoprostol or placebo, and delivered either at home or in a village sub-centre. There was close to a 50% reduction in any PPH and an 80% reduction in severe life-threatening PPH, as measured by auxiliary nurse midwives. Misoprostol is also used as part of medical abortion and there are concerns that misoprostol, taken early in pregnancy, can lead to premature labour and other complications. Such concerns around misdosage were specifically studied in the operational field trials described below.

After viewing trials of community provision of misoprostol in Indonesia, the Government of Nepal, with USAID support, tested the feasibility of community-based distribution of misoprostol in a setting with many home births. Female community health volunteers (FCHVs), working under the government health service, visited over 18,000 women in the eighth month of pregnancy and provided counselling (including promotion of facility-based childbirth) and misoprostol – with instructions to take it after the baby was delivered. In 2010 they reported good quality baseline and follow-up surveys that showed an expansion in uterotonic coverage from 11.6% to 74.2%, the expansion being due to use of misoprostol during home births, with special benefit to women who were poor, illiterate or in remote locations. It is important to note that facility-based childbirth rates showed a statistically significant increase (from 10.9 to 14.8%) during this intervention, and facility-based deliveries showed an improvement in AMSTL performance. The observed maternal mortality ratio was 72 per 100,000 live births (compared with the Nepal average of 281 and the district average of 173 – this used robust information systems assumed to be complete, but could not be tested statistically. There was only one recorded mis-dosage (with a good outcome) among 13,969 women and side-effects were acceptable. There are now recommendations for staged scale-up in other sites in the country.

Other community-based initiatives show promise for reduction of deaths from PPH, including the provision of oxytocin using Uniject (a simple pre-filled infection device) tested in Indonesia and Mali and expanding training in other aspects of AMTSL, including community-based staff for example among community midwives in Mali.

Prevention and treatment of infection

Global data suggests that sepsis causes about 10% of all maternal deaths and 26% of neonatal deaths but this contribution is likely to be significantly higher in high mortality settings where home births are common. This recent review concluded that there were a mix of factors contributing – including poor conditions in the home, and infection as an addition to other complications (such as retained placenta). However many risk factors for mothers related to facility-based childbirth where instrumental or surgical delivery raised the risk of infection.

Community-based care likely to reduce infection includes clean delivery kits which may be provided to mothers, or whoever attends a home-birth, along with advice on hygiene at childbirth. The effectiveness of these is debated, however there is some evidence from studies in Egypt and Tanzania that they reduce perinatal infection for both mother and baby, although the effect is greatest in reduction of umbilical cord infection in the baby.

Most programs that trained traditional birth attendants (TBAs) emphasised clean delivery (often with provision of clean delivery kits) in addition to recognition of complications. A large (and unique) cluster randomised controlled trial of the training and integration of TBAs in Sindh,...

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*Given global trends, most such programs were in the 1990s*
Pakistan\textsuperscript{51}, found that women and newborns whose birth was attended by trained TBAs were significantly less likely to have post-partum infection, with a significant reduction in perinatal mortality that was attributed to reduced infections. There was a trend to lower maternal mortality, but it was not statistically significant.

The use of antiseptics, like chlorhexidine, for washing mother or baby is also under investigation – however, while simple, they have not yet convincingly demonstrated high impact\textsuperscript{52,53}. One promising approach is the prevention or treatment of maternal sepsis with antibiotics delivered at community-level. However no properly structured programmatic trials have yet been reported\textsuperscript{13,26} and this is less well-defined as a community intervention package. However advances in treatment of genitourinary infection, including the use of new antibiotics such as azithromycin, and the likelihood that infection plays a major role in high-mortality settings, suggests that this should be tested in future community-based approaches. Recent modelling shows strong potential benefit\textsuperscript{21,26,36}. Detection and rapid treatment of newborn infection in the early postnatal period is a mainstay of community-based newborn care (discussed below). This is relevant to maternal sepsis because it demonstrates the capacity of community-based staff to provide injectable antibiotics (for example using the Uniject device)\textsuperscript{18}.

Other intrapartum care for mother or baby

Perhaps the most difficult area for community-based care to address is that of providing good management of childbirth to recognise and respond to obstructed labour, eclampsia and the other complications noted above. The contribution of obstructed labour to maternal deaths varies from 4% to 13%, depending on region, but the contribution is probably lowest where mortality is high\textsuperscript{54}. Intrapartum complications are also a major contributor to stillbirths and intrapartum-related newborn deaths\textsuperscript{55}.

For both mother and baby, this highlights the benefits of skilled attendance during childbirth (EmOC). This requires a skilled attendant capable of assessing the progress of labour, possibly using the partogram, and recognising and treating complications such as high blood pressure or convulsions, with referral if needed\textsuperscript{4,34}. The work required for the strengthening health system for improved skilled attendance at childbirth in health centres and hospitals is beyond the scope of this paper, however some points are relevant to discussion of community-based care.

Skilled care at birth may be feasible, at a basic level, in the home or community birthing centres. At present the two best-studied examples are in Bangladesh\textsuperscript{20,56}, and Indonesia\textsuperscript{57,58} where community-based SBAs do seem to have increased access to EmOC or contributed to reduced stillbirths and intrapartum-related newborn deaths. There is also a large body of experience in community midwifery\textsuperscript{59} for which it is hard to show clear impact using current standards of evidence. Descriptions of the SBA role include their potential to take EmOC into community birthing centres, or even the home\textsuperscript{4,21}, and this approach forms part of current practice in our cases studies in NTT and Solomon Islands, and of future strategy for PNG\textsuperscript{60}. There is a well documented case study of home-based EmOC as part of outreach to difficult settings in Burma\textsuperscript{61}, but there are few well-researched broad-based program models.

While there is no convincing evidence that training TBAs reduces maternal deaths, there is evidence that this can reduce stillbirths, intrapartum-related newborn deaths and some maternal complications\textsuperscript{27,51,62}. Apart from improved hygiene noted above, the main component seems to be through better recognition of complications. Thus, one determinant of successful programs\textsuperscript{27,51} is the strength of linkages made with health system – a feature also seen in limited deployment of TBAs in our case studies in PNG and Laos.

Neonatal resuscitation is one specific childbirth intervention that can be delivered at community level, regardless of where the delivery took place, as long as a trained health worker is in attendance. A landmark study by the doctors Bang in 1999 included training of community
volunteers in room-air resuscitation of newborns who fail to commence breathing\textsuperscript{63}. This has since been proven as a feasible intervention in a variety of settings and cadres, because simple resuscitation in room air is usually sufficient to establish breathing\textsuperscript{64} and it is able to be integrated into community newborn care packages\textsuperscript{66} with significant effect. One example is found in the Saving Newborn Lives program in Indonesia, discussed in our case studies. From global evidence, facility-based resuscitation is estimated to reduce intrapartum related newborn deaths by 30%, and community-based resuscitation care by 20\%\textsuperscript{64}.

**Community-based care in the post-natal period**

High quality evidence for improved survival with community-based postnatal care of the newborn has been evolving over more than a decade. The influential study\textsuperscript{63} referred to above also included community-based recognition and treatment of infection with referral if possible. This included administration of oral and injected antibiotics. Recent trials in Nepal, as part of the USAID-funded National Family Health Program, include FCHVs providing similar care, but using Uniject for the injected antibiotic, with promising results\textsuperscript{18,5}.

More studies, from India\textsuperscript{66}, Bangladesh\textsuperscript{67} and Pakistan\textsuperscript{27} have demonstrated the power of simple educational interventions, delivered by a variety of cadres, that have proven effective in addressing the main direct causes of postnatal deaths\textsuperscript{6} by promoting changed behaviours in the home. These include better temperature control (including kangaroo mother care for low birth-weight babies, and delayed bathing where this is a problem), hygiene, early exclusive breast-feeding and recognition of infection with appropriate care-seeking. Both community meetings\textsuperscript{17,27} and home visits\textsuperscript{67} have proven effective delivery mechanisms. The use of community-based staff to help make the link with health services has been a common theme\textsuperscript{27,29} in successful programs.

Examples from a number of countries\textsuperscript{27,66,68} and systematic reviews\textsuperscript{69} have informed a new guideline from WHO/UNICEF on home visits for post-natal care\textsuperscript{70}. One aspect of early post-natal care that is included in this approach, but rarely discussed, is birth-dose vaccination with hepatitis B vaccine: for which regional strategies target delivery in the first 24 hours of birth\textsuperscript{71}. Although this does not contribute to newborn survival, this could be an additional motivation for staff to reach newborns in the early postnatal period and there is one example of community-based delivery of birth-dose vaccination in our PNG case studies.

One concern with community-based postnatal care is whether it will add an unacceptable load to community staff – noting that much of the evidence above comes from programs that trained staff especially to undertake this intervention\textsuperscript{68}. One example from Nepal\textsuperscript{19} describes the scale-up of a program with an existing cadre of community volunteers (FCHVs) that form part of the government system and, in successful areas, work under and with paid government health staff. This broad-based program for community-based maternal and newborn care provides a model not just for newborn care, but also for integration with interventions for maternal care.

The second part of this Working Paper presents models for delivery of community-based care, including the types of health worker who may be effective in this, applied to the various settings we studied in PNG, Solomon Islands, Lao PDR and NTT, Indonesia.

\textsuperscript{5} and personal communication from NFHP
\textsuperscript{6} Apart from intra-partum related neonatal mortality dealt with in the preceding section
Next Steps

Part Two of this Working Paper, also due March 2010, will discuss:

- Possible cadres and models for delivery of the interventions discussed above,
- Adapted to the four sites we studied,
- Roles of development partners, and
- Implications for the work of the Compass: WCH Knowledge Hub in 2010 and 2011.
References


